

# "You can continually be awakened to the fun and enjoyment of your jobs."

– An interview with Lee Hunt



*Lee Hunt is an experienced exploration geophysicist and a well known name in the Canadian oil patch. He has become a successful manager of seismic exploration, mostly focused in WCSB. He believes it is important to adapt the latest available technology into his processing/interpretation workflows and add value to his projects. He has actively participated in the CSEG activities, was the Technical Chairman for the 2001 CSEG Convention, was the co-recipient of the 1997 SEPM Best Paper award as well as the Best Paper award at the 2000 CSEG Convention, and has chaired many Convention technical sessions. Lee very sportingly agreed to be interviewed for the RECORDER, and made the interview a pleasant and interesting discussion by revealing his impressions, opinions and insightful comments on different aspects. Following are excerpts from the interview.*

*(Photos courtesy: Penny Colton)*

**S:** *Lee, let's begin by asking you, the first question that I usually ask, tell us about your educational background and your work experience?*

**L:** I already knew I wanted to be a geophysicist in High School, so I knew I had to enroll into a physics program. In point of fact, I did my first year of physics in Fort McMurray's Keyano College. From there, I transferred into the second year of geophysics at U of A. U of A is very physics oriented, with geophysics placed within the Department of Physics; and I graduated with a B.Sc. with specialization in geophysics.

PanCanadian Petroleum recruited me and fellow U of A 1990 graduate Tom Podavinsky straight out of school. PanCanadian had an excellent training program, and I enjoyed working there for 6 years. Eventually I departed to go to Cimarron Petroleum. I was the third geophysicist there, which was a big contrast from the enormous geophysical college of PanCanadian. Cimarron had been engaging in successful business for 19 years, but ironically they sold within six months of my arrival. I was briefly at Cimarron's successor, Newport Petroleum, but quickly made the move to another company called Calahoo Petroleum. My role there was as the only geophysicist so that was a whole set of new responsibilities for me. For the first time I had to manage all aspects of geophysics, including the data itself, processing, software, acquisition, and even liability issues related to geophysical activities. I took that job for this new and broader experience alone. From there I have had the privilege of working at a number of small companies, with each move prompted by a series of corporate take-overs. I have been through six of them in all, so I went to Tikal, Ketch Energy, Ketch Resources, and finally Ketch Resources Trust, which was recently acquired by Advantage Energy Income Fund. I enjoyed a new role as a middle manager at Ketch Resources Trust, where I ran their North Business Unit.

Now I am consulting under my consulting company Mimir's Well Exploration Corp.

**S:** *You said you had already made up your mind to go into geophysics. How did you make up your mind?*

**L:** When I was in High School, I recognized there were a few things that I was good at: one of them was writing, and the other was physics. I liked writing; especially creative writing, and I loved literature, but I didn't think that writing held a realizable career for me. So I visited the school's career counselor, and we focused on careers in physics, which I hoped would be more tangible. The school had a gigantic book of careers, and we eventually found geophysics. Geophysics looked really good because you didn't need a PhD. to be a practitioner. It was a practical, applied science and appeared to have a future. That made a lot of sense to me.

**S:** *What were some of the early landmarks in your career that put you on a sound footing?*

**L:** One of them was my ineffable good fortune to be hired by PanCanadian at that time. In those days they had a superlative training program and they also had a number of excellent people such as Lorne Kelsch, and a fellow who stands head and shoulders above most of the rest of us: Bill Goodway. Bill took very active hand in training the new grads and that was probably the best turn of good luck I ever had. He imparted a lot of good advice, particularly emphasizing the need to "question everything". This often overlooked habit might be one of the key things a person has to learn; especially a new grad that perhaps lacks confidence and experience. The new graduate's role there was to Q.I. the processing of the seismic data. We worked with both the processor and the interpreter to produce the best image we could for the task at hand. We were encouraged to explore, to investigate, and interrogate any and all aspects of

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acquisition and processing. I was very fortunate that they had that program and role. And there was also time to dig into subjects that interested us. I became very interested in noise attenuation and resolution issues. I recognized that we were in a privileged position to learn about processing for interpretive advantage, and worked hard to make the most of it.

There were some things that we did there that exceeded my regular role. I ran a task force for investigating inter and intra bed multiples. One of the things we did with that task force was form alliances with various big processing houses in town and supported some of their research, both through interpretive input and through actual capital funding. These kinds of activities helped me to appreciate the value of research and development (R&D), and to make contacts with some of the excellent R&D talent that we have in Calgary.

So I have described a little bit about the value of working with a good company that values people. Maybe it is not a landmark that I achieved but I appreciated it- loved it- and did the best I could to take advantage of the privilege of being there. This may sound paradoxical, but one of the most important things that I did was recognize when it was time to leave. And I did this after being there quite along time; 6 and 1/2 years, but there came a time when to continue to grow I had to go. I knew when that time came.

**S:** *As you said, you worked for a big company, PanCanadian and then you went to other smaller companies. From your perspective, tell us about the merits and demerits of working for a small and a big company.*

**L:** Big companies are a great place to start a career. Certainly they are not the only place, and there are new ways for other people, but I doubt that I could have gotten the same technical training anywhere else that I did than at a big company. Also, I gained an appreciation for technology and R&D that may have been difficult to achieve in depth or detail later in a career. In fact it is one of the reasons you go to University and you learn physics or geology first. You are not going to learn that later or at least it would be incredibly difficult. So I think that the technical details needed to be reinforced early. And also it's very collegiate, so you get to meet a lot of people and contacts.

Some other benefits of a larger organization are flexibility. It is possible to work on various projects at a big company, you can move around in them. There are also lots of different kinds of people to work with. If you don't fit in with some, you know there are always other people that you will work well with. And I think not long ago people might have argued that larger companies have greater job security, but I wouldn't make that argument universally now.

There are some drawbacks to bigger corporations and people are aware of a lot of them. Sometimes individuals feel that their impact is too small at a large company. They like to feel that they have done something to make a difference and that's important. Sometimes the structure of the company, the bureaucracy that is necessary to go with it, can be stifling for others and it can induce them to leave. Now I wouldn't say that these kind of frustrations necessarily affect everyone the same way. It is the job of good management teams to try to minimize

and mitigate those kinds of effects so they do not cause a problem. Nevertheless, the structure and bureaucracy of bigger firms often do cause issues for entrepreneurial people.

Small companies can be a lot of fun. Individuals almost always feel they have a big impact and they almost always have greater responsibilities. There are fewer people to solve problems for you. If something goes wrong, it needs to be dealt with- often by you. Since there are fewer people or teams every person on the team is essential. There is certainly nowhere to hide. If you get along with the few people around you, it's the best time of your life and if you don't it can be terrible. So I think interactions are magnified at smaller companies. Interaction with the executive level is also usually much closer in small companies, so most people can be more engaged with the real business struggle of the company.

One of the drawbacks of a small company is its limited financial resources. It is not uncommon for a small company to overspend on a major property (often follow-up to an acquisition) and the debt levels come up too high. The limited financial resources of the smaller organization then make it very difficult to execute other programs. This is a straight jacket that any company can get into, and you really feel that struggle at a small company. Just as you can have a bigger impact at a small organization, you cannot withstand as many problems. If you thrive on that kind of a struggle, it's great, if it drives you insane, maybe a smaller firm is not the place for you.

The main difference that I would point out is that you are close to the heartbeat of the corporation at all times, almost in all ways. I'd say lastly that flexibility and efficiency are key elements at a small company. I knew when I was leaving PanCanadian to go to that very first small company role at Cimarron, I had to change. Instead of having a single large project area for years, three or more geologists would show up at your door every day with new projects. One had to think about how to be flexible and how to learn things quickly, so I'd say to be at a small company you have to be very adaptable and efficient. Some might argue though that that is true everywhere, but it is most obvious in the smaller firms.

**S:** *I know you have mentioned this briefly, but I am still going to ask you – what has been your philosophy towards your professional growth?*

**L:** I didn't have one at first. You start with desire, and I think most people have the desire to do a good job. This is fundamental to professionalism, even if in the beginning we don't always appreciate everything it takes to do a good job. With some experience and guidance, we all learn how to perform better in our roles, and can better ponder the elusive dream of professionalism.

Some of the things that I felt were important for this process were not being afraid to change roles. You don't want to become stale. A professional should be a very bright, dangerous, active person, so you can't be doing the same

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things over and over and if it seems that way, maybe you've got to think about differences in perspective or environment and continue to learn. That is a very professional thing to do. Understand and embrace what really is different and keep thinking about what you are doing.

I would also say that if you want to grow as a professional, you have to be a professional. One example I will give you is: I have been through a number of corporate change changes in control. Whenever a corporate change is happening, there is uncertainty and a significant amount of personal stress on people. Sometimes folks will flake out and become less productive during this period. It is a common behavior phenomenon. In such situations, I usually put on my suit and tie. The reason for that isn't because I want to impress somebody to get my next job, it's to put my self in that armor of professionalism, remind myself why I am there: to help both companies to get through whatever it is they are going through, to be a professional.

Going back to what Bill Goodway first told me-it was a very professional thing- was always ask questions: be interested. A professional is responsible. To be responsible means you are a source of your actions. That means you have to be asking questions, and really owning what you are doing. We are not sheep; we cannot be passive. A professional is a source of significant action, value creation, opportunity, or advice.

**S:** *Yes, that's true, it is very important too. You had mentioned that you had switched from your initial love for technology to decision-making or from a technology position to a management position. Let's hear you say something about that.*

**L:** Geophysics is fantastic for so many reasons, but one of the most enduring and intriguing challenges is its lack of complete certainty in the real world. Even as far back as in university, we recognized that flaws in either our experimental set-up, or simplification in our physical methods, formulae, objective functions, etc, meant that there were many ways to solve a problem. This also meant that there would be endless ways of improving what we were doing. There was no denying we were working in a causal world, but the uncertainty, error, and the ill-posed nature of our problems meant that there was also room for art in the science. Whether a geophysicist is estimating a Fourier transform, the time or depth structure of an event, informal (human) interpretation, or the formal interpretation of an algorithmic inversion, there would always be a better or different way to approach the problem. I fell in love with this idea, and I believed that the clever, creative, use of technology would bring advantage.

I overestimated the importance and universality of technology, and probably did not follow through on my hopes and thoughts regarding technology with a rigorous enough analysis of its real economic value. So, I loved technology, and was biased towards its uses. I think that in those early days, I lacked that cold, skeptical view that was needed to make economic decisions. It took me a long time to fully realize that the discipline of the scientific method was required in all aspects of our work – particularly business and decision-making. The bridge between loving technology in a biased way, to loving the larger science of decision making was built by the experience I later had at small companies.

The MBA guys, or business people from other programs, all study strategy, competition, and economics. Most geophysical programs do not go anywhere near these subjects, so it is left for us to discover this important knowledge through our own means. I suppose that it is probably fitting that we learn the physics first, since our mathematics is far more complex and mind-bending than anything found in a business class. But just because geophysics is more difficult to learn conceptually does not mean that business principles are trivial or unimportant. Ultimately, all geoscientists learn about the business side, often through on the job (experiential) training. But I have to come back to my point that we don't generally learn about decision making as a disciplined process, and we should. Geoscientists either make or advise on enormous, corporately material decisions every day. And we may be good scientists, but we start as amateur business people and amateur decision makers.

As I went to smaller companies, I inevitably became closer to the real business effect of the decisions I made or influenced. Not all the companies did well, and, as I said, we feel that failure or that success and you can start to ask – okay, how much of a difference did I really make? Or did I lead us the wrong way? – So every company gave me a deeper glimpse into these matters and I began to see flaws in my ways of thinking and I will admit to another one of them: confirmation bias. Confirmation bias occurs ubiquitously. It is seen when you are looking back upon what happened or you are looking ahead, and you look for things that confirm what you want to believe. Most people are also too impatient in their decision-making processes, and this tends to direct them towards their biases as well.

I have had the privilege of seeing different executive teams and their decision-making processes. Every time you move you learn something from other people. I became awakened to the fact the technology itself is not so important, but that it's real value comes instead from how well or appropriately it is used. This sounds pretty obvious, but true appreciation of this simple idea could only come when I abandoned some of my old biases. My point is definitely not that technology and decision-making are at loggerheads, but rather that bringing these two disciplines into union is the true goal of the applied scientist. Eventually I took on a role as a manager, and experienced the decision making side more fully.

**S:** *Given the administrative responsibility, sometimes managers tend to loose grip of the technical expertise. What is your take on this?*

L: Well, I was a middle manager, so I had to do both technical work as well as management work and this is not a realistic goal. Generally something gives and there are a few things that can happen: you can lose the personality side, the business side, the technical side, or do poorly at all three. Never the less, I pursued everything as hard as I could. The problem was exasperated by the chronic understaffing most of us find ourselves in. It is hard to find good professionals, and many people try to do too much to make up for the problem. Corporate changes tend to exaggerate these kinds of issues because there tends to be fewer people to go around, but an even greater desire by everyone to somehow make it all work. My experience as a manager was probably the worst grind of my career, both for the dual nature of the role as well as the staffing issues.

On the other hand, I also learned a lot in that role. I enjoyed organizing things the way I wanted them, and dealing with strategic issues. I learned to abandon my biases, learn more from honest look-backs, and finally to appreciate decision making as a discipline and a thing in itself.

S: *What are you planning for your next move?*

L: I am not sure in the near-term. I don't have a big plan at this time. I am consulting right now and I find it to be a breath of fresh air. It has been excellent for the short time I have been doing it. Whether I continue to do that, or take on a larger role with one of my clients or someone else, remains to be seen.

S: *Tell us about some of your memorable moments in your professional life and also a success story that you might want to share with us if the two are different?*

L: Sure. One of them that you are aware of would be in 2001 when I was the convention technical chair. It was memorable because we felt that we were able to unleash a little bit of our own creativity, particularly through the vehicle of the Greek theme we used. One of the things I remember most of all was a discussion amongst the technical team regarding whether we would have awards that year. There are always a variety of opinions on whether we should have a Best Paper Award, or if there even can be a Best Paper Award. We decided to be very aggressive with it- we gave away some very cool and interesting looking swords. I loved doing that because the people that had the courage to get up and contribute to the CSEG were awarded in a way that they had to remember for a long time.

There was also one pretty good example at Ketch Trust where we tried to put it all together. A few of the most basic and important business concepts are those of understanding your own competitive strengths, those of your competitors, and create a truly advantageous position within a market. People talk about positioning and advantage, but aren't always able to execute. The really great companies succeed often. So, in this example, we had an area with the only plant nearby, and there was an enormous amount of open Crown Land. The area had multizone potential, but had not been drilled with repeatable success by anyone to date. It was obvious that we had an area that we could dominate with our plant, and that the land position was such that if we could drill successfully, would scale nicely. What was missing was an ability to drill with certainty. We uncovered a combined technical method to crack the area- a combination of statics work with AVO- and were (for a short time) probably the only local operator who could predict the structure properly. Once we had the technical

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advantage to back up our dominant infrastructure, the business success was virtually assured. This became the one of the few organic growth area in the Trust, and the team was very proud to have pulled it all together so well.

Another example occurred at Ketch Resources, and concerned the challenge of making targets. It is critical every quarter to make targets at these publicly traded companies, because analysts and shareholders have to be able to trust your guidance. I remember we were behind going into one very critical quarter and there were a couple of decisions that we made that were both gutsy and exhibited a true awareness of the situation. We made our targets for a couple of reasons. Firstly, we pushed to drill two particular wells that were not well regarded at the time but the team had a strong feeling about them, and secondly we recognized certain tie-in issues. The team was very much on top of that as they raced to solve some of these problems and there was this vast sense of awareness of what needed to be done, of everybody working together. We executed uniformly and the wells came on at a prolific rate and we made our targets. It was a fantastic moment that I am sure has been experienced in some similar fashion by many of the geoscientists in town, particularly those who have been in either tight teams, or smaller companies.

**S:** *Wonderful. Tell us about the most difficult challenge that you may have faced in your professional life.*

**L:** Okay, I will give you an ongoing challenge and sort of philosophical. It is two-fold. One is to keep thinking critically. It is very easy to relax and become complacent. Humility is required- you needed to scare us enough that we always should wonder what we might have missed, what could be wrong and

if we've asked the right questions. At the heart of this is the humility of the scientific method, which is suggesting that we are trying to go against our biases and not be complacent.

The second thing is balancing your emotions, and I don't mean that I am a fly-off-the-handle emotional guy. We are all emotional and we need them to make any decisions- you can't break through logic without emotions. As I have stressed earlier, we usually have a (emotional) bias of some kind and this sometimes helps us and sometimes doesn't, so we need to be disciplined in our decision making methods. On the other hand, if we aren't still passionate in what we are doing, we may never fight for an outcome, which is also important. So what I have just said sounds contradictory, but I guess what I am saying is that you've got to balance these things. Discipline must be in union with enthusiasm; and this is not a trivial process. Both are required and I'd say this is an ongoing challenge.

**S:** *I am reminded of a very good article that you published in the RECORDER on black box technology. What you had intended to convey in the article was that geoscientists should not get carried away by any technology, but try and understand what it is essentially doing to the data and accept it on its merits. Now there are geophysicists who would like to try out new technology, whether it is black box or anything else and if they see that at the control that they are getting favorable results, they'll likely accept it and go on with its application. What is your opinion on this?*

**L:** I will only answer to black box technology. I have no issues with new technology where we can talk about and challenge the theoretical framework. On the other hand, if we run into a

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product or service whose theoretic framework has not been adequately explained, then I would say that it's not a good idea to pursue it. In fact, I'll go so far as to say it is unprofessional. So I will see if I can back that up.

We are investment advisors, and tremendous amounts of money ride on our advice. One of the very few reasons that the professional designation

of APEGGA has any meaning for geoscientists is the trust that the public and the private shareholders put in our expertise. We have a duty to the public to provide scientific advice, and it's not a trivial duty. I can think of no excuse not to use scientific methods or to use black box technology. Put it in a different way, the scientific method is a discipline – it's not an answer – it's a process. It is designed to help separate us from our biases and designed to test hypotheses. It's the method that's moved us ahead as a species from the middle ages. We don't make predictions made on faith, but on methods that can survive the crucible of what is essentially a very harsh discipline. The scientific method is trying to prove you wrong, or it's not scientific.

I'd say also that tying an a posteriori test is nice, and we all do it, but it's not necessarily meaningful. Unless you can make a priori predictions, your work is not useful. In fact, I can make all kinds of meaningless functions that can be created to match old data points. Predicting new independent points is entirely different, so I don't like the argument that a method can be "proven" by tying old points.

Let me reinforce this by adding that if we don't know the theoretic framework behind a process, how can we question it? How can we be sure we have the correct parameterization, how do we know its weaknesses or its pitfalls, how can we claim to be responsible for the result or comment on their meaningfulness or certainty? Can we say anything at all about a process we do not understand? Do you trust the salesman? The salesman is not responsible for the result, you are. And if we can't be responsible for the result, but yet we make a recommendation on it, then we are irresponsible. And that is unprofessional.

**P:** *As a listener, I would like to make some notes, add some information here. You mentioned APEGGA, and because of my other connections I am aware that was about a year ago, APEGGA issued a new guideline on use of soft-ware as a practice standard, and there was at least one geophysicist on that committee and I read it about six months or so ago and it actually does indicate that in the engineering and geoscience world the professionals are actually responsible for verifying that the soft-ware that they are using actually works the way they expect it, so did that entirely back up what you were saying? We don't normally find time to read some of those guidelines but it might be interesting to follow up in light of what they have suggested.*

**S:** *For protecting technology, some service companies, like to patent their technology. Do you think that is a fair thing to do?*

**L:** Absolutely. You know you can't tell people they can't use black box technology and then tell the researcher who spent all kinds of money that they cannot protect themselves. I am not a fan of litigation- and sometimes I have a little feeling of insecurity over how general a patent award might be- but all that aside, absolutely, you should be able to reap the fruits of your labor as a research developer and that's a great legal way to do that and stay within the scientific framework.

**S:** *I would be curious to see how you react to that. The moment you patent any technology, the patent information is there on the website and once you pick that up you can always come up with something similiar or better, bypass that particular approach, but still get down to the root of it. This is going on. How would you say people will protect if they keep on patenting and then giving out information in the public domain?*

**L:** It is very rare that a company will develop something new without able competitors also doing similar work. It is not the old days where Chevron had developed the Fourier Transform, and it took a long time for other people to get it. That's a very rare occurrence and I don't think it happens today. So I think there is a bit of falseness in thinking that you are really going to keep a secret for a very long time and nobody else is going to get it. I think that companies can reap the rewards of their developments without excess secrecy through appropriate marketing methods. Processing companies that invest in technology are known for it, and they tend to gain a kind of brand recognition that is comforting and useful to their clients. I always give consideration to people that do put money in research and development, and have a good reputation for these sorts of things, and I steer my processing dollars preferentially to those with a good technical track record. I do this because I know I may have to utilize their inventive ingenuity at any time. When you develop something excellent, you will be respected and sought out for it.

**S:** *Some geophysicists deliver well when they are given responsibility. Others excel when they are team players. So in this regard, what is your take and where do you belong?*

**L:** I am not sure that there is a conflict between our responsibility and teamwork. I will try to say a few things around that.

Firstly, everybody on a team should feel responsible. They should all feel they are a source of what they are doing. Now I don't mean we always try to do each other's jobs, but we are certainly a source for our own work. Consider a baseball team where you may be trying to catch a ball in the outfield. You see another player running behind you in case you miss it. That's good teamwork, right? And that doesn't mean everybody is not responsible.

Secondly also, you want to think about humility. Humility tells us the truth which is that no one person, no matter how smart or skilled, knows it all and can do it all. This means that you must be working on a team, and if you are responsible you should not isolate yourself from the team. Remember humility and talk to these people and work in a very team oriented manner to do a better job. Engaging other people almost always makes better decisions. Sometimes folks will fail to talk to their teammates because they think asking questions is a

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sign of weakness, or they are protective and proud. This can happen, but it's not a good thing. I think this is forgetting about that humility and our need to work together.

Another example is rock climbing. Rock climbing is an activity best described as interdependent. We are neither fully dependent nor independent. When one fellow is climbing, he's got to climb. The belayer cannot climb for him. The belayer has other responsibilities that are equally important. If the climber falls, the belayer has to protect him, right? And second, he can also point out holds that the climber misses. This is a lot about how a team should work. We are interdependent and we have to work together, but we do have slightly different roles. We always support each other.

When you have a team that's functioning very well you will often see that they take turns being the team leader. During the early the G&G phase, the geologist or geophysicist may take turns leading the ship, and eventually the engineer and operation's person may take the front. A good team will naturally move that leadership role around if they are working well together.

As for my personal take on team and leadership? I don't have to be the leader, but I will lead if it's required and the primary goal that I would have is that the job is completed and completed well. You do what you have to do with your team to get it done.

- S: *Knowing you and also as you just mentioned, you are a firm believer in new technology, so over the years what new technology ideas you have assimilated in your interpretation, which others didn't adopt at the time, what was the outcome of that, and why do you believe so?*
- L: How about a failure and a success story related, kind of tie that thing together.

I remember some years ago there was a paper that was out on AVO inversion for Triassic sand and this paper invoked all kinds of multi-linear regression. Everything was coming up roses for finding gas sands for the Triassic, so I was quite excited. The authors were some pretty reputable people and I thought I must try this technique. I had always been interested in AVO because of Bill Goodway's influence, and I had a similar problem as the authors' to deal with. I went ahead and did this work with Jonathon Downton, who was one of the gentlemen who wrote the paper. We performed the work, and we all thought we did the job properly.

The project was a failure on an exploration level. Our failure had two principal causes. One was the unfortunate fact that the multi variable regression that we performed was invalid: we were using dependent variables and we cooked the statistics. I think that same mistake had been made in the original paper too. You've got to be a little careful that you know what you are putting into a multi linear regression. Second is that we had sampling problems. We utilized every local well we could on our modeling and within the 3D that we are using. We had a significant number of control points, and it seemed like there was good sampling but when we really thought about it, we realized we never had a really porous, wet well. We had both members: might have been wet, kind of tight,

maybe porous, but we never had that really singing wet sand. So, we drilled some wet wells, and I got my comeuppance. This was an important, although painful moment. I was so confident, but there was a fundamental flaw in what I was doing in that sampling. I learned a valuable set of lessons regarding critical thinking and applicability, but I didn't give up on AVO.



Jon Downton and Yongyi Li and I kept coming back to the question of physics in AVO and we performed more sophisticated forward modeling. I think we came to appreciate how difficult it would be to perform AVO on Triassic sands as you are coming out of a lot of very hard rocks and anhydrites and going into sands. This produces some responses that are very difficult to measure accurately.

Eventually I found an area where we could create significant practical advantages via a combined AVO project. And in this case, the team was working on the Cretaceous in the Peace River Arch. I combined AVO and another piece of technology, which Kim Head spoke of at one of the CSEG conventions, called replacement velocity optimization. What I wanted to find was a subtle structural high that would be in a ubiquitous reservoir rock. All of our efforts to find the highs were stymied by an area wide problem with the statics. I remembered that Kim Head had done some very simple, but excellent, work with replacement velocity optimization to find better structures. We followed Kim Head's method to produce a new statics solution for the area, and also performed some simple AVO work. This was particularly effective because these two methods were entirely independent. The AVO in the Cretaceous was much more tractable than it was for the Triassic, and whenever the structure would line up with the AVO, we would take action. We nailed every well that relied on that method, and had a very successful program.

- S: *Coming back to searching for jobs in our industry, if it is a planned move, one may not lose time, unless you wanted to take some time off. Another aspect is when its a management decision for laying people off as a result of merger, or a take-over or something else and that is quite common these days. Then it could take the individuals some time to land up with a job of their choice. Now in such a scenario, what would you say is the appropriate thing to do, put career above everything else, a move some may term as a self-centered move, or something else, what do you think?*
- L: I don't think there is a really good general answer for this. Everybody endures a different set of circumstances. Assuming you are giving adequate notice, which is a legal professional thing, this isn't something I want to make sweeping generalization on.

Generally though, we really want to act as team players with the people around us, especially around these kinds of things. A lot of people profit from corporate take-overs, and there may be stiff financial penalties for leaving the corporation

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prematurely. Regardless of the financial details around a deal, I recommend as a point of integrity that people do everything they feel they can afford to do to help both corporate entities complete any friendly change in control. On the other hand, there is nothing wrong with putting feelers out and talking honestly with the company's involved and other people. You do have to look after

yourself first. Always. You know, you may have a family, whatever. So that's all I can say about that.

**S:** *That's a nice diplomatic answer. What new technology ideas do you have in your mind at present that once you get an opportunity you would like to apply them to real data?*

**L:** I recently tried a plains depth migration and found it an immensely difficult task to get the fidelity I needed. I followed up with various people in the CSEG- people like Peter Cary, Scott Cheadle, Jonathon Downton, Stuart Trickett, Brian Link, and others. We were all interested in the fact that we do not yet use all of the (resolution and noise) tricks from time processing when we move to depth processing. The depth paradigm tends to abandon vertical resolution after a certain point, and this needs to be addressed. I will look for the time when vertical resolution is critical on a play that also requires depth migration. The goal will be to try to bring all the tricks of time processing into a depth flow and yet to see that happen as aggressively as I think it needs to. This involves talking about a whole processing flow.

So I will just mention a couple of things that might be important on processes within the larger flow. One of them is pre-stack interpolation. I was recently involved in a paper that examined pre-stack interpolation. We were initially looking at pre-stack time migration but we found that the interpolation of even tightly shot 3Ds helped in stabilizing the last ten or so hertz of the bandwidth. This actually enabled us to produce a higher frequency product. The impact was greater than we expected, and quite applicable.

I would also still look at minimizing stretch. There is stretch with migration operators. There are all kinds of little things of this nature that we can try to put together in the larger flow. I know that a number of companies are working on some of these problems, including yours.

**S:** *Let's talk about the future of the Canadian Oil Industry. You know WCSB wells are getting mature, so what would you think?*

**L:** Well, fundamentally geoscientists and particularly geophysicists always find more than others thought they could.

**S:** *Yes, this has been going on.*

**L:** We are going to continue doing that. Some of the improved processes we have spoken about will help us, as well as more 3D seismic data. In some cases, 3D data will be re-shot more expensively to deal with more difficult issues. There is also the endless opportunity of reprocessing old data. This is a reason

we should continue supporting the R&D companies that will help us make those more subtle discoveries.

I have also been interested in fracture detection, and although I am no expert on it, I think that it is going to become more important in the future in some of our non-conventional reservoirs.

**S:** *You are a member of the CSEG and APEGGA. What made you get interested in CSEG for example?*

**L:** We all have to come together somewhere and this is our society. You know we all have to work together. There has to be an ethic and policy around that and you need a group that helps make that happen. The CSEG does so many things around bringing us together and it prevents us from being isolated. So for that reason, I love the CSEG.

APEGGA is also important. We are not all engineers, and it's not always obvious why we should be associated with APEGGA. APEGGA's relevance becomes clear when we to stop and think about just how much money and how many people's fortunes and savings plans- their livelihood- are tied up in the things that we do. So the society brings us together, but APEGGA helps us to think about professionalism and assures other people that we are professional. I think they are both really important to our place in the world.

**S:** *How do you think the CSEG can get more youngsters interested in our industry?*

**L:** The CSEG has a scholarship program. Things like that are great. I think that the more the Outreach program can do, the better. This is a very important and useful function of the CSEG, and we should support it. Since geophysics is still not a career that is commonly known, the more information we can get to high schools and colleges, the better for our industry.

**S:** *Have you had any experience with some of the new graduates from UofC or UofA in particular because they have had record enrolments? There was a combined job ballpark for the last two or three years.*

**L:** I had a geophysical summer student at one of the small companies I worked at. She was very close to graduating from the U of C. She had a few courses to complete and was a very professional lady. Remembering my own mentoring at the foot of Bill Goodway, I was concerned about my ability to mentor her. It accentuated the importance of training and mentorship to me in a very clear manner. I was fortunate in that she had a very good attitude and outlook, which makes any relationship of that nature more productive.

**S:** *What words of advice would you have or inspiration, what words of inspiration for young people considering a career in geophysics?*

**L:** Well, I guess maybe three things. One is - there is an unending flexibility in our careers and the challenges ahead of us. You can continually be awakened to the fun and enjoyment of your jobs. It is great for that reason. Look for that.

The second thing is: if you have a skill there is a way to use it in our industry. There is a way. And lastly I'd say: be courageous. You know we talked a lot today about business,

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## “You can continually be awakened...”

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economics, we talked about the need to be skeptical, but in the end it requires courage to do our jobs well. When people will eventually look back on their careers they can see that courage hopefully and be proud of it.

**S:** *One last question, apart from professional work what other interests do you have?*

**L:** Well, I do a little bit of weight lifting in the mornings, also a little triathlon.

**S:** *Do you still go to the YMCA?*

**L:** Yes, there are a few characters I work out with. This is important for me. A little triathlon I mentioned, my wife kind of got me into that. I like to read, do some writing; I actually wrote a book.

**S:** *You did?*

**L:** Yes, unpublished – but I finished it. I am trying to do some re-writes on it so I can push it to be published.

**S:** *What is it about?*

**L:** The book is a work of fiction, set in a medieval era. The story revolves around attitudes about change and perception of the

future. The characters in the story stand to be hugely impacted by changes going on around them, and they take on familiar attitudes. Some people are very enthusiastic about the future, while others fear it and initiate plans to recapture the so-called “old ways”. The *deux ex Machina* of the story is an entity that represents the fear of change, *Nimrheal*. If for instance, you are an inventor, or creator, even a poet in this world, this demon *Nimrheal* will find you and kill you. *Nimrheal* becomes a major threat and obstacle for the main characters of the story. The fantastic setting allows the story to play out some of our current struggles regarding technology, religion, and change in an entertaining fashion.



**S:** *Well Lee, thank you very much for giving us this opportunity to sit down and talk with you. It has been a pleasure.*

**L:** It has been an honor. Thank you. *℞*

