Defense Manufacturing Science and Technology Integration Plan

The following text presents excerpts from this report. A complete copy of the report is available through MTIAC.

Background

For over 35 years, the ManTech program has been DoD's principal mechanism for inventing in broadly applicable manufacturing process technologies. Major manufacturing innovations credited to ManTech range from numerically controlled machining in the 1950s to graphite composite fabrication and integrated computer-aided manufacturing in the 1980s. ManTech has made significant contributions in meeting the needs of major acquisition programs, depot maintenance and remanufacturing programs and in establishing new capabilities in the defense industrial base. DoD's ability to move new defense products from the laboratory to the production line has often depended on ManTech's providing the process technologies needed for affordable production.

In recent years, however, both industry and DoD have recognized that downstream benefits increase when process technology needs are addressed starting in the earliest stages of product development. Integrated product and process development (IPPD) is now a key element, not only in acquisition programs but also in the thrust areas of the new science and technology (S&T) strategy. DoD's investment in process technologies is expanding to cover the full spectrum of development and application stages, from S&T to acquisition to life cycle support and remanufacturing. The integration of ManTech and S&T (MS&T) will provide a seamless flow of process technology, from basic research to fielded capabilities.

Accordingly, the Under Secretary for Acquisition has decided to move oversight of the ManTech program from the Production and Logistics organization to the Director, Defense Research and Engineering (DDR&E). This decision coincides with Congressional direction in the FY 93 Defense Authorization Act. ManTech will be fully integrated within the DoD S&T Program. A recent

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review confirms that the technologies and maturation models involved are complementary and that this merger will strengthen both programs.

Scope
The scope of "manufacturing" and "technology for affordability" as used in this plan is broad. It includes engineering and manufacturing/remanufacturing technologies that affect total systems affordability, including development, production and life cycle costs. As shown in the figure below, the FY 93 defense appropriation includes over $1.5 billion for programs related to manufacturing technology.

OSD is developing procedures for executing the FY 93 Congressional provision of $575 million for "Title IV - Technology and Manufacturing." Depending on the results of this ongoing review, S&T Thrust 7 may be required to include some of the projects mandated under the headings of Defense Conversion, Dual-Use Critical Technology Partnerships, Commercial-Military Integration Partnerships, Regional Technology Alliances Assistance Program, Dual-Use Assistance Extension Program, and Agile Manufacturing/Enterprise Integration. This plan will be updated as necessary to include any such projects.

Upon completion of the DDR&E review, some of these projects may be included under Thrust 7, and will be subject to the procedures defined in this plan. However, the initial scope of this plan is limited to:

- Service and DLA ManTech programs that total $266 million in FY 93:
  - 0708045A – Army Industrial Preparedness
  - 0708011N – Navy Industrial Preparedness
  - 0708011F – Air Force Industrial Preparedness
  - 0708011S – DLA Industrial Preparedness

- DARPA programs in Electronics Manufacturing Technology and High Definition Systems which total $493 million in FY 93:
  - 0603739E – Electronics Manufacturing Technology
  - 0602708E/IC-03 – High Definition Systems

Basis for Integrating ManTech into the S&T Strategy for Affordability

The New S&T Approach
Until the advent of the new S&T strategy in 1992, the development emphasis in 6.2 and 6.3A programs was predominantly on product performance issues. New system concepts developed in S&T were passed on into the acquisition process, and manufacturing process issues were addressed principally in the engineering and manufacturing development (EMD) and the production phases of acquisition. The ManTech program operated in parallel with the acquisition process to address manufacturing technologies applicable to multiple weapon systems, either in acquisition or depot maintenance. ManTech also invested in exploratory development of new processes where process technology opportunities were not being pursued in 6.2 S&T programs. A key feature of ManTech was a focus on customer needs.

The new S&T strategy requires a balanced emphasis on process, as well as product, issues in 6.2 and 6.3A. The new strategy shifts a great deal of technical risk mitigation forward into the S&T pre-acquisition phases, where process issues can be addressed less expensively. This shift is based on integrated product and process development (IPPD) as an integral part of new S&T programs and on investments in process innovation and demonstrations. Advanced Technology Demonstrations (ATDs) in Thrusts 1-5 will identify critical processes and establish
metrics and exit criteria for process capabilities and maturity. This philosophy will extend to additional product-oriented thrust areas that may be defined in the future. Thrust 6, "Synthetic Environments," is developing simulation technology that will increase user involvement in defining and validating the top level design requirements for new systems. Thrust 6 and Thrust 7 will jointly define an interface so that engineering simulations and trade-off analyses can be coupled with battlefield simulations to arrive at an optimized set of performance requirements and affordable product and process design specifications.

The initial focus of Thrust 7 was to develop and demonstrate advanced process technologies applicable to products in Thrusts 1-5. The integration of ManTech with S&T Thrust 7 now expands the customer base to include current as well as future weapon system needs. The resulting integrated MS&T program extends from science-based understanding of manufacturing process phenomena, through demonstration at laboratory scale, to application in full-scale production and repair processes. ATDs in the new MS&T program are process demonstrations – pilot engineering and manufacturing operations. The process technologies involved span a wide spectrum, but will be organized in subthrust areas to focus investments on assembling the critical mass to make a substantial difference in the way manufacturing is done.

The Integrated MS&T Program
Under the new integrated MS&T program, the range of process technology needs will be viewed as a continuum across S&T Thrusts 1-5, acquisition programs, the defense industrial base and defense maintenance depots. Major emphasis will be placed on positioning DoD to take maximum advantage of commercial industrial capabilities. The purposes for investments in the integrated MS&T program include:

- Developing new processes for new product technologies
- Attacking the cost drivers of current and future weapon systems
- Establishing initial industrial base capabilities for new technologies
- Supporting depot maintenance and remanufacturing needs

- Developing infrastructure capabilities for interoperability and technology transfer

Structure of the Integrated MS&T Program

MS&T will address manufacturing process development along a continuum broken into five stages. These stages are shown in the chart below, and are distinguished both by the customer served by the technology and by the phase of the life cycle addressed.

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<td>• Process Innovation</td>
<td>• Process Modeling &amp; Simulation</td>
<td>• Design &amp; Manufacturing</td>
<td>• Support to Weapon System Manufacturing</td>
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<td>• Process Physics</td>
<td>• Scalable Process Development</td>
<td>• Pilot Line Scaling</td>
<td>( Major EMD Production Processes)</td>
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<td></td>
<td>• Program Demos</td>
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<td>• Support to Weapon System Depot Maintenance</td>
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<td></td>
<td>• Manufacturing of Replacement Parts</td>
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<td></td>
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<td></td>
<td>• Rebuild and Overhaul</td>
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Process Application Stages

The first stage, Process Research and Exploratory Development consists of new ideas, process innovations and research into process physics. The second stage, Advanced Process Demonstrations includes primarily ATDs and other scalable process demonstrations. Stage 3, Tools and Initial Industrial Base Capability, includes integration and validation of design and manufacturing tools and processes, demonstrating that pilot line processes can be scaled up and deploying technology to establish new capabilities in the industrial base. In the fourth stage, Weapon System Implementation, the application needs of weapon systems in EMD and production are addressed. Primary responsibility in this stage rests with the weapon system developer, but some acquisition programs will serve as lead customers for new process technologies developed by MS&T. Pilot projects in this stage will also demonstrate new approaches to manage and reduce risks for transitioning cost-reducing manufacturing technologies. In the fifth and final stage, Weapon System
Support, depot maintenance processes and spares manufacturing processes are considered. The integration of ManTech substantially broadens S&T coverage in the last three stages.

Process Technology Thrust Areas
Ongoing S&T and ManTech programs cover a diverse mix of process technologies and product applications. New starts in the MS&T program will be strongly guided toward strategic subthrust areas to achieve focus and critical mass. MS&T will also emphasize strong customer involvement in Advanced Technology Demonstrations (ATDs) and Pilot Projects for process technology insertion. Based on a combination of S&T and ManTech strategic planning done in 1992, the integrated MS&T program will start with the following focus areas for investments:

- Subthrusts in Process Technology Development
  - Manufacturing Systems and Infrastructure Technology
  - Composites Fabrication and Processing
  - Precision Machining
  - Electronic Devices and Systems, including Automatic Test Systems

- Technology Insertion Demonstrations
  - ATDs for Affordable Seeker and Sensor Components
  - Pilot Projects for Affordable Weapon Systems and Upgrades
Defense Scientific and Technical Information
Applied to National Needs:

Contributions from the DoD Information Analysis Program

December 7, 8, 9
Anaheim Hilton and Towers
Anaheim, CA
(Being held concurrently with
Technology 2003, Anaheim Convention Center)

Sponsored by
The Defense Technical Information Center
Cameron Station, Alexandria, VA
MTIAC announces the publication of the Directory of Manufacturing Research Centers. This directory gives information on approximately 200 centers. Information on each center includes addresses, telephone numbers, the host organization, sponsors, associated personnel, technical areas, goals, facilities, and funding. The directory lists the centers in order of assigned center number. As reference aids, indexes by center name, affiliation, personal name, state, and key words are provided.

To be cited in the directory, a center must
• engage in manufacturing research and
• be available to the manufacturing community on a free or fee basis.

Corporate or government manufacturing research activities with limited availability are omitted as are activities such as professional societies and trade associations that do not normally conduct research.

This directory is available from MTIAC in three formats:
• hardcopy (270 pages) – $75.00
• Floppy disk (ASCII, WordPerfect, dBase III+) – $150.00
• online – $60.00 per connect hour

To order contact:
Manufacturing Technology Information Analysis Center (MTIAC)
10 West 35th Street
Chicago, IL 60616-3799
Phone: 312-567-4730
Toll-free: 1-800-421-0586
Fax: 312-567-4736

Review copies are available. Contact Marge Hernandez at the above telephone number.

CENDI

CENDI is an interagency cooperative organization composed of scientific and technical information (STI) managers.

CENDI's mission is to help improve the productivity of federal research and development (R&D) through the development and management of effective STI support systems. In fulfilling its mission, CENDI members agencies plan an important role in helping to strengthen U.S. competitiveness and address other science- and technology-based national priorities.

CENDI's senior STI managers are from five U.S. federal agencies:
• Commerce – National Technical Information Service (NTIS)
• Energy – Office of Scientific and Technical Information (OSTI)
• National Aeronautics and Space Administration – Scientific and Technical Information Program, (NASA, STI)
• Health and Human Services – National Library of Medicine (NLM)
• Defense – Defense Technical Information Center (DTIC).

These managers have responsibility for STI at agencies representing more than 90 percent of the $70 billion federal R&D budget.

The STI programs at the CENDI agencies have many common interests. The organization was chartered in 1985 to maximize the opportunities for sharing member agency resources, avoid duplication of effort, and improve each agency's effectiveness. The principals have agreed to exchange information and ideas, to share resources, and to undertake joint initiatives. They cooperate on many levels from policy to standards to operations.

With the rapid pace of technological change, in combination with basic changes in science and science-based policy, there is a shifting paradigm in the management and use of STI. For the next few years, CENDI will focus its energies on ways to harness the promise of information technology while ensuring that the professionals in and users of STI are prepared to make productive use of what technology offers.

For more information about CENDI and its activities, contact: CENDI Secretariat, P.O. Box 4219, Oak Ridge, TN 37831, Phone: 615-481-0388, Fax: 615-481-0390, e-mail: bcarroll@sti.nasa.gov
Meetings

**Defense Manufacturing Conference**
DoD and Department of Navy, Nov 29-Dec 2, San Francisco, CA  
Contact:: 703-271-9055 (Wendy Blythe)

**Integrated Optics for Military and Commercial Applications**
U. S. Army Missile Command Research, Development and Engineering Center, Dec 7-9, Huntsville, AL  
Contact:: 205-842-6352 or 205-895-6343 (ext. 277)  
(Susan T. Caldwell)

**Soldier Survivability: A Force Multiplier**
Defense Week, Dec 7-8, Washington, DC  
Contact: 202-638-4260

**Assurance Technologies for the 90s**
RAC, Dec 7-10, Orlando, FL  
Contact: 315-339-7036

**1994**

**Composites Manufacturing and Tooling Conference and Exhibits**
SME and Composites Manufacturing Association of SME, Jan 18-20, Anaheim, CA  
Contact:: 313-271-1500 (ext. 294)

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**Books on Manufacturing**


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**Happy Holidays from the staff of MTIAC**

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**Sheet Metal Congress**
FMA, Jan 31-Feb 2, Orlando, FL  
Contact:: 815-399-8700

**Houstex Advanced Productivity Exposition**
SME, AMTDA, Houston Chapter – National Tooling and Machining Association, Feb 1-3, Houston, TX  
Contact: 313-271-2861

**Fourth International Conference on Management of Technology**
University of Miami, Feb 28-Mar 4, Miami, FL  
Contact: 305-284-4777

**Advanced Joining Technologies Conference**
AWS, Mar 2-4, Cocoa Beach, FL  
Contact: 305-443-9353

**Intelligent Robot in Field, Factory, Service and Space Conference**
AIAA, NASA, Mar 21-24, Houston, TX  
Contact: 713-483-1508

**Western Metal and Tool Exposition**
ASME, SME, and AMTDA, Mar 21-24, Los Angeles, CA  
Contact: 216-338-5151 (ext. 507)
ManTech Project Schedule

- One of the important steps in a DoD Manufacturing Technology project is the end-of-contract demonstration when the contractor or agency that has developed and/or applied the technology demonstrates the equipment and processes involved.
- The following calendar has been compiled by the staff at MTIAC. It is also available online to MTIAC users through the MTIAC Online Services, which is updated monthly.

<table>
<thead>
<tr>
<th>1993</th>
<th>PROJECT</th>
<th>TITLE</th>
<th>POINT OF CONTACT</th>
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<tbody>
<tr>
<td>Dec</td>
<td>Air Force F33615-92-C-5816</td>
<td>In Situ Sensor-Based Manufacturing</td>
<td>Eugene Miller 513-255-2461</td>
</tr>
<tr>
<td>Dec</td>
<td>Air Force F33615-86-C-5044</td>
<td>Robotic Paint Stripping Cell</td>
<td>Siamack Mazdiyasmi 513-255-5151</td>
</tr>
<tr>
<td>Dec</td>
<td>Air Force F33615-91-C-5964</td>
<td>Open Architecture for Electronic Design and Support Tools</td>
<td>James Poindexter 513-255-8589</td>
</tr>
</tbody>
</table>

All data and information herein reported are believed to be reliable; however, no warrant, expressed or implied, is to be construed as to the accuracy or the completeness of the information presented.

The MTIAC Current Awareness Bulletin is prepared under Contract DLA900-90-D-0134, and is available only to qualified U.S. users. Some of the reports referred to in this and subsequent issues may be subject to current U.S. export control laws and regulations.

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