



## How can Illinois manufacturers help — and be helped by — the Chicago-based Digital Manufacturing & Design Innovation Institute?

By Jacob Goodwin

**W**hen President Obama announced the establishment of the Digital Manufacturing & Design Innovation Institute (DMDII) at a White House ceremony last February, he joked that the Institute would essentially be building Ironman.

The President did an excellent job of describing what the new Institute, more commonly known as DMDII, would actually be doing, but it was clearly a tough assignment. It's not easy to explain the audacious goal of DMDII, and even harder to explain precisely how Illinois-based manufacturers will fit into the Institute's grand plan. Here I hope to provide further enlightenment.

In short, DMDII is going to help revolutionize American manufacturing by organizing and funding research efforts aimed at making communications between players at every stage of the manufacturing process more efficient. This will speed up the "time to market" for U.S.-built products and reduce their costs, which in turn will make American manufacturers more competitive around the globe and hopefully bring thousands of manufacturing jobs back to our country.

The problems that DMDII aims to solve are little-known to the general public. Most people are unaware of the inefficiencies, gaps and bottlenecks that frequently plague the process of designing a part, building a prototype of that newly-designed

item, correcting imperfections in the original design, sending the revised design to the factory floor where computer-driven machine tools will build hundreds or thousands of the parts, spotting problems in having the machines hold the tolerances called for by the revised technical data packages, and tracking those parts as they are assembled into a larger, more-complex system and eventually into the final product, which will be shipped off the factory's loading dock so the product can perform in the marketplace for the next five, 10 or 20 years. In a nutshell, the goal of DMDII is to enable the people — and the machines they use — to communicate with each other more effectively and more interoperably, so that each of those manufacturing stages can be accomplished more smoothly.

American factories, which during the decades following World War II led the world in cost-competitive production, have in recent decades fallen behind the factories of several other nations — principally in Asia, and most especially in China — which have largely benefitted from the dramatically lower wages they pay their factory workers.

With the establishment of DMDII, and a handful of similar institutes across the country which will focus on other unique aspects of American manufacturing, the United States is essentially saying, "You might be able to beat us on the wages you

pay your workers, but we will regain our edge by tapping the best brains in our country to figure out better ways to streamline the manufacturing process, make it much faster and much cheaper, and thus restore American manufacturing to the supremacy it long enjoyed."

Great, that sounds good. But how does DMDII intend to accomplish this lofty goal? The federal government recognizes that some of the huge problems affecting American manufacturing cannot be solved by one company alone — even one gigantic, hugely-talented company — or one leading research university, acting by itself. Some of these manufacturing problems are so profound, and so systemic, they require the best brains available from many companies — both large and small — and many universities to drill down into the problem to identify the specific information gaps that exist, and then to undertake the painstaking research necessary to find innovative ways to fill those gaps with newly-developed digital tools.

The challenge, in short, is to create a research environment in which numerous companies, academic institutions and other organizations can work together collaboratively to pinpoint a vexing technical problem, and then develop an innovative new solution to that particular problem.

The federal government is doing its part by establishing DMDII and partially funding the research that

DMDII will undertake during the next five years to the tune of \$70 million. The companies and universities that will become official “Partners” of DMDII will do their part by offering approximately \$250 million in additional cost-sharing funds during the same five-year period, and by tackling the ambitious research agenda set out by the Institute. This “public/private partnership” will only succeed if DMDII can create a fair and impartial environment in which major corporations — such as Lockheed Martin, General Electric, Dow Chemical, Deere, Procter & Gamble, Rolls-Royce and Siemens, which have already pledged their support — find it advantageous to cooperate with each other, rather than compete with each other; and if research universities and nimble, innovative, dynamic small- and medium-sized companies — which frequently operate at the frontiers of technology — can be integrated into the Institute’s research process. Essentially, the goal of DMDII is to tap the best brains in American manufacturing to solve the biggest problems plaguing American manufacturing. As one participant described it, this is our moon shot.

To understand how all these pieces are supposed to fit together, it’s helpful to talk with the leaders of DMDII, as well as UI LABS, a forward-looking “research collaborative” based in Chicago which is DMDII’s parent organization. Dr. Caralynn Nowinski, the executive director of UI LABS, who spearheaded the proposal effort that culminated in UI LABS winning a nationwide competition and landing the \$70 million grant from the U.S. Army, understands the roles that each participant in the DMDII consortium must play.



**Dr. Caralynn Nowinski,**  
Executive Director,  
UI LABS

“We won the grant because we pulled together an extraordinary team comprised of the City of Chicago, the State of Illinois, more than a dozen major U.S. corporations, more than a dozen major research universities and hundreds of medium and small businesses, nonprofit organizations, local gov-

ernment agencies and other educational institutions,” explained Nowinski. “We will succeed in our mission by tapping into these organizations’ diverse talents in an ongoing and productive manner.”

Manufacturing companies across the country, and particularly those located in the State of Illinois, have expressed their eagerness to participate in DMDII’s research program. Dr. Dean Bartles, a longtime senior sales and manufacturing executive with the General Dynamics Corporation who was recently named executive director of DMDII, welcomes the involvement of such Illinois manufacturers. “Our Institute has a national mandate, but we



**Dr. Dean Bartles,**  
Executive Director,  
DMDII

“The technology projects in our portfolio are focused on solving business problems,” said Dr. William King, the Institute’s Chief



**Dr. William King,**  
DMDII’s Chief  
Technology Officer  
and College of  
Engineering Bliss  
Professor at the U of  
I, Urbana-Champaign

Technology Officer and the College of Engineering Bliss Professor at the University of Illinois Urbana-Champaign. Dr. King was a key architect of the UI LABS proposal, which focused on how digital technologies can unlock value for manufacturing companies. “When we unveil our specific projects, we hope that Illinois manufacturers will become members of the various teams that will compete for those

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**— Dr. Dean Bartles, Executive Director, DMDII**

expect the most active participation to occur among the manufacturing community located closest to our Chicago headquarters,” explained Bartles. “In fact, we hope that many Illinois manufacturers will pitch in to help us establish our new headquarters and outfit our showpiece demonstration facility, which we intend to open on Goose Island — an industrial district just northwest of Chicago’s downtown — in less than one year.”

Of course, the best way for Illinois manufacturers to participate in DMDII’s research effort is to become an active “Partner” of the Institute, to help identify the most vexing challenges confronting American manufacturing and their eventual digital solutions, and to win a role in the specific research projects that DMDII will be launching.

research assignments. For Partners that do not participate on project teams, we still invite them to visit us, share with us their challenges, and learn about what we are doing.”

The leaders of DMDII and UI LABS recognize that participants will be drawn to its profound mission by the desire for new revenues and the desire to help the country regain its role as the globe’s premier manufacturer. They welcome all participants who share DMDII’s broad goals. ■

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**Editor’s Note:** Illinois manufacturers who wish to learn more about the opportunities offered by DMDII can contact author Jacob Goodwin at [jgoodwin@uilabs.org](mailto:jgoodwin@uilabs.org).