Professional Issues in IT

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Profession


Profession
Priest
Law officer
Lawyer
Policeman
Teacher
Professor
Pupil
Doctor
Business man
Manager
Secretary
Woman staffer
Man staffer
Programm...
Artist
Musician
Writer
Nurse

Profession (Pro's)

- **Professional** Footballer: Earns $,$$$,$$$
- **Professional** Employee:
  - Put interests of Organization above Self.
  - Others: Just paid employees.
  - Organization can rely on them to work competently
- **Professional** Work:
  - Work that satisfies established criteria of quality

Examples of Professions

- Professions in eyes of Parents
  - Engineer
  - Doctor
- Professions in eyes of Pakistani society
  - Engineer, Doctor, CSS Cadre, ...
  - Influenced by 1) Income Level and 2) Power ? ? ?
- Professions Elsewhere
  - Police Force, Nurses, Lawyers, Teachers, Pharmacists, ... anything that is regulated by professional bodies.

Reasons ?

Professions

- **Social Stratification:** Grouping of people into hierarchical social categories
  - **Upper Class:** wealthy, powerful
  - **Middle Class:** professional workers, managers, white-collar workers, job-security provided
  - **Lower Class:** wage-jobbers, poverty, blue-collar workers

- Higher Classes want to maintain status-quo
- Lower Classes want to break shackles of class so only accept doctor engineer as professional career options

What makes a Professional?

- Substantial Training and Education in Professional Institute (Get a degree)
- Members of same profession decide:
  - nature of education/training
  - Control of entry into profession (test criteria for admission, test criteria for graduation)
- Profession standardized by presence of 1 or more Professional Bodies
  - e.g., PEC, PMDC (Pakistan), others not well established
  - e.g., UK: Engineering Council UK, Institution of Engineering and Technology, Royal Academy of Engineering, etc.
- Standard of Conduct for Members to Follow (if violated, may involve disciplinary procedure and barring from profession)

Training: Vocational Institutes, Technical Colleges not given due

Professional Bodies

- How it is Formed?
  - Started by group of people of profession coming together formally
  - Initiated through government act
- Why is it Formed?
  - Protect business & work environment from non-professionals, i.e., “quacks” (who do not have proper knowledge and/or may practice dis-honesty)
- Examples in UK:
  - British Computer Society (Est. 1957)
  - Institute of Electrical Engineers (Est. 1871)
- Examples in Pakistan:
  - Pakistan Engineering Council (Est. 1976)
  - Pakistan Engineering Congress (Est. 1912)
    (Still active but not elite as PEC)

Pakistan Engineering Council

- Federal Institute (Est. 1976)
- Main functions:
  - Regulation and Registration of Chartered Engineers + Professional Engineers + Technicians
  - Accreditation of Degree programs
  - Rules for Industry/Govt Services/Consultants
- Areas covered by them:
  - Applied Sciences
  - Computing Engineering
  - Engineering Technologies

(NCEAC) National Computing Education Accreditation Council

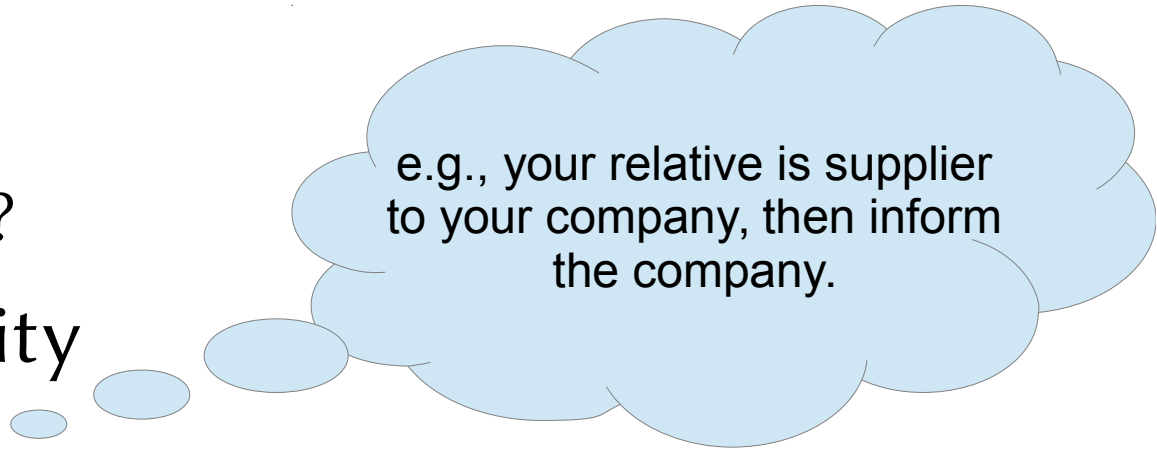
- Main functions:
  - Accreditation of Institutions/Departments teaching Computer Science and related courses (Computer Science, Information Technology, Bio-informatics)
  - Define organization objectives, functions, duties
  - Monitoring of standards defined by them in Pakistani universities, Degree awarding institutions, + affiliated colleges
- No regulations/standards yet defined for Industry

General Functions of Professional Bodies

- Establishment of **Code of Conduct** for members (disciplinary action in case of violation)
- Establishment of mechanism for disseminating knowledge of good practices (using conferences, seminars, journals, WWW, short-courses)
- Set educational standards
  - Accreditation
  - Member grades (promotion based on qualifications + experience)
- Advise governments + regulatory bodies in areas falling under it's jurisdiction
- Career Counseling for its members
- Provide job openings related information to its members for their career development

Code of Conduct

- Public Interest
  - Right of Society over you?
- Duty to Relevant Authority
  - Avoid conflict of interests
  - Don't mis-represent information
  - Don't pass on confidential information
- Duty to Profession
- Professional Competence & Integrity
  - Keep yourself up-to-date
  - Be committed to your profession and don't change associations



Doctor's Oath (Pakistan)

- At the time of being admitted as a member of the medical profession:
  - I solemnly pledge myself to consecrate my life to the **service of humanity;**
  - I will give to my **teachers the respect** and gratitude which is their due;
  - I will practice my profession with **conscience and dignity;**
  - The **health of my patient** will be my first consideration;
  - I will respect the **secrets which are confided** in me, even after the patient has died;
  - My colleagues will be my **sisters and brothers;** and I will pay due respect and honour to them.
  - I will not permit **considerations of age, disease or disability, creed, ethic origin, gender, nationality, political affiliation, race, sexual orientation, or social standing** to intervene between my duty and my patient;
  - I will protect **human life in all stages and under all circumstance**s, doing my utmost to rescue it from death, malady, pain and anxiety. To be, all the way, an instrument of Allah's mercy, extending medical care to near and far, virtuous and sinner and friend and enemy."
- I make these promises solemnly, freely and upon my honour

http://www.pmdc.org.pk

Membership Grades

- Defines expertise Levels of Members
- Pakistan (via Pakistan Engineering Council)
  - Registered Engineer
    Graduated from accredited program
  - Professional Engineer
    Registered engineer + passing PEC tests
- UK (via Engineering Council UK)
  - Accredited Engineer
    Graduated from accredited program
  - Chartered Engineer
    Professional Engineer + a lot of industry experience
    (min: 5 years)

If program is not accredited ?

مزے کرو یا
ہڑتال کرو

If program is not accredited ?

Do further training (e.g., Masters), get work experience, pass tests

Registration Types of Engineer

- Chartered Engineers ... Expected to:
  - Develop solutions to engineering problems using new or existing technologies
  - Be innovative and creative
  - Introduce new and efficient production techniques
  - Introduce new and efficient marketing techniques
- Professional Engineers ... Expected to:
  - Design and develop solutions using existing technologies
  - Operation/maintenance of products, equipments, etc.

Titles of Engineer (Function of Engineer)

- Allow usage of title Eng/Engr. With name, just like Doctors do with Dr.
  - It is a criminal offense to call yourself one if you are not registered with respective membership body
- Restriction of some Functions from general public to only members of professional body:
  - You can only perform audits if you are registered chartered accountant
  - You can only take engineering projects if you are registered with engineering council
  - You can only apply for foreign software projects if you are registered with Pakistan software export promotion bureau
- Title of Eng./Engr. religiously followed in Europe, Sub-Continent (But other countries, e.g., UK are very lax in it's usage)

Status of Engineers

- Illegal to call yourself with a title if you are not registered with respective membership body.
- It is "un-ethical" to continue calling yourself with a title if you are no longer working in that field (case Dr.'s/Engr's in commission services)
- Illegal for company to use the term "Engineering" in name if:
  - It is not registered with engineering body (PEC Rule)
  - It does not employ 2 registered engineers (PEC Rule)
- Academic programs using word "Engineering" in name must be taught mostly by registered engineers (PEC Rule).
- Illegal to Carry out Engineering work if not carried out under supervision of Registered Engineer (PEC Rule)

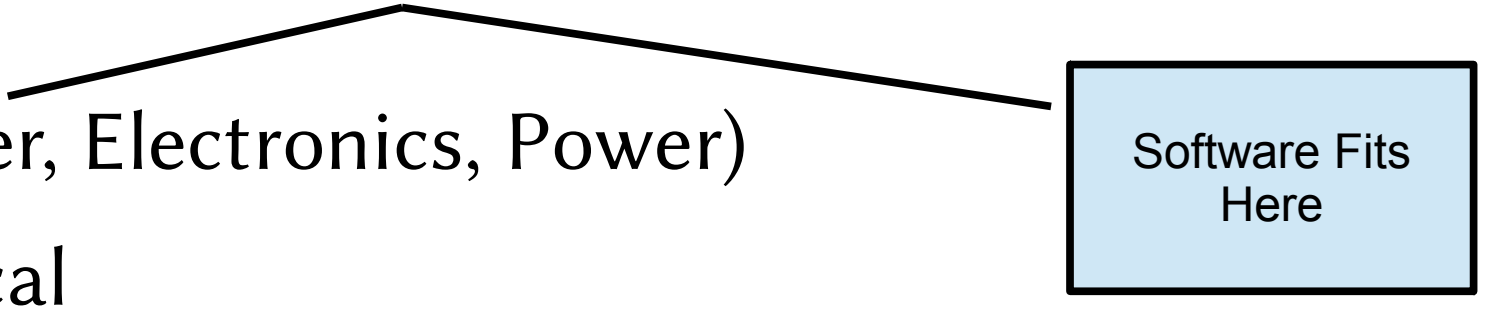
- Rules vary from country2country but are more or less same in spirit.

Pakistan Software Export Promotion Bureau

- Apex Government Body
  (Falls under larger body,
  i.e., Ministry of Science & Technology)
- Purpose: Promotion of IT sector in local and international markets
- Example functions
  - Internship Facilitations
  - Incubation Programs
  - Standards for IT functions in Pakistan
  - Company Certification
  - IT Parks

Types of Engineering

- Chemical
  (Material, Textile)
- Civil
  (Environmental, Geo-technical, Structure, Transport)
- Electrical
  (Computer, Electronics, Power)
- Mechanical
  (Manufacturing, Thermal, Industrial)



Software Engineering as an Engineering Discipline

- Software Engineering + Information Systems now accepted as branch of Engineering
- Why?
  - Engineering is synonymous with "building" Dams, Bridges, Airplanes, Cars, Radios, etc.
  - Some key ingredients of the "building" process:
    - Design and testing so that the built object works properly, reliably, efficiently.
    - Completing task in time, and within budget constraints.
  - The "building" process not shared by other areas like marketing, medicine, accounting, etc.
  - This "building" ingredients shared by "Software Development"

Software Engineering as an Engineering Discipline

- In the USA, Some states don't allow titles like "Information Systems Engineering" and "Software Engineering"
- University of Texas prevented by law to offer courses in Software Engineering
- Tech companies (e.g., Sun Microsystems, Microsoft) ignore this for the time being.
- Their criticism:
  - Software Engineering not able to reliably/precisely describe
    - Materials and methods that they use
    - Metrics that define results of their work (example SE metrics: Lines of Code, Algorithm Complexity)

London Ambulance System (LAS)

- Computerized Dispatch System Project (1987-1992)
- £ 7.5 Million Spent
  - Ambulance Location System
  - Automatic Ambulance Allocation
  - Mapping Software (No Google Maps at that time)
  - Centralized Command/Control System
- Failed after just 9 days due to software errors, written by non-regulated Software Developers

London Ambulance System (LAS)

- Recommendations:

  (1) Compulsory registration of Software Engineers

  (2) Legislation which ensures software development carried out under supervision of registered SE

  (3) Design and control of critical systems should be under control of registered software Chartered Engineer

- (1) and (3) accepted
- (2) not accepted
  - Administrative Nightmare: More Software Developers than registered SE
  - If enforced, software development would go underground, and then difficult to regulate.

Software Engineering as an Engineering Discipline

- Pakistan Engineering Council accepts:
  - Bachelor's of Software Engineering
  - Bachelor's of Computer Engineering
- BS Computer Engineering from following is recognized as "Engineering Degree" by PEC
  - FAST-NU Karachi
  - FAST-NU Lahore

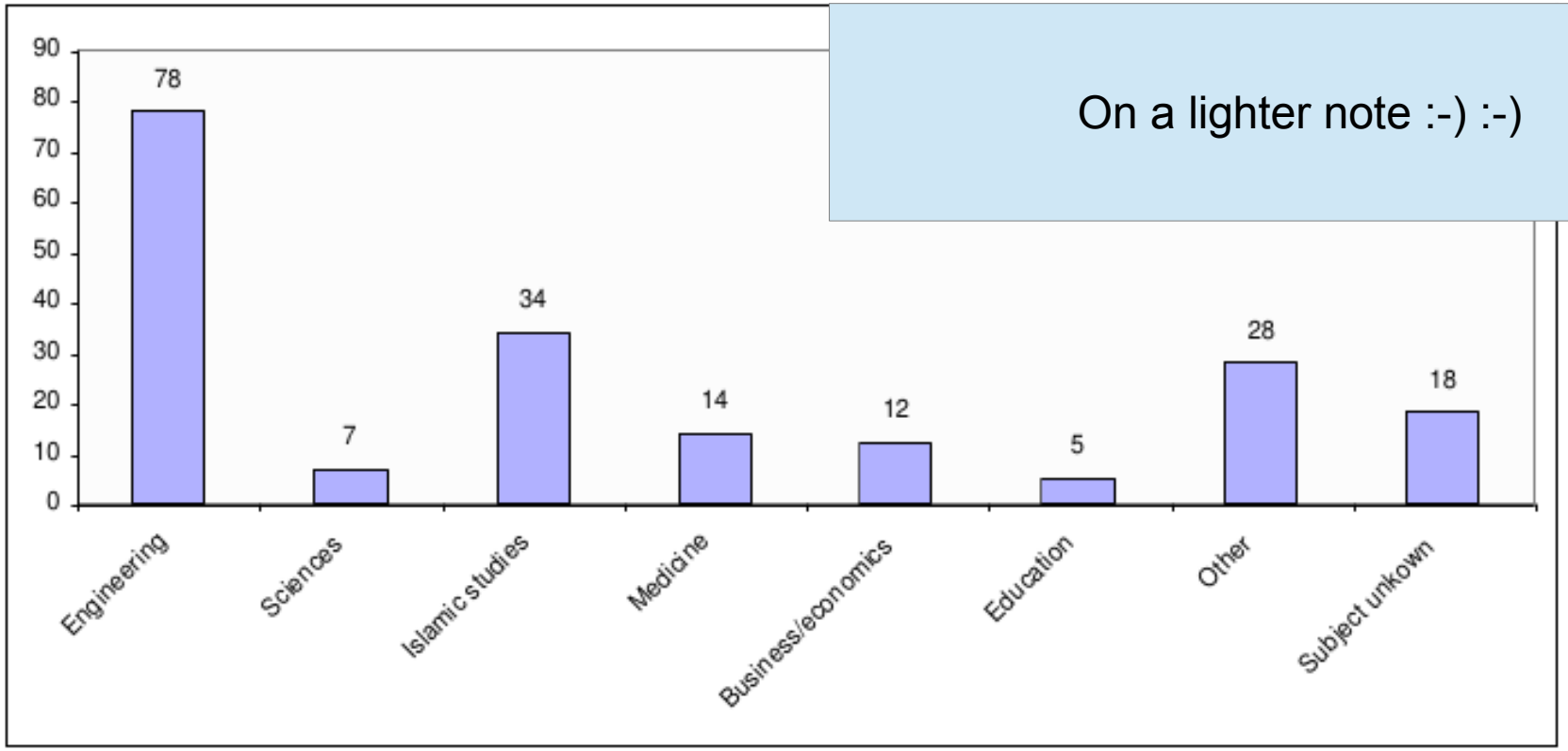
International Recognition of Engineering Qualifications

- **Europe: Mobility Directives.**
  Get Qualified in 1 Country, Practice in any European Country
  - European Federation of National Engineering Associations (FEANI, Est. 1951)
  - Registered Engineers allowed the usage of Title **EurIng**
  - Registered Engineers with European Country only allowed the usage of title **Ing, Eng**
- **USA: Washington Accord, 1989**
  - Engineering Programs in Australia, Canada, Ireland, New Zealand, UK, USA, Hong Kong, South Africa, Germany, Malaysia, Japan, Singapore are automatically accredited by each country's Engineering Bodies.
- **Pakistan (PEC)**
  - Recognizes foreign Engineering programs that are listed in "2nd Schedule".

:-) :-) Are Engineers Terrorists :-) :-)

Educational Background of key captured terrorists

Figure 2: Higher education in our sample (196 cases)



On a lighter note :-) :-)

* Engineering in our definition includes computer sciences and architecture. The latter was included because it is commonly part of engineering faculties in Middle Eastern countries, as it is in European countries.

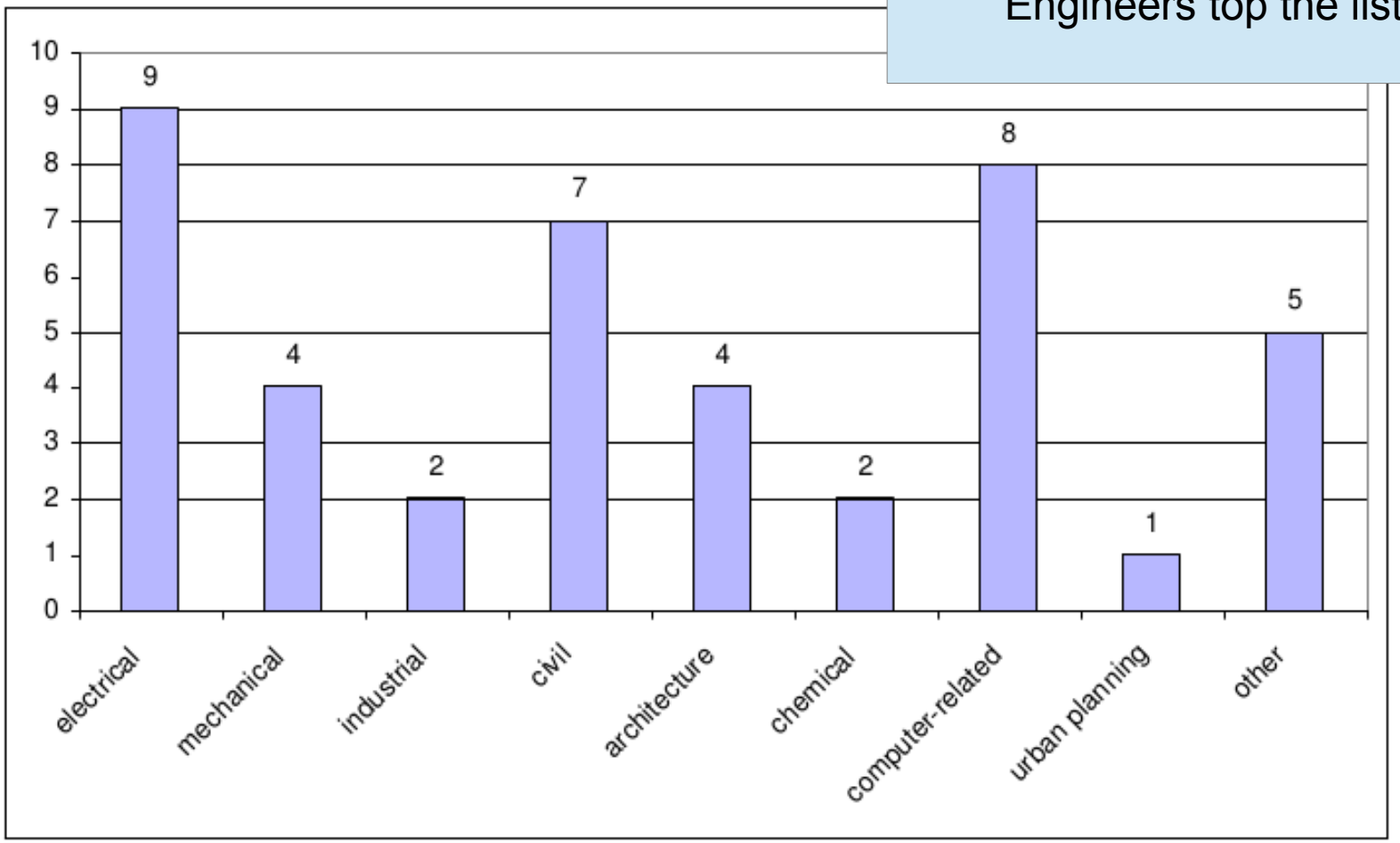
** Islamic studies includes various Islamic subjects, such as "Islamic law", "Quranic studies", "religion" etc.

*** Other subjects include Agriculture, Arabic Literature, English, History, Law, Media And Communications, Pharmacy, Philosophy, Psychiatry, Social Services, and Technical Military Science.

:-) :-) Which types of Engineers :-) :-)

What types of Engineers are more Inclined to Terrorism

Figure 4: Types of engineers in sample (42 cases)



* One case studied both chemical engineering and computer science and hence adds to two subjects in this table, while being counted only as one case in the total

** "other" includes rare subjects

Note that electrical and computer Engineers top the list loool

What about Non-Islamic terrorists ??

Table 12: Graduates and engineers in non-Islamic radical groups

Anarchists	A search in the biographies of 700 international anarchists – covering 19th and 20th century individuals and most European countries, the US, Russia and several Asian countries – yielded 54 cases with a known degree, six of whom were engineers, 10 doctors, 20 lawyers, and 15 philosophers*
Post WWII Left-wing extremists	• Most 1970s *German left-wing terrorists* studied humanities (Jäger et al. 1981; von Baeyer-Katte et al. 1983) • No engineer among 17 members of the *Rote Armee Fraktion* cases with known higher education (www.rafinfo.de). • In a sample of 67 members of the Italian *Red Brigades* and other radical leftist Italian groups, which is part of a database under construction by Valeria Pizzini-Gambetta, out of 34 known education achievements, 16 had either a university degree (6) or some university exposure (10); of those, 10 were in the arts, humanities or social sciences, 3 in natural sciences, 1 in maths, 1 in physics and 1 in engineering. • Most radical *US leftists* were doctors, lawyers or had a liberal arts education (Smith and Morgan 1994) • *Latin American left-wing radicals* in late 1960s were mostly graduates of law, humanities, and medicine (Russell and Hildner 1971) • Members of the *Japanese Red Army* were mostly university students or graduates and mostly from liberal arts fields, with only very few medical doctors or students and one physicist (Patricia Steinhoff, personal communication). • No example of engineers found anywhere outside of Islamic world (Russell and Hildner, Smith and Morgan, Jäger et al., von Bayer-Katte et al., survey of dozens of websites).
Separatists	• There is no evidence of the presence of engineers. *IRA members* took humanities courses when studying in prison.** Graduates of all kind were a tiny minority. • Among 1117 cases of *ETA members* only 1.8 per cent were university graduates and 2 per cent were university students (Domínguez Iribarren 1998: 47, cited in Smith 2005).

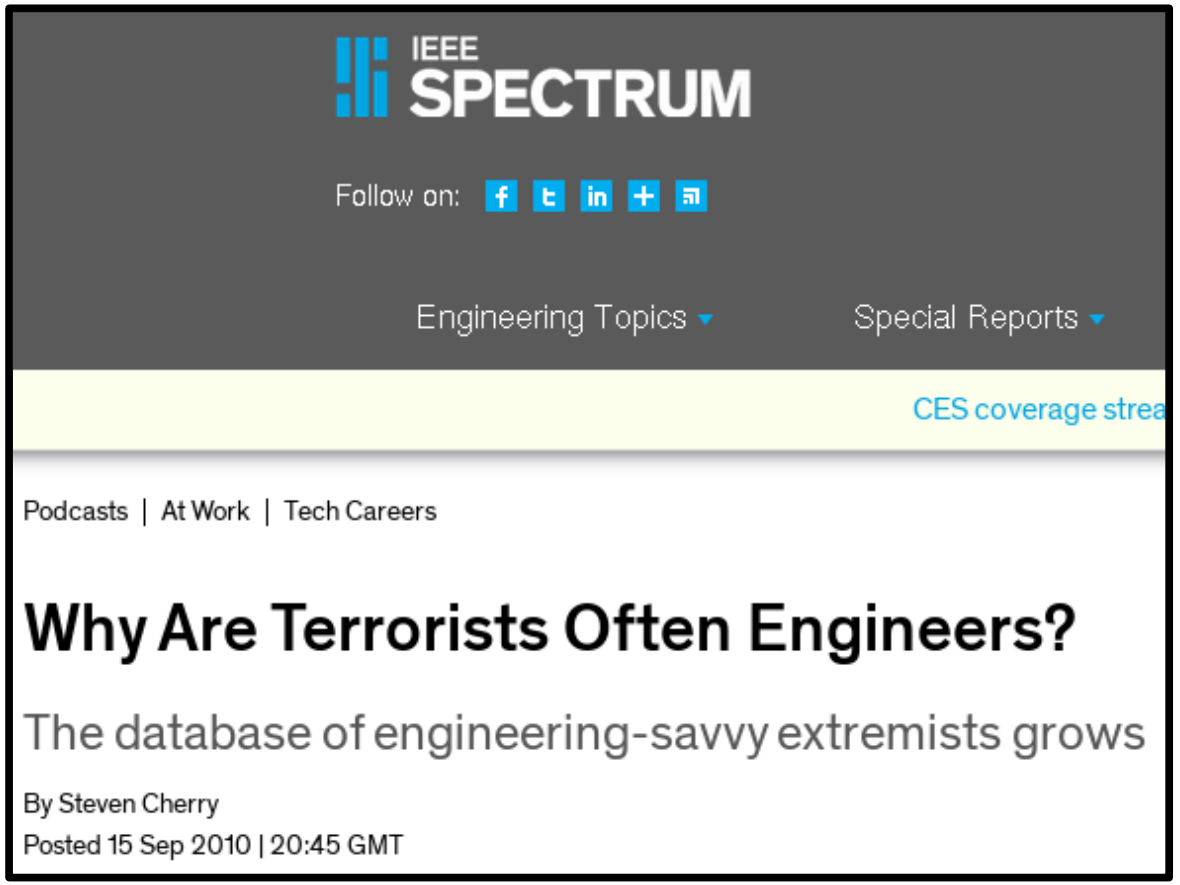
What about Non-Islamic terrorists ??

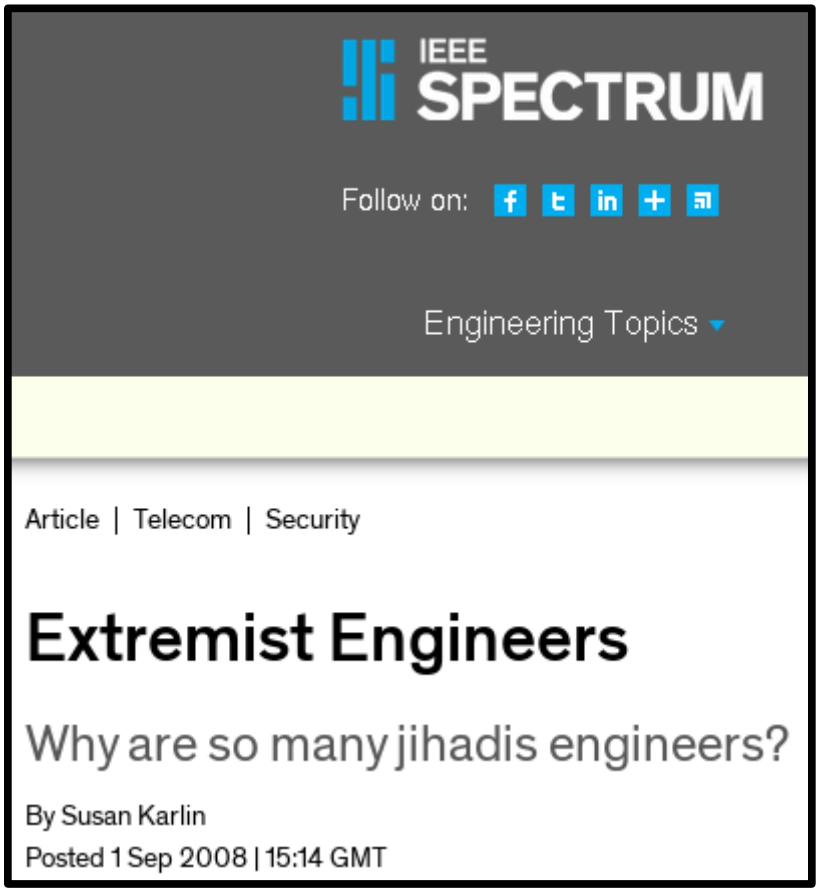
Nazis	Engineers were strongly present in the Nazi party even early on, but no more than people with other degrees (Herf 1984: 197-8), and they were not over-represented in the Nazi leadership.
Fascists	• In Roberto Franzosi's database, constructed using newspapers from 1919 until 1923 and tracking all reported violent episodes, there is reference to some 10,703 fascists; among them only four were reported as engineers (personal communication). • "In 1935, out of a sample of 93 *federali*, 39 had no university degree, 25 described themselves as dottori without giving details, 5 were accountants and 4 engineers. There were only 5 professors and 15 lawyers; these professions had provided about half of the deputies in the pre-Fascist parliament" (Lyttelton 1973: 305-6).
Post WWII Right wing extremists	• A survey of three *German right wing parties* yields a presence of some engineers, but no over-representation compared to the share of engineers among German graduates (federal and state-level websites of Nationaldemokratische Partei Deutschlands, Republikaner and Deutsche Volksunion) • Among 287 *right-wing extremists and neo-Nazis* in Germany and Austria, we found 29 individuals with known higher education, involved in 33 groups, 6 of whom were engineers. • Among seven educated *leaders of US extreme right-wing* groups whose degree or occupation we could establish, three were educated as engineers and another one worked in the electronics industry (Smith and Morgan 1994; web surveys) • Among the technocrats surrounding Pinochet, engineers featured prominently, even among the 'Chicago Boys' who are generally believed to have been only economists (Huneeus 2000).
Jewish Under-ground	The 27 individuals involved in this extremist Israeli group active in the early 1980s were overwhelmingly well educated, in high paying occupations and very religious. They included teachers, writers, university students, geographers, a combat pilot, a chemist, a computer programmer, and two engineers (Krueger and Maleckova 2003: 137)

* Survey of biographies on <http://ytak.club.fr/index.html>

**James Spencer, personal communication, July 2006

Topic also covered in IEEE





Institute of Electrical and Electronic Engineers (IEEE)

- Global reach. Noticeable for
  - Standards (E.g., 802.11 Wireless Standard, 802.3 Ethernet Standard, 754 Floating Point Standard, etc.)
  - Research Conferences, Journals, Transactions, etc.
- HQ: New York, USA
- ~ 0.5 Million members from 160 countries
- Established 1963
- Areas of Expertise
  - CS, Mechanical Engineering, Civil Engineering, Biology, Physics, Mathematics

Institute of Electrical and Electronic Engineers (IEEE)

- Membership Grades
  - Students
  - Member (also Professional Member, must have Degree and/or experience. If does not pass criteria at time of application, can be registered as associate)
  - Senior Members (Possible on producing 3 letter of recommendations from other Senior, Fellow, honorary members)
  - Fellow Members (Highest Grade. Members cannot apply. Must be nominated by others)

ACM Association for Computing Machinery

- Chapters (Student/Professional)
  - Networking Opportunity
  - Tools (Conferencing/Webhosting, etc.)
  - Promotional/Informative Material
- Digital Library
- Publications/Journals
  - Special Interest Groups (SIGGRAPH, SIGAI, SIGBIO, SIGCOMM, SIGMOBILE, ...)
  - Communications of the ACM
- Conferences
- Career Resources

Others

- British Computer Society (Like ACM, but focuses more on setting Industry Standards, accreditation, etc.)
- Italian Association for Informatics and Automatic Computation