The National Academies of
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NATIONAL MATERIALS AND MANUFACTURING BOARD

Strategic Long-Term Participation by DoD in Its Manufacturing USA Institutes

Webinar

4/23/19

The National Academies of Sciences, Engineering, and Medicine are private, nonprofit institutions that provide independent advice to the nation on pressing science issues.

For each of our studies, committee members are chosen for their expertise and experience, and they serve pro bono to carry out the study's statement of task. The final report will represent the consensus view of the committee and will go through extensive peer review.

Strategic Long-Term Participation by DoD in Its Manufacturing USA Institutes

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Strategic Long-Term Participation by DoD in Its Manufacturing USA Institutes

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Strategic Long-Term Participation by DoD in Its Manufacturing USA Institutes

Statement of Task

Conduct a workshop that will:

- Focus on the business models used to stand-up and operate, on a long-term basis, the 8 DoD institutes
- Evaluate 'lessons-learned' in developing and implementing the public-private partnerships adopted in those Institutes and what changes may be needed
- Evaluate the potential values and costs that would accrue to DoD from further long-term engagement with the institutes under various scenarios and funding structures
- Receive input regarding similar public-private partnerships developed in other countries
- Identify topics to be addressed in a follow-on Phase II study

Strategic Long-Term Participation by DoD in Its Manufacturing USA Institutes

Statement of Task

The output of this suggested *fast track project* will be:

(1) Workshop Proceedings prepared by a designated rapporteur

(2) Short Report that drawing from the proceedings:

- Provides the report committee's findings
- Provides options for DoD to consider in developing its long-term role with existing and potential future institutes
- Recommends topics to be included in a follow-on Phase II study.

Strategic Long-Term Participation by DoD in Its Manufacturing USA Institutes

Consensus Study Report Content

Strategic Long-Term Participation by DoD in Its Manufacturing USA Institutes

Consensus Study Report Content (Cont'd)

APPENDIXES

A Statement of Task

B Institutes' Offerings Value Proposition Rankings by Stakeholder

C Summary of Potential Improvements to the DoD Institutes' Offerings

D Summary of Potential Improvements Related to the DoD Institutes Strategy Goals

E Committee and Staff Biographical Information

F Acronyms

G Other Resource Documents

H Workshop Agenda and Participants

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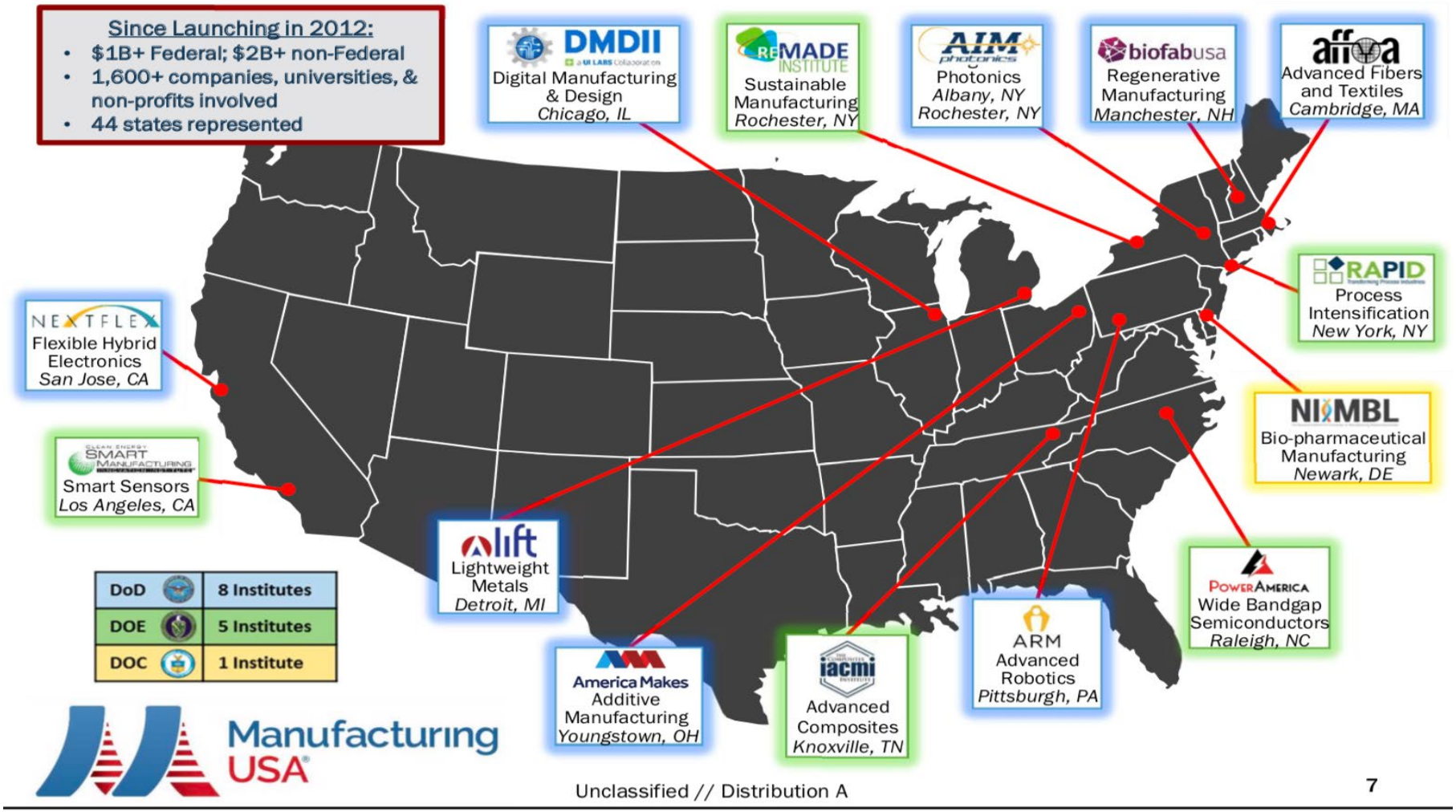

Strategic Long-Term Participation by DoD in Its Manufacturing USA Institutes

Fast Track Study Committee

- Met 14 times between November 8, 2018 to February 1, 2019
- Focused on the five elements of the statement of task
- Reviewed DoD Manufacturing USA Strategy (September 2017) Goals
- Identified key questions to address & data gathering methods
- Identified five key stakeholder groups
  - DoD
  - DoD Institute Leaders
  - Industry
  - Academia
  - Other Organizations

Strategic Long-Term Participation by DoD in Its Manufacturing USA Institutes

Fast Track Study Data Gathering Methods

- **Data Gathering Methods:**
  - DMC attendance, notetaking and face-to-face interviews (December 2018)
  - Phone interviews of key stakeholders
  - Stakeholder questionnaires for each Stakeholder Group
  - Two day open workshop at the National Academies' Keck Center in DC, 145 attendees (28-29 January 2019)
    - Presentations
    - Breakout Discussions
    - Panel Discussions

Strategic Long-Term Participation by DoD in Its Manufacturing USA Institutes

Workshop Day 1:

Lessons-Learned from DoD Public-Private Partnership with Its Manufacturing Institutes

- **Keynote Presentations:**
  - "Accelerating the Delivery of Innovation to the Warfighter," Kristen Baldwin, Deputy Director, Strategic Technology Protection and Exploitation, DoD Research & Engineering Enterprise
  - "Expectations of DoD Manufacturing Institutes: Past, Present and Future," Jeffrey Wilcox, Vice President, Digital Transformation, Lockheed Martin Corporation
- **Breakout I:** Value & Cost of Participation in DoD Manufacturing Institutes
- **Breakout 2:** What Should DoD Manufacturing Institutes Keep Doing, Stop Doing, Start Doing

Strategic Long-Term Participation by DoD in Its Manufacturing USA Institutes

Workshop Day 1: (Cont'd)

Lessons-Learned from DoD Public-Private Partnership with Its Manufacturing Institutes

- **Panel 1: Alternate Public-Private Partnership Models**
  - Mr. Marty Ryan, VP, Advanced Technology International
  - Mr. Phillip Singerman, Associate Director for Innovation & Industry Services, NIST
  - Dr. Thomas Donnellan, Associate Director, Applied Research Laboratory, Pennsylvania State University

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Workshop Day 2:

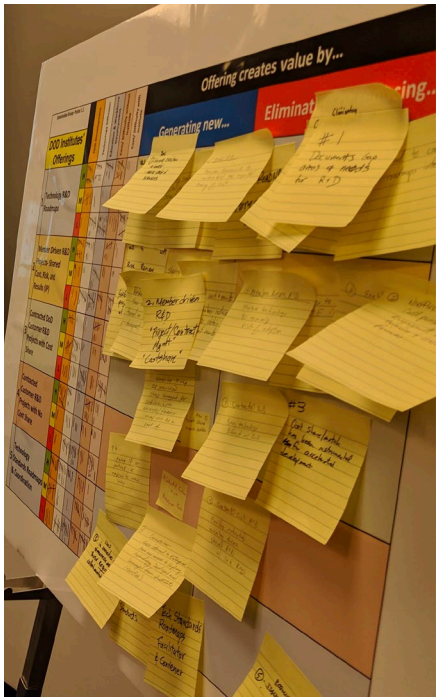
Long-Term Sustainability of DoD Manufacturing Institutes

- **Panel 2:** International Programs in Advanced Manufacturing
  - Sir Michael Gregory, Founding Head, Institute for Manufacturing (Retired), Cambridge University
  - Scott Kennedy, Senior Advisor, Center for Strategic and International Studies
  - Dr. James Mulvenon, General Manager, Special Programs Division, SOS International
- **Breakout 3:** DoD Long-Term Engagement Model Options for DoD Manufacturing Institutes
- **Follow-On Consensus Study Topics**

Strategic Long-Term Participation by DoD in Its Manufacturing USA Institutes

DoD Institutes Generic Offerings Identified by the Study Committee

1. Technology R&D Roadmaps*
2. Member Driven R&D Projects- Shared Cost, Risk, and Results (IP)**
3. Contracted DoD Customer R&D Projects with Cost Share**
4. Contracted Customer R&D Projects with No Cost Share**
5. Technology Standards Roadmaps & Coordination*
6. Technology Consulting Services***
7. Rapid Prototyping/Pre-production Services**
8. Use of Institute Equipment**
9. Updates on State-of-the-Art Technology*
10. Technical Papers & Publications***
11. Data Coordination and Dissemination*
12. Networking & Collaboration Opportunities Amongst Industry, Academia, & Gov't Members and Other DoD Institutes*
13. Creation of Regional Institutes/ HUBs and Technology Ecosystems*
14. Use of NIST MEP Program to Reach SMEs*
15. Education & Workforce Development Roadmaps*
16. Institute Internships & Apprenticeships*
17. Technology Hands on Training & On-Site Courses (K-12, Veterans, DoD, Industry)***
18. Technology Education On-line Courses***
19. Technology Overview Courses for Government & Industry Executives and Leaders**
20. Job Postings*



Key: * Core Activity (10) **Project Activity (6) ***Core or Project Activity (4)

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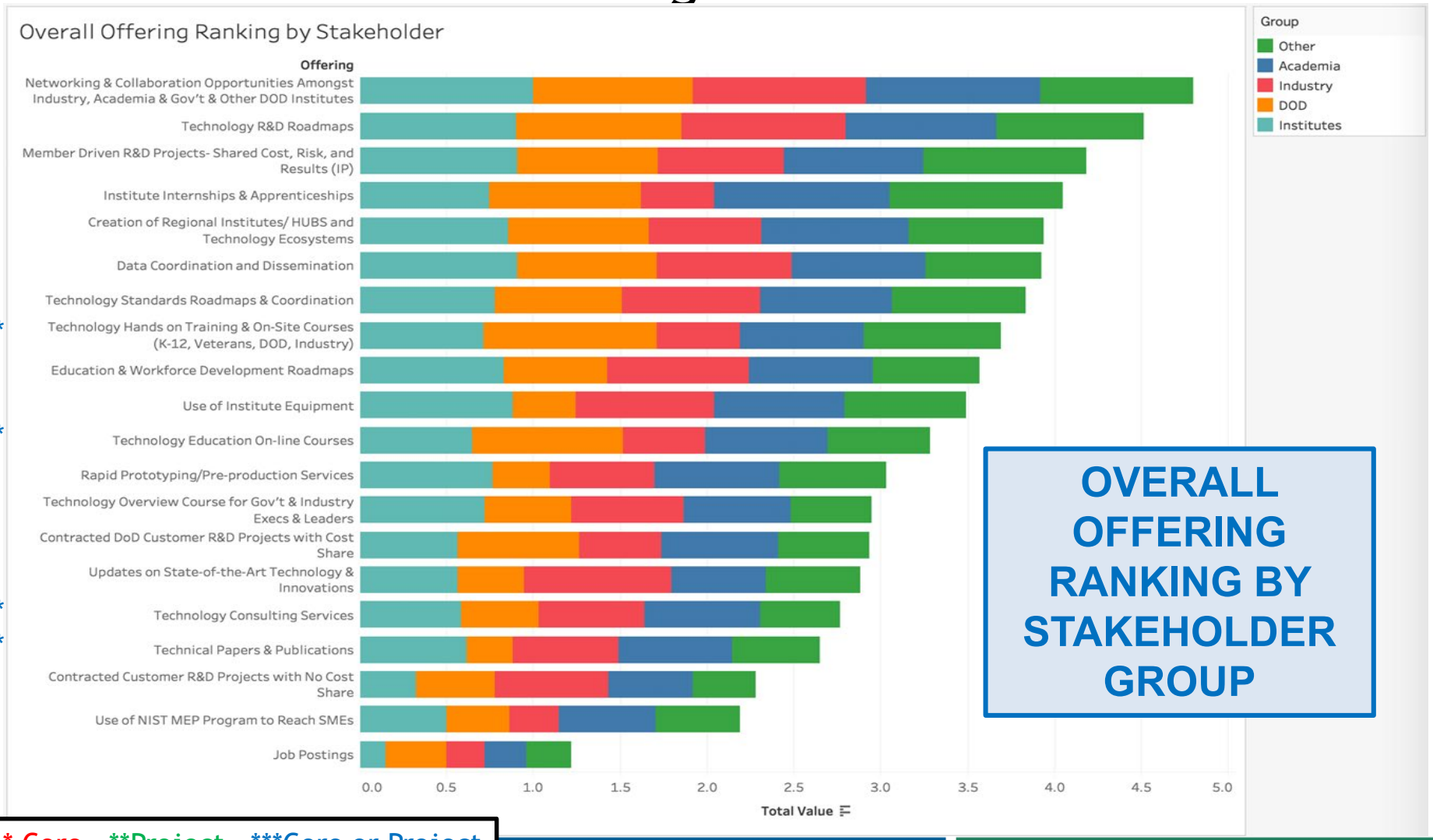

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OVERALL OFFERING RANKING BY STAKEHOLDER GROUP

* Core **Project ***Core or Project

Strategic Long-Term Participation by DoD in Its Manufacturing USA Institutes

Top Eight Ranking of DoD Institutes' Offerings (All Stakeholder Groups):

1. Networking & Collaboration Opportunities *
2. Technology R&D Roadmaps *
3. Member Driven R&D Projects **
4. Institute Internships and Apprenticeships *
5. Creation of Regional Institutes/ HUBs and Technology Ecosystems *
6. Data Coordination and Dissemination *
7. Technology Standards Roadmaps and Coordination *
8. Technology Hands on Training & On-Site Courses ***

* Core Activity	**Project Activity	***Core or Project Activity

Strategic Long-Term Participation by DoD in Its Manufacturing USA Institutes

Top Eight Ranking of DoD Institutes' Offerings by Stakeholder Group

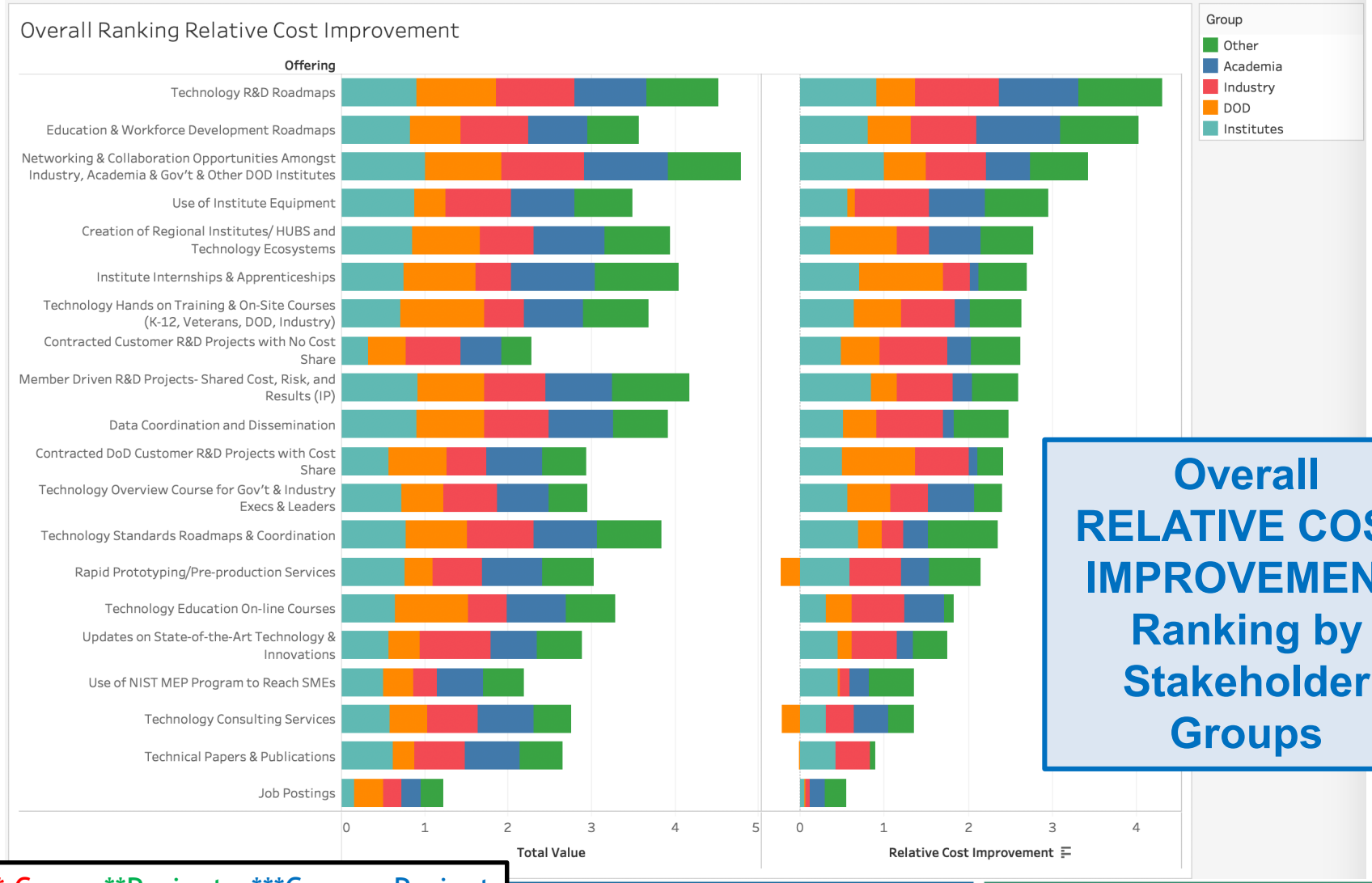
Institutes Total Value Ranking	
Ranking	***Offering***
1	Networking & Collaboration Opportunities
2	Member Driven R&D Projects- Shared Cost, Risk, Results
3	Data Coordination & Dissemination
4	Technology R&D Roadmaps
5	Use of Institute Equipment
6	Creation of Regional Institutes/ Hubs & Tech Ecosystems
7	Education & Workforce Development Roadmaps
8	Technology Standards Roadmaps & Coordination

DoD Total Value Ranking	
Ranking	***Offering***
1	Technical Hands on Training & On-Site Courses
2	Technology R&D Roadmaps
3	Networking & Collaboration Opportunities
4	Technology Education On-Line Courses
5	Institute Internships & Apprenticeships
6	Member Driven R&D Projects- Shared Cost, Risk, Results
7	Creation of Regional Institutes/ Hubs & Tech Ecosystems
8	Data Coordination & Dissemination

Industry Total Value Ranking	
Ranking	***Offering***
1	Networking & Collaboration Opportunities
2	Technology R&D Roadmaps
3	Updates on State of the Art Technology & Innovations
4	Education & Workforce Development Roadmaps
5	Technology Standards Roadmaps & Coordination
6	Use of Institute Equipment
7	Data Coordination & Dissemination
8	Member Driven R&D Projects- Shared Cost, Risk, Results

Academia Total Value Ranking	
Ranking	***Offering***
1	Institute Internships & Apprenticeships
2	Networking & Collaboration Opportunities
3	Technology R&D Roadmaps
4	Creation of Regional Institutes/ Hubs & Tech Ecosystems
5	Member Driven R&D Projects- Shared Cost, Risk, Results
6	Data Coordination & Dissemination
7	Technology Standards Roadmaps & Coordination
8	Use of Institute Equipment

Strategic Long-Term Participation by DoD in Its Manufacturing USA Institutes



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Overall RELATIVE COST IMPROVEMENT Ranking by Stakeholder Groups

* Core **Project ***Core or Project

Strategic Long-Term Participation by DoD in Its Manufacturing USA Institutes

Breakout 2

DoD Institutes' SWOT Assessments by Stakeholder Group

(Strengths, Weaknesses, Opportunities, Threats)

Chapter 2
2-7 to 2-12

Strategic Long-Term Participation by DoD in Its Manufacturing USA Institutes

Breakout 2

DoD Institutes' Offerings Should…

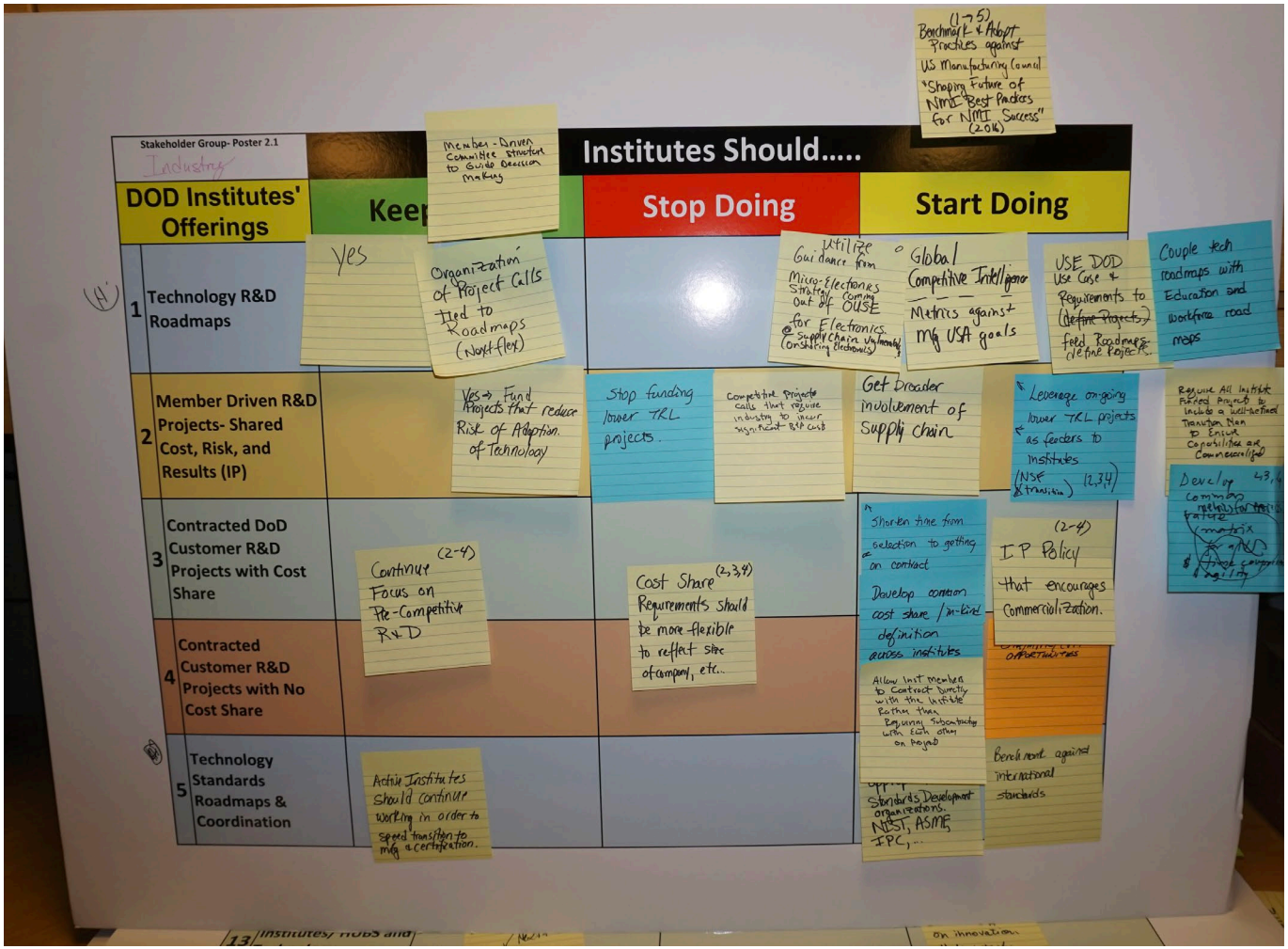
Keep Doing,

Stop Doing,

Start Doing

Assessments by Stakeholder Group

Chapter 2
2-13 to 2-17
Appendix C

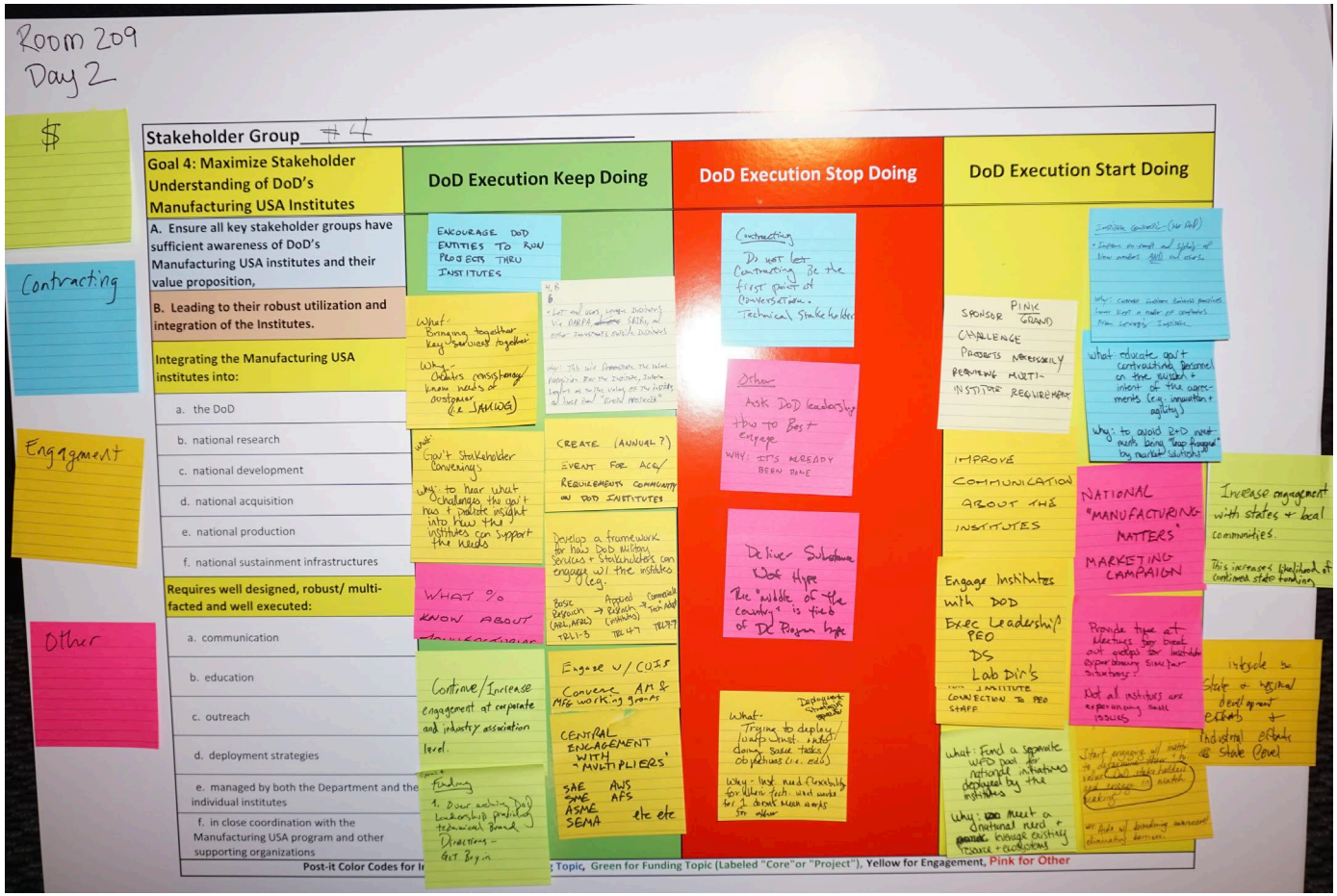


Strategic Long-Term Participation by DoD in Its Manufacturing USA Institutes

Breakout 3

DoD Long-Term Engagement Model Options Assessments by Strategy Goal ("Keep Doing, Stop Doing, Start Doing")

Chapter 5 Appendix D



Strategic Long-Term Participation by DoD in Its Manufacturing USA Institutes

Alternate International Public-Private Partnership Models

Foreign models profiled are 8 to 50 times larger as a share of manufacturing GDP than the Manufacturing USA Institutes

Attribute	MfgUSA	Fraunhofer	Catapult* HVM	IMEC	A*Star	ITRI	MIC
Owner	Government Agencies	Fraunhofer Society	Innovate UK	Non Profit	Govt. of Singapore	Non Profit	Government of China
Type of governing organization	Non Profit	Non Profit	Non Profit	Non Profit	Autonomous Government	Non Profit	Government
Country	USA	Germany	UK	Belgium	Singapore	Taiwan	China
Est 2017 GDP (US$ Billions)	$19,417	$3,423	$2,496	$426	$292	$566	$11,795
Percent GDP From Mfg	12%	23%	10%	14%	20%	29%	23%
# of Institutes	14	69	7	9	18	6	8
Year Started	2012	1949	2010	1984	1991	1973	2016
Estimated Total Budget/Year (US$ Millions)	$330	$2,482	$287	$426	$163	$714	Unavailable
Index: Investment per Mfg GDP	1.0	22.3	8.1	50.4	19.8	30.7	Unavailable
Government Direct Support After 5th Year	0%	33%	33%	15%	15% - 100%	25%	Unavailable
Government Indirect Support (Competitive Projects)	Unavailable	33%	33%	Unavailable	Unavailable	0%	Unavailable

NOTES:

*HVM Catapult is an institute within the Catapult system of 11 institutes

**Partners = Universities and other stakeholders

Index/Mfg GDP is a comparison of the program funding to the Mfg portion of GDP, where the U.S. investment in Mfg USA is 1.

Low levels of core funding were found to lead to focus on short-term projects and services.

GDP Data Source: http://statisticstimes.com/economy/countries-by-projected-gdp.php accessed 11/29/17

Currency conversions dated 12/13/17; For ITRI, 1 NTD = 0.03242 USD

Ref: Hauser Report (The Current and Future Role of Technology and Innovation Centers in the UK) 2010

Ref: United Nations National Accounts Main Aggregates Database, value added by economic activity, at current prices—U.S. dollars.

ACRONYMS:

IMEC = Inter-University Micro Electronic Center

A*Star = Agency for Science, Technology and Research.

ITRI = Industrial Technological Research Institute, Taiwan

MIC = China's Manufacturing Innovation Centers

Strategic Long-Term Participation by DoD in Its Manufacturing USA Institutes

DoD Manufacturing USA Strategy

Goal #1 Drive Impactful Advanced Manufacturing R&D

Goal #2 Encourage the Creation of Sustainable Business Plans

Goal #3 Maintain an Optimal Program Design to Maximize Value Delivery

Goal #4 Maximize Stakeholder Understanding of the Institutes

Goal #5 Effectively Support a Capable Workforce

Strategic Long-Term Participation by DoD in Its Manufacturing USA Institutes

DoD Manufacturing USA Strategy Goal #1 Key Findings

Goal #1 Drive Impactful Advanced Manufacturing R&D

- While transitions to support DoD requirements have occurred, portions of DoD find the institutes to be insignificant or were unaware of their impact on DoD

- The institutes' ability to accelerate technology adoption has not been well articulated or verified across all stakeholder groups

Strategic Long-Term Participation by DoD in Its Manufacturing USA Institutes

DoD Manufacturing USA Strategy Goal #2 Key Findings

Goal #2 Encourage the Creation of Sustainable Business Plans

- Support for the original vision for the Manufacturing USA Institutes remains high among engaged stakeholders
- Continued core funding at some level is required to meet DoD goals
- The DoD Manufacturing USA Institutes have not currently established themselves sufficiently to function without Federal core funding being provided
- The experience of similar agencies in other countries suggests that core funding is likely to be critical on an on-going basis to achieve strategy goals #3 and #5
- Beyond core, DoD Manufacturing USA Institutes need to find additional sources of funding to remain viable in the long term

Strategic Long-Term Participation by DoD in Its Manufacturing USA Institutes

DoD Manufacturing USA Strategy Goal #3 Key Findings

Goal #3 Maintain an Optimal Program Design to Maximize Value Delivery

- DoD Manufacturing USA Institutes provide value to DoD, Industry and Academia by creating an environment for collaboration
- In their technology areas, DoD Manufacturing USA Institutes are creating strong ecosystems with a wide diversity of organizations involved
- DoD Manufacturing USA Institutes perform important functions for their communities, including roadmapping and workforce development, that are not considered research and development
- DoD Manufacturing USA Institutes play a strong role in standards development
- Within the set of institutes, current funding and IP models are diverse and cumbersome

Strategic Long-Term Participation by DoD in Its Manufacturing USA Institutes

DoD Manufacturing USA Strategy Goal #3 Key Findings

Goal #3 Maintain an Optimal Program Design to Maximize Value Delivery (Cont'd)

- DoD Manufacturing USA Institutes are operating as individual organizations and do not appear to function as a network
- Portions of DoD find the institutes to be an ineffective means for conducting research and do not see the value of the products being delivered by the DoD Manufacturing USA Institutes for the funding that has been spent
- Numerous specific opportunities have been identified in the Workshop that would improve core outcomes and have the potential to increase the efficiency and effectiveness of the institutes
- The process of advancing TRL/MRL is not clearly understood across the institutes and stakeholders

Strategic Long-Term Participation by DoD in Its Manufacturing USA Institutes

DoD Manufacturing USA Strategy Goal #4 Key Findings

Goal #4 Maximize Stakeholder Understanding of the Institutes

- DoD Manufacturing USA Institutes need to be more broadly engaged with DoD stakeholders beyond OSD
- The long range objective of continued co-investing in core activities is creation of dual use US supply chains
- The advantage of using the DoD Manufacturing USA Institutes versus other R&D mechanisms is not clear to project sponsors who are currently not engaged with the institutes
- Major portions of the DoD Science & Technology (S&T) and Acquisition and Sustainment communities are unaware of the DoD Manufacturing USA Institutes and their offerings
- DoD needs to engage as a partner (not arm's length) to enable the institutes to accomplish their mission

Strategic Long-Term Participation by DoD in Its Manufacturing USA Institutes

DoD Manufacturing USA Strategy Goal #5 Key Findings

Goal #5 Effectively Support a Capable Workforce

- DoD Manufacturing USA Institutes are exploring a number of approaches to supporting programs in workforce development

- The Education and Workforce Development (EWD) program is generally looked upon as being a valuable component of the program; however, the program needs to be assessed to determine best practices and ensure that it supports the DoD goal of developing a capable workforce

Strategic Long-Term Participation by DoD in Its Manufacturing USA Institutes

DoD Long-Term Manufacturing Institutes Strategy

Business Model Options & Implications

- The business model options and implications that follow were developed by the study committee to span the range of alternative strategies for DoD to consider in developing its long-term engagement with existing and potential future institutes
- These options and implications were developed in closed-session during the two and half days immediately following the study workshop, while the inputs from all relevant sources were fresh in the committee's thoughts

Strategic Long-Term Participation by DoD in Its Manufacturing USA Institutes

DoD Long-Term Manufacturing Institutes Strategy

Business Model Options & Implications

- The committee observed two distinct DoD modes of engagement with the institutes:
  (1) As co-investor with industry in creating an ecosystem that will lead to dual use US supply chains in an emerging technology sector, and
  (2) As a customer for DoD projects that tap capabilities in these sectors to meet Defense needs
- The first engagement mode, also referred to as DoD "core funding," has been dominant to date. However, from the outset DoD core funding was planned to ramp down after 5-7 years.
- With these two modes of engagement in mind, the committee developed five business model options for evaluation.
- The committee's consensus study recommendation topics encompass the results of that evaluation.

Strategic Long-Term Participation by DoD in Its Manufacturing USA Institutes

DoD Long-Term Manufacturing Institutes Strategy Business Model Options & Implications

Option A	Current Model with Planned Reduction in DoD support for Core Activities
Option B	Current Model with Improvements to Processes, Offerings, and Value-based Core Funding
Option C	Transition to DoD Customer Model
Option D	Transfer Core Responsibilities to the National Program Office at NIST
Option E	No Core Funding of Institutes Beyond Initial Investment

Strategic Long-Term Participation by DoD in Its Manufacturing USA Institutes

Option A. Current Model with Planned Reduction in DoD Support for Core Activities

DoD Goal	Implications of Business Model Option A
1. Impactful R&D	• Both core activities & industry-driven core projects in TRL/MRL 4 to 7 will be difficult to fund & narrow in impact. • Impact on the US industrial base adversely affected if institutes are driven to accept foreign funds.
2. Viable Business Plans	• Reduced core funding will drive focus on revenue generating offerings. • Institutes become less mission-driven. • Unfunded core offerings that don't generate revenue will be cut back or dropped.
3. Maximize Value Delivery	• Reduced DoD support of core activities will reduce influence on ecosystem and dual use value to DoD. • If industry does not make up the difference in funding, important ecosystems elements will lag.
4. Stakeholder Understanding	• Retains a role for DoD to collaborate with all stakeholders on core activities • Reduces DoD input to industry-led R&D projects if they no longer fit within funding constraints.
5. Capable Workforce	• Assumes DoD will continue to give priority to co-investment in broad EWD programs. • Increases dependence on customer funded EWD projects which have been scarce to date.

Strategic Long-Term Participation by DoD in Its Manufacturing USA Institutes

Option B. Current Model with with Improvements to Processes, Offerings, and Value-based Core Funding

DoD Goal	Implications of Business Model Option B
1. Impactful R&D	• Same as Option A, but mitigated by improvements that reduce the R&D contracting time and promote a stronger focus on DoD needs
2. Viable Business Plans	• Like Option A, retains DoD role as a co-investor at some level. • Risks reducing the scope of core activities despite more efficient use of resources. • Puts viability of some institutes at risk.
3. Maximize Value Delivery	• If core funding stays at projected Option A level, reduces influence on the ecosystem and its dual-use value to DoD. • Benefits from formal reviews of both short-term and long-term value at renewal points.
4. Stakeholder Understanding	• Includes several communication improvements that increase the breadth and depth of stakeholder understanding and engagement
5. Capable Workforce	• Same as A, plus improvements in cross institute coordination and adoption of best practices to enhance workforce education and training.

Strategic Long-Term Participation by DoD in Its Manufacturing USA Institutes

Option C. Transition to DoD Customer Model

DoD Goal	Implications of Business Model Option C
1. Impactful R&D	• Enhances the direct impact of Institute R&D on DoD needs through customer projects. • Gradual de-emphasis (not abandonment) of core activities reduces DoD's impact on the ecosystem. • Risk that project sponsors will favor early or late TRL/MRL projects, leaving a gap in the "valley of death."
2. Viable Business Plans	• Higher risk than options A or B, in that agency-directed projects must be generated to provide the funding currently received as core funding used to fund unencumbered institute projects. • The risk is reduced through the proposed 3-year transition period.
3. Maximize Value Delivery	• Improves integration of institutes with DoD needs, enhancing value delivery by increasing impact of R&D. • Adding an OTA contracting mechanism will accelerate the development & delivery of solutions for DoD. • Potential negative impact on core activities of value to the DoD based on available Option C funding.
4. Stakeholder Understanding	• Requires an ***expanded role*** for the OSD ManTech office to assist institutes in ***engaging customers*** in the Science and Technology (S&T) and Acquisition and Sustainment (A&S) communities
5. Capable Workforce	• Requires project-funded workforce education and training in projects that transition to dual-use supply chains and DoD's depot workforce

Strategic Long-Term Participation by DoD in Its Manufacturing USA Institutes

Option D. Transfer Core Responsibilities to the National Program Office at NIST

DoD Goal	Implications of Business Model Option D
1. Impactful R&D	• Loss of DoD influence on institute agendas. • Shift in emphasis from dual use to commercial impact. • DoD projects less likely.
2. Viable Business Plans	• Unsustainable if Congress does not fund. • Consequence would be loss of sources for DoD projects. • Reduced likelihood of dual use US supply chains in areas of DoD interest.
3. Maximize Value Delivery	• Optimized for commercial impact, not DoD (except projects).
4. Stakeholder Understanding	• Serious loss of connection with DoD customers.
5. Capable Workforce	• Focused on commercial workforce, not defense industry or depots.

Strategic Long-Term Participation by DoD in Its Manufacturing USA Institutes

Option E. No Core Funding of Institutes Beyond Initial Investment

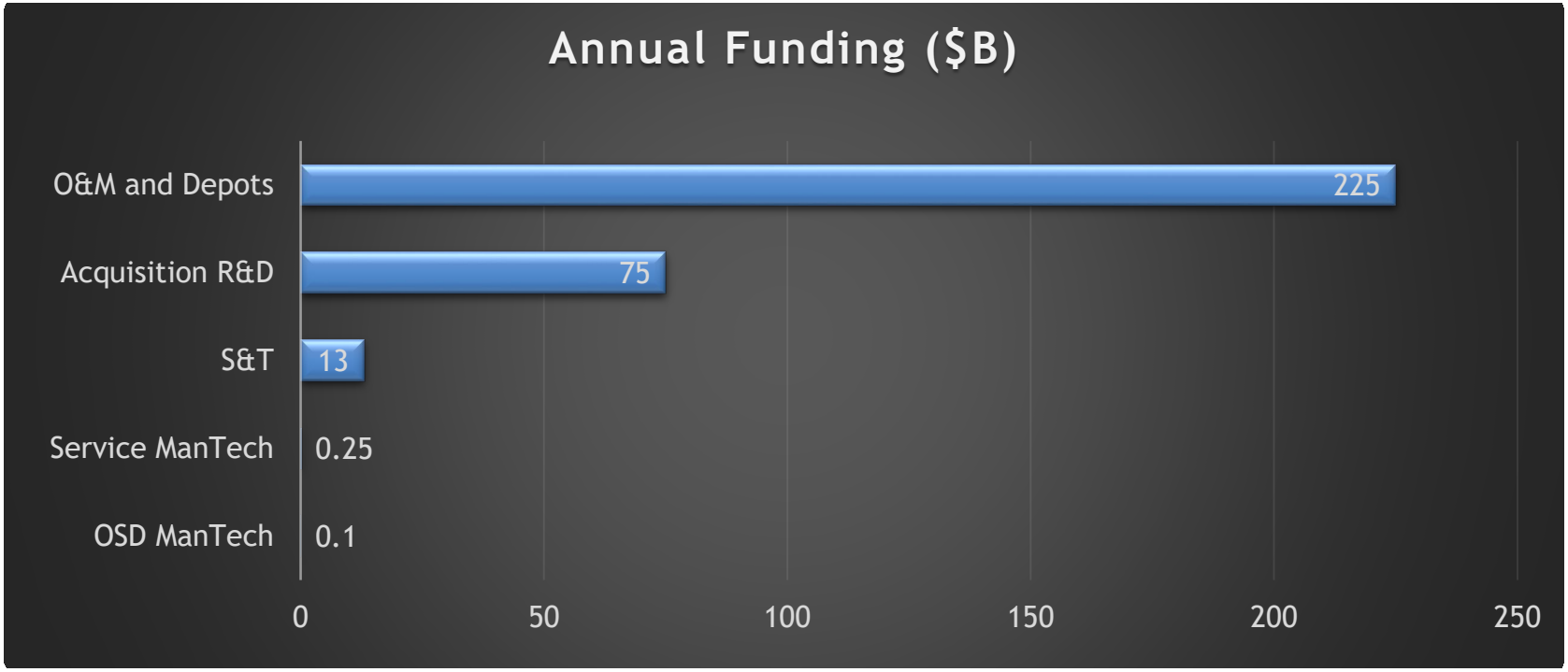
DoD Goal	Implications of Business Model Option E
• 1. Impactful R&D	• R&D will no longer be focused on DoD requirements; impact only where projects fit. • Loss of DoD influence on Manufacturing USA Institute agendas. • Transition path of technology not clear.
2. Viable Business Plans	• DoD no longer strategic partner in business plan. • Loss of sources for DoD R&D projects and long term risk to availability of US supply chains. • Few institutes will have a viable business plan without Federal core funding.
3. Maximize Value Delivery	• Agenda no longer focused on DoD requirements. • Institutes would have no assistance in connecting with DoD customers to maximize value.
4. Stakeholder Understanding	• DoD understanding of institutes' capabilities and innovations would occur only where institutes succeed on their own in making connections. • Institutes will have no DoD partner to assist with understanding of DoD needs.
5. Capable Workforce	• If workforce development survives at all, it may not be suitable for DoD needs.

Strategic Long-Term Participation by DoD in Its Manufacturing USA Institutes

Option	Addressable DOD Market	DoD Actions	Institute Actions
A	OSD ManTech	Support fewer core activities	Become more self-sustaining
B	OSD ManTech	Same as Option A, but improvements in core processes and network	Same as Option A, but improvements in core processes and network
C	Service ManTech	Facilitate through JDMTP	Understand ManTech needs
	S&T	Facilitate connections	Compete for S&T projects
	* Uses BAAs, sometimes OTAs	* S&T COIs, &D Top Ten Leaders	* Dev/ Market relevant capabilities
	* Front end of TRL/MRL 4-7	* Roadmap matching	* Use OTA business methods
	Acquisition R&D	Facilitate connections	Engage with PEOs
	* Increasing use of OTAs	* Create OTA interface	* Leverage OEM members, understand needs
	* Back end of TRL/MRL 4-7	* Broker transition agreements	* Be a competitive business, go fast
	O&M and Depots	Facilitate connections	Engage with Depots
	* Workforce development, modernization needs	* Create rapid contracting interface	* Understand needs
		* Depots sponsor projects	* Comptetive pricing
			* Fast, convenient contracting

Strategic Long-Term Participation by DoD in Its Manufacturing USA Institutes

Addressable DoD Markets



Strategic Long-Term Participation by DoD in Its Manufacturing USA Institutes

Recommendation:

Next Steps Towards Continuation of DoD Sponsored Institutes

- Based on the finding that the institutes provide value of benefit to DoD goals, the committee recommends that ***DoD conduct a formal review of each institute to support decisions on renewing, re-competing or canceling current agreements***.
- The review criteria should be tied to meeting the goals of the DoD strategic plan.
- The review should also examine whether the institutes' budgets are appropriate based on the stakeholders' assessments of the value of each institute offering.
- Procedures used by other DoD programs, such as DoD's University Affiliated Research Centers (UARCs), should be considered for these reviews.

Strategic Long-Term Participation by DoD in Its Manufacturing USA Institutes

Recommendation:

Long Term Engagement Model

- The committee recommends a DoD hybrid business model that combines:
  (1) **Option B** for continuation of core support (within budget constraints) &
  (2) **Option C** for expansion of DoD customer-sponsored projects and impact
- This combination should be implemented with contractual agreements (including an Other Transaction Authority (OTA) business interface) that support DoD's roles both as a continued co-investment partner in core activities and as a customer of R&D and workforce development.
- To succeed, it is essential that the institutes understand DoD-wide needs and develop and market their capabilities relevant to those needs.
- It is also essential that the relevant DoD stakeholder organizations understand and engage with the institutes as active members of the public-private partnerships.

Strategic Long-Term Participation by DoD in Its Manufacturing USA Institutes

Recommendation:

Improvements to Institute Operations

- ❑ **Linking DoD and Federal R&D**
- ❑ **Improving Acquisition and Contracting Policies**
- ❑ **Ensuring Project Relevance to DoD**
- ❑ **Developing Relevant Performance Metrics**
- ❑ **Understanding Barriers and Engaging the Entire Supply Chain**
- ❑ **Advancing Best Workforce Education Practices**
- ❑ **Improving Cross-Institute Collaboration and Networks**

Strategic Long-Term Participation by DoD in Its Manufacturing USA Institutes

Recommendation:

Senior DoD Support for Institute Engagement with DoD Customer Communities

- Options B & C engagement model requires an ***important expanded role*** for the OSD ManTech office to assist institutes in ***engaging DoD-wide customers***, *e.g.*, Science and Technology (S&T) and Acquisition and Sustainment (A&S).
- This role will require leadership support in OSD, Services and Agencies.
- The committee recommends top level communication from the Undersecretaries for R&E and A&S to the appropriate Service and Agency leaders:
  - Raise visibility of the institutes
  - Request points of contact for the OSD ManTech office to work with to increase engagement with the institutes.

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Recommendation:

Senior DoD Support for Institute Engagement with DoD Customer Communities (Cont'd)

- For **S&T**, this senior level communication should facilitate connections to explore intersections in technology roadmaps between DoD S&T roadmap leaders and the institutes.
- For the **Acquisition Community**, the communication should request focal points for a few specific target programs that might benefit from solutions the institutes can provide, similar to the programs of record that have been successfully identified as transition targets for the Navy ManTech program.
- For the **Sustainment Community**, the communication should facilitate discussions with the institutes regarding depots' needs for skilled workforce development and technology insertion opportunities.

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Potential Topics for Follow-On Consensus Study

1. Evaluation criteria for DoD Manufacturing USA Institutes
2. Relationship and linkage of the institutes to DoD and the federal research system
3. Institute linkage to DoD acquisition, O&M, and related processes and projects
4. Best practice adoption of education and workforce development (EWD) efforts
5. Current role and expansion of the cross-institute networks
6. Better integration of industry supply chains into institute demonstration facilities
7. International participation
8. Strategic assessment process of emerging, international advanced production capabilities

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Consensus Study Afterword: "Rationale for Continued Engagement with the Institutes"

- Manufacturing plays a key role in national security, providing equipment for the military & building a strong, resilient national economy.
- DoD requires technology and manufacturing leadership.
- DoD plays a key role in US manufacturing eco-system, purchasing 8% of US manufacturing output and accounting for 15% of total US R&D spending.
- Our key trading partners & competitors spend vastly more (8 to 50X) on maintaining their manufacturing base and investing in advanced manufacturing.
- A restoration of production innovation leadership is crucial to America's continued defense technology leadership.
- The public-private institute partnership model addresses structural problems in the innovation system and is an important route for DoD to continue to pursue.

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Questions?

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