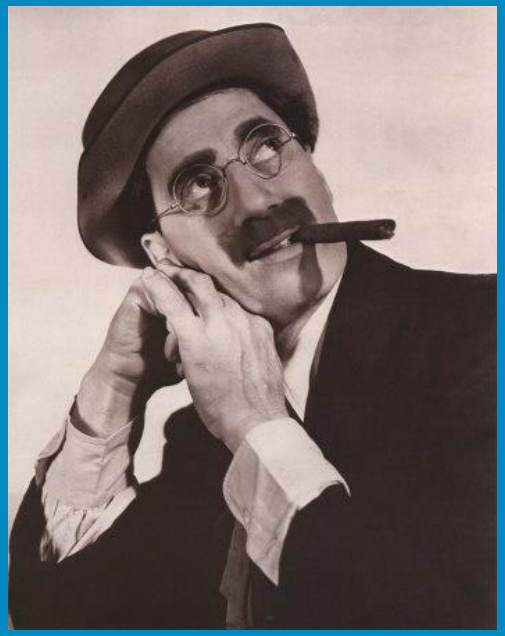

Professional Organisations, Licensing & Certification

Omid Hajilou

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CO643/CO841
Computing Law and Professional Responsibility

University of Kent

Brining experience from…

- Computer Scientist - Artificial Intelligence (King's College)
- Research and Consultancy in Industry (Reuters & Shell)
- Director/Management in Banking (Schroders & Travelex)
- Founder: CardioVascular Healthcare (CVS Health Ltd)
- Med.Tech. Research Advisor (S.E. Health Tech. Alliance)
- Start-up: R+D Technology company (Omigaman Ltd)

- Lecturer & Researcher in Cognitive Neuroscience (UoK)

Professional Organisations (key questions)

- What are the **requirements of the Information & Communications Technology (ICT)** profession?
- Should ICT professionals **require a licence** & why?
- If ‘yes’, should it be **everyone or only specific jobs** within the profession that should require licences?
- Finally, is there **value in ICT certification**?

Institution of Eng. and Tech. (IET)

(pre-2019 logo/brand)

- 1871: **Society of Telegraph Engineers**
  (breakaway from civil/mechanical), professional + learned society
- 1880: included **Electricians**

  (concerned with: *Rules and Regulations for the Prevention of Fire Risks arising from Electric Lighting*)
- 1889: Institution of Electrical Engineers (**IEE**)
- **Accrediting** courses **since** end of **WW1**
- 1963 **charity** status
- By 2006 **incorporated** up to 40 predecessors (in particular, Society of Engineering and Institute of Incorporated Engineering & Technology)
- Members: 168,000 (2019)

IET: Strategy

The Institution of Engineering and Technology

(2019 rebrand)

Vision: Working to engineer a better world.

Mission: To inspire, inform and influence the global engineering community, supporting technology innovation to meet the needs of society.

Values: We treat everyone with **integrity** and respect, continually striving for **excellence** in all our activities and use the power of **teamwork** to deliver value.

British Computer Society (BCS)

- 1956: London Computer Group
- 1957: BCS
- 1966: Charitable status
- 1970: Armorial Bearings (coat of arms)
  "eternal vigilance over the integrity of the Society and its members"
- 1980s: chartered, Engineering Council, Chartered Engineering Institution
- 1996, 2004: licenced by Engineering & Science councils
- Members: 27,000 (1983), 50,000 (2007), 82,000 (2019)

Source: www.bcs.org

BCS: “What We Do”

BCS enables individuals, organizations & society to realise the potential of and maximise the benefits from IT by:

- … **standards** for IT professionals (accreditation, codes)
- … debate on IT **strategic issues** (govt., industry, academia)
- … **advising** the UK government
- … **representing** the profession (liaising)
- … debate on IT **topical issues** (press)
- … individuals & **career development**
- … **networking**

(pre-2009 logo/brand)

BCS: “About US”

Supporting careers

We're creating a diverse and sustainable IT profession with opportunities for development and progression at every step.

Sharing expertise

We offer an inclusive environment; a space where you can communicate and collaborate, with like and unlike-minds, to kickstart innovation.

Improving education

We're equipping society with the knowledge, skills and understanding to remain resilient and thrive in the digital world.

Influencing practice

We tackle the big issues in IT, connecting industry, education and government to shape policy and bring about ethical change.

Driving standards

We bring out the best in people, recognising talent at every level through our professional registration, qualifications and frameworks.

(2009 rebrand)

BCS “Members”

Student

If you're preparing to work in the IT industry.

Associate AMBCS

If you're taking those early career steps.

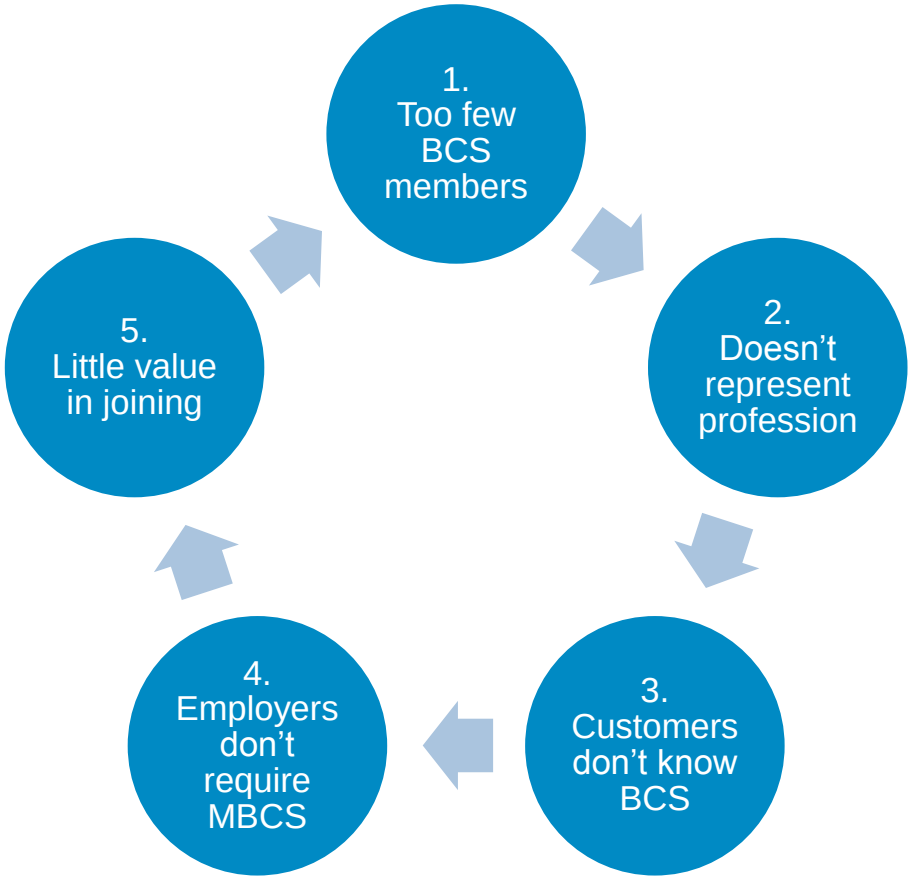
Professional MBCS

If you're already an experienced practitioner.

Fellow FBCS

If you're influential in today's industry.

The vicious circle?



Source: www.bcs.org

1,048 events hosted last year

112 regional and specialist groups

70,000+ members in our global network

151 countries with members

ICT – is it a Profession?

from Benveniste, G. (1987) Professionalizing the Organization

1. Application of skills based on **special knowledge**
2. Requirements for **advanced education** and training
3. Formal **testing of competence** and *controlled admission*
4. Existence of a **professional association** (BCS, IET)
5. Existence of a **code of conduct** or ethics
6. Existence of an accepted commitment, *calling or sense of responsibility* for **serving the public**.

ICT candidates for Licensing:

- Consultants
- Software Engineers in Public Sector
- Safety critical work areas

Common drivers for Licensing:

- **Health and safety** concerns (e.g. Doctors),
- **Societal** concerns (e.g. Teachers),
- **Business critical** concerns (e.g. Accounting).

Melody Moore "A license to practice software engineering"

Certification

Minimally, tests have been passed that **guarantee** a **knowledge** and **skill** level

Who benefits? Who pays?

- Will pay levels rise?
- Will we be safer/healthier?
- Will software be better made?
- Will software cost more?

Should Computer Professionals be Licenced?

Some Arguments for:

- **Defective software** is a **causal factor in many failures** of safety-critical systems: *"London Ambulance service system crash on 1 Jan. 2017"*
- Increased professional **status, accountability & pride** in work: *"Knowing the syntax of Java does not make an individual a software engineer"*
- Many **other disciplines** of engineering **are licenced**: *(e.g. civil engineer and aircraft engineer)*

Some Arguments against:

- Licencing is **not a 'fix-all' solution** to improving standards - Software Engineering is 'technical' *(i.e. should not incorporate standards of care for users)*
- **Costs** would be **prohibitive** (i.e. elitist), and would create a monopoly *(i.e. ultimately damaging to Start-ups, SMEs and can limit creativity)*
- How would you **examine**, and who are the **mentors**? Currently, there are little/no agreements on these topics

Costs of certification (Time / Cost)

- Cisco qualifications from Firebrand (a UK trainer)
  - **3 to 17 days** for certifications
  - £600-£900 **per day** for the training
- Elsewhere, EC-Council's Certified Ethical Hacker (CEH)
  - **5 days**, £1,950+VAT
- Still need to **pass** the **appropriate tests** and sometimes appropriate work experience

Plethora of certifications

Microsoft Certified Solutions Expert (MCSE)	Server technology, private clouds, business intelligence, messaging, enterprise devices/applications, data platforms, communication
Computer Hacking Forensic Investigator V8 (CHFI)	Forensics tools, analytical techniques, obtaining forensic data, presenting forensic data in court
CompTIA Healthcare IT Technician	Healthcare-related regulatory rules, organisational behaviour, healthcare IT best practice, medical business operations, medical IT security
Google Apps for Business Certified Development Specialist	Gmail, Postini, mobile development and access, planning/managing/troubleshooting Google Apps deployments
Adobe Certified Expert (ACE)	Creative Suite: Dreamweaver, Photoshop, After Effects, Premiere, etc.

Among the many security certifications:

- Certified Ethical Hacker (EC-Council)
- CISSP – Certified Information Systems Security Professional (ISC)2
- CISM – Certified information Security Manager (ISACA)
- CISA - Certified Information Systems Auditor (ISACA)

Top paying certifications in ICT (2018)

1. Certified in the Governance of Enterprise IT (CGEIT) - $**121,363**
2. AWS Certified Solutions Architect – Associate - $**121,292**
3. Project Management Professional (PMP®) - $**114,473**
4. AWS Certified Developer – Associate - $**114,148**
5. Certified Information Systems Security Professional (CISSP) - $**111,475**
6. Certified in Risk and Information Systems Control (CRISC) - $**111,049**
7. Certified Information Security Manager (CISM) - $**108,043**
8. Certified ScrumMaster - $**106,938**
9. Certified Ethical Hacker (CEH) - $**106,375**
10. Six Sigma Green Belt - $**104,099**

Long-term considerations: Cisco jobs were in top two slots in 1990s, but now 14th

Source: https://www.globalknowledge.com/us-en/content/articles/top-paying-certifications/

Should Universities link to certifications?

- Not the tradition, due to practical problems
- Usually opposed:
  - Proprietary
  - Training not education
  - Soon out-of-date
  - Costly

Opposition to licensing

- ACM (world's largest computing society) said **NO to software engineering licensing** in early 1990s:
  Engineering licence required a number of skills of little or no relevance to software engineering (calculus, chemistry, physics)…

Codes of Conduct (covered in Seminars…)

BCS Code of Conduct (1)

The Public Interest: You Shall

- ~~In your public role~~ have due regard for public health, ~~safety~~ **privacy, security and wellbeing of others** and the environment.
- have due regard for the legitimate **rights of Third Parties**.
- conduct your professional activities **without discrimination** ~~against clients or colleagues~~ on the grounds of […], or of any other condition or requirement
- Promote **equal access to the benefits** of IT and seek to promote the inclusion of all sectors in society wherever opportunities arise.

BCS Code of Conduct (2)

Professional Competence and Integrity. You shall:

- **only undertake** to do work or provide a service that is **within your** professional **competence**
- NOT claim any level of competence that **you do not possess**.
- **Develop** your professional knowledge, **skills** and competence on a continuing basis […]
- Ensure that you have the **knowledge and understanding** of Legislation and [comply]
- Respect and value **alternative viewpoints** and seek, accept and offer honest criticisms of work
- **Avoid injuring** others, their property, reputation or employment by false or malicious or negligent action or inaction.
- [**no bribery**]

BCS Code of Conduct (3)

Duty to Relevant Authority (i.e. your employer/client/Uni.)

- Carry out your professional responsibilities with **due care and diligence** in accordance with the relevant authority's requirements whilst exercising your professional judgement at all times.
- Seek to **avoid** […] **conflict of interest** between you and your relevant authority. […] ~~**You shall endeavour to complete work undertaken on time to budget and [inform ASAP] if any overrun is foreseen.**~~
- Accept professional **responsibility for your work** and for the work of colleagues […] working under your supervision
- NOT disclose […] or use […] **confidential information** except […].
- NOT **misrepresent or withhold information** on the performance of products, systems or services (unless lawfully bound [confidentiality], or take advantage of the lack of relevant knowledge or inexperience of others.

BCS Code of Conduct (4)

Duty to The Profession

- Accept your personal duty to uphold the **reputation of the profession** […]
- Seek to improve **professional standards** […].
- **Uphold** the **reputation** [of] BCS.
- Act with **integrity** [with BCS members and other professionals]
- ~~Have due regard for the possible consequences of your statements on others. NOT make any public statement in your professional capacity unless [qualified and authorised]~~
- [Tell BCS if you become **criminal or bankrupt**]
- **Encourage** [others'] professional development

BCS Code of Good Practice (CoGP)

- Expanded to 36 pages, 2004 *(more technical)*
- **Purpose**: intended to help, framework, but "your responsibility to an organisation and society as a whole may have to **prevail over your personal interests**"
- Split into: common, IT, education, and business
- "Common" is mostly an elaboration of old code of conduct

BCS CoGP: Key IT Practices

- Programme/project management (plans, risks, teams, tracking, ...)
- Relationship management (customers, suppliers)
- Security
- Safety Engineering (see next slide)
- Change Management (see next+5 slide)
- Quality Management

BCS CoGP: Key IT Practices: Safety (1)

In General

- ... **take all reasonable care** ...
- Take all reasonable steps to make your management, and those to whom they have a duty of care, **aware of the risks** you identify; make anyone overruling or neglecting your professional advice formally aware of the consequent risks.

  Whistleblowing implications (next lecture)

BCS CoGP: Key IT Practices: Safety (2)

When Building a System

- Examine the proposed use of proprietary digital communication systems and **seek out common-cause failures** between control and protection functions.
- Beware of **novel approaches** [...]
- Be aware that, [for] distributed systems involving communications systems [...] it is **difficult to predict** their overall operational behaviour and there may well be **hidden complexities**.
- Determine the **adequacy of protection** and control systems for remote plant; enumerate hazards to which plant may be subjected and relate to the proposed protection and control systems.

BCS CoGP: Key IT Practices: Safety (3)

- Be aware of the **intended operational environment** of integrated modular systems.
- Establish that the proposed integration of the mechanical structures (moving parts) with micro-electromechanical (MEMS) components is based on components intended for mechanical operation based on computer control.
- Be aware that the overall behaviour of systems based on software components of unknown or uncertain pedigree (SOUP) and commercial off-the-shelf products (COTS) will be affected by software components not specifically designed for safety purposes.

BCS CoGP: Key IT Practices: Safety (4)

When Assessing Complexity

- Only use evaluated and **validated software languages** or accredited components for control systems.
- Establish/determine practicable software development methods and validation tools for embedded software [...]
- Establish how well the sensing devices and software within programmable electronic systems (PES) are compatible with the human form.
- Apply '**proven in use**' analysis to achieve the appropriate level of safety integrity for opto-electronic components/techniques used for the sensing of personnel presence.

BCS CoGP: Key IT: Change Mgmt

When Advising on Business Change

- Appreciate the implications of **new processes on both people and the organisation**; identify the activities necessary to ensure a smooth transition to the new processes.
- Strive to understand the underlying **resistance to change** and, if unfounded, be re-assuring of the benefits.
- **Challenge** any apparent **malpractices** and investigate the root causes.
- Appreciate that **not all improvements need technological solutions**; significant benefits can often be achieved through procedural or organisational changes. [etc]

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