TIMES OF CHANGE: THE FUTURE OF PROFESSIONAL INSTITUTIONS IN THE BUILT ENVIRONMENT

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ABSTRACT

The aim of this research was to explore the evolution of the profession and professional institutions in the built-environment industry. Success of professional institutions is marked by their ability to adapt to changing market situations and provide value to members. This research compares the changing characteristics of several cost engineering and quantity surveying professional associations, against trends in professional firms.

The research gathered information in three stages. The first step comprised a literature review. The second and third stages involved the collection and analysis of data on demographics, body of knowledge, identity, and professional services. This data was used to explore various themes that emerged during analysis.

Professional associations have had to adapt significantly to changes in members' needs and the cost engineering / quantity surveying industry, resulting in evolution of technical products, online services, and globalization. The research objective was to determine what elements of professional institutions should be carefully considered, in conducting strategic planning for the future.

INTRODUCTION

"In relation to the construction professions in particular, there are at least three constituencies of interest: the members of a profession, the professional institution and wider civil society. If dissonances between the perceptions of these constituencies become too great, the professional institutions may find that they are no longer seen as relevant and useful" (Hughes & Hughes, 2013).

What is a profession?

A "profession" is classically defined as an occupation that has particular characteristics or can claim jurisdiction over a specific skillset or cognitive framework. (Eccles, 2002) defines a profession as 'a type of higher grade non-manual occupation with both subjectively and objectively recognized status, possessing a well-defined area of study or concern and providing a definite service after advanced education and training'. According to (Eccles, 2002), there are four methods by which to define and describe a profession: trait, process, usage, and as a labor market phenomenon. Additional characteristics may include ownership of a body of knowledge, a code of ethics, and self-regulation.

There seems to be general agreement on their key characteristics that define a professional. These include "… high levels of knowledge and expertise in areas characterized by complexity and uncertainty, autonomy and impartiality in decision-making, a strong client/professional relationship, and membership of a recognized professional body or institution providing access to and control of relevant knowledge including, in some cases, a licence to practice, and requiring adherence to a code of ethics in return" (Connaughton & Meikle, 2013).

LITERATURE REVIEW

The Role of Professional Institutions

According to (Hughes W. , 2003), professional institutions primarily see themselves as qualifying / certifying bodies, providers of training courses, and developers of published standardized methodologies. The intent of certification for individuals is to assure a minimum level of qualification and experience, which (in theory) should result in a reasonable guarantee of good work from the employee or consultant. "It's a three-way link between the quality of practitioner, quality of product (professional service), and the level of satisfaction experienced by the consumer" (Mills, 2003). Once certification is obtained, most professional institutions require a certain number of hours of continuing education as criteria for maintaining certified status; such continuing education includes training courses, conference attendance, university coursework, research, and more. According to (Mills, 2003), continuing professional development programs ensure the members of professional institutions remain relevant to both their community and their profession. "Society still appears to place some value on an essential element of the professional's knowledge, which is subjective professional interpretation and evaluation based on experience" (Hughes & Hughes, 2013) and, one presumes, training.

Professional institutions perform as the glue that holds professional communities together. "Associations [have] committees and task forces that host intra-professional discourses, official publications easily and comprehensively transmit ideas and scripts, and celebratory and developmental programs gather professionals and provide for interaction and discussion" (Greenwood, Suddaby, & Hinings, 2002). Through common purpose and a robust knowledge base, shared identity and a sense of community are developed. Professional associations also "… act as the means whereby communities represent themselves to others in the field" (Greenwood, Suddaby, & Hinings, 2002), to themselves (shared identity), and to the general public. Recognition of the profession can lead to endorsement by Owner agencies and legislation by government authorities, which are in themselves a form of legitimization, public recognition, and status.

Professional associations sometimes have a research division with close ties to academia, or may offer scholarships for students studying in a field related to the subject profession. This relationship, where it exists, is beneficial and necessary for both recognition and growth. "Secure connections between research, practice and education are essential for a profession to obtain social consent" (Bordass & Leaman, 2013). Research enables a professional community to grow its knowledge base, maintaining relevance and legitimacy, instead of clinging desperately to a body of knowledge that risks becoming increasingly limited or stagnant, even irrelevant, due to technology advances or societal pressures.

Later work by (Hughes & Hughes, 2013) discusses the role of professional institutions in establishing and monitoring ethical standards. He makes the point that criticisms about integrity, independence, and ethical standards can taint any profession with disrepute, as occurred with the accountancy profession in 2001. Research by Bent Flyvbjerg at the University of Oxford BT Centre for Major Programme

Management is currently calling into question the conduct of project planners in transportation and infrastructure, in multiple countries; clearly, any profession can be disgraced in public perception, with just a few high-profile incidents. As such, “professional societies have an incentive for maintaining and enforcing ethical standards on their members” (Mills, 2003). In countries that are still developing, legal systems, and where corporate governance structures may not be as sophisticated or accepted as in the developed world, a definition of professionalism that includes ethical codes of conduct supported by self-enforced sanctions is increasingly popular as a proxy. Where professional societies (including the AIQS, RICS, and AACE) have been experiencing primary recent growth outside their country of origin, such elements of ethical standards, certification, education, representation, and standardized methodologies are of paramount importance.

New Professionalism

Professions and concepts of professionalism are experiencing transformations that are changing the way that professionals are perceived and employed. According to (Hughes & Hughes, 2013), the potential future for professions is dynamic yet challenging. As such, the role of professional institutions must also change, in order to remain relevant.

One element of this ‘new professionalism’ that is worth further discussion is attention to Corporate Social Responsibility (CSR). As (Green, Harty, Elmualim, Larsen, & Kao, 2008) stated, the CSR agenda is a response from professional service firms to societal pressures. There is a traditional bias towards definition of CSR and sustainability as, respectively, social and environmental concepts (van Marrewijk, 2003), but the terms are now being used interchangeably, often referring to a myriad of concepts “such as sustainable development, corporate citizenship, sustainable entrepreneurship, Triple Bottom Line, and business ethics” (van Marrewijk, 2003).

Notions such as CSR are not new; “past eras have shown acts of charity, fairness, and stewardship, such as the medieval chivalry and Scholastic view on pricing, the aristocracy’s noblesse oblige, the early 20th century paternalistic industrialists, and the contemporary ways of corporate (and private) sponsoring of arts, sports, neighbourhood developments, etc.” (van Marrewijk, 2003). Indeed, CSR concepts can be seen to continuously evolve, encompassing society’s current economic, legal, ethical, discretionary, and philanthropic expectations (Pirsch, Gupta, & Grau, 2007). Key CSR elements are related to compliance with laws and regulations (Hardjono & de Klein, 2004), and these can vary by country, county, state, and city. How an organization further broadly or narrowly defines CSR depends on corporate strategy and circumstances, including the needs of “both direct and indirect stakeholders (such as shareholders, employees, clients, pressure groups, communities, etc.), without compromising the ability to meet the needs of future stakeholders” (Kleine & von Hauff, 2009).

Research has demonstrated that a well-crafted CSR strategy “helps to attract and retain high quality employees, generate a positive corporate image, and enhance product evaluation via an overall evaluation of the firm. CSR also acts as a buffer against, and may help a company recover from, a market crisis” (Pirsch, Gupta, & Grau, 2007).

Another piece of new professionalism is ethics. (Hill, Lorenz, Dent, & Lutzkendorf, 2013) argue that, while built environment professionals have an ethical responsibility to protect the public good, their professional institutions provide them with fractured and inadequate guidance on the topic. It appears there is a moral vacuum to be filled, in which built environment professionals and their institutions need to confront "the current economic, social and environmental crisis, question the neo-classical economic discourse, take responsibility, and work together in the common interest" (Bordass & Leaman, 2013). Essentially, new professionalism begs not just corporate social responsibility, but also professional social responsibility, and professional institution social responsibility.

There are other components of new professionalism, which could broadly be interpreted to include: attention to organizational and individual maturity; being accountable and honest; having a personal ethical stance; engaging fully with stakeholders and project team members to provide value for money and achieve project objectives; sharing knowledge and lessons learned; mentoring and championing the next generation of professionals; and constantly striving for the betterment of all. Some of these elements may even be seen to conflict with the profit-oriented management objectives of both corporations and professional institutions; a difficult choice must be made.

To survive, (Hill, Lorenz, Dent, & Lutzkendorf, 2013) posit that professionals, corporations, and their professional institutions must embrace ethics and collective social responsibility, admit information gaps, and commit themselves to continuous learning, organizational improvement, and pushing the barriers of the body of knowledge. According to (Bordass & Leaman, 2013), since the myriad of built environment professions are interconnected and intertwined, and cannot survive alone, 'new professionalism' must unite them all.

Professional Services Firms, Transformed

A recent study by (Connaughton & Meikle, 2013) demonstrated how the largest built-environment professional services firms (CPSFs) have changed in the past 30 years, with a primary focus on UK-based firms. However, as the majority of those firms have a global presence, the study is applicable worldwide. The (Connaughton & Meikle, 2013) study showed that "CPSFs are moving towards newer areas such as management consulting and information technology"; this observation about expansion and diversification of services was also noted by (Perera, Pearson, & Dodds, 2010), and (Nkado, 2000) posited that such diversification served the dual purposes of meeting differing & changing client needs while simultaneously growing the market for professional services. Indeed, "… every profession must evolve in response to rapid changes in the global business environment, [and] practitioners must … understand their clients and their commercial objectives and explore innovative ways to deliver value" (Frei & Mbachu, 2010).

In the case of quantity surveying CPSFs, professional service diversification is a strategic option that enables the firms to both grow their business and hedge against decline in their traditional (quantity surveying) markets (Connaughton & Meikle, 2013). Examples of service diversification include "… project management, construction taxation and legal support services, value and risk management consultancy, and specification and design management" (Connaughton & Meikle, 2013). The breadth of services now offered by CPSFs embrace the myriad concepts of total cost management (Smith, 2008) and the entirety of the project and asset lifecycle. In the aforementioned study by (Connaughton & Meikle, 2013), the emergent and soon to be primary disciplines for these firms are project management and management consulting, not quantity surveying. This trend is mirrored in the way the CPSFs refer to and market themselves. Indeed, the top ten firms no longer use the term 'quantity surveying' as a descriptive in

their marketing materials and value statements. Instead, they use such language as: 'built asset consultancy', 'programme management & construction consultancy', 'consultancy services to the construction and property industry', 'construction project & cost management consultancy', 'property and infrastructure professional services', 'programme and commercial management', and 'asset management and construction consultancy'[1]. Interpreting this broadly, we are all become consultants, instead of professionals.

Another CPSF trend is growth through acquisition. Indeed, three of the top ten (former quantity surveying) professional services firms have been acquired and are now divisions of much larger global multidisciplinary firms (Connaughton & Meikle, 2013). One concern about growth through acquisition is the inevitable situation of conflict of interest, which is occurring with increasing frequency. Under such circumstances, such firms may need to make a strategic decision regarding which professional service is potentially most lucrative, and then decline to provide additional services. For example, the authors are personally aware that, on the Panama Canal expansion program, a major 'project management and construction claims' firm at first provided both project management and claims consulting services on the program, but later had to choose between their two primary service lines and divest themselves of a portion of their engagement scope. This dilemma is almost identical to that experienced by the accountancy profession in 2001, the Enron scandal, after which (again, in the authors' personal experience) many of the Big Four firms and others divested themselves of their management consulting divisions. In fact, the accountancy profession has begun to come full circle: growth through diversification & acquisition, ethics scandal, spinoff of management consulting departments, and now (again) growth through diversification.

Industry consolidation also means the pool of available firms is shrinking. As firms begin to choose between service lines and propose on projects accordingly, competition is likely to decline and lack of market forces may lead to an increase in the pricing of professional services. Some industry trend watchers have posited that this will likely result in a resurgence of boutique firms.

Rapid growth and sudden expansion of service offerings can lead to concerns about the depth of skillset available within the firms. Diversity of expertise, while maintaining profit margins, implies that the firms will need to hire more generalists than specialists to serve their rapidly growing markets, and possibly use sub-consultant specialists (the aforementioned boutique firms) to provide deep expertise. Further, cost of service delivery necessitates the use of more junior (and thus less expensive) staff on projects and consulting engagements. 'Bait and switch' techniques are not uncommon, which is why many requests for qualifications and requests for proposals now include a clause that the staff whose resumes are included in the proposal must be guaranteed to be available for the entirety of the project or consulting engagement. Profit margin concerns are also necessitating a commodification and reduction of content knowledge and expertise, into discrete products that can be readily delivered by entry-level staff, a practice that causes "…de-professionalization of services that reduces professionals' autonomy and independence in decision-making" (Connaughton & Meikle, 2013). Further, junior staff can be more easily manipulated, are less likely to diverge from established processes, and are prone to questioning neither "best for the firm" decisions (at the expense of "best for the client" decisions) nor conflicts of interest. These characteristics identified above and also by (Connaughton & Meikle, 2013) may mean the use of more junior staff creates the ideal corporate petri dish for lapses in ethical practice.

[1] As gathered from top ten quantity surveying firms' websites, 20 January, 2014. These websites are listed subsequent to the bibliography.

The growth of the CPSFs has demonstrated there has been an evolution in the skillsets necessary to service clients' needs, weather market dips, and maintain profitability. The next part of the paper describes the methods chosen to determine if these new competencies are found in the bodies of knowledge of relevant professional associations.

RESEARCH QUESTIONS AND METHODS

This research identified the top ten professional services firms that operate in the construction consulting market worldwide. The firms were selected on the basis of analysis done by (Mair, 2013). Each of these firms was originally a UK-based consulting firm that offered quantity surveying services.

The objective of the research was to compile a list of services currently offered by CPSF's in order to compare them with the list of professional competencies published by relevant professional associations. The review of professional competencies also included gathering information on specialty competencies and expansion of the professional institutions' bodies of knowledge. While the authors are aware that many services offered by CPSFs are broader than the competencies of professional associations, it is thought that the analysis may provide an insight to the emergence of new competencies and skills in the profession. The data was collected using a desktop analysis of the firms' websites and review of professional institutions' published competency guidelines. A full list of the firms, and their websites, is included subsequent to the bibliography.

RESULTS AND DISCUSSION

Several issues and potential solutions surfaced from the professional service firm and professional institution literature review presented earlier.

Professional service firms, by diversifying their services lines, have wandered into a realm of management consulting that is not served by professional institutions, and therefore its practitioners are not bound by the codes and ethics traditionally associated with professional institutions (Connaughton & Meikle, 2013). "The idea of placing the interests of the client above all else is tantamount to an abrogation of responsibility for professionals' actions. The idea of being an amoral and detached servant of the client goes against the fundamental tenets of professional institutions" (Hughes & Hughes, 2013). We have entered an age where firms and individuals are more likely to rely on professional liability insurance as a proxy for ethics and competence, instead of codes of ethics and accountability. Ethics are also being replaced by "… rules and regulations, … leaving everything else to the invisible hand of the free market" (Bordass & Leaman, 2013).

There is also a widening gap between the professional services offered by firms, and the availability of appropriate training and education. Professional institutions need to pay "… more attention and alignment to market trends" (di Castri & Ray, Dec. 2013), in order to remain relevant and adequately serve their membership. Further, professional institutions should be leading the practice, not lagging it. "The relationship between the professional institutions and universities, government, and other stakeholders is, therefore, critical if the professions are to emerge as reflective as well as responsive to the issues and expectations of the 21st century" (Hughes & Hughes, 2013). Working together, these entities could enable the profession to evolve and innovate (not stagnate), embrace new technologies, and challenge itself by enabling and funding research. Although professional institutions have evolved over time and expanded their body of knowledge (as shown in Appendix A), there still remains a gap representing areas of specialty which lack a professional institution home; these represent opportunities for the professional institutions to add to the bodies of knowledge (BoK) and best serve their members. Many of these services are in the realm of management consulting. The full gap analysis is attached as Appendix B.

Capability		AACE	ACostE	AIQS	IPMA	PAQS	RICS		PSF #1	PSF #2	PSF #3	PSF #4	PSF #5	PSF #6	PSF #7	PSF #8	PSF #9	PSF #10
Acquisition Due Diligence									X		X		X	X	X		X	X
Audit												X					X	X
Building Information Modeling							X					X	X			X	X	X
Building Surveying									X		X				X	X		X
Business Assurance									X	X	X	X		X	X	X	X	X
Closeout					X						X			X	X	X		
Funder Advisory										X	X	X	X		X	X	X	X
Investment Decisionmaking		X					X		X	X	X	X	X	X	X	X	X	X
Lifecycle Cost Analysis		X		X		X	X		X	X	X	X	X	X	X	X	X	X
Owner Agent / Owner's Representative									X					X	X	X	X	X
Performance Management					X				X	X	X	X		X	X	X	X	
Project Monitoring											X	X	X	X	X	X	X	X
Strategic Management		X					X		X	X	X	X	X	X	X	X	X	X

Table 1: Opportunity Analysis, PSF Services Offered vs. Institutional Bodies of Knowledge[2]

However, proprietary knowledge is often marketed as a firm's distinguishing characteristic, and thus both information and methodologies are carefully guarded by CPSFs as strategic differentiators. According to (Connaughton & Meikle, 2013), the extent to which CPSFs develop and control their strategic interests and technical knowledge would appear to conflict with the more altruistic goals of professional institutions, which seek to develop knowledge in the service of both society and their individual members. While there will always be some tension between profitability and growth of CPSFs and the loftier ideals of learning, public interest, and integrity, the survival of professional associations depends on adaptation to ensure their relevance and usefulness are assured. "See, for instance, how the accountancy profession incorporated consultancy activities, regardless of whether consultancy fitted into the original vocational vision of the association" (Davies & Knell, 2003). Professional institutions and professional service firms alike need to find "… an appropriate balance between generality and specialization, [and] increased attention to continuing professional education" (di Castri & Ray, Dec. 2013). (Bordass & Leaman, 2013) believe shared vision could be the core of a new professionalism to unite all the built environment professional service firms, professionals, their professional societies, and

[2] *Data gathered from 2012 published bodies of knowledge* (Nalewaik & Bennett, 2012) *and 2014 websites (professional service firms)*

their educational institutions. Such shared vision could include such elements as research (furthering the profession), education (growing the skills of members), practice (application of knowledge for the betterment of society), and marketing (stewardship of the profession).

The changes occurring with professional service firms create a dilemma for the project profession, which "… is divided into a plethora of organizations representing various specialties (project managers, cost managers, contract managers, risk managers, construction economists, [quantity surveyors], planners, etc.) who do not speak with a unified voice" (di Castri & Ray, Dec. 2013). Indeed, many project professionals find they must become members of multiple professional institutions, in order to have access to technical knowledge and be able to serve the interests of their employers as service offerings continue to broaden. Professional institutions have responded in turn, by broadening their bodies of knowledge (Nalewaik & Bennett, 2012) to reflect the skills and knowledge of their members, technology advancement, and current research. This expansion is well illustrated in the table in Appendix A, representing growth in AACE International's body of knowledge from 1988 to 2006.

Professional institutions have also begun to offer specialty certifications to supplement their core qualifications (Nalewaik & Bennett, 2012). AACE International has added five specialty certifications since 2004 (Whoolery, 2013): Planning & Scheduling Professional (2004), Earned Value Professional (2005), Certified Forensic Claims Consultant (2007), Certified Estimating Professional (2008), and Decision & Risk Management Professional (2013). Similarly, RICS developed a pathway for the Assessment of Professional Competence in Project Management in 2006 and published guidance for that APC in 2012 (RICS, 2014), perhaps a nod to the aforementioned evolution of traditional quantity surveying firms toward a management consultancy and project management identity. RICS and other professional associations have also identified and implemented "optional" competencies in addition to core competencies, as shown in the table below.

	PAQS	RICS	RICS
	Competency Standards for Quantity Surveyors	Project Management APC	Quantity Surveying and Construction APC
Cash Flow Analysis	✓	✓	✓
Change Management	✓	✓	✓
Claims Management / Disputes	✓		✓
Compliance	✓		
Constructability Analysis	✓		
Contract Administration	✓	✓	✓
Cost Management	✓	✓	✓
Economic Analysis	✓		✓
Environmental Initiatives			✓
Feasibility Studies	✓	✓	✓
Financial Audit	✓	✓	
Insurance			✓
Lifecycle Cost Analysis	✓		✓
Performance Assessment		✓	
Planning & Scheduling		✓	✓
Project Management	✓	✓	✓
Reporting	✓	✓	✓
Resource Analysis	✓		
Risk Management	✓	✓	✓
Quality Assurance	✓		
Scope Definition		✓	
Tax Depreciation	✓		✓
Valuation & Appraisal	✓	✓	
Value Management	✓	✓	✓

TABLE 2: Optional Competencies, QS Professional Institutions (Nalewaik & Bennett, 2012)

One perceived threat to professional institutions is the quantity of Information (both correct and incorrect) readily available through the internet. Whereas professional institutions once represented a barrier to and protector of information, achievable only through accredited educational and professional institutions, mentoring, and assessments of competency (leading to full qualification), the plethora of information available online means the professional institutions have now lost control of ownership of technical concepts. The institutions might have copyright on specific technical products, but concepts and many methodologies are running amok on the internet without adequate oversight. In the 21st century, without regulation of certifications, anybody can claim to be an “expert”.

Other industry trends are having an impact on professional institutions. For example, primary growth for many organizations, such as RICS and AACE International, is occurring outside the traditional (national) home base[3]. This reflects both mobility of the workforce and an increased demand for certification from G-20 countries, plus Middle East and Africa. While such growth increases institutional membership numbers and thus revenue, it also creates additional administrative overhead, and challenges with both published technical materials and certification (such as bias and translation).

According to (di Castri & Ray, Dec. 2013), because there are multiple professional institutions representing the project professions, and regulatory differences between countries, there is a lack of unified representation both nationally and internationally, which results in lack of exposure to industry, diluted presence, inconsistent and / or duplicated standards, conflicting technical vocabulary, and limited or unclear career path progression. Marketing the profession is a traditional role of professional institutions, but if the profession is fragmented then there is a considerable impact in lost opportunities of representation to government, corporations (owners), corporations (PSFs), and other professions (Greenwood, Suddaby, & Hinings, 2002). "Umbrella" organizations, such as IPMA, PAQS, and ICEC, currently seek to reduce these problems by establishing a minimum standard for certifying bodies, defining common terminology, and encouraging discussion and cooperation between professional institutions, corporations, practitioners, and academia.

CONCLUSION

In The System of Professions, (Abbott, 1988) characterizes professional services firms as having deep knowledge in a specialty area of expertise; a strong focus on specialist functions characterized by complexity and uncertainty; the ability to create bespoke services to suit customer needs, face-to-face (in-person) interaction; and a strong demonstrated history of both service excellence and ethical behavior. However, the research conducted in this paper indicates that Construction Professional Services Firms (CPSFs), especially those which are multinational, are focusing instead on corporate profitability and sustainability targets, e.g. maintaining cash flow by broadening services across industries, sectors, and geographies, and seeking to implement projects for the lowest cost while maintaining some standards of service excellence.

This is part of an international business trend which is resulting in larger and more diversified professional services firms. According to (Connaughton & Meikle, 2013), this has been proven over time as a successful business strategy. However, it raises significant questions about professionalism, accountability, the best interests of society, and codes of ethics. Today's tasks for building professionals include adding value while coping with the realities of fewer human and financial resources and, in doing so, not just minimizing negative consequences and risk but also helping to effect organization improvements (e.g. Cole, 2012). "Modern" professionals require a broad worldview and birds-eye perspective on projects, while maintaining both responsiveness to context and attention to detail. Innovation remains important; purposeful and meaningful improvements to processes, techniques and the addition of new technologies, proven in practice.

[3] *Based on member demographic data from RICS in 2010 & 2013, AIQS in 2012, and AACE International in 2011 & 2012. This demographic data was obtained either during boards of directors meetings, or directly from institution headquarters staff and members of the boards of directors.*

Professional associations traditionally make strong, generalized statements about ethics and codes of practice, which might no longer be germane to the realities of CPSFs. The challenge for professional institutions is in adapting to meet the changing needs of both business and their membership. Professional societies have been slow to adapt to the ever-broadening body of knowledge of professional competence; the change over time for bodies of knowledge has been demonstrated in this paper, and opportunities for more BoK additions have been identified. Combined with a growing wealth of (previously proprietary) knowledge available for free on the internet, these issues may ultimately limit the ability of professional institutions to remain relevant to future members. More timely, unified representation is needed to ensure professions' exposure to both industry and government, and clarify career path progression for professionals.

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5. Mace, www.macegroup.com
6. Faithful & Gould / Atkins, www.fgould.com and www.northamerica.atkinsglobal.com
7. Cyril Sweett, www.sweettgroup.com
8. Gleeds, www.gleeds.com
9. Franklin & Andrews / Mott Macdonald, www.franklinandrews.com
10. Rider Levett Bucknall, www.rlb.com

APPENDIX A:

Evolution of AACE International's Body of Knowledge

(AACE International, 1998) (AACE International, 2006)

	11R-88 1988	11R-88 2006
SECTION 1 – SUPPORTING SKILLS & KNOWLEDGE		
1.1 ELEMENTS OF COST		
Cost		X
Cost dimensions		X
Cost classifications		X
Cost types		X
Pricing		X
1.2 ELEMENTS OF ANALYSIS		
Statistics & probabilities	X	X
Economics and financial analysis	X	X
Optimization and models	X	X
Physical measurement	X	X
1.3 ENABLING KNOWLEDGE		
Enterprise in society		X
People in organizations and enterprises	X	X
Information management		X
Quality management		X
Value management		X
Environmental, health & safety		X
SECTION 2 – PROCESS AND FUNCTIONAL SKILLS & KNOWLEDGE		
2.1 TCM FRAMEWORK		
Overall TCM process and terminology	X	X
Strategic and asset management process		X
Project control process	X	X
2.2 PLANNING		
Requirements elicitation and analysis		X
Scope and execution strategy development		X
Schedule planning and development	X	X
Cost estimating and budgeting	X	X
Resource management		X
Value analysis and engineering	X	X
Risk management		X
Procurement and contract management	X	X
Investment decision making		X
2.3 PLAN IMPLEMENTATION		
Project implementation		X
Project control implementation		X
Plan validation		X
2.4 PERFORMANCE MEASUREMENT		
Cost accounting		X
Project performance measurement	X	X
Asset performance measurement		X
2.5 PERFORMANCE ASSESSMENT		
Project performance assessment		X
Asset performance assessment		X
Forecasting	X	X
Project change management		X
Asset change / configuration management		X
Historical database management		X
Forensic performance assessment		X

APPENDIX B: Gap Analysis of PSF Services Offered vs. Institutional Bodies of Knowledge

Capability	**AACE International** (Body of Knowledge 2013)	**ACostE** (National Occupational Standards)	**AIQS** (National Competency Standards)	**IPMA** (Competence Baseline)	**PAQS** (Competency Standards for Quantity Surveyors)	**RICS** (Construction Pathway Guides)	**Professional Service Firm #1**	**Professional Service Firm #2**	**Professional Service Firm #3**	**Professional Service Firm #4**	**Professional Service Firm #5**	**Professional Service Firm #6**	**Professional Service Firm #7**	**Professional Service Firm #8**	**Professional Service Firm #9**	**Professional Service Firm #10**
Acquisition Due Diligence							X		X		X	X	X		X	X
Architecture & Engineering											X					
Asset Change / Configuration Management	X						X	X	X		X	X				
Asset Management	X		X			X	X	X			X					X
Asset Performance Assessment	X						X				X					
Audit										X					X	X
Benchmarking	X					X										
Building Information Modeling						X				X	X			X	X	X
Building Maintenance						X										
Building Surveying							X		X				X	X		X
Budgeting	X	X	X	X	X	X										
Business Assurance							X	X	X	X		X	X	X	X	X
Business Planning						X										
Cash Flow Analysis	X	X	X		X	X										
Change Management	X	X	X	X	X	X	X	X		X		X	X	X	X	X
Claims Management / Disputes	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X
Closeout				X					X			X	X	X		
Compliance			X		X											
Conservation & Restoration						X										
Constructability Review					X	X			X	X	X		X			X
Commercial Management of Construction						X										
Construction Management							X			X	X	X		X		X
Construction Technology			X		X											
Contract Administration			X	X	X	X	X	X	X	X		X	X	X	X	X
Corporate Recovery & Insolvency						X										
Cost Accounting	X		X		X	X										
Cost Management	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Design & Specification						X	X		X	X	X		X	X		
Development									X	X	X		X	X		X
Document Controls				X												
Due Diligence						X										
Earned Value Analysis	X		X	X		X										
Economic Analysis	X		X		X	X										
Engineering Science & Technology						X										
Environmental Initiatives																
Estimating	X	X	X	X	X	X										
Ethics		X	X	X	X											
Expert Witness							X		X	X			X		X	X
Facilities Management							X	X	X	X	X	X	X	X		X
Feasibility Studies	X		X		X	X										
Financial Audit			X		X											
Fire Safety						X										
Forecasting	X					X										
Forensic Analysis							X			X					X	X
Forensic Performance Assessment	X															
Funder Advisory								X	X	X	X		X	X	X	X
Health & Safety						X	X	X	X	X	X	X	X	X	X	X
Historical Database Management	X					X										
Information Management	X					X	X			X	X	X		X		
Information Technology		X	X	X	X	X	X	X	X		X	X		X		
Inspection						X										
Insurance						X	X		X				X			X
Investment Decisionmaking	X					X	X	X	X	X	X	X	X	X	X	X

APPENDIX B, continued[4]

Capability	**AACE International** (Body of Knowledge 2013)	**ACostE** (National Occupational Standards)	**AIQS** (National Competency Standards)	**IPMA** (Competence Baseline)	**PAQS** (Competency Standards for Quantity Surveyors)	**RICS** (Construction Pathway Guides)	**Professional Service Firm #1**	**Professional Service Firm #2**	**Professional Service Firm #3**	**Professional Service Firm #4**	**Professional Service Firm #5**	**Professional Service Firm #6**	**Professional Service Firm #7**	**Professional Service Firm #8**	**Professional Service Firm #9**	**Professional Service Firm #10**
Lean and Six Sigma									X							
Lifecycle Cost Analysis	X		X		X	X	X	X	X	X	X	X	X	X	X	X
Logistics							X		X		X					
Material Quantity Takeoff	X				X	X	X	X	X	X	X	X	X	X	X	X
Optimisation	X				X	X										
Organizational Structuring								X	X							
Owner Agent / Owner's Representative							X					X	X	X	X	X
Performance Management				X			X	X	X	X		X	X	X	X	
Planning & Scheduling	X	X		X		X	X	X	X	X	X	X	X	X	X	X
Plan Validation	X					X										
Policies & Procedures				X	X	X										
Portfolio Management				X		X	X	X					X			
Preconstruction Services											X		X			X
Premises, Energy, & Maintenance Audit			X													
Probability & Statistics	X					X										
Procurement and Contract Management	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Productivity Management					X	X										
Program Management				X		X	X	X	X	X	X	X	X	X	X	X
Programming						X										
Project Administration						X										
Project Audit						X										
Project Controls	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X
Project Funding & Finance						X										
Project Management	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X
Project Monitoring									X	X	X	X	X	X	X	X
Project Performance Assessment	X					X										
Property Management							X									
Public Private Partnerships									X			X	X	X		
Regulatory & Statutory Compliance						X	X							X		
Reporting	X	X	X	X	X	X										
Requirements Elicitation & Analysis	X					X										
Resource Analysis	X	X	X	X	X	X										
Risk Management	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Quality Assurance	X		X	X	X	X										
Quality Monitoring									X	X	X	X		X		X
Quantity Surveying							X	X	X	X	X	X	X	X	X	X
Scope Definition				X												
Site Supervision							X				X					
Software Development							X				X	X				
Specifications							X		X		X					
Stakeholder Management																
Startup / Operational Readiness				X			X		X			X	X	X		
Strategic Management	X					X	X	X	X	X	X	X	X	X	X	X
Supplier Management						X										
Supply Chain						X	X		X							
Sustainability						X	X	X	X	X	X	X	X	X		X
Tax Assessments			X			X	X		X	X	X		X	X	X	
Tax Depreciation	X		X		X	X										
Technology								X						X		
Valuation & Appraisal			X		X	X			X						X	X
Value Management / Design Economics	X		X		X	X	X		X	X	X	X	X	X	X	X

[4] *Data gathered from 2012 published bodies of knowledge* (Nalewaik & Bennett, 2012) *and 2014 websites (professional service firms)*