STRATEGIC STANDARDS MANAGEMENT AS A NEGLECTED COMPETITIVE UNDERPINNING

Cloud Computing, Smart Supply Chain/Smart Grid/Smart Manufacturing
emerging high value application domain examples

A business and engineering school faculty workshop with industry input

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Northwestern University
Norris Center, 1999 Campus Drive, Evanston, IL

WORKSHOP GOALS

US industry is facing changed operating conditions which offer new potential and new threats that challenge strategic, technology and innovation decisions as well as the preparation of business and engineering students. This is particularly true with the emergence of cloud computing and smart systems and infrastructure - smart manufacturing (alternatively described as an aspect of advanced or digital manufacturing), smart grid and related smart supply chains. Although these are increasingly on the view screens of schools, few recognize or give sufficient attention to a key underpinning to the success and impact of these domains: the evolution of enabling standards and the growing competitive importance and complexity of planned participation in standards development (instead of living by standards and markets set by others, including competitors). The workshop includes significant industry participation and is intended to stimulate and enable this gap to be addressed.

Hosted by Northwestern University in partnership with the Industry-university Global Advanced Technology Innovation Consortium (GATIC), the program is supported by the National Institute of Standards and Technology (NIST). Participants will hear from industry and academic presenters who will detail and confirm the need and potential and review approaches used by US and international schools.

The program will include demonstrations of materials that may be adapted for different courses, disciplines and institutional contexts. Recognizing the inherent, and not easy to capture and teach, complexity and volatility in the target areas, experiential learning will be emphasized. To this end, participants will work through a customized standards decision and negotiation simulation. Extended open discussion on pedagogical implications will be integral to the workshop.

RELEVANT DOMAIN BACKGROUND

Cloud computing and Smart Systems (manufacturing, grid and smart supply chain) are driven by intensifying global competition, economic uncertainty and constraints, along with exponential growth in information technology. Smart systems, in particular, entail going beyond traditional disciplinary and sectoral boundaries. The definition of the application domains varies (likely even among our presenters) and is in flux, but the following is useful background.
Cloud computing

Cloud computing services, loosely defined, provide ubiquitous, virtual on-demand internet/network-based access to storage, servers, software and applications. As such, they significantly reduce capital expenditure and the need for in-house expertise and increasing flexibility in terms of media, work location and collaboration. But, although cloud computing is growing rapidly, lingering concerns over migration paths, participation and choice, security, implied interoperability and portability across varying global infrastructure and regulatory frameworks, as well as related investment planning with changing technologies call for carefully designed standards.

Smart manufacturing (SM)

SM entails plant and enterprise-wide data sharing and standardized processes that bridges current silos with the intent to support rapid/agile decision-making and communication. Integration is enabled across not only machines and manufacturing cells but also across the supply/value chain. With increasing self-aware, self-diagnosing and optimizing machines, SM is expected to reduce costly downtime and maintenance, improved energy efficiency (particularly when coupled with smart grid) and to enable more accurate planning as well as innovation. But SM is highly complex and dynamic and must be continually reconfigured as new technology is developed and incorporated. Clear reference architectures are essential that detail key technology and functional elements in the systems and how they interact, remain interdependent, and will be impacted by change and system expansion. Full implementation of SM is currently limited by the inability of manufacturers to adapt legacy production and make optimal use of real-time actionable data. There are also potential severe consequences of disruptions to operations, damage to expensive equipment and personnel injuries. Systems must also enable use of competing vendors and globally distributed activity while ensuring consistent knowledge, data gathering and understanding across value chains. Response to local reporting requirements while recognizing varying levels of understanding, contexts and proprietary concerns is also critical. Differences in culture between manufacturing and IT developers, and the multitude of standards stakeholders with varying agendas, further complicate standards evolution.

Smart Grid (SG)

SG responds to the pressing need for 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. As with SM, but even more intense, are the numerous stakeholders with varying perspectives and demands. The workshop will consider smart grid particularly in its application as a facet of SM.
Standards contribution

To enable communication, interoperability, assessment and regulatory compliance standards need to be developed that fit the emerging environments. These are intended to offer essential common data formats, controls and performance measures across devices, systems, sensors and organizations (including multiple vendors). Standards negotiations provide vehicles for companies to balance individual strategic and operational requirements with implied cross organization/cross-sector, even cross-national environmental and efficiency initiatives. Standards can support innovation by giving confidence that new products, technologies and processes will be compatible with legacy systems, infrastructure and vendor capabilities, and will be accepted in the market. They can enable manufacturers to move ahead on procurement and implementation decisions. But standards selection will be influential in determining which technologies and approaches lead (and Asian and European countries are often more aggressive in promoting standards than the US).

Consistent with the increasing global nature of manufacturing operations and world-wide economic as well as environmental/energy pressures driving the domains, trends in standards include a push for regional and global harmonization and to become more anticipatory – with sophisticated knowledge foundation and guidance for new and uncertain industry futures.