

“Always aim for a higher level of perfection...”

An interview with Satinder Chopra



Satinder Chopra, Chief Editor for the RECORDER, is well known among CSEG members.

On the technical side he has contributed numerous, articles, papers and posters.

He has also been an extremely active volunteer for the society, and recently the SEG.

His technical and volunteer activities have resulted in several awards and honours, including the CSEG's prestigious Meritorious Service Award.

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He is perhaps best known in his RECORDER editorial role, as he has spearheaded its rebirth as a world-respected technical magazine. More specifically, the many interviews he has conducted for the RECORDER have become one of its hallmarks. By popular request Satinder graciously agreed to sit on the other side of the microphone this time, as Oliver Kuhn and Penny Colton interviewed him for a change!

(Photos courtesy: Penny Colton)

O: *Well, this is different, with you on the other side of the table! I'll start, as usual, by asking about your educational background and your career – introduce yourself to our members, though you don't need any introduction really.*

S: I grew up in Shimla, the capital city of Himachal Pradesh – it's a hilly province in north India. I received my early education at St. Edward School, a missionary school at the time run by Irish Christian Brothers. After passing the Senior Cambridge examination, I pursued my Masters in Physics at Himachal Pradesh University in Shimla. I started teaching part-time at Loreto Convent, and continued with that until I was finished with my studies.

In 1984, after a seven-year teaching stint at the convent, I joined ONGC (Oil and Natural Gas Corporation) in Dehradun as a geophysicist. Dehradun is in the Himalayan foothills, and about a seven-hour drive from Shimla. During the next thirteen plus years, I specialized in the processing and interactive interpretation of seismic data. This also included several years mastering special processing techniques used for characterizing reservoirs, like AVO, seismic inversion, attribute studies, and VSP processing.

Since migrating to Canada in 1997, I have worked for CTC Pulsonic, which later became Scott Pickford, Core Lab Reservoir Technologies Division and Paradigm Geophysical through takeovers. Since November of 2004, I have been working as Manager, Reservoir Services at Arcis Corporation and I am enjoying my work.

P: *Were you interested in science as a child at school?*

S: Yes, definitely – at school I was more interested in the sciences than other subjects. I really loved all aspects of science, so for my B.Sc. degree I actually took courses in Mathematics, Physics, and Chemistry. I wanted to take a Masters, but couldn't decide between Chemistry and Physics, so I applied for both. My father was keen on Physics—Physics was considered to give good employment opportunities, and no one in our family had ever majored in Physics. As it happened I got a call from the Physics department first, so I joined there, and have been hooked on it ever since.

O: *I remember that when you and I first started working together on the RECORDER, you had not been in Canada that long. How did you decide to come to Canada? Was it because you saw it as a good environment for exploration geophysics?*

S: Well, my reason for coming to Canada was to study for a doctorate degree. I always wanted to do this. After doing my Masters in Physics, I enrolled myself for Master of

Philosophy degree in Physics, with this in mind. The university structure is different in India – are you interested in this?

O: *Absolutely.*

S: Well an M.Phil. degree at the time was the prerequisite to teach in a degree college. A degree college is an institution where students get their bachelor degrees. For the most part such degrees do not form part of university curriculum, as is done in the west. After getting their bachelor degrees at degree colleges, students go to the universities to get their masters and doctorate degrees as well as doing research, but first have to get their M.Phil. Typically an M.Phil. degree entailed completing four courses and submitting a thesis.

So I had enrolled in the M.Phil. program as a stepping-stone to a Ph.D. My thesis was entitled 'Horizontal and Vertical Multi-Junction Solar Cells', which included some original research, plus some review work that I published later in an international journal. I completed that and got a scholarship to work for a Ph.D. However, I developed some differences with my supervisor at the time and so quit from the fellowship, and started teaching in a convent school for girls run by Irish Christian nuns at Shimla. This was a disappointing move, as I had always wanted to do research.

O: *Nuns? Girls? I had no idea you had such a racy past!*

S: After a couple years of teaching I again gave it another shot and got admission at the Physics department at the Indian Institute of Technology (I.I.T.) in Delhi. IITs are considered the premier institutions in India and carry considerable prestige, so I considered myself very lucky. However, at the time family circumstances intervened. My father was transferred to a touring job and my mother and younger brother would have been left alone if I had moved out of the house to Delhi. So, my dad suggested I drop this idea.

I did not stop there. As the new session started at the University in Shimla, I again started working towards a Ph.D. After a few months I got a call from ONGC for the job of a geophysicist. My supervisor encouraged me to take the job as he said that such jobs are not easy to come by, and that I could pursue the Ph.D. at a later time, if I wanted to. So I quit at the University and joined ONGC.

By now I was convinced that I was destined to not get a doctorate degree! After working for over thirteen years in ONGC, my suppressed desire was again aroused when I learned that there was a very interesting gas hydrates research program at the University of Victoria. India has a vast coastline and I thought this would be a great project, first to understand gas hydrate characterization, and then to apply that expertise to the data that we had at ONGC.

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I pursued this idea and got admission as well as fellowship at the University of Victoria.

So in the fall of 1997 I moved to Canada with my family. I was married and my two children were 12 and 5 years old. But here again my desire to pursue research was short-lived as we soon realized that the fellowship I was getting was not enough to support the four of us. My wife was not allowed to work in Canada as I was on a student visa. The financial pinch soon became a painful thorn, and I was forced to either go back to India or find a job in Canada. Luckily, I got my first job at CTC Pulsonic in Calgary easily enough, and so moved here in October 1998. So, that is how I ended up in Calgary and Canada. I did not come here looking for greener pastures, it just happened for me.

O: *Because of its history most Indians speak excellent English and that most certainly helped you fit in so quickly in Canada. But what other languages are you conversant in?*

S: Yes, you're right Oliver. I was fortunate that my parents admitted me to a missionary school where right from nursery school instruction was in English. In school I also learnt Hindi, the national language of India, though the working language in offices in most provinces is English. As I come from a Panjabi family, my mother tongue is Panjabi. So the answer to your question is I am fluent in three languages, English, Hindi and Panjabi. I did do 6 months of German at the University, but found I didn't have the time to carry it through.

P: *What did you find different between ONGC and CTC Pulsonic?*

S: ONGC is a large corporation, which has the usual top down control-oriented structure. At ONGC, indeed throughout India, one is expected to address one's seniors respectfully. For example, we would stand up when a senior officer entered our cubicle or office, and we just naturally displayed those mannerisms.

When I came to Canada and joined CTC Pulsonic, the environment was quite different. First, it was a small geophysical service company and it was more open in terms of greeting and meeting other employees and senior colleagues.

Apart from that, ONGC being the national oil company of India, everything takes time, as there are procedures and rules and regulations, which have to be followed. For example, the replacement of the main computer system for processing seismic data took close to 4 years starting from the day the request was sent to the senior management until finally it arrived and was installed. At CTC Pulsonic when management felt a need to enhance computing capacity, I remember it took them a few weeks to install the Origin 2000 from Silicon Graphics in 1998. So there were such obvious differences, which I welcomed as a positive change. Besides, in a big corporation a lot of time is spent in meetings and developing strategies and at times the implementation and focus doesn't seem to be at the heart of the ultimate goal. In a private service company, there is a lot of emphasis on how to achieve the ultimate goal, and quickly.

P: *Did you adopt a strategy in pursuing the career options you have made so far?*

S: No, I don't think I ever had a strategy in my mind. However, there were some genuine concerns that prompted me to make a change each time that I did, even though change is never comfortable. For example, when I was a teacher, I felt I was overqualified for the job. This was my personal opinion, not to belittle the excellent work teachers do. So I pursued a job opportunity at ONGC when it came up, but not as part of a larger strategy.

O: *What sort of work did you do in the thirteen years at ONGC?*

S: At the start I had to learn geophysics on my own, having come from a pure physics background. I got the opportunity to work first in basic marine processing, and then carry out some special processing. Thereafter I moved to interactive interpretation on workstations. This was followed by a three-and-a-half year stint on the management side – I was appointed the Head of the management service group that catered to the manager who was running the biggest computing facility of ONGC. It was called GEOPIC (GEOdata Processing and Interpretation Centre).

P: *How do people move around or advance at ONGC?*

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S: Actually, that is another big difference! In the 13+ years that I served in ONGC I got only length-of-service promotions. Not even once were merit interviews held. What this means is that people who slog and those who take it easy get the same promotions after a certain time, which happened to be five years. This becomes frustrating for high achievers.

There was also a rotation system for geophysicists in ONGC. Geophysicists were supposed to spend about five to six years in data acquisition, and a similar amount of time in processing and interpretation, irrespective of where their aptitudes or preferences were. Since I was first posted in the processing group and then interpretation, I knew I would be posted in the field for data acquisition very soon. This was something I was not interested in doing. So that was another reason that I decided to leave it. Now it may come across that I am being critical of ONGC, but I have to acknowledge that it was my geophysics training ground, the company where I gained experience as a geophysicist and all this has kept me in good stead till now.

O: *How has your career played out in Calgary?*

S: When I moved to Calgary, I continued my work on Special Processing Projects and spent close to seven years at Scott Pickford, Core Labs and Paradigm Geophysical, companies formed as a result of takeovers and mergers.

In June 2004 I was laid off along with 15 other employees, when Paradigm Geophysical took over Core Labs Reservoir Technologies Division where I was working. This came as a complete shock to me as I had partly stayed out of loyalty; I had disregarded some lucrative offers that had come my way. I turned down one offer just three weeks before being laid off!

This was my first real taste of rejection of that sort. Rejection of any kind is not easy to deal with. I was discouraged, but didn't lose faith in my abilities. One thing I learned was that loyalty in the western business world has its place, but other factors can or should take priority. Each individual has to manage his own career development. This was more of a cultural issue for me. I began my next innings...

O: *Ah, the cricket reference!*

S: ...at Arcis Corporation in November 2004 where I have been since, managing the Reservoir Services Group. This has been a very positive move for me as I have been given complete freedom to pursue whatever technologies I consider useful in terms of their development and application in our industry. Besides generating revenue for the company, I have also been given a free hand in terms of pursuing writing and technical communication.



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- O:** *I consider your career to have been successful so far, in two totally different parts of the world. What roles have luck and hard work played in this?*
- S:** I feel that one very interesting aspect of my professional life has been that the successes in my career graph have had very little to do with luck. It may sound surprising, as there is always some element of luck in everyone's life, but I like to think otherwise. It has been hard work all the way.
- P:** *Who were some of your mentors and what influence did they have on you?*
- S:** The first name that comes to mind is Niranjan Nanda, one of the finest interpreters at ONGC that I got the chance to work under. His memoir was recently published in the November 2008 issue of TLE. Once he got to know me and had confidence in my abilities, and good communication was established, he channeled my thinking and energy into creative endeavours in such a way that I gradually learned the tricks or fundamentals that he may have learnt the hard way.

When I first began interpretation, he made me interpret 2D seismic sections by hand and transfer this onto a base map. After I did this he had me contour by hand so that I understood what is going on there. Contouring on the computer is not difficult, but by doing it by hand you get to appreciate what the computer is doing.

Every now and then he would challenge me to a question or a problem and then ask me how I would go about doing it. I learned a lot during the time that I spent with him, till he got transferred from that office. In essence his greatest contribution towards my learning process was that he made me realize that I should not look at data 'horizontally', but should look 'deep' into it, and set the process of asking myself questions and coming up with answers. Such answers come straight away at times; at other times they come after you have spent hours, days and months at them. But in the process you learn a lot about what you are engaged in doing.

There were some other people, notably Iqbal Siddiqui, Ananda Pramanik, and Sudhakar Vasudhavan, my bosses at various times. I learnt different things from Roy Hyndman and George Spence, who were my supervisors at U.Vic. More recently, my association with Kurt Marfurt, my co-author of 2 books, has been very enriching for me. I am now engaged in working with John Castagna and Larry Lines and I am enjoying my association with them.

- O:** *When we've conducted interviews in the past, you've tended to ask technical questions, and I've asked personal interest questions. So I'm really interested in Satinder the person – what makes you tick?*
- S:** Fair enough! I see myself as a simple guy, but I'm always aiming for bigger and higher things. I always strive to be better than myself. I am somehow intrigued to find out what my real potential is, and the only way I can do that is by pushing myself. Now that does not mean that I am a workaholic. I do take time off from work-related stuff, but whatever I am doing, Amrita, my wife, tells me that I tend to exaggerate it or cross limits. But then I don't like to sit idle; I love working.

I like to do my work quietly and when I think a certain amount of work is done and can be shared with the community, I write that in the form of an article or a book. I have always been like that.



I used to be a shy person in school and college. I'd get uncomfortable around people I didn't know, but gradually I learnt the art of handling it. Now I go out only when I have to because of my professional commitments or where my wife and kids want me to, without feeling uncomfortable in any way.

- P:** *How did you get over the initial shyness or fear that most people have when they have to do public speaking?*
- S:** I believe that the only way you can get over your fears is by facing them. At school and college I was always running away from public speaking. In fact at school the first time I was asked to read out to my class was a nightmare experience. I was literally trembling. This fear or phobia remained with me until I was doing my Masters in Physics.

My mother was concerned that this shortcoming of mine could affect my career. When a ten-day substitute teaching opportunity at a convent school for girls came up, she forced me to accept it. So that was my first teaching experience, teaching girls in grades 9, 10 and 11. I really prepared my lessons well and was able to do a good job. What this experience taught me was if you know your stuff well, you have nothing to fear. In fact, instead of letting fear control you, you should be the one controlling fear.

- O:** *I've never heard you speak of your parents before, but they obviously played a big role in your life. Can you tell us a bit about your mother and father?*
- S:** My parents had a big impact on my education, and my two brothers'. Our father worked in the office of the Accountant General at Shimla and retired as Accounts Officer, and our mother remained a housewife throughout. Both my parents ensured that we had an academically conducive environment where we could focus on studies. Both were actively involved in our day-to-day school activities, though my father was stricter when it came to studies.

My father had a stable job, but it was expensive at the time to have all of us enrolled in Convent and English-medium schools. They economized on other things and ensured that we were educated in a Missionary school run by Irish Christian Brothers. This was a tough decision at the time, but well worth the sacrifice. All three of us got good educations and our father supported us throughout. Our home

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routine was education-focused, and instilled good habits in us. Good, sincere and selfless advice came from my parents whenever I needed it and that has rubbed off on me, I think.

P: *What careers did your brothers pursue?*

S: I'm the oldest son. Number two joined the Indian Navy as a Commissioned Officer and my youngest brother first worked for Motorola as Country manager for radio products and now runs his own communications company. My parents are really proud of us and my mother's dream of educating her three children in a Convent school was realized, despite major sacrifices. You may have noticed that in the 'Acknowledgements' section in our book on attributes, I have stated that I thank them for 'nurturing in me a thirst for knowledge which continues', which is very true.

O: *And how about your own children. What sort of relationship do you have with them, and do they take after you?*

S: We have a daughter and a son. Both are good kids. Our daughter is studying medicine. She is a responsible child and likes to chat and has a good sense of humour. Recently she was chosen to compère a Medical Conference. So she wrote out her speeches and other notes to conduct the sessions that were spread over a few days. That is something in line with what I have done, so perhaps she takes after me a bit.

Our son is in Grade 11 and plans to do engineering. He is also doing well academically. He likes playing basketball and keenly follows NBA and NHL games. They are both very respectful.

About the relationship with my kids, I think it is a very healthy bond we have and something that is easier to feel and enjoy than it is to describe in words.

My wife is a French Immersion teacher. Although highly qualified, with 8 years University to her credit,

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she had to face some of the challenges and hardships like other immigrants coming to Canada. Because of her determination and perseverance, she has been able to withstand this arduous journey. She loves teaching with a passion and often comments that it is a rewarding experience, well worth the effort.

P: *I heard you speak at the Earth Science Editors Meeting held in Calgary last year, about how you got into writing as a schoolboy. Could you tell our readers about that?*

S: Yes, certainly. As a child I was never really into writing. However, one quality that I somehow did possess was patience to sit down and make notes. When my father would take me along to attend lectures by eminent speakers or really good orators, I would have a pocket diary and would write my notes. Later, at my leisure I would go over them. This habit of taking notes and then later expanding on them gradually evolved into a love for writing. But when I was young I was never particularly good at writing, and I was never interested in fiction. It was only later when I got into science at university that the writing really blossomed.

P: *How did your first book come about?*

S: When I was doing my Masters in Physics, the foreign textbooks were too expensive and not available in the local bookstores. There were two or three copies of each book in the library and we were expected to make notes for whatever was taught each day. So I believe this made me go through lots of writing. Because of my neat handwriting, I was selected the editor of the wall magazine of the Physics department; I was supposed to write out articles neatly on chart paper 4 by 5 feet in size and put them up on the wall. I performed that job for a year and enjoyed it.

O: *That might explain why you create such good technical posters for the conventions.*

S: Yes, perhaps. Later, when I was teaching at the convent, the syllabus for Mathematics and Physics was revised, but there were no textbooks available yet for this new curriculum. So I started to find the topics in other books, and made up problems. After teaching like this for about two years, I found I had collected a huge pile of calculations and problems. By then, a couple of revised books had appeared on the scene, but weren't very good. They were probably written to make quick money and didn't impart a standard course to the students. In addition to this, my students were performing extremely well for the subjects that I was teaching. To cite an example in a particular year, out of 33 kids who appeared for grade 10 Board examination, 26 got first division marks, 7 got second division marks, with no third divisions or failures. So that was encouraging.

One day it occurred to me that if I compiled all these math problems in the form of a book, it could be well received by the teachers and students of other schools. I was somehow quite confident.

I went to New Delhi and met the chief editor of Oxford University Press (OUP). I was a bit nervous and I was also young at the time, in my mid-twenties. I did not know of any

young authors – I was under the impression that only old people become authors. Anyhow, the editor was a nice man. His first question to me was, "There are other books in the market, what made you write this one?" I explained to him exactly how I felt as a teacher and gave him my reasons. He gave me a patient hearing and then said to me, "Let me go through these problems." Now imagine, these were all handwritten papers arranged neatly in a file.



After a month or so, I again made a trip to New Delhi, expecting that he would turn me down. Contrary to my expectation he said, 'Yes OUP would be happy to publish your book.' Imagine how excited I was. This book of problems was successful, and led to a second, more standard textbook-style mathematics book in 1988.

O: *What about the editing aspect?*

S: Well writing involves a lot of editing, as you know. But in 1996, I volunteered as Joint Secretary and Editor of 'Geohorizons', the quarterly magazine of the Society of Petroleum Geophysicists (SPG) of India. Around that time we organized the society's first International Conference in New Delhi. Out of the many papers that were presented at this conference, we were able to request enough papers to compile them in the form of a book entitled, 'Emerging Technologies for Reservoir Exploration', published in 1998. This was a different experience, as here I was not writing, but editing all the submitted papers

P: *How did the writing relationship with Kurt Marfurt come about?*

S: My first assignment in Calgary (in 1998) involved algorithms on coherence attributes all developed by Kurt. At the time he was working as a research scientist at Amoco. I needed his help to understand the algorithms and their application, so I contacted him. I received very prompt and able guidance and assistance, and thus began our association. It has been a great privilege to interact with him since then.

Once again I collected good examples, and after about five years I compiled all of them in the form of a manuscript and handed it over to Kurt to get his opinion. He was by now at the University of Houston, and working with the SEG on his DISC program. He looked through my work and suggested that we could have a joint publication, which would serve for the DISC as well. This culminated in the two co-authored books that have recently been published by the SEG.

P: *Have you got feedback on these books?*

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S: Well, I'm happy to say that people seem to like them. It is an ongoing process, because it covers a young technology. As we, and others do further work in this field, we hope to document it in subsequent editions. If I receive criticism, which I haven't so far, I will take that in a constructive and positive way, as it will help improve the quality of future editions of the book.

P: *Could you speak about your involvement in the RECORDER?*

S: Both Oliver and I joined the RECORDER Committee in the fall of 2000, when there was not enough technical content in it. It used to be more like a newsletter. We both worked hard at it, brought on significant technical content as well as human-interest articles, besides the usual information in the regular columns like TTI and Grapevine. We introduced a number of new features like 'Expert Answers', 'Interviews', 'Memoirs', etc. All these features have been well received by the membership and this has given us the motivation to continue at it. In the last eight plus years or so we have overseen around ninety issues.

You know I have particularly enjoyed conducting interviews such as this one, with many reputed geophysicists. Member feedback shows that they are popular. Many of these interviews have been published in the Leading Edge. At the recent 2008 SEG Convention, there was a special session

devoted to Rodney Calvert who passed away some time back. I had the good fortune of conducting Rodney's interview when he visited Calgary to give his DISC course. The session's opening presentation was by Ken Lerner, who said he had drawn heavily from that interview. So it was nice to know that that information was shared with the 8000 or so SEG members who attended the Convention

It has been a fulfilling and enjoyable experience all the way. Not only the interviews, but also the hundreds of articles we have published in the RECORDER. We have a team of editors that helps me solicit and edit articles. I would like to acknowledge the able support of the RECORDER Committee and their team effort, which has been commendable, and has made this possible.

O: *Tell us about the recent changes at the RECORDER.*

S: Recently we have added more volunteers to our RECORDER Committee and also made the different positions time bound so that more people get a chance to participate and contribute to our flagship journal. You are probably aware of a new feature that we introduced in the RECORDER and that is to publish peer-reviewed articles. This has started with the December 2008 issue of the RECORDER. I am sure more and more authors will have their articles included as peer-reviewed articles in the RECORDER.

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O: *And your RECORDER work has led to similar involvement south of the border, correct?*

S: Yes. In November 2005, I got a position on the The Leading Edge Editorial Board. The SEG is the biggest international organization of geoscientists with a membership of over 30,000 people and so the exposure and experience is significant. I have tried to remain active with my writing work by publishing technical articles in different geoscientific journals including the RECORDER, TLE, and the EAGE's First Break. This is a great privilege and I hope to continue with my passion for writing for many more years to come.

P: *What is your message to upcoming writers?*

S: My message to upcoming writers is to remember that technical writers render a great service to the scientific community. When writers take the initiative to share their work with others in the scientific community, everyone benefits, writers and readers. Without this the progress we make in whatever we do would be impeded severely.

Writing also brings with it recognition within the scientific community, which is the reward that writers receive. Having said that, I should also point out that whatever you write may not get published and so be prepared to accept that and not get disheartened. But it is certainly not a waste of your time as with each writing assignment you learn a lot. It is possible that that material could come in useful elsewhere, for building a course, delivering a talk, etc. As a writer, you need a lot of patience, persistence and hard work. But the rewards are very satisfying when you see your work being read by others. Remember, it is a good idea to leave your mark on the geophysical landscape in some way – whether it is big or small. Writing is one way to do it.

P: *How do you feel about winning awards? You have won several awards for your presentations and posters over the years. How does it feel?*

S: I don't aim to win awards, but I do try to bring perfection to my work in whatever way I can. Having said that, I have to admit that I am always thrilled when I receive awards. An award, financial or otherwise, is a benchmark or measure of achievement, and gives one the strength and motivation to continue what one is doing. I have heard it said that awards are like ornaments for a lady; the more she has, the more her charm is enhanced.

O: *I would prefer to see you with awards, but that's just a personal opinion.*

S: [laughs] Recently, when Tad Ulrych was honoured with an award for being the SEG/EAGE Distinguished Lecturer for 2007/08 at Las Vegas, in his witty and humorous way he recalled Oliver Twist's words, 'I want some more.' I tend to agree with him.

P: *Well with you on that side of the table Satinder, I guess it's up to me to ask the technical questions! Tell us about the seismic attributes on which you have written so much.*

S: Seismic reflection amplitudes have limits in that they convey only so much information. Due to limited resolution of the seismic data, it is difficult to map small or subtle features. Attributes are quantities that are computed from the seismic amplitudes with the objective to extract more meaningful information with regard to structural, stratigraphic and reservoir properties.



Attributes like dip magnitude, coherence, and curvature are useful for picking up subtle information, and are also convenient in accurately interpreting discontinuity features quickly, which otherwise would take extensive amounts of time.

Attributes for lithology or porosity estimation would be AVO and absolute acoustic impedance inversion. Spectral decomposition has proven to be useful for studying the thickness of thin reservoirs below tuning thickness, accurately determining the boundaries of reservoir lithounits and for geomorphological applications.

Texture attributes hold the promise of helping with the detection of reservoir zones in the background of non-prospective lithology. All these attributes are used for seismic data enhancement and subsequently more confident interpretation. In fact today they form an integral part of most seismic interpretation projects.

O: *What about the analysis of several attributes simultaneously?*

S: Yes, we can recombine selected extracted attributes using neural network technology and generate other attributes useful for a given objective. This usually involves training of a neural network on a subset of the full data and then running it over the whole dataset. The interpreter then churns through the new volume(s) to determine any geological or petrophysical variations that may be interpreted. The choice of attributes for such an exercise is important. For example in the neural network analysis increasing the number of attributes that are highly correlated (contain redundant information) may not enhance the quality of the final results.

I believe attribute analysis to be of utmost importance in the characterization of reservoirs and for accurate interpretation.

P: *What future developments can we expect in the field of seismic attributes?*

S: I have talked about future attribute development in some of my presentations. I see them happening in three different areas.

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First is in the area of processing and acquisition. We have been applying volumetric attributes to P-wave data by and large. We should see the application of this to converted wave and shear volumes.

Integration of volumetric attributes and AVO technology, especially for data with long offsets, is something we should see soon. Application of suitable attributes for time lapse seismic should see more application. Advances in measuring anisotropy and attenuation should result in attributes that we can incorporate in our interpretation workflows.

Second is with regard to the calibration of attributes. I think we should see calibration of volumetric curvature as well as azimuthal limited seismic volumes with fracture-sensitive measurements that would include image logs, trace data, production rates and microseismic measurements. Statistical pattern recognition and the use of neural network application using textures should become more common,

And the *third* area would be algorithmic development and workflows. It is possible that we may see the development of algorithms aimed at determination of attenuation from seismic data. We use crossplotting of AVO attributes effectively. This methodology has immense application for other attributes. After performing principal component analysis on suitable attributes, it is possible to distinguish favourable targets separating out as clusters on 2D or 3D crossplots. This would be really useful.

Finally, I would like to sound optimistic about the development of algorithms in the area of image processing, just as the concept of texture was adapted to seismic from there.

All in all, I am very enthusiastic about new developments in seismic attributes that will unfold in the years to come.

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O: *Administrative responsibility can take a lot of time, and so some senior managers gradually lose their technical expertise. What is your take on this?*

S: I had a taste of management roles while at ONGC, and I found that it took me away from the technical role that I used to find so fascinating, exciting and satisfying. So, I have never lost sight of that since then, and like to remain current with the latest technology developments in our profession.

P: *Given that you are always looking for ways to improve yourself, or tackle new challenges, can we expect any surprises? I am sure you have your eyes set on something. Have you ever perhaps considered a role at the University?*

S: I want to keep evolving and learning. I believe when you stop doing this, you grow 'old' or stagnate. I never want to get there.

Our attributes book has been well received and so I have been enjoying that. I want to explore some more areas of



geophysics, so there are a few writing projects I am working on and in the near-term I hope to complete them, probably this year. For the longer-term I am hoping to be able to conduct courses on different topics and on different platforms. For this I will have to remain in touch with real data and I am quite optimistic about it.

As far as an academic role, I think it is a good idea as Brian Russell has done. It is another option to consider. But to pursue that I would need a doctorate, and going by my past record that might be tough! But it is something I might consider some time.

O: *You are a member of CSEG, SEG, EAGE, APEGGA and AAPG and you volunteer for some of these societies. Why do you think you do this?*

S: I have volunteered for professional societies in different ways. When I was in India, I was one of the founding members of the SPG India. I served first as an Executive Member, then as Joint Secretary and also as the first editor of their flagship quarterly magazine called 'Geohorizons'.

Here in Canada, I volunteered in a variety of ways. I must say it has been fun all the way and has been my way of giving back to the geophysical community from which I have gained so much.

I feel that Professional societies stimulate the advancement of science and technology, and facilitate ongoing education and exchange of information. You know, this happens in many ways – conventions, workshops, courses, and publications. It is not unusual to cross-disciplinary boundaries as part of the

job assignment. In such cases being a member of professional societies can help. Usually cross-disciplinary courses or workshops are available through the societies to fill up such technical voids that one may encounter, and volunteering definitely helps one stay on top of that.

I would definitely encourage young geophysicists to become members of one or more professional societies and participate in the many activities that are organized by them. As I have said I have enjoyed being involved in professional societies. It is always a fruitful and satisfying experience.

O: *You've initiated many new CSEG features, for example the luncheon webcasts, and the invited speakers forums at the Conventions, among others. What other initiatives might you like to see the CSEG take on?*

S: I have thought of a few things I'd like to see.

I would love to see more details about the professional careers of famous Canadian geophysicists on the CSEG website. We started the interviews, which is a step in this direction. However, we should have detailed write-ups of the CSEG award winners also posted on the website. All this is inspiring for the young and upcoming geophysicists.

One thing I DON'T want to see happen – there has been talk of limiting access to the technical material on the CSEG website to members only. I don't like this idea at all, and think it goes against the spirit of our mandate, which is something like 'to promote the science of geophysics, and fellowship and cooperation among people interested in geophysics.' Having open access to our website is a very valuable service that the CSEG renders. I often meet people from different countries in South America, the Far East, Europe and the Middle-East, who are not members of CSEG, but have accessed the technical material on the website. As per the statistics of the CSEG website a couple of years ago, there were more hits to the site from outside North America which confirms the point I make.

David Finch documented the history of the CSEG up until 1984 in his book 'Traces through Time'. It is time to have it updated, or I should say it is time to document the history from 1984 until the present. I have run this idea by the CSEG Executive some years ago and they were open to it. However, David Finch wasn't free to take that on at the time. But it should be done. If it is started now it will take a couple of years for the job to be completed and I like to think it will be done by 2010.

The idea of a CSEG Distinguished Lecturer has turned into practice and I believe it is doing well. It should continue to do well. I think there has to be some effort devoted to ensuring a good mix of industry and academia in terms of the choice of the DL so that both benefit from it.

I would also like to see more activities like the SEG Challenge Bowl organized for the students from different universities in Canada.

P: *Of the many people you have worked with, which ones have you particularly admired?*

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“Always aim for a higher level of perfection...”

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S: When I was back in India, Brian Russell came to teach a course I arranged. He impressed me greatly, and I believe my interaction with him provided some of the inspiration to move to Canada.

I met Oz Yilmaz, also back when I was still in India, and I admired him for the body of work he had done on seismic data processing and published in the form of his famous book. I was impressed with the depth of his knowledge, which I witnessed during technical discussions on different projects.

Since coming to Canada I have met many people who I admire for different reasons. As I said, Oliver and I have worked together on the RECORDER for many years, and I consider him a dear friend. I have admired his encouraging and supportive attitude.

You Penny, I first met you when you defeated me in the 2001 CSEG Executive Elections. You have always been warm, polite, helpful and supportive. I am indebted to you for encouraging me to become a member of APEGGA and later TBPG (Texas Board of Professional Geophysicists), which I was apprehensive about joining in the beginning.

P: *Gosh, that's flattering, but I'd forgotten about the election thing...*

S: Oh, don't worry about it! Only one person can win an election, and one should take pride in running regardless of the outcome.

I have always admired Bill Goodway for his knowledge, his down-to-earth attitude, and always being ready to enter into technical discussions or otherwise. Bill is a very nice and warm person.

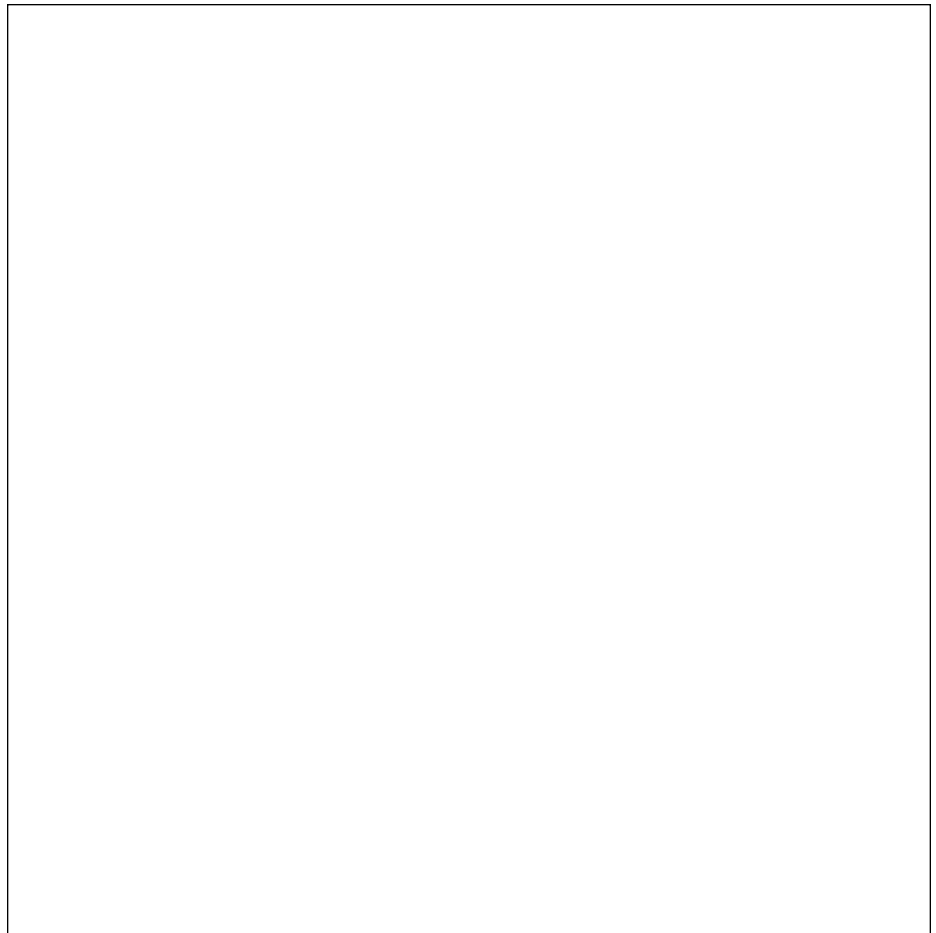
Thane McKay and I have been together since I joined CTC Pulsonic here in Calgary in 1998. He is a trusted and respected colleague, and I often turn to him for advice when I need it, including project and business matters.

I met Rob Howey when I joined Arcis in November of '04. While I have had a good rapport with all my bosses, Rob is different. He is an excellent person, very respectful, has given me complete freedom to do my work, never interferes, is appreciative of what I do and achieve and it has been really enjoyable to report to him.

I have had so many interactions with many, many interesting people in our industry. I will rattle off a few names at the risk of

forgetting someone: Paul MacKay, Doug Pruden, Lee Hunt, John Fernando, Laurie Ross, Jon Downton, John Townsley, etc. and this list goes on and on. I apologize if I have missed some names here. At Arcis, I would mention Yong Xu. Yong and I have been together since the time CTC Pulsonic and Integra/Scott-Pickford merged to form Core Labs RTD, Calgary. He is a very hard-working guy, who has that uncanny desire to learn more and is persistent with whatever work he is pursuing. It is a pleasure to work with him. Our RECORDER Committee members have been very encouraging and supportive and I have enjoyed working with them.

O: *I'm still blushing. What are your interests outside work and geophysics?*



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"Always aim for a higher level of perfection..."

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S: I believe that there should be a balance between work and one's family life. So, I try to fulfill my duties or obligations towards my family, and enjoy them. Outside of that I do find some time to pursue my own interests like reading and writing. I like to go out for long walks, preferably in the morning

when it is so fresh outside. Whenever we get a chance we do travel together as a family. I have been travelling more over the last little while than I have done previously, and this has been work-related or for conducting courses. But whatever I do, I do it with a passion and so I love it and enjoy it.

I like to read, listen to music, watch movies and "be with my people", who would include my immediate family, extended family, some of my school friends, and some close colleagues.

Amrita and I don't need to socialize or go out every day to feel happy. We share long evenings having tea, watching TV or video and exchanging warm vibes right in our house. To be together in our own house gives us more joy than anything else.

O: I have to ask the "Satinder question"! What would be your message for young entrants or individuals who are planning to take up geophysics as a profession?

S: Well, having asked this question many times, I have given it some thought!

First, you need to be very clear and decided in your mind to take up exploration geophysics as a career. Once you have taken it up, then aim for perfection, i.e. always look to learn more that will help you do your job in a more convincing and meaningful way.

Second, you have to be patient. All that you aspire for is not going to happen immediately, so be patient, diligent and honest in whatever you are doing. Your focus early on in your career should not necessarily be the financial side of things, but more on how you can learn more and have a sound foundation on which you will build your career – that will keep you in good stead. Once you are in a position where you always contribute more meaningfully than others, you will never be out of work.

Third, don't be afraid to ask questions, but always do it in a respectful way. Don't shy away from getting



into discussions on technical topics and always try and throw your two cents in whatever way you can.

Fourth, always look for opportunities to broaden your horizons. If you are engaged in research, it is always a good idea to keep your eye on what developments are taking place in other fields, as some of those ideas could easily find a convincing application in our seismic analysis.

Fifth, find good mentors. If you come across experienced colleagues whom you hold in high regard, in my experience, these people will always try to share their knowledge and experience with you, and you will benefit greatly.

Finally, maintain a positive attitude. A smile can go a long way. Serious matters can be a lot of fun as long as you maintain a positive attitude. So always remain positive.

Ours is a high-tech industry that has a bright future ahead. You should always aspire to do well. Embark on a lifetime of continuous learning, and always aim for a higher level of perfection. And you will invariably experience some setbacks, so learn from them and make the best of it.

O: My goodness, I might have to start calling you Deepak! But seriously, thank you so much for this interview. Even though I've known you for over eight years, I learned a lot about you. We really enjoyed chatting with you.

S: It has been my pleasure. **R**