Smart Process Manufacturing: An Engineering Virtual Organization to Develop a Technology Roadmap

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Since the April 2008 Smart Process Manufacturing workshop, the long term objective has been to provide the vehicle for collaborative work and facilitated assessment to generate foundational information for the technology roadmap. A new framework and business case for the roadmap were drafted in 2009. The framework of the roadmap is now a series of "lanes" under the categories of:
1. Data to Knowledge
2. Knowledge to Operating Models
3. Operating Models to Key Plant Assets
4. Key Plant Models to Global Application
5. People, Knowledge and Models to a Key Performance Indicator

Figure 1 shows a schematic of the five lanes and how they fit together. Smart Process Manufacturing (SPM) is an integrated, knowledge-enabled, model-rich enterprise in which all operating actions are determined and executed proactively applying the best possible information and a wide range of performance metrics.

Figure 1
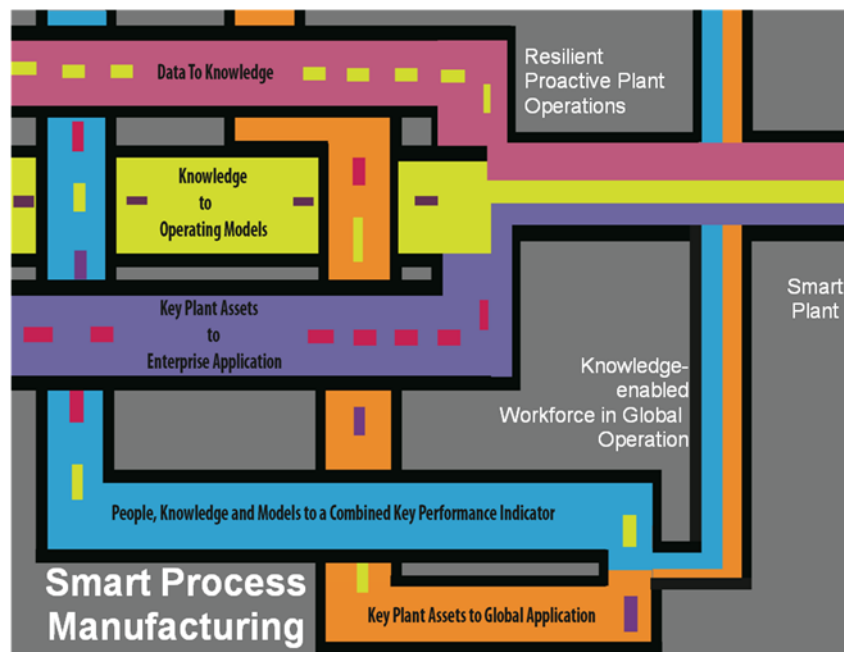
During the 16 months after the 2008 Smart Process Manufacturing workshop when the initial report was issued, the SPM Steering Committee has devoted considerable time in additional discussion and further refinement of the workshop results and, in particular, development of an SPM Operations and Technology Roadmap. We have also continued

to make presentations to various stakeholder groups at AIChE meetings, which are posted at http://www.oit.ucla.edu/nsf-evo-2008/.

We solicited ongoing input from the 50 plus practitioners and faculty who attended the previous workshop. The new report was issued in October, 2009. In this report the SPM vision, description and motivation are substantially sharpened and refined. The Operations and Technology Roadmap now comprises considerably more granularity and description including the business case for SPM.

A workshop to develop industry priorities and actions in Smart Process Manufacturing was held at the ARC meeting in Orlando, Florida on February 8, 2010. The purpose of the meeting was to solicit input on the Technology Roadmap for Smart Process Manufacturing. The workshop was intended to:
1. Validate the roadmap elements with a larger industrial base.
2. Expand the consensus on the roadmap for the purpose of coalescing around actions that benefit companies through work and investment as an industry.
3. Systematically identify and prioritize action areas and specify best approaches.

The ARC workshop focused on resilient proactive plant operations; quality, resilience and fault tolerance, life cycle asset management, zero incidents and EH&S performance, energy and sustainability reliability with product objectives and workforce. Practitioners from across industries were brought together with suppliers of automation solutions. Workshop participants, most of whom were managers and experienced practitioners in the process industry or in the supplier sector, responded to roadmap areas based on near term benefits, operational and technical readiness, risk and cost and in breakout sessions, and made proposals for a plan of action. The leaders of the workshop were John Davis (UCLA), Tom Edgar (UT Austin), Peggy Hewitt (Honeywell), and Jerry Gipson (Dow), all of whom serve on the SPM Steering Committee. A report on the workshop findings will be posted on the SPM website in March, 2010.

Current work by the EVO in 2010 has included mobilizing a consensus point of view on next steps and partnering with other groups to identify sources of funding for academic research and industry demonstration projects. We are working with the U.S. Department of Energy on applying smart process manufacturing to address energy efficiency and reduced carbon emissions in the process industries.