5. What is an ICT professional anyway?[1]

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Introduction

The intention of this paper is to instigate ongoing discussion surrounding the connected topics of information and communications technology (ICT) professionalism and the ICT profession. Part of that discussion needs to include suggestions for 'the way forward' for the development and recognition of an ICT professional body and the way it should govern/support/protect the professionals within it.

I want to start off by describing some of the types of people that I have met/ observed during my time in the systems/software industry and also within academia. The type classifications are mine, are not formal, and carry no essential meaning other than what I have opted to give them. They are like a loosely typed language: they only possess meaning in a chosen context, and I can change the meaning and context whenever I like. Hence, the classifications are not to be interpreted as authoritative.

The point in presenting these ICT types is to help to identify different angles to the accepted norms on the subject of professionalism, and to use them in a discussion on the state of professionalism and, indeed, the current state of the ICT profession.

To me, individual professionalism (as a norm), requires a combination of several necessary characteristics:

- competency
- ethicity
- knowledgeability
- learning ability
- care
- pride.

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1   A version of this chapter was published in *The Australasian Journal of Information Systems*, 2009, vol 16, pp 149–63. It is published here with permission.

An individual cannot be a professional in the absence of even one of these characteristics. It is common, however, for ICT people to attach to themselves the label of 'professional' whilst lacking one or more of the characteristics listed above.

Aside from professionalism in ICT, it is not clear what the ICT profession is. Is it a combination of two (or more) different professions? Is it merely a label given to a broad range of computer, software, communication networks, electronics, and other practices and sciences? I will draw on more formal definitions to discuss the state of play of the ICT profession later in the paper.

Information and communications technologies types

The following descriptions are provided in the hope that readers, who have perhaps met people with many of the same traits, ponder the connection between the traits and 'professionalism'. The labels given to the 'types' are intended to summarise overall capability and social interaction.

The 'highly broadly technical and you know it' type

They know their stuff and make sure everyone else knows they know their stuff. They have an excellent grasp of what they know, and they ususaly interest themselves in highly technical/detailed information. Presumably it provides a degree of comfort/control to know a whole heap of stuff in which few others are interested. They always have something to say when discussions move to their area of expertise and, on such occasions, they nearly always make everyone feel inadequate or irritated. Such discussions don't last long, unless there's another 'highly technical and you know it' sort of person participating — but then they tend to be the last people standing, when everyone else has gone. These people are usually competent and ethical, and often perform best under pressure — they love challenges. They typically don't make successful team players/ managers because their organisational abilities only apply to themselves. When praised for their performance their attitude is typically one of: 'What did you expect?'. Diplomacy is not one of their strong points.

The 'highly broadly technical and you don't know it' type

They are quiet/unassuming and know their stuff but, generally, others don't know that they know their stuff. They have an excellent grasp of lots of things, not just their ICT knowledge — but few ever know this. They perform their

work ethically with a high level of competence and diligence — they hate pressure, though. They are typically self-critical, even when told that they have performed excellently. These people often squirm when praised — but, in the end, they do appreciate being wanted. Typically they will not volunteer their expertise and they're just as happy to occupy themselves learning new stuff if no-one bothers to include them in a team/task. These people cannot manage anyone other than themselves, but at least they know it. They also know that there's a lot that they don't know and they often worry about this.

The 'highly narrowly technical and you know it' type

A little like the 'highly technical and you know it' types, but they are usually newbies to the game and/or immature. Every new problem put to them is solved using the 'one' technique that they know really, really well. These people are often seen as a pain. They usually don't perform well, even when they are given the opportunity to use their best knowledge assets — probably because they are not particularly good at solving complex problems. If these people resist learning new ideas, they become increasingly incompetent.

The 'highly narrowly technical and you don't know it' type

As with the 'highly narrowly technical and you know it' type, every new problem put to them is solved using the 'one' technique that they know really, really well. The trouble is, others don't necessarily know this is happening during a project and, if not discovered early, it can be disastrous. These people are a pain because they stubbornly insist that they are right and that everyone else is wrong. Again, just like the 'highly narrowly technical and you know it' type, they usually don't perform well, even when they are given the opportunity to use their best knowledge assets, simply because they are not good at solving complex problems. These people typically resist learning new ideas and so they remain incompetent.

The 'big-picture broadly technical' type

Tend to be the visionaries. They possess/understand enough/plentiful technical concepts/information to be able to provide effective plans of attack for solving large/complex problems without being swamped with detail. These people are typically the engineers of the ICT industry and they usually possess a wealth of experience. They are competent and always prepared to learn more, but not usually open to taking on detailed knowledge. They can be good leaders and managers, but they are best at analysis, architecture and design. Verification and validation of ideas are not their strong point, but they are very happy for others

to provide that detail. These people know what they know and don't know, and are typically prepared to inform others of the same. Sometimes their ethics are questionable, especially when they produce solutions to large/complex problems that do not recognise, or simply ignore, the broader stakeholder community.

The 'big-picture narrowly technical' type

The industry is, unfortunately, riddled with these people. They try hard to emulate the 'big-picture broadly technical' type, but usually fail because they lack experience, or they have only worked within a narrow field of ICT, or within a single organisation. These people typically provide the same, conceptually limiting solutions to all large problems with which they are presented. Put them outside their safety net and they are flummoxed. They can behave unethically when under pressure, or when others have great expectations of them — but this is often caused by them having neglected to communicate what they don't know.

The 'concepts only' type

There doesn't seem to be too many of these people about these days. They typically possess very limited knowledge and understanding of the technical, process, quality, and people elements of the ICT industry. They try and make themselves seem important by producing a million (mostly crazy) ideas a minute. They do try and concentrate on human usage and efficacy aspects of ICT. This is not to suggest that good concepts cannot be produced by people who have never been trained in ICT, but they are usually experts within other domains.

The 'I can do it' type

Usually new graduates who are very enthusiastic and keen to make their mark. Often smart, but they tend to be over-confident. While these are good qualities for new professionals to possess, they do have to be controlled/directed so that the individual builds on good professional behaviour. If uncontrolled, all sorts of disasters can occur not only for the individual but also for teams and organisations. If these individuals are newbies, then their expectations are typically not well aligned with reality — and this example is not limited to ICT. There is the potential, however, to assume that 'I can do it' ICT graduates are somehow smarter and more correct than engineers, scientists, lawyers or artists, and their bosses. These people can possess new ideas and new technology, but this does not mean that they should be in control.

The 'I can't do it' type

Perhaps these people have chosen the wrong vocation. They lack confidence. They struggle to remember/understand almost anything, and they always need training. These people are not self motivated and they lack initiative. They don't want to be responsible for anything or anyone. Under pressure, they usually fail to perform. These people probably have other problems that override their professional responsibilities. Given the right opportunity and environment, however, they can change.

The 'other professional' type

There is a broad group of this type of person. From a professional viewpoint, however, they are often the people who both criticise the ICT profession and contribute to the apparently parlous state of the profession, typically by undertaking ICT-related work themselves (when they are not competent to do so) or making serious decisions on behalf of ICT professionals without seeking any advice/input from those professionals.

What have these different types to do with professionalism and professions? Well, for a start, it makes it clear that there is a diverse range of people in the ICT industry, possessing a diverse (not necessarily adequate) range of knowledge, abilities and personalities. On the one hand, many of the people working in the ICT industry and academia belong to no professional body, such as the ACS, ACM or IEEE. Many do work professionally, however, and demonstrate ethical behaviour — often to a greater degree than any of the professional bodies might expect. On the other hand, a number of people in the ICT industry do belong to a professional society, and yet they possess minimal knowledge of any part of the ICT domain, display little competence, and even occupy positions superior to others who are far more knowledgeable and competent. Often, for the latter 'professionals', it seems that personality is the most valued characteristic. Interestingly, and in contrast, while working as a scientific professional within the more traditional engineering and scientific domains, I observed that positions of importance/influence belonged to those with appropriate knowledge and competence — their personality traits were a less important factor in gaining such positions. Of course, this situation has another set of problems.

I have had about 25 years experience as a software engineer at various levels. In all that time, although I have identified lots of different work practices, ethical attitudes and personalities, I have not been able to establish precisely what comprises an IT or ICT professional. Hence the question associated with this paper: 'What is an ICT professional anyway?'

Since I am not sure of the answer to this question, it seems appropriate to start with one or more definitions of a professional.

The professional

There are numerous definitions of 'professional'. To begin with, the typical dictionary (in this instance *The Collins English Dictionary*) contains definitions for the word *professional* such as:

- 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.

More definitive views of professionalism include reference to profession, professional development and professional bodies. Such a view might include the following (Texas Library Service, nd):

- Professionals are considered experts in their chosen vocation/field.
- Professionals possess a broad range of (systematic) knowledge with a theoretical base.
- Professionals are responsible to the public and/or community.
- Professionals possess a high degree of autonomy regarding their decision-making and behavior.
- Professionals are governed by a code of ethics, which:

    - is a statement of rules and values

    - intends to ensure a high quality of service

    - intends to guarantee competency of membership, honor and integrity

    - is an expression of a professions' principles and what it expects of its members

    - emphasises no personal gain at 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.

David Maister provides a more humanist-oriented view of professionalism, by de-emphasising the knowledge/skill aspects. To paraphrase Maister slightly, he believes that '… real professionalism has little to do with which business you are in, what role in that business you perform, or how many degrees you have. Rather it implies a pride in work, a commitment to quality, a dedication to the interests of clients, and a sincere desire to help' (2001). An important indication of the nature of professionalism made by Maister is that it is '… predominantly an attitude, not a set of competencies. … skills you can teach, attitudes and character are inherent'.

The key traits of a professional are shown in Table 1, where they are presented as a set of criteria for professionalism. All but the last of these have been taken from the Texas Library Service tutorial on professionalism (nd). The last trait has been added on the basis of Maister's views on professionalism.

Table 1: Criteria for professionalism

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.

Source: Texas Library Service

It is interesting to apply the criteria in Table 1 to some of the ICT types described earlier. These are shown in Tables 2 and 3 where, again, the resulting summaries are drawn from my own experience and observations.

Table 2: 'Highly broadly technical and you know it' professionalism

Training	Usually possess a technical degree. Also do much self-education.
Intellectualism	Not usually dominant.
Autonomy	Usually.
Judgement	Whenever allowed or are asked to advise, but more likely to criticise other peoples' judgements.
Independence	Not usually. Confidence in own abilities does not usually extend to taking on the responsibilities of being independent.
Service	Usually.
Dedication	Not usually.
Pride	Usually.
Honest & trustworthy	Usually.

Source: Author's research

Table 3: 'Big-picture narrowly technical' professionalism

Training	Usually possess a non-technical degree. Don't do much self-education.
Intellectualism	Very little.
Autonomy	Not usually but do try.
Judgement	Whenever the opportunity arises. These people make the judgements that the ICT types in Table 2 criticise.
Independence	Not usually.
Service	Inconclusive observation.
Dedication	Inconclusive observation.
Pride	Sometimes.
Honest & trustworthy	Often not honest about their knowledge/capability.

Source: Author's research

The reason for choosing the two particular ICT types in Tables 2 and 3 is simply that they are contrasting but, nonetheless, represent a significant percentage of the ICT-industry membership.

Slight variations within Table 2 would result when applying the criteria to the other 'broadly technical' types described earlier. Similarly, variations within

Table 3 would result when applying the criteria to the other 'narrowly technical' types. The 'concepts only', 'I can't do it', and 'other professional' types should probably be disqualified as professionals, let alone ICT professionals.

One might conclude that there are no real ICT professionals. I doubt that's true. Because there is a confusion of diverse backgrounds and training of people working in the ICT industry, it seems appropriate to create an effective method for identifying the various professionals — the ICT professionals specifically.

How do we distinguish an ICT professional from other professionals working within the ICT industry? Perhaps the answer can be found by examining the profession that supports the ICT professional.

The profession

Professions, usually exemplified in the form of an association/society/body of like-minded colleagues, are typically created to represent and support those who are accepted as accredited members ('qualified' professionals), and to maintain professional integrity, values and recognition. Hence, real professions have responsibilities to the professionals that they purport to support. For example they:

- create structures within professional subcultures
- provide legal reinforcement for the activities of professionals
- strive to provide environments of public acceptance
- promote ethical practices
- define penalties for professionals who work against the tenets and practices of the profession.

The traits of a profession are summarised in Table 4.

Table 4: Traits of a profession

Exclusive control — esoteric and systematic BOK (body of knowledge)	Members have a monopoly on understanding and applying the BOK.
Autonomy of practice	Members control the standards of the society.
Norm of altruism	Members act in the best interests of clients.
Authority over clients	Professionals control the client/practitioner relationship.
Distinctive occupational culture	Occupation is set apart by a distinctive set of norms, values, and symbols.
Recognition	Usually legal requirement for specific training and preparation prior to practice.

Source: Dinsmore & Cabanis-Brewin, 2006

The *Software engineering body of knowledge* (SWEBOK, nd) provides a characterisation of an engineering profession as supporting the follow 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*.

According to Andrew Abbot (1998), professions begin when people recognise that they are undertaking a vocation/occupation that is not covered by any existing profession. *Perhaps this is the current state of the ICT industry*. The creation of a professional association/society defines the extent of practices and necessary competencies to perform those practices — thus defining a 'competence territory' (see Dinsmore & Cabanis-Brewin, 2006). The process, or life cycle, of professionalisation typically consists of the following steps/phases (not in strict order):

- create a full-time occupation/vocation
- establish professional association
- create and enforce code of ethics
- control use of the (profession's) name and the body of knowledge (BOK)
- develop recognised training procedures
- win political, social, and legal recognition.

A profession provides comfort and security to people who fulfil its requirements and obey its tenets. Professionalisation, however, can be a torturous and drawn-out process simply because of other existing professions. Even when the first five steps of professionalisation are largely fulfilled, gaining political, social and legal recognition can be a serious problem for the associated professionals — *software engineering is a good example of such a profession*.

The status of a profession can change significantly with time, especially when it becomes too protective of its members and doesn't respond appropriately to serious challenges — of (say) malpractice. Giving any impression to society of cover-ups and lack of interest in upholding codes of ethics can only damage a profession. Charges of malpractice need to be investigated without bias or conflicts of interest by professions, and the processes of investigation need to be transparent.

With time, professions are also affected by changing political, social and legal environments and, if they are too slow to move with those types of external changes, they may suffer diminished recognition.

The *AMA handbook on project management* (Dinsmore & Cabanis-Brewin, 2006) presents the concept of semi-professions by examining the state of the occupation of project management using the traits of a profession from Table 4. Table 5 represents a summary of that examination.

Table 5: The status of project management as a profession

Exclusive control — esoteric and systematic BOK (body of knowledge)	No — *BOKs are beginning to be recognised but still highly contested.*
Autonomy of practice	No — *members contribute to the standards of practice.*
Norm of altruism	Not usually — *societal impact of failed projects not recognised.*
Authority over clients	Not usually — *project managers tend to work within corporations.*
Distinctive occupational culture	Possibly — *certain aspects exist.*
Recognition	Not yet — *project management not legally recognised as a profession in any jurisdiction.*

Source: Based on Dinsmore & Cabinis-Brewin, 2006

After having (myself) attempted to elicit (without success) a specific ICT BOK it would seem that the state of the ICT profession is similar to that of project management — it is a semi-profession because, as summarised in Table 6, it possesses only elements of the 'required' traits, described in Table 4. Certainly ICT 'practice' is at the stage in the path of professionalisation of being a full-time occupation/vocation. By splitting ICT into the components of IT and communications, it is evident that there is at least one core/common IT BOK (Australian Computer Society) but there seems to be no obvious communications BOK — although there is a WEBOK (Wireless Engineering BOK within the IEEE Communications Society). As an aside, the term 'body of knowledge' seems relatively new, and so, many older professional societies may either use an alternative term or not actually refer to any specific knowledge base. The latter is probably due to an acceptance that (tertiary) educational institutions will provide the primary body of knowledge to support a society and its membership. Thus, identifying bodies of knowledge that might underpin a professional society may not always be straightforward.

A BOK is important to a professional society, not only in defining/creating boundaries to the essential knowledge of members, but also in helping to define required education/training programs for basic/extra qualifications for members at different levels of the society. The BOK may, in fact, enable the identification of several related occupations/vocations for which different certification programs be defined. It is one of the essential elements that a profession's membership should control, and be prepared to consider, according to changing technology and societal concerns.

One of the important duties of a professional society is to ensure the disambiguation of the name of the profession. A case in point is the profession of software engineering within Australia. Aside from the fact that computer scientists possess a different view of what software engineering is, there is also the issue that, despite Engineers Australia accrediting software engineering degrees, there is no apparent support to disambiguate either the typical industry or the computer scientific usage of the name. Ambiguity of a profession's name can be damaging to the professionals who enter the profession, only to find themselves competing for positions that are apparently advertised for them, but open to those who are either less qualified or from different professions. Recognition of the profession externally becomes more difficult when recognition internal to a professional society is not obvious.

A professional society's code of ethics is intended to ensure its members maintain competency and appropriate behaviour and consideration toward other professionals, clients and the community. Together, the BOK and the code of ethics are important in both the mounting of, and defence against, charges of unprofessional behaviour. Any charge of misconduct against a professional can only be successful if it is proved that best practices have not been followed and that codes of ethics have been contravened. Defence of such charges follows the opposite view. If unprofessional behaviour is proved, then appropriate penalties should be applied.

This is well and good, but I have only ever heard of one person in the Australian ICT industry being punished for misconduct — and this was undertaken independent of any professional body. Is it the case that there are no charges concerning professional misconduct in ICT? Or, are the associated professional bodies defending charges so successfully that very few individuals have been punished for professional misconduct? Is it that legal processes are more likely to ascertain charges of professional misconduct and also deliver penalties — perhaps using associated ICT professions' BOKs and codes of ethics to do so?

Table 6: The possible status of the ICT profession

Exclusive control — esoteric and systematic BOK (body of knowledge)	Not fully apparent — *there are contributing BOKs such as SWEBOK and possibly the ACS IT Core BOK, but there doesn't seem to be a specific BOK for ICT. University degrees confuse the situation because of little consistency on base knowledge/ courses.*
Autonomy of practice	No — *members sometimes contribute to the standards of practice, but not necessarily for community interests.*
Norm of altruism	Not usually — *still a general lack of best fit for overall approaches and technological decisions, and many ICT projects still fail on cost and achievement of deadlines.*
Authority over clients	Not usually — *ICT professionals tend to work to other (non)professionals who control the client relationship.*
Distinctive occupational culture	Possibly — *certain aspects exist, but the norms, values and symbols are confused. Partly because ICT is a multi-profession profession.*
Recognition	Seemingly — *ICT is assumed to be a profession, or at least, it is often referred to in that way.*

Note: This is the opinion of the author and is based on a combination of long-term observation and the seemingly confused state of an ICT BOK.

Don Gotterbarn (2008) relates stories of people working in the ICT/software industry who having been fired because of unethical practices, but with no intervention by appropriate professional societies to either condone the company that instigated the act, nor impede/prevent the perpetrators of the unethical act(s) in simply moving to similar jobs at other companies.

Is it any wonder that there are sceptics concerning professionalism and professions? For example, according to John Quiggin (2003):

> Professionalism is both an individual characteristic and an ideological position. The primary definition is that of individual professionalism: the idea that membership of a profession carries with it a set of internalised values that will be reflected in the way in which work is carried out and the ethical standards that are adhered to.

This statement appears to support the concept of professionalism, however, Quiggin goes on to say that *the idea of professionalism as an individual characteristic is false* — given the chance to pursue their own self-interest (narrowly defined to exclude such items as the approval of professional peers) individuals will do so regardless of any attempts to instill professional values. In elaborating on

the words of George Bernard Shaw, 'The professions are a conspiracy against the laity', Quiggin writes, 'That is, adherence to professional values and ethics serves to advance the collective interests of the profession at the expense of society as a whole. Exactly the same critique is made of trade unions.'

When it comes to the ICT profession/professionals, I don't wholly agree with Quiggin. I rather think that the ICT profession is nebulous in terms of BOK and lacks authority, or the right sort of recognition, to ensure the professional behaviour of anyone (society members and/or non-members) practising in the ICT industry.

Some conclusions about the state of ICT professions/ professionalism

I believe it *is* appropriate for professions to set expectations of knowledge, competence and behaviour. Professions and the professionals within them should encourage continuous learning, sharing of knowledge, informing of experiences, and reflection on episodes of good (and perhaps bad) ethical behaviour and the benefits (or negatives) to others and themselves.

Establishing and maintaining a BOK and a code of ethics are the easiest activities for a profession to undertake. Because humans are the enablers and disablers of professionalism, there is always going to be a spectrum of acquired knowledge, ethical behaviours and personalities, ranging from competent, ethical, empathetic, and earnest individual professionals down to those who just barely meet those standards and who should, perhaps change their profession.

The most difficult activities for a professional society to undertake seem to be related to maintaining the integrity of its membership (using the criteria of Table 1 and the traits of Table 4 as guides). I believe there are ICT workers, and indeed have met several people working in the ICT industry, who rate as professionals according to Table 1. However, I don't currently know of any ICT type professional body, that maintains any but a few of the traits listed in Table 4.

So far I have concentrated on trying to establish what a professional is (independent of vocation) and what a profession is. I have used definitions that establish that (really) the ICT profession is young and is evolving slowly.

In answering the question: 'What is an ICT professional anyway?', I have to admit that I'm still not sure, but I think I have a reasonable idea of the sort(s) of knowledge, competence and ethics that someone who is labelled as an ICT professional, should possess. I do not, however, have a definitive answer to the question.

The ACS Core BOK for IT professionals does not significantly assist me, either, in answering the question. The ACS BOK contains the following diverse areas of knowledge:

- computer organisation and architecture
- conceptual modelling
- database management
- data communications and networks
- data structures and algorithms
- discrete mathematics
- ethics/social implications/professional practice*
- interpersonal communications*
- program design and implementation
- project management and quality assurance*
- security
- software engineering and methodologies
- systems analysis and design
- systems software.

Those items that are marked by an asterix are designated as mandatory knowledge within all professional-level IT courses accredited by the ACS. Any one of the listed areas of knowledge could constitute a lifetime of professional activity/work, and indeed such professionals exist. For example, within the software engineering and methodologies area of knowledge, there is another recognised BOK (SWEBOK, nd) and it contains the following knowledge areas:

- software requirements
- software design
- software construction
- software testing
- software maintenance
- software configuration management
- software engineering management
- software engineering process
- software engineering tools and methods
- software quality.

Again, any one of these knowledge areas could occupy a lifetime of professional activity/work and, again, such professionals exist.

As indicated earlier, it is appropriate to define a BOK. It is also appropriate, however, to define levels of practice. The SWEBOK (nd) includes descriptions of practices and processes for each of its knowledge areas, but it does not define levels of practice. At this stage, the ACS Core BOK for IT professionals contains little in the way of appropriate practices/processes for each of the areas of knowledge, nor anything about levels of practice. This is not intended to be a criticism, the SWEBOK took six to seven years and the help of well over 500 professionals to define. It does show, however, that the ACS BOK is not yet complete.

It is appropriate that anyone possessing significant capability surrounding any one of the knowledge areas of the SWEBOK might be an eligible ICT professional. They would, however, have to possess significant understanding of other (related) knowledge areas in order to do their jobs comprehensively. So, what minimum depth of overall knowledge would anyone need to reach some base level of practice enabling professional status in (say) software testing? Also, what other higher levels of practice might these base level professionals aspire to, which are both defined and supported by an ICT professional society?

I could conclude by simply stating that I do not believe the ICT profession, as it stands today, is, or is even capable of, providing adequate support to ICT professionals and non-professionals. Until that happens I doubt I, or anyone, else will be able to answer the question — 'What is an ICT professional, anyway?' While this conclusion may be correct, it neither helps in maturing the ICT profession further, nor in providing less confusion for those working as professionals and non-professionals in the ICT industry.

Further work

It is apparent that significant work needs to be done to fully establish an appropriate ICT BOK and associated practices. To that extent, it should be noted that the ACS is in the process of establishing a more comprehensive BOK than is currently available. This endeavour is important for the ACS because (as a professional body) it accredits tertiary ICT programs throughout the country. In this process, existing BOKs, such as SWEBOK — which provides a very good basis for describing base knowledge, methods and practices for each of its knowledge areas — need to be taken into account.

In this and other related BOK endeavours, it is necessary to ensure input from a broad range of stakeholders — not, for example, academics only. The mixture of stakeholders needs to include people and organisations who are not only creators of ICT-related knowledge, products or services, but who are the users/receivers and/or who are impacted in some way by ICT activities.

Regarding the matter of codes of ethics, it seems that professional societies provide these mostly as guidelines of acceptable behaviour and also as a basis for examination of accusations of unprofessional behaviour. On the one hand, codes of ethics can be used as blunt instruments, only to be made apparent when a professional member has committed some (alleged) malpractice. On the other hand, codes of ethics should be used to actively encourage greater, unwavering commitment to integrity, honesty and trustworthiness. Obviously, to establish a profession containing professional members requires education, not just to learn the wording of codes of ethics but also how to use the codes of ethics as a framework to clearly promote what is expected of professionals and how they should behave when ethical behaviour is at risk. All this is easily stated but hard to do. Nonetheless, ethical behaviour needs to be imparted and governed effectively in order to raise the bar on expectations of all ICT stakeholders in regard to ICT activities.

It seems that ICT professional bodies need an injection of governance practices, especially in being proactive about supporting current members and expanding membership to help ensure wider consistency of professional behaviours, practices and project outcomes.

Aside from dealing with the BOK, ethical behaviour and expectations, there is the matter of determining different levels of practice/skills regarding the broad range of capabilities among people working in the ICT industry. Some of the ICT types I described at the beginning of this paper may better fit the job description of 'technician' rather than (say) 'engineer' or 'scientist'. All of these roles should, of course, follow professional practices and abide by ethical standards. The purpose in providing a range of levels of practice, however, is to set in place a reasonable framework to establish minimum requirements for being able to practice as a particular type of ICT professional, and also determine what 'endorsing' criteria need to be met to advance to higher levels of practice.

The concept of levels of practice is not new, and has the same advantages within other more established professions of protecting all stakeholders. For example, it should not be possible for a new graduate of the ICT profession to be placed in a managerial role requiring significant technical and people management experience, to be handling significant numbers of staff (including senior staff), and to also be expected to make technical decisions on topics about which they possess only superficial knowledge. I have seen this occur on several occasions, and the result is unacceptable because it affects a significant body of stakeholders, including the junior professional and their employer. The junior can be 'scarred' for life professionally, and the organisation for which they work rarely takes the blame for the inevitable failure(s). This sort of situation is caused through the combination of lack of ethics (of both parties) and no limitation concerning a role in which a junior ICT professional can be involved. Ethically,

junior professionals must be able to both admit their inability and to resist the temptation/encouragement to be involved in a role for which they do not have the requisite knowledge or skill. Ethically, the organisation should not be able to advise a junior professional to undertake a role for which they do not possess the appropriate capability.

So, if the ICT profession is to gain traction as a true profession that supports true professionals, then steps need to be made now along the lines described above. The magnitude of such a task may seem insurmountable just now and, indeed, it will take some time to evolve. The point is that the first steps need to be undertaken as soon as possible so that ICT comes to earn its recognition as a profession, which it currently does not deserve.

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