



LEHIGH UNIVERSITY
Civil and Environmental Engineering
P.C. Rossin College of Engineering and Applied Science

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Pictured above: Dan Frangopol and Ph.D. candidates Duygu Saydam, left, and Benjin Zhu work in the Computational Laboratory for Life-Cycle Structural Engineering at ATLSS; upper right: Consulting with Ph.D. candidate and research assistant Mohamed Soliman; bottom left: At Tongji University, Shanghai, with Jie Li, Distinguished Professor, Director of Institute Of Building Structures, School of Civil Engineering

A CONVERSATION WITH DAN FRANGOPOL

On structural safety, great students, and the state of his art

You're the first holder of Lehigh's endowed chair honoring Dr. Fazlur Rahman Khan. In what ways has Khan's legacy influenced your own body of work?

Dr. Khan's legacy is the creativity, practicality, efficiency and cost-effectiveness of his work. I try to incorporate these same qualities into my own work.

ON CREATIVITY: I am ever mindful that it takes creativity to innovate, whether you are investigating new solutions to research problems or finding new applications for existing tools. This was the case when I applied the life-cycle, reliability, and optimization concepts used in bridge engineering to naval engineering, which benefited both the naval research and practice communities.

ON PRACTICALITY: A researcher's job is to find practical solutions to the difficult problems facing society. As such, I'm always trying to narrow the gap between what's state-of-the-art in my lab and the state of real-world practice. For example, my research on multi-criteria optimization under uncertainty is at the heart of the modern management of civil infrastructure systems. But what's most satisfying to me is best stated by the *American Society of Civil Engineers*: "Frangopol's research has not only saved time and money, but very likely also saved lives."

ON EFFICIENCY AND COST-EFFECTIVENESS: Ensuring these attributes in the design, maintenance and management of the civil infrastructure is a major focus of my work. The cost savings that result from efficiently performing structural systems can be used in other critical areas of our decaying infrastructure.

Dan Frangopol by the Numbers

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| 15 | Former students working in academia |
| 35 | Ph.D. students supervised |
| 37 | Books written or edited |
| 270 | Journal articles |
| 4 | Distinguished and honorary memberships |
| 4 | Fellowships in associations and institutes |
| 3 | Honorary professorships |
| 2 | Honorary doctorates |
| 20 | NSF awards |

You're a world-renowned [researcher](#) in the areas of life-cycle engineering, structural reliability, safety, resilience and optimization. How does this expertise translate to the built environment?

Many of my contributions have occurred at the interface of research and practice. A case in point is my definition of system redundancy under uncertainty, which in 1994 was used in the development of the first [AASHTO LRFD Bridge Design Specifications](#) and all five subsequent editions. More recent research assesses infrastructure resilience to disasters such as earthquakes, hurricanes, tsunamis and fires. We're investigating the ability of communities to recover in the fastest and most cost-effective way after a disaster strikes, so that people can go back to their normal life as soon as possible.

Since your arrival here in 2006 you've garnered international attention in the form of [awards](#), honorary professorships, conferences chaired, distinguished fellowships and more. Why are these global collaborations more important than ever to the practice of structural engineering at Lehigh?

The practice of structural engineering is widely understood among nations, yet the management of the civil infrastructure differs from country to country. We have a responsibility to exchange ideas and share experience for the benefit of all.

My global collaborations also provide a wide platform from which to promote civil engineering at Lehigh. Consider that I'm the founding president of both [IABMAS](#) and [IALCCE](#), professional organizations with an estimated 1,000 members from 50 countries and 300 members from 40 countries, respectively. Those are just two examples among many that allow me to extend Lehigh's international reach.

What attracts students from all over the world to Dan Frangopol's lab at Lehigh University?

In a word, collaboration—between me and my students, between senior students and new ones, between students and the experienced associates and visiting scholars who make up my [research group](#). Each student can find multiple channels for getting their required experience.

Fazlur Khan worked closely with his colleagues to seek out the new and interesting, whatever the task at hand. I take the same approach with my students. I enjoy working with them and value their contributions to the research process.

I further try to strengthen our relationships in the group by sharing social activities outside the office. This for sure creates a better working environment for the students and also for me.

How do you measure your students' success?

I measure it over time. Ph.D. and M.S. training starts by teaching students how to think creatively, develop new ideas, and translate their ideas into reality. Along the way they learn how to express themselves orally and in writing. In fact, many of my publications are co-authored with my former or current graduate students. Ultimately, I measure their success by their ability to innovate, communicate, and collaborate with one other.

I have been very lucky in my career to attract excellent students. Some of the ideas used in my research are at least as much theirs as mine.