

More on the Petroleum Geoscience Vision of the University of Calgary

Helen Isaac reported on the above subject in the February 2006 issue of the RECORDER. Such discussions are commendable. When training the future workforce, it is not only desirable but absolutely necessary to have visions of the future. However, Gaylord Simpson once said: "The future cannot be predicted but one can explore its possibilities". This means that there is considerable room for debate in such endeavours. In the following, I wish to add some thoughts that I developed during my tenure in office (1966-1992). I write this in the first person, since I do not wish to imply that these ideas were shared by all of my colleagues.

My general goal: I used to say to the students: "Your first step in your budding career is to find somebody who is willing to pay money for what you can do". This was also a guiding principle for my lectures. Since a university is more than a mere trade school I used to call "time outs". On such occasions I reflected on such matters as to what it means to "have millions of years for breakfast" every day or take the elevator to the 20th floor while our ancestors only "a short while" ago had to climb a tree to get a better view of the lay of the land. These efforts met with mixed reactions and, in particular, some of the engineers "recommended" I stick to my rocks.

I did not strive for the holy cow of excellence. By definition, this is given to few and it can neither be bought nor mandated. Furthermore, in our democratic world, excellence can only be tolerated when it is far removed in space or time or both. In fact the best excellence is dead. Just consider a candle burning in your office when your neighbour has a 500 W floodlight going. This is not excellence; this is competition. I had a less lofty goal: As our students went out into the world, be that to go on to grad studies or to accept industrial employment, they should be able to meet the competition head-on and compete on a level playing field (assuming they did their part and graduated with a respectable grade point average).

My specific goal: North America is a mature hydrocarbon province. This means that further exploration is unlikely to find more elephants. Also, of the oil/gas already discovered, more than half is still in the ground. As a result, geologists, geophysicists and petroleum engineers will work for small and medium sized companies. Furthermore, they will work in teams to: a) drain new reservoirs more effectively and b) rework old fields to increase their recovery factors. Geologists and geophysicists will be increasingly involved in the exploitation of hydrocarbons and will no longer be relegated exclusively to exploration. The interdisciplinary dialogue (IDD) between geologists, geophysicists and engineers is a must if we want to squeeze the last barrel out of our reservoirs. And we will have to do just that. **80x106 bbl/d of oil** can only be replaced by coal or nuclear energy. The general public perceives no energy crisis as long as the sun is shining and the wind is blowing. It is in for a rude awakening. But even with coal or nuclear plants, we face a gigantic rebuilding of our infrastructure. All indications are that the time of shortages is near (Simmons, 2005, *Twilight in the Desert*; Oeffeys, 2005, *Beyond Oil*; Tertzakian, 2006, *1000 Barrels per Second*). In 1998 I said we are leaving the century of the locusts to enter the century of the crunches (oil/gas AND water), placing the crunches near the middle of the present century (AAPG Explorer, May 1998, p. 102). I see no reason to modify that prediction today. The vital IDD is not going to function properly unless the participants have some inkling

where their counterparts "are coming from". This means that besides specializing, some broadening of the horizon is necessary. Helen is right, the new knowledge gained in the last 5 decades cannot be taught at the expense of the basics, or at least only to a very limited degree. Thus today, the professional degree is an M.Sc. Calgary, as all North American schools, has a masters program that not only requires a thesis but also a certain amount of course work. The latter is used to deepen knowledge in the chosen area of specialization. However, in the light of the above discussion, at least one and possibly two half courses should be used to broaden the students' know-how. Here the universities must abandon their practice of declaring undergrad courses as off limits to graduate students. E.g. for a graduate student in structural geology it may be more advantageous to take the undergraduate course in soil mechanics than Structure 759. It may take more courage too.

To give a few examples: There is more to geophysics than seismic data. An elementary understanding of Geomechanics throws much light on the idea of reservoir heterogeneity, presently a common buzzword in the industry. Open fractures are possible at depth. Everybody should have some inkling how the stress/pressure and temperature conditions increase with depth. In the field of organic metamorphism the concepts of Source Rock, Kerogen, Oil Window, etc. should be known. The revolutionary well-reservoir connection via horizontal drilling will play a big role for infill drilling. Graduates with this type of background will find jobs.

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Gretener on the IDD:

- 1984, *Geology, geophysics and engineering: a case for synergism*; JCPT, June, p. 54-56.
- 1987, "Banff Conference" *Geology & Reservoir Management*; Bull. CSPG, p. 375-379.
- 1992, A "Senior Fossil" Offers Some Advice; *The PEGG*, 20/6, p. 9.
- 1994, Reflections on the Keck Visiting Professorship at the CSM and the interdisciplinary dialog; *TLE*, Oct., 13/10, p. 1022-1026.

Others on the IDD:

- 1982, Hubbert Says: Avoid the "Trap" of Specialization; *AAPG Explorer*, May, p. 32.
- 1993, Haney, D. C., Wake Up Geologists!; *Geotimes*, Feb., p. 6.

The late Bob Sneider was a great and successful promoter of these interdisciplinary teams. In my opinion "this is where it's at". The "bible" of this topic is the proceedings of the 1st Archie Conference by Sneider et al., AAPG, 1991, 441 p.

P. S. Want to meet some real excellence? Read some of King Hubbert's papers. Normal and thrust faults in the sandbox; a real classic. Man-made fractures at the mercy of Mother Nature Geopressures, a global phenomenon with far reaching consequences. Or the now well known Hubbert's peak that made the National Post in September of 2005. A truly amazing man and one far ahead of his time. **R**