



# The Consortium Chronicle

The Official Newsletter of the UT Supply Chain Management Consortium

Fall 2006

## SCM becomes stand-alone major

*Upgrade underscores strong McCombs School commitment*



### From the Director

Professor Douglas Morrice

Effective in September 2006, the SCM undergraduate program will become a stand alone major, i.e., a BBA in SCM (rather than a BBA in Management, Supply Chain Track). This is a significant event for the

McCombs School because it is the first new major introduced in fifteen years. I view this as another indicator of the strong commitment that the McCombs School has to SCM. I am doing a number of things to advance and strengthen the new major:

1. This summer I hired Elota Patton (MIS Instructor, Mc-

Combs School, The University of Texas at Austin) to develop a campaign to promote the major to our students. Elota has great qualifications since she lead the incredibly successful promotional campaign for the MIS major last year.

She was assisted by a Ph.D. student in Advertising, Kely Logan. Before returning to graduate school, Kely was a marketing director for Masterfoods USA, a division of Mars, Inc., so she brought significant *continued on page 5*

## SCM project helps Dell optimize production

*New scheduling algorithm minimizes downtime*

Success has a cost, as Dell, Inc. discovered early in 2003.

Thanks to continually increasing product varieties and production volumes, the computer manufacturer had reached the capacity limits of the Morton L. Topfer Manufacturing Center (TMC), one of its main production facilities. By the following year, an expected doubling of the number of product families threatened to degrade production rates at TMC by nearly 20 percent.

To help the company solve — or at least assuage — the problem, Dell's Jennifer Loveland teamed with Susan Monkman, then a doctoral candidate at the McCombs School of Busi-

ness, and Professor Douglas Morrice. Their task: to create a new production scheduling algorithm capable of minimizing the number of setups required and to reduce downtime and "slowtime" during those setups.

Dell's model offered customers their choice from about a dozen different computer cases, or chassis, each of which could be customized with a variety of additional components. Parallel "kitting lines" allowed each chassis type to be placed at the front of at least one line at all times. Additional components offered with that specific chassis type could also be placed on that line.

The system proved an efficient one, allowing Dell to

build computers in "first come, first serve" order without changing out the type of parts placed on individual kitting lines. But as product variety and volume increased, the number of product families began to exceed the number of lanes on a kitting line.

"Once that happened, setups became necessary," said Monkman, now an assistant professor at the Graduate School of Business and Public Policy at the Naval Postgraduate School in Monterrey, CA. "Since these setups were so rare in the past, there was no formal method in place to schedule them. Each setup required significant time and labor, so it wasn't feasible

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### Consortium mission

Our mission is to bring together executives from leading corporations with Texas faculty and students to identify, document, research, develop and disseminate best practices in Supply Chain Management.

## Consortium Calendar

Fall 2006

### Thursday – Friday, October 5-6, 2006

#### IM/Ops Challenge

Annual case challenge co-hosted by the MBA Excellence in Operations Student Organization and the Information Management Association. Teams of first year students present their solutions to a business problem in front of industry and faculty representatives. If you are interested in judging this competition, please contact Yezmin Acle at [Yezmin.Acle@mba07.mcombs.utexas.edu](mailto:Yezmin.Acle@mba07.mcombs.utexas.edu).

### Friday, October 13, 2006

#### Dell Tour

MBA Excellence in Operations Student Organization will be touring the Dell facilities this fall and reviewing their operations.

### Thursday, November 9, 2006

3:00-8:00 PM

#### Operations and Supply Chain Management Steering Committee Meeting

*Where:* Dean's Room, The University of Texas Club (6th Floor)

*Additional Info:* Meeting set for 3:00-6:00 PM with dinner to follow. Consortium members welcome; non-members by invitation only.

### Friday, November 10, 2006

8:00am-3:00 PM

#### Roundtable Discussion on "Assurance of Supply in Global Supply Networks"

*Where:* Red McCombs School of Business (CBA), 2100 Speedway, Room GSB 3.104.

*Additional Info:* Lunch will be served in the Special Events Room on the 3rd floor at noon. Consortium Members welcome; Non-members by invitation only.

### November 10-12, 2006

#### Carnegie Mellon Case Competition

The McCombs School will send five representatives from the program to compete in this annual case competition. The representatives are comprised of three second year students and two first year students who are selected on an application basis.

*For more information, please visit [www.mcombs.utexas.edu/scm/events](http://www.mcombs.utexas.edu/scm/events). If you have any questions, please contact Doug Morrice at [morrice@mail.utexas.edu](mailto:morrice@mail.utexas.edu) or (512)471-7857.*

Join us from 8:00 AM to 3:00 PM on Friday, November 10, 2006 for the next Roundtable on Assurance of Supply in Global Supply Networks.

With outsourcing and off-shoring, global supply networks are now a fact of life for many companies. Sourcing supply from around the world can be a challenging and risky business. The purpose of this Roundtable is to discuss what companies and governments are doing to develop supplier bases and supply network infrastructures in order to assure supply and reduce risks caused by disruptions.

### UT SCM Consortium Corporate Sponsors

Applied Materials

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UT SUPPLY CHAIN  
MANAGEMENT CONSORTIUM

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## SCM Q&A

# Ford's Anu Goel discusses the supply chain re-design that cut costs — and improved service

**U**pon his return from Europe in January 2004 as director of Ford's Global Parts Supply and Logistics, Anu Goel and his team oversaw the completion of an overhaul of the company's North American PS & L network.

The network fulfills approximately 60 million order lines a year from over 5,000 dealers, servicing more than 250,000 part numbers.

Thanks to its new "Daily Parts Advantage" program, Ford's North American PS & L network has replaced weekly dealer stock orders with daily ones, improving on-time delivery from 75% to 98% and slashing the number of emergency orders from 15% to 5%.

*What prompted the network re-design?*

One major driver of customer satisfaction is the service experience.

We wanted to know what we could do to improve our "fix it right the first time, on time" performance to help improve our customer satisfaction scores, which in turn help drive vehicle purchase loyalty. At its heart, that's what this all about — getting the customer back to buy another Ford vehicle.

*What impact have these improvements had?*

It actually costs us about 10-15% less to run the new 26-

building network than it did to run the old 10-building network.

We used to carry about \$1.1 billion in service parts inventory in our 10 buildings; now we have about \$600 million in 26 buildings thanks to improved efficiencies.

Our segmented network comprises 19 "high velocity centers" which offer next-day delivery of the 35,000 top-selling part numbers and three "high cube centers" which stock about 4,000 sheet metal and power-train parts available for two-day delivery. Our slowest moving parts are grouped in one location, which can ship them anywhere in the country within three days.

Segmenting the network improved our efficiencies while matching what our customers expect in repair times.

It has also allowed us to increase our system fill from 94% to about 98.5%. That's up 4.5 points, and we cut our inventory in half! We're now running at best-in-class or world class levels in system fill.

Best of all, our service has improved. Our "fix it right the first time" metric has gone from about 70% to 87-88%. Customer service satisfaction has gone from the 64-65% range to the 71-72% range, approaching best in class on overall service satisfaction. Are we the only reason this has happened? No. But parts availability is a big piece of the overall weighting.

*As a result of the re-design, what lessons did you learn?*

The first thing we learned

was that we *could* do it — and we could do it as a win-win, which doesn't often happen. I think we did make the system

**"It actually costs us less to run the new 26-building network than it did to run the old 10-building network."**

too lean to start with, which caused some launch issues.

We also didn't realize just how huge a benefit the new building segmented network was a going to be for everyone. This is the first time it's ever been tried on this large a scale. But it's been so successful several other companies are taking a look at what we've been able to accomplish and how we've done it.

*What are the next steps?*

We have a three-tiered approach: standardize the processes, stabilize the performance, and finally optimize. You can't optimize until you've done the first two. My goal now is to optimize by increasing velocity.

That's a huge culture change, particularly given the inherent volatility of our ordering environment. But we want to increase velocity through the entire chain, from suppliers through our dealers to the customers.

Can we take another \$100+ million out of our \$600 million inventory and still keep service where it is? I believe we can.



**Anu Goel**  
Director, Ford Global Parts  
Supply and Logistics

## New production scheduling algorithm helps Dell increase variety, production volumes

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to perform enough setups to continue producing in 'first come, first serve' order."

To handle the increased number of product families, the manufacturing facility needed a process that facilitated the planning of setups in advance in order to prevent downtime, slow-time and the buildup of parts in the work areas. The procedure had to be able to determine when the specific parts for each product family needed to be on each kitting line during the production shift.

Their were a few company-specific requirements, as well. Production schedules for each family had to be in place before the start of each production shift. The procedure had to be compatible with Dell's Factory Planner software. It also had to allow each family to be placed on at least one kitting line for some time each day to minimize order delays.

“To address this scheduling problem within the existing constraints, we developed an algorithm using a combination of optimization programs and heuristics,” said Monkman. “Every production scheduling algorithm contains three essential elements: assign tasks to machines, sequence tasks, and schedule when each task must be performed. Following this logic, our scheduling method contained three steps.”

In step 1, Monkman and her colleagues used a linear mixed-integer optimization program to determine the chassis-to-line assignments. In step 2, those assignments were used

to help determine the sequence in which each family should be placed in each lane within each kitting line.

“The chassis-to-lane assignments are determined using a linear integer program which balances demand across lanes within each production line,” Monkman explained. “Then the sequence is partially determined by ensuring that



**Susan Monkman**

chassis left in a lane at the end of a previous production period begin the next period in that same lane. A heuristic based on demand is used to determine the rest of the sequencing.”

In step 3, a heuristic was used to determine when each family's parts should be placed on or removed from each line, ensuring that each family's parts would spend enough time there to fulfill the expected demand.

Implemented in the fall of 2003, the new line assignment model enabled Dell to seamlessly accommodate a 25 percent increase in product variety during the first

quarter of 2004. The complete 3-step algorithm was put in use during the summer of 2004, just before the number of product families peaked at over two times the original level.

As a result of the work, “Dell was able to accommodate a two-fold increase in product variety as well as an effective production volume increase of over 35 percent,” said Monkman. “The company has also realized a conservative cost avoidance of more than one million dollars annually in additional overtime expenses.”

TMC's sister facility has also requested that a similar approach be developed and implemented on its kitting lines. Co-author Jennifer Loveland was also able to use the findings to help design a production scheduling system for Dell's new facility in Winston Salem, NC.

The Dell-UT partnership yielded benefits to UT as well. The work formed the basis of Susan Monkman's dissertation research, which she successfully defended in July.

“This as a model research project impacting both practice and theory,” said UT's Professor Douglas Morrice. “We hope to facilitate many more of these projects through the Consortium. They benefit the Consortium companies and our Ph.D. students who get the opportunity to work on problems relevant to industry.”

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## Academic changes designed to increase SCM offerings to undergrads and MBA students

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experience to the project team.

Together, Elota and Kelty did a phenomenal job developing materials for the new BBA in SCM. Their research involved student focus groups, a recruiter survey, and a benchmarking analysis.

We discovered that the students have misconceptions about the career potential for SCM majors and the type of skills required. The recruiter survey provided us with facts to counter these misconceptions in the new promotional materials.

These materials will be used to market the major this fall to freshmen in a first year seminar, sophomores in an MIS core course, and juniors in our Operations Management core course. Hence, we will be directly reaching almost all eligible students with this campaign.

We will present the results of this project at the November

9<sup>th</sup> Steering Committee meeting. To preview the materials in advance of the meeting, please visit <http://www.mcombs.utexas.edu/dept/irom/bba/scm.asp>.

2. I have established a minor in SCM. This should bolster the major by increasing our course enrollments allowing us to offer more sections of each course.

Additionally, some of the students who are attracted to the minor may choose to major in this area. Also, the minor provides a great service to the rest of the school. Several corporate recruiters and students have indicated to me that they would find great benefit in combining an SCM minor with a major in Finance, Marketing, or MIS.

3. I am working with our Center for International Business Education and Research (CIBER) to develop an international summer program in SCM scheduled to start next summer. The program would partially fulfill the requirements of the SCM major and provide our students with a meaningful international experience. Rotterdam and Hong Kong have been targeted as potential locations.

4. I am initiating a curriculum review to update the content of our current courses and to determine what new electives we might need to offer.

We have also taken steps to strengthen our program at the graduate level. This past spring the McCombs Faculty approved a new MBA core curriculum which will become effective in 2007-2008. In the new core, the Operations Management core course (which provides foundational content in supply chain management) was increased to a full semester course from only a half semester course.

This has a number of positive implications. First, we will be able to provide more supply chain content to all our MBA students. Second, it will give us more opportunity to attract additional students into our Operations and Supply Chain Management specialization. Finally, we will be able to add more advanced content to our elective courses.

Indeed, it is an exciting time for us. We look forward to partnering with you as we build world class programs in SCM!

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## Spring 2006 Supply Chain Management Roundtable largest, most successful yet

**T**his was the largest and, by several measures, the most successful Roundtable to date. The UT MBA/Shell Practicum team Jaweeria Ashraf, Scott Bryan, Matt Jaruzel, and Sanjay Mishra kicked off the meeting with an excellent pre-

### Roundtable Wrap-up

sentation on their distribution strategy analysis for Shell Lubricants. Their analysis showed that it would be advantageous for Shell to move from a prod-

uct based distribution system to a regional based distribution system.

Dr. Anant Balakrishnan, Kenneth M. and Susan T. Jastrow, II Chair in Business at the Red McCombs School of Business, demonstrated the

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## Spring Round-table presented variety of SCM challenges, solutions

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importance of strong linkages between academia and industry in his presentation entitled "Relevance with Rigor: Practice-driven Supply Chain Research Projects". Dr. Balakrishnan described several of his own research projects that delivered valuable insights to both the corporate sponsors and the academic research community. Dr. Balakrishnan's work is an outstanding example of "applications driven theory" (a term coined by Dr. William Cooper, Foster Parker Centennial Professor Emeritus), the type of research that is highly valued at the McCombs School of Business, and the Consortium is an ideal forum in which to foster this type of research. The enclosed article on Susan Monkman's work with Dell (*see story on pg. 1*) testifies to this fact.

**M**r. George Drazic discussed logistics network optimization at Applied Materials. He argued for a more comprehensive strategy to logistics network improvement leveraging investments companies have made in information technology and process improvement in order to improve execution and provide a service competitive advantage. While he sees this as an emerging or even an advanced strategy, it is one the companies will need to

adopt in order to remain competitive in the future.

**D**r. Gang Yu described the work being done at Amazon.com to optimize its worldwide supply chain. Because Amazon must be able adapt and rapidly increase volumes in order to take advantage of new business opportunities, it places a high value on the flexibility and scalability of its systems. Dr. Yu gave an example of how these things are achieved in the management of Amazon's supply chain inventories.

**F**rito Lay's supply chain has undergone a major transformation over the past five years. Mr. Steve Hankin explained how changing consumer and customer (retailer) needs are placing more demands on Frito Lay to increase product variety, produce products with shorter life cycles, grow volumes and revenues but not the price point, increase inventory turns, and provide a very high level of in-stock service.

Frito Lay has responded to this challenge by implementing a multi-phased optimization plan that has transformed almost every aspect of its supply chain. By leveraging these improvements, Frito Lay views itself as poised to move from a

competitive position to an advantaged position in the very near future.

**D**r. Alexis Takvorian described several examples for supply network optimization at Dell. He discussed the benefits of modeling and the insights Dell has gained from using optimization and simulation tools. Dell has found models useful for guiding and supporting the cross-functional decision making process and conducting "what-if" scenario analysis.

Dr. Takvorian's vision is to develop a unified modeling approach in which network optimization and simulation models are combined to analyze the impact of different policies for an optimized network and conduct "what-if" analysis to test the robustness of the network solution.

We hope you will join us for our next Roundtable on Friday, November 10, 2006. The topic will be "Assurance of Supply in Global Supply Networks."

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