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Day-long seminar honors Peter Jackson

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A day-long symposium celebrated the retirement of Professor Peter Jackson after nearly four decades on the faculty of Cornell's ORIE and Systems Engineering Program.

A day-long symposium on May 6, 2017 celebrated the retirement of Professor Peter Jackson after nearly four decades on the faculty of Cornell's School of Operations Research and Information Engineering (ORIE) and Systems Engineering Program.

"It's our chance to give tribute to someone who has had enormous impact on everything related to OR and Systems at Cornell," said David Shmoys, Laibe-Acheson Professor of Business Management and Leadership Studies and ORIE's director. "Without Peter we'd be a very different place. It's a testament to his generosity of spirit, his warmth as a human being, and his technical contributions that such an array of people have come to speak as part of this day."

Half a dozen distinguished symposium speakers, as well as numerous colleagues and family members at the dinner that capped off the day at the Country Club of Ithaca, praised Jackson not only as a brilliant researcher and teacher but also as a loyal, generous, and humble colleague, mentor, and friend.

Jackson joined the ORIE faculty in 1980 after completing his M.Sc. in Statistics and Ph.D. in Operations Research at Stanford. Originally from Montreal, Quebec, he also holds a B.A. in Economics from the University of Western Ontario.

His research spans the areas of production planning and scheduling, inventory control, supply chain management, transportation planning and scheduling, integrated production and transportation planning, and graphical modeling systems.

“I’ve especially enjoyed working on problems that have application in the field of production and inventory management,” Jackson said. “But the solutions at their heart are mathematical techniques.”

Among his most cited early papers, for example, is “The Joint Replenishment Problem with a Powers-of-Two Restriction,” which appeared in IIE Transactions in 1985. It is part of a body of research on lot-sizing problems Jackson “conducted rather intensely,” as he put it, with colleagues William Maxwell, Jack Muckstadt, and Robin Roundy—or, as they came to be known in ORIE, “JMMR.”

They adopted a powers-of-two approach that offered elegant and practical mathematical treatments to the challenge of finding the optimal trade-off between increasing or decreasing production frequencies in order to balance inventory costs and fixed setup costs.

In addition to these scholarly accomplishments, Jackson has enjoyed a successful consulting career, frequently developing software for companies involving vehicle routing, production scheduling, sales forecasting, and inventory stocking – pursuits that in turn enriched his teaching.

“I am able to bring stories into the classroom of how the mathematics of operations research can be brought to bear on practical, real-life problems,” Jackson said. “It has also increased my appreciation for systems engineering in the design of decision support systems for large scale operational management problems.”

Conversely, his love for developing educational computer games for use in his courses—recounted in more detail by John Jenner at the symposium—positively impacted his work for industry.

“I remember one client exclaiming that everything he needed for his decision-making was right there on the screen I had created for him,” Jackson said. “That integration of just the right information was the consequence of years I had spent designing game interfaces for my students.”

After this long and distinguished career at Cornell—which also includes an impactful tenure as director of Systems Engineering, where he oversaw the launch of the top-ten-ranked Distance Learning Degree Program—Jackson has recently thrown himself into a new adventure on the other side of the globe. At Singapore University of Technology and Design (SUTD), he is bringing his experience to bear as the head of the Engineering Systems and Design Pillar.

But he may soon come full circle: “I hope to forge ties between our young university and the great Cornell,” he said.

Symposium

Jack Muckstadt
Jack Muckstadt kicked off the day of presentations that highlighted examples of Jackson’s broad impact not only as a scholar but also as a friend.

The ORIE Acheson-Laibe Professor of Engineering Emeritus and Stephen H. Weiss Presidential Fellow was among the faculty who recruited Jackson to Cornell. Over the next 37 years, the men grew close as they shared experiences while teaching, researching and working together on consulting activities.

“When Peter left, it was a big hole in my professional life,” Muckstadt said. “I can’t overstate how important he is to me personally and professionally and much fun I’ve had with him.”

Muckstadt’s talk gave an example of the researchers’ joint work on inventory management and multi-echelon, multi-item systems. It has its roots in Muckstadt’s efforts as an active duty officer in the U.S. Air Force, where he served for 12 years some four decades ago. At the time, the young captain was tasked with developing models that would help his employer determine in how many F100 engines and repair components to invest to maximize operational readiness of the new F-15 Eagle aircraft that were being procured.

Over the years, Jackson helped to extend Muckstadt's original two-echelon, two indenture multi-item solution to consider any number of echelons and indenture levels.

"Peter constructed a very creative software approach for optimizing the allocation of an investment budget by part type, location and relationship of each part to each other," Muckstadt explained. "His code, when executed, solves a very large-scale, non-convex integer program very quickly. I thought this was absolutely brilliant."

The U.S. Air Force has chosen this new approach to prepare budgets, purchase parts, and allocate inventories to installations for what Muckstadt estimates to be some 650,000 reparable items, 1,500 locations, and 5,000 airplanes. Other militaries and commercial entities around the globe have become clients, as well.

"I've got to consider this as one of the most interesting and useful operations-research-based modeling environments our profession has created, and I'm obviously very proud of this," said Muckstadt, concluding: "Those were fun years."

John Jenner

Muckstadt went on to introduce the next speaker, John Jenner '57, M.B.A. '59, crediting the CEO of Change Tech International with moving his and Jackson's teaching in a new direction that "has had a profound impact on literally many thousands of Cornell students."

The three men's cooperation began in 1986 when Muckstadt first learned of Jenner's work developing computer-based learning games for IBM's Manufacturing Technology Institute. He introduced Jenner to Jackson, who was engaged in a similar project, resulting in their creation of nearly two dozen Experiential Learning Games that are used by students, faculty, and business professionals at Cornell and among universities and consulting clients worldwide.

The simplified computer simulations of a company's work environment allow students to learn actively in hierarchically organized teams as they encounter typical real-world problems, such as equipment breaking down on a factory shop floor.

"These games provide a very good complement to the traditional, rigorous, lecture type of delivery," Jenner said. "They help bridge the gap from the classroom to the work place where you send students on to earn a living for the rest of their lives."

Jackson taught Experiential Learning Games through his ORIE 515 (now ORIE 5150) course for three decades, bringing Jenner back for guest lectures year after year.

“But it wasn’t all work with Peter and me,” Jenner added. “We also pursued FR subjects—that’s food research. We had breakfast together and made a study of where we could buy the best home fries. So far, it was in Flint, Michigan. And the study continues.”

Uday Rao

Uday Rao Ph.D. ‘92, Professor in Operations Management at the University of Cincinnati, returned to Cornell to put the spotlight on “Peter Jackson the Farmer,” much to the amusement of the audience.

“Peter plants seeds and sows ideas,” Rao said about his former thesis advisor and co-author of several papers. “And from these ideas, little plants grow. And these plants have seeds that get planted again.”

In his own research at Cincinnati Children’s Hospital, Rao has applied a mathematical model similar to the ″cyclic scheduling” he used in his dissertation under Jackson’s guidance to improve unpredictable physician schedules to allow them to better plan their work and family life.

In the next generation, research by Rao’s Ph.D. advisee Yann Ferrand, now on the faculty of Clemson University, likewise draws on Jackson’s practice orientation and use of computer programming and simulation to consider ways to structure systems or make complex decisions under uncertainty, such as in emergency departments. In deciding on the flexible or focused allocation of operating rooms to deal with elective and more urgent emergency surgeries, for example, modeling helped determine that a partially flexible policy with mostly flexible rooms performed best.

None of this research would have happened, Rao said, if Jackson had not suggested he explore an academic path rather than working in a research lab or company, as Rao had initially favored.

Not only did Rao discover that he loved academia, but he took important life lessons with him into his new career: “I learned from Peter the importance of balance,” he said. “It’s balancing your work life with your personal life, balancing your research with your teaching. I loved the way he did it.”

Chris Jones

Another Peter Jackson mentee, Chris Jones M.Eng. ’81, M.S. ’83, Ph.D. ’85, had made his way to the symposium from Bogotá, Colombia, where he works remotely as CTO for Atlantic Decision Sciences.

Jones offered a history of the Gantt chart, a visual tool for representing and manipulating schedules, for example in planning what each machine on a factory floor is doing at a given time in a production process. (He pointed out that Polish engineer Karol Adamiecki published a chart of this type in the 1890s, a couple of decades before the eponymous Henry Gantt.)

More recently, the pivotable Gantt chart, developed by Jones and his colleagues, makes it easier to read information from a variety of perspectives, for example by rearranging the timelines according to products rather than machines. (At Jackson’s request, the company has donated software for use in the M.Eng. program.)

Noting that his research on visualization has typically fallen outside of the mainstream of Operations Research, Jones thanked Jackson for nevertheless providing unfailing support as a mentor during Jones’ years as an ORIE graduate student.

“Peter was always very inspiring to me,” said Jones. “He was always thinking about how we can better represent these complicated problems so that people can make better decisions.”

Robin Roundy

The “R” of “JMMR,” Robin Roundy, stepped up next for a trip down memory lane. A professor of mathematics at Brigham Young University, he spent 24 years teaching in Cornell ORIE, from where he retired as Professor Emeritus in 2007.

After describing newer work on “Stochastic Job Scheduling: Minimizing Weighted Tardiness with Proportional Weights,” Roundy highlighted research he conducted with or influenced by Jackson.

When they tackled a problem of lot sizing in large, complex production and distribution networks, for example, Roundy thought Peter’s version of the solution was “just absolutely beautiful. Among the things I’ve done with him, this was probably the most fun and satisfying.”

Acknowledging the support and friendship he has enjoyed from Jackson over the years, he said: "I'm deeply grateful to Peter and many colleagues and students here who have just made my life really rich and deeply rewarding."

Sirietta Simoncini

Jackson's vision was evident in the final presentation by Sirietta Simoncini, Lecturer in Systems Engineering. When the architect proposed teaching design thinking – a process for innovative design formulated into a curriculum at Stanford's d.school – in the Systems Engineering Program starting in 2013, she found Jackson to be enthusiastic and highly supportive.

Over a series of courses and case studies, they experimented with blending design thinking's human-centered approach with SE's efficiency into a flexible and scalable method dubbed Systems Design Thinking. Through trial and error, Simoncini learned how best to apply such SE techniques as diagramming to "emotional" data collected from empathy fieldwork, for example in a project that had student teams interact with local families to come up with an innovative family experience.

While the quantitative aspects of mapping and categorizing made the engineering students more comfortable with the otherwise unfamiliar process and its results, the classes have expanded to include increasingly interdisciplinary cohorts of students, teaching design thinking to engineers and SE to non-engineers.

"Thanks to Peter, hundreds of students each year are now learning Systems Design Thinking by engaging in real-world projects," Simoncini said. "He envisioned the potential of this project. I feel I was so lucky to have him as a mentor. With his enthusiasm and optimism, he made it possible for me to experiment freely and achieve important results."

Peter Jackson the Unicorn

Over the course of the symposium and celebratory dinner, Peter Jackson's friends and colleagues portrayed a man who consistently, and often quietly, applies the best of himself—humility, generosity, and service were frequently mentioned—across his work and personal life.

"Peter is without question one of the finest persons, if not the finest person, I have ever known," Muckstadt summed up his long friendship with Jackson.

Jones agreed: “Peter combines both a deep intellect and genuine kindness. To find someone at the top end of the spectrum on both those dimensions is a unicorn-level event.”

In the academic arena, Jackson was noted to be a remarkable coder and mathematician who nevertheless can “think with both sides of his brain” and “appreciates good design,” according to ORIE Professor Huseyin Topaloglu.

Oliver Gao, Associate Professor of Civil and Environmental Engineering and Director of Systems Engineering, added that, given Jackson’s work on the Systems Engineering Program and now at SUTD, he can be called an “academic entrepreneur.”

These tendencies are also apparent in his dedication to students, both as a teacher and mentor.

“I have loved teaching,” Jackson said. “Preparing a lecture is a very creative process of organizing, simplifying, and motivating material. Then, adapting the lesson on the fly as I see eyebrows furrow is great fun”—an enjoyment that Rao admired as Jackson’s teaching assistant: “I was impressed by how interesting he made a dry topic like accounting,” he said.

Outside the classroom, “he never said no to his students when they asked for assistance,” Muckstadt recalled. “Frankly, several of them would not have gotten their degrees if he had not been so willing to help them.”

Professor of Practice and ORIE’s Director of M.Eng. Studies Kathryn Caggiano Ph.D. ’98 highlighted her former advisor’s particular dedication to the M.Eng. program, where he “taught, mentored, and debugged code for literally thousands of M.Eng. students.” He also unfailingly volunteered to grill corn at every M.Eng. picnic, for which she awarded him a Corn Master trophy “for 36 faithful years of ears.” It joins a shelf full of 17 teaching awards, a number that is “just absolutely insane,” according to Shmoys.

Jackson’s three sons, Mike, Stephen, and Daniel, finally, recounted how their father has guided them with the same qualities that his colleagues and students admire so much. By the time Daniel thanked him for the “humility and service and generosity to the family,” many a napkin was dabbing at moist eyes across the room.

Jackson, too, was “deeply affected” by the tribute paid to him during his retirement event: “Everything about the weekend was classy and beautifully done,” he said. “The turnout was exceptionally gratifying, and having seven of my doctoral students together at one time was a real

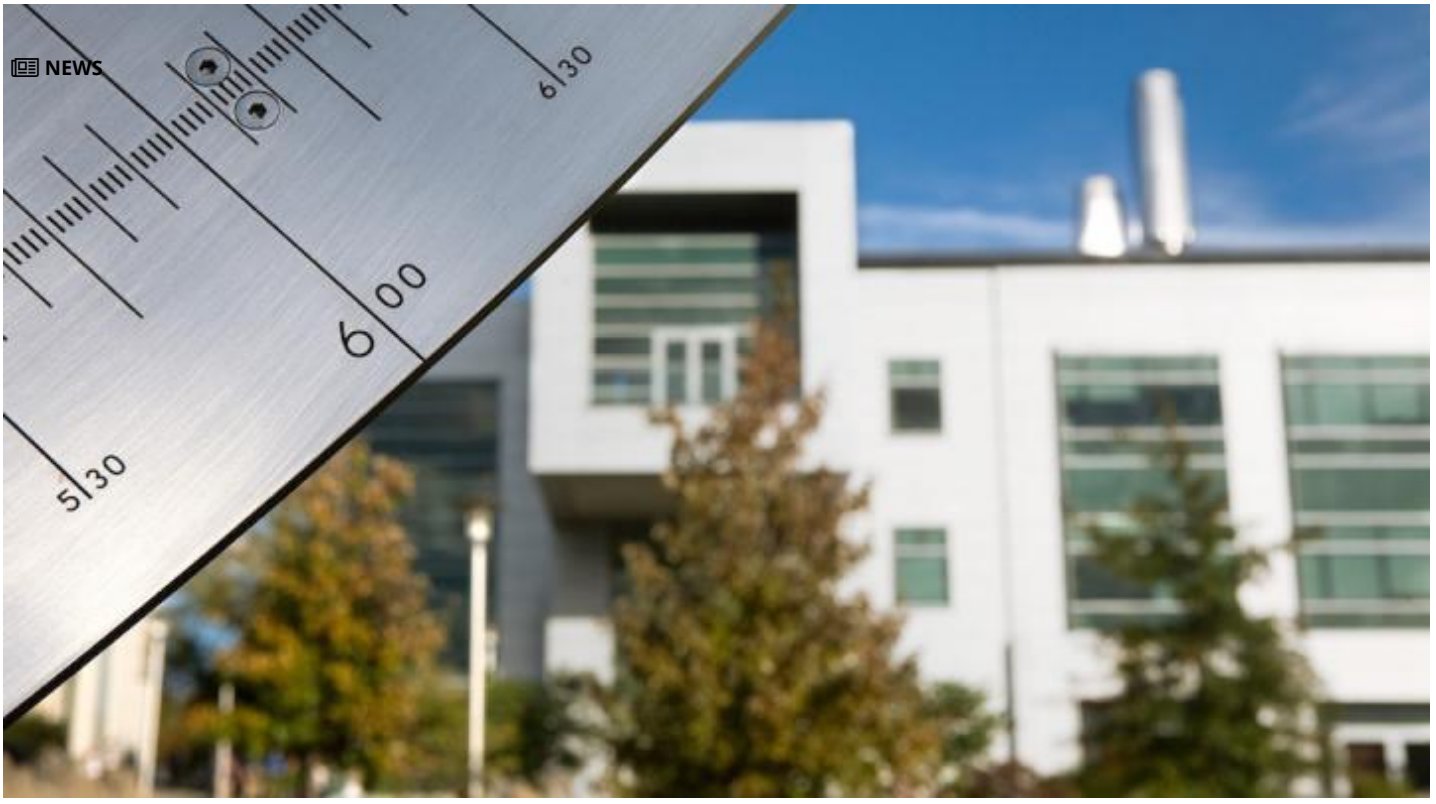
treat."

In a speech that marked the end of the dinner, he joked that "my nature is that I'd like to hide away five days and code just to process the emotion from today, but I believe in the grace of God, and when you are the recipient of grace, the proper response is to say 'thank you.'"

He expressed particular gratitude towards faculty members who have passed away; his mother Margaret, who instilled a love of learning; his friend Jack Muckstadt, who made an academic career so enjoyable; and his wife Nancy, who balanced his investment in a career with her own in their family.

"So, thank you very much," Jackson concluded. "I'm going to go code."

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