



What's the Latest on NDEMC? A Conversation with the Council on Competitiveness

October 03, 2011 | John Kirkley, Editor, Digital Manufacturing Report

The check is almost in the mail.

At least that's what the Council on Competitiveness is hearing from the U.S. Department of Commerce's Economic Development Administration (EDA), which is in the process of completing the paperwork necessary to send a \$2 million grant their way.



The EDA grant joins matching funds totaling \$2.5 million from General Electric, John Deere, Lockheed Martin, Procter & Gamble, and Purdue University. The goal is to create a public-private partnership (PPP) to help small- and medium-sized manufacturers (SMMs) use advanced digital manufacturing techniques such as modeling and simulation. The technology will allow them to be more efficient, cut costs, shorten time to market, be more responsive to the needs of their supply chain partners, and, in general, be more competitive in the global marketplace.

The partnership, which goes by the rather unwieldy name of the National Digital Engineering and Manufacturing Consortium (NDEMC, pronounced "ENDEMIC") will initially focus on setting up pilot projects in the Midwest, America's industrial heartland.

Conversation with the Council

We recently spoke with several Council members who are leading the NDEMC effort to determine how the initiative is progressing. Included were Cynthia McIntyre, a senior vice president who oversees the Council's High Performance Computing Initiative, Dennis Thompson, director of Pittsburgh-based DSN Innovations, who has been recruited as the NDEMC technical project manager, and Bill Booher, the Council's executive vice president and chief operating officer.

Despite the fact that the EDA funds are still tied up in "the bureaucratic spin cycle," work on the PPP is underway. Already engaged are a number of NDEMC collaborators including the National Center for Manufacturing Sciences (NCMS), the National Center for Supercomputer Applications (NCSA) in Illinois, and the Ohio Supercomputing Center (OSC). In addition to the Department of Commerce, interagency partners include the Departments of Defense and Energy, NASA, and the National Science Foundation.

McIntyre comments that the federal government is interested in the initiative's goal of providing SMMs with access to not only advanced hardware and software, but intellectual capital as well. By bringing the federal players to the table with the private sector, both sides will better "understand the problem of getting the SMMs to use modeling and simulation, as well as the potential solution path to lowering the barriers and democratizing the use of the technology," she says. "It's a way to bring the knowledge of the public and private sectors together to solve a problem that hasn't quite been solved at this point."

Regarding progress on the initiative, Thompson adds, "We now have a significant amount of infrastructure available through our solution partners." For example, NCSA and OSC have made available about 60 different software packages related to digital manufacturing. The two Centers are also making their high performance computers available to SMMs participating in the program.

Super Supercomputers

At OSC, the top of the line system is "Glenn," an IBM Cluster 1350 with a peak performance of more than 75 trillion floating point operations per second. NCSA now has available "Forge," a 153 teraflop supercomputer that combines both CPUs and general-purpose graphics-processing units (GPUs). Both Centers have smaller clusters as part of their portfolio.

Six Midwestern SMMs have been identified and visited by NDEMC solution partners including subject matter experts from the OEMs. The NDEMC team has profiled these potential "customers" and identified specific high value projects involving modeling, simulation and analysis.

Three additional companies will soon be joining the original half dozen to make up the first group of SMMs involved in demonstration pilot projects. The Council plans on releasing the names of the nine companies in two or three weeks. (*Digital Manufacturing Report* will continue to update readers as the story unfolds.)

Thompson comments that the academic institutions, including the Ohio Supercomputer Center, NCSA at the University of Illinois, and Purdue University, are fully involved in the project. Initially the NDEMC team identified the needs of the individual SMMs and matched their needs with the HPC capabilities offered by these members of the academic community. The facilities will also provide the subject matter expertise needed to educate the manufacturers as to the ins and outs of setting up their problems to derive the most benefit from using the complex software and hardware associated with modeling and simulation.

Putting Together a Portal

Another aspect of the NDEMC initiative is the creation of a portal that will allow the SMMs to access HPC computing resources in the cloud. The portal will also provide educational resources and feedback from the NDEMC partners addressing specific SMM problems.

Thomson says the Council team is now working with the universities to develop the requirements document for the portal. Part of the document deals with the broad spectrum of capabilities found within the SMM community. He notes, "You're going to have some [SMMs] come in at a very sophisticated level — they have the expertise — and all they want is to have access to the high performance computers and software. At the other end of the pole — probably the larger community — you have the people who know they need something but don't know what it is, how to use it, and, even if available, how to operate it."

For this latter group, NDEMC will provide a section of the portal offering consulting services — primarily from the initiative's university partners — to identify the problem and discuss a possible solution. These SMMs can then decide to hire an independent consultant or engineer or a university consultant who can tap into the NDEMC HPC resources.

McIntyre adds that NCMS, one of the NDEMC solution partners, is an integral part of this process. The Center has the infrastructure in place to certify SMMs who become proficient on particular modeling and simulation programs, such as the many variants of finite element analysis software (FEA) or the even more complex world of computational fluid dynamics (CFD).

There may also be SMMs that require specialized codes that are not commercially available. In this case, the NDEMC team will look to other resources to find the appropriate software. For example, a Department of Energy lab, DOD or NASA may have developed a code that fits the manufacturer's need. Los Alamos National Labs is a good example: LANL has developed an extensive CFD Library over the years (see [From Detonation to Diapers at Los Alamos National Laboratory](#)).

Knowing What You Don't Know

Comments Booher, referring to NDEMC's manufacturing customers, "You don't know what you don't know. Ideally this pilot project will put in place a roadmap that will allow the SMMs to learn what they don't know, to have access to the technology, and be able to benefit."

"This [the NDEMC initiative] is the Holy Grail," Thompson adds. "If we can pull this off, I think we'll see the US manufacturing base become competitive again."

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