Attaining more formal recognition of ICT professionals in Malta

A study conducted on behalf of the eSkills Malta Foundation

eSkills Malta Foundation

CONTENTS

PREFACE

Today´s world development is significantly fuelled by the ICT sector, and inevitably the influence of technology in our daily lives continues to grow. ICT has made our lives more comfortable, transformed the economy, decreased imperfections, rendered industry and society more efficient, and has heavily impacted our education systems. It is only after a system failure or blackout, an identity theft or cybersecurity attack, or an intentional or unintentional error in a system that we realise that we cannot go forward without ICT.

ICT practitioners and professionals are crucial in creating and supporting these innovative technologies and systems. But so long as human beings remain flawed with imperfections, lack the training, knowledge, or even misuse of power, corruption, technology remains a big risk. Additionally, since emerging technologies have become more intuitive and take control of many daily tasks, then it is obvious that the risks increase.

Although the ICT sector and the behaviour of its practitioners substantially influence our lives, their products and services can save or endanger our lives. ICT as a regulated profession still does not exist. In the field of accountancy, medicine, law, construction or engineering, Professional Bodies and legal acts exist to regulate and safeguard the obligation and rights of their practitioners. However, in ICT, this function is currently provided by Computer societies, academic qualifications, and certifications to confirm competence and ethics. Public Law regulates only the most essential breaches of morality, namely the crimes and misdemeanours. The rest of the non-professional behaviour, misuse of trust or violation of rights of clients is resolved by a private law mechanism. Over the years, it has become very difficult to believe that the ICT profession will escape some kind of accountability. Some countries have, in fact, introduced this in one form or another.

Past studies carried out by eSkills Malta Foundation consistently indicated the need and desire for national recognition by the practitioners and professionals in the ICT sector. It is well understood that with national recognition comes national obligations. It is also clear that such recognition provides compelling benefits for all. The main ones include:

- Responsibility and Accountability
- Serving society and the corporate world with minimum safety standards
- Improvement of quality of services and protection of consumers

eSkills Malta Foundation has been at the forefront in promoting the ICT Professionalism needs of the sector. In its European Presidency of 2018, the Foundation launched the European Framework on IT Professionalism. In 2021, we commissioned a thorough study on the subject, and the goal is to propose a way forward depending on the outcome.

We trust that the study gives a good degree of knowledge about the European and local scene on the national recognition of ICT professionals. The study strongly indicates the views of various local stakeholders and has provided several options as a way forward. We believe that ICT professionals deserve national recognition, which is bound to become crucial in the future development of our sector.

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1. INTRODUCTION

Information and Communications Technology (ICT) has become the main driver behind economic growth. It is fuelling the economy, businesses and individuals with unlimited potential for growth and development. There is not one sector of society that is not affected by the tremendous potential of ICT. Government, businesses and the community, in general, have become increasingly reliant on robust and secure ICT infrastructure and services. To ensure that we can fully unleash the ICT power for our society, we need a highly qualified and competent ICT professional workforce. It is essential that the ICT workforce is recognised and valued and that it is ensured that this same workforce will keep on growing to cope with ever-increasing demand and will keep on improving its skills, competence and ability to deliver required solutions.

It has to be acknowledged, however, that the practice of ICT as a profession is still very young. In fact, one of the issues we face is that many still do not recognise the ICT practitioner as a professional in the same way that an engineer, accountant or medical doctor is recognised. To a good part, this is due to the fact that the practice of ICT is still relatively new. Still, other important factors come into play, such as the fact that the practice of ICT is so broad and encompasses so many different areas, both vertical and horizontal.

If information and communications technology is to fulfil its potential in improving the lives of all, then the importance of the professionalism of its practitioners cannot be overemphasised. The broad objective of this study is to try and understand better what better, more formal recognition of the ICT profession entails and what benefits it would bring to the practitioner and the community.

2. KEY FINDINGS AND MAIN RECOMMENDATIONS

- The issue of ICT professionalisation is one that receives a lot of attention worldwide as it is felt that ICT has become the key factor in helping ensure sustainable economic and social growth
- There is no universally accepted approach on how to address the issue of better recognition for ICT professionals
- Two basic types of recognition are common; one is voluntary certification, and the other is some form of mandatory licencing to practise the profession
- In looking at the approaches taken by different countries, it is evident that there is a whole spectrum that starts from no specific legislation recognising the ICT profession to legal systems where the practice of any ICT activity requires a licence from the state
- Some countries have opted for state-endorsed certification of ICT professionals, which essentially amounts to formal attestation of competence and title protection, while others have opted for licensing, which also entails restrictions on the performance of certain reserved activities to be solely by licensed individuals
- In Malta, there exists legislation regulating a number of different professions; however, no specific legislation directly addresses the regulation of ICT professionals
- The Inginiera Act states that “engineering services” subject to regulation also include services on information systems, but there appears to be no precise agreement on what this exactly defines and which ICT practitioners are eligible for a warrant
- In a survey conducted among ICT practitioners in Malta, the overwhelming majority felt that more formal recognition was needed, with most holding that a licence to practise was desirable
- Several benefits were identified that would emerge from better professional recognition
- A majority of organisations responding to a separate survey were also of the view that better recognition of the ICT profession was desirable
- It was observed that national associations representing ICT practitioners exist in practically every country surveyed and play an important role in the professionalisation of ICT
- There is currently no generic national association representing ICT practitioners in Malta. The Practitioners’ survey elicited the fact that most respondents believe that such an association should be formed.
- Active consideration needs to be given by Government to introducing legislation that grants more formal recognition to the ICT profession. An alternative could be to use the existing Inginiera Act, but there are certain disadvantages to using this path which would need to be understood and addressed. The predominant view is that distinct legislation regulating the ICT profession is a cleaner and overall better option.

- Such legislation should lead to a licence to practise for ICT professionals, at least for certain reserved activities, particularly where health and safety and public welfare could be at risk. Multiple levels of licensing might be considered, as is the case in a number of countries.

- There can be a gradual introduction of legislation with the stages being initially being equivalent to de facto certification with the eventual introduction of reserved activities that would require a licence to perform or certify

- Efforts need to be made to set up an Association of ICT professionals. One option is to have this as a legally constituted body, as happens in a certain countries; another option would be to have an entity such as the eSkills Foundation take on the task of seeding such an association. There are various national models which can be followed in setting up such a national Association.

- The use of established Frameworks such as the European e-Competence Framework can be leverage as a good foundation for recognition guidelines and policies.

- It is proposed that a task force is set up to put together draft legislation as an ICT Professions Act to be eventually submitted for consultation with the sector and the broader community

The broad objectives of this study were set out in the RFQ as being the following -

The Researching, reviewing, collecting and performing an analysis using a representative sample of the ICT organisations in the ICT Sector, ICT government, ICT departments/units in the sectorial industry and individual ICT professionals and ICT tertiary education lecturers to come up with:

1. National Recognition of ICT Professionals in other major countries.
2. Identify the best options for Malta to achieve national ICT professionals national recognition.
3. Identify the tasks needed to achieve the best options in (2).
4. Analysis and percentages of the preferred options by a representative sample of ICT organisations in the ICT Sector, ICT government, ICT departments/units in the sectoral industry and individual ICT professionals to achieve ICT professionals and ICT profession recognition and ICT tertiary education lecturers.
5. Using collected feedback from a representative sample of actors mentioned above, carry out analysis to identify the percentages of the preferred option/s to use for national ICT profession recognition.

It is to be noted that the objectives set out the “what is to be achieved” along with some specifying of the “how”. The methodology followed reflects the above with some changes and enhancements which are described below.

4. METHODOLOGY

The steps followed and related methodology are below described in boroad outline:

1. Establish the traits that define a profession
2. Consider the extent to which the practice of ICT exhibits those traits
3. Understand the different ways in which better professional recognition can be attained
4. Examine the pros and cons of each recognition approach and the potential attendant benefits and drawbacks
5. Analyse and understand how other countries are recognising ICT professionals
6. Produce options and recommendations on how to implement better recognition of ICT professionals in Malta

Although the steps above are set out in a linear sequence, it should be noted that the actual process involved a high degree of parallelism and iteration of the steps.

The sources of information were the following:

1. Extensive desk and online research
2. Elicitation of feedback and views through interviews with stakeholders and key influencers, both local and non-local
3. Surveys conducted among ICT practitioners and organisations providing and using ICT services

It should be noted that in this document, the terms “warrant” and “licence to practise”, or when the context makes the meaning clear, simply “licence”, are used interchangeably. As DeGiovanni remarks in his 2016 thesis “The Evolution Of The Legal Profession: Self-Regulation Or External Control”, *“The use of the word ‘warrant’ both in the English and the Maltese version (spelt in English but not italicised) is peculiar to Malta since, though clearly an English word, it is not used any longer to denote a professional license in the English speaking world, except perhaps in a naval or military context”*

In Maltese legislation, it also appears that the terms are used interchangeably. For most professions (e.g. accountants, engineers, teachers), the term “warrant” is used, but in the case of medical practitioners, the corresponding term is a “licence to practise”. The term “licence to practise” would be considered the preferred term due to its more universal usage and clearer meaning. There also exists in Maltese legislation the concept of awarding “practising certificates” (e.g. to auditors) which can best be described as an addendum to a base warrant or licence to practise.

Another point to note is that in this document, use is made of the terms “ICT practitioner” and “ICT professional”. The first term, “practitioner”, is used to include all individuals whose occupation is in ICT. The second term, “professional”, is used where the context requires that the individual or group of individuals being discussed are deemed to meet the criteria that would suffice to grant a professional licence to practise.

5. WHAT CONSTITUES A PROFESSION?

Before discussing whether ICT practice can be regarded as a profession, it is good to examine what is normally considered as constituting a profession and the related concepts of "professional" and "professionalism". In this section, we examine some views of what constitutes a profession and elicit the common elements in these views.

There exist numerous definitions and uses of the term '*professional*'. The typical dictionary (in this instance, the Collins English Dictionary) contains the following definitions for the word "*professional*":

- of, or relating to, suitable for, or engaged in a profession
- engaging in an activity for gain or as means of livelihood
- extremely competent in a job, a person who engages in an activity with great competence
- undertaken or performed for gain or by people who are paid
- a person who belongs to or engages in one of the professions.

From the above, it can be seen that there are some important differences in how the word "*professional*" can be used. There is a significant difference between a person being considered to be "professional" in their approach to conducting business, whatever that business may be, and a person being part of a profession and therefore considered to be a professional. This difference appears to have created enormous misunderstanding and confusion within the ICT sector and possibly hampered its progress towards being recognised as a profession. Being part of a profession requires knowledge, skills and competency in some department of learning or science, for example, medicine, law, engineering, architecture, accountancy and, more recently, ICT.

If we are to focus on the meaning of "profession" and "professional" that are of interest to this study, more definitive views of "professional" should include reference to "profession", "professional development", and also "professional bodies". One such view could include the following considerations for members of a profession:

- Professionals are considered experts in their chosen vocation or field.
- Professionals possess a broad range of (systematic) knowledge with a clearly identifiable theoretical base.
- Professionals are responsible to the public and the community.
- Professionals possess a high degree of autonomy regarding their decision-making and behaviour.
- Professionals are governed by a code of ethics, which:
  - is a statement of rules and values
  - is intended to ensure a high quality of service
  - is intended to guarantee the competency of membership, honour and integrity
  - is an expression of a profession's principles and what it expects of its members emphasises no personal gain at a cost to others (co-professionals, clients, community etc.).
  - The professional's system of rewards is primarily recognition for building up appropriate knowledge and experience, and furthering the respect of the profession.
  - There is a system for testing the competence of members.

The Institute of Electrical and Electronic Engineers (IEEE) consider certain parts of ICT practice (particularly Software Engineering) to be part of the engineering profession. The IEEE Software Engineering Body of Knowledge (IEEE SWEBOK) provides a characterisation of an engineering profession as supporting the following components:

- an initial professional education in a curriculum validated by society through accreditation
- registration of fitness to practice via voluntary certification or mandatory licensing
- specialised skill development and continuing professional education
- communal support via a professional society
- a commitment to norms of conduct often prescribed in a code of ethics.

The table below, put together by Prof Clive Boughton, who has written extensively on the subject of ICT professionalism, is yet another attempt to define in a structured manner, the criteria that qualify an occupation as being a profession.

Criteria for Professionalism (Source Clive Boughton)

Training	There is an extensive period of training, often after a combination of formal education, training and apprenticeship; this training is usually undertaken in a higher education environment.
Intellectualism	The intellectual component is dominant.
Autonomy	Professionals usually have autonomy in their work.
Judgement	Professionals, because of their training, education, knowledge and experience, may use their own judgement in determining the appropriate approach to their clients or customers.
Independence	Professionals can work independently and charge fees, or they can be part of an organisation.
Service	Professionals possess abilities to provide a valuable service to society and operate with little or no self-interest.
Dedication	Professionals are dedicated to service and institutions.
Pride	Professionals take pride in the quality of their work.
Honest & trustworthy	Professionals can be trusted to behave honestly.

Figure 1

Many would agree with most of the above, although there might be some scepticism on the assertions that most professionals "operate with little or no self-interest" and that all of them can be "trusted to behave honestly". However, the above can certainly be held up as an ideal standard that anyone who claims to be a professional can be judged by, even if it is not completely attained.

From the foregoing, it can be deduced that there is broad agreement that professionalism requires a mix of a number of necessary traits or characteristics. These can possibly be summarised as the following-

- Knowledge in a specific field
- Skills to complement the knowledge
- Competency in the field
- Ethical behaviour
- Learning ability
- Care
- Pride in the Profession

It has been argued that an individual cannot be considered a professional in the absence of even one of these characteristics. It is with these characteristics in mind that we should examine the extent to which the practice of ICT can be considered a professional practice.

6. CAN ICT PRACTICE BE REGARDED AS A PROFESSION

From the foregoing it can safely be stated that there are many ICT practitioners who clearly meet the criteria required of a professional as described above. A well-qualified and competent ICT practitioner requires as much academic training as in practically any other profession; the skills and competencies deployed are on a level that certainly matches those of other professionals such as an accountant or engineer; there is very often a degree of autonomy and significant judgement that needs to be taken in the practice of many ICT activities.

One potential concern is that the scope of practice in ICT is extremely wide and there are certainly a number of ICT practitioners who would not necessarily qualify as professionals within the understanding of the term as discussed above. It might, for example, be the case that the training obtained did not carry formal accreditation or perhaps the scope of work of the individual is too narrow or the experience gained is not at a suffiently high level. However, this is arguably the case in many other occupations including engineering, accountancy and medicine. In these other areas of practice, it is also recognised that there are practitioners who do not meet the necessary professional criteria but can be considered as associates or technicians (or some other analogous term). These multiple layers of recognition are already the case in certain countries that formally recognise the ICT profession, such as in the United Kingdom and Italy.

From the foregoing, it can be hence be understood that an ICT professional, can be seen as an individual who has full accountability for their own technical work and responsibilities; whose decisions can often have an impact on the success of projects; who develops business relationships with customers; who must apply fundamental principles in a wide and often unpredictable range of contexts; and who can analyse, diagnose, design, plan, execute and evaluate work to time, cost and quality targets.

ICT professionals should be able to communicate effectively, demonstrate leadership, and keep their skills up to date. They are creative, innovative, and aware of their impact on social, business and ecological environments. Their knowledge and actions are able to influence direction within the organisation, their peers and the industry.

Undoubtedly not all ICT practitioners meet the criteria outlined above. The task of any legislation will be to have as clear as possible yardsticks to ensure that the professional designation is only available to those meeting similar conditions as apply to other professions. Some thought can and should however be given to having licensing also at a subordinate level such as associate or technician level.

7. HOW DOES A PROFESSION BECOME FORMALLY RECOGNISED

7.1 What forms can formal recognition take?

Broadly speaking, there are typically two forms of **formal state recognition** that can apply to a profession. One of them is **voluntary certification** regulated by legislation, whereas the other is **mandatory licensing.** With certification, an individual who wishes to have his professional competence recognised will submit himself to whatever process is required to achieve the certification. If we were to take the term **"Certification"** in its broadest sense, however, we need to recognise that various forms of accepted certification already exist in the ICT sector.

The most common would be -

1. Academic certification, the highest levels being degrees or similar qualifications granted by universities or colleges

2. Institutional certification and accreditation, e.g. BCS, ACM, IFIP, IET, IEEE, ITIL, ISACA

3. Vendor-specific certification, e.g. Microsoft, Cisco, Amazon, Oracle etc State-sponsored legally endorsed certification

All the above certifications are based, at least in part, on intensive learning, training activities, and experience, which are often formal in nature but can also be non-formal or informal.

It should be emphasised that state-sponsored legally endorsed **certification** goes a number of steps beyond the other types of certification listed above. It goes beyond the certification granted by an academic further or higher education institution as, apart from high-level qualifications in the area of the target profession, it typically requires evidence of experience and skilful practice of the knowledge and skills that are essential components of the profession. It also goes beyond the private certification offered by many companies, which simply attests to competence in a company's products or services. These commercial certifications lack legislative input that both promotes and embeds public policy, ethics and other non-commercial standards that benefit the greater public welfare. Good examples of this sort of formal state-sponsored certification are the CEng and CITP awards available in the United Kingdom (discussed further below).

Mandatory licensing is different from voluntary certification in that it requires that the exercise of a profession can only be performed by what is in effect a ***state-certified*** individual. Hence, in order to practise a particular profession, the individual must go through a process that is similar to the certification process and upon successful conclusion of this will be granted a warrant or licence to practise the profession (which can also be constrained to certain reserved activities within the occupation). It will be recognised that licensing applies not only to professional practice but can also apply to various occupations such as electricians, builders and crane operators. The regulatory principle generally applied is that if the practice of an occupation or profession can expose third parties to health and safety risks or even significant financial or other material loss, then a licence to practise should be required. This is essentially what it implies to have a profession or occupation regulated.

It is an evident fact that the practice of ICT can give rise to many situations where health, life, well-being and safety can be put at serious risk. There have been many instances where the faulty design or implementation of IT systems has led to injury, loss of life, major financial losses or other forms of harm to individuals or organisations. This then begs the question as to why the practice of ICT tends, in many contries, to be left unregulated.

7.2 Should the practice of ICT be regulated?

There are strong proponents on both sides of the ICT practice regulation debate. In this section, both sides of the argument are examined and evaluated. Let us start with the arguments of those who are against regulation, in particular, mandatory licensing. Arguments that have been presented against the licensure of ICT practitioners typically tend to fall under the following headings -

1. ICT is still a relatively young industry, and the state of knowledge and practice is still too immature to allow for effective regulation and professional licensing
2. Licensing can give false assurances of competence or software quality and reliability
3. A licensing regime will probably preclude many competent ICT practitioners from being recognised and allowed to practise
4. ICT covers such a vast array of knowledge that it is impossible for one individual to be competent in all areas of ICT
5. Regulation can stifle innovation in ICT

Those in favour of licensure would, first of all, argue that the above arguments do not hold water. The points above are addressed individually below:

1. *ICT is still a relatively young industry, and the state of knowledge and practice is still too immature to allow for effective regulation and professional licensing*

This matter can certainly be seen as open to debate. ICT is certainly young, but the amount of research and knowledge that has been gained in the last decades surpasses many other areas of knowledge. It can also be argued that with the rapid advance of technologies, the same argument can be made in other knowledge and practice domains. As an example, telecommunications has changed radically in the last thirty years, but no one appears to have argued that engineers engaged in the telecoms sector should not be given a licence due to this rapid change. It is also worth considereing that although many licensed professions are older than the ICT profession, the current state of these professions compared to what they looked like, say 50 years ago, almost makes them into new professions. Perhaps one of the ironies is that a lot of this change has been brought about through the pervasive influence of ICT is practically every area of professional activity.

2. *Licensing can give false assurances of competence or software quality and reliability*

Again, this is an issue that affects every licensed profession or occupation. There is no guarantee of how competent a doctor or engineer is simply because he has a licence to practise. Knowledge, skills and competencies tend to be very specialised within any practice domain. A licence can only serve as a form of guarantee that there has been a process that ensures that a practitioner has met the minimum basic requirements of someone qualified enough to practise a profession. There are however more assuances of at least basic competence than in an area of occupational practice that is totally unregulated. It is commonplace that licenses to practice have to be renewed periodically. It is also a norm in professional practice regulation that there exists a mechanism for revoking a license or certification from an individual who has say, been guilty of malpractice or gross negligence

3. *A licensing regime will probably preclude many competent ICT practitioners from being recognised or allowed to practise*

This issue was first raised by the ACM when in the year 2000, they had come up with why they objected to the licensing of software engineers. It is a bit of an odd objection because the solution here would be to have mechanisms that can recognise skills and competencies irrespective of how they have been obtained. It can be argued that nowadays, with our better recognition of the role of informal and non-formal training

and education and the universal availability of online learning, this objection is much less valid than it was when first formulated by the ACM 20 years ago. In Malta, for instance, we have legislation that creates structures and process for the formal recognition of informal and non-formal learning. However, it is, perhaps, one of the most valid objections to licensure. Any licensing regime must not act as a barrier to people entering the ICT sector. There would appear, however, to be several solutions to this issue, including multiple paths to licensure (examined further below) and possibly different levels and layers of recognition.

The argument here can also be phrased as unjustified and harmful market closure, as a situation where access to the market and employment opportunities would be restricted to licensed practitioners. Such a situation would, however, not in practice arise if the licensing framework only restricted access to certain reserved activities.

4. ICT covers such a vast array of knowledge that it is impossible for one individual to be competent in all areas of ICT

This again is a rather curious objection as today, the same argument can be applied to just about any domain of professional practice. One way to approach this issue is to have various areas or fields of specialisation and grant a licence or some form of endorsement to a base licence only in specific areas where knowledge and competence can be demonstrated. This is very much the case in the medical sector. As an example, the list below shows the various specialisations that are listed in the **Health Care Professions Act** (Cap 464) that require what can be considered specific registration. Licensed medical practitioners require certificates of completion of specialist training before they can practise in any of the following areas of medicine.

1. Anaesthetics and Intensive Care Medicine
2. Audiology/Phoniatry
3. Baromedicine
4. Cardio-thoracic Surgery
5. Cardiology
6. Chemical Pathology
7. Clinical/Medical Genetics
8. Clinical Neurophysiology
9. Clinical Pharmacology and Therapeutics
10. Dermato-Venereology
11. Dermatology
12. Emergency Medicine
13. Endocrinology and Diabetes
14. Family Medicine
15. Forensic Medicine
16. Gastroenterology
17. General/Internal Medicine
18. General Surgery
19. Geneto-Urinary Medicine
20. Geriatrics
21. Haemotology
22. Histopathology, including Cytopathology
23. Immunology
24. Infectious Disease
25. Microbiology/Bacteriology
26. Neonatology
27. Nephrology
28. Neurology
29. Neurosurgery
30. Nuclear Medicine
31. Obstetrics and Gynaecology
32. Occupational Medicine
33. Oncology and radiotherapy
34. Ophthalmology
35. Oral and maxillo-facial surgery
36. Orthopaedic Surgery

37. Otorhinolaryngology - Head and Neck Surgery
38. Paediatric Surgery
39. Paediatrics

    i. Community Paediatrics

    ii. Paediatric Cardiology

    iii. Paediatric Endocrinology and Diabetes

    iv. Paediatric Gastroenterology, Hepatology and Nutrition

    v. Paediatric Infectious Disease

    vi. Paediatric Nephrology

    vii. Paediatric Neurology

    viii. Paediatric Oncology

    ix. Paediatric Respiratory Medicine

40. Palliative Medicine
41. Plastic Surgery
42. Psychiatry
43. Public Health Medicine
44. Radiology
45. Rehabilitation Medicine
46. Respiratory Medicine
47. Rheumatology
48. Sports and Exercise Medicine
49. Urology
50. Vascular Surgery
51. Virology

A similar concept can apply to the ICT sector. One objection that can be made to applying the same approach to the ICT sector is that categories of specialisations are more subject to change in ICT. As an example, the role of a Data Scientist did not exist a few years ago. However, the pace of change at this level is perhaps not as rapid as most people would think and having a relatively lightweight approach to how new fields of specialisation can be introduced should not be too difficult. This idea is examined further below.

An interesting point here is that there has been considerable work done at the European level on identifying "standard" roles that exist within the ICT profession. One such effort has been the work done by the European Committee of Standardisation (CEN) which provides a generic set of typical roles performed by IT Professionals in any organisation, covering the full range of ICT business processes and using the European e-Competence Framework (e-CF) as the basis for competence identification. The e-CF also identifies the possible grades of an e-Competence level that a person could have reached (Work Proficiency Levels 1 to 5). To quote from the official document, *"The levels are characterized by a combination of levels of influence within a community, context complexity, autonomy, and typical behaviour"" And "These work proficiency levels have a sector-specific, consistent and rational relationship to the European Qualification Framework (EQF) learning levels 3 – 8. "*

The roles currently identified, which could potentially be classified as different fields of ICT practice, are listed below:

- Account Manager Role
- Business Analyst Role
- Business Information Manager Role
- Chief Information Officer (CIO) Role
- Data Administrator Role
- Developer Role

- Digital Media Specialist Role
- Enterprise Architect Role
- Digital Consultant Role
- ICT Operations Manager Role
- Information Security Manager Role
- Information Security Specialist Role
- Digital Educator Role
- Network Specialist Role
- Project Manager Role
- Quality Assurance Manager Role
- Service Support Role
- Service Manager Role
- Systems Administrator Role
- Systems Analyst Role
- Systems Architect Role
- Technical Specialist Role
- Test Specialist Role
- Solution Designer Role
- Digital Transformation Leader Role
- Devops Expert Role
- Data Scientist Role
- Data Specialist Role
- SCRUM Master Role
- Product Owner Role

However, even a quick glance at the above will reveal certain shortcomings and ommissions, including the absence of key AI-related roles and possibly too narrow a scope for certain professional roles. It might also be the case that overlap of roles is much more likely to occur in the ICT sector making the precise designation of professional roles more problemetic.

5. Regulation can stifle innovation in ICT

One way to address this objection is to examine the extent to which regulation in other sectors has adversely affected innovation. It can certainly be argued that although telecommunications and pharmaceuticals are both very heavily regulated industries, this has not prevented tremendous innovation and advances in these sectors. There is also the argument that while innovation is crucial, it is wise and in the interest of the public good, that it is conducted in a way which ensures the safety and well being of the public which is where regulation steps in.

One final consideration

In addressing objections to more formal recognition of the ICT profession, it should also be remarked that as has been noted above, more formal recognition does not necessarily involve regulation in the form of licensing. Certification and voluntary registration, also options to be considered, should not be seen as regulation but more as a form of attestation to formally recognised competence in an area of professional activity. Many of the objections raised will simply not apply to a regime that simply involves voluntary certification of professionals.

Benefits

There are also a number of strong arguments which actively support the better recognition and possible formal regulation of ICT practice. It must be first of all acknowledged that nowadays, it is almost universally accepted that the best form of regulation is the lightest touch regulation possible to achieve a set of desired objectives, which would not otherwise be attained with no regulatory mechanism in place. Ultimately the main and ultimate objective for regulating a profession is the benefit to the community and the protection of individual clients of the regulated professional services. Any benefit derived by the individual professional is only ideally considered an incidental and subsidiary outcome.
Among the benefits of more formal recognition, the following have been identified:

- *Protection of clients' interests*

A formally certified or licensed individual is more likely to guarantee a better service to clients than the situation where any individual can provide a service, and there is no clear way for a client to be cognisant of the competence of their ICT service providers. There are hundreds of qualifications and certifications that individuals can obtain in ICT, some of them of dubious value and relevance, and it is unrealistic to expect clients or even employers to be versed in the quality and value of each qualification available in the ICT field.

- *Clearer expectations of required knowledge, competence and behaviour from ICT practitioners*

Certification (or licensing) will certainly give a clearer picture of the knowledge, competence and behaviour required from ICT practitioners as there will be a legal framework, the likes of which have already been shown to work well for other professions. Naturally, not each professional is equally competent or experienced in each area of ICT, but the fact that certification or licensing exists, will set a baseline and also provide an explicit mechanism to protect against malpractice and gross negligence or incompetence.

- *A means for better sharing of knowledge between ICT practitioners*

It is considered that any legislation related to better formal recognition of ICT professionals will be accompanied, in some mode or manner, by the setting up of a representative body of these professionals. It is normally the case that such a body would organise meetings and conferences for its members, leading to a better sharing of practices and knowledge among the ICT services community.

- *Provides extra motivation to carry out work in a more conscientious and moral fashion*

It is felt that once an individual is a member of a recognised body of professionals, also bound by a formal code of ethics, he will feel more compelled to be diligent and ethical in his work. There is also the consideration that this motivation will also arise from the fact that there will exist in any regulatory legislation, disciplinary procedures against a licensed professional who is guilty of professional misconduct, gross negligence or incompetence in his work.

- *Better protection of the public*

Apart from protecting individual clients' interests, the public will also be better protected from ICT systems that are not working well and can be detrimental to the public welfare.

- *Provides a means for employers and clients to identify more competent practitioners*

As has been noted above, having a framework that certifies or licences professionals will help employers and clients identify more competent practitioners. This should not be seen in isolation from other mechanisms such as formal competence frameworks such as the e-CF or the role of professional associations in helping to set standards. It can also be perceived that formal certification and licensing legislation will encourage the use and promulgation of such frameworks.

- Improved status for ICT practitioners

Although the first perception might be that improved professional status is mainly of benefit to the individual practitioner, it is arguably the case that the community would derive strong benefits out of improved status for ICT professionals. It is clear that ICT is crucial to the development of our country, and the more individuals that can be attracted to the sector as professional workers, the better it will be for the community at large. Improved status for those working in ICT will help promote the value of ICT and how work in this sector is recognised as being on par with engagement in other professions. The improved status will also increase the expectations of the ICT industry in general.

The above is, of course, not a closed debate. Many countries still do not regulate ICT in any significant way and there are many different approaches among those that do. There is, however, the fact that a significant majority of survey respondents (see results and analysis below) felt that some form of regulation of the sector is called for. It must be acknowledged that the balance of views and evidence is that there are tangible benefits to be attained if ICT practice in Malta were given more formal status as certified or licensed professionals.

8. THE STAGES OF PROFESSIONALISATION

An occupation typically develops into a profession by passing through a number of stages, and In the process acquiring certain characteristics which eventually deem the occupation in the public eye as meriting of professional status.

The main stages of the development of a profession have been identified by Buckley and Buckley (1974) as typically involving the below steps:

1. The emergence of a full-time occupation;
2. First training schools will be established;
3. Those seeking and attaining training combine to form the first professional association
4. Establishment of the first national association;
5. Legal recognition/protection sought and obtained
6. Launching of the subject at university level; and
7. Adoption of a code of ethics with rules to eliminate those unqualified and immoral, diminish internal competition, protect the clients and emphasise the service ideal.

Clearly, this path is not always followed in the precise sequence listed above. As a case in point, university courses in ICT have existed for many years in Malta (and elsewhere) and this without any legal recognition having yet come into effect. However, it is almost certainly the case that each and every stage identified is traversed in the path that leads from an occupation to becoming a fully-fledged legally recognised profession - even if not in an identical sequence to that listed above.

One key factor that needs to be examined is the extent to which these steps have taken place in Malta. It is certainly the case that ICT is, for thousands of individuals, a full-time occupation; training courses and university level degrees have existed for a number of years. However, there is currently no national association representing ICT practitioners and no universal code of ethics which governs the practice of ICT and certainly no legal recognition or regulation of the practice of ICT.

One can conclude that although the path towards professionalisation in the ICT sector has commenced, certain steps still need to be taken before the objective of legal recognition can be attained. It would appear indeed that the lack of an association representing practitioners in the sector and an arguably consequent lack of a code of ethics are two factors that have to be in place.

9. PRACTICES AND ATTITUDES TOWARDS ICT PROFESSIONALISATION IN OTHER COUNTRIES

One of the main tasks of this study was to carry out an extensive scan of how recognition of the ICT profession is tackled in other countries. This took into account jurisdictions in Europe, North America, Africa, Asia and Australia. Many different approaches were identified, ranging from a "do nothing" approach (from a State point of view) to comprehensive licensing of any activity connected with the performance of an ICT related task. Below are described the processes and structures existing in a selection ofl countries globally, which review should give a balanced overview of the different approaches taken. This selection is considered a good representative sample of recognition systems that are found world-wide but makes not attempt or claim to be comprehensive. The systems in certain countries are described in more detail where it is felt that this is of more relevance to the particular situation in Malta.

9.1 Portugal

In Portugal, ICT is regulated under laws regulating the engineering professions. The Ordem dos Engenheiros (OE, English: Order of Engineers) is the regulatory and licensing body for the engineering profession in Portugal.

The OE was established by law in 1936. It succeeded the Portuguese Association of Civil Engineers, founded nearly 70 years earlier. The OE is a member of many international engineering organisations, including general engineering ones (e.g. FEANI) and those for specific engineering disciplines (e.g. ECCE, EUREL, EFCE).

The OE's stated mission is to contribute to the progress of engineering by supporting the efforts of its members in scientific, professional and social areas, as well as to ensure compliance with professional regulations and ethics.

The OE is organised in Colleges with 12 Specialties, of which Informatics Engineering is one.

- Civil Engineering
- Electrical Engineering
- Mechanical Engineering
- Mining Engineering
- Chemical Engineering
- Naval Engineering
- Geographic Engineering
- Forest Engineering
- Metallurgical Engineering
- Agricultural Engineering
- **Informatics Engineering**

It is illegal to provide engineering services or sign off engineering projects in Portugal without being a member of the OE. However, many other professionals in engineering (such as technical engineers, short-cycle degree engineers, or engineers graduating from unaccredited courses) are allowed to work in the field as long as they do not provide engineering services or sign off on engineering projects and they cannot

officially use the title "engineer". Clearly, there are definitions of engineering services in the various fields which reserve certain activities to the licensed professional engineer.

The OE is also the entity responsible for the accreditation of engineering degrees and engineering courses in Portugal. Engineers graduating with an accredited degree are exempt from the licensing exams conducted by the Order.

Over three hundred engineering degrees are awarded in Portugal by public universities, public polytechnic schools, and private institutions. However, only about one hundred of these are accredited degrees.

Within the context of ICT, the role recognised is labelled as **Engenheiro informático** which translates to Informatics Engineer or Information Systems Engineer. The legislation describes licensed professionals as individuals who perform engineering tasks related to informatics and information systems. They must have the scientific and technological knowledge necessary to apply engineering principles to the planning, design and implementation of information systems, processes and services, as well as to the associated informatics resources. They also may supervise or participate in the management, execution, exploration, auditing, quality control or maintenance of the aforementioned systems. Their activities include (1) business analysis and requirements engineering; (2) design, construction, test and validation of informatics solutions; (3) planning and management of information technology infrastructures; (4) management of information systems projects and (5) planning and auditing of information systems.

The justification made for having professional licensure in ICT is that this is a profession with implications for public safety. It is evident from the foregoing that not all ICT activity in Portugal is regulated; however, the availability of the professional regulated status allows the state to decide that certain ICT activities require certification and sign-off from a licensed ICT professional.

9.2 Spain

In Spain, it is considered that ICT Regulation is not a matter to be left to practitioners, nor to the industry sector and computer service providers, but rather a general social issue that the state should tackle. It is argued that ICT products, activities and services, especially those that make use of the Internet, have an increasing incidence and influence in all areas of life: individual, family, work, business, administrative and social. It is felt that, in general, this growing incidence is insufficiently evaluated and regulated at the legal level, potentially generating a growing sense of insecurity, mistrust and discomfort among citizens and companies.

In fact, the Spanish Constitution, in its 1st Section "On fundamental rights and public liberties" stipulates in article 18, paragraph 4, a mandate on the imperative need to regulate information technology - *"The law will limit the use of information technology to guarantee the honour and personal and family privacy of citizens and the full exercise of their rights".*

Ensuing in part from this stated principle, Spanish computer engineering professionals have promoted in Europe the InformatiCALL initiative, a *"Call to governments and European society for the proper regulation of computer products, activities and services for the general interest, fundamental rights and security - physical, legal and general - of people and companies in the Information and Knowledge Society."*

Among the stated objectives of InformatiCALL are:

- the need and urgency of a regulatory improvement of computer engineering in general,
- To carry out, at the European level, a deep and rigorous evaluation of the impact of IT products, activities and services on the general interest and the fundamental rights to determine the cases in which it would be recommendable to establish some kind of regulation or administrative control due to reasons of general interest,

The above notwithstanding, Spain, presents quite a mixed picture of the regulation of the ICT profession. This is in part due to the fact that each of the 17 regions in Spain is quite autonomous in how they approach the issue of recognition of the ICT profession. In general, the trend is to treat ICT as a branch of engineering. Some procedures or activities in the engineering field require sign off by someone with the qualification of an engineer of the related speciality, which also includes Information Systems. There are, for example, laws that state how security should be established in a database that contains personal information. There has, however, been criticism of some of these laws in that they do not say anything about the qualifications of the individuals who certify them.

9.3 Italy

9.3.1 Categories of professions in Italy

In Italy, professions are divided into two categories:

- legally "regulated" professions

- "non-regulated" professions

9.3.2 Regulated professions in Italy

Regulated professions: are those whose practice is regulated by national legislation. The law establishes both the minimum qualification necessary and the further requisites of training in the practice of the profession (e.g. internship and/or State exam for a professional licence) and the adherence to a professional code of ethics.

The practice of such professions is protected by law and limited exclusively to persons qualified according to the specific legislation for the type of regulated profession.

Those who hold a foreign professional qualification need the recognition of the competent Italian authority to practise the corresponding profession in Italy legally.

In Italy, ICT is considered a regulated profession within the engineering field, with the ICT professional being considered as an Industrial Engineer or a Graduate Industrial Engineer with a university degree in Information Technology. This was established by official Italian primary level law (no. 1395/1923) and the thinking was that this should be done to meet the legitimate expectations of the community to have available specific information on the professionals registered as being able to professionally perform design, management, implementation, verification, testing and assessment of public and private Information Systems as well as to safeguard the general interest.

Following the reform of the academic courses, which implemented the Bologna Declaration, the Presidentialz Decree 328/2001 (Modifications and integrations regulating the requirements to the access to the State Exam and relevant test to pursue some professions, as well as the discipline of the relevant regulations) has partly modified the structure of the Register in which professionals are officially listed. The Register is now divided into two sections: A, for the engineers with a Masters Degree education (3+2) years and B, for the engineers with a Bachelor Degree education of 3 years. Both sections are then divided into three sectors: civil/environmental engineering, industrial engineering and computer/information science engineering.

Legislative Decree 206/2007 transposes the Directive 2005/36/EU on the recognition of professional qualifications obtained in other EU Member States.

Scope of the profession:

The law requires that a services provider has been qualified by the State to meet certain conditions relating to qualifications and experience. The qualification consists of a professional title protected by law. Moreover, the provision of certain services (referred to as regulated activities) is reserved only for Qualified Engineers

enrolled in a Register (Albo) kept by a Provincial Order of Qualified Engineers. No other person is legally allowed to pursue these activities.

To obtain a professional title, it is **mandatory to own the relevant University degree** and also to have **passed the relevant State exam.** As has been noted above, for Engineering, the Professional titles are different according to the level of the degree (3 years or (3+2) years), and the particular State exam passed. The relevant titles covered by the law are:

"Ingegnere civile-ambientale iunior"

(1st level degree – State exam for section B and Civil and Environmental Sector)

"Ingegnere industriale iunior"

(1st level degree – State exam for section B and Industrial Sector))

"Ingegnere dell'informazione iunior"

(1st level degree – State exam for Computer Science Sector)

"Ingegnere civile-ambientale"

(2nd level degree – State exam for section A and Civil and Environmental Sector))

"Ingegnere industriale"

(2nd level degree – State exam for section A and Industrial Sector)

"Ingegnere dell'informazione "
(2nd level degree – State exam for section A and Computer Science Sector))

What is of note, is that in Italy, the attainment of a licence to practice appears to always require the taking and passing of a State Exam in the respective subject area.

9.3.3 Non-regulated professions in Italy

Non-regulated professions: are those that may be practised without the need for holding a specific qualification. Anyone who wishes to practise a non-regulated profession in Italy does not need to obtain legal or formal recognition to join the Italian job market.

Examples of professions that are **NOT** regulated include advertising, various artistic and musical sectors (ex. interior designer, actor, dancer, composer, orchestral conductor, musician – instrumentalist, designer, fashion designer, artist, director, stage designer, sculptor, etc.), linguistic services (interpreters and translators), marketing, and many others.

It is interesting and quite unique that Italy has legislation that relates to non-regulated professions. The object of this legislation was to allow for more flexible regulation – particularly given the rate at which new 'professions' are emerging. In 2013 Italy enacted Law No 4 of 14 January 2013, containing provisions for professions that do not have professional bodies or associations. The scope of the law excludes health professions, craft and commercial activities and trades, and public establishments governed by State law.

Notwithstanding that this legislation is targeted at professions that are not formally recognised or organised, this legislation does attach importance to the role of professional associations, formed by professionals on a voluntary basis and without the constraints of exclusive representation and actively encourages the formation of such bodies. Associations are seen as having the objective of promoting their members' skills, ensuring compliance with ethical standards, facilitating choice and protecting consumers in compliance with competition rules.

The law in question actually regulates the characteristics and requirements for the establishment of professional associations. They must endeavour, inter alia, to ensure the continuous professional development of their members, provide a one-stop-shop that customers can contact in the event of a trade dispute or to obtain

information about activities and quality standards, and publish on their website the information necessary to protect consumers in accordance with the criteria of transparency, integrity and authenticity. Only once they meet all the requirements and are subject to a declaration of responsibility of their respective legal representatives may professional associations apply to be included in the list published by the Ministry of Economic Development on its website. Inclusion implies neither regulation nor recognition of the profession but demonstrates the expertise of members and the ethical standards they must adhere to.

By law, professionals are required to include a specific reference to Law No 4/2013 in each written agreement with consumers; non-compliance is regarded as an unfair trade practice.

Law No 4/2013 is also designed to protect consumers. The certificate awarded is one of the ways of demonstrating professionalism by identifying and disclosing information about the professional. It is not intended to directly regulate the profession.

Any professional – whether a member of an association or not – can apply for certification with any UNI (the Italian Organization for Standardization) standards that apply to the profession. Certification will be issued by accredited certification bodies. Having this certification is not a prerequisite for pursuing the profession. Any professional who decides to join an association can also ask it to issue a certificate as an additional stamp of quality.

9.4 Cyprus

In Cyprus, ICT is considered an engineering profession. To practise the engineering profession in the Cyprus, one needs to register with the **Cyprus Scientific and Technical Chamber (ETEK)** and obtain an annual professional licence.

ETEK is a legal entity established under public law. One of its key responsibilities is to keep records of its members and issue licences to practise the engineering profession.

ETEK is considered the statutory Technical Advisor to the State and is the umbrella organisation for all Cypriot Engineers. It was established by Law 224/1990 and is a Public Law Body with an elected Governing Body. It has an office and services capable of promoting its objectives.

ETEK legislation sets out the professions regulated by the Chamber. These include the following fields: Architecture,; Civil Engineering, including, Mechanical Engineering, Electrical Engineering, Electronic Engineering including Information Technology Engineering, Chemical Engineering, Mine and Applied Geology Engineering, Agronomic-Topographic Engineering, Land Survey and Valuation, Town and Spatial Planning.

According to the declaration in the relevant Cyprus entry in the **EU Regulated Professions Database,** *"Computer Engineering is the science which deals with the design of integrated systems for the collection, storage, processing and dissemination of information using computers, peripheral equipment, communication networks and general technology. The fields of specialization of the Professional Computer (sic) are programmers and systems administrators, applications, databases, Systems Analyst and Designer, Engineer and Technical Communications, Engineering and Technical Equipment Engineer and Computer Network Technician, Specialist of the internet, Information Systems Auditor, Information Security Officer."*

It is to be noted that the definition of a Computer Professional proffered is very broad and appears, at a high level, to cover most activities in the ICT field. On the other hand that it appears that, the licensable ICT field, namely Information Technology Engineering is considered a subset of Electronic Engineering,

In the same EU Database, the justification for regulation of ICT practice in Cyprus is given as arising from the consideration that *"The profession has public health and safety implications, so (a) basic check that requirements of the directive are met is performed (confirmation that service provider holds relevant license or has practiced the profession)."*

9.5 The Netherlands

There is no formal state recognition of ICT professionals in the Netherlands. However, the Dutch Association for Computer Scientists Registry (Vereniging van Register Informatica - VRI) plays a key role in recognising ICT professionals. Each IT professional registered with VRI abides by a Code of Ethics and can thus be recognised as a professional of high competence and integrity. The VRI, together with Ngi-NGN (the Dutch Computer Society for IT-professionals), EXIN Foundation (a leading independent exam- and certification institute,) and several industry and education partners, have initiated the start of an e-CF register. This is a voluntary register aimed at providing transparency in achieved competencies of IT professionals while at the same time providing IT professionals with an opportunity for personal branding. The register is developed based on ISO standards (17024:2012) for certification. The register started from the then existing VRI-register of informatics but is now aimed at all Dutch IT professionals. The launch of this initiative took place in 2016.

9.6 The USA

There has been considerable debate over the last twenty years in the USA over the issue of whether ICT practitioners should be licensed. The situation in the USA is one where each state makes decisions regarding the licensure of occupations, and there have been significant differences in how different states have tackled the issue of licensing of ICT practitioners. In addition, the two most influential ICT associations in the USA, the ACM and the IEEE Computer Society, have diverged in their views of whether ICT practice should be subject to licensing legislation.

Consideration of licensing in the USA has always tended to treat ICT as an engineering discipline. In fact, most licensing or formal state certification requires knowledge of basic engineering principles not necessarily directly related to computing. States regulate the practice of engineering to ensure public safety by granting only Professional Engineers (PEs) the authority to sign off engineering plans and to offer their services to the public. The PE is responsible not only for their work but also for the work of those they oversee.

One complicating factor in the USA is the so-called “engineering exemption”, which applies in most states. With an industrial engineering exemption, a Professional Engineer is not required to oversee a project and provide their seal of approval. Instead, the company involved assumes liability for the project. These exemptions are intended to apply to companies with internal processes and safeguards in place that provide supervisory oversight to all engineering projects. These engineering projects are thus able to circumvent state professional licensing laws. Because the company is assuming responsibility for the projects, the seal of the Professional Engineer is not required. However, lawmakers and industry experts are more and more questioning whether such an exemption should be re-visited to ensure society’s health, safety and welfare. The National Society of Professional Engineers has stated that “all engineers who are in responsible charge of the practice of engineering as defined in the NCEES Model Law and Rules in a manner that potentially impacts the public health, safety, and welfare should be required by all state statutes to be licensed professional engineers. NSPE recommends the phasing out of existing industrial exemptions in state licensing laws.”

(See https://fxbinc.com/wp-content/uploads/2016/10/state-by-state-summary-licensure-law-exemptions.pdf)

Although, as has been noted, individual U.S. states do set their own licensing eligibilities, generally speaking, to be licensed, there are three requirements. First, one must satisfy the respective state board requirements, including minimum education criteria. Secondly, the candidate must pass the Fundamentals of Engineering (F.E.) Exam. The F.E. exam is a general, engineering principles-based exam, recommended to be taken right after (while the concepts are still fresh) graduation for graduating seniors of four-year engineering accredited programs. The third and last step is the Principles and Practices of Engineering

Examination (P.E.) exam — which focuses on measuring candidates' experience as working engineers. A respective state's board for P.E. exams sets forth the minimum years of engineering work experience (under a licensed professional engineer) required for P.E. exam eligibility. The National Council of Examiners for Engineering and Surveys (NCEES) administers both exams. There are various PE exams, each referring to a specific engineering discipline, and Computer Engineering is one of these areas examined and in which a PE licence can be obtained.

9.7 Canada

In Canada, the different provinces have legislation that grants a professional engineering licence to ICT practitioners who meet the requisite qualifications. Holders of a licence are also legally entitled to use the title "P.Eng".

Individuals who work in software need the P.Eng licence if their work falls under the definition of professional engineering unless someone else who is a licensed engineer takes responsibility for their work.

In the Ontario Professional Engineers Act (which is an Act typical of others that exist in the other Canadian provinces), the practice of professional engineering is defined as: *"Any act of* **designing, composing, evaluating, advising, reporting, directing or supervising** *wherein the safeguarding of life, health, property or the public welfare is concerned, and that requires the application of engineering principles, but does not include practising as a natural scientist. "*

For the PEO (Professional Engineers Ontario), software development is considered as the practice of professional engineering under the following conditions:

- where the software is used in a product that already falls within the practice of engineering (e.g. elevator controls, nuclear reactor controls, medical equipment such as gamma-ray cameras, etc.);
- where the use of the software poses a risk to life, health, property or the public welfare; and
- where the design or analysis requires the application of engineering principles within the program (e.g. does engineering calculations), meets a requirement of engineering practice (e.g. a fail-safe system) or requires the application of the principles of engineering in its development.

In Canada, professional status is rendered through CIPS (Canadian Information Processing Society), which is a national federation of CIPS Provincial Societies that certify IT professionals in Canada and abroad.

CIPS is the only professional organisation in Canada that offers an Information Technology (IT) designation **recognized by law in Canada.**

CIPS provides three types of designation, the **AITP, I.S.P. and ITCP Designations -**

- The **Information Systems Professional (I.S.P.)** is the **only IT designation that is recognized by law in Canada and is** legislated as a self-regulating designation in British Columbia, Alberta, Saskatchewan, Ontario, New Brunswick and Nova Scotia
- The **Information Technology Certified Professional (ITCP)** recognizes senior IT professionals who understand how to effectively apply their organisational and business experience in addition to their IT knowledge
- The Pre-Professional **Associate Information Technology Professional (AITP)** Designation recognizes recent Graduates from University and College IT programs who do not yet have the required experience for the I.S.P. and ITCP Professional Certifications

Interestingly there are a number of eligibility routes in order to achieve the I.S.P. designation. These are described briefly below.

- **The most popular is the Education Plus Experience Route**
    - A University/College IT related degree/diploma is required
    - IT Professional Experience required

- The second most popular is the **Established IT Professional Route**
    - A competency-based review and assessment methodology that allows applicants to demonstrate mastery of the CIPS Body of Knowledge (BOK)
    - The application defines competency requirements in 11 knowledge areas, and applicants are required to demonstrate their knowledge, competency, and skills in these specific knowledge areas

- For Full-time academics, there is the **Established Academic Route**
    - **Full-time academics** with positions in a Computer Science, Software Engineering, Information Systems (IS), or equivalent department at a recognized University or College

- There is also the **IT Industry Leader Route**
    - For Senior Executives (i.e. CIO, CTO) at large organisations
    - Must have either a **non-IT related degree** or currently hold a professional designation

- **Exam Route**
    - BCS Diploma Level, BCS Professional Graduate Level Exams, or ICCP Exams Leading to the CCP (or equivalent) required
    - IT Professional Experience required

Professional Experience Only Route
- Applicant must have entered the IT field prior to 1976
- A minimum of 12 Years of IT Experience is required

Upgrade from Candidate Membership (AITP) Route
- Applicant must be a current CIPS Candidate Member / AITP holder
- IT Professional Experience required

There are four important factors to be derived from the Canadian model:
1. Certain ICT practices can be considered as constituting a branch of Professional Engineering
2. The practice of Professional Engineering requires a licence in Canada
3. Canadian professional associations recognise multiple levels of membership, with only the top-level having legal recognition
4. There are multiple paths to achieving the highest level of professional membership and hence a licence to practise.

9.8 Australia

In Australia, ICT professionals do not require a licence to practise. However, certification of professionals is one of a number of prerequisites for inclusion in the Australian Computer Society's (ACS) Professional Standards Scheme as covered by the Professional Standards Act 1994 (NSW). Professional Standards Schemes are legal instruments that bind occupational associations such as ACS to monitor and improve the professional standards of their members in order to protect consumers of ICT professional services.

The **Australian Computer Society (ACS)** is an association for ICT professionals with over 48,000 members Australia-wide. According to its Constitution, its objectives are "to advance professional excellence in information technology" and "to promote the development of Australian information and communications technology resources".

There are estimated to be around 700,000 workers in ICT in Australia, so ACS membership only represents around 7% of this total. However, the influence of the ACS upon ICT policy in Australia is very considerable. Indeed getting ACS certified and hence becoming an ACS Certified Professional (CP) will mean that the individual will get professional recognition from the Australian federal, state and territory governments. Certified members get to use post-nominal IP3P and corresponding certification logo, a mark of expertise.

The ACS actually certifies IT professionals at two levels, the **Certified Professional** and the **Certified Technologist.** Each certification level has a minimum level of experience and also requires ongoing CPD (Certified Professional Development) hours of learning each year.

The ACS has, over many years, been extremely active in pushing for the professionalisation of the sector. In January 2000, the Australian Computer Society (ACS) was admitted to the Australian Council of Professions — since renamed Professions Australia — as the membership body formally representing the ICT profession. Professions Australia is the peak body for all professions in Australia and includes representatives of medicine, law, accounting, engineering and architecture, amongst other professions. The ACS's membership was the culmination of more than five years of work by a committed team, and it meant that ICT had finally come of age. The final decision was made by over thirty other professional associations represented by Professions Australia. This recognised ICT as a profession, making the ACS the first computer society in the world to achieve this status in its own right. The ACS is also involved in the development and monitoring of educational programs and accredits ICT courses that meet the standard of the ACS Professional Standards Board (Core) Body of Knowledge (CBOK). It has set standards of knowledge and experience for professionals and has codes of ethics, conduct and professional practice.

The objects of the aforementioned Professional Standards Act, which recognises ACS Certified Professionals are the following:

(b) to facilitate the improvement of occupational standards of professionals and others,
(c) to protect the consumers of the services provided by professionals and others,
(d) to constitute the Professional Standards Council to supervise the preparation and application of schemes and to assist in the improvement of occupational standards and protection of consumers.

In essence

- All Certified Professional (CP) members now have a form of professional recognition from Australian federal, state and territory governments
- ACS has obtained approval for a redesigned Professional Standards Scheme to include all CP members
- CP members now need to demonstrate ongoing compliance with professional standards It will be seen that this does not go all the way to giving ICT professionals a licence to practise as we understand it above. However, it is a step in the right direction, and the ACS holds the view that

9.9 Hong Kong

In 2012 the Government of Hong Kong set up a Task Force on ICT Professional Development and Recognition under the Digital 21 Strategy Advisory Committee to examine the case for establishing a unified framework for ICT professional recognition in Hong Kong, with reference to international practices and frameworks of other economies. The Task Force has critically examined the major local and international ICT qualification and competency frameworks and ICT professional qualification schemes and agreed on a number of desired outcomes of the professional recognition framework from the perspective of different stakeholder groups, including ICT practitioners, employers, the ICT sector and the community.

The Task Force concluded that the professional recognition framework should facilitate the professional career development of ICT practitioners and not unduly become a barrier to entry into practice or a barrier to advancement in the profession. For employers, it was agreed that the framework should enhance the quality of ICT human resources and professional services without unduly increasing the related cost. Furthermore, the framework should also facilitate local ICT industry players in upgrading their global competitiveness and advancing the public interests of Hong Kong as a leading knowledge-based society.

In order to achieve the above-desired outcomes, the Task Force agreed on the following essential features of the professional recognition framework –

(a) Voluntary-based to ensure that ICT human resources supply would not be disrupted;

(b) Recognises ICT professional qualification schemes rather than individuals for clarity and to avoid duplication of efforts;

(c) Makes reference to local and international ICT qualification and competency frameworks to facilitate cross recognition;

(d) Recognition criteria to cover professional standard (based on a combination of academic qualification, examination, professional experience and competency), continuing professional development and code of ethics requirements of the qualification scheme, as well as the evaluation process, expertise and organisational capability of the respective qualifications awarding body

(e) Periodic reassessment of the recognised schemes to ensure their quality can be sustained continually

(f) Managed by an awarding body to be incorporated under the Companies Ordinance

(g) To be self-sustaining financially in the long run with qualifications awarding bodies jointly bearing the operating cost. Before a critical mass of recognition is achieved, funding support from the ICT industry and/or the Government could be considered to start off the initiative.

A number of working groups were constituted to examine different aspects of any emergent legislation, and a number of additional recommendations were finally made in 2014 to the original proposals.

(a) In addition to professional schemes, the Proposed Framework could be extended to cover the recognition of technologist schemes (a level lower than professional).

(b) To pursue cross recognition with the mainland China and other jurisdictions, the Awarding Body of the Proposed Framework could take on a facilitating role while qualifications awarding bodies should retain their autonomy on cross recognition; and

(c) To provide incentives for faster adoption, consideration could be given to seeking support from existing funding schemes to initiate programmes for promotion in order to raise the community's awareness on the Proposed Framework. The final report was published in August 2015.

It is worth noting that the Hong Kong government has, up till today, decided not to implement the recommendations of the Task Force. The reasons put forward were that it was felt that the industry and

public had not reached a general consensus on the relevant issues of the Proposed Framework, including the credibility and transparency of the awarding body of the Proposed Framework, impact of the Proposed Framework on the operating costs of small and medium-sized enterprises, whether the introduction of the Proposed Framework would dampen innovation and creativity and raise the entry barrier for pursuing a career in ICT. It was also felt that nowadays, with the rapid development of ICT, the qualification requirements of ICT practitioners in the industry keep evolving with the emergence of new technologies adding to the difficulty in setting up a unified professional recognition framework.

There are however a number of findings and recommendations in the Hong Kong ICT Professional Task Force Report that are worth noting an mulling over.

9.10 The United Kingdom

The UK has opted to legally take the route of what can be considered as voluntary certification for ICT professionals. This is done through the achievement of chartered status through the British Computer Society (BCS). BCS, the Chartered Institute for IT, was set up in 1957 as the British Computer Society by a group of people working in the new and expanding field of computers who wanted the opportunity to exchange ideas and infromation. It currently has about 70,000 members.

The standard for the achievement of Chartered IT Professional status is set and maintained by BCS. Criteria and requirements for chartered status in the UK have to be approved by the Privy Council. As such, the CITP designation is on par with other chartered qualifications in other fields (such as the Chartered Accountant qualification awarded by the ICAEW).

The process followed by the BCS in granting certification is described below in some detail as it gives a good overview of how a proper procedure should be followed in the granting of formal recognition. The process involved can apply to both a process that leads to voluntary certification as well as one that provides mandatory licensing.

9.10.1 BCS Charter Process described:

On application, individuals wishing to register as a Chartered IT Professional must be:

- employed using skills defined by BCS as within the scope of the IT profession; and
- be working in a complex role or multiple roles, requiring underpinning knowledge and competence.

To be included in the register of **Chartered IT Professionals**, an individual must also:

• be a **member of a professional body** licenced by BCS to award Chartered IT Professional status and have agreed to abide by the body's code of conduct which is subject to disciplinary procedures; and

• undertake to maintain and **develop their knowledge and skills** in the IT profession by keeping a record of professional development.

9.10.2 Registration validates the following:

1. knowledge and experience gained through formal and informal education and training and the ability to apply fundamental principles in a wide and often unpredictable range of contexts;
2. the ability to perform an extensive range and variety of complex technical and/or professional work activities;
3. a breadth of knowledge of IT that has been evidenced through a method approved by BCS that allows individuals to communicate and work with specialists across the IT profession;
4. the registrant's ability to understand and appreciate the relationship between their own discipline and wider customer/organisational requirements; and
5. the leadership qualities to influence and build appropriate and effective business relationships that promote collaboration between stakeholders who have diverse objectives. Identification of a Chartered IT Professional

A Chartered IT Professional is entitled to use the post-nominal letters 'CITP'. BCS maintains a register, and a public version is available listing registrants who wish to be included.

9.10.3 Maintaining BCS registration:

To maintain their registration, a Chartered IT Professional is required to **remain a member of a body licensed to award Chartered IT Professional status** and to keep a record of continuous professional development.

9.10.4 Evidencing current competence

Current competence is assessed against evidence of continued practice and continuous professional development in accordance with the *BCS Policy for Determining Current Competence for Chartered IT Professional Status* at intervals of 5 years.

9.10.5 Assessment of competence

The competence will be assessed against the criteria listed below:

Autonomy: it is expected that work is often self-initiated.

A1 Works under broad direction.
A2 Is fully responsible for meeting allocated technical and/or project/supervisory objectives.
A3 Establishes milestones and has a significant role in the assignment of tasks and/or responsibilities.

Influence: leadership ability to achieve successful business benefit.

B1 Influences organisation, customers, suppliers, partners and peers on the contribution of their own specialism.
B2 Builds appropriate and effective business relationships.
B3 Makes decisions that impact the success of assigned work, i.e. results, deadlines and budget.
B4 Has significant influence over the allocation and management of resources appropriate to a given assignment.

Complexity: the ability to succeed in multi-faceted roles.

C1 Performs an extensive range and variety of complex technical and/or professional work activities.
C2 Undertakes work that requires the application of fundamental principles in a wide and often unpredictable range of contexts.
C3 Understands the relationship between their own specialism and the wider customer/organisational requirements.

Business skills: vision and appreciation of the overall context to achieve benefit from exploiting IT.

D1 Advises on the available standards, methods, tools and applications relevant to their own specialism and can make an appropriate choice from alternatives.
D2 Analyses, designs, plans, executes and evaluates work to time, cost and quality targets and takes all requirements into account when making proposals.
D3 Analyses requirements and advises on scope and options for continuous operational improvement.
D4 Assesses and evaluates risk.
D5 Demonstrates creativity, innovation and ethical thinking when applying a solution for the benefit of a customer/stakeholder.
D6 Communicates effectively, both formally and informally.
D7 Demonstrates leadership and facilitates collaboration between stakeholders who have diverse objectives.

D8 Maintains an awareness of developments in the industry; takes the initiative to keep their skills up to date, and mentors colleagues.

9.11 Africa

In the African continent there are a number of countries that have legislation in place that regulates ICT practice. It is interesting, in fact, to note that some of the most comprehensive legislation governing the practice of ICT is found in some of the larger African countries. Below are described the principal African countries with existing legislation regulating the practice of ICT.

9.12 Nigeria

Computer Professionals (Registration Council of Nigeria) [CPN] was established by Act. No. 49 of 1993 and charged with the responsibility of controlling and supervising the IT profession and practice in Nigeria, quality assurance in computer education, and developing local IT capacity in tune with national and international standards. The Act makes it **mandatory for all persons and organisations** seeking to engage or engaged in the sale and/or use of computing facilities and the provision of professional services in computing or services related to the use of computational machinery in Nigeria to be registered by CPN and licensed to carry out such services.

It is also charged with the responsibility of determining the standards of knowledge and skills to be attained by persons seeking to become members of the computing profession and improve those standards from time to time as circumstances may permit. Also, it is part of the responsibility of the CPN to maintain a register of persons seeking to be registered under the Act to practise the computing profession and the publication from time to time of the list of such persons. It is actually illegal for anybody to practise Information Technology in Nigeria without registering with the Nigerian Computer Professionals Registration Council.

The Computer Professionals Registration Council of Nigeria (CPN) duties include:

1. to determine what standards of knowledge and skills are to be attained by persons seeking to become members of the computing profession and improving those standards from time to time as circumstances may permit.
2. to secure the establishment and maintenance of a register of persons seeking to be registered under the Decree to practise the computing profession, and the publication from time to time, of the list of these persons.
3. to perform any other functions as bestowed on it by the provisions of the decree Consequent upon the foregoing, the Council has responsibilities for the following among others.

    - organisation of computing practice in the country.
    - control of the practice of computing in the country.
    - supervision of the practice of computing in the country.
    - screening individuals seeking to be registered as computer professionals.
    - screening corporate bodies seeking to be registered to engage in the sale or use of computing facilities and/or the provision of professional services in computing in the country.
    - ensuring high computing professional ethics and professionalism - standards, discipline etc.
    - determining academic standards in computing - computer science, computer engineering, information science, etc.
    - accreditation of institutions, courses and programmes and the evaluation of certificates in computing.
    - conducting professional examinations in computing by liaising with associations/bodies external to the Council.
    - publicising activities of the Council.
    - publication of the register of Computer Professionals and other computing professional works - journals, books, magazines, newsletters, etc.

In line with the duties assigned to the Council through Decree 49 of 1993, the Council has embarked on the programme of Accreditation of Computer Training Institutions. As can be seen from the above, the scope of the Nigerian legislation and the duties of the Registration Council are extremely broad. What is also interesting is that the Nigerian legislation provides for nine different types of membership in the register, namely fellows, distinguished fellows, honorary fellows, members, honorary members, associates members, students, affiliate members, and corporate members. Nigerian legislation in this context has probably the broadest scope of all ICT profession regulation that has been encountered. It is doubtful however, whether such a total reach of all ICT related activities is in fact desirable and does not bring in a number of disadvantages and barriers.

9.13 South Africa

South Africa does not appear to have specific legislation which requires an individual to have a licence to practise within the ICT sector. However, South Africa does have an extremely visible and active ICT professional association, the IITPSA (the Institute of Information Technology Professionals South Africa). The IITPSA was founded in 1957 as the Computer Society of South Africa and has a proud 60-year heritage of representing the interests of professional and aspiring practitioners in the South African ICT industry. With a membership base exceeding 9,000, IITPSA is engaged in promoting transformation, skills and capacity development and is an active participant in sectoral issues locally and internationally.

IITPSA committee members and executives represent the members in such entities as the B-BBEE ICT Sector Council, the National ICT Forum, the MICT SETA, the City of Joburg Governance Committees, the Vaal University of Technology, the Africa ICT Alliance (AfICTA) and the International Federation for Information Processing (IFIP). IITPSA is recognised as a professional body by the South African Qualifications Authority (SAQA - equivalent to the Malta Further and Higher Education Authority) and its professional membership designation (PMIITPSA) is registered on the National Qualifications Framework (NQF) and accredited by the International Professional Practice Partnership (IP3).

In South Africa, a professional is seen as a practitioner whose practice is based on a significant body of theory, has completed appropriate tertiary qualifications from a recognised body (in South Africa, usually a university or university of technology), is committed to undergoing continuous professional development, consults good practices before undertaking work, and subscribes to a Code of Behaviour (or Code of Ethics).

There are different grades of membership within the IITPSA, with the highest being a Professional Member. Grades of membership are Student Member, Associate Member (AMIITPSA), Member (MIITPSA) and Professional Member (PMIITPSA)

The Professional Member Grade of the IITPSA promotes a very rigorous standard for the certification of professional ICT practitioners across the entire ICT spectrum. The standards required for admission to Professional Membership of the IITPSA ensure that professional practitioners admitted to this grade of membership have appropriate qualifications and demonstrate a high degree of relevant professional experience in one or more of the many disciplines included within the ICT spectrum. Such disciplines include (but are not limited to): software, network or telecommunications engineering, information security, ICT governance, business analysis, database management and administration, ICT management, ICT lecturing and/or research, project management, business intelligence, Enterprise Resource Planning, software design and/or development, web development, Artificial Intelligence, Robotics, Big Data and Data Analytics, and mobile technologies. Most professional members have ten or more years of experience in the ICT arena. Applicants admitted to this grade may use the post-nominal designator “PMIITPSA“.

Although there is formal legal recognition of an ICT professional through the South Africa Qualifications Authority, this does not amount to a mandatory licence to practise but can be more seen as a form of state-endorsed certification similar to the UK BCS CITP.

9.14 Tanzania

Since 2019, Tanzania has required that any individual who practises ICT is registered with the Tanzania ICT Commission. The Commission registers all IT professionals in the country for the stated purpose of monitoring, controlling and securing the country's cyberspace while speeding up the uptake of technology.

In this context of the framework guiding the registration process, an ICT Professional is described as ***"a person with proven relevant skills who is registered by the Commission to perform ICT professional activities related to Information technology, computer and communication systems that includes hardware, software, ICT management, data communication and management, signal processing, security, electronics, analytics, Internet, ICT Infrastructure, e-services and other related ICT areas ".***

Additionally there are four other levels at which an individual can be licensed rangin from an affiliate ICT practitioner to an ICT Consultant. As the legislation is very new, it is difficult to assess the impact of an Act regulating the ICT profession which has such a broad scope as the one in Tanzania.

9.15 Kenya

The recent Information Communication Technology Practitioners Bill (2021) in Kenya seeks to establish a legal framework for the training, registration, licensing, practice and standards of Information Communication Technology (ICT) professionals in the country

The main features are the following -

- The Bill establishes an Information Communication Technology Practitioners Institute that will be governed by a Council and charged with registering and licensing ICT practitioners on a register as well as approving training programmes and advising the government on industry policy.
- It contains provisions relating to the registration of ICT Practitioners. This includes the requirements, maintenance of a register and the manner in which alterations may be made to that register.
- Contains provisions relating to the licensing of ICT Practitioners. This includes the issuance of practising licences and the duration of those licences.
- It has enforcement provisions that provide for professional misconduct, disciplinary proceedings by the Council against an errant practitioner, removal, suspension or cancellation of a member and the effect thereof and the various offences relating to different matters in the Bill.
- It contains financial provisions and defines sources of funds for the Institute, its annual estimates and auditing of the accounts.
- On the registration of ICT Practitioners, the Bill notes that a person shall be eligible for registration if the person is a holder of at least a bachelor's degree in electrical and electronics engineering, mathematics or physics and has at least one year of post-qualification experience in the ICT Field.

The Bill has created quite an amount of controversy and opposition in Kenya with detractors claiming it is simply a means for the Government to collect more revenue. One of the criticisms is that the Bill offers a very broad definition of ICT which could refer to a wide range of services many of which do not require special training for which it is required that a license be issued by the Institute. It is argued that the Bill could stifle creativity and cause the loss of many jobs and livelihoods, hampering ICT practice contrary to its original aim. Some of the criticism would appear to be justified on the basis that the scope of the Bill is too broad in that it tries to make the practice of any ICT activity subject to a State licence.

9.16 The European Union as a whole

Although the principle of subsidiarity applies to the regulation of the ICT profession in the EU, and each member country takes an individual approach to how it chooses to recognise the ICT profession, there is a lot of discussion and activity at the European level about ICT professionalism and the possibility of coming up with a common approach to this issue. As has been noted there is in fact a significant amount of variation in EU countries as to how the issue of ICT professional recognition is handled. A number of countries have no structures in place for the formal recognition of ICT professionals, whereas there are others, as discussed above, which have laws in place that confer recognition upon certain types of ICT practitioners.

Apart from the work done by the European Commission in promoting the professionalisation of the ICT sector, there are entities whose main focus is increasing professionalisation among ICT practitioners and also seeking a common approach within the EU. The main one is the Council of European Professional Informatics Societies (CEPIS) which is a non-profit organisation seeking to improve and promote high standards among ICT professionals in recognition of the impact that ICT has on employment, business and society. CEPIS currently represents 33 member societies in 32 countries across greater Europe. Through its members, who are the professional ICT bodies at the national level, CEPIS represents approximately 450,000 ICT professionals.

The stated mission of CEPIS is the following:

CEPIS aspires to promote best practice for IT professionals and users throughout Europe by

- *promoting high standards to further mature and promote IT professionalism;*
- *building gender balance in IT industry and inspire more young people to pursue IT-related education and careers;*
- *advocating for a digitally competent and skilled general workforce in support of employability and higher productivity;*
- *advocating for the socially responsible adoption, secure, ethical, inclusive and environmentally friendly application of IT in Europe.*

It is of note that CEPIS is quite neutral in its views towards the enactment of legislation requiring licensing of ICT professionals as it sees this as an individual country's competence. Its role is more in the area of promoting frameworks such as e-CF, Bodies of Knowledge (BOKs) and codes of ethics to ensure that the European ICT workforce has the required skills, knowledge, attitudes and competencies required. In fact, in its definition of an ICT Professional, CEPIS states that *"Professionals are accountable to themselves, the ICT Profession and society, through an agreed code of ethics/conduct or* ***applicable regulatory practices."***

Additionally, CEPIS has initiatives such as the IT Professionalism Europe **(ITPE)**, which is a network of public and private sector experts from critical IT domains committed to the advancement of IT professionalism in Europe.

9.17 Discussion on different country models

From the above description of systems that exist in different countries for the recognition of the ICT profession and its practitioners, it is clear that there are several different approaches as to how this matter is approached. It is also a fact that there are a number of countries including a number of advanced economies, where there exists no explicit legislation pertaining to formal recognition of the ICT professional.

Where there is state recognition of the ICT profession, some form of licence to practise would appear to be the most common approach. It is also clear that these forms of licences are generally restricted to the performance and certification of certain activities with there in general being no restriction on the practice of ICT for areas that do not fall under the reserved activities. Of note is also the fact that in countries where there is any regulation of the practice of ICT, the profession is often considered as a field within engineering. Scope here would appear to vary considerably, with a number of countries clearly viewing the design and production of software as an engineering discipline, while others would appear to hold a

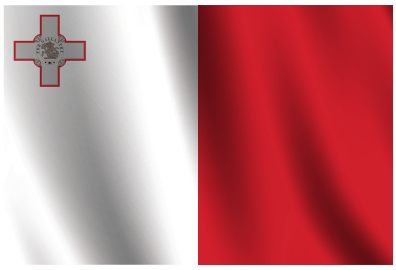
more restricted view, often more related to the areas of ICT practice that can be regarded as a branch of electrical engineering.

Voluntary certification and registration does exist in certain countries but it is not widespread. This is to a good extent understandable and it could also be remarked that the countries that opt for a certification approach tend to be countries where the practice of self-regulation of sectors is more of an accepted and practised norm.

There are, however, several ideas in the models that are used in different countries that can be utilised in finding the best system for Malta. For example, the different paths established in Canada for achieving professional status show clearly that more than one route should be available to achieve professional status. It is also evident that there are a number of jurisdictions that have multiple levels of licensing or certification in the ICT sector. Two examples in Europe are Italy where there is the ingegnere dell'informazione (Informatics Engineer) and the "ingegnere dell'informazione junior" (Junior Informatics Engineer), and in the UK, where the BCS can award Chartered IT Professional status or Chartered IT Technologist status. The last point regarding the BCS brings up another factor. The discussion in this document has focused on the professional certification and licensing of ICT practitioners. However, consideration can be given, as happens in the UK through BCS and in certain other countries, to the option of certifying or licensing individuals who are deemed to have attained an associate or technician status. It is also interesting how each country handles the aspect of professional ICT associations, their formal roles and responsibilities and the relationship they have with the state.

Of note is the fact that irrespective of the state of legislation in each individual country, there always tends to be a national association representing ICT professionals which appears to play an important part in the professionalization and status of ICT in the respective countries.

10. MALTESE LEGISLATION REGULATING OTHER PROFESSIONS



In Malta there are various pieces of legislation which are used to regulate a number of professions as well as other occupations where, as a general principle, health, safety or public welfare might be compromised through the actions of an unskilled worker, although, it should be pointed out that this principle might not apply for all regulated activities.

Chapter 451 of the Laws of Malta, the **Mutual Recognition of Professions Act**, refers to all the regulated occupations in Malta. Interestingly the reference made in the legislation is to "regulated professions or professional activities". This description covers occupations as diverse as medical practitioners and taxi drivers. The Act makes no attempt to define what a profession or a professional activity is. This is somewhat curious; however, one can perhaps sympathise with the legislator not wanting to be drawn into impassioned debates as to which occupations deserve professional status and which do not. If one excludes the slight reference in the Inġiniera Act, no legislation directly addresses ICT in the activities which are being regulated and licensed.

If we restrict our discussion to those regulated activities that at least require an MQF level 6 qualification, we will be looking at occupations which would in many instances qualify as professions with our foregoing description of the term . We will briefly examine below some of the common traits of Maltese legislation that are used to regulate certain key professions as this will aid us in understanding what legislation governing the ICT profession could look like.

The table below picks out the principal attributes of a number of professional regulation Acts.

	Medical Practitioner	Periti	Inginier	Accountancy	Psychology
Academic MQF Level 6 or 7	Y	Y	Y	Y	Y
CPD required	N	N	N	Y	Y
Recognised Professional Body	Y	Y	Y	Y	Y
Code of Ethics	Y	Y	Y	Y	Y
Any practice of activities within the profession requires a warrant	Y	Y	Y*	Y	Y
Different fields of practice recognised within the profession	Y	Y	Y	Y	Y+
Recognition of autonomous body representing the profession	Y	Y	Y	Y	Y
Protection of title	Y	Y	Y	Y	Y

*All Engineering Services as defined in the Inginiera Act appear to require a warrant; there is, however, some ambiguity as the Act refers to reserved activities, which concept does not typically directly appear in other local regulatory legislation
+Article 6(5) of the Psychology Professions Act requires the stipulation of the specialised area of psychology that the warrant holder may practise in

Figure 2

From the above, it can be observed that, in essence, the Maltese legislation regulating a number of professions appears to follow similar patterns. The differences that exist are mostly due to historic factors and due to the particular nature of the profession being regulated.

The characteristics of typical legislation regulating a profession are examined in more detail below.

One observation that should be made is that although there is no direct legislation regulating the ICT profession there are certain pieces of legislation which set requirements on individuals auditing or certifying certain key ICT systems that are subject to that specific legislation and related regulations. The two main instances that should be highlighted are the Gaming Act, 2018 – Chapter 583 of the Laws of Malta and the Malta Digital Innovation Authority Act Chapter 591 of the Laws of Malta (along with related Acts and regulations). This legislation caters for the audit and certification of certain software systems which can have an effect on public welfare, and the legislation sets out the qualifications (or certifications) required of the individual professional who is entrusted with these tasks.

11. PROFESSIONAL ASSOCIATIONS

11.1 The importance of Professional ICT Associations

It is certain that representative bodies for ICT professionals globally play an important role in developing, promoting and sustaining the ICT profession. Obtaining the status of a profession typically requires professional bodies to set suitable standards of knowledge, competencies and codes of conduct.

The value of ICT professional associations lies in the opportunity to mature the ICT profession, which also gives a sense of belonging to like-minded people, giving high esteem to their practices. Specific tasks and characteristics are needed to secure this value. Some of these are would include

- With a strong membership, there is a stronger role in communicating, voicing concerns, and shaping emerging industry practices;
- The promotion of ICT professionals' interests at various levels
- Augmenting professionalism by the formulation and adherence to a code of ethics;
- The development and accreditation of educational offerings or tools could support ICT professionals or stakeholder groups.

In a European context and depending on future developments, ICT professional associations can and should have a pivotal role in case that voluntary registering or licensing ICT professionals would be considered more the norm by the ICT industry and the wider community. This would concern how the profession may be regulated and who is responsible for making sure that professionals are doing their jobs properly. In other professions that are licensed to practice or regulated in some manner, such as law or medicine, professional bodies are often legally empowered to set standards and codes of conduct – a form, one could say, of partial self-regulation. In close cooperation with governments, ICT professional associations often accredit certification providers, promoting transparency and providing guidance to employers.

Professional associations are also involved in the promotion of self-assessment processes for ICT professionals and in the development of related tools to better channel them to the right ICT positions. European ICT Associations have also worked hand in hand to develop frameworks such as the e-CF, which will help align practices in different countries. In this regard, the skills and proficiency levels established by these frameworks provide the basis for any individual assessment also facilitating the tasks of the professional associations. By aligning with the frameworks, professional associations across Europe may also update their codes of ethics/conduct and by sharing common criteria, guidelines and a core set of issues beyond diverse cultures in Europe. In doing so, further harmonisation will be achieved. Finally, and in collaboration with governmental bodies, there is a clear need to promote the European framework for IT professionalism in the interest of the professionals it represents. This role could contribute to an enhanced visibility of supply and demand of IT skills, helping to provide a robust and granular basis for informed policy setting at local, national and European level.

11.2 The situation in Malta

One of the noticable features of the ICT profession in Malta is that there is no association with a general membership whose objective is to represent ICT professionals in the country. This is a rather curious omission and a potentially unfortunate one since, as has been argued above, this sort of association seems to be a prerequisite for more formal professional recognition. It is in a strong contrast to many countries where strong professional organisations representing ICT professionals are very evident. Some examples are in the section of this report dealing with the status of the ICT profession in various countries as well as a partial list of European ICT associations set out in Annex 1.

In the past, Malta has had a local association whose objective was to represent ICT professionals. This was the Computer Society of Malta (CSM) which was established in 1992 and was also eventually accepted as a member of the Council of European Professional Informatics Societies (CEPIS). The society had an established revenue stream mainly by conducting the European Computer Driving Licence programme (ECDL), including examinations, permanent offices, an office coordinator and a business development manager. It had also adopted a Code of Conduct for its members and the creation of professional membership grades within its structure. Unfortunately, however, this association has now been defunct for many years.

There do exist local chapters of foreign associations which are active in Malta. Amongst these are the IEEE, ISACA and the BCS. However, it cannot be said that any of these can claim to represent the Maltese ICT profession.

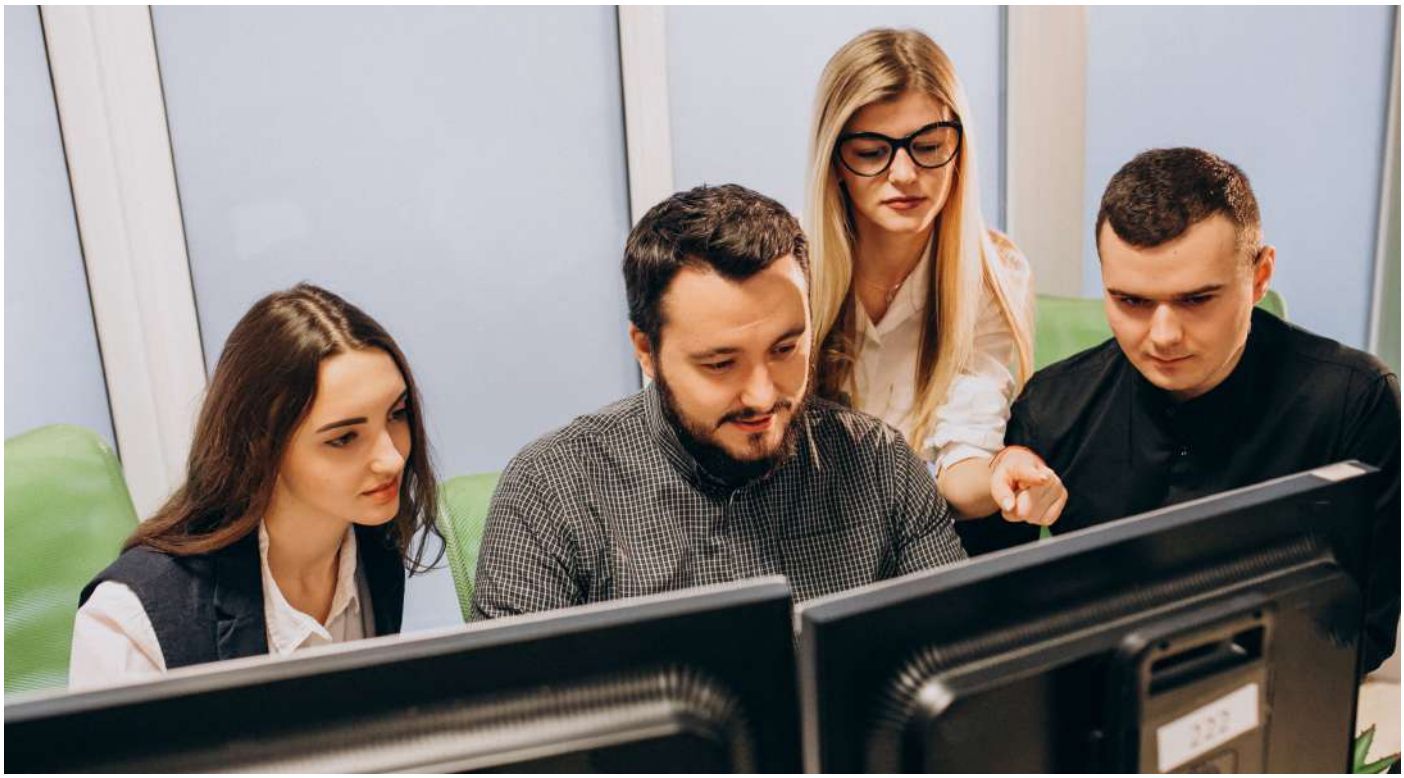
The establishment of a strong and well-recognised body representing ICT professionals could well be seen as an essential step on the path towards the professionalisation of the ICT industry. The setting up of such a body can come about in a number of ways. Some key options are identified below:

1. A group of individuals or stakeholders from the industry and education sectors can get together to set up an association. Even if statal certification or licensing is not introduced, this can well serve as a point of reference for recognition of local ICT Professionals and practitioners.

2. An existing institution can provide the initial impetus and support for such a national association to be set up. Such a candidate institution could be an academic establishment or some entity such as the eSkills Foundation or even a public entity such as MITA.

3. One other option is to have the association set up via legislation, as is the case with the Kamra tal-Periti (Chamber of Architects and Civil Engineers). The Chamber is somewhat unique amongst similar professional organisations in Malta since its regulatory remit and functions arise from specific Legislation. The Kamra tal-Periti is established and governed by Subsidiary Legislation 390.01, which, amongst other things, specifically makes provision for the various functions that allow the Kamra to regulate the profession of Periti on a nationwide scale.

12. ICT PRACTIONERS SURVEY RESULTS



Two surveys were conducted to gauge the extent to which more formal state recognition was desired for the practitioners in the ICT sector. One survey was conducted among ICT practitioners using a variety of means, including social media notification, as well as direct distribution by entities employing practitioners, by academic institutions using their alumni lists and by associations representing certain groups of practitioners. A total of 364 questionnaires were completed. Assuming an ICT practitioner workforce of 10,227 individuals (as per NSO figures for the end of December 2021), this represents 3.6% of the workforce. It is also stated that 21% of the NSO figures of the ICT workforce are female, which is close to our female response rate of 17%. The responses received should give us a confidence level of 95% in our results and a confidence interval of 5.

The thinking behind the survey was to try and keep it as straightforward as possible to respond to. The primary overriding objectives were to establish:

1. The extent to which ICT practitioners desired more formal recognition of the ICT profession
2. What type of recognition is preferred
3. The reasons for making a particular choice

It was decided that in order to keep the questionnaire relatively short and avoid complex issues, questions relating to details of any potential legislation (such as what qualifications and experience would be required, whether there would be a requirement for CPD, different levels of recognition etc) would be avoided at this stage. These could be examined once decisions in principle are taken as to whether to proceed with legislation or otherwise.

12.1 Survey analysis and findings

12.1.1 Demographic data

The questionnaire was totally anonymous, but basic demographic data was gathered from each respondent, relating to gender, age, educational attainment, role and employment sector. Interestingly, the same percentage of females (16%) responded to the survey as in the eSkills Foundation 2021 Demand and Supply Monitor survey. This figure is again very close to the percentage of female students in the UM ICT faculty.

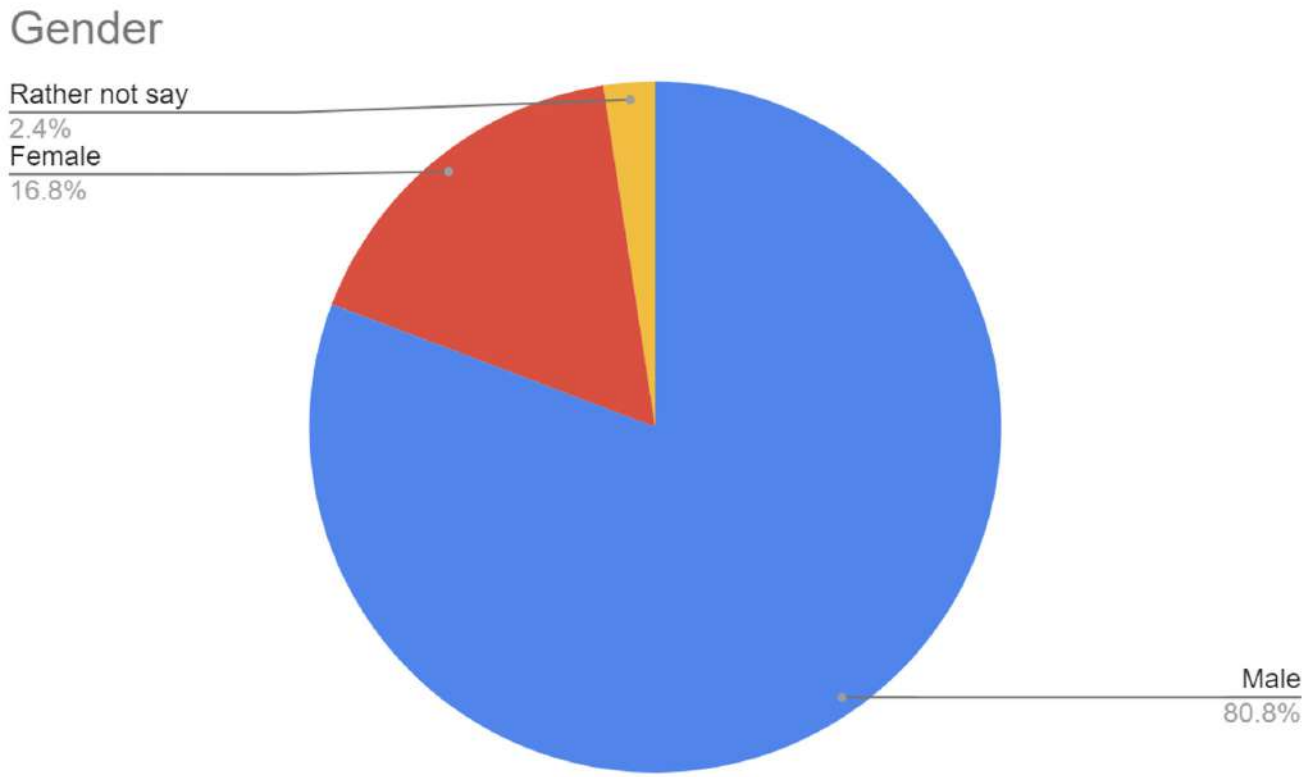


Figure 3

12.1.2 Age of respondents

The age grouping of respondents is represented in the chart below. There are no known reliable statistics on the age distribution for those practising ICT in Malta. However, the chart below presents us with a distribution that one would expect. The one remark that can be made is that from the shape of the resultant distribution, there might be a slight under-representation of the 20 to 25 age cohort. However, this could also be due to fewer individuals taking up ICT as a profession in recent years; this might suggest a hypothesis which should be investigated further. A statistic provided by Eurostat for Malta stated that in 2020, 56% of the ICT workforce in Malta was aged between 15 and 35 (incidentally the highest percentage in Europe but one that is decreasing over the years). Our respondent figures show that 44% of the workforce is in this age group. https://ec.europa.eu/eurostat/statistics-explained/index.php?title=ICT_specialists_in_employment#ICT_specialists_by_age_group

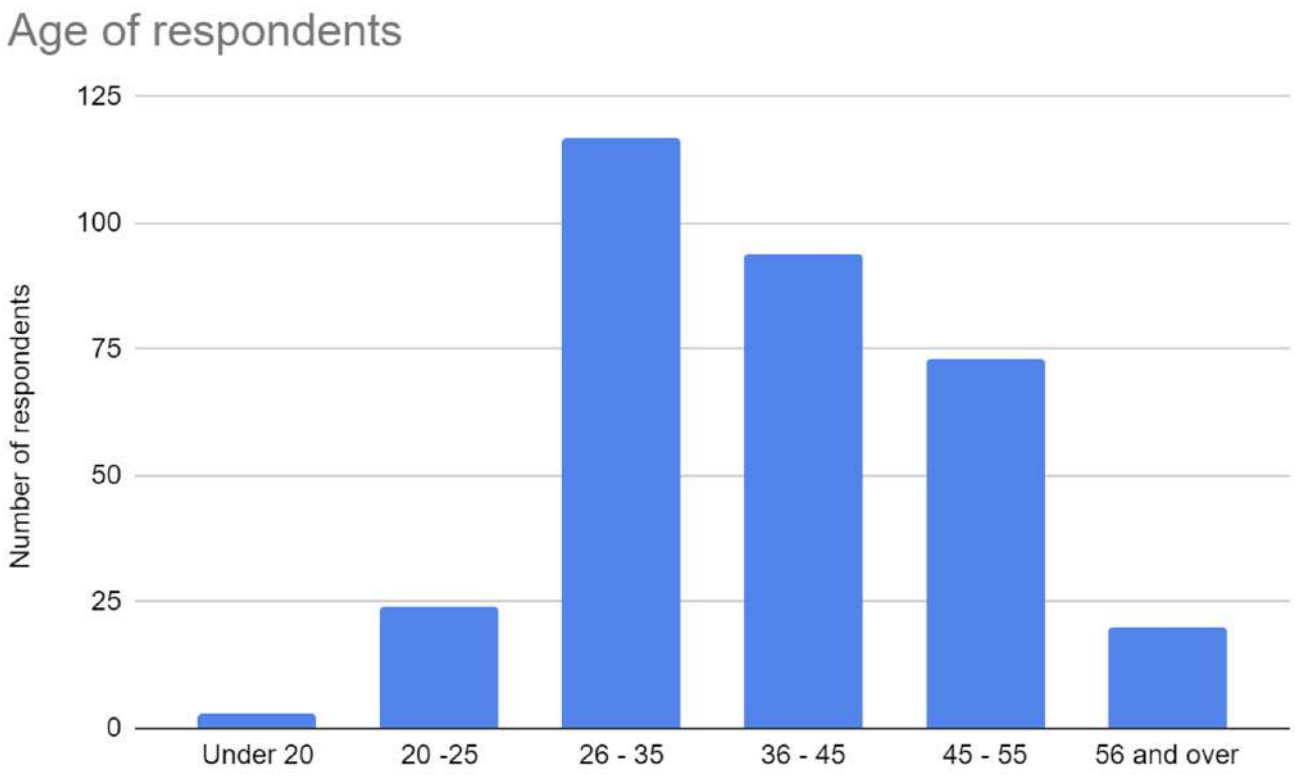


Figure 4

12.1.3 Where employed

The employment sector of respondents is shown in the figure below. There is somewhat of a bias towards ICT practitioners in public sector and government employment as respondents here represent 60% of all the sample. This is in all likelihood due to the fact that it proved easier to distribute the survey within the public sector rather than within the private sector given that this is quite fragmented. However, this should not affect the outcomes as ICT practitioners in the public and private sector are unlikely to have diverging views on the issues involved.

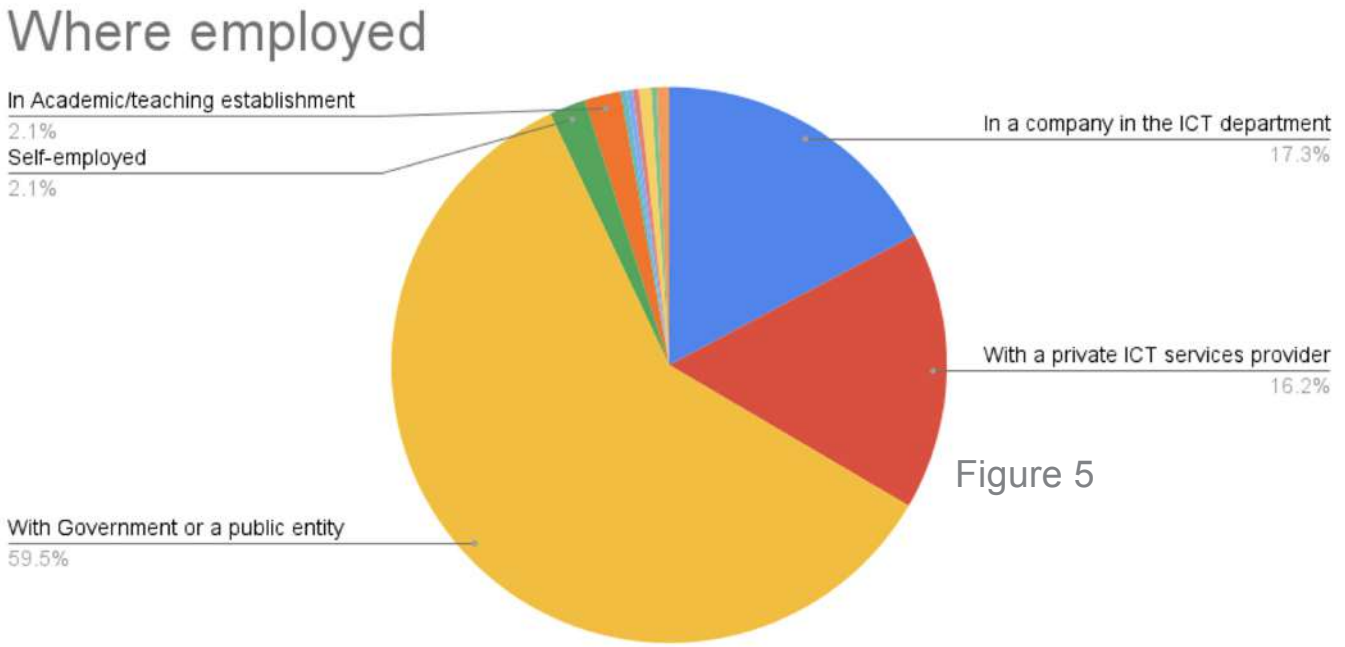


Figure 5

12.1.4 Educational attainment

The below chart shows the level of education attained by the respondents. Three-quarters of respondents hold a degree, with around half being a first degree and the rest being a postgraduate qualification. The rest are a mixture of qualifications, with respondents holding a Diploma being the largest slice.

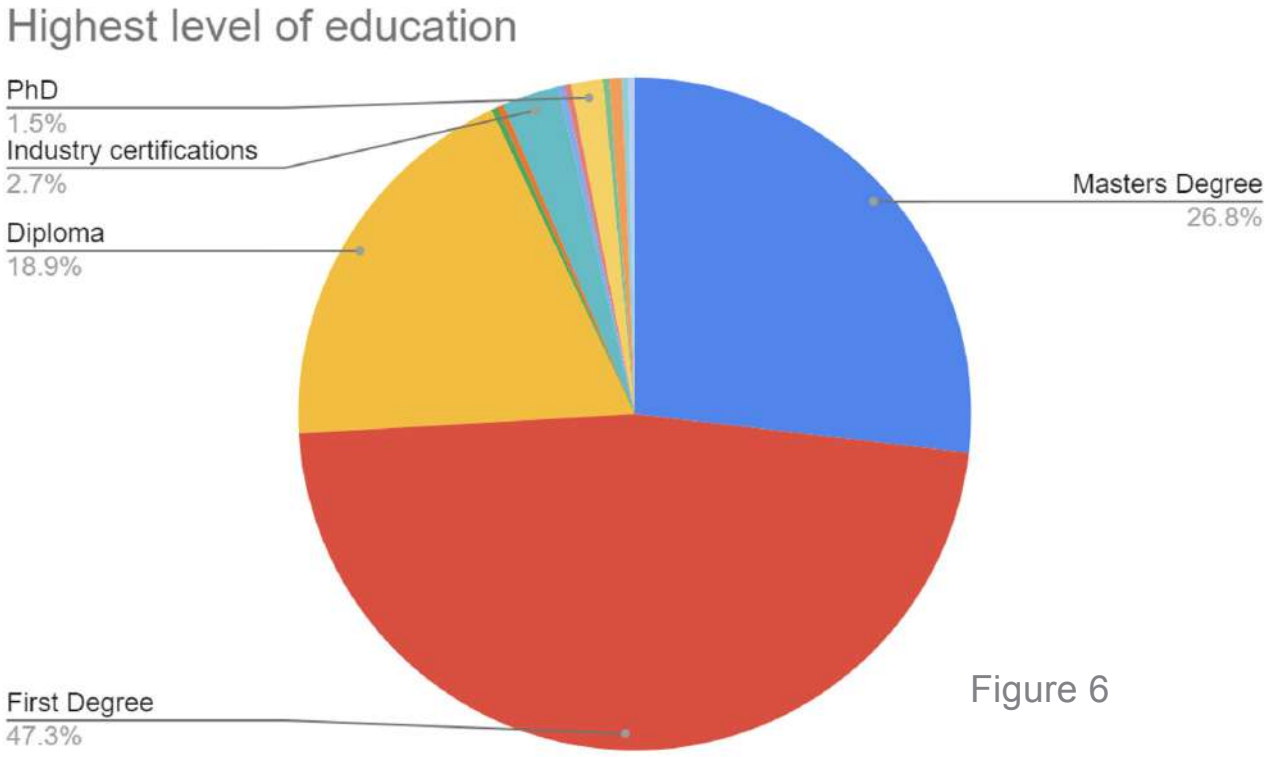


Figure 6

12.1.5 Recruitment responsibilities

Quite a significant percentage of respondents are involved in the recruitment of other ICT practitioners. The idea behind this question was that it makes it possible to establish whether practitioners with a recruitment responsibility have a different attitude to recognition.

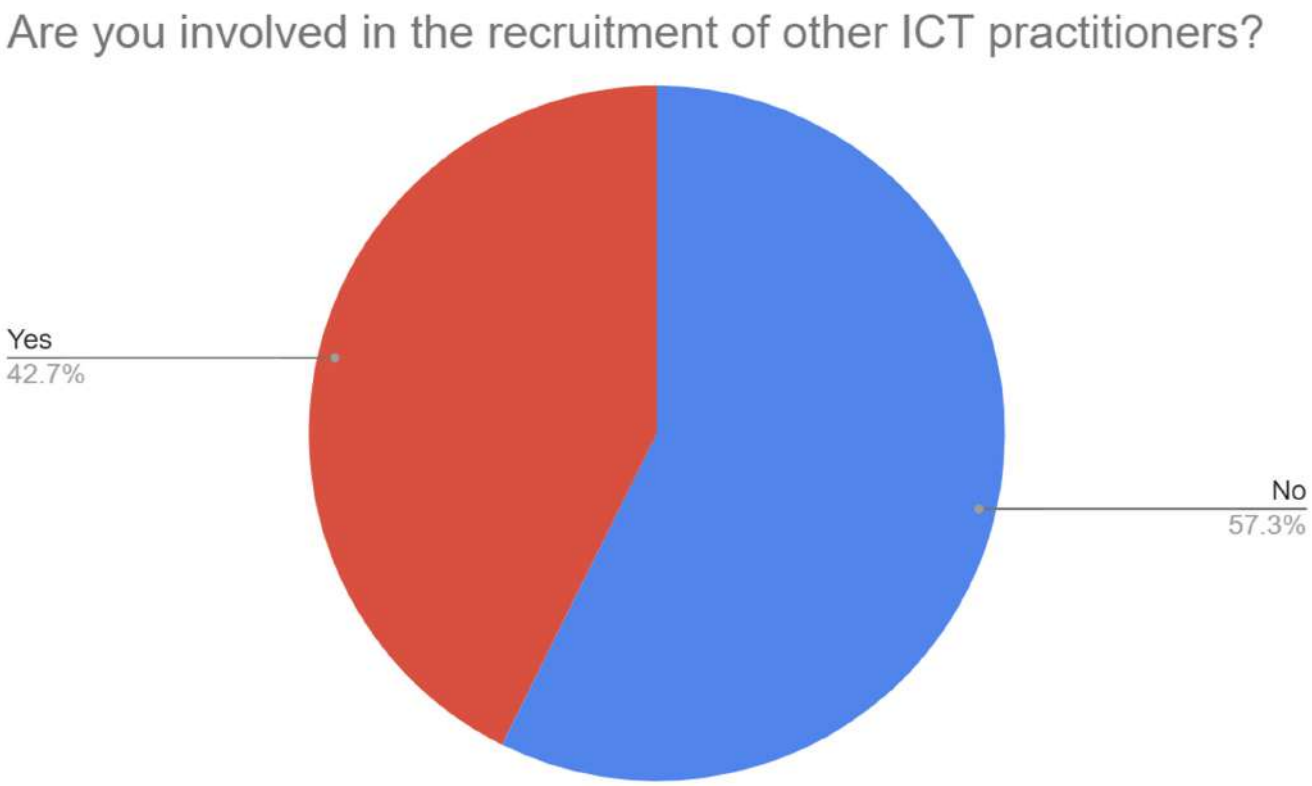


Figure 7

12.1.6 Views on recognition

An extremely significant majority of respondents hold the view that the ICT profession merits more formal recognition by the state. In fact, as can be seen from the below chart 84% of respondents answered in the affirmative to this question. This is arguably the key finding of this survey. A similar question asked in the eSkill ICT Skills Demand and Supply Monitor had 67% of the sample answering in the affirmative.

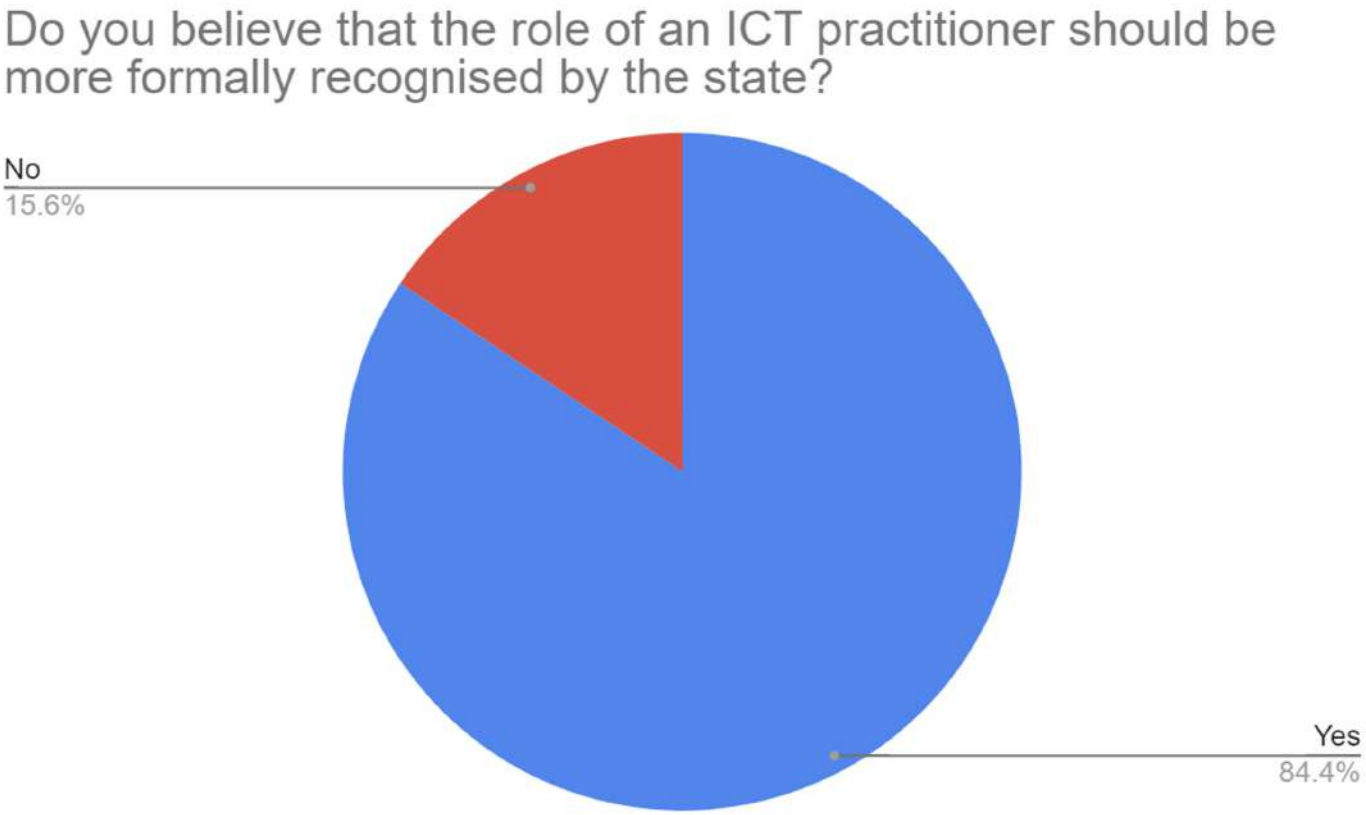


Figure 8

12.1.7 Type of recognition desired

The next question put to those who answered that they would like to see more formal recognition of the role of the ICT practitioner was what sort of recognition they would prefer to see in place. Three options were presented here -

1. Voluntary certification and registration for those who have the right qualifications and experience
2. Mandatory licensing for all ICT practice
3. Mandatory licensing for the performance of certain reserved ICT activities

Views were almost equally divided among the three options. However, it is of note that just over 70% of respondents felt that some form of licensing of ICT practice is called for.

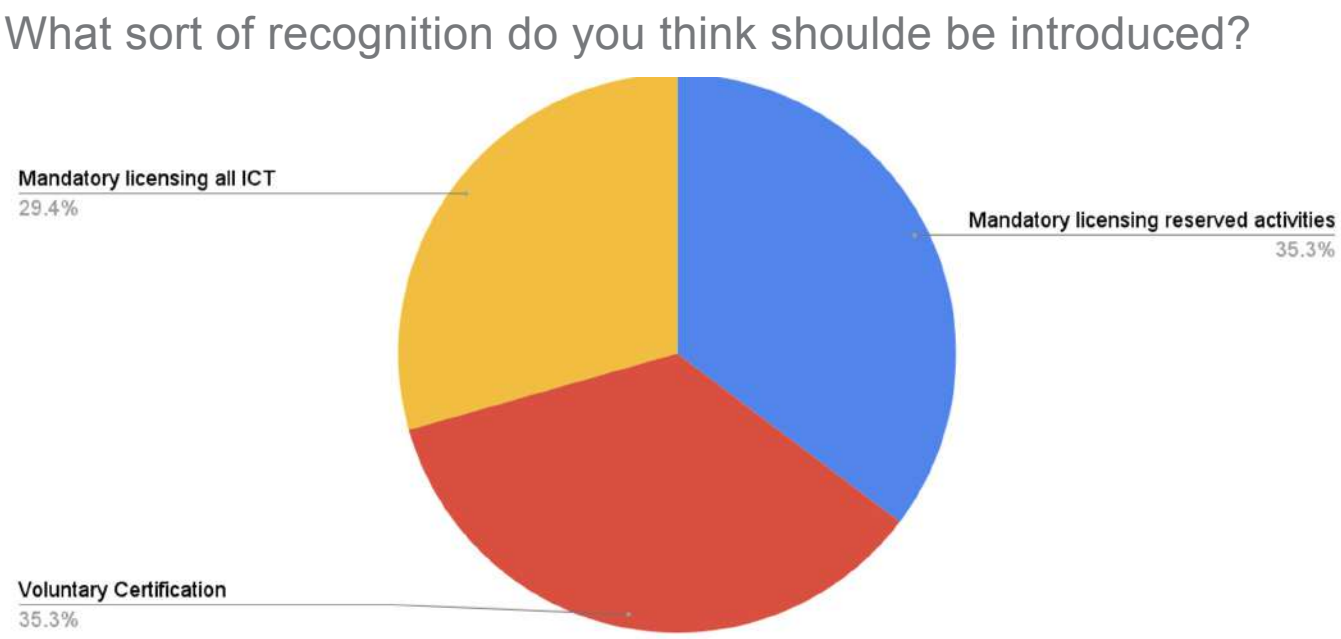


Figure 9

Respondents were then asked to give the reasons for their particular choice. These were presented as the advantages normally attributed to certification or licensing in the one instance and the perceived disadvantages as seen by those who felt that more recognition was not required. Respondents were also provided with the opportunity to state any other factors they saw supporting their choice.

Of note is the fact that for each stated potential benefit, more than 75% of respondents agreed or strongly agreed that the particular benefit would be achieved through better recognition of the ICT profession.

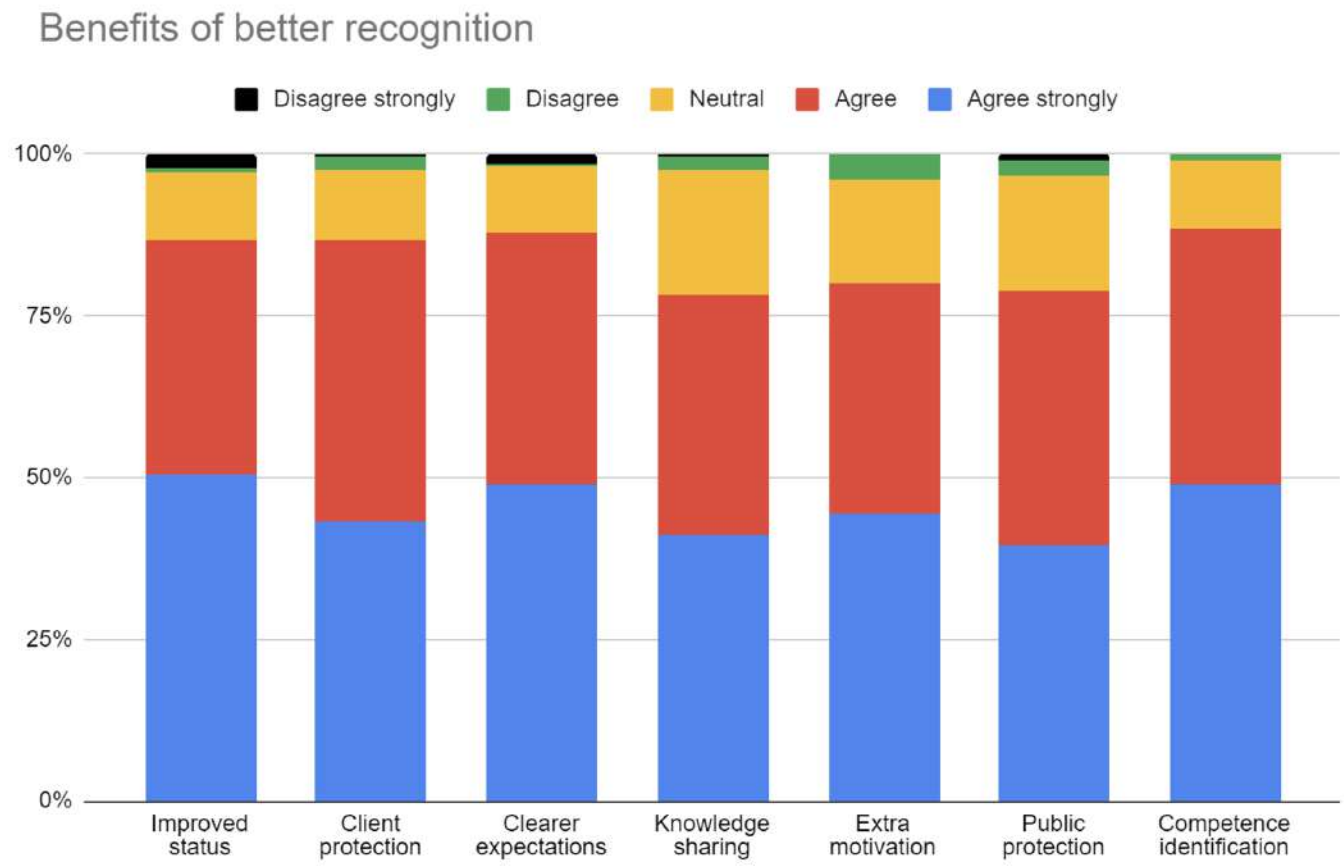


Figure 10

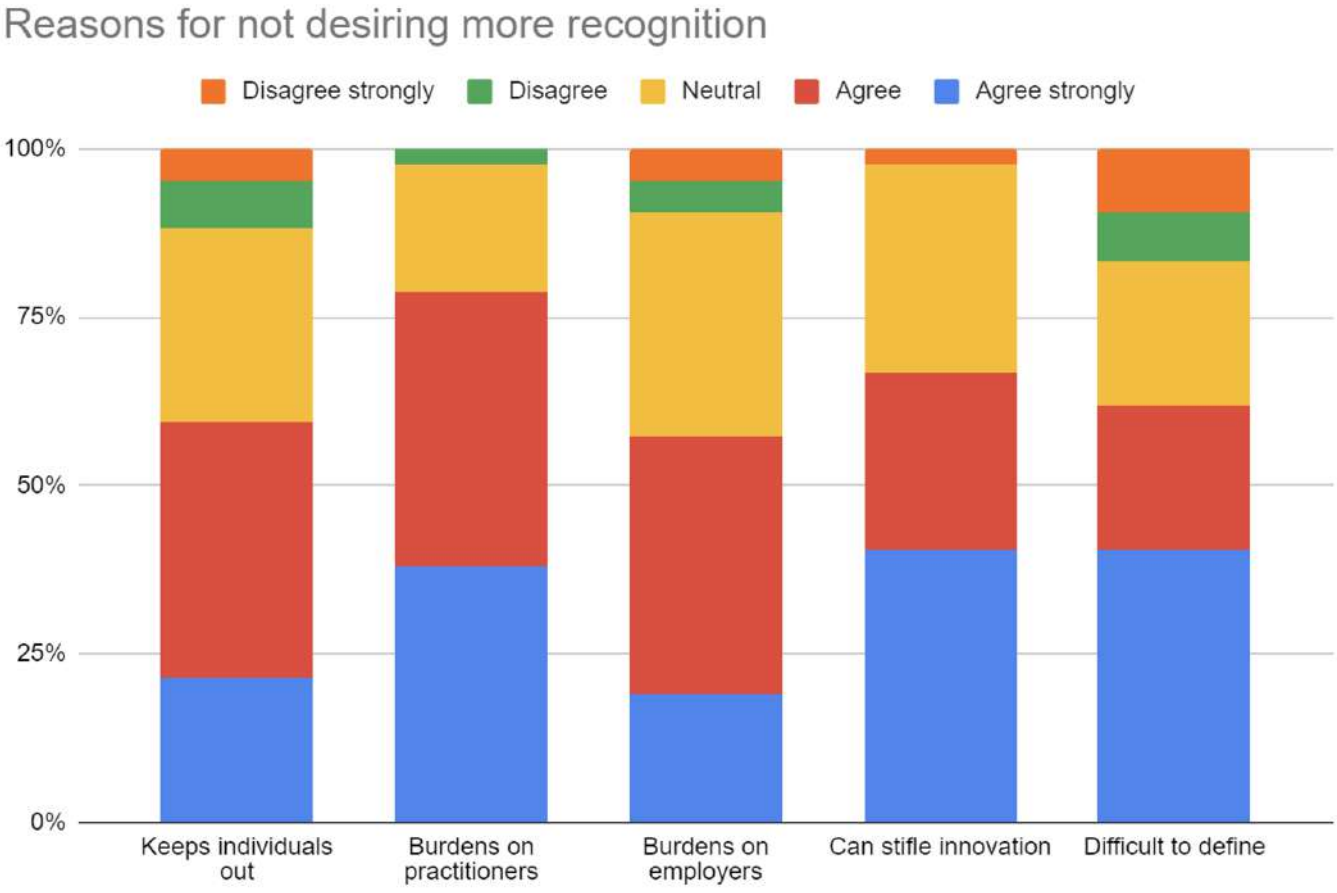


Figure 11

12.1.8 Professional Associations

Respondents were asked if they belonged to any professional association. A significant majority of 73% said they were not members of any professional association. The ones who did were exclusively members of local chapters of overseas associations. The most significant participation is in ISACA, followed by IEEE, IMIS and BCS.

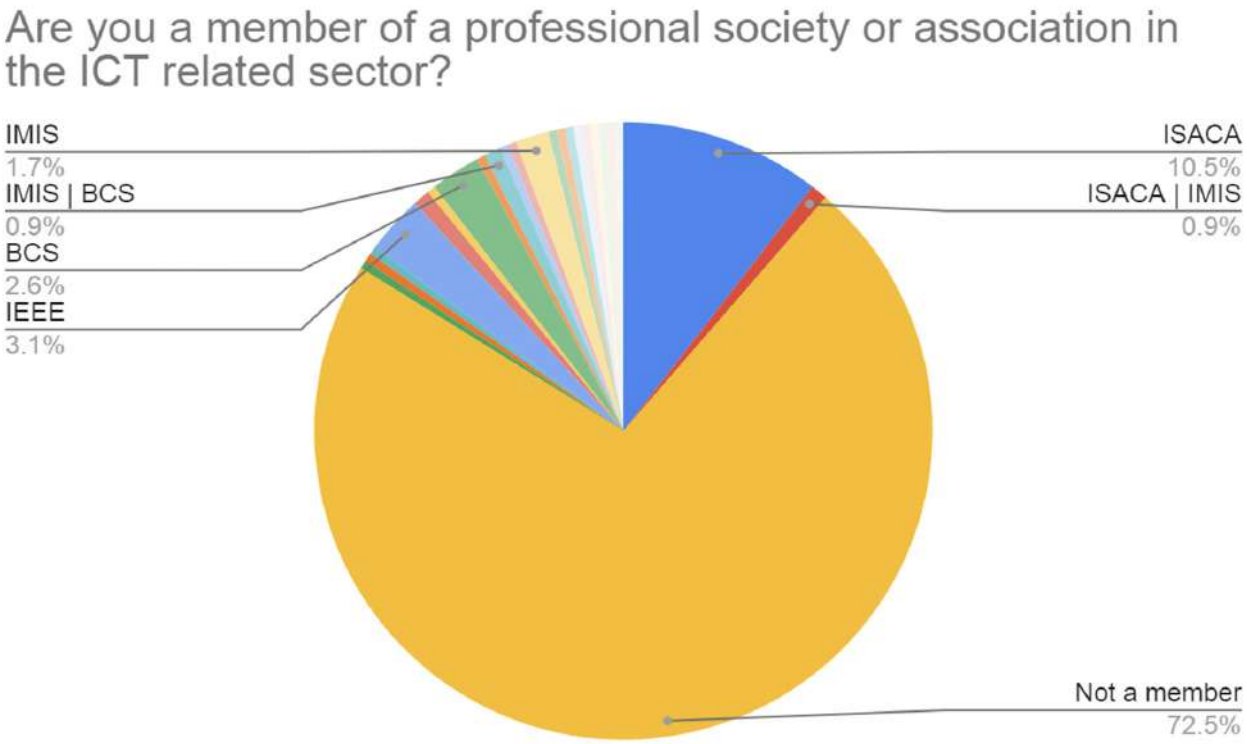


Figure 12 Membership of professional showing those with the greatest participation

12.1.9 Local Association representing ICT practioners

The lack of a local association representing ICT practitioners has been noted in other parts of this document. Respondents were asked whether they believe that such an association should exist in Malta. An overwhelming majority of 86% agree that such an organisation representing ICT practitioners should be set up in Malta.

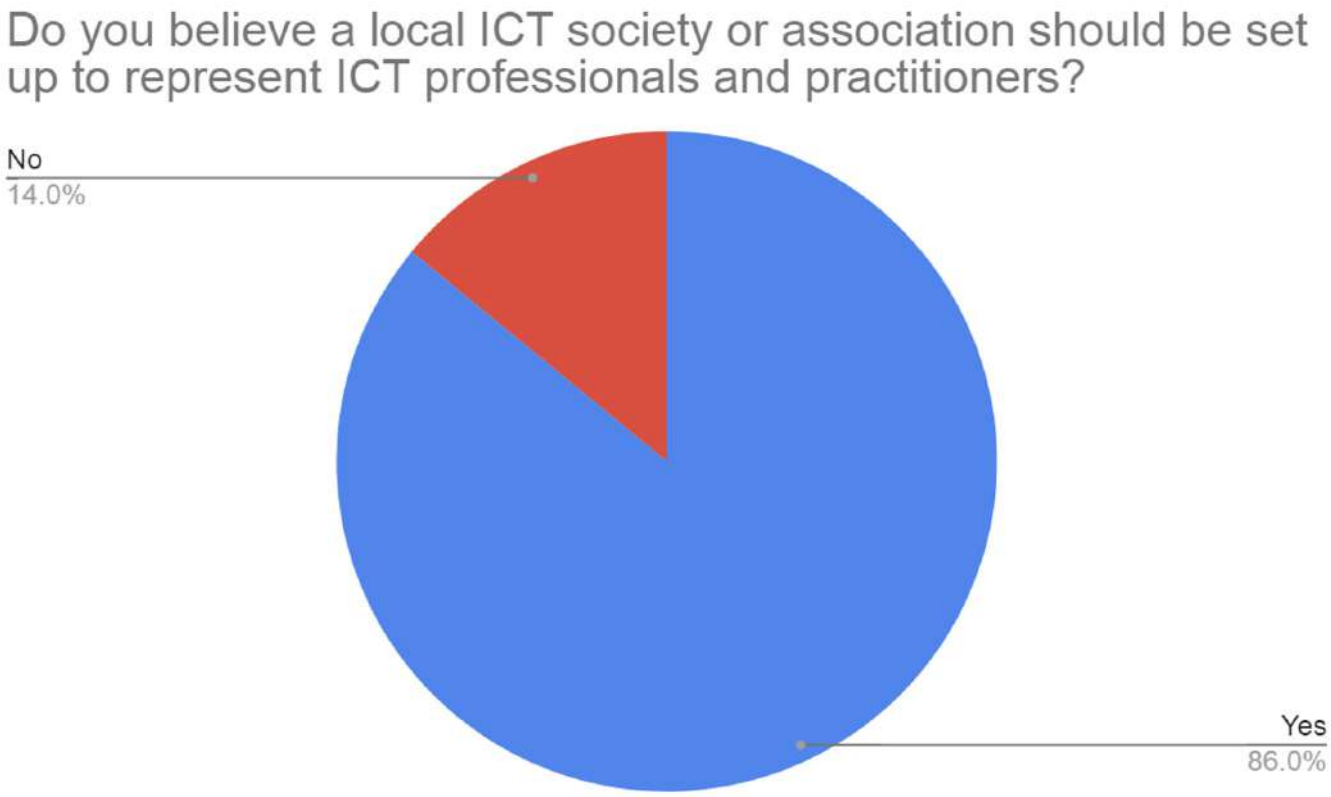
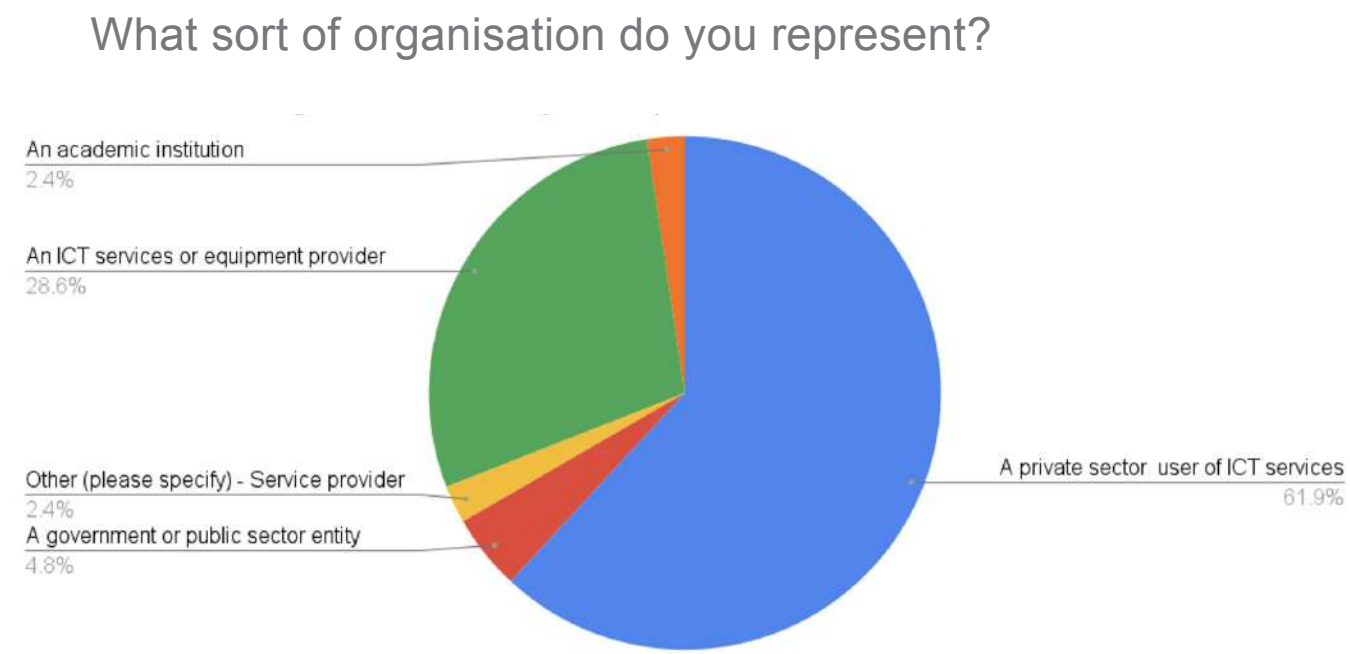


Figure 13

12.2 Organisations survey

A second survey was also conducted targeted at organisations providing or using ICT services. The number of responses, in this case, was 46. It obviously does not have the statistical significance that the practitioners survey carries, but clear patterns also emerged from the responses which are analysed below. The majority of respondents were companies in the private sector, users of ICT services.



The chart below shows the size, in number of employees, of the respondent organisations.

Figure 14

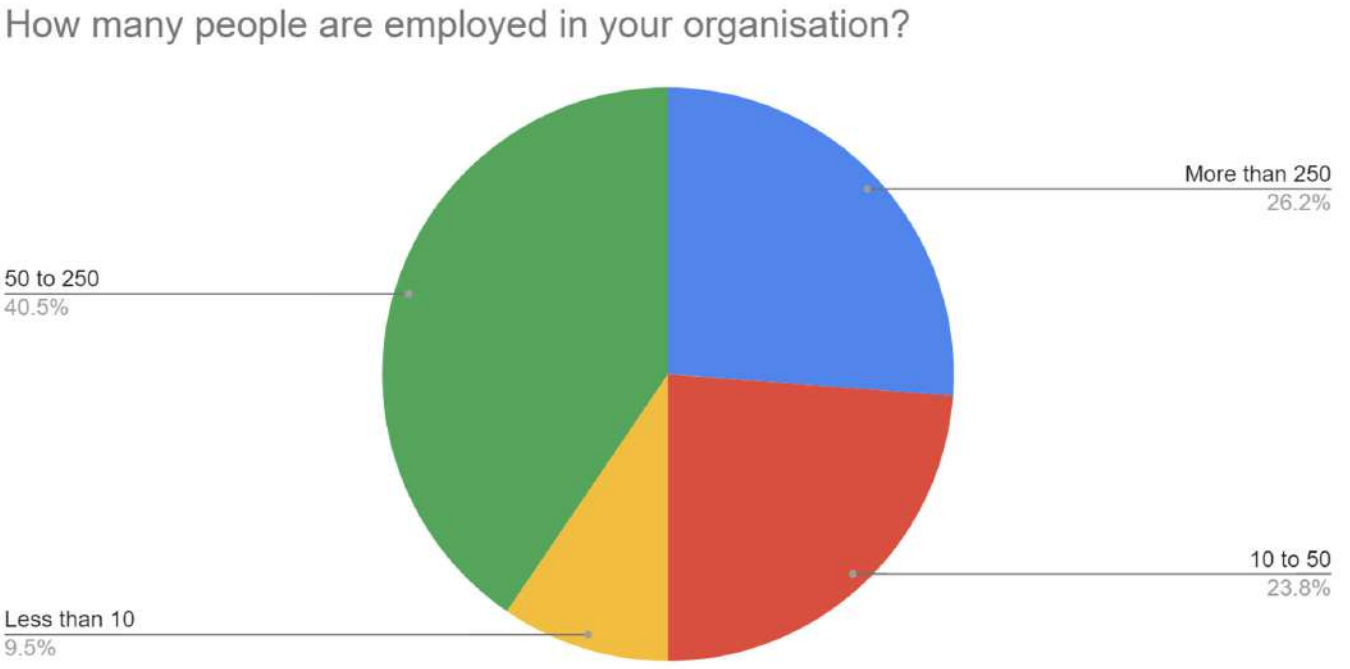


Figure 15

The next question establishes how many employees in the organisation are employed in a predominantly ICT role.

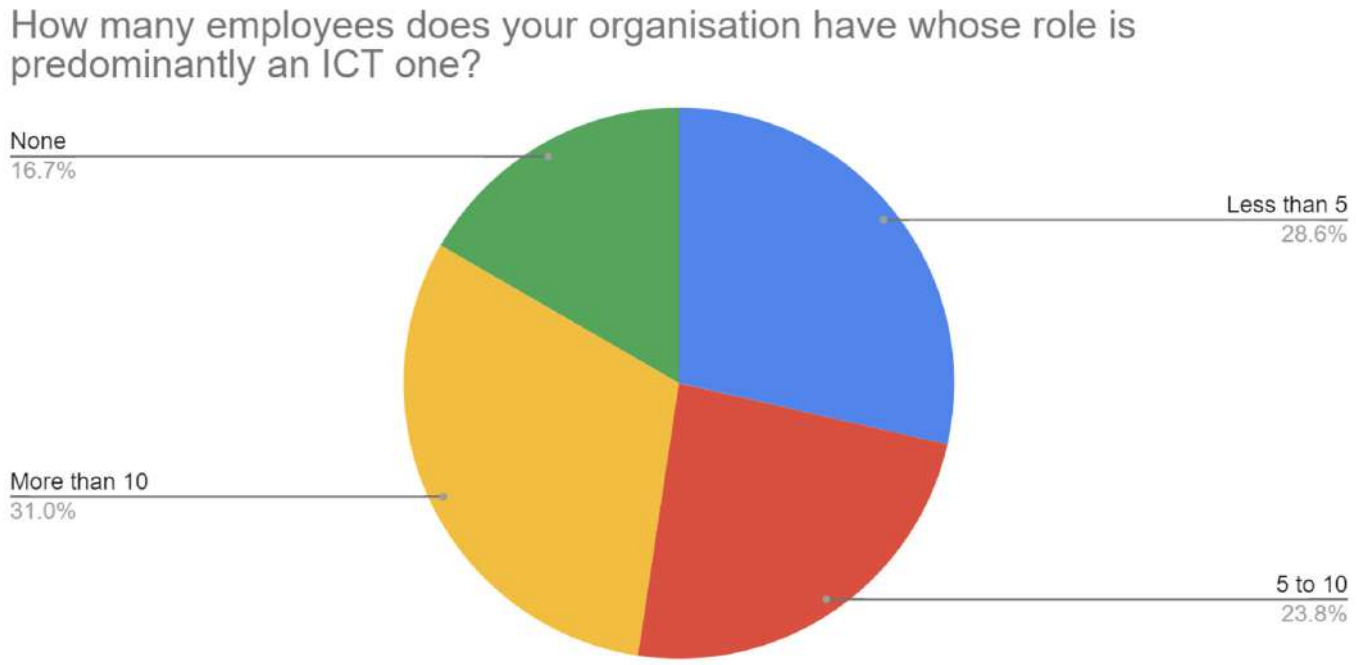


Figure 16

The next question is a key one and seeks to establish the organisation's view of there being legislation to provide better recognition to ICT professionals. It results that an overwhelming majority see this as being beneficial.

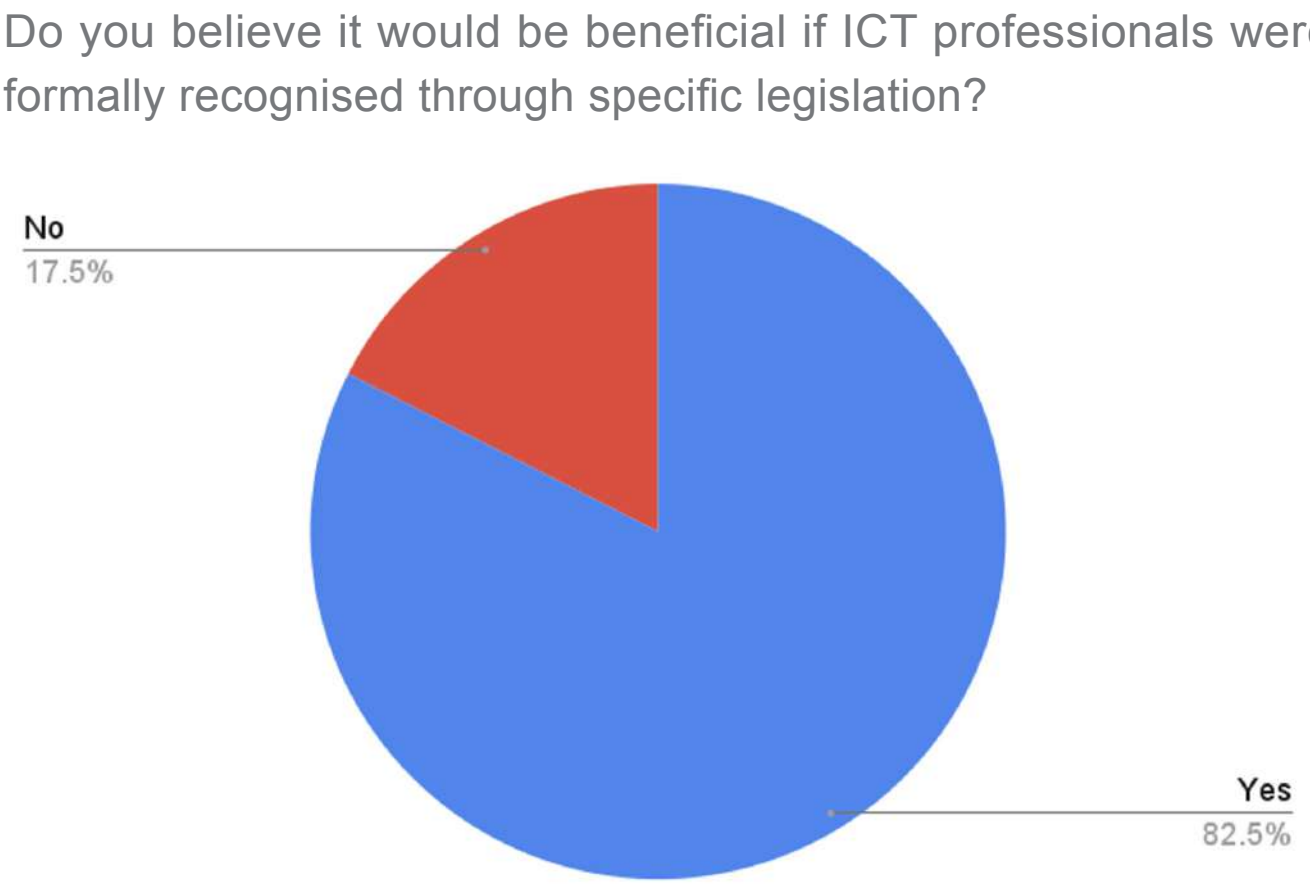


Figure 17

The next question established the type of recognition preferred by those organisations that felt that better recognition was desirable. Fully 81% held that some form of licensing was desirable, with a majority of close to 50%, however deeming that it should only apply to certain reserved activities.

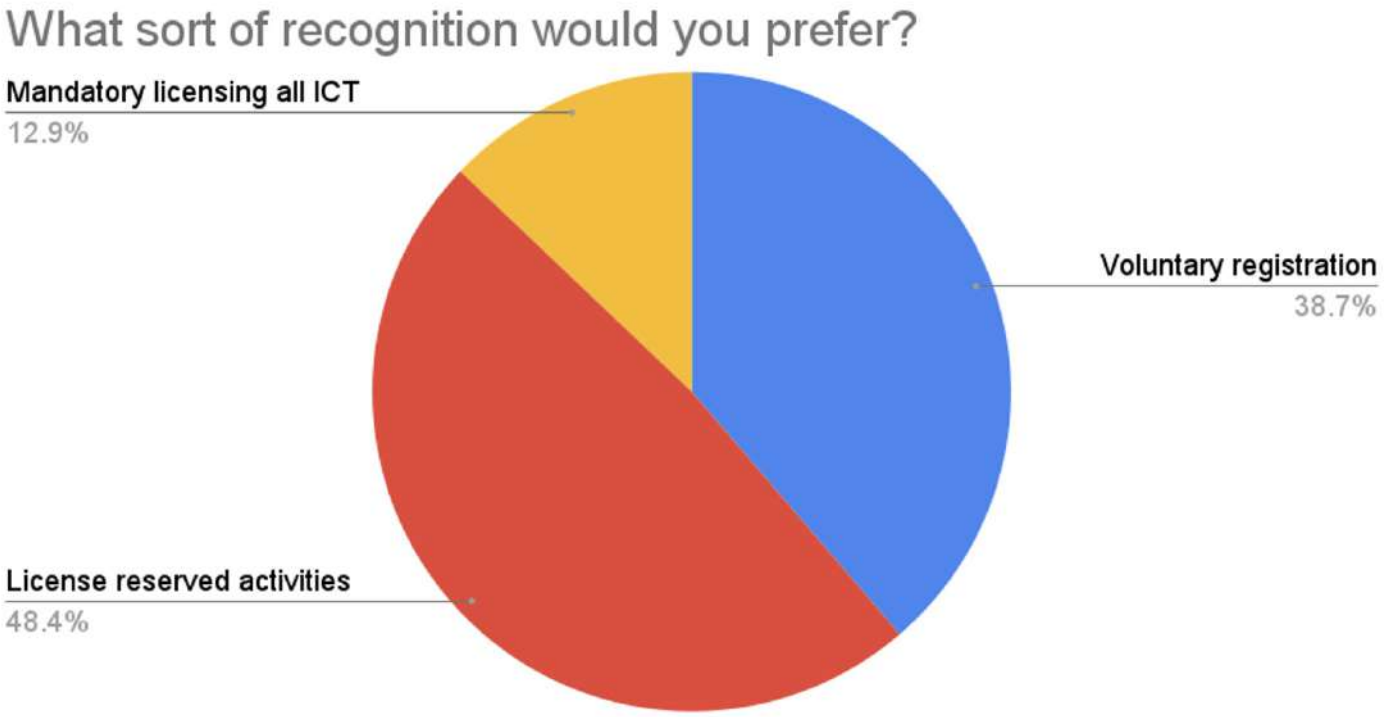


Figure 18

Those who agreed that more recognition of ICT professionals is desirable agreed overwhelmingly with the potential benefits listed.

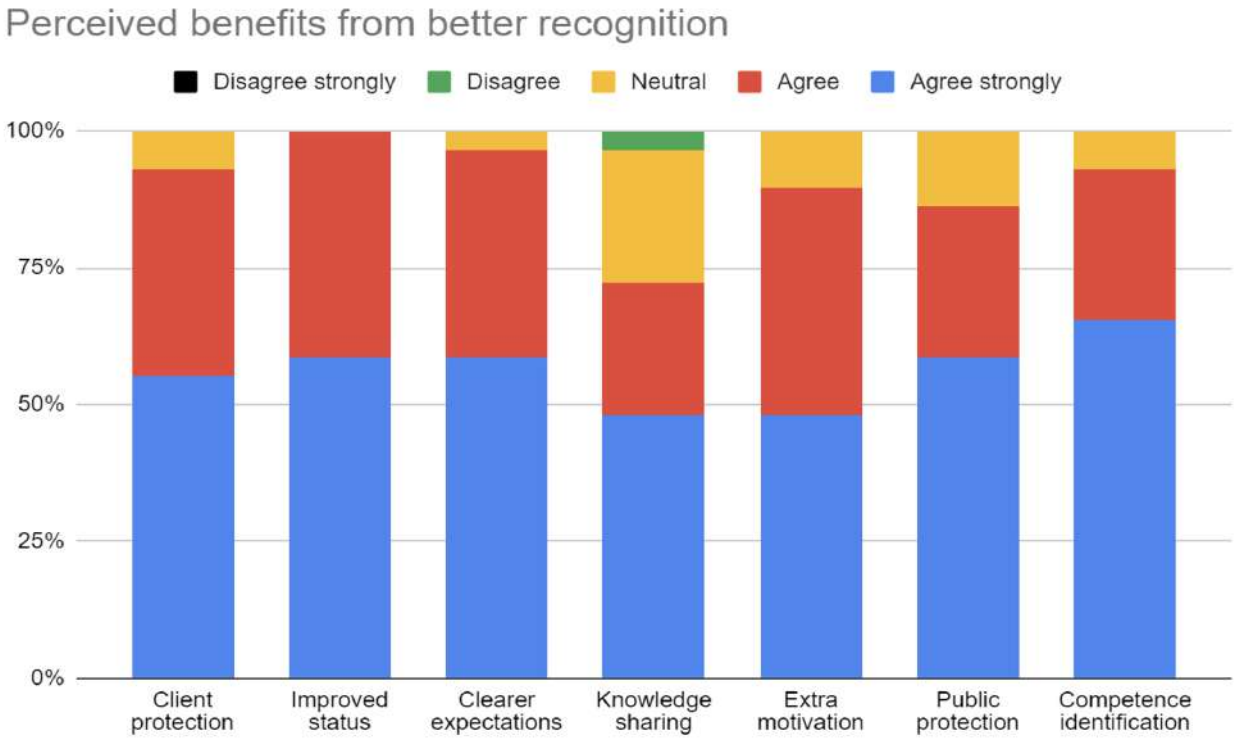


Figure 19

The much smaller number of those who did not feel that better recognition was desirable had the following reasons for their disagreement. The main points (with over 75% agreeing) appeared to be that legislation would have the effect of keeping otherwise competent individuals out of the sector and that it is difficult to define exactly what an ICT professional is.

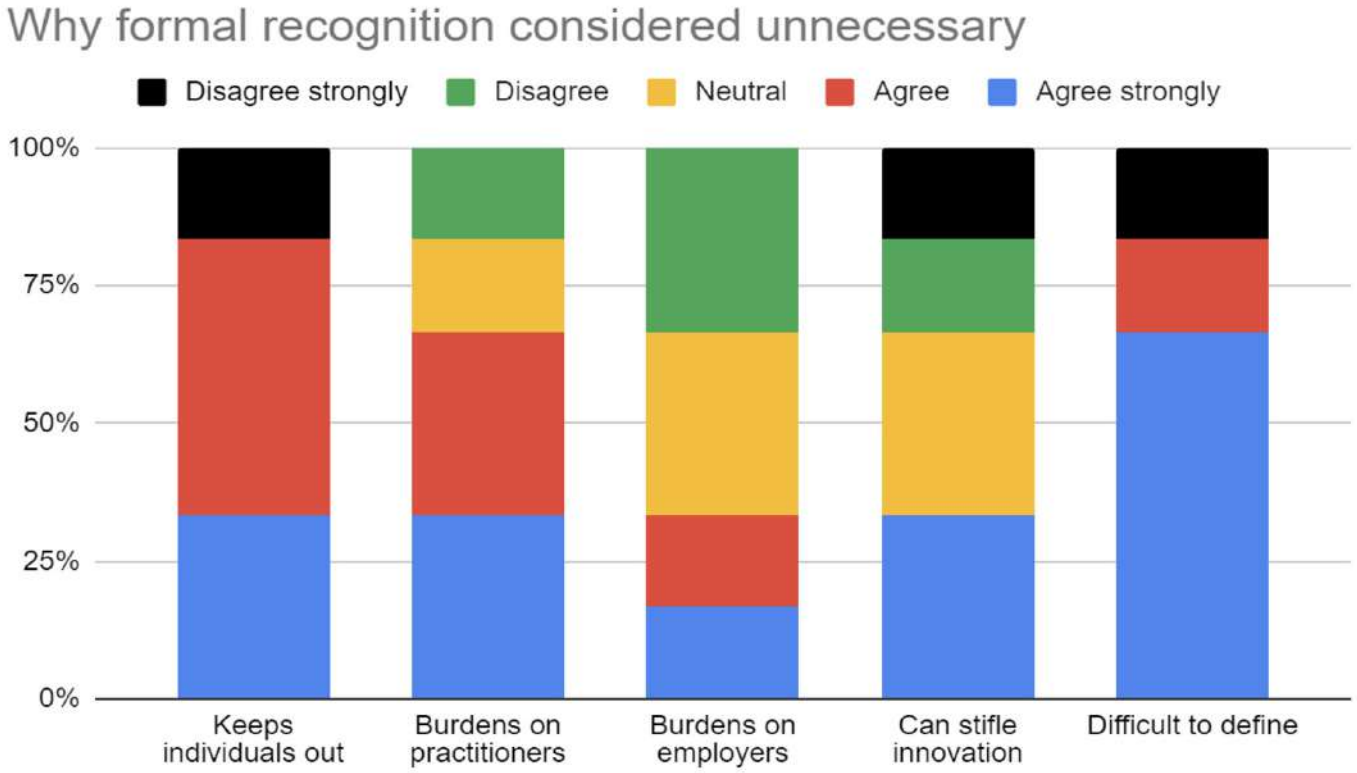


Figure 20

One remark that should be made regarding the Organisations survey is that it can be difficult to identify whose views should be solicitied on this issue. The CIO's view, for instance, could diverge from the CEO's view. There is also the factor that the stance taken can depend very much on the exact details of what recognition system is implemented. An organisation will be tend to favour something when the potential benefits outweigh the costs. It is felt that more nuanced and valid feedback will be forthcoming if it is decided to come up with draft legislation on ICT professional licensing and issue this for statutory consultation.

13. THE WAY FORWARD

There are clearly a number of options that can be considered when dealing with the question of whether the practice of ICT and the activities of ICT practitioners requires more formal recognition in Malta. The options can be summarised as follows:

- Stay as we are
- Provide voluntary state-endorsed certification
- Create a mandatory licensing regime for all ICT activities
- Create a mandatory licensing regime for certain reserved ICT activities

Apart from the first option, each of the above can have various sub-options and different ways of being implemented. We will below examine these options and their implications in further detail.

13.1 "Stay as we are" option

This would simply leave things as they are. There might be ancillary legislation (such as the MGA Act which requires certain qualifications from individuals who perform certain tasks), but there would be no overriding legislation certifying or licensing ICT professionals. There might be the temptation to take this approach on the basis that there does not appear to be a consensus in Europe or elsewhere on the way to approach the issue of ICT professionalisation. It can be argued that no European country requires a licence to practise for ALL ICT activities, and only a few appear to have taken the approach of requiring a licence for reserved activities. Voluntary certification of ICT professionals also does not appear to be a common approach.

There are however other factors that need to be taken into account when assessing the situation in other countries. First of all, there is a very strong push towards more effective legal professionalisation of the ICT sector by a number of national and supra-national organisations such as CEPIS and IFIP. Secondly, whereas it might be a fact that formal direct regulation of ICT practice is not commonplace, each European country has in place a strong professional association representing practitioners in the ICT sector. These associations, even when they are not formally recognised by law, go a long way to giving the ICT profession status and elevating its standing with the public. The existence of these Associations also provides a basis for establishing the required level of skills and competencies, establishing the norms of professional behaviour in the sector and being a source of information sharing among professionals aside from other benefits. It is also very important to observe that these benefits and influences tend to extend well beyond the direct membership of the association and to the community at large.

The situation in Malta is different in that the absence of an association representing ICT professionals exacerbates the issues arising from there being no formal recognition of the ICT professional. The case can certainly be made that if legislation to cater for professional recognition were not to be undertaken, at the very minimum, concrete steps should be taken to ensure the setting up of an association representing ICT professionals in Malta. This issue is addressed in more detail elsewhere in this document.

13.2 Voluntary State-endorsed certification

This option would grant formal state-endorsed recognition to an individual who meets the required criteria for certification. Such certification would be purely voluntary and would simply attest to the fact that an individual has been judged to have reached the level of quality required to be recognised as a professional in the ICT field. The state can either grant the certification itself or else it can confer to an established constituted body representing ICT practitioners, the right to grant this certification. One issue that immediately arises with this approach is that at this stage and as has been discussed above in this document, it does not appear that there is a body in Malta who could claim to merit the authority and responsibility of granting ICT professional certifications.

One consideration with this approach, is that in interviews with stakeholders, the certification option was not one that appears to have a great deal of support. Most of those interviewed appeared to believe that it would add very little value to existing academic, vendor specific or institutionalised certifications. It is also perceived that, given that certification would be voluntary, this could mean that it would not be much in demand. Another aspect to be taken into account is that the number of respondents who believed that certification was the best recognition option was around one third of those desiring better recognition. Around two thirds held that some sort of licensing to practise was preferable.

13.3 State licence to practise - all activities or reserved activities only

There would appear to be basically two fundamental legal approaches if it were decided that ICT practitioners should be given a licence to practise. The first is to use the existing Inginiera Act whereas the second would be to pass specific legislation for the purposes of granting a licence to practise to ICT professionals. The two approaches are examined in more depth below.

13.3.1 Inginiera Act option

The use of the Inginiera Act would be more or less in line with the practice followed in a number of countries which consider certain elements of ICT practice to be a form of engineering discipline. This approach does give rise to certain difficulties which are discussed below. The Engineering Professions Act as recently modified (and now renamed the Inginiera Act) has introduced into primary legislation a definition of "engineering services", which states: *"engineering services" means "activities of design, specification, development, installation, commissioning, operation, maintenance and decommissioning of any mechanical, electrical, chemical process,* **information and related systems** *and such activities shall be carried out by or under the authorization and guidance of an engineer who is a warrant holder, competent in the field as recognized by the Board."*

This article has existed in substance in secondary legislation (now repealed) since 2012 (S.L. 321.05). What is interesting in this article is the explicit inclusion in primary legislation of activities pertaining to information systems in the definition of the services that a warranted engineer can provide. This would appear to give the right to those with a qualification in ICT or Computer Science to apply for an Engineering Warrant. There are, however, some complications and additional considerations. Article 22 of the Inginiera Act states the following *"This Act shall apply only to the Engineering profession in the fields of Mechanical Engineering and Electrical Engineering: Provided that the Minister may, from time to time by order, extend the applicability of this Act to other fields of the Engineering profession."*. Given the foregoing definition of "engineering services" in the Act, this restriction in eligible fields can be due to a) an oversight in the drafting of the Act amendments but which can be readily remedied directly by the Minister concerned through the issuance of regulations extending the fields covered by the legislation or b) a view that activities in ICT are a subset of Electrical Engineering. At this stage, however (April 2022), it is noted that there have not been any new fields added to the ones covered by the Act. The view that ICT is a branch of Electrical Engineering brings in certain problems in that it would appear to significantly limit the ICT activities that can be considered as within context.

One other factor is related to the academic qualifications required by the recipient of a Warrant. Article 3(2)(d) states the following as a requirement - *"(that) he is in possession of such degree of the University of Malta or an equivalent academic qualification* **relating to the engineering profession** *both of which, at the relevant time, are recognised by the Board to be sufficient for the purposes of this article"*

Clearly, the issue here is that the Engineering Board would have to recognise an ICT academic qualification as "relating to the engineering profession". A number of questions arise here. Should all ICT academic qualifications be treated as engineering qualifications? Or should it be only those which exhibit characteristics which can be considered to be of an engineering nature? For example, the UM ICT degree **Bachelor of Science in Information Technology (Honours) (Software Development)** could be considered as a Software Engineering degree and hence qualifying as being of an engineering nature (though even this would be at the total discretion of the Engineering Board). However, there could be those who would argue that the degree given by the same faculty, the **Bachelor of Science in Information Technology (Honours) (Computing and Business)** might be considered a hybrid degree without a sufficient engineering component. A similar argument can be made with respect to the Business Analytics degree course offered at MCAST.

It is certainly not a given that a degree in Software Engineering, despite the nomenclature, would necessarily be considered an engineering degree by the Engineering Board. The same can and will apply to degrees in AI, Blockchain and a number of other ICT higher level qualifications.

It would appear that although certain ICT qualifications are in many countries considered as engineering qualifications, it can reasonably be argued that due to the diverse nature of ICT and the resultant hybridisation of certain ICT qualifications, there are a number of ICT degrees that might not be considered to contain a sufficient "engineering" element. On the other hand, it can be strongly argued that individuals with these qualifications can also be considered equally professional even if, by conventional definitions, not quite meriting the title of "Inginier".

In the course of this study, discussion took place with the Engineering Board and the Chamber of Engineers and while it is clear that these bodies do not oppose the granting of an Inginier Warrant to certain members of the ICT profession, it is felt that their definitions of what sort of knowledge, skills, qualifications and experience justify the granting of a warrant to an ICT professional, their definitions might be too narrow to cater for the sort of recognition that many ICT practitioners feel they merit and that proper regulation of the ICT industry would seem to require and deserve.

13.3.2 An ICT Professionals Act

The second approach is to **enact specific legislation** which would grant a licence to practise (or warrant) to ICT professionals. Most key stakeholders and experts that were interviewed appear to favour this approach rather than have a warrant being granted as part of other existing legislation. This was not a question solicited in the survey as it was felt that the issues involved were too complex to try and examine in a short survey. Once it is decided which paradigm should be followed, the legislation can be drafted to follow from existing regulatory models. Specific sectoral legislation regulating the ICT profession would require the following minimum attributes:

- A clear definition of the ICT profession
- What ICT services would be covered under the legislation
- What qualifications and experience a practitioner would need in order to be granted a licence to practise
- What different fields of ICT practice would be recognised at law
- The process required for the granting of a licence to practise
- The responsibilities of a licensed ICT practitioner
- Duration of licence and conditions for renewal such as requirements for Continuous Professional Development
- Treatment of legal persons within the ICT profession
- Granting of temporary licences (to citizens of EU Member State or Third Country Nationals)
- The composition and responsibilities of the Board, or other legally responsible entity, which will oversee the granting of a licence to practise and related activities
- Disciplinary processes and any arising appeal procedures
- Reasons and processes for the revocation or withdrawal of a licence
- Conditions for recognition and legal status of a representative body (or bodies) for ICT professionals
- Responsibilities of representative body
- Reporting requirements
- Issues related to mutual recognition of qualifications and right to practise for citizens of EU member states

A number of the above points are examined in more detail below, along with identifying options when this might be the case.

- **A clear definition of the ICT profession**

The legislation should provide as clear a definition as possible of what is considered as constituting the ICT profession. The definition will give clarity as to what would be required for an individual to be designated and licensed as an ICT professional.

As has been touched upon above, legislation can also be considered that has more than one level of licensing. There can also exist levels subordinate to the professional, as is the case in other industries, although it is norally the case that this is done through separate pieces of legislation.

- **What ICT services would be covered under the legislation**

This could potentially be one of the most difficult areas to be addressed by the legislation. One option is that the legislation would cover all ICT services. It is interesting to note that of those who agreed that more recognition was desirable, approximately one-third of these respondents held the view that **ALL ICT** service provision should be subject to a licence. A roughly equal number of respondents believed that licensing should only be required for the performance of certain **"reserved activities".** This "reserved activities only" approach would mean that there would need to be legislation or policies in place that would have to clearly specify which activities require a warrant or licence to practise, along with mechanisms to keep this list updated.

There are a number of approaches to how this identification of reserved activities could be addressed. One approach is to explicitly mention these activities in the legislation. Another way is to specify in broad terms in the Act, the type of activities, along with necessary attributes, that would require a licence. Yet another approach is to leave it to other specific pieces of sectoral legislation (e.g. gaming, financial, health) to specify when an activity covered by that legislation requires the oversight or certification of a licensed ICT professional. For example, in legislation related to Online Gaming, that legislation could require that a systems audit is carried out by a licensed practitioner. There could also be a combination of these approaches. Such a list of reserved activities would naturally evolve and be modified over time. Reference can also be made to other regulations, directives and laws, which help identify which systems would require certification by a licensed professional.

As an example, one potential approach would be to use a class-based system to classify software such as that used in IEC 62304. This standard defines three safety classes for software:

- Class A: No injury or damage to health is possible
- Class B: Non-SERIOUS INJURY is possible
- Class C: Death or SERIOUS INJURY is possible

With such a classification, it can, for example, be decided that software systems falling under Class C (or optionally B and C) would need certification from an appropriately licensed ICT professional. Similar classifications can be applied to other systems outside the health category. For example, a categorisation could be devised for financial systems using as one criteria quantification of financial loss that can occur due to system malfunction or bad design.

All in all, it would appear to be too restrictive to subject all ICT activities to a licence requirement. A good approach in fact might be to start with a minimalist approach and simply set out what attributes activities should have in order to be part of the "reserved activities" list. As discussed above, over time and as the need evolves, the reserved activities could then be added in the legislation or attendant regulations.

- **What qualifications and experience a practitioner would need in order to be granted a licence to practise**

The legislation must, of course, address what qualifications are required by the individual who seeks licensing and also how many years and what type of experience are required. It is recommended that there should be more than one path for an individual to obtain a warrant. This would be especially true in the first years of the legislation and certain transitional periods could apply when the legislation would come into force for individuals who might not have the required qualifications but have significant experience. The practice followed by CIPS in Canada in providing alternative paths to accreditation can here serve as a useful model.

Different paths would also involve the level of qualifications and the number of years of experience, and at what level. The BCS in the UK also has a very balanced model for this.

- **What different fields of ICT practice are recognised at law**

ICT covers many different fields of activity such as software engineering, computer and network engineering as well as crypto science, data science, AI etc. it should be determined whether the legislation should identify these distinct fields or not. If the fields are explicitly defined, one key decision is how broad or narrow the definitions should be. On the other hand, given that change is the order of the day in ICT, it would probably be best if these fields were defined in subsidiary legislation or even at a lower level by the responsible licensing Board or entity.

One approach could be similar to that used in the Health Care Professions Act, where there exist different specialisations and a Specialist Accreditation Committee is appointed to examine the credentials of warranted individuals who wish to be listed in a particular Accreditation Register.

Consideration can also be given to frameworks such as the European e-Competence Framework to help identify the top-level fields of ICT practice. However, a balance must be struck between what is stipulated in the legislation and what is left at policy level with the Board or entity overseeing the licensing.

- **The process required for the granting of a licence to practise**

The legislation should, at least at a high level, identify the process through which an individual applies and can be granted a licence to practise although the details should probably best be left to subsidiary legislation or even policy level.

- **The responsibilities of a licensed ICT practitioner**

The legislation should clearly set out the responsibilities of the licensed practitioner. These should include a duty to abide by a published Ethical code and to engage in the required continuous professional development activities as required by the Act.

- **Duration of licence and conditions for renewal such as requirements for Continuous Professional Development**

The validity of a licence should be for a fixed duration; certainly not longer than three years. Renewal of a licence should be on the basis of continuing practice and, very critically, evidence of ongoing learning and updating of knowledge and skills.

- **Treatment of legal persons within the ICT profession**

The legislation must make it clear on how legal persons in the ICT sector (e.g. companies providing software development services) should be treated. Other pieces of legislation, such as the Accountancy Act or the Periti Act, provide models on how the treatment of partnerships of professionals can be addressed in the legislation. Consideration can be given to providing licences to ICT companies provided they meet certain criteria.

- **The composition and responsibilities of the Board which will oversee the granting of licences to practise**

The enacting and oversight of this legislation would, as is the case with other professions, be entrusted to a Board or similar entity specifically set up for the purpose. The composition and functions of this Board should be clearly set out in the legislation. Typically such a Board would include members appointed by the responsible minister, a number of members elected by warrant/licence holders and representatives of any bodies recognised in law as representing the licence holders.

Another option which already exists in Maltese legislation (the Kamra tal-Periti in the Periti Act) is for the legislation to set up a body which will represent the profession but also has the role of “managing” the profession by granting licences, maintaining registers, taking any disciplinary actions etc. Such an approach exists in other countries such as Portugal (OE), Cyprus (ETEK), Nigeria and others. The role of BCS and the Canadian CIPS is also analogous although it is more aligned to state-endorsed certification rather than

licensing.

A structured setup with a small number of full-time employees will be required in order to support the Board in managing the required processes. This is particularly the case if different paths are made available to licensure (requiring more detailed evaluation of applicant qualifications); a not unreasonable requirement, particularly in the early years following enactment of the legislation.

- **Reasons and processes for the revocation of a licence**

There will be instances where revocation of a licence will be called for. The reasons and circumstances under which a licence can be revoked should be clearly set out in the legislation as well as the process involved and any appeals procedures that might be applicable.

- **Disciplinary processes and any related appeal procedures**

Apart from revocation of a licence, there are other instances where disciplinary procedures might be called for upon an existing licence holder. These might be fines or temporary revocation of a licence or other measures as catered for by the legislation. The processes and structures required, such as Disciplinary sub-committees and their composition, should be clearly set out in legislation.

- **Conditions for recognition and legal status of a representative body or association**

Most legislation regulating professions will include recognition of a formally set up body which represents the profession. An example of such legislation is in the Inginiera Act where clause 18 (1) states, "*The Minister may, after consulting the Board recognise an association of warrant holders to be known as the Chamber of Professional Engineers.*"

The Maltese Accountancy Act has a provision (Clause 9 (1)) which states, "*The Board may recognize any local association of accountants as an approved accountancy body for the purposes of this Act if the Board is satisfied, among such other matters as may be prescribed, that the educational and professional qualifications demanded by such association for associate membership thereof conform to currently accepted standards and that such membership is open to all persons having such qualifications.*" In this Act the body is not named and there is also scope for the recognition of more than one representative body.

As touched upon above, the Periti Act takes a somewhat different approach in that the body representing the profession given significant powers which in the case of other professions are vested in a Board or similar body set up by Government. Article 12 of the Periti Act concerns the Establishment of the Kamra tal-Periti and Periti Professional Conduct Board. This approach, probably mainly a result of historic reasons, takes a different approach from more recent professional regulatory legislation in that what can be deemed as the representative body of the profession is established by law and given significant power over the conduct and discipline of warrant holders.

The commencing relevant text in the legislation is Article 12 (2) of the Periti Act, which states, "*The Kamra tal-Periti shall be the* **recognised and approved national regulatory and representative body for the profession** *whose purpose* is that of:

(a) advancing the practice of architectural and civil engineering professional activities in Malta;
(b) corresponding with Government, and vice-versa, on all matters concerning the profession, including advice to Government on the formulation of public policy related to the built environment;
(c) ensuring that all members of the profession act responsibly and ethically, having due regard for sustainable development practices, the protection of the national, cultural, social and environmental heritage, the upholding of public health and safety and structural integrity before, during and after construction processes, and the adherence to the Code of Professional Conduct, as may be prescribed by regulation."

This might be an interesting option to consider, along with the assurance of appropriate representation from all stakeholders and the necessary safeguards incorporated in the law.

- **Reporting requirements**

Annual work programmes and activity reports would typically be required of the licensing board and other quantitative data and recommendations. The up-to-date maintenance of various registers, which list licensed

individuals, and specialist registers and registers to identify any individuals who have been subjected to any disciplinary action, is also a crucial activity.

- **Issues related to mutual recognition of qualifications and right to practise in an EU context and the granting of temporary licences.**

In any legislation regulating a profession in an EU member state, account must be taken of EU legislation which mandates the mutual recognition of the diplomas and other qualifications required in each Member State for access to regulated professions and which can be used to facilitate freedom of establishment and the provision of services in the respective member states.

This requirement should not present any major issues as Malta has now adequate experience on how to avoid problems in this matter. In fact it is observed that any issues that might have arisen in the past have been more due to legacy laws rather than recently crafted and enacted legislation.

13.4 Should a phased approach be considered?

One option that was raised, particularly in discussion with stakeholders, was to propose a phased approach as to how better recognition could be gradually attained. Such a phased approach might initially introduce a certification regime which can then be followed up by legislation that requires licensing for certain reserved activities.

An approach could be to build legislation that from the start caters for licensing - for reserved activities only - but the reserved activities list could be built up over time. When the reserved activities list is initially empty, this will amount to solely de facto voluntary certification. As items are added to the reserved activities list, a professional licensing regime would, by default, be gradually introduced. As noted elsewhere, the reserved activities could be introduced either through the Act's enabling legislation, or through other sectoral legislation which identifies activities which need to be certified by a licensed ICT professional.

The advantage of this approach is that it introduces and makes available a framework which allows for the introduction of regulation on an "as needed" basis where it is felt that such regulation is required in order to protect life, health, safety and public and consumer welfare.

One final aspect that cannot be emphasised too much is that it is crucial that whatever approach is finally opted for, steps need to be taken to ensure the setting up of a representative body of ICT practitioners. It will be more difficult for the professionalisation of the ICT sector to move forward with such a representative body being in place.

14. GLOSSARY

ACM - Association for Computing Machinery (main USA body representing the IT profession)
BCS - British Computer Society
CITP - Chartered IT Professional (awarded by the UK's BCS)
CoE - Chamber of Engineers (represents the interests of professional engineers in Malta)
Competence – a combination of knowledge, skills, attitudes, and/or personal traits demonstrated in a person's behaviour that allows them to achieve specific objectives in a work-related setting

A competence essentially consists of three elements:

- knowledge: information and experience
- skills: highly developed physical and/or mental abilities and coordination required to perform a specific task
- attitudes/personal traits: a person's values as they define them as an individual and how they relate to and interact with their surroundings

CPD - Continuous Professional Development
CPN - Computer Professionals Nigeria
CSM - Computer Society of Malta - now no longer active
e-CF - European e-Competence framework

Formal learning - Formal learning is learning that is delivered "in a systematic, intentional way". It is planned and guided by an instructor, and it usually occurs in a face-to-face setting or through an online learning platform.
IEC - International Electrotechnical Commission; brings together more than 170 countries and provides a global, neutral and independent standardisation platform
IEEE - Institute of Electrical and Electronic Engineers (main USA Engineers institution and has a well respected Computer Society as well as a presence in Malta through a local chapter)
IFIP - International Federation for Information Processing - Represents IT Societies from 56 countries/ regions, covering five continents with a total membership of over half a million
IITPSA - Institute of Information Technology Professionals of South Africa
Informal learning - Informal learning is unstructured, often unintended, and it occurs outside of a conventional learning setting.
ISACA - Information Systems Audit and Control Association - this has a very active local chapter in Malta
ITIL - IT Infrastructure Library
MQF - the Malta Qualifications Framework based upon the European Qualifications Framework (EQF). The highest levels are Level 8: Doctoral Degree; Level 7: Master's Degree; Level 6: Bachelor's Degree.
NCEES - National Council of Examiners for Engineering and Surveying - A USA body
Non-formal learning - Non-formal learning takes place outside formal learning environments but within some kind of organisational framework. It arises from the learner's conscious decision to master a particular activity, skill or area of knowledge and is thus the result of intentional effort
NSO - National Statistics Office (of Malta)
SFIA - Skills Framework for the Information Age
UM - Universita ta' Malta

15. LEGISLATION CONSULTED

Maltese Legislation

- Accountancy Professions Act, Chapter 281
- Education Act, Chapter 327 Laws of Malta
- Inginiera Act, Chapter 321 Laws of Malta
- Health Care Professions Act, Chapter 464 Laws of Malta
- Medical and Kindred Professions Act, Chapter 270 Laws of Malta
- Mutual Recognition of Qualifications Act, Chapter 451 Laws of Malta
- Periti Act, Chapter 390 Laws of Malta
- Psychology Profession Act, Chapter 471 Laws of Malta
- Malta Qualifications Framework for Lifelong Learning Regulations, SL 327.431
- Mutual Recognition of Higher Education Qualifications in the European Region Regulations, S.L. 451.02
- Recognition of Professional Qualifications Regulations, S.L. 451.03
- Legal Profession (Advocates) Regulation Act, Bill no 123 of 2012

Other legislation

- Directive 2005/36/EC on the Recognition of Professional Qualifications
- Directive 2013/55/EU amending Directive 2005/36/EC on the recognition of professional qualifications and Regulation (EU) No 1024/2012 on administrative cooperation through the Internal Market Information System ('the IMI Regulation')
- The Cyprus Scientific Technical Chamber Law of 1990 (224/1990) http://www.cylaw.org/nomoi/enop/non-ind/1990_1_224/full.html
- Nigeria Computer Professionals registration Act http://www.placng.org/lawsofnigeria/print.php?sn=78
- Australian Professional Standards Act 1994. - https://legislation.nsw.gov.au/view/html/inforce/current/act-1994-081

16. REFERENCES

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- Professional recognition - cimea.it http://www.cimea.it/en/professional-recognition.aspx
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- Terms of reference for Hong Kong ICT professionalisation Task Force https://www.ogcio.gov.hk/en/about_us/committees/archive/d21sac/pd/index.html
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- Novatica Monograph - An overview of the Informatics Profession - in Spanish http://www2.ati.es/novatica/2010/207/nv207sum.html#art17
- CEPIS Member organisations https://cepis.org/member-societies/
- The Importance of Professional Engineer (PE) Licensure for Electrical, Electronics and Computer Engineers https://insight.ieeeusa.org/articles/importance-of-pe-licensure-for-electrical-electronics-and-computer-engineers/
- PE Electrical and Computer: Computer Engineering exam - NCEES https://ncees.org/pe-electrical-and-computer-computer-engineering-exam/
- NCEES Principles and Practice of Engineering Examination https://ncees.org/wp-content/uploads/Computer-Oct-2021_CBT-1.pdf
- Topics To Practice Before Taking The FE Civil Exam | PrepFE https://www.prepfe.com/blog/2020/8/checklist-of-topics-you-need-to-know-before-taking-the-civil-engineering-fe-exam
- FE Electrical and Computer Exam Topics | PrepFE https://www.prepfe.com/fe-exams/disciplines/electrical-and-computer

- Research conducted by the Malta Federation of Professional Associations (MFPA), on the public's perception of professionals in Malta.
https://app.powerbi.com/view?r=eyJrIjoiZDVjNzQzNzItNzUyYi00YmE1LThlZmQtZDI2OWFjOTQ-wYTY1IiwidCI6IjczMjdkNTExLWQ3Y2QtNDZkNy05NDEzLTdkYjkzY2FlNGYwOSIsImMiOjh9

- Regulated professions database - European Commission
https://ec.europa.eu/growth/tools-databases/regprof/index.cfm?action=map_regulations

https://www.ccii.es/images/ccii/recursos/The_European_Foundational_ICT_Body_of_Knowledge_eSkills_Promotion_of_ICT_Professionalism_in_Europe.pdf

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- Advocates bill
https://www.parlament.mt/media/18516/bill-no-123-legal-profession-matters.pdf

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https://www.change.org/p/mosti-stop-computing-professionals-bill-2011-cpb2011
https://digital-skills-jobs.europa.eu/en/organisations?keywords=&page=0

- Deputizing Software Professionals: One case for settling the lawless Digital Wild West in the Golden State By Rafa Baca
https://digitaldeputyact.org/wp-content/uploads/2020/09/Deputizing-Software-Professionals.pdf

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https://www.nspe.org/resources/licensure/what-pe

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https://blog.cm-dm.com/post/2012/04/14/Is-my-software-in-class-A%2C-B-or-C#:~:text=IEC%2062304%20defines%20three%20safety,or%20SERIOUS%20INJURY%20is%20possible

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17. ANNEX 1 ICT PROFESSIONAL ASSOCIATIONS IN EUROPE

Note that this is a partial list of the main ICT associations in Europe

- Austrian Computer Society
- Informatics Association of Bosnia and Herzegovina
- Union of Automation and Informatics, Bulgaria
- Croatian Information Technology Association
- Cyprus Computer Society
- Czech Society for Cybernetics and Informatics
- Dansk IT, Denmark
- Finnish Information Processing Association
- German Informatics Society
- Informationstechnische Gesellschaft im Verband der Elektrotechnik Elektronik Informationstechnik - Germany
- Hellenic Professional Informatics Society, Greece
- John von Neumann Computer Society, Hungary
- Icelandic Society for Information Processing
- Irish Computer Society
- Associazione Italiana per l'Informatica ed il Calcolo Automatico
- Latvian Information Technology & Telecommunications Association
- Association Da Vinci, Luxembourg
- Serbian Informatics Association
- Koninklijke Nederlandse Vereniging van Informatieprofessionals, the Netherlands
- Den norske dataforening, Norway
- Polskie Towarzystwo Informatyczne – Polish Information Processing Society
- Asociatia Pentru Tehnologia Informatiei si Comunicatii, Romania
- Slovak Society for Computer Science
- Slovenian Society Informatika
- Asociacion de Tecnicos de Informatica, Spain
- Dataforeningen i Sverige, Sweden
- Swiss Informatics Society
- Informatics Association of Turkey
- British Computer Society, United Kingdom

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