Z-99 Attracting, Developing and Retaining Top Technical People

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Extended Abstract

Our industry is graying. The mentors in many of the major companies are gone, the in-house training programs in many major companies are gone, and the research centers in many major companies are gone. Comparing the E&P landscape just 10 years ago, many of the major companies themselves are gone, and have been replaced with very different looking organizations. Indeed, in 10 years, most of the people attending this EAGE conference will be gone.

The industry is starting to think hard about the "big crew change". And as it takes some 10 years to educate and train entry level university students in the geoscience and engineering disciplines so they can begin to effectively contribute to their companies with minimum levels of supervision, there is no time to lose. A further challenge is how to build and maintain skills once professionals have entered the industry.

The paper will look at why relatively few graduates in engineering and the geosciences are now considering entering the Oil and Gas industry, and how the upstream business can make itself more attractive to young undergraduates. It will consider the education they can be given in universities so they are most effective upon graduation, and at how to develop and retain them through their careers. I shall focus on those areas where we, as professionals, have some control.

The paper draws on studies by volunteer members of the professional societies and publications (AAPG, SPE, JPT and Heath 2000), with specific reference to recent Asia/Pacific Colloquia and Technical Sessions on Education and Training for the Petroleum Industry (Lloyd & Ronalds, 2003, SPE 84351, Kaldi & Lloyd, 2003, Transactions of IPA, 29th Annual Convention, IPA). These recent meetings between universities and industry are proving a little different from previous events because people are focusing on not only developing the geoscientists and engineers with the skill sets that the industry would like to see when they graduate, but also in keeping those skill sets current and further developing them during their careers.

Background:

Numbers published by the Oil & Gas Journal show that at as we entered the new Millennium the number of employees in the upstream departments of the top 25 Oil and Gas companies in the US and Europe had dropped from a peak of 1.6 million in 1982, to about 250,000. Age demographics from the large professional societies show the median age to be just under 50 in the case of engineers, and just over 50 for geoscientists. The population of geoscientists studying at universities in the US and European Universities peaked in 1984 at 50,000 whereas today it is well below 20,000 (W. Fischer, Bottomley, D.I.S.T)). And of these, only 6% of students who are entering geosciences programs as undergraduates, enter the oil and gas industry. Percentages are even lower for engineering disciplines.

Surveys conducted at Adelaide University and elsewhere by AAPG's educational volunteers, and confirmed at various SPE Education Colloquium, show that the main reasons why students are steering away from the Oil and Gas industry are because they view it as "low tech", "as environmentally unfriendly" and to offer an "unstable career future".

It is ironic that at a time when world energy consumption is increasing, and when organizations like the AAPG and USGS are showing optimistic forecasts of potential worldwide reserves (based on new areas opening up, and new technologies being successfully implemented) that many of the bright young minds are turning away from the industry. And this is a phenomenon seen not only on the West, but also in countries with emerging economies and indigenous production.

While some of the reasons for this disenchantment with the industry are not altogether unfounded, the upstream (and downstream) parts of the business are not as black as they have sometimes been painted in the popular media.

Partnerships between Universities & Industry

What can be done to attract bright young minds to the industry? Many of the ideas are based on a stronger linkage between industry with academia, and that is a two way street.

Just as the O&G industry has some unfortunate episodes in its past which shade its attractiveness to young geoscientists and engineers, there are some historical issues that elements of academia are struggling to deal with. Some university faculties have teaching staff with little or no industry experience and an in-bred "academic" approach that is characterized by esoteric research and outdated, "non-applied" curricula. Sometimes the disciplines are silo'ed, with disconnected programs in engineering, geology, geophysics and computer science. There may be limited industry awareness with few company linkages, and business practices being poorly understood.

Some ideas that we are seeing implemented in several universities across the Mid East and Asia Pacific area (and are being reinforced with good examples and leadership from European and North American institutions) are:

- Incorporate relevant "career useful" course content into the curricula, and update the research format.
- Recognize the need for cross-disciplinary courses (i.e. G&G, computer data bases, risk analysis).
- Increase cooperation with not only other universities, but also with professional societies (by starting Student Chapters), and with industry (from hosting visiting speakers and lecturers, to developing full business and research links).
- Engage industry by forming boards and advisory committees and developing research consortia.
- Incorporate research programs considered valuable by industry and consider excluding those that are not.
- Develop and promote masters programs with industry related thesis subjects (including the use of software tools and workstations to manage and integrate data).

Industry must also be pro-active in helping set up the right environment for this to happen, by engagement, involvement and investment. Increasing company and university dialog and cooperation is a key. Here are some examples of how industry can interact with, and support university programs.

- Developing teaching and training alliances.
- Providing internships and sabbaticals.
- Outsourcing research.
- Visits, career days & seminars.
- Board and committee representation.
- Scholarships, prizes, data, equipment (workstations and software).
- Endowed chairs and lectureships.
- Government lobbying via regulatory bodies.

Preparing Graduates for the Oil and Gas Industry

In recent years a lot of collaborative work has gone into defining optimal curricula for masters graduates to prepare them for the industry. Such exciting and relevant programs are likely to attract students as they provide a valuable route to employment upon graduation. Here are some of the attributes considered important for petroleum engineering and geoscience programs.

For Petroleum Engineering, the first degree would be in Mechanical, Chemical, Civil or Petroleum Engineering, with a minor in Geosciences as a pre-requisite. The curriculum would include Petroleum Geoscience, Formation Evaluation, Reservoir Engineering, Drilling Technology, Production Technology, Petroleum Economics & Risk Analysis, a Field Development Project and a Research-oriented Project.

For a Petroleum Geoscience, the first degree would be in the Earth Sciences, with a minor in a rigorous pure science or mathematics as a pre-requisite. The curriculum would include Petroleum Systems, Geophysical Interpretation, Subsurface Mapping, Stratigraphy, Sedimentology, Structural Geology, Petroleum Geomechanics, Formation Evaluation, Reservoir Geology (including capillary pressures and reserves estimates), Basic Introduction to Petroleum Engineering, Petroleum Economics and Risk Analysis, a Field Mapping Project and a Research-oriented Project.

In addition to the technical skills, a strong grasp of the so-called "soft-skills" is considered essential for both groups:

- Sound English: technical writing & oral communication.
- IT skills and (generally) a computer language.
- Broad understanding of ethics, QHSE, legal & business aspects.
- Teamwork and leadership skills.
- Some level of practical exposure and training (through an internship or practical project).
- Integration competencies (appreciation of factors involved in Exploration campaigns and/or Field Development planning).
- Professional awareness; ability to find technical data (preferably member of professional student chapter).

One consistent theme is that the industry requires creative thinkers, adaptive hands-on people, who seek out and absorb new data and techniques. Industry want, and academia are frequently striving to produce, "educated engineers" and not simply "trained engineers".

Graduates Entering the Oil and Gas Industry

Being able to offer a road map for technical and career development was considered a fundamental element of first attracting, and then retaining, the right people.

The career lifecycle can be subdivided into three elements: "getting up to speed", "broadening" the technical skill base and "staying sharp".

- "Getting up to speed" corresponds to the first 3-4 years in an organization where a blend of technical, basic cross-disciplinary and software tool skills is acquired in the workplace using hands-on projects and exposure to different asset teams to ensure the theory is properly absorbed and practiced. Technical assessments, post short-course tests and mentoring, and rigorous tracking are important elements of mastering the technology. Soft skills such as communication, report writing, presentations, teamwork and leadership also start to be honed in this period, aided by participation in local professional society chapters. The programs should be quite structured, mentor-led, and typically involve 6-16 weeks training per year.
- The next 5-8 years are devoted to "broadening" expertise and experience on different projects tackling various technical challenges, and working with different asset teams. Risk Analysis, Financials and Project Management skills are combined with cross-disciplinary technical work. Professional society involvement and networking are considered essential in this development phase, along with co-authoring publications. During this period technical staff should evolve into teachers and mentors, guiding and encouraging the "getting up to speed" staff population. Professional certification should also be sought in this period. The training should be mentor-advised and performance-pulled. Training for 2-6 weeks per year is optimal.
- After about 8-12 years, the professional should now enter that phase in the career defined as "keeping sharp", where leadership skills in both technical and people domains start to become fully developed. New technologies are absorbed and enhanced using the professional network

and access to research groups, and various publications. The individual should be seen by his or her peers as a specialist, teacher and mentor in a growing number of fields, and become fully active in professional societies at a regional or international level. This phase is "interest-led", and typically 2-3 weeks/year should be devoted to continued education.

Retaining the Professionals

A Saratoga Research study of 8000 people in 35 industries has concluded that leading drivers for retention are:

- exciting work & challenge.
- career growth, learning & development.
- fair pay & benefits.
- relationships & working with great people.
- supportive management, a great boss.
- pride in the organization, it's mission & product.
- great work environment or culture.
- being recognized, valued & respected.
- meaningful work, making a difference.
- autonomy.

Remuneration usually appears as the 3rd or 4th item in what motivates and retains people, being led by exciting work and personal & career development. However, jumps to 1 or 2 if any of the following are not in place:

- belief and trust in the leadership
- direction in one's career
- respect for the manager

Conclusions

The key challenge to maintaining a robust petroleum industry is ensuring an adequate supply of well trained professionals, now and in the future. In order to meet this challenge it is imperative for all stakeholders to realize that an educational-industrial continuum exists. The university is the upstream part of the E&P business.

As funding for education from traditional government sources decreases, companies must make the same carefully thought out strategic business decisions regarding their future human resources as their subsurface resources. The quid pro quo from universities must include changes to traditional format of degrees, courses, research and attitude to meet industry needs.

Despite the somewhat tarnished image of the industry, bright young minds can be attracted (and, as importantly, retained) if paths for technical and career development are clearly communicated, and graduates are quickly introduced to the exciting challenges of the business by project work and hands-on exposure to case studies in asset teams.

The career lifecycle can be effectively subdivided into three elements; "getting up to speed", "broadening" the technical skill base and "staying sharp". While different drivers dominate each phase, there is a common thread of enhanced competencies and mentoring skills. Universities can play a role in helping knowledge and technology transfer at key points on that road-map; from providing foundation level to advanced short courses and field trips, to co-hosting advanced technology workshops and research symposia.

Retaining top professions is a dual management and technical challenge. Provided there is sound management and technical direction, people are most motivated by exciting work, career growth and development. Remuneration (while important) assumes a more secondary role. When hard cash does assume the primary motivational role, companies can expect to start losing their good people.