

The Future of Professionalising Informatics: a University Education Perspective

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Abstract. In March 2015, the Shadbolt Review group was established in the UK to review course accreditation of computer science university courses. The Council of Professors and Heads of Computing is represented on the review group alongside industry, funding councils and the UK government. The aim of the review is to explore ways in which course accreditation might address the relatively high levels of unemployment among computer science graduates. This paper considers the role of accreditation and the nature of professional bodies both in the UK and beyond in order to explore how the complex interactions between graduates, industry and universities can benefit the computer science discipline in Europe in the future. ¹

Keywords: Computer science informatics · professionalization · higher education.

1 Introduction

The Information Technology (IT) sector is a relatively new occupational area and its professional body in the UK, the British Computing Society (BCS), received its chartered status in 1984 [1]. In the UK IT sector chartered status is granted through an application process based on accredited university courses or examinations or a combination of both. With an estimated 753,000 graduates working in IT [2] and 70,000 members, the BCS can be said to represent approximately 10% of professionals with a small fraction holding chartered status.

The UK government-sponsored Shadbolt Review was set up to determine the role of university computing course accreditation to explore how ‘the system can support the skills requirements of employers and improve graduate employability’ [3]. One of the main motivations for the review came from recently published graduate employment statistics. In the most recent year for which data is available, computer science graduates in the UK suffered the highest unemployment rates of all subjects. For UK-domiciled undergraduates the figure was 11% unemployed after 6 months of graduation, compared with an overall average of 7% across all subjects [4]. This led to negative press coverage and a national level debate about the nature of computer science courses. Following turbulent times for university departments in attracting students on to computer science courses in the UK these headlines had the potential to impact negatively on applications to computer science courses. Representing over 95% of UK university computing departments, the Council of Professors and Heads of Computing (CPHC) is working with the government to explore the challenges behind the data. The Shadbolt Review group is one example of this work. This paper considers briefly the situation of other professions then the context for informatics to explore how universities might play a part in professionalising the IT sector.

2. Looking to Other Professions

The essential characteristics of a profession can be defined as a common set of professional standards, values, autonomy and prestige with the professional body acting as the ‘body of [the profession’s] unity, the face of its identity, the voice of its authority, the guardian of its integrity and the prophet of its future’ [5, p. 119]. Engineering, architecture, psychology, nursing, accountancy, medicine and law are now considered to be established professions. The imperatives to professionalize have historically come variously from a need to, say, protect patients, the users of engineered products or financial investments.

In psychology, although the term ‘psychologist’ is not protected by law, only the British Psychological Society can award chartered status and this is reserved for those with accredited specialist Masters awards together with supervised work experience. To be employed in the public health sector, psychologists must have achieved chartered status. Meanwhile, in accountancy, according to the National Careers Service [6] almost all professional accountancy jobs advertised cited a requirement for applicants to hold chartered status and membership of their professional bodies (different bodies exist in different regions). Recent work acknowledges the changing nature of professional standards as practice changes and the impact of training on how professionals self-identify with their organization or profession (for example, [7]). Regulated professions in the UK include medicine where medics are required to be registered with the General Medical Council (GMC) in order to practice. Members look to the GMC for professional development; while compliance to acceptable professional standards is policed through disciplinary action taken with the ultimate sanction of denying membership status and thus ability to practice.

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While these strong and established professions might give an indication of the type of profession IT might become, professionalism is being widely debated across the board in the context of the global consumer, access to information and managerialism (for example, [8, 9]). Arguing that professional fields are built on a 'formalisation of knowledge' in ways to make it impenetrable to those without qualifications, theorists such as Fournier [10, p. 75] are questioning whether aspects of public funding, boundary status (for example para-legals, para-medics and un-certificated teachers) and wider access to information are threatening our understanding of the professions. Neo-Weberians hold a somewhat negative view of professionalism as state-backed 'exclusionary social closure' [11, p.4]. In the UK there has recently been some erosion of professional status in the teaching profession with the introduction of academies and the subsequent relaxation of teaching education for new teaching job applicants. If professional bodies lose their political support in an increasingly globalized world the value of joining a profession with its consequent training, coupled in some cases with periods of professional practice and professional examinations, may become a price too high for individuals to pay, particularly within the context of increased university tuition fees.

However, if we accept that informatics underpins previously mentioned professions (through, for example, robot-assisted surgery, financial modelling and civil engineering simulation) then this is one case for a strong informatics profession.

3 CS and Professionalization: a UK Perspective

Established in 1957, the British Computer Society is the professional body of the IT profession in the UK. The BCS can be shown to meet the expectations of a professional body, as prescribed by [5], in terms of professional standards, values and autonomy. The BCS defines professional standards through granting chartered status to applicants (Chartered Information Technology Professional) and recognition of a skills framework [12]. Professional values in computing and IT are expressed through the granting of university courses accreditation, and/or examinations. Course accreditation is incumbent on evidence in the curriculum of legal, social and professional issues. Applicants must demonstrate competence through work experience, breadth and depth of knowledge [13]. To support role and skills identification the BCS promotes the use of the Skills Framework for the Information Age (SFIA) which was developed to provide a common language for the IT industry with a view to identifying the spectrum of roles. There has not yet been much interest in the framework (as evidenced by its absence in IT job adverts) instead progression is generally recognized through role titles such as assistant, developer, analyst and manager. In terms of autonomy, the BCS, in common with other professional bodies, operates as a membership organization and is run by a board of trustees. Monterio's [5] final category, prestige, is problematic. To be prestigious the IT professional body needs an authoritative voice. With 1.3M jobs in IT in the UK [14] and membership of 70,000 only about 5% of IT workers are members and only a fraction of the existing workforce holds chartered status. Although IT professionals are generally highly skilled, there remain only low barriers to entry to the profession with skills being developed 'on the job'. Using data published in the 2001 Employers Skills Survey, employees in computer services have the highest mean skills score across all science, engineering and technology industries [15, p. 11], however Donnelly et al. [16] highlight 'loose controls on entry into IT occupations' and observe that only a minority of graduates hold a qualification in computer science (p. 101). This is largely explained as due to the falling numbers of computer science students (from 27,000 to 13,000 between 2001-2007) but also by the fact that 57% of IT graduate recruiters favoured recruitment of graduates with client-facing capability over technical skills.

Reflecting on the status of a profession, studies have argued that an oversupply of graduates can alter a previously high-status profession [17]. In the UK IT sector an over-supply was experienced after the dot.com boom and bust triggered by increased numbers studying computer science at university together with people entering the profession from non-computing courses or with a lesser qualification. Taken together with further recent pressures including jobs being offshored and the general economic downturn the employment market is relatively volatile [16].

The main challenge for the BCS is the lack of employer endorsement; as evidenced by membership not being required by job holders. In a search of current job adverts only a handful of safety critical systems roles mentioned chartered status as desirable, chartered status was not mentioned in any other role. Returning to the accountancy profession, chartered status is a requirement for a job as a professional accountant ensuring an agreed level of competence. Employers in the IT profession have historically not required chartered status for professional level job holders. Being a relatively new profession may provide the answer to this phenomenon which is not observed in other, more established professions, but it may also be related to the inability of employers to agree that the BCS is accrediting the right course curricula or that the profession has a fully agreed set of standards. There is also the situation that employers' demand for new employees is so great that they can't afford to limit their choices, so employ staff expecting to train them to work.

4 The Picture in Europe and the USA

There is no shortage of accreditation activity. In the USA the Accreditation Board for Engineering and Technology (ABET) reported a 147% increase in IT (specific) accredited courses between 2009-14, bringing the total number of ABET-accredited programs to 3,367, representing 684 institutions [18]. Meanwhile in Europe (excluding the UK), 45 institutions representing 140 courses have been accredited for Euro-Inf status through bodies such as the National Agency for Quality Assessment and Accreditation (ANECA) of Spain and the Accreditation Agency for Degree Programmes in Engineering, Informatics, the Natural Sciences and Mathematics e.V. (ASIIN) of Germany [19]. With approximately 3,500 universities in Europe this number seems low,

however, as in the UK, job adverts in the European and USA IT sectors rarely mention the need for applicants to have chartered status or professional body membership so the worth to computing graduates in selecting an accredited course is not immediately clear.

Global trends in accreditation are considered to be; a clarification of the definitions of disciplines; a unified approach to accreditation; and finally a focus of graduate skills through continuing professional development [20]. The first of these has been requested by employers who are increasingly confused by the proliferation of course titles (which is due to the competitive aspects of university entry and are designed to attract students rather than employers), which have emerged as the discipline has expanded and specializations emerged from computer science to, for example, software engineering, security and games. In the UK the Quality Assurance Agency is currently consulting on a new computing benchmark with a publication date in 2016 [21]. The second, a unified approach, was the aim of the Seoul Accord which was signed by 8 national professional bodies, including the BCS and ABET, in 2008. The challenge is that it is only one of 7 agreed frameworks identified by Bacon & MacKinnon [22]. Finally, in terms of continuing professional development, although the focus on graduate skills has been taken up by many professional bodies through organizing training courses and issuing publications, in general, specific vendor training has been perceived by graduates as having greater value for employment prospects.

What is not clear is whether these trends should be the priority of universities, professional bodies or employers. In fact, it would appear that all three have a role to play in professionalizing the IT sector.

5 Discussion

The UK review group is gathering evidence from a wide range of stakeholders including industry representatives, students, graduates and universities. The main driver for the review is the relatively high level of unemployment amongst computer science graduates while employers cite skills shortages, however there may be other reasons to uncover that might explain this apparent disconnect between university graduates and employers. Early analysis is looking at the employment landscape and the entrance qualifications of computer science university students. Indeed, rather than courses which are not equipping graduates with the right skills, the more concerning evidence of a lack of professionalization in the sector can be described briefly as unmet high expectations of technology. Although the workforce is generally considered highly skilled there have been a number of high profile public sector IT project failures including the NHS National Programme for IT project which was abandoned in 2011 after costing £12.7bn. The project suffered from years of delay and made little progress, citing technical difficulties [23, 24]. In fact, this project was the latest in a long line. For example, in 1999 the passport office oversaw a disastrous IT rollout [25]. On investigation, it was reported that the factors behind lack of success included; IT projects which were overly ambitious in scale, poor skills exhibited by software engineers, a lack of project management expertise within the civil service, the complexity of procurement and finally ‘mission creep’ caused by multiple stakeholders adding new requirements as the projects progressed.

The challenge of these high profile projects is that general discourse impacting how the general public perceive a profession has been shown to affect the way an individual view themselves as a professional with negative press coverage shown to reduce self-efficacy [26]. Negative media coverage also has the potential to reduce the prestige of an occupation, leading to a weak sense of a profession and consequent challenges in attracting the best applicants to university computer science courses.

Finally, in some organizations the status of IT is low as evidenced by incoherent and frequently changing reporting lines and lack of management support for the IT function, leaving individuals employed in the IT sector somewhat at the mercy of their organizations.

If the university sector can agree that professionalizing informatics is the right thing to do, then the following recommendations for university informatics departments could be considered:

1. Work on a benchmark to clarify employer expectations of core competencies of graduates from informatics degrees and ensure a unified approach to accreditation.
2. Seek accreditation for courses that meet these expectations, noting that the entirety of a degree course should extend beyond simply meeting these expectations.
3. Influence national and EU government policy to require chartered status for those working on public sector projects.
4. Influence employers and employer bodies to consider requiring chartered status for specific roles.

6 Conclusion

Professions are generally viewed by university applicants and their parents as attractive career destinations with benefits such as status, higher levels of pay and some level of job security. If the wider IT sector was a more attractive career destination, it could attract a wider range of applicants – including women. The review underway in the UK offers an opportunity to establish a stronger profession and the key to this is to work closely with industry and public sector employers with a view to recognizing membership and chartered status; as would be demonstrated by requiring chartered status, BCS membership or other professional indicators in job adverts. The aim of the review is to bring employers and universities together ‘to best ensure accreditation is as valuable as possible to all stakeholders - in particular the individual who wants a great education and a great career’ [27]. The motivation has arisen from the government’s concern about high levels of graduate unemployment, rather than concern over high profile and expensive IT project failures so an insistence on BCS membership by IT employers is unlikely to be the final conclusion. Instead

the focus is likely to be on finding ways of ensuring accreditation of university courses takes account of current employer requests for skills and capabilities. The danger is that the lack of engagement with the IT professional body observed through low membership levels may remain entrenched.

In the future, universities and employers working closely on a new global accrediting framework could look towards more established professions to find evidence of effective ways of working. It is likely that this would result in seeking national and European-wide government support to insist on accredited professional status to work on high profile and high value public projects. This would be a start and our computer science and informatics graduates would begin to benefit from the protection of their profession.

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