

Technologies Enabling Agile Manufacturing (TEAM) – An ORCMT success story

Technologies Enabling Agile Manufacturing (TEAM) was one of the larger programs to come from the Department of Energy (DOE) technology transfer office, and it was managed through the Oak Ridge Centers for Manufacturing Technology (ORCMT). It was a visionary view of design and manufacturing that was showcased across the nation, and the benefits from TEAM are still flowing.

Sometimes persistence and hard work pays off, along with a dose of naïveté! In 1993 when the Clinton administration moved to Washington, defense conversion became a very important concept. The defense budget was reduced, and part of the reduction was reinvested in the nation's technological infrastructure. The agencies created technology transfer offices, and money started to flow. DOE followed suite, and the first call came out. The call went to all of the DOE facilities, offering \$50 million total for "good ideas." The news that a new opportunity was coming filtered through the Y-12 Plant, and when the call came, the solicitation was circulated. Richard Neal, a group leader in the development division, responded to the call with the idea of a major national manufacturing program and requested \$50 million. Just a few weeks later, he received a call from Jim VanFleet, DOE Director of Technology Transfer. Mr. VanFleet told Richard that he had three things to say to him:

1. Responding to the call by asking for the total \$50 million was improper and unacceptable.
2. Oak Ridge would not be allowed to create the program and conduct it alone.
3. They liked the idea a lot and would award \$1.25 million to create a cooperative program.

Richard was directed to convene a meeting with representatives from Sandia, Los Alamos, Lawrence Livermore, and Kansas City. The meeting was scheduled for a hotel in Detroit, and somewhat surprisingly (although money is a good incentive), all of the organizations sent representatives. It was a chess match with lots of "what are we doing here?" However, the group agreed to work together. The challenges then became how to distribute the money, and how to turn a \$1.25 million partnering experiment into a program.

The original proposal to DOE outlined a model for a new manufacturing enterprise and talked about a concept of "integrated product realization." The model, fortunately, had five topic areas, and there were five players at the table. The negotiations started. Lawrence Livermore was first. They agreed to support the activity if they could lead the manufacturing execution portion of the project. Since that was a precedent, and they were first to agree, the deal was made, and that brought Bob Burleson to the team. As you will learn later in the story, that agreement was probably the best thing that could have happened. Los Alamos was next to agree. They wanted "virtual manufacturing," and Dan Wienacht joined the team. Suffice it to say that the process was rather turbulent! While Richard was trying to make a program from nothing, the Y-12 managers were emphasizing that Oak Ridge had to lead, get the largest share of the money, and have more of the lead roles. It was tough, but, in the end, everyone signed on. A management team (one leader from each site) was formed, and the program moved out.

With the DOE structure in place, the next step was to build the industry coalition. Richard had already been working on this, and he had a great "Chairman of the Board" lined up in Ray Walker from Pratt

Whitney. The first visible activity was a meeting in Texas with about 70 people invited to define the program. The attendees broke into the five groups to define some foundational goals. It was not smooth, but we got through it. On the plane coming home, the Y-12 contingent was unanimous in their advice to Richard – “the challenge is too great, and this program should be left in the “too tough” pile.”

The group started with a management team and a technical team. The technical team grew to about 30 people with most from the DOE complex and some from industry. Everyone worked together to produce a strategic plan. Based on the strategic plan, \$5 million was awarded for the first year of operation, and the technical team then took the lead in building the technical plan.

There were several strokes of wisdom, inspiration, or just blind luck in TEAM. Some of these “strokes” are worth noting. First, the politics was rugged because TEAM was a radical program in many ways. It broke technical, business practice, and cultural barriers that were well entrenched. The opposition was, at times, brutal. Hence, TEAM adopted a slogan that it would cooperate, collaborate, negotiate, and arbitrate, but would not stop. That mindset kept TEAM alive over many rocky roads! One attribute of the environment was the development of the “blunder theory” for program management. It was amazing how effective the strategy of “if you run into a wall, go in another direction” turned out to be – in many, many cases.

Another stroke of good fortune was the development of the TEAM models. TEAM was about a single connected thread from idea to product. To explain this concept is complex, but the technical team developed three visuals, called the TEAM models, that became known across the country. They were simple, and everyone understood them. When TEAM was mentioned, everyone immediately understood!

Another point of good fortune was the strength of the planning. The strategic plan laid out a four-year strategy with clear milestones for each year, each one pointing to an annual conference in which the work was showcased. The fact that everyone knew exactly where TEAM was going, even though the dots on the map might have been vague, was a great strategy for success.

The people were a major part of the good fortune. Dan Weinacht from Los Alamos was the original technical team leader. He did a great job. Bob Bureson of Lawrence Livermore National Laboratory replaced Dan early in the program, and Bob formed a unit whose members would fight for each other. He became the orchestrator of, what was arguably, the most compelling manufacturing technology program ever offered. In one event, for example, 11 computer systems were running in an auditorium at LLNL connecting the nation in an interactive demo in which Corvette engine heads were designed, evaluated, and then machined at GM and taken by car to Ford for inspection. The programming and planning for the work was done, essentially in real time, in California, Arizona, Missouri, Tennessee, and Florida. Through it all, Diane Bird from DOE was the program manager, and her support (even in taking controversial positions) was absolutely essential in TEAM’s success.

Finally, the greatest stroke of good fortune was the **TEAM**. A group that was thrown together in a politically charged environment came together as a unit that learned to love each other and work

together. That was the blessing of TEAM. TEAM became a \$52 million program and won a DOE award that was presented by the Secretary of Energy. Thirty people went to Washington to receive the award, because the TEAM could not be separated.

The impact of TEAM is far felt. Several major corporations credit TEAM with changing their corporate strategic direction. Multiple government agencies have molded programs around the concepts of TEAM, and one of the hottest topics in today's design and manufacturing community, the Model-Based Enterprise, has its roots in the TEAM mindset and models.

As the late Paul Harvey would say, and now the rest of the story: based on what started as TEAM, the leadership of TEAM became involved in founding and leading several major national manufacturing programs. As these programs went forward, a new not-for-profit was spun off from ORCMT. The Integrated Manufacturing Technology Initiative (IMTI, Inc.) operates from its offices on Hardin Valley Road and provides technology management services for major corporations and government agencies. The legacy of ORCMT and the vision of Jack Cook, Dave Beck, and others live on!