Capturing and Managing the Complexity and Volatility of Smart Manufacturing/Smart Grid, Big Data, Value Chain Coordination and Related Challenges

A two-day program at the Northwestern University Kellogg School of Management (coordinated by the Center for Technology and Innovation Management of the Northwestern University Buffett Center)

Day 1, May 4, 2012: Roundtable discussion on value chain challenges
2:30-4:00pm
Management & Organizations (MORS) department conference room
Jacobs Center, 2001 N. Sheridan, Evanston, IL; 3rd floor southeast corner (room 386)

Meeting participants (alphabetically)
1. Bruce Anderson (General Manager, Global Electronics Industry, IBM)
2. Sunil Chopra (IBM Distinguished Professor of Operations Management in Kellogg)
3. Diego Klapjan (Associate Professor of Industrial Engineering and Management Sciences McCormick School of Engineering, and Director, Master of Science in Analytics)
4. Alec McMillan (Director, Global Standards and Trade, Rockwell Automation)
5. Michael Radnor (Professor, Management and Organizations, Kellogg and Director, CTIM - Center for Technology and Innovation Management)
6. Jeffrey Strauss (Associate Director, CTIM.)

Roundtable Focus
This first informal meeting conversation will begin with a presentation by Alec McMillan on issues and challenges his company is facing that are implicit in maintaining efficiency and ensuring visibility of the customer throughout the value chain. This also relates to US Conference Board task force deliberations in which he is involved concerning the challenges of maximizing/optimizing data/knowledge flow and use and reporting in the face of data overload and globalization. The goal is to exchange insights and perspective and find common ground as a basis for possible future activity and programming.

Day 2: Smart Manufacturing/Smart Grid and Application of Analytics and Standards Management: Issues and Pedagogy Workshop:
For Faculty and Students from Northwestern and regional Schools (including several faculty from the College of Lake County)
May 5, 2012, Jacobs Center, Room G05

The workshop brings together undergraduate and graduate business and engineering students who have been studying tools designed to address challenges such as these along with faculty observers concerned with improving coverage of these domains in business
and engineering curricula. The workshop is intended to be the first in a series of events and activities to support teaching and enhanced capability including teaching module design. A major goal is to feed program planning.

Time: 9:00am until approx 12:30pm, with a Giordano’s pizza lunch at 12:30. Faculty and industry people will then be invited to stay on for informal discussion of pedagogical implications, needs and potential, and consideration of fruitful follow-on events. The two workshop components are scheduled as follows:

1. For faculty, students and industry participants: 9:00am – 1:00 pm
2. For faculty and industry participants only: 1:00pm – 2:00pm

Focus: The workshop will focus on smart manufacturing/smart grid and, through assessment of their application to these domains, Strategic Standards Management, and Big Data and Analytics, all in the globalizing world. The target domains are indicative of a broader trend captured in IBM’s concept of a Smarter Planet.

**Smart manufacturing and smart grid** are rapidly becoming major operational and competitive realities:

- **Smart manufacturing (SM)** entails plant and enterprise-wide data sharing bridging current silos with the intent to support rapid decision-making and communication and integration across not only machines and manufacturing cells but across the supply/value chain. SM is expected to reduce costly downtime and maintenance and enable more accurate planning. But SM is highly complex and dynamic and must continually evolve as new technology is developed and incorporated. Clear reference architectures detailing key technology and functional elements in the systems and how they interact, are interdependent, and will be impacted by change and system expansion, are essential. Full implementation of SM is limited by the inability of manufacturers to adapt legacy production and make optimal use of real-time actionable data. Systems must also enable use of competing vendors and knowledge distribution to respond to local reporting requirements while recognizing varying levels of understanding, contexts and proprietary concerns.

- **Smart Grid (SG)**, in turn, promises enhanced grid reliability, improved precision of monitoring and control, greater flexibility in energy sources and allocation and overall reduction in energy cost. But – at least in the short term – optimization across industries and companies may force behavior changes and reduce efficiency, performance and competitiveness of individual firms, particularly manufacturers. This program will consider smart grid in application to power requirements and cost control as a facet of smart manufacturing.

These two developments are being driven by economic, security and social factors, along with global competitive pressures. They are also being enabled by advances in improved and improving sensors and control systems, enhanced communication technology and the application of more extensive and sophisticated IT, as well as the potential and challenge offered by Big Data. These promise significant benefit but hurdles must be overcome. Important in their own right, assessment of these domains also reveals the importance of new analytic approaches and the strategic management of technical standards.
We are pleased to be joined at the workshop by:

- **Bruce Andersen**, **General Manager, Global Electronics Industry, IBM**. Anderson is responsible for IBM’s Electronics Industry worldwide, across consumer electronics; medical devices; office, industrial and network equipment; and microelectronics manufacturers. He has spent more than 25 years assisting companies in their use of information technology to solve their business problems and gain competitive advantage as a management consultant to the electronics industry. He was previously a vice president and partner in IBM’s Global Business Services unit, where he led a large consulting practice focused on supply chain strategy, process re-engineering and systems implementation. He is also the executive in charge of the Rockwell account for IBM.

- **Alec McMillan**, **Director, Global Standards and Trade, Rockwell Automation**. McMillan joined Allen-Bradley (Rockwell) as European System Marketing Manager in 1985, based in the UK, and transferred to the United States in 1989. Since that time he has held positions of increasing responsibility in the development of Advanced Architecture and Technology. In his current position he is responsible for coordinating companywide global standards and trade programs. Previous to this, he was employed in Europe from 1968-1985 in a range of engineering and management positions. He has been active on numerous domestic and international development committees and advisory boards in standards, advanced process and intelligent manufacturing systems.

- **Moderator: Michael Radnor**, **Professor, Kellogg School of Management**. At Northwestern for over 40 years, Radnor founded and chaired Kellogg’s Management and Organizations department and heads the NSF launched university-wide Center for Technology and Innovation Management (CTIM) under the Buffet Center for International and Comparative Studies. He also chairs the multi university-industry Global Advanced Technology Innovation Consortia. He has a Ph.D. in Industrial Engineering and worked as an automation engineer and production manager in Westinghouse, trained in production technology at the UK Lucas Industries, worked as a production engineer with Israel Aircraft Industries and headed the high-tech Tann Controls electronics start-up in Detroit.
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Workshop Agenda

9:00am Welcome and introduction: Michael Radnor, Kellogg/BCICS CTIM

9:15 Smart manufacturing.smart grid – A manufacturer’s perspective (defining SM, SG, how evolving, key factors, benefits and obstacles with case examples; value chain issues): Alec McMillan, Rockwell Automation

10:00 Big Data and analytics (implications of Big Data, analytic approaches and how they can be applied to SM/SG, examples of key inputs, outputs and requirements of organizations to maximize value): Bruce Anderson, IBM

10:45 Break

11:00 Standards management panel (role in SM/SG, why critical, and why challenging to strategically manage standards and standards development): Alec McMillan

11:45 Open discussion

12:30pm Lunch

1:00 (faculty, industry participants only) Discussion of pedagogical challenges, defining and addressing gaps in curricula; next steps

2:00 Adjourn