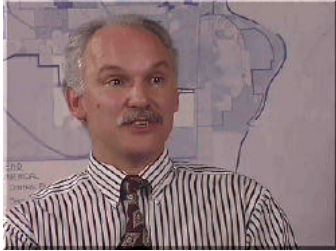




Sloan Career Cornerstone Center

Profiles of Civil Engineers



Chris A. Bell, Ph.D., P.E.

**Associate Dean
Oregon State University
Corvallis, OR**

Education:

B.S., Civil Engineering, University of Nottingham, UK
Ph.D., University of Nottingham, UK

Job Description:

"As an Associate Dean of an engineering college with more than 2,500 students and faculty conducting research contracts in excess of \$12 million per year, I am involved in a broad range of activities involving the "business" of educating engineers."

Advice to Students:

"Be completely open-minded about the direction(s) your career might take. Set realistic short and long-term goals, but be prepared to change because we live in an ever changing world."

Video Transcript 1:

"Engineering is constantly changing, and students need to stay ahead of what's going on. And universities and organizations are going to be providing more and more continuing education opportunities through conferences, through workshops, and so on. And everybody needs to be involved in that to keep on top of their profession."

Video Transcript 2:

"We try to work in a lot of group settings now with the students, and on project-related activities so that they're involved in working together and maybe even working with people in different disciplines occasionally. It's very like the real world. We also encourage the students to get involved in internships, and do our best to help them establish internships during the Summer. Because we know the industry needs students that have experienced the workplace, and have done things in the workplace that are relevant to when they graduate and get out there as practicing engineers."

Video Transcript 3:

"I didn't think about staying in academia at first. I enjoyed the research aspect of the senior project, but I went to work for a local government agency immediately after graduation. And about nine months into that I got an offer to do a PhD at the school where I did my bachelors degree, the University of Nottingham. I jumped at the opportunity. It was with a professor I had a lot of regard for, and they actually offered me quite good money to go back to school."

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Video Transcript 4:

"I don't think the need for global outreach is overstated at all. I think it's very important that we learn to understand how international people are not the same as we are. They have different perspectives -- very valuable perspectives -- that we can work better together than we could individually."

Interview:

My name is Chris Bell. I'm a professor of civil engineering at Oregon State University in Corvallis, Oregon. I'm also director of the Transportation Research Institute and Associate Dean of the College of Engineering with responsibilities for research and graduate studies.

What I like most about being a civil engineer is that everything we do has a very direct impact on people, therefore we are always challenged to make that impact positive! I would advise civil engineering students to be completely open-minded about the direction(s) your career might take. Set realistic short and long-term goals, but be prepared to change because we live in an ever changing world. Employment opportunities for civil engineers exist all over the world. Civil engineers are needed everywhere to plan, design, construct, operate, improve, and renovate the projects essential to modern comfort and growth. Where you work makes a big difference to your career. The key to making a success of a foreign assignment is being prepared, considering all the issues, and having a clear picture of the benefits.

Q: Why don't we start with your background? Can you give us a little hint at how you started getting involved in civil engineering?

Bell: Well, as with many things in my life it was accidental. I was advised by a high school teacher that engineering was probably what I was best suited for, so I applied to the university to do civil engineering, not really having much idea what civil engineering was all about

Q: And what do you think your motivation was to go into civil as opposed to some other sort?

Bell: I think I was more hands on and more people oriented than most engineers would be, and civil engineering at that time I saw as being a people-oriented engineering discipline. I believe I was right. That certainly is the case.

Q: How about your course load in undergraduate?

Bell: Well, the university system in the UK when I went through it -- I graduated twenty-five years ago -- was less time-intensive than school tends to be here. We had less contact hours in the classroom but more expectation that we would work more intensively by ourselves and with other students. So it was pretty hard work, but very different to school here.

Q: And what were the next steps? Were you thinking about staying in academia?

Bell: I didn't think about staying in academia at first. I enjoyed the research aspect of the senior project, but I went to work for a local government agency immediately after graduation. And about nine months into that I got an offer of going back to do a PhD at the school where I

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did my bachelors degree, the University of Nottingham. I jumped at that opportunity. It was with a professor I had a lot of regard for, and they actually offered me quite good money to go back to school. It was at a salary level similar to an assistant professor, so that was very tempting, and I went back and ended up on the academic track.

Q: What were some of the factors that led you to choose your specialty as opposed to others?

Bell: I started in transportation materials. It was really materials rather than transportation, although I liked transportation and planning as well. And it was just an opportunity that was presented to me as a way of financing a research project and a PhD with a professor that I had enjoyed working with before. So I had enjoyed working in the lab setting, testing materials, making samples, doing all the data evaluation, those sorts of things. And that was what the PhD program was all about. In the U.K. PhD's don't involve course work. They're three years of research, so I was faced with a three-year research program, which really appealed to me, something to really get your teeth into in a research setting. What I was going to do was very practically oriented, and it was to do with road surfacing materials. And I knew there would be an impact of the research work. Interestingly enough, the project was sponsored by the U.S. Army Corps of Engineers. So it was sponsored by their European Research Office, and there was a connection there with the U.S. which I was interested in. Most of the significant research in my area was being done in the U.S., and I enjoyed that linkage.

Q: Can you talk a little bit about what your responsibilities are, and what you actually do while you're here?

Bell: When I first came here as an assistant professor I had a fairly typical career path where I started out doing a lot of teaching, but trying to establish some research projects, funded research projects. And dealing with students, writing papers. And doing service-related work. I was fortunate that I had a senior colleague that worked with me as a mentor, and really brought me along through the academic path, and helped out significantly with guidance. And from a good start, went through the tenure track process and became tenured as an associate professor. Did more research, less teaching, but at that time took on the faculty advisor role for ASCE, which I've now been doing for eight years. Which is a little longer than is usually advised because sometimes one gets a little bit stale doing those kinds of roles, but I've enjoyed it tremendously. And this kept me in very strong contact with students while my teaching activities have diminished a little bit as research has taken on more of a role in my career. Now I spend about fifty percent of my time on research and fifty percent on teaching and other activities. And I've recently transitioned into a much more administrative role as associate dean in the college of engineering.

Q: You have a very unique perspective in that you were trained, you know, twenty-five years ago and now you are training. How do you think that civil engineering has responded to the needs of the employers that are employing these students? Is the way that civil engineering is being taught relevant to the way that kids are going to be working?

Bell: Very much so. We try to work in a lot of group settings now with the students, and on project-related activities so that they're involved in working together and maybe even working

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with people in different disciplines occasionally. And we encourage student chapter activities that involve projects like the concrete canoe and the Steel Bridge Contest that are fairly long-term projects that involve more or less the whole range of activities involved in getting a project from its first concept stage into a final product, and being proof tested at a contest. It's very like the real world. We also encourage the students to get involved in internships, and do our best to help them establish internships during the summer. Because we know the industry needs students that have experienced the workplace, and have done things in the workplace that are relevant to when they graduate and get out there as practicing engineers.

Q: Do you think that you require a student different skills to go into academia than you would if you decided to go into industry? Are there two different types of students, and how would you recognize if you are one of those?

Bell: Well, there are definitely different types of students. There are some that are more content working on traditional engineering design aspects, and somewhat on seeing those things through to fruition in the field. Other people, I think, are more business oriented. More entrepreneurial, and we can sense that with them, usually, when they're students. And they may go into consulting. Or possibly into the academic area, because being an academic now requires entrepreneurial skills. You've got to be able to generate new business for the university in the form of research contracts. That's a very important part of most universities now. We need to do that not only to generate funding for the university, but also to generate relevant settings for the students to work in. Both undergraduate and graduate research projects are much more relevant if they're working on a funded project with a faculty member that's at the forefront of their field.

Q: You spoke about an international character. I've heard a lot about the global impact in the Civil Engineering Field. Do you think that's been overstated? And not only just for industry, which you obviously have a lot of contact with, but also in academia. Do you think that you see the same sort of global reach in academia as you do in industry for civil engineering?

Bell: I don't think the need for global outreach is overstated at all. Obviously as an international person I've benefited tremendously from having some different aspect in my education here in the U.S. I've been able to bring some different skills, and different ways of looking at things to what a typical American person might have or would have had. And I've grown to appreciate over the years in academia that every single foreign engineer that I've come in contact with has a valuable perspective that is often different to the perspective of somebody trained in this country. And just as somebody trained in this country has something to take internationally. I find myself working more and more with international people in the academic setting, but I also see with industry far more interaction among different countries, and far more need for Americans to go overseas and interact very closely not only with international engineers, but with people from various aspects of business. So I think it's very important that we learn to understand how international people are not the same as we are. They have different perspectives, very valuable perspectives, that we can work better together than we could individually.

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Q: How about the 21st Century and world technology? Do you think that that is changing the way that engineering is done and is taught?

Bell: It certainly is changing the way it's taught, and I'm sure it's changing the way it is done also. We're not quite at a point where we can conduct meetings by video conference all the time, but we can conduct some meetings in that way. I don't think the ability to communicate with people using e-mail or video conferencing or those kind of techniques is ever going to be a substitute for people meeting face to face because you can do certain things when you're all together at one place that you can't do when you are remote like that. But we can certainly do a lot of business remotely with modern communication techniques that save everybody a lot of time. One of the things I do a lot is transmit documents via the World Wide Web, fairly significant documents that we can all work on at our remote locations and transmit back and forth. This has worked very well for us. Saved us tremendous amounts of time.

Q: What do you think the skills are, that students are going to need for the 21st Century in technology?

Bell: Students certainly need to be able to communicate better than they used to be able to do in the engineering area. There is a lot more interaction now among engineers and between engineers and the public. There is even the need for being involved in the political process now. And I've learned to value over the years that I've been in academia the need for communicating with our politicians so that they know what are needs are, not just as educators, but also as an engineering professional. We just need to keep telling them what is going on in the profession and what is going on in education so that they can develop the funding that is necessary to pursue new engineering education.

Q: Can you give me a sense of the kind of projects that are being done by your graduate students and how you interact with them, what your role is?

Bell: In the advising of graduate students I have sponsored projects, contracts, and I have non-sponsored contracts. About half of our students are international students, and often they are supported by their home country. I have a student from South Korea who works for the Seoul Metropolitan Government, and he's been here now for three years. He started with a master's degree and is now nearly finished with a PhD. And we're dealing with a project to do with pavement condition index for road surfaces in the city of Seoul, which is a very congested city.

And we've developed a procedure using video techniques to enable a vehicle to carry a video camera around the city of Seoul and film the road surface. And then back in the office we can work out techniques to catalogue the condition of the road surface. It's a fairly complicated project using video image processing techniques, and that's been a lot of fun for me to work on, because it's a new area that we wouldn't have been able to get sponsorship for from an agency here in the U.S. Although what he has done will apply not only in South Korea, but also here in the U.S. for small cities or counties, or for a state, or even for a major city. He has been developing that project on a fairly rapid time schedule over the last six months, and we interact almost daily with him, coming in to tell me what he's recently discovered, or a problem that he has that he wants to discuss. Or he'll ask me to come over and check out on the

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computer what he's done. And I encourage him to do that because he needs to be back in South Korea at a certain time, and we want him to get done.

Another project that I have is on a contract which is for a four-year period dealing with an intelligent transportation system project that is the Oregon Green Light Project, which involves mainline sorting of trucks on freeways. And it's essentially a pilot project for national implementation of such technology in the future. There's a lot of dollars being spent on this project to install hardware all over the state at twenty different sites that will weigh trucks as they move down the freeway, and also communicate with trucks as they move down the freeway. And if everything's fine with the trucks, if the weights and all of their paperwork works out, they can go on by the weigh stations and the ports of entry, and it saves everybody a lot of time. Eventually this project will turn into a national system. Our role in the project has been to evaluate the success of the system. Because it's a major federally funded project, it is required that there be an independent evaluation of such a project. And that has been my role. So I have a full-time research assistant working for me on that project who has completed his masters degree and is now working for me on a full-time basis. And he does a variety of tasks that again, involve needing to communicate with me as the principal investigator. We also have subcontractors working for us on that project that have particular skills that we don't have here at Oregon State. So it's a cooperative project that has been very exciting because we've dealt with people with different skills to what we have in our civil engineering group here.

Q: Do you see more women and minorities being involved in civil engineering?

Bell: I think there are more, but I've been disappointed that the numbers have not grown tremendously over the last few years. When I first started in academia we had about five percent of women in civil engineering. I think it grew to about ten percent approximately ten years ago. And it seems to have leveled off at about that level. We had a class go through here last year which was a little bit different. I think we had about twenty-five percent of the class was women, and that's the most enjoyable class that I've taught, one that had a better balance. We don't see a tremendous amount of minorities here on the West Coast, particularly in Oregon, and that also is a disappointment. And I think we have to do more things to attract minorities to the profession.

Q: Can you give me an idea of what a day might be like for you?

Bell: Well, a typical day -- I usually start at eight o'clock, and I finish about six, typically. But there isn't really a typical day. We travel a lot because of various project meetings, conferences and so on. And I usually start the day by checking my e-mail, and on a typical day I'll receive twenty to thirty e-mails, and most of those are related to project work, research work, or other colleagues on campus that are contacting me in my role as an administrator to ask for help or assistance in dealing with various bureaucratic issues, often. I deal quite a lot with my professional society activities via e-mail. My committee work, we communicate as a committee via e-mail. I don't get many phone calls any more. Most of my external communication is e-mail based. So fortunately, the phone doesn't ring very often, and I have fairly good control of my schedule during the day. If I have a class, then I'll spend a little bit of time preparing for the class, usually immediately before the class, and I'll close my door before that so that I can concentrate for fifteen or twenty minutes on getting ready. And the classes are about an hour of time, and usually a little bit of time afterwards dealing with student

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questions. And then come back and try to spend some time working on project-related activities. I try to block out my time so that I can give the time I'm supposed to a project. But I spend a lot of time during the day in dealing with graduate students who come and ask me questions that are fairly random about their projects. I encourage them to come and find me whenever they need me. And also I deal with students who are part of our student chapter activities coming fairly randomly to deal with issues that they have, too.

Q: What is that one thing that makes this career worthwhile?

Bell: It is the interaction with students and seeing students do things that you recognize you probably could never have done yourself. Meeting exceptional people, young people, and then also seeing how they develop as they get into their careers. I've been fortunate that I've developed several good relationships with students and I still stay in touch with people that were first here fifteen years ago when I first came. And they have been successful in their careers and are becoming leaders in their careers. And that is something that I look forward to following in the future, too, that I've still got another twenty years to go in academia, and people that I have known over the last fifteen years are going to be very successful. Not only that, though. I think people that have been the -- the people that have been the ordinary students, and staying in touch with them, and seeing them being satisfied with their careers. Not necessarily leaders, but they've been successful because they've done what they wanted to. That's also very rewarding.

Q: How about what you do when you're not teaching?

Bell: I tend to combine, as a lot of people do in their careers, work and pleasure. We get to travel a lot. There's quite a lot of conference and business, research business travel involved, and also the service-related activities such as with ASCE. I do have a family, and I spend quite a bit of time with my family outside of office hours. Sometimes they travel with me on the business related activities. I have a young son that comes to ASCE meetings with me.

Q: What are some of the milestones that you would set for yourself in the second half of your career?

Bell: I'd like to make sure that graduates from this institution as well as graduates from other institutions appreciate what the institution provided for them. So I'd like to be sure that we do a good job as academics, and I'd like to be sure that the graduates from the institution regard us as a resource that they can use throughout their profession for continuing education, but also for other things that they might need throughout their careers. So I'd like us all to be more responsive. Most engineering departments have advisory committees that are quite often comprised of graduates, sometimes distinguished graduates, that provide the institution with a lot of support. Sometimes financial support, which is very important. But more importantly, the kind of support that makes sure that we're doing the right thing for current and for future students.

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Q: How about continuing education, you have PE. Could you explain why? And then sort of explain what the process was and why you decided to get it. And you know, was it a hard process?

Bell: Well, in civil engineering, and particularly in the academic area, I think we have a lot more credibility if we are Professional Engineers. And in our department here at Oregon State University we emphasize that for the faculty. And eighty percent of our faculty have their PE. It is not a particularly hard process for somebody in academia to go through. You have to have some engineering practice experience, but to become a licensed engineer is essentially done through an examination. Academics are good at examinations, at least they ought to be, so it's something that isn't very difficult for us to do, and I think all engineering faculty should be encouraged to do it. Our graduates need to be involved in continuing education when they get out in the big, wide world. They need to recognize that they haven't learned all that they can when they get out of here with a bachelors degree, a masters degree, or even a PhD. Engineering is constantly changing, and they need to stay ahead of what's going on. And universities and other organizations are going to be providing more and more continuing education opportunities through conferences, through workshops, and so on. And everybody needs to be involved in that to keep on top of their profession.

Q: Here's a question I'm sure you're asked a lot. What advice would you have for a student who's interested in a career in civil engineering?

Bell: Well, students need to be involved. Not necessarily in everything going on campus, but in more than just classroom activities. They need to be flexible in their thinking about what they're going to do in the future. Be adaptable. And be prepared for making changes in their careers that they didn't expect. I didn't expect to be a professor in civil engineering at an American University when I graduated with my bachelors twenty-five years ago. That was really the least thing I expected. But I'm here, and I enjoy what I do.

Q: What do you think the role of a civil engineer is today?

Bell: I think our role is to particularly preserve the infrastructure that we have, where our role is not so much building new things, but preserving and rehabilitating structures that have been here for sometimes over a hundred years, but are still very functional. I think our role is to communicate better with the public, to make sure that the public understands what we do and vice versa, what the public needs are.

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