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**Kasra Ferdows**  
*POMS President 2005*  
 McDonough School of Business  
 Georgetown University  
 ferdowsk@georgetown.edu

**President's Message**

Whoever thought about naming our President-Elect a year in advance deserves a prize! It is a brilliant system. I had a year to learn how our society operates and observe the competent leadership of Gabriel Bitran. This system of breaking in a new president is a good way to make sure we don't lose momentum.

I also had the opportunity to reflect on broader issues and take a fresh look at the question faced by every new president: how can POMS serve its members better? I need your help to answer this question and hope you will send me your suggestions. Meanwhile, for this first message, I would like to report our efforts in four areas two of which involve expanding existing activities and two of which explore new ideas

**What more can POMS do?**

*1. Extend your network internationally*

We are expanding our international reach. In Europe, we are getting closer to EurOMA. POMS and EurOMA boards have now approved the president of EurOMA to be an ex-officio member of POMS board and President of POMS an ex-officio member of the EurOMA board. **Jaume Ribera**, current president of EurOMA attended our board meeting in April in Chicago, and I attended the EurOMA Board meeting in June in Budapest. Even after these two meetings, it is clear that our two societies can benefit a great deal from closer cooperation. We have started with more obvious things like coordinating the dates of our various conferences and workshops and providing information about each other's activities on our websites. The boards have also approved a discount in membership fees, starting in 2006, for those who

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**Upcoming Conferences**

**Seventeenth Annual Conference of POMS**  
 (BOSTON April 28, 2006 - May 1, 2006)

**POMS International Conference**  
 (SHANGHAI June 19–June 23, 2006)

**POMS College of Service Operations Conference**  
 (MONTEREY June 2–June 3, 2006)

Details at [WWW.POMS.ORG](http://WWW.POMS.ORG)

**EDITORIAL TEAM**

*Editor:* **Rohit Verma** University of Utah, Phone: 801-585-5263. (rohit.verma@business.utah.edu).

*Associate & Feature Editors*

**Sal Agnihotri**, Binghamton University (agni@binghamton.edu): **Scheduling, After Sales Service, Product Support**

**Lori Cook**, DePaul University (lcook@depaul.edu): **POM Education**

**Nicole DeHoratius**, University of Chicago (ndehorat@gsb.uchicago.edu): **Retail Operations**

**Craig Froehle**, University of Cincinnati (craig.froehle@uc.edu): **Service Operations**

**Vidyaranya Gargeya**, The University of North Carolina at Greensboro (vbargey@uncg.edu): **POM Education**

**Susan Meyer Goldstein**, University of Minnesota (smeyer@csom.umn.edu): **Health Care Operations**

**John Goodale**, University of Oregon (jgoodale@LCBmail.uoregon.edu): **Service Operations**

**Ken Klassen**, Brock University (kklassen@brocku.ca): **Service Operations**

**Lalit Johri**, Asian Institute of Technology (lmjohri@ait.ac.th): **Strategic Management/POM Interface**

**Pranab Majumder**, Duke University (majumder@duke.edu): **Environmental Operations**

**Debashish Mallick**, University of Minnesota (dmallick@csom.umn.edu): **Product Development**

**Larry Menor**, University of Western Ontario (lmenor@ivey.uwo.ca): **Operations Strategy**

**Gerhard Plaschka**, DePaul University (gplaschka@allgrp.com): **Customer Value Management**

**Taylor Randall**, University of Utah (acttr@business.utah.edu): **POM/Accounting Interface**

**Rachna Shah**, University of Minnesota (rshah@csom.umn.edu): **Lean Manufacturing**

**Rajiv Srivastava**, Indian Institute of Management (rks@iiml.ac.in): **International Issues**

**Srinivas Talluri**, Michigan State University (talluri@msu.edu): **Supply Chain Management**

**Don Wardell**, University of Utah (mgtdgw@business.utah.edu): **Quality Management and Six Sigma**

**Jacob Wijngaard**, University of Groningen (J.Wijngaard@bdk.rug.nl): **POM Problems, Models, Systems, People**

**Kum Khiong Yang**, Singapore Management University (kkyang@smu.edu.sg): **International Issues**

**Ashley Livingston**, University of Utah (alb9@utah.edu): **Assistant Editor**

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among its members.*

**Dr. Sushil K. Gupta,**  
*Executive Director-POMS*

*Professor  
Decision Sciences & Information Systems  
College of Business Administration  
Florida International University  
RB250*

*11200 Southwest, 8th Street  
Miami, FL 33199, USA  
Phone: 305-348-1413  
Fax: 305-348-6890  
Email: poms@fiu.edu  
Web: www.poms.org*

**POMS Membership Information is available at:**

*POMS Website: www.poms.org  
or  
Professor Chelliah Sriskandarajah  
Associate Executive Director*

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interest to POMS members to  
the Editor.**

**Rohit Verma**

rohit.verma@business.utah.edu

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**www.poms.org**

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join or renew their memberships in both societies. The discount is approximately 20%. You will see the details when you receive the membership renewal notice for 2006.

In South America, where we have very active members, we just launched the first international POMS Chapter. **Henrique Luiz Corrêa** (FGV Business School, Sao Paolo, Brazil) is leading that project and you'll be hearing more about it soon. The conference in Shanghai in June 2006 will extend our network in Asia, particularly in China. We are also pursuing projects in other parts of the world and I will report more about them in a future column.

#### 2. *Inform you more about our work environment*

What is the current average salary of an assistant, associate, or full POM professor? What was the average increase last year? How many POM electives are offered in a typical business school, and what are their average enrollments? How many schools are expanding their POM groups and how many are contracting? Up-to-date information about these kinds of trends can be useful to all of us. **Rohit Verma**, the editor of POMS Chronicle, has kindly agreed to design a simple questionnaire to collect and report such data. The idea is to design a questionnaire that would take only a few minutes and involve ticking a few boxes. So, without spending too much time or revealing personal information, we hope to be able to report the aggregate trends in these kinds of statistics. I hope you will cooperate.

Another project that is also designed to put more information at your disposal is the creation of a repository of POM syllabi. **Ed Davis** has been working on this project diligently during the last year and we are putting the first batch of these syllabi on the POMS website as the Chronicle goes to production.

#### 3. *Bring you closer to practitioners*

Thanks to tireless work by **Marty Starr**, **Wick Skinner** and **Joel Goldhar**, the Operations Advantage Group (OAG) is now turning into a major activity of our society. Recently I had the pleasure of announcing the appointment of **Rafael Menda** as the first director of OAG. Rafael, as Director, Operations Strategic Planning at McNeil Consumer & Specialty Pharmaceuticals (a subsidiary of Johnson & Johnson) and long time member of POMS, is uniquely qualified for this position. I am confident we'll be hearing more from OAG in the coming months and learn new and innovating ways to get closer to POM practitioners.

#### 4. *Help our younger members*

During the general assembly meeting in Chicago, several younger members of POMS spoke about special problems that are faced by junior faculty in our field. They mentioned, for example, that the pres-

sure to publish quickly is forcing them to look away from empirical research and tackling big issues; or that the quality of our journals is under-valued in tenure and promotion decisions. These are not new problems but they are real and important. I believe we should take a fresh look at what our society can do to resolve these issues. **Larry Menor**, one of our young and energetic new board members, has kindly agreed to lead this effort. If you have ideas or suggestions for how we should approach this task, please contact him.

Meanwhile, may I suggest that each of us, especially those in more senior positions, help the process by speaking out more often. We know in our hearts that production and operations management is a core function in managing any entity—commercial or non-commercial, private or public, governmental or non-governmental, manufacturing or service, you name it. Yet in most business schools, POM is still a small group, has a small share of the core courses and even a smaller share of electives; it is often absent in executive programs for very senior managers; and indeed, our journals are under-represented in citation indices, schools' rankings, and tenure and promotion decisions. None of this is reasonable.

It is time to be more vocal collectively and individually. In recent years POMS has been more assertive in claiming our rightful position. I will report more on that in a future column. But what each of us can do individually—even though they may be in small and incremental steps—will be more powerful. Next time you see POM is missing in a program that should have it, please don't hesitate to point it out; if someone questions the quality of our scholarly journals and implies that they are not as good as top-tier journals in other fields, please don't be timid in correcting this erroneous impression; if you come across people that still in this day and age think OM is a re-packaged OR, please take the time to educate them. There are now over a thousand of us POMS members, and together we can change even deeply engrained mindsets.

**Kasra Ferdows**



**Paul R. Kleindorfer**

***Vice President for Publications***

Anheuser-Busch Professor of Management Science  
University of Pennsylvania  
kleindorfer@wharton.upenn.edu

### **POMS Publications**

If you have been reading the POMS Chronicle, you know that exciting things have been happening this past year at POMS on the publications front. Together with the establishment of the colleges on Service Operations, Supply Chain Management and Product Innovation and Technology Management, and with the setting up of a departmental structure for the Journal, POMS has moved ahead in important ways to secure the positioning of the Society as the professional centerpiece for researchers and research-oriented practitioners in the field of operations. Amidst these changes, it is important to focus on several key points related to the quality and positioning of our principal publication organ, our journal, *Production and Operations Management (POM)*. I want to share a few thoughts on this issue with you, which were central to the discussion at the Annual Board Meeting of POMS at Chicago this past spring.

Concerning the Journal, quality and scope remain essential elements of our journal positioning. On the quality front, this means everything from high quality reviews, and a properly designed and executed reviewing process, to quality and impact of the papers we publish. It also means continuing to ensure that POM is understood as a premier journal for personnel committees and Deans in the reviewing and personnel evaluation process for our academic colleagues. This means ensuring that POM is on various lists of "A" publications and other such summary certifications of quality. The POMS Board feels that these matters of journal quality and positioning are important elements of disseminating the research results of POMS members, and assuring that they receive the respect they deserve among their intended audiences and stakeholders. We will continue to keep our members updated on our progress in this important endeavor.

Again concerning quality, there have been several instances recently of queries related to POMS policies on publishing work, parts of which have already been published elsewhere. Such "republishing" often occurs for very good reasons, such as exploring different elements or aspects of the same empirical context or data set. But republishing also has the potential for abuse, and given our new decentralized departmental structure for the Journal, it is obviously important to identify and publish a uniform policy concerning

When such republication will be deemed appropriate. This policy has now been approved by the Board in our 2005 Annual Meeting. Basically, it requires that such republication make an additional or incremental contribution to knowledge beyond the original publication, perhaps only by bringing the same material together in a manner that makes it accessible to an audience that would not have found the original material accessible. If it does make such an incremental contribution, and if it makes clear by reference to the related original work its intended incremental contribution, it is clearly appropriate for POMS to review. Otherwise not. A longer and more detailed version of this rather intuitive policy will appear in the frontice material of the Journal going forward.

Concerning scope, our publication efforts will continue to emphasize the encompassing nature of POMS as the society where research on theory, empirical work and case studies across the full spectrum of Operations Management will all find their appropriate place. The Board also discussed the important role that special issues of the journal play in delving deeply into key areas of emerging interest in Production and Operations Management. The Board continues to believe that these special issues are important vehicles for establishing the boundaries of new areas for research as well as for summarizing and marking the accomplishments of established areas. Suggestions for special issues by any of our members are welcome and can be sent directly to the Journal Editor-in-Chief. You will see from recent issues of the POMS Chronicle that we have continued to exploit the vehicle of special issues as an important element of our publications policy.

It has been a real honor to serve with the dedicated Board of POMS, its distinguished presidents over the past few years, and the journal editors, and especially Kal Singhal, in continuing to push the frontiers of OM and to ensure that our publications policies meet the needs of our members. We all hope that you are finding that the Journal, the Chronicle, our Website and the annual meetings of the Society and its Colleges are making good on our mission of assuring that POMS is a welcoming umbrella for academics and practitioners of all stripes in the OM arena. Please let any of us know if you have ideas how we can better serve this mission in our publications activities.

***Paul R. Kleindorfer***

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Dear Colleagues:

**Professor Elwood S. Buffa** of UCLA who played a central role in delineation of the domain of production and operations management passed away this summer. The UCLA community celebrated his life on August 19, 2005. POMS has created a web-site at [www.poms.org](http://www.poms.org) in his honor where the operations management community can post its comments on Elwood Buffa's contributions to production and operations management. Sharing your personal experiences and observations will be much appreciated by those who knew Elwood Buffa and by those who never had the opportunity to know him and his work. Please send your contributions to the web site editor, Professor Raju Balakrishnan at [nbalak@CLEMSON.EDU](mailto:nbalak@CLEMSON.EDU).

Sincerely

Kalyan Singhal

## CHINA: A COUNTRY OF CONTRASTS AND CONTRADICTIONS

**Glen Schmidt**

Associate Professor  
David Eccles School of Business  
University of Utah  
[glen.schmidt@business.utah.edu](mailto:glen.schmidt@business.utah.edu)

China is a country where things are produced cheaper, by the dozen or in any other volume. It's also a country of numerous contrasts and contradictions. For example, you wouldn't expect a bureaucratic communist country to have a capitalistic fervor and opportunistic spirit, and be able to get things done fast! The "China price" of today's goods entices Americans to buy and buy more – the question is whether Americans will also pay the "China price" of tomorrow, in the form of lost competitiveness on all fronts. This point remains open to debate.

This summer, a group of about 15 professors, along with Rick Reis and John Aney from Stanford University's Alliance for Innovative Manufacturing (who deserve commendations and thanks for arranging this remarkable trip!), visited five cities, three Universities, and six factories in China. Each of the cities had roughly as many inhabitants as New York City, yet the only two I had previously heard of were Beijing and Shanghai. The others, Guangzhou, Dongguan, and Shenzhen, are outgrowths of the recent boom in China's manufacturing output. This report, by Glen Schmidt of the U. of Utah, offers only a small window into this country halfway around the world. For further insights, talk to one of these other participants (or better yet, go see for yourself!): Dave Beach (Stanford), Kyle Cattani (Indiana), Ely Dahan (UCLA), Cheryl Druehl (UMD), Feryal Erhun (Stanford), Olaf Hall-Holt (St. Olaf), David Kazmer (U-Mass), Holly Lutze (UT-Dallas), Julia Miyaoka (SFSU), Beth Pruitt (Stanford), Erica Plambeck (Stanford), Manohar Prabhu (Stanford PhD candidate), Keith Rollag (Babson), Eric Tao (Stanford PhD candidate), and Jan Van Mieghem (Northwestern).

**\$ 3 Gasoline Explained.**

Our visit to China offered a first-hand lesson as to why gasoline is approaching \$3 per gallon: 1.4 billion Chinese, quite a number of whom (but still a very small percentage) now live like Americans, and many others who aspire to do so. They are driving SUVs, buying computers and cell phones, and increasing their standard of living in general. How far and how fast will the progression extend? What will be the costs along the way, for example, in terms of environmental degradation? Is it a zero-sum game, where China's rise comes at the

expense of other countries, or is there room for all to benefit? In particular, how can/will U.S. manufacturing companies participate in this economic expansion? Will there be major bumps and disruptions along the way, such as social unrest within the Chinese population? These are all questions that prodded me as the trip progressed.

**Beijing – A Contrast of Old and New.**

Our first stop was Beijing. Quite frankly, given that we were in the capital city of a country of 1.4 billion, I expected Beijing to be more crowded like what we eventually saw in Guangzhou, Dongguan, and Shenzhen. The relatively lighter density of Beijing is apparently due in part to the government's tight control over migration – citizens need visas to travel from place to place and need "permission" to place children in school or receive other government services.

Beijing is a blend of historical sites (like Tiananmen Square, the Forbidden City, and the Hutong) and modern industrial parks (like the Xing Wang park we visited, the site of Nokia and its suppliers).

**Chinese Charms and Curses.**

Lucky numbers, unlucky colors, the Chinese Animal Zodiac – there are a host of Chinese charms and curses to be aware of, as I learned the hard way. We had each brought some trinkets from our respective schools to give to our hosts as tokens of appreciation. My contribution was a number of small mantle clocks with the U. of Utah logo. But our tour guide in Beijing informed us that the word "clock" in China is similar to the word "death," and accordingly if you give the gift of a clock or watch, you are wishing death on the recipient. Thus the clocks came back to the States with me (and are now very well traveled, as of course they were originally made in China, then came to Utah, then went to China with me, and are now back in Utah again).

**Nokia's Tight-Knit Supply Chain.**

Nokia performs 20% of its manufacturing in China, and has become the most recognized brand name in the country. Its Xing Wang industrial park in Beijing represents a concerted attempt to develop a tight-knit supply chain. Nokia is surrounded by suppliers such as Excel Logistics, RFMD, and Sanyo, some of whom also supply Nokia's competitors. Labor pressures are apparent even at this premiere employer with 35% employee turnover and a 10% yearly increase in labor costs. The work day is 12 hours long, 4 days per week followed by 3 days per week. Nokia has a targeted lead time of less than one day but relies on its vendors to hold inventory.

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### **The Climate in Academics.**

In Beijing we also visited Tsinghua University (the premiere technical school) and Peking University (the premiere liberal arts school). The competition for admissions was reportedly even hotter than the sweltering climate we experienced! The graduate-level educational system seems to largely parallel the US system, except in business education. Given that the universities are supported by what has been an officially communist government, management principles as we know them have not historically been taught. But new hires are being made – one of these, Professor Jason Long, described how centers of production have cropped up all over China. For example, toys (95% of production worldwide) are made in Shenzhen. The implication we gleaned is that when multiple suppliers of these individual items all compete against each other within a small geographic area, “perfect competition” results, driving the cost and price down. Everybody knows the minimum price. This manufacturing specialization and concentration creates a network of suppliers, each of which is subjected to similar intense competition. Adding up the efficiency gains at each step along the supply chain results in a final price that is rock-bottom. Hence, the “China price.”

### **Shanghai – The Most Modern City in the World?**

Driving into Shanghai from the airport we immediately got a sense of the modernity of the city. An elevated freeway extends mile after mile several stories above the city. The fastest train in the world zips along at 431 km/hr, or roughly 250 miles per hour. The city’s streets are lined with one new skyscraper after the next – architectural splendors – or eye sores, depending on your taste – including the Pearl Tower, the JinMao tower (only a few yrs ago the tallest building in the world), and a new “tallest in the world” beginning construction. To design a structure in Shanghai the architect must be world-renowned, and many have used the opportunity to design something eye catching.

The breakfast buffet at the Shanghai Shangri-la merits its own paragraph. There must have been as many cooks as there were customers – custom-made dishes of Chinese, Thai, and American cuisine, fresh fish, fruits and vegetables, pastries, freshly squeezed juices of varieties too exotic and too numerous to name.

### **Lenovo: The IBM of China.**

More accurately, Lenovo also now represents the IBM of America, at least for PCs, given their purchase of IBM’s PC division earlier this year. Although they aren’t yet making IBM’s, Lenovo is the largest computer manufacturer in China. The company’s plant in Shanghai

two types of assembly: conventional assembly lines (20 people per line) and assembly cells (2 people) for the lower-volume products (trays of pre-picked components were delivered to the cells – this pre-picking created the inefficiency of the cells). The company sees up to 50% increase in demand during the peak season of July and August. To manage the plant in the face of such variability, the company reduces wages by 10-20% during the slack time to “encourage” some attrition of employees. The company also hires some contract labor during the peak production season. Lenovo has a “Learn from Dell” philosophy and a saying that they must “walk with two legs,” where one leg is the distributor network and the other is direct sales. The company’s challenge is to remain standing tall as they transfer more weight to the direct sales leg.

### **A Changing China: Chengdu or Changchun?**

Dr. Linda G. Sprague, Professor at the China Europe International Business School, gave us an historical perspective on economic development in China, also reporting that China plans to build an “interstate highway system” equivalent to that of the U.S. – it remains to be seen whether the development of their infrastructure will be adequate to support the rate of economic growth envisioned. She noted that manufacturing is moving inland as companies continue to migrate to areas of low labor cost, suggesting Chengdu would beat out Changchun as the future inland center of manufacturing.

### **Baosteel: What Would Mao Think of Profits Like These?**

We didn’t see much inside of the largely state-owned Baosteel plant, but the outside landscaping and worker salaries (for 32,000 employees) were not what one might expect from a “no-frills” state-run business – overhead pipelines were nicely camouflaged in trees and shrubs. We toured their port on the Yangtze River, which almost makes the Mississippi River seem like a creek in comparison. Surprisingly, given its size, China does not have large iron ore deposits and must import this raw material from Australia and Brazil. Coal, however, comes from inland and/or the northern provinces. Roughly 13% of output is exported. This number has declined from 20% due to China’s own growing appetite. Baosteel had a phenomenal year due to high steel demand, earning 13.5 billion in pre-tax profit on sales of 58 billion and assets of 64 billion RMB. The company supposes that Posco, the large Korean steel producer, was even more profitable.

### **Traffic Jam on the Auto Assembly Line**

#### **– Everyone Welcome to Compete.**

At Visteon (Ford’s parts-manufacturing spinoff) we got first-hand exposure to the automotive market. “Nothing is China is different, it

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just happens faster,” our host suggested. The market took off at the end of 2001, growing from 600,000 vehicles to 2 million vehicles in just over two years. Another doubling is expected over the next 3-5 years, building up to the 2008 Olympics, followed by a small dip. Regarding their ability to meet this growing demand, Visteon contended that at the end of the day, you find a way to meet demand. You increase your efficiency, or you increase labor force, or you out-source, but somehow you meet it. The increase in demand is partially driven by the fact that people in China with incomes of \$10,000 per year are buying cars; they have the purchasing power of people with \$35,000 income in the U.S. (the threshold level for buying a car is \$6,000 on a purchasing-power index scale). The market is impacted by the availability of financing, which is just becoming commonplace in China (the market was recently pushed to a lower price point due to lack of financing).

Rather than protecting its market until its own manufacturers can develop, as Japan did, China is “letting everyone in to compete.” VW has historically been the market leader, but is losing share fast. The Europeans, Americans, Japanese, and Koreans all have a presence in China, along with some local brands. Companies must be at least 50% government owned, unless the entity is for export only (Honda is testing such a venture). Government ownership is held among six or more entities (it’s not necessarily the central government that exerts ownership, but can be some mix of provincial and local governments). Visteon started by making parts to print, but now is self-sufficient in that they go from blank sheet to delivered parts. It is one of the few suppliers with this capability, and considers this to be its competitive advantage. The company doesn’t want to compete against local companies on price alone, as the locals can simply reverse-engineer. Interestingly, the Chinese define craftsmanship as that which is hard to manufacture (even though maybe it isn’t).

#### **Guangzhou, Dongguan, and Shenzhen: \$1 shoes, \$2 T-shirts, and \$20 “Rolexes”.**

Driving into Dongguan we passed a commercial area of small wholesale shops, selling everything from bolts of fabric or leather to little presses, punches, and sewing machines. Erica Plambeck and I took a walk through this area before dinner. Each shop was approximately 15 ft. wide by 20 ft. deep and packed with goods. Farther down we saw a small manufacturing shop of about four presses stamping out one shoe sole at a time. How can these shops compete with more efficient factories? Even farther down the street there was a leather market where it looked like individual small “factories” of this type would bring their output and sell it to distributors. So within

few square blocks was everything a local entrepreneur might need to run a small manufacturing business: equipment, raw materials, and an outlet to sell the goods.

Across the street from our hotel was a retail outlet with \$1 shoes. This is also the general geographic area that produces the T-shirts that sell for \$2 in the Hong-Kong markets we later visited, and possibly the source of the \$20 (knock-off) Rolex watches that could be purchased on the street from vendors or in street-level shops.

#### **OSHA-Like Regulations, But Sweat Shop Realities.**

A guest speaker from Hong Kong gave us some insights with regard to social responsibility within China. The country reportedly has laws and working standards rivaling those of OSHA, however they are not enforced. Nevertheless, while sweat shops and despicable working conditions undoubtedly exist in places, there seems to be some upward pressure on wages and working conditions. This is caused by the fact that migrant workers can “vote with their feet.” They go home to their rural areas for the Chinese New Year holidays (or other extended holiday periods) and hear about better opportunities. Rather than return to their previous places of employment, they migrate elsewhere. Thus companies are beginning to hire consultants to find ways of improving conditions in order to attract and retain workers. The minimum wage around Shenzhen was recently raised by 30% in recognition of this upward pressure. Of course, the pressure isn’t increasing fast enough for some workers, who are cheated out of overtime wages or who are exposed to abhorrent working conditions in illegal mines, for example.

#### **The Silicon Valley of Toys.**

In Shenzhen we visited Toybiz, one of the largest toy manufacturers in the world. There seem to be economies of scale in this business, as 5-6 toy companies comprise 80% of the market. (Branding and licensing impact this.) Furthermore, 95% of the world toy market is produced in this geographical area. A key comment by Toybiz’s owner was that it is crucial to have the entire supply network in one place. Effectively, the Shenzhen area is the “Silicon Valley of toys.” The owner resisted moving inland to chase cheap labor because this kind of network doesn’t exist farther inland. Toybiz represents what I had perceived to be the quintessential Chinese manufacturer: row after row of assembly lines, dormitories for workers, and mostly young women assembling toys under very basic working conditions (in the paint assembly lines each worker had a little spray gun or even a little paint brush, and a small mask to combat fumes). The owner suggested there were copy-cat manufacturers of their licensed products, but fighting of brand infringement was left to the licensors: “Knock-offs are like a cockroach – you can’t squash them.” Toybiz

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experiences 20% worker turnover per year within a population of 12,000 employees comprised mostly of migrant workers. They take only 9-12 months to go from concept to production versus 18-24 in America, and introduce a new Spiderman every three months. This results in many variations over time, but not many at any one time. They would rather under-produce than over-produce, to encourage some pent-up demand. Royalty costs run in the tens of millions of dollars, as compared to production costs in the low single digits.



#### The 2<sup>nd</sup> fastest growing company on the NASDAQ.

MSI, a company manufacturing sensors for bathroom scales, automobiles, and other markets, has a \$300 million market cap and \$150 million in sales. At MSI we found 1/3 of the employees were staff workers, doing design and process development (it takes more workers to perform these tasks but is still cheaper than designing in the US). In some markets their value proposition is to strictly do design and outsource the production. The HR manager suggested one of the biggest shortcomings of new engineers was their inability to make decisions, and the managers confirmed her statement. The factory was relatively more automated than the others we had seen, and confirmed our earlier impression from Nokia that China isn't just about cheap manual labor; it's also about relatively sophisticated manufacturing and even product design.

#### "That Person is According to the Clothing."

As it develops, China has the opportunity to adopt and even improve upon best practices from all over the world. Examples we saw were Nokia's industrial park and Lenovo's "learn from Dell" philosophy. Further, due to its culture and organization, China is in a unique position to do things that would be unthinkable elsewhere. That is, for better or worse, some aspects of development can be centrally planned by their (engineer-dominated!) leadership team. For example, the government leases the land for business development for 50 years at a time. Depending on whether the leases are staggered, sometime

around 2055 it will have the option to radically remake itself by either moving further in the direction of private ownership, or by taking back the property. Notably, it has also been controlling the birth rate with a one-child policy, but has begun relaxing this policy – if both a husband and wife come from single-child families, then they can have two children.

China's legacy creates both opportunities and challenges. For example, in the past, successful businesses benefited from breaking the law. Since capitalistic efforts were illegal, successful businesses became accustomed to finding ways of beating the system. This may be why knock-off goods are so readily accepted and why OSHA-like standards are so readily circumvented – the culture doesn't necessarily recognize the validity of business law. Does this "culture of lawlessness" need to be reversed to achieve such goals as environmental sustainability, the creation of a motivated workforce, and a system of patent protection that gives firms incentives to innovate? If so, how fast can China transition to such a system?

In Beijing we saw a billboard stating "That person is according to the clothing," an apparent muddling of the saying "The clothes make the wo/man." Undoubtedly, in adopting best practices and refining them to their own culture, there will similarly be glitches in translation, and bumps in the road to China's development. Thus, many of the questions pondered at the outset remain unanswered: exactly where is China headed? What is unquestioned, though, is that our future will be impacted by China in many ways. The price of gasoline is just one among many!

In summary, China comes across as a country of contrasts and contradictions. Here are a quick dozen:

1. Shanghai, possibly the most modern city in the world, lies in a country in which the bulk of the population lives in extremely primitive conditions.
2. There is an intense capitalistic fervor and opportunistic spirit in a communist country.
3. Things get done fast even in a "communitistic bureaucracy!"
4. Seemingly endless resources, but they aren't adequate to support the country's growing appetite for steel and oil, for example.
5. The beginnings of upward pressure on wages and working conditions in a country full of cheap labor.
6. Stringent labor laws and OSHA-like standards in a country known for sweat shops and poor working conditions.

...Continued on page 10

...China: A Country of Contrasts and Contradictions... from page 10

7. One-worker shops stamping out one shoe sole at a time coexisting with factories teeming with people.
8. A generation of unschooled citizens, followed by one that clamors to get into the toughest of schools.
9. A generation of extremely large families, followed by a generation of one-child families.
10. Engineering graduates that can't seem to readily make design decisions out in the real world, coming from a discipline that focuses on analysis.
11. A country with enough money to re-invest locally to support its own high growth despite a high savings rate and heavy investments in U.S. Treasury securities.
12. A "China price" of today that entices Americans to buy volumes of goods, but which may result in Americans paying the "China price" of tomorrow, in the form of lost competitiveness on all fronts. I leave it to you to debate this point.



## Announcement of POMS Course Data on POMS web site

### Dear POMS members:

The course data were collected in a survey of the Business Week "Top 40" MBA programs, through an initiative sponsored by the office of the POMS VP, Education (Ed Davis) with the assistance of Professor Kyle Cattani of Indiana University. Data from 30 of the top schools are contained in the collection, which is among the most comprehensive collection of comparative data on POM courses available.

Click

[http://www.poms.org/POMSWebsite/EducationCourses/POMS\\_Syllabi.html](http://www.poms.org/POMSWebsite/EducationCourses/POMS_Syllabi.html) for the complete list.

**KISS: UTILIZING A SIMPLE OPERATIONS MANAGEMENT STRATEGY FOR TROUBLESHOOTING A HEALTHCARE OPERATIONAL PROBLEM**



**Gregory L. Katzman , M.D**  
 Associate Professor,  
 Neuroradiology and Medical Informatics  
 University of Utah Health Sciences Center  
[greg.katzman@hsc.utah.edu](mailto:greg.katzman@hsc.utah.edu)

**Introduction**

Sometimes elegant solutions can be found utilizing the simplest of methods. Such is the case I encountered while applying flowchart analysis to a problem I was experiencing as the Chief of Radiology Services at the Veterans Administration Salt Lake City Health Care Services (VASLCHCS) hospital. In a nutshell, the Veterans Administration has many, many metrics that are tracked at all their healthcare facilities across the nation, and I was having a specific problem meeting a metric that requires 90% of radiology reports to be “verified”, or finalized by a radiologist, within 48 hours. Specifically, when I instituted the described actions, we had been measured at 64%.

**Background**

Radiology images are officially interpreted by an M.D. specialist called a Radiologist. The VASLCHCS, like many VA hospitals, is affiliated with a neighboring medical school, the University of Utah Health Sciences Center. We generate radiology images, and interpret them, 100% in digital format. Gone are the days of handling X-Ray film. Additionally, transcription is no longer a third party event as our radiologists utilize voice-recognition software while dictating, immediately producing a radiology report. Given our relationship with a medical school, we are also affiliated with their radiology residency program, thus images are first reviewed by a radiology resident who generates a preliminary dictation. Subsequently, a faculty member will review the studies with the resident, describing when they are right or wrong (explaining why so), and the resident then modifies their preliminary dictation appropriately and “finalized” it from their queue. The report is

ology Information System (RIS) to the radiologist’s queue, where they then read it, modify it as needed, and lastly “finalizes” it. The final report is then sent by the RIS to the Hospital Information System (HIS) as a verified and finalized report for inclusion in the patient’s electronic medical record (EMR).

**The investigation**

At the same time the aforementioned measure difficulty was occurring, I was a student in the University of Utah, David Eccles School of Business, Executive MBA Program. Coincidentally, I was also in the middle of my Operations Management course. Thus, I thought, “How can I improve the process such that I meet my measure using the tools I am currently learning?”

I had learned that a simple way of managing quality in the role of inspection was to troubleshoot by simply constructing a flowchart, analyzing each step in its creation (Fig 1). Although simple, flowchart analysis is a great way to dissect a process, and thus I hoped to uncover system deficiencies during such a process.

On a Monday, I gathered my administrative manager and all the supervisors I could find into one room with a large whiteboard. First, we constructed a flowchart that illustrated all the process steps which occur from the point a radiology request for a patient is entered into the RIS to the concluding report dictation finalization step.

Second, realizing that the measure, as calculated by the HIS, only begins with patient registration within the Department of Radiology, we separated all steps into one of two types. The right-sided yellow-colored steps are inclusive within the measure, the left-sided blue-colored are not. Next, each person with expertise in a particular area led everyone else in trouble-shooting these steps for potential system problems as we created our flowchart. In this manner, we believe we uncovered a number of problems, and devised solutions for each one.

...Continued on page 12

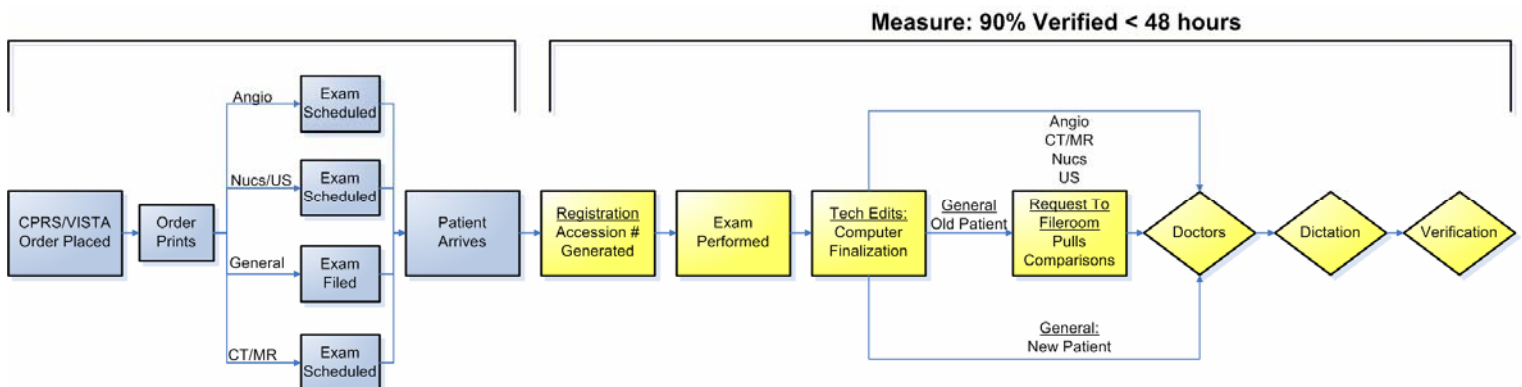
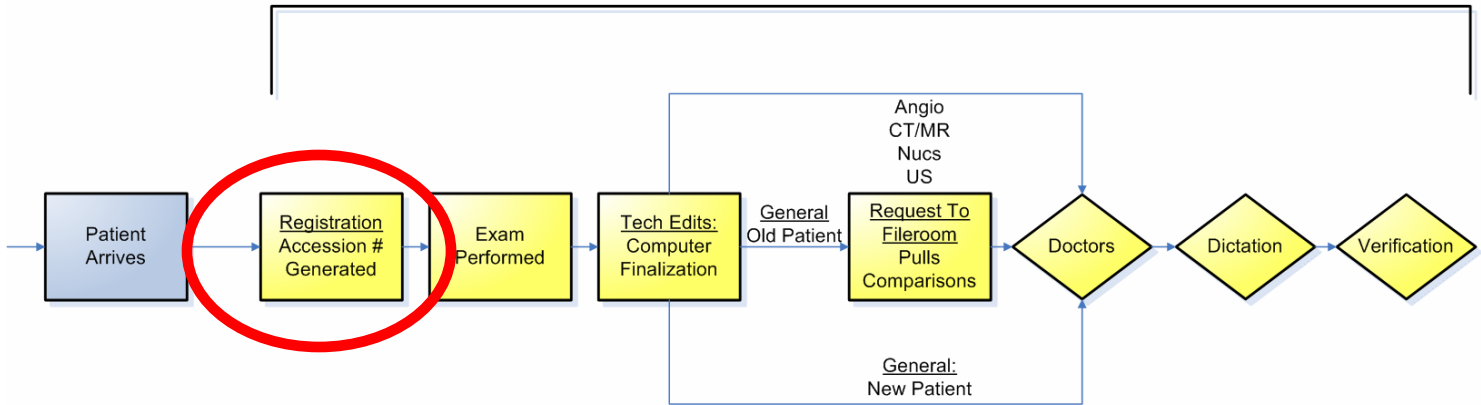


Figure 1

...KISS: Utilizing Simple Operations... from page 11

Figure 2

Measure: 90% Verified < 48 hours



**Problem 1: Pre-registration**

Patients are not supposed to be registered until they are physically present within the department of radiology. We discovered that “pre-registration events” were occurring. For example, the overnight, mid-night-8 AM shift technologist would “register” every request they had in-hand when beginning their shift in order to “make less work later”. However, as one can imagine, if a study was not performed until 7 AM that specific study is already 7 hours old from the outset of measure time.

Similarly, the nuclear medicine technologists were “registering” all patients for the day at 5 AM when they came to work. Since up to 20% of these patients never show up for their study, these “no-show” exams become unverified late reports if the technologist doesn’t cancel the study, which was occurring regularly.

Our solution was to immediately implement a “whites of their eyes” policy; no technologist was to register a patient until they physically saw them. This was verbally explained to each technologist individually, and we required that they sign a policy sheet stating we had explained the policy and that they understood it.

**Problem 2: Techs not completing edits**

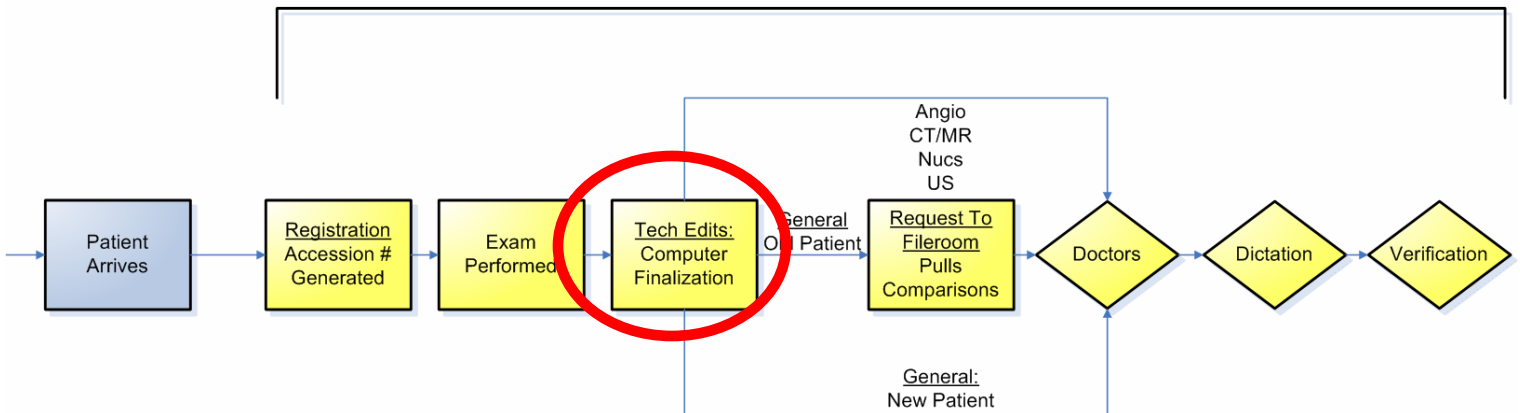
At the conclusion of acquiring a radiologic study, technologists have data fields they must complete in the computer (e.g. number of films taken). Most important is a field that is marked “completing” the study as having been acquired. We found that a significant portion of studies were not being “completed” correctly. Because of an idiosyncrasy of the HIS, these studies were held as “stuck” at this position in the electronic record, even if it had been dictated and verified in a timely fashion.

Our solution was twofold. First, when every tech was educated as to the aforementioned requirements of registration, they were simultaneously instructed to complete their edits for every case. Second, after the paperwork is handed to the fileroom staff, they were instructed to not only check for the existence of prior, comparison studies, but also to verify that the study had been completed by the technologist.

Figure 3

...Continued on page 13

Measure: 90% Verified < 48 hours



...KISS: Utilizing Simple Operations... from page 12

**Problem 3: Lost paperwork**

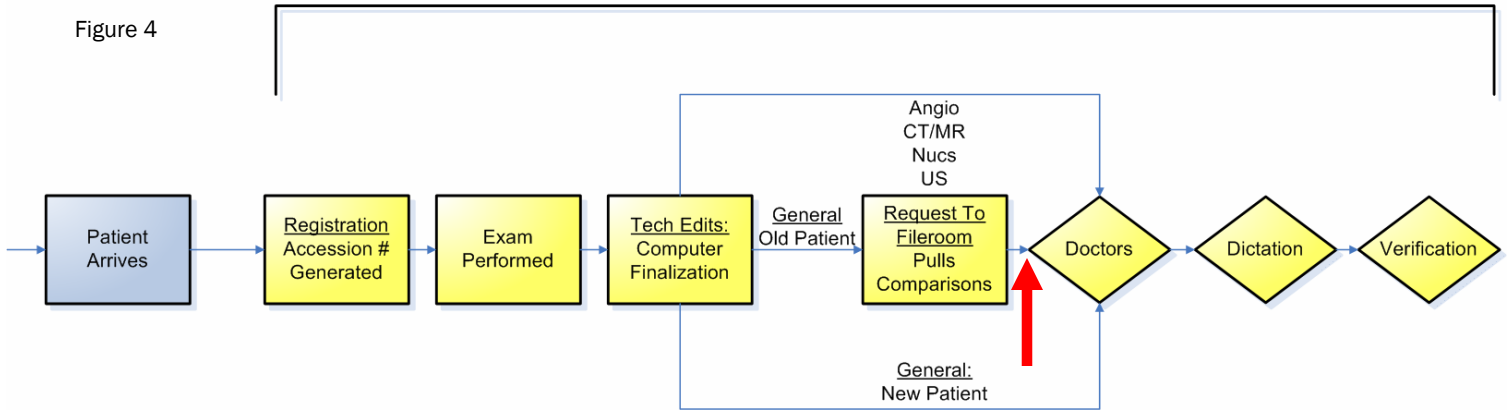
Since our workflow remains paper-driven, we realized that there will always be lost requests. To counteract this possibility, all radiologists were instructed to periodically check throughout the day for exams that had been done, but for which they have not presented paperwork. In that situation they are to dictate the study, even though the paperwork is missing.

**Preliminary results**

Two weeks after implementation, our verification was measured at 82% after our various policy change implementations. Although this is not “successful” as defined by our mandated 90% measurement requirement, it is a significant improvement within a short period, and we are now more confident in our ability to ultimately achieve measure success.

**Measure: 90% Verified < 48 hours**

Figure 4



**Problem 4: Radiologist verification**

Occasionally, too few voice recognition computer stations becomes a bottleneck in some of the dictation areas, delaying the interpretation of studies and thus also verification times. Additionally, physician apathy may delay final verification (e.g. “I’ll finish it tomorrow”).

To relieve the bottleneck, more voice recognition systems will be purchased and distributed throughout the reading areas. To combat apathy, time-to-verification (which can be measured per individual radiologist) will be measured on an annual basis with the results impacting their annual bonus amount. All radiologists have been informed that high-performers will receive an increase in bonus monies whereas under-performers will actually be penalized.

**Concluding remarks**

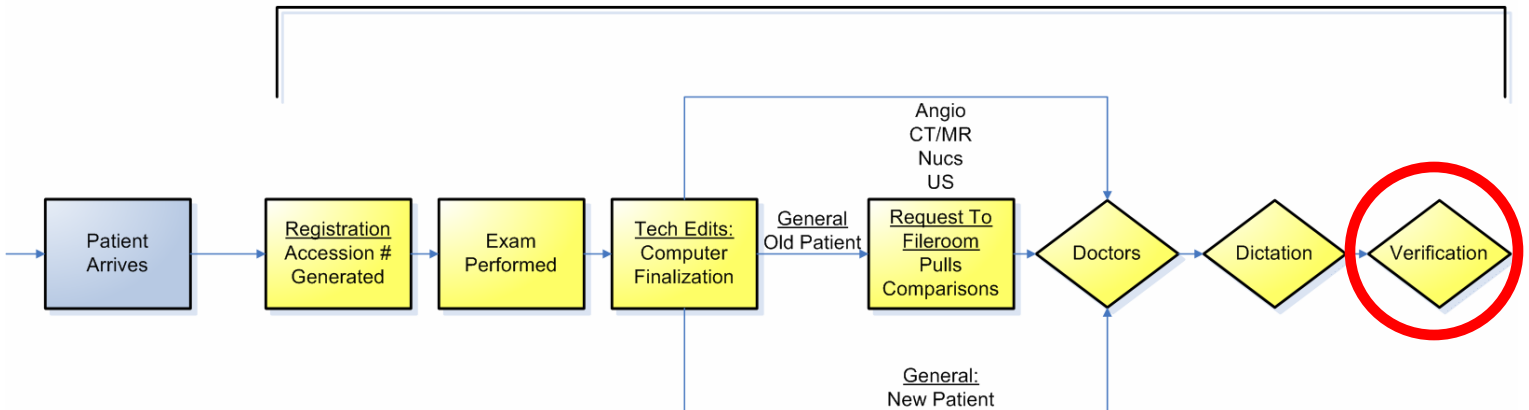
This successful analysis used a very simple yet powerful tool for evaluating a process. In our case it was more than sufficient to enable us to uncover both system inefficiencies and bottlenecks. The acronym ‘KISS’ defines this process well, and underscores that often there is elegance in simplicity.

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Figure 5

**Measure: 90% Verified < 48 hours**



## OPERATIONAL ADVANTAGE GROUP (OAG): BRINGING ACADEMICS AND PRACTITIONERS TOGETHER IN POMS



**Rafael Menda**

*Director, POMS - Operational Advantage Group*

McNeil Consumer & Specialty Pharmaceuticals

[rmenda@gmail.com](mailto:rmenda@gmail.com)

Bridging the gap between knowledge creation and knowledge application has generally been a challenge in many fields. Production and Operations Management (POM) is no exception. Typically the creation side has been seen as the domain of academics, leaving the consumption side to practitioners. But does the distinction have to be so pronounced? Many of us in POMS don't think so, and we are taking some concrete steps in trying to bridge this gap between these two domains.

One of the past presidents of my company, during his first weeks with the organization, has once remarked: "The other day I walked into a room full of managers from marketing, sales, operations, finance, etc., and listened to the discussions for a while, and I couldn't tell who was from which function. Right there I knew I had a great team working with me." His point was that those in the room were all speaking "the same language"—the language of business—and not simply expressing their functional points of view. In a similar vein, my vision is that one day I will walk into a room full of POMS members at a future POMS conference, listen to an on-going discussion, and not be able to tell the academics from the practitioners. This is not to say that each constituent does not bring a unique perspective to such debates and contribute to the advancement of our field in a different way. It is just that those perspectives need not be so distinctly associated with either of those two constituencies. After all we share the overall goal of improving companies' operational effectiveness while advancing the field of POM.

Naturally the best way of attaining this goal for us would be to gradually move POMS from being an exclusively academic association, towards a society that functions as a partnership among academia, industry, and government. It is within this context that we articulate the **mission** of the **Operational Advantage Group** as follows:

*To achieve an inclusive organization, that brings together academics and practitioners, from many countries, who are devoted to furthering cooperation and interactions between the two groups. OAG members agree to coordinate activities to increase understanding and effectiveness of all aspects of operations management. OAG's purpose is to foster partnerships that include collaboration on research, consulting, teaching, and publishing. This goal is in conformance with the original conception of POMS.*

### The Beginnings

The initiative started as the Industry Support Group at the POMS conference in San Francisco, in April, 2002. The initial planning team consisted of Gabriel Bitran, Bob Hayes, Aleda Roth, Wick Skinner and Marty Starr. The initiative was approved by the POMS Board at Savannah, in April, 2003, and the group held its first session, as the OAG, in Cancun, Mexico in 2004. Attended by 60 POMS members, the session focused on the ways in which the activities of industrial executives can be integrated with the academic interests of POMS members. At that session, 50 people asked to be added to the OAG list, bringing the group total to 62—including four POM executives in various industries and about 15 academic consultants to industry.

Another all-day meeting was held at the annual conference in Chicago, in April, 2005. Highlights of the Chicago session included a panel on Collaborative Research, held by Andy Neely, Aleda Roth, and Chris Voss, and a workshop on the Role of the COO (Chief Operating Officer), organized by Joel Goldhar. Some of the questions explored in the workshop included: Is the COO title disappearing? Will the lack of the COO function lead to sub-optimization within SBUs? What are the primary tasks of the COO? What are the characteristics of an effective COO? Currently the group list consists of 92 names, and it is growing gradually.

### Moving Forward

Now we have to take these initiatives to a new level. If we are really serious about significantly increasing industry-academia collaboration, we need to find ways to reach out to the practitioners' world. When we approach them, though, just stating OAG's intent, its mission, and past activities will not be sufficient. Thinking from a typical "operations guy's" point of view, there needs to be a "WIFM" (what's-in-it-for-me?). Other than understanding the reasons for their absence from associations such as POMS, we have to articulate the benefits they would gain from collaborating with academia. To that end we plan to take on the following steps:

- Initiating individual contacts between POMS members and targeted practitioners in various industries, and creating a database of those potential "recruits," categorized by industry and discipline expertise.

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- Asking those practitioners for their pressing concerns (what is it that keeps them up at night?). This could take the form of a targeted survey, and once the responses are compiled and categorized, the outcomes can be used as a guide by faculty and doctoral students for initiating new research in areas where it is needed most. Participants in the first conference of the POMS Supply Chain College in Chicago this year compiled a list of possible research topics specifically in “Global Supply Chain Synchronization” and “Formulating and Executing a Supply Chain Strategy.” It was an excellent start—we will try to extend it to a broader POM agenda.
- Encouraging those practitioners who shared their pressing concerns with us to allow access to their companies and participate in collaborative research.
- Preparing a list of recent collaborative research by POMS academics; using this information to attract practitioners and maintain their interest. We can learn more from our colleagues in Europe and elsewhere in the world, where more institutionalized collaboration exists; e.g., the Advanced Institute of Management Research initiative in U.K., as presented by Andy Neely in Chicago this year.
- Inviting practitioners to fully participate in annual POMS conferences and mini OAG conferences that can be organized separately. This participation should go beyond singular presentations at panels and plenary sessions, and extend to papers presented in more varied venues (special tracks, etc.).
- Encouraging and helping them to co-author articles on the collaborative research undertaken.

All this may look ambitious, but we would like to have as many ideas as possible, which we can shape into a three-year plan in the coming months, and share with the membership in future POMS Chronicle articles and in Boston next year.

#### How Can The POMS Community Help?

We welcome any information that will help us pursue any of those six steps. Please contact one of us below if you want to get involved or have ideas to contribute. We are particularly interested in names and contact information of practitioners who may become potential participants. We have a long way to go, but we have never been in a better position to take on this challenge.

Rafael Menda ([rmenda@gmail.com](mailto:rmenda@gmail.com)); Marty Starr ([mstarr@cfl.rr.com](mailto:mstarr@cfl.rr.com));  
Sushil Gupta ([poms@fiu.edu](mailto:poms@fiu.edu)); Wick Skinner ([wskinner@maine.edu](mailto:wskinner@maine.edu))

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## DOES INFORMATION TECHNOLOGY MATTER?

**Johnny Jiung-Yee Lee**

School of Accounting and Information Systems  
University of Utah

[pactjl@business.utah.edu](mailto:pactjl@business.utah.edu)

Investments in information technology (IT) represent a considerable portion of a firm's capital expenditure. Does investment in IT really pay off? In popular press and consulting reports, beliefs about the business value of IT have changed. Initially, researchers argued that IT increased firm performance by creating competitive advantage. Recently, researchers argued that IT really doesn't matter (Carr 2003). The positive impact of IT investment on firm operational efficiency is well documented. Similarly, in the financial markets, we observe investors reacting positively to IT investment in increased stock performance. The increases in operational efficiency and gain on firm value expected by investors should ultimately be realized in firm accounting profits. However, several attempts to document such an association resulted in either negative or insignificant results. Does IT really increase firm value as expected by investors? Do high cost technologies, like ERP and CRM, aimed at increasing a business' competitive position increase firm profit?

Before we can answer these questions, more fundamental issues need to be clarified. What should be measured as IT investments? Most researchers only measure hardware and IT-related labor cost. How about investment on software and training? These components are costly, ERP software can cost several million dollars and half a day training workshop sometimes cost several thousand dollars per attendant. Do they impact firm performance significantly? Does ignoring them in IT investment measure, as most researchers did, bias the result? Also, intuitively, the bundle of components should impact firm performance as well. Some IT components have limited benefits to the firm alone, they benefit firm when they complement other components. For example, running high processing demanding software in a computer with low-end slow central process unit (CPU) would not result in a satisfactory performance. Similarly, employees who are unfamiliar with software systems need training to operate the system efficiently. If the complementarities between components do impact firm profitability significantly, they should not be ignored in the IT-value analysis. The Cobb-Douglas model implies a complimentary/substitute relation between production factors. Many IT-value studies that successfully

document the positive impact of IT model IT as an add-on production factor in modified Cobb-Douglas functional forms (Brynjolfsson et al.; Sircar et al. 2000). On the other hand, in studies that focus on firm profitability, the potential complementarities between IT components are ignored. How do complementarities between IT components impact firm profit?

We use a unique data set detailing IT investments by several hundred Taiwanese firms created and maintained by a government-funded agency. The information in the database is collected through face-to-face interviews with the head of IT units at selected firms. Specifically, this database includes firm-level data on hardware expenses, software expenses, training expenses, and in-house IT staff size for the years 2000 through 2002. The firm profitability information is gathered from the TEJ database that is similar to the COMPUSTAT database for U.S. firms. IT value models with different specifications of IT investment are compared. IT investment components are aggregated into a single factor in model 1. Model 2 includes components as distinct independent variables. Model 3 includes multiplicative terms between components to model the complementarities between them. Return on assets (ROA) and return on equity (ROE) are used as dependent variables. The empirical results indicate that when IT investment is aggregated into a single measure, it does not associate with firm profitability. When investments with different characteristics are measured separately, training and hardware significantly associate with firm ROA and ROE. Compared to the above two models, the third model including complementarities among IT components fits the best based on adjusted-R<sup>2</sup> and Akaike's information criterion. In model 3, the main effects of hardware, software, training, and all bundles between IT components except hardware-software are significantly associated with ROE.

### Managerial Insights

Overall, we find that IT investment is associated with firm profitability. The association can be detected only when IT investment components are measured as distinct factors rather than aggregated into one measure. Two insights can be drawn from this finding. First, the insignificant results found in earlier study might be due to the aggregation and omission of IT investment components. Second, these commonly omitted components, such as training and software, impact firm profitability significantly.

<sup>1</sup> See Brynjolfsson and Hitt's papers published in MIS Quarterly and Management Science.

<sup>2</sup> A unit of investment is US \$3000 per employee.



...Does Information Technology Matter?... from page 16

More importantly, we find that the complementarities between IT components are significantly associated with firm profitability. The impact of each IT component is conditioned on the mix of the other components. The direction of the marginal impact depends on the component.

For training, investments in software and labor create positive marginal impacts while investment in hardware creates a negative impact. Nowadays, IT hardware is highly standardized. Combining with the more user-friendly human-computer interface, users do not need too much training to be able to operate the hardware.

In sum, the marginal impact of an IT component is codetermined by the level of other investments. Let's specifically examine the impact of each investment in conjunction with others. We first construct an explanatory model including these statistically significant terms from our Model 3, and then take partial derivatives with respect to each IT component. These first-order functions represent the marginal impacts of IT components on firm profitability. We then substitute the minimal, mean, and maximal amounts of complementary investments from our sample firms to these first order functions. For example, as mentioned earlier, the marginal impact on ROE of training is a function of hardware, software, and IT-related labor investments. As illustrated in Figure 2, the marginal impact of training is approximately negative 200% when hardware, software, and IT-related labor are at the minimal level found in our sample. The same marginal impact is over positive 700% when complementary investments are at the maximal level. Also, when other investments are at high levels, the marginal impact of a unit of software on

ROE is more than 800%. This finding suggests that managers should look closely to the current mix of IT investment components before making decisions on new investment. In practice, it is common for firms to purchase information technology system as packages. For example, when a firm purchases an ERP sys-

tem, new hardware, training, software, and sometimes IT-related labors are also acquired at the same time. Our finding suggests that this kind of package practices might not be the most efficient way to invest in IT. Firms might already own some excess resource to support the new system. These resources will be wasted if a new system is acquired as a package.

Note: Please contact the author for additional details.

Figure 1: Marginal Impact on firm Profitability of IT Training Investment

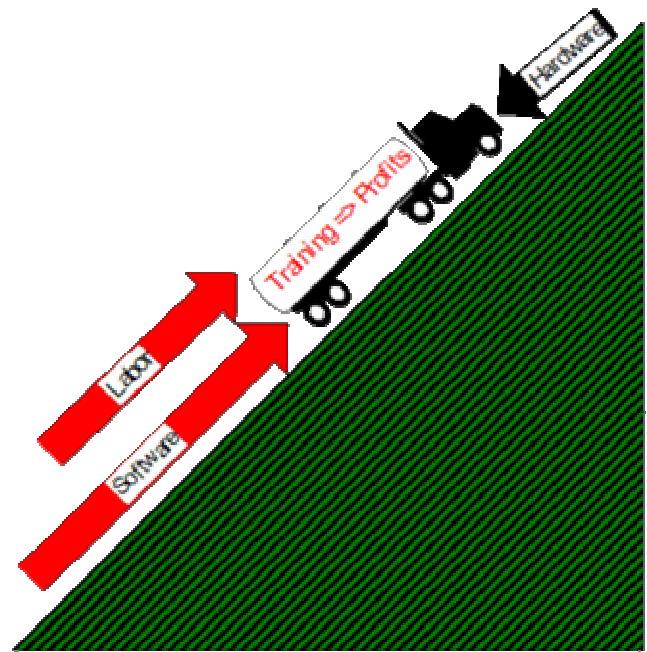
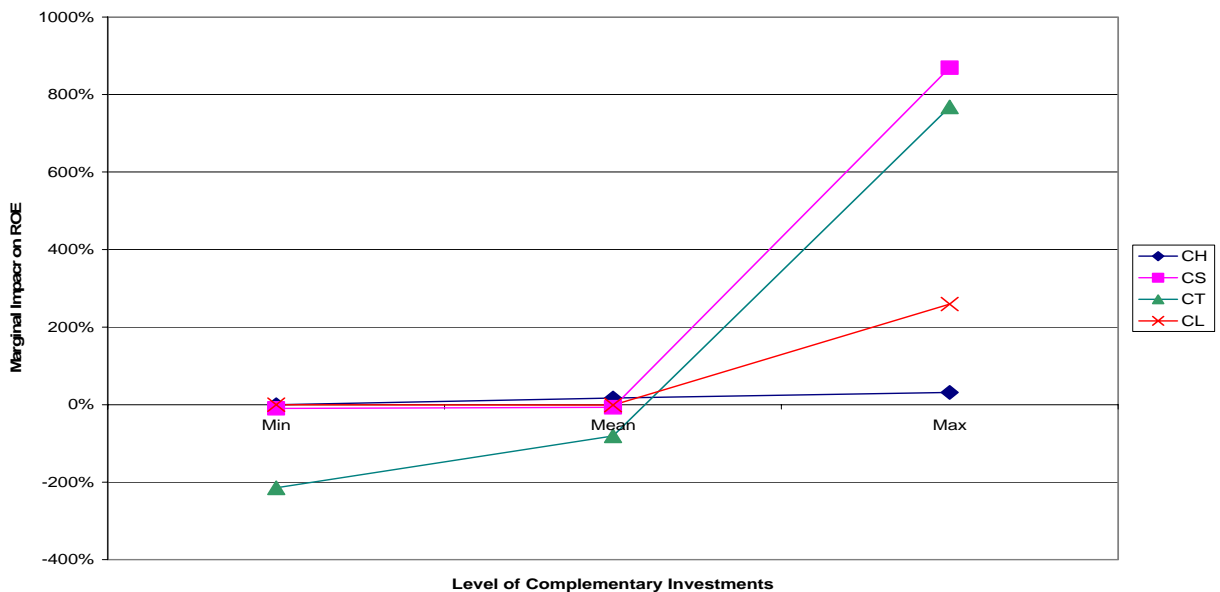


Figure 2:

IT Components' Marginal Impact on ROE at different Complementary Investment level



## INVENTORY TURNOVER PERFORMANCE IN THE U.S. RETAIL SECTOR

**Vishal Gaur**

Assistant Professor

Leonard N. Stern School of Business

New York University

[vgaur@stern.nyu.edu](mailto:vgaur@stern.nyu.edu)

Inventory turnover, the ratio of a firm's cost of goods sold to its average inventory level, is commonly used to measure performance of inventory managers, compare inventory productivity across retailers, and assess performance improvements over time. However, we find that the annual inventory turns of U.S. retailers vary widely not only across firms but also within firms from one year to another. For example, during 1987-2000, the annual inventory turns at Best Buy Stores, Inc. (Best Buy), a consumer electronics retailer, ranged from 2.85 to 8.53. The annual inventory turns at three peer retailers of Best Buy during the same period show similar variation: at Circuit City Stores, Inc. from 3.97 to 5.60, at Radio Shack Corporation from 1.45 to 3.05, and at CompUSA, Inc. from 6.20 to 8.65. Variation in inventory turns across retailers is even larger. For example, inventory turns of public-listed food retailers during the year 2000 varied between 4.7 and 19.5. The factors influencing these variations have not been well-studied in the operations management literature. Thus, the extent to which changes in inventory turns indicate better or worse performance in inventory management cannot be determined in practice.

Additionally, inventory turns are known to be correlated with other performance variables of a retailer. For example, Levy and Weitz (2001) describe a tradeoff between inventory turns and gross margin (the ratio of gross profit net of markdowns to net sales). This model, called the strategic profit model, suggests an 'earnings versus turns' tradeoff in retailing, i.e., a firm either has high margins and low inventory turns or low margins and high inventory turns. Figure 1 illustrates this tradeoff for the four consumer electronics firms cited above. CompUSA has the highest turns and the lowest margins while Radio Shack has the lowest turns and the highest margins. Best Buy and Circuit City have intermediate values for both variables. Thus, changes in inventory turns may be correlated with gross margin.

Inventory turns can also be correlated with the fixed assets of a retailer. This is so because investments in supply chain infrastructure, information technology, process improvements, etc., that lead to an improvement in inventory turnover, are typically capitalized as fixed or

long term assets on the retailer's balance sheet. A third variable that inventory turns can be correlated with is sales surprise. We define sales surprise as the ratio of actual sales to forecasted sales. When a retailer's actual sales are higher than forecast, then average inventory will be lower than expected so that the retailer's actual inventory turns will increase. On the other hand, if actual sales are lower than forecast, inventory turns will show a decrease.

In Gaur et al. (2005), we study the variation in firm-level inventory turns as a function of gross margin, capital intensity (the ratio of gross fixed assets to the sum of gross fixed assets and average inventory) and sales surprise. We employ data on the income statement and balance-sheet records of firms from Standard & Poor's Compustat database. This dataset covers 311 public-listed U.S. retailers in ten retail segments for the period 1987-2000. The retail segments are based on the standard industry classification (SIC) of firms as done by the U.S. Department of Commerce. For example, apparel and accessories retailers are designated by SIC codes 5600-5699, consumer electronics and computers stores by SIC codes 5731 and 5734, etc. We compute the values of all the variables in our study using this dataset. Sales forecast data are unavailable in Compustat. Thus, forecasts are generated by us using a variety of time-series forecasting methods.

An important aspect of our paper is that we model intra-firm variation in inventory turns, i.e., our model correlates changes in inventory turns and explanatory variables across years for each firm. Thus, our regression model in its simplest form is as follows:

$$\log IT_{it} = F_i + c_t + b_1 \log GM_{it} + b_2 \log CI_{it} + b_3 \log SS_{it} + e_{it}$$

Here,  $i$  denotes the firm index,  $t$  denotes the year index,  $IT_{it}$ ,  $GM_{it}$ ,  $CI_{it}$  and  $SS_{it}$  respectively denote the variables for inventory turns, gross margin, capital intensity and sales surprise, and  $e_{it}$  denotes the error term.  $F_i$  denotes a firm-specific fixed effect to control for firm-level hidden variables and  $c_t$  denotes a year-specific fixed effect to control for time-related hidden variables. In this model, we do not compare inventory turns across firms in a year because such comparisons can be confounded by factors exogenous to the model. For example, inventory turns cannot be compared across two firms that use different accounting policies.

Our paper yields three types of results. First, we find that two-thirds of the intra-firm variation in  $\log(IT)$  is explained by the three explanatory variables,  $\log(GM)$ ,  $\log(CI)$  and  $\log(SS)$ . The coefficients' estimates

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...Inventory Turnover Performance ... from page 18

for the above regression model are  $b_1 = -0.285$  (standard error = 0.017,  $p$ -value < 0.001),  $b_2 = 0.252$  (0.021,  $p < 0.001$ ), and  $b_3 = 0.143$  (0.007,  $p < 0.001$ ), respectively. Thus, inventory turns are negatively correlated with gross margin and positively correlated with capital intensity and sales surprise as hypothesized. Since we have a log-linear model, the coefficients give the elasticity of inventory turns with respect to each of the variables. For example, a 1% increase in gross margin (e.g., from 0.5 to 0.505) is associated with an average 0.285% decline in inventory turns across all retailers over the period 87-00. The coefficients' estimates in the model are found to be extremely robust with respect to sub-periods as well as estimation methods.

estimates of  $c_t$  obtained for each year. We find that average inventory productivity across the firms in our dataset has declined during this period. This result is similar to the empirical findings of other studies regarding the U.S. manufacturing sector. Using aggregate industry-level data from the U.S. census bureau, Rajagopalan and Malhotra (2001) find that manufacturers in only six out of twenty sectors show an improvement in finished goods inventory turns during 1961-1994. Chen et al. (2005) use panel data for public listed U.S. manufacturers for the period 1981-2000 and find that while raw material and work-in-process inventory turns have improved during this period, finished goods inventory turns have not. Note that these studies measure time-trends in raw inventory turns while we correct for correlations of inventory turns with gross margin, capital intensity and sales surprise. We also evaluate time trends in inventory turns for individual firms in our dataset. Here, we find that even though average inventory turns have declined among retailers during 1987-2000, 135 out of 311 firms (59 statistically significant at  $p < 0.05$ ) have improved their inventory turns during this period. Further, firms that have invested more in capital assets have achieved higher inventory turns.

Our study is useful for benchmarking inventory turnover performance of retailers. The firm-specific fixed effects estimated by us can be investigated further to understand the differences between the trade-off curves of different retailers. The variables in our firms can be augmented to include other factors that are expected to affect inventory turns, such as sales growth rate, firm size and supply chain design. Finally, one may assess the impact of improving inventory turns on a retailer's financial performance. For example, Chen et al. (2005) conduct such a study for U.S. manufacturers, and Raman et al. (2005) present a case study describing the complexities in evaluating inventory related performance from the investors' view point.

Figure 1: Plot of annual inventory turns vs. annual gross margin for four consumer electronics retailers for the years 1987-2000

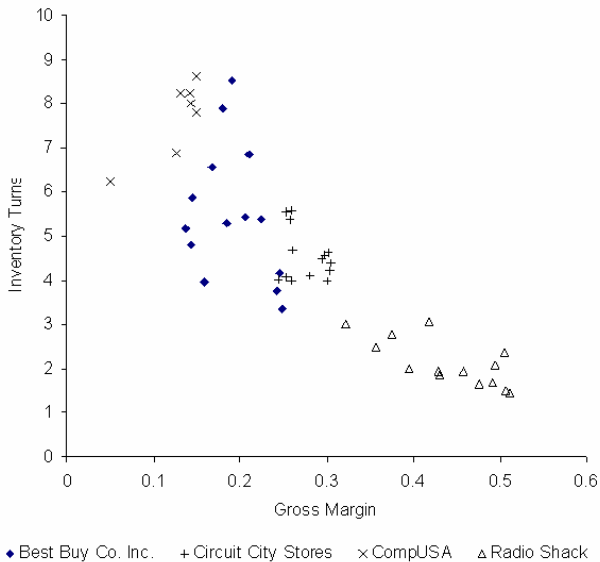
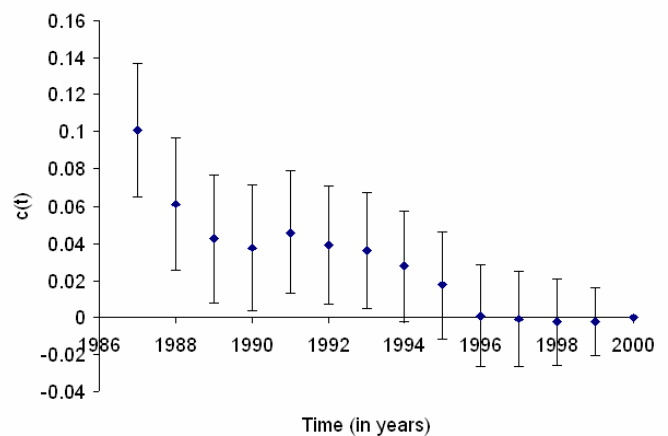


Figure 2: Plot of time-specific fixed effects  $c_t$  for the regression model (the error bars show intervals of  $2 \times$  standard error)



Second, our model can be interpreted as a tradeoff curve between  $\log(IT)$ ,  $\log(GM)$ ,  $\log(CI)$  and  $\log(SS)$  for each firm. Thus, we use the estimates from our model to construct an alternative metric of inventory productivity, Adjusted Inventory Turns (AIT), which adjusts changes in inventory turns for co-variation with the explanatory variables. We use AIT to compare inventory turns performance across retailers and over time. We show examples where AIT leads to inferences that are opposite to those obtained using inventory turns. For example, Riddick Corporation, a supermarket chain, is found to have no appreciable change in inventory turns during 1990's but its adjusted inventory turns improved significantly during the same period due to the correlation with a substantial increase in gross margin.

Third, the estimates of  $c_t$  in our model are useful for evaluating time trends in inventory productivity in the retail sector. Figure 2 shows the

...Continued on page 15

## JONAH CERTIFICATION

**Jacob D Bailey**

Senior Operations Specialist

Merrill Lynch

[baileyjacob@yahoo.com](mailto:baileyjacob@yahoo.com)

Over the past couple years I've had the privilege of being exposed to a program based specifically upon improving operations management. Many of you, if not all, have had to opportunity to read a book called "The Goal" by Eliyahu Goldratt. If you recall, one of the main characters in the book was named "Jonah." Like a God from some distant planet, Jonah held the answers to all problems involving business operations and also those problems which had nothing to do with business at all. The program in which I was involved was based upon further study of those insights taught in the "The Goal" and it was henceforth named "Jonah Certification" program.

With large response from his book, Goldratt created the program to help others develop their skills in solving complex problems through use of the Theory of Constraints or "TOC". As a young physicist, Mr. Goldratt had the opportunity one summer to help with his uncle's business. After being surprised with how badly the business was managed, he decided to spend the rest of his energy applying physics methods to solve common problems which have plagued businesses for years. These physics methods developed in what is now known as TOC.

TOC centers on getting to core causes of problems, not just addressing their symptoms. Most of us are great at putting Band-Aids on what we think is the core problem, when we probably haven't even come close to getting down to what's causing our cuts and bruises. The Jonah program teaches some of the more basic concepts in finding core causes of problems and creating the organizational change necessary to improve. The Goldratt Institute describes the program as the following:

"The Jonah<sup>SM</sup> Program employs a systematic and logical process that is a practical blend of the scientific method and the Socratic technique to answer the three questions essential to any successful change: *What to Change?*, *To What to Change?* and *How to Cause a Change?* This process is referred to as the **Theory of Constraints (TOC) Thinking Processes (TP).**" <sup>1</sup>

When I first read "The Goal" it was a fresh breath of new understanding. It was a release from structured thought. It was by far the only topic which could keep my attention while going to school. The more and more I learned from being involved with the program, the more I realized how many managers had no idea how to find the core cause of the tribulations they faced, let alone find a solution to solve the core problem. While studying in the program, I went into work every day thinking "what are we doing to ourselves?"

The concepts in the program are not overly complex. In fact, I've seen undergraduate students use these concepts to solve problems which business executives haven't been able to solve for years. What's most important is that they are extremely valuable and applicable in almost all situations. The only limitation to the new concepts is to not presume you already know the answer to the problems you face.

As part of finishing the certification program, each candidate must complete an assigned project by using Jonah methods. My particular project involved a family-owned business which specialized in customized metal fabrication for the medical industry. The main issue going into the project was that I had limited information regarding the company's problems. However I was given a list of problems which the company had encountered and was asked to discover the main causes of the issues plaguing the company. I used the following steps to help get to what I believed to be the actual problem, not just a symptom:

**Step 1- Building a Current Reality Tree – "What to Change"**

A Current Reality Tree is a visual representation of the cause and effect relationships of undesirable effects (otherwise known in Jonah lingo as UDE's) brought about by one core cause. The relationships between these different undesirable effects must be factual (just as in physics). The diagram on the left is an example. The bottom box A represents the cause of the box B and boxes C and D are both effects caused by box B. An example from my project is given below on the right. In the case of this small manufacturing company, the core cause of employees disregard for management was because management was akin to running the company as a family.

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<sup>1</sup> <http://www.goldratt.com/jp.htm>

...Jonah Certification... from page 20

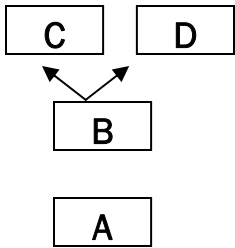
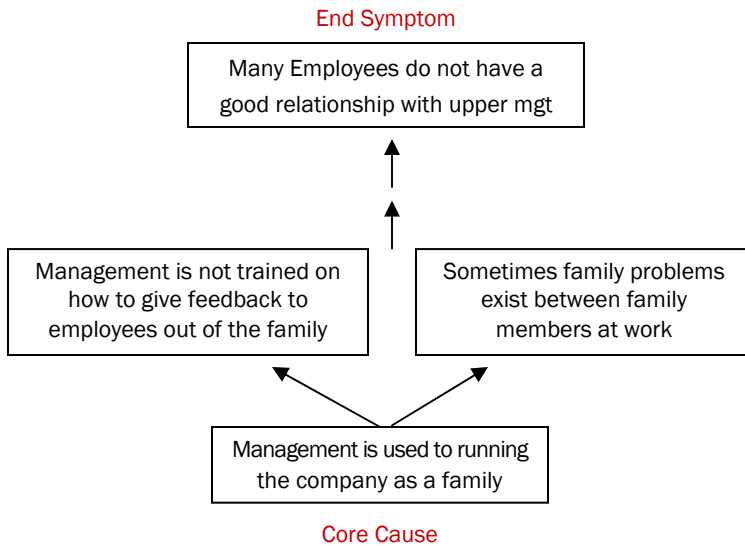


Figure 1

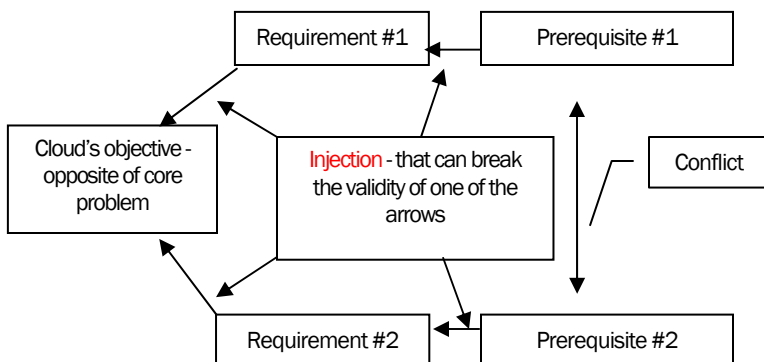


This is a very simplified example of what the actual product looks like. In the case of this small company, there were over one hundred different UDE's used to create the overall puzzle. After this step was completed we needed to find out what was required to prevent the core cause from happening.

**Step 2- Building an Evaporating Cloud - "To What to Change To"**

An Evaporating Cloud is best described as "The thinking process that enables a person to precisely present the conflict perpetuating the core problem, and then directs the search for a solution through challenging the assumptions underlying the conflict." <sup>2</sup>

Figure 2



The cloud's objective (on the left) is the direct opposite of the core problem created earlier in the current reality tree. To meet this core objective we can complete the evaporating cloud by noting the two requirements to meet that objective and then state the prerequisites to meet those two requirements. Between the two prerequisites usually lies a conflict which exists between prerequisites for complying with the requirements. The reason to make an evaporating cloud is to find a feasible solution (injection) which can help in reaching the objective, while at the same time get rid of one the requirements wherefrom part of the conflict is created. In the case of my project, one of the evaporating clouds looked like figure 3.

**Step 3- Building a Future Reality Tree - "How to Cause the Change"**

After deciding what we're going to change, we needed to see if we're actually going to improve the situation or exacerbate the problem. This part of the process is called the Future Reality Tree, and it is much similar to a current reality tree except that it is an attempt to predict the things which will occur when we make our injection from our evaporating cloud. In the case of the future reality tree, we are now trying to create as many DE's ("desired effects" - opposite of UDE's) as possible.

Obviously, a future reality tree will never be able to evaluate all possible outcomes. However, it will give us a better idea of what might happen if we make the suggested changes given in our evaporating cloud. In dealing with one of my project's evaporating clouds we found that creating a matrix team for the production process would help increase interdepartmental communication. That being said, a quick summary of what the future reality tree looked like in this scenario is shown in figure 4.

Jonah certification is highly regarded in the Operations and Logistics industry. When combined with Six Sigma, this program can be a potent source used for consistent improvement within any organization. The average Jonah cert. program costs around ten thousand dollars (I was lucky enough to have the training through school) which may sound steep. But when a company realizes the cost savings brought about by using the Jonah methods, the costs seems trivial.

If you are interested in learning more about Jonah method, but can't afford the price tag of the certification program, I'd highly recommend reading "It's Not Luck," (also by Eliyahu Goldratt) which is a follow-up book after reading The Goal. It goes into much greater detail in applying the methods. Regardless of your intentions, any organization would benefit greatly by having their company's operations viewed through the lenses of the almighty Jonah.

<sup>2</sup> Problem Resolution and The Thinking Process - Sixth Edition. Tony Laturner. August 2002.

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Figure 3

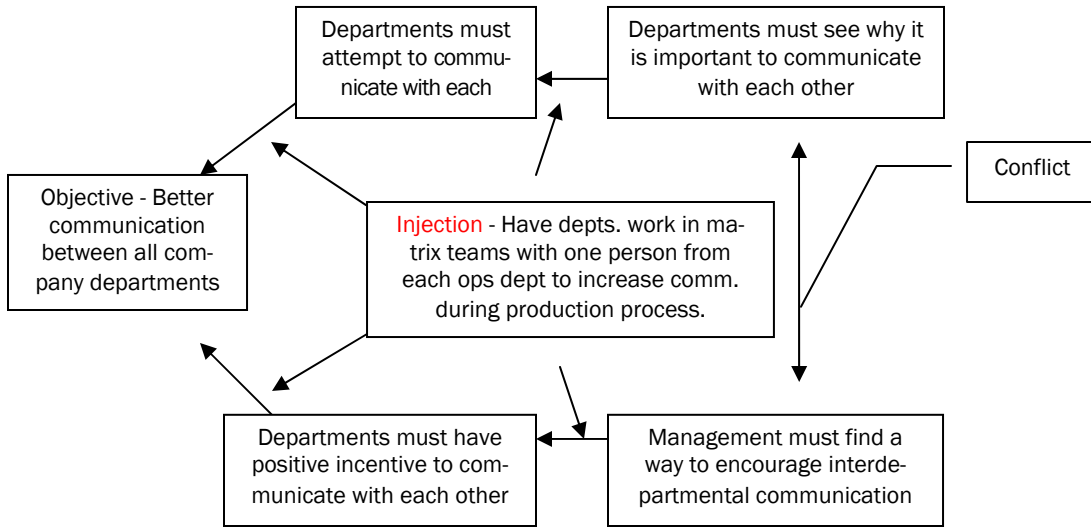
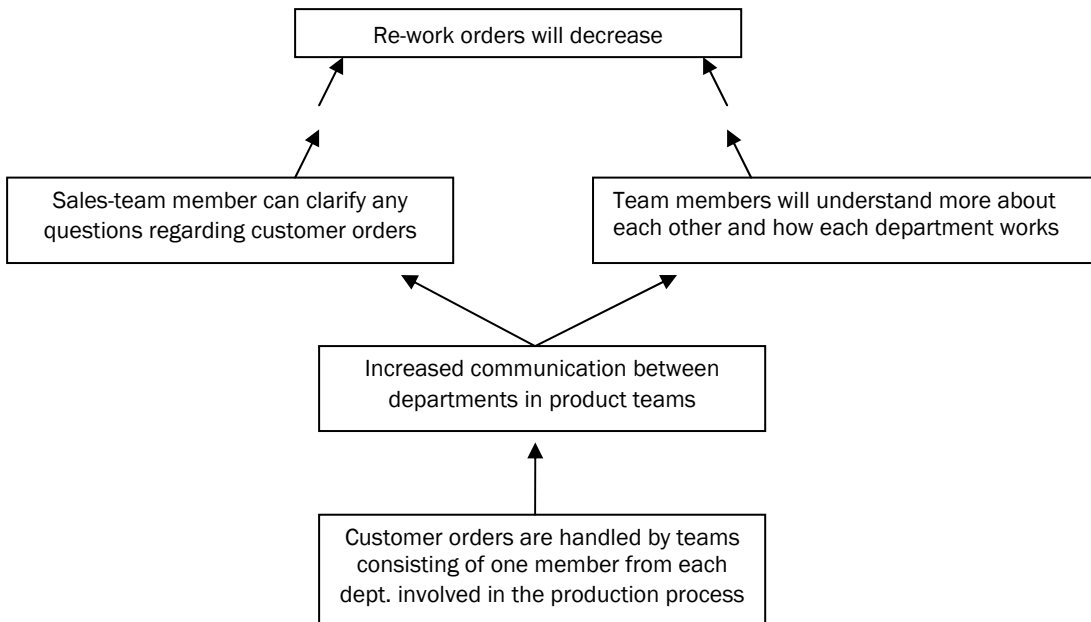


Figure 4



## A NEW PARADIGM FOR PROJECT MANAGEMENT EDUCATION

**Ted Klasterin**

Department of Management Science  
University of Washington  
tedk@u.washington.edu

**Gary Mitchell**

Pamplin School of Business  
University of Portland  
mitchelg@up.edu

There are many areas within Operations Management that benefit from a systematic and analytical focus, but perhaps no greater potential exists than in the area of Project Management (PM). PM has long been an important area within Operations Management that is directly related to many other OM topics including scheduling and production systems (e.g., job/flow shops). However, in recent years, PM has become increasingly important in its own right as projects have become globalized, product life cycles have been dramatically reduced, and outsourcing has become a key business strategy. The result is that managers now place great emphasis on project management skills.

Despite this emphasis on effective PM, empirical evidence indicates that the track record of project managers is quite poor (although perhaps improving). For example, new product development projects and IT projects have not fared well. With respect to the latter projects, the Standish Group<sup>1</sup> has tracked over 50,000 IT projects globally since 1994 and characterized projects as failed (project cancelled or never implemented), challenged (project was over budget or time or had fewer features than originally planned), or successful (project implemented on time and budget as designed). According to their research, less than thirty percent of all projects in 2004 were successfully completed and almost a fifth of all projects were considered failures (however, this is down from 31 percent in 1994). Why do project managers have such a poor track record? According to the Standish Group, "Corporate America spends more than \$275 billion each year on approximately 200,000 applications software development projects. Many of these projects will fail, but not for lack of money or technology; most will fail for lack of skilled project management."<sup>2</sup>

<sup>1</sup> The Standish Group International, Inc. (available at [www.standishgroup.com](http://www.standishgroup.com))

<sup>2</sup> The Standish Group International, Inc. "Chaos: A Recipe for Success", 1999

<sup>3</sup> Calculations for the "classic" PERT model are based on the longest path that is found using expected values; when there is more than one path with the same expected duration, the path with the largest variance is selected. In this case, since both paths have equal variance, one path (say, START-A-END) is picked arbitrarily. The probability that this path is completed in less than 8 days is 0.5; similarly, the probability that the path is completed in more than 8 days is 0.5.

What can be done to improve this record? We believe that an analytical approach based on Management Science (MS) tools can play a significant role; MS tools and methodologies are ideally suited to illustrating the difficult and often subtle problems, issues, and trade-offs faced by project managers. Ironically, Project Management is included in most Operations Management textbooks and has long been part of most OM courses. However, most textbooks treat PM from a deterministic perspective, showing how the critical path is found and slack values are calculated using a longest path algorithm. This (deterministic) approach is reinforced by most commercial PM software packages that are based on similar assumptions. This approach is misleading to managers who face real-world projects. Consider, for example, the small project indicated in Figure 1 where two tasks can be performed concurrently. Assume that the duration of each task can either be 6 days or 10 days with equal likelihood (as indicated in Figure 1). (Obviously, the mean duration of each task is eight days.) A deterministic critical path calculation (using the mean values) suggests that the project will take 8 days. In reality of course, this project will never take eight days; it will be completed in either six days or 10 days. Furthermore, the probability that this project will be completed in 8 days or less is only 0.25 while the expected duration of this project is actually 9.0 days (the calculations are given in Figure 2). Adding more tasks only makes matters worse. A project with three tasks in parallel (all three tasks having the same probability distribution indicated in Figure 1) has an expected makespan of 9.5 days; the probability that the makespan for such a project will be 8 days or fewer drops to 0.125. As more tasks are added in parallel, the expected makespan increases (at least to an asymptote). Clearly, any manager who uses the "classic" (i.e., deterministic) CPM results (or most PM software) to plan a project is being misguided. Stated alternatively, any manager who uses the deterministic results to plan a project is planning to fail.

Readers who are familiar with project management will recognize that the "classic" PERT approach for addressing uncertainty in activity times may yield even more misleading results since a project manager may believe that the method has adequately addressed the uncertainty in her project. In the project represented in Figure 1, the "classic" PERT approach (using expected activity durations) would predict an expected project makespan of eight days and a probability of achieving that makespan of 0.5.<sup>3</sup> Typical with "classic" PERT, the expected project makespan is under-estimated and the probability of achieving that makespan is over-estimated.

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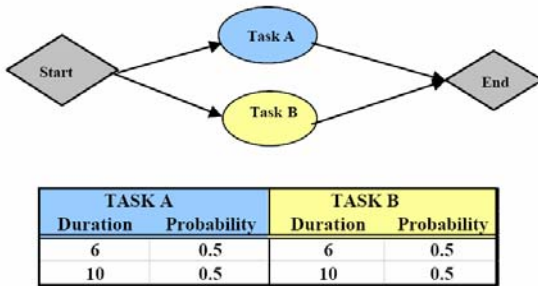


Figure 1. Example Project with Two Parallel Tasks

There are numerous ways to illustrate why this project will have an expected makespan greater than eight days (e.g., Monte-Carlo simulation) in a manner that will allow managers to better understand the implications of performing concurrent tasks on project schedule and costs. Furthermore, we can extend this approach to illustrate other important managerial implications; for example, the impact of a procrastinating worker, or the impact of a worker who follows Parkinson's famous law (that work expands to fill the time allotted).

Management science models can also be used to illustrate the complex trade-offs that managers face in most real-world projects. For example, the trade-off among cash flows, NPV, and activity scheduling can have significant implications that are often not apparent at first glance. Or consider the problem of setting due dates for customers, especially when projects arrive randomly; a poorly conceived policy will frustrate customers (if their projects are tardy) or reduce revenues (if resource capacity is underutilized). Or how should managers prioritize projects when workers have more than one project to complete? The solution to all of these problems will directly impact an organization's bottom line.

We have found that many of these problems can be modeled in Excel spreadsheets to both illustrate the nature of the problems as well as possible solution strategies. Fortunately, there are an increasing number of case studies that can be used in conjunction with these spreadsheets and methodologies (see Klastorin, 2004).

An effective PM course relates to all business disciplines and therefore is likely to have a greater appeal (and class enrollment) than most MS or Operations Management courses. For example, a well-designed PM course relates to finance (projects treated as investment portfolios), marketing (trade-off between quality, scheduling, and cost for specific markets), accounting (cash flows), management (how to form project teams, learning issues in project management), as well as statistics and operations research. Furthermore, we have found that our PM courses at the University of Washington attract students from various disciplines outside of the Business School, including engineering, urban planning, construction management, health sciences, and information technology.

Knowing how to manage projects effectively is a critical skill for all organizations. Management Science has a great deal to offer in the PM area; it provides an effective means to challenge old ways of thinking and to stimulate new ideas. A course designed around MS tools can provide the critical thinking that successful PM needs while potentially stimulating greater interest in other MS courses.

**Reference:**

Klastorin, T.D. (2004) *Project Management: Tools and Trade-offs*. John Wiley & Sons, New York, N.Y.

Task A		Task B		Project	
Duration	Probability	Duration	Probability	Makespan	Probability
6	0.5	6	0.5	6	0.25
6	0.5	10	0.5	10	0.25
10	0.5	6	0.5	10	0.25
10	0.5	10	0.5	10	0.25

Figure 2. Calculations for Project with Two Parallel Tasks



## FELLOW OF POMS AWARD (REPRINTED FROM POMS CHRONICLE VOL 11, NO 2)

**Martin K Starr**

*Chair, POMS Council of Past Presidents*  
Distinguished Professor of  
Operations Management Emeritus  
Crummer Graduate School of Business  
Rollins College  
Email: mstarr@rollins.edu

When Aleda Roth became President of POMS over two years ago, she asked me to put together a proposal for the Fellow of POMS Award. To evaluate the opportunities and possibilities required contacting people from other societies that had experience with fellowship programs.

There are many of them reflecting an incredible number of different approaches. Once the pros and cons had been sorted out, tentative recommendations were discussed with various members of our society who were familiar with the history and culture of our POMS organization.

It is clear that adoption of fellowship recognition is essential to put POMS on the same level with other scientific and professional societies. All major, professional societies have used fellowship to solidify their base of support. The foundation of great societies is composed of people. Articles and books are written by researchers. Students are inspired by their teachers. Problems are solved by P/OM executives who apply their art and science to do it better the first time. Our cases demonstrate conclusively that people are the crucial, scarce resource. Successful professional societies must recognize the contribution of their members in a proper way.

For appropriate fellowship recognition, there are two main options. First, some societies consider the title of Fellow to be a membership category. (You lose it when you leave.) Second, Fellow designation is presented as an award. It is given to recipients for life. The title is (solely) an honor that does not bestow any special status nor does it provide expanded privileges.

The first category of fellowship has caused problems in various societies that have employed it. For example, ORSA, at its inception, limited positions on the Board to Fellows of the society. Non-fellows felt disenfranchised which led ORSA to discontinue the fellowship member level. In the Fall of 2002, INFORMS (created by merger of ORSA and TIMS) reestablished fellowship award status, but this time it was based on the second option.

A strong infrastructure is crucial for the well-being of professional societies. To achieve full commitment to publications, meetings, and service to the society, recognition of significant contributions is essential. This supports high personal involvement and continued retention, as well as attracting new contributors who respond positively to the environment of appreciation for contributions.

The fact that fellowship programs are considered to act in this way became evident as data revealed that fourteen out of fourteen societies studied (major organizations from every field of science) had active and on-going fellowship programs.

Following the POMS-Cancun Meeting (April 30 – May 3, 2004) POMS President Gabriel Bitran set in motion the establishment of a committee to exam-

ine appropriate conditions for awarding members the honorary plaque designating them as a Fellow of POMS. This Committee was asked to propose criteria and suggest candidates for recognition at the 2005 POMS-Chicago Meeting to be held in May. The Committee is composed of the Past Presidents of POMS who by Board agreement were the first recipients of the Fellow of POMS Awards at Cancun.

A consensus emerged in discussions at the POMS-Cancun Meeting. It has been strengthened by conversations with members from many areas of academia and industry since then. There is agreement that the organizational model for POMS is that of a professional society without hierarchy. In accord with that, the fellow's award designation should be based on broad inclusion of the membership of POMS.

Recognition of contributions must cross all geographic boundaries. There should be a growing body of Fellows who meet regularly at all meetings. Selection must not be constrained by industrial affinities, governmental activities, and academic proclivities. Contribution should be defined to be representative of a spectrum of well-informed opinion from a variety of sound constituencies concerning what constitutes accomplishments of merit.

There are many options to be examined. Societies studied to date show great variation in their standards for the Fellows Award. Some examples: one professional society requires 10 consecutive years of membership; another demands 12 years in the profession; one has a minimum age condition; quite a few limit the total number of fellows as a percent of total membership; almost half impose a limitation on the number of new fellows per year. The limits on numbers tend to be applied by large and well-established societies. Accomplishments that merit consideration for the Fellow of POMS Award must be carefully defined.

Type I errors (bypassing someone worthy of the award) are undesirable, but they can be remedied. Type II errors (an award is made that is not justified) cannot be remedied. Type II errors are visible and disheartening for those who previously received the award. They demoralize those who strive to earn the fellows award. The POMS Award Committee will make every effort to minimize both of these two types of errors. The Committee will be particularly cautious about Type II since Type I can be fixed. Every effort will be made to listen and to be responsive.

A few statistics about the supply of candidates for possible awards will help to explain why a Fellowships Award program is well-timed. POMS was founded 15 years ago (June 30, 1989). There have been on average twenty members of the POMS Board serving two-year terms during that time. This means that about 150 people have served the society in an administrative capacity. During the same period there have been about fifty issues of the POM Journal—including special issues. This works out to about 350 articles contributed by as many as 1000 authors with hundreds of editors who have refereed accepted papers as well as rejected papers.

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**FELLOW OF POMS AWARD (REPRINTED FROM POMS CHRONICLE VOL 11, NO 2)**

*Fellow of POMS ... from page 26*

An important source of potential candidates for the Fellow of POMS Award is in industries around the world. POM executives have been solving vital production and operations problems for decades. A similar statement can be written about the teachers who have contributed teaching innovations to the POM profession. Only recently have candidates come forward to describe their work in response to the Wick Skinner award for innovations in teaching. The time has come to recognize industry practitioners and teachers whose contributions earn them the right to be considered for the honor of receiving the Fellow of POMS Award.

Scores of POMS members have created and chaired meetings all over the world. There have been some outstanding contributions which involved years of work out of the limelight. Intellectual leaders in the POM field have won awards for research ideas and results which may be overlooked without a properly orchestrated Fellow of POMS Award program. It is fitting that we have this Fellow Award program in place for the 15th anniversary of POMS.

**POMS Fellows**

- Kalyan Singhal
- Martin K. Starr
- Sushil K. Gupta
- Roger W. Schmenner
- Wickham Skinner
- John A. Buzacott
- Robert H. Hayes
- Aleda V. Roth
- Chris Voss
- Luk Van Wassenhove
- Gabriel R. Bitran
- Hau L. Lee
- Paul R. Kleindorfer
- Suresh P. Sethi
- Steven C. Wheelwright
- Marshall Fisher

## NEW POMS FELLOWS

**Chris Voss**

Professor of Operations and Technology Management  
London Business School

Chris Voss is Professor of Technology and Operations Management at London Business School and a fellow of the UK Advanced Institute of Management (AIM). Professor Voss studied metallurgy at Imperial College London, and gained his MBA and PhD from London Business School. Prior to his PhD, he spent over 10 years in production management in the steel industry and in consulting. In the 1980's he founded the UK and subsequently the European Operations Management Association (EurOMA), of which he was chairman for many years. He has played a major role in building the operations management community in Europe and in forging links between Europe and the US in particular with POMS. One of the mechanisms he has used to build strong international links have been multi-country research programs such as the International Service Study and the International Manufacturing Strategy Survey. To honour his work in Europe, the annual EurOMA best paper award was named the Chris Voss award.

Professor Voss's research has covered a wide range of fields including Japanese manufacturing methods, where he published the first UK book on JIT; manufacturing strategy, where his paper on different paradigms of manufacturing strategy is widely quoted; quality management where he has recently published in both the POMS journal and the Journal of Operations Management; technology management and finally service management where he published the first UK textbook. A particular focus has been how research can be applied by users and he has developed a series of benchmarking tools that have been used by many thousands of companies around the world. His current research is first in the area of service management where he is studying the operations strategy dimensions of high experience services. Second he is working on the evaluation of the effectiveness and sustainability of best practices. Chris Voss has been active in POMS since its foundation being a regular contributor to the conferences and publishing in the POMS journal. He is currently chairperson elect of the POMS service college.

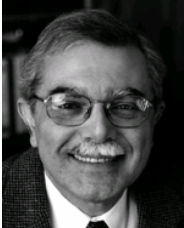
**Luk Van Wassenhove**

The Henry Ford Chaired Professor of Manufacturing & Dean of Research & Development  
INSEAD

The Henry Ford Chaired Professor of Manufacturing, Dean of Research & Development, INSEAD Luk Van Wassenhove has been the Director of CMER since September 2000. However, already since the early 1990s, he had a lively interest in environmental research. As director of the Centre for Integrated Manufacturing and Service Operations (CIMSIO) he has published several papers on remanufacturing and the greening of the supply chain. His other research interests are in the modeling of complex operational, tactical and strategic problems in remanufacturing, retro-distribution and services, as well as, process design for quality, responsiveness and continual improvement. His current research projects include REVLOG, Eco-Terrorism, the Sustainability Balanced Scorecard, and the Greening of the Supply Chain.

Prof. Van Wassenhove holds a PhD in Industrial Management and an MSc in Mechanical Engineering and Industrial Management from Catholic University of Leuven. Before joining INSEAD he held positions as Catholic University of Leuven, and Erasmus University Rotterdam. He is Senior Editor of Manufacturing and Service Operations Management, and Associate Editor for the International Journal of Production Economics, Production and Operations Management and Technology and Operations Review.

## NEW POMS FELLOWS



**Gabriel R. Bitran**  
Nippon Telephone and Telegraph Professor of  
Management  
MIT Sloan School of Management

Gabriel R. Bitran is a Chair Professor at M.I.T. Sloan School of Management. He has been Head of the Management Science area and Faculty Head of the Senior Executive Program. He was Editor-in-Chief of Management Science. Professor Bitran is a member of the editorial boards of several journals. He was the President of POM society during 2004. He has a M.Sc. and a Ph.D. in Operations Research from the Massachusetts Institute of Technology and a B.S. and a M.Sc. in Industrial Engineering from the "Escola Politecnica" of the University of Sao Paulo, Brazil.

Professor Bitran's research interests lie in the field of operations management in manufacturing and the service industry. More recently he has been working on pricing for high tech services, fashion retail goods and services, design of bandwidth markets, as well as related revenue management problems. He has consulted with companies in banking, financial services, computer, telecommunications, semiconductor, electronics, steel, and automotive industries. He has published numerous articles on a wide variety of topics in operations management.

Gabriel Bitran is a source for information on the design of service delivery and manufacturing systems. His work addresses topics that include matching the supply and demand in service systems, capacity planning, technology selection, pricing of perishable and seasonal products, and understanding consumer behavior in highly interactive services like the Internet.



**Hau L. Lee**  
Thoma Professor of Operations,  
Information, and Technology  
Graduate School of Business  
Stanford University

Hau L. Lee is the Thoma Professor of Operations, Information and Technology at the Graduate School of Business at Stanford University. His areas of specialization include supply chain management, eBusiness, global logistics system design, inventory planning, and manufacturing strategy. He is the founding and current Director of the Stanford Global Supply Chain Management Forum, an industry-academic consortium to advance the theory and practice of global supply chain management.

Professor Lee was the recipient of the Harold Lardner Prize for International Distinction in Operations Research, Canadian Operations Research Society, 2003. He was elected a Fellow, Manufacturing and Service Operations Management, INFORMS, 2001.

Professor Lee's research in medical education planning for the State of West Virginia received the Health Application Section Spotlight Prize by the Operations Research Society of America. His work on multi-echelon inventory system design and control for IBM's National Service Division was a finalist in the Edelman Application Prize Competition by the Institute of Management Science. His work on resource deployment of global manufacturing and distribution network for Apple Computer won the First Prize by the Lauder Institute and the Institute of Management Science, for the Best Advances in the Theory and Practice of International Management Science.

Professor Lee has consulted extensively for companies such as KLA-Tencor, Hewlett-Packard Company, Bay Networks, Savi Technology, Nortel Networks, SUN Microsystems, Apple Computer, IBM, Lucent Technologies, General Motors, Xilinx Corp., Accenture, Eli Lilly and Company, Booz-Allen and Hamilton, Raychem Corp., McKesson, and Motorola. He is a co-founder of NON-STOP Solutions, a company that provides demand chain optimization services to industry, and a co-founder of DemandTec, a company that provides pricing and promotion optimization services. In addition, he is on the board and advisory board of several logistics and supply chain software companies. He has also given executive training workshops on supply chain management and global logistics in Asia, Europe and America.

## NEW POMS FELLOWS

**Paul R. Kleindorfer**

Anheuser-Busch Professor of Mgt. Sc.  
Wharton School  
University of Pennsylvania

Dr. Kleindorfer is the Anheuser Busch Professor of Management Science at the Wharton School of the University of Pennsylvania. Dr. Kleindorfer graduated with distinction (B.S.) from the U. S. Naval Academy in 1961. He studied on a Fulbright Fellowship in Mathematics at the University of Tübingen, Germany (1964/65), followed by doctoral studies at Carnegie Mellon University, from which he received his Ph.D. in 1970 in Systems and Communication Sciences at the Graduate School of Industrial Administration. Dr. Kleindorfer has held university appointments at Carnegie Mellon University (1968/9), Massachusetts Institute of Technology (1969/72), The Wharton School (1973 - Present), and several universities and international research institutes, including the University of Frankfurt, INSEAD, Ulm University, IIASA and The Science Center (Berlin). Dr. Kleindorfer has held a number of editorial and professional positions over the years, including his current positions as president of the Society for Economic Design, associate editor of the *Journal of Regulatory Economics* and vice president for publications of the Production & Operations Management Society. He has consulted with companies and governmental agencies worldwide on risk management and technology strategy.

Dr. Kleindorfer's early research was concerned with the application of optimal control theory to deterministic and stochastic production planning problems. His later work has been concerned primarily with risk management and with the integration of operations, economics and finance. His sectoral interests have included a deep interest in electric power, in the postal and logistics area, and more recently in capital-intensive sectors such as chemicals and semiconductors. In these areas, Dr. Kleindorfer has been concerned with a broad range of risk management activities, ranging from traditional supply chain contracts to hedging and trading arising from derivatives defined on spot markets ancillary to the sector in the question. As part of his on-going interest in risk management, Dr. Kleindorfer has also developed and maintained a continuing research program in environmental, health and safety risks, with a primary focus on the chemical and process industries, which led *inter alia* to three special issues, co-edited with Charles Corbett, in *Production and Operations Management* on Integrating and Operations and Environmental Management.

**Suresh P. Sethi**

Ashbel Smith Professor and  
Director of Center for Intelligent Supply Networks  
School of Management  
The University of Texas at Dallas

Suresh P. Sethi, Ashbel Smith Professor and Director of Center for Intelligent Supply Networks at University of Texas at Dallas, has made important and sustained contributions in the fields of operations management, finance, marketing, industrial engineering, operations research, and optimal control. In operations management, he has made significant advances in inventory and supply chain management, decision and forecast horizons in dynamic lot sizing and machine replacement, sequencing and scheduling in robotic cells, flexible manufacturing systems, multi-time scale stochastic manufacturing systems, and optimal control models in production planning. His research has led to the publication of three books, two forthcoming books, over 300 papers, and numerous conference presentations and invited lectures.

Suresh Sethi was inducted as a Fellow in 1994 by the Royal Society of Canada. The Canadian OR Society recognized his work on operations research and operations management by bestowing on him the 1996 Award of Merit. In 1999, he was elected a Fellow of New York Academy of Sciences for his outstanding contributions in a variety of research areas. In 2001, the Institute of Electrical and Electronics Engineers named him IEEE Fellow for his extraordinary accomplishments in optimal control. In 2003, he was elected a Fellow of INFORMS "for years of dedicated leadership and valuable contributions to the profession of operations research and the management sciences," and a Fellow of AAAS (American Association for the Advancement of Science) "for distinguished contributions to hierarchical decisions in manufacturing, investment/consumption problems with bankruptcy, forecast horizons in dynamic optimization, and optimal control applications to management problems." Last year, he was a recipient of the Wickham-Skinner Best Paper Award at the 2<sup>nd</sup> World Conference on POM, 15<sup>th</sup> Annual Production and Operations Management Conference held in Cancun, Mexico.

He serves on editorial boards of leading journals such as *Production and Operations Management*, *Manufacturing Services & Operations Management*, *Automatica*, and *Decisions Sciences*.

## NEW POMS FELLOWS

**Steven C. Wheelwright**

Baker Foundation Professor  
Senior Associate Dean  
Director of Publications Activities  
Harvard Business School

Steve Wheelwright rejoined the HBS faculty as a Baker Foundation Professor in 2003, after retiring in 2000 as the Edsel Bryant Ford Professor of Business Administration. From 2000-2003 he and his wife fulfilled a full-time voluntary assignment as the President of the London, England Mission for the Church of Jesus Christ of Latter-day Saints. Professor Wheelwright currently teaches the required first-year course in Technology and Operations Management and in a number of HBS Executive Education Programs.

In his research, Professor Wheelwright examines product and process development and their connection with competitive advantage and operations excellence. His newest book, developed with HBS colleague Clayton Christensen and Stanford colleague, Robert Burgelman, is *Strategic Management of Technology and Innovation, 3<sup>rd</sup> ed.* (Irwin, 2003). Along with Harvard colleagues Bob Hayes, Gary Pisano and Dave Upton, Professor Wheelwright will shortly publish *The Operations Edge: Strategy, Technology, and Improvement* (John Wiley and Sons, 2004), a complementary volume to the highly regarded book, *Dynamic Manufacturing: Creating the Learning Organization* (Free Press, 1988). He has also co-authored several works with Harvard Business School colleague Kim Clark, including *Leading Product Development: The Senior Manager's Guide to Creating and Shaping the Enterprise* (Free Press, 1995). Professor Wheelwright is also the author or co-author of more than a dozen other books.

Professor Wheelwright has a B.S. degree in Mathematics from the University of Utah and an M.B.A. and Ph.D. from Stanford University's Graduate School of Business. In addition to his Harvard and Stanford positions, Professor Wheelwright served on the faculty of INSEAD (European Institute of Management) in Fontainebleau, France. He was Vice President of Sales in a family-owned printing company and has consulted in the areas of business/operations strategy and improving product development capabilities. Professor Wheelwright currently serves as Chairman of the Board of HBS Publishing, and as a Board member at O.C. Tanner Company (service awards), Zions Bankcorp (banking services), and Quantum Corp. (data storage products and systems).

**Marshall Fisher**

UPS Transportation Professor for the Private Sector;  
Professor of Operations and Information Mgt  
Wharton School  
University of Pennsylvania

Marshall Fisher is the UPS Professor of Operations and Information Management at the Wharton School of the University of Pennsylvania and co-director of the Fishman-Davidson Center for Service and Operations Management. His pioneering research in logistics and supply chain coordination in the 29 years he has been at the Wharton School has been implemented by many companies and recognized by numerous awards.

In 1990s, Dr. Fisher turned his attention to supply chain coordination, focusing particularly on environments with rapid introduction of new products and a high degree of demand uncertainty. With various co-workers he developed Accurate Response, an integrated framework linking operational changes and planning approaches to improve a firm's ability to match supply with the demand for new products. Accurate Response was initially implemented at Sport Obermeyer, a leading fashion skiwear firm which credits the approach with doubling profits and significantly improving customer service. He is currently engaged in a multi-year study funded by the Sloan Foundation to investigate how retailers can exploit information technology and flexible manufacturing to improve the merchandising of fashion products.

In 1994, Dr. Fisher was elected a member of the National Academy of Engineering in recognition of his contributions to the use of mathematical analysis to improve supply chain performance in companies. He also served as president of the Institute of Management Science during 1988-89 and as departmental editor of *Management Science* from 1979 to 1983.

He has been a consultant to many Fortune 500 companies, including Ahold, Air Products and Chemicals, BMG, Campbell Soup, Dupont, Exxon, Frito Lay, General Motors, IBM, Matel, Nokia, Scott Paper and Spiegel, Inc., to name a few.

Dr. Fisher is a founder and Chairman of 4R Systems, Inc., a company that provides supply chain planning software to retailers of short lifecycle products.