NIST Advanced Manufacturing Series 600-8

Manufacturing USA Institute Evaluation: Renewal Process and Performance Standards

Office of Advanced Manufacturing

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NIST
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Introduction

Evaluation and Renewal Process for Manufacturing USA Institutes

Manufacturing USA's original 2014 legislative program authority prohibited renewing funding for institutes sponsored by the Department of Commerce (DOC). The Program's 2019 reauthorization removed this restriction, authorizing the National Institute of Standards and Technology (NIST) to renew institute support, subject to a "rigorous merit review," with each renewal period not longer than the initial period of award.[1] Following an initial five to seven-year cooperative agreement in which federal support must be cost-matched by at least a 1:1 match of non-federal co-investment over the performance period of the award, NIST-funded institutes are now eligible to apply for renewal of their support with the same 1:1 cost match obligations.

Statute-Based Rigorous Merit Review

NIST's Renewal Assessment Protocol is based on its statutory authority, which allows renewal of funding to DOC-sponsored institutes, subject to a "rigorous merit review."

The statute requires the review to incorporate metrics developed "to assess the effectiveness of the activities funded in making progress toward the purposes of the Program…including the effectiveness of Manufacturing USA institutes in advancing technology readiness levels or manufacturing readiness levels," and to "establish standards for the performance of Manufacturing USA institutes that are based on the metrics developed." The review must consider the institute's "progress in meeting the standards of performance established." [2]

[1] 15 U.S.C. § 278s(e)(2)(B)(i), as amended. http://uscode.house.gov/view.xhtml?req=(title:15 section:278s edition:prelim)

[2] Section 278s(e)(5), as amended. http://uscode.house.gov/view.xhtml?req=(title:15 section:278s edition:prelim)

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Renewal Process

Assessment Elements

The NIST Director makes the final determination of whether an institute will be offered renewed funding. The Director's determination is informed by an evaluation of institute performance that includes the following elements:

- Institute performance metrics and associated NIST performance standards for renewal developed in alignment with performance goals for DOC institutes that flow from the Statutory Purposes and Strategic Goals of Manufacturing USA.
- A written report, submitted by the institute before the assessment, detailing their performance in support of the NIST's performance standards during the current cooperative agreement. The report uses both quantitative metrics and a narrative to describe the institute's activities and impacts, focusing on technical, educational, and workforce efforts during the performance period. In addition to summarizing the institute's consortium model, membership base, organizational structure, and leadership, the report presents the institute's vision for the next five years. Designed to serve as the foundation for the institute's presentations during the external assessment described below, it ensures that the assessment panel is briefed on areas critical to the success of the institute, including:
    - The extent of the industry-led ecosystem that has been built across its members;
    - A description of its portfolio of industrially focused technical and workforce development projects, investments, and programs, including partnerships with key industry members;
    - A breakdown of the non-federal investment it has attracted to its technical and workforce activities, and of cost matching of non-federal to federal funds; and
    - Its role in accelerating the commercialization of technologies developed by large, medium, and small-sized manufacturing members.
- An assessment of the institute's performance by an independent external evaluation panel, as described in the next section. Following the panel's in-person or virtual review, the program management team prepares a summary of the panel's assessment and discussion. It is reviewed by the panel and provided to the NIST Director along with the internal summary of the institute's compliance with terms of the federal award described below. The Director's determination to offer a renewal of funding is informed by the external panel assessment, but is not bound by it, provided the Director documents sufficient justification for a divergent opinion on the institute's performance.
- An internal summary of the institute's compliance with its award conditions to date. Prepared by the federal program management team, the summary notes any performance issues or failures in compliance with the cooperative agreement award conditions to date. The summary also evaluates the quality of the institute's financial accounting and reporting, and its diligence in

administering subawards, including tracking non-federal cost-match as required by statute. It describes the overall competence of the institute's management of its initial award, coupled with the federal program management team's confidence in the institute's ability to manage a renewal award. The internal summary also analyzes the contribution the institute has made to NIST's mission and other benefits to NIST that have been realized through institute sponsorship.

External Evaluation Process

The external evaluation process is led by a panel of experts who are expected to evaluate institute progress against each of the NIST performance standards (see Appendix 1). Approximately eight panelists are chosen from organizations that are not institute members but represent critical stakeholders for the institute's success. These include large and small-to-medium industry members, academia, and other non-profits, as well as federal stakeholders who are not directly involved with the institute's oversight or operations. A member of NIST's leadership team not associated with institute management serves as the non-voting panel chair.

During a briefing two weeks prior to the event, NIST provides the panel a document prepared by the federal program management team that describes the Manufacturing USA statutory purposes, NIST's sponsorship of the institute, and an overview of the renewal evaluation protocol. Excluding travel time, NIST estimates panelists will devote a total of 16 hours over a six-week period serving as external evaluators. This estimate includes time spent reading all documents prior to the review, attending the assessment meeting, and reviewing the panel summary report prepared by NIST following the assessment. For an in-person event, travel times must also be included in the time commitment expected of panelists.

The assessment, which may be conducted in-person or virtually, is supported by the institute-prepared pre-assessment report, provided to the panelists several weeks prior to the event. During four sessions on the first day of the two-day evaluation (see Table 1), institute leaders present the structure, activities, and impacts to date, supported by quantitative metrics and narrative evidence. Panelists are encouraged to ask clarifying questions in real-time, and to also indicate questions that should be addressed more fully on the second day, during an in-depth, two-hour question-and-answer session with institute leadership.

On the second day of the evaluation, institute leaders address any deferred questions, and panelists probe more deeply into areas of interest or concern. The panel then holds a closed session to discuss key learnings from the institute presentation and from the question-and-answer session. Panelists are also encouraged to offer any recommendations for increasing the institute's impact in the future, should NIST choose to renew funding. The NIST program management team documents the panel discussion and recommendations to inform the NIST Director's review. The information also informs the institute's leadership as it plans for the next performance period and for subsequent program reviews.

For the panel evaluation, the non-voting chair facilitates discussion of each NIST performance standard (Appendix 2). Through an anonymous virtual engagement platform, each panelist then uses the performance assessment rating scale shown in Figure 1 to rate how well the institute has demonstrated progress for each standard. If the ratings are widespread, the chair may reopen discussion and the panelists have opportunity to update ratings, if appropriate.

Table 1. Sample Meeting Agenda for Institute Renewal Assessment

	Time	Lead	Purpose	Topic
Day 1	10:30 - 10:50	Panel Chair	Introductions	Institute, NIST, and Panel
	10:50 - 11:30	Institute	Section I	Institute describes how it fosters a strong and engaged member community of leading organizations
	11:30 - 12:30	Institute	Section II	Institute describes how it develops, accelerates, and adopts cutting-edge technologies
	12:30 - 1:00	BREAK		
	1:00 - 1:45	Institute	Section III	Institute describes how it builds national capacity to meet talent, training, and workforce development needs
	1:45 - 3:00	Institute	Section IV	Institute describes how it increases competitiveness of U.S. manufacturing in its sector
		Panel Chair	adjourn	
Day 2	10:30 - 12:30	Panel Chair	Questions and Answers	Panelists question the institute
	12:30 - 1:00	BREAK		
	1:00 - 2:55	Panel Chair	Panel Closed Session	Panel determines institute progress against NIST Performance Standards, and makes recommendations for improving institute performance
	2:55 -3:00	NIST Program Management team	Wrap up	NIST's next steps, timeline for panel review of report
		Panel Chair	Adjourn	

NIST Performance Standards for Renewal, Based on Institute Performance Metrics

Institute Performance Metrics. NIST has established performance goals, objectives, and performance indicators for DOC-sponsored Manufacturing USA institutes that are based on the Manufacturing USA Program's Strategic Goals[3] and Program Objectives for DOC-sponsored Institutes, both of which flow from the statutory purposes of the program.[4] To allow institutes the flexibility to respond to the priorities of their industry stakeholders, NIST does not set performance *targets* for these indicators, but rather evaluates year-to-year data to ensure that the institute is continuously improving its capabilities and impact. The current set of performance metrics for DOC-sponsored institutes, piloted in December 2020 for the National Institute for Innovation in Manufacturing Biopharmaceuticals (NIIMBL) and subsequently revised for future institutes, are included in Appendix 1.

Appendix 2 documents the NIST Performance Standards (NPS) used for renewal assessment. These standards are based on the institute performance goals derived from the Manufacturing USA program's strategic goals and objectives for DOC-sponsored institutes. Each DOC institute performance goal has a corresponding renewal standard, as shown in the example metric and standard in Table 2. For the

[3] *Manufacturing USA Strategic Plan*, Advanced Manufacturing National Program Office, National Institute of Standards and Technology, (November 2019). https://www.manufacturingusa.com/reports/manufacturing-usa-strategic-plan

[4] 15 U.S.C. § 278s(b)(2), as amended. http://uscode.house.gov/view.xhtml?req=(title:15 section:278s edition:prelim)

external evaluation, institutes are required to present both quantitative data and qualitive evidence that support the assessment of progress in meeting each standard.

Table 2. Sample Metric: Alignment of NIST's Renewal Performance Standards with Institute Performance Goals

Performance Goals for DOC Institutes	NIST Performance Standards for Renewal Assessment
INST 1.1-1 Strengthen partnerships with critical U.S. stakeholders	NPS 1.1-1 Year-to-year membership trends demonstrate that the institute has established a sustainable national innovation ecosystem with representation from all critical stakeholders within the industry sector.
INST 1.1-2 Demonstrate sustained engagement by U.S. industry in institute's technical activities	NPS 1.1-2 Data indicates substantial and sustained engagement and co-investment by U.S. industry in institute technical activities.

Performance Assessment Rating Scale: The external evaluation panel's assessment informs the NIST Director's decision to offer a renewal of funding. The evaluators assess the institute's performance for each NIST Performance Standard (e.g., NPS 1.1-1 and 1.1-2, as shown in Table 2) according to the scale presented in Figure 1.

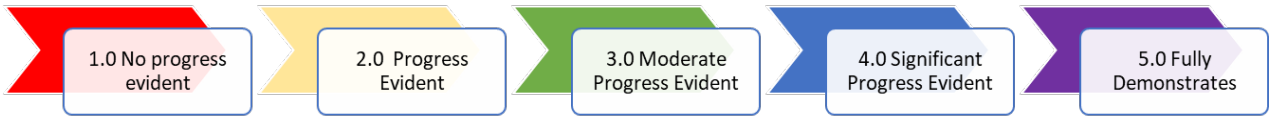

Figure 1. Institute Performance Rating Scale

For each Performance Standard, the evaluation panel can reach two outcomes:

1. If no more than one panelist indicates a rating of 1.0, the panel concludes that the institute has met the performance standard.
2. If more than one panelist indicates a rating of 1.0 for that standard, the panel concludes that the institute has NOT met the performance standard.

NIST preliminarily considers the institute as meeting each performance standard if the external evaluation panel consensus rating shows "progress evident" or above, with no more than one panelist indicating "no progress." However, NIST may consider the institute as having met a standard even if more than one panelist indicates "no progress evident" for a given performance standard (or consider a standard not met despite a panel consensus), provided that NIST sufficiently documents the reason for its determination.

Director's Renewal Assessment Report and Outcomes

The consensus of the external evaluation panel regarding the extent to which the institute has made progress against the performance standards for renewal is summarized in a brief report to the NIST Director that is prepared by the NIST program team post-assessment. The individual panelist ratings are also provided in a summary graph. The report lists any significant recommendations or concerns expressed by evaluators for consideration during the next performance period should NIST renew

funding for the institute. This report to the Director also includes the internal program assessment of the institute's compliance with the terms of the award during the current period of performance and any benefits to NIST realized through the sponsorship of the institute.

If the process above supports a decision by the NIST Director to offer renewal of funding, that decision is documented through a memo from the NIST Director. That determination is followed by the release of a non-competitive Request for Application inviting the institute to submit a proposal for consideration of renewal of funding. As with any request for NIST funding, the institute's renewal proposal is evaluated in a separate rigorous merit review process.

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Lessons Learned

Feedback from the external evaluators indicates that the renewal assessment protocol piloted for the NIIMBL institute in May 2020 was rigorous and effective. NIST's institute renewal process drew on knowledge of best practices of other programs, including the National Science Foundation's evaluation process for Engineering Research Centers and NIST evaluations of Manufacturing Extension Partnership Centers. The process applied these practices to the specific needs of managing Manufacturing USA institutes.

There are four areas that present opportunities to refine the process in preparation for future institute renewals:

1. Timing considerations
2. Correction and re-evaluation of institute deficiencies
3. Consideration of institute age in performance metrics and outcome measures
4. Consideration of industry-sector characteristics in evaluating institute performance.

Timing Considerations

Ideally, renewal assessments should be conducted in the first quarter of the last year of an institute's period of performance to ensure that there is time for the renewal application process and new funding agreement to be negotiated prior to the end of the current award. However, many factors can influence the desired timing of the renewal assessment, including alignment of the institute fiscal year with availability of funding in the current federal fiscal year, likelihood of a no-cost extension to expend obligated funds within the current award, and potential disruptions in federal budget cycles.

NIST recommends considering timing for the renewal assessment 15 months prior to the end of the current award. This timing provides a more fully informed review by allowing the assessment to be as late as possible in the period of performance, while still providing sufficient time for the full renewal process.

Correction of Deficiencies

The statute authorizing renewal of funding for DOC-sponsored Manufacturing USA institutes allows an institute one year to correct deficiencies noted in the merit assessment. Prior to the next renewal assessment of a DOC-sponsored institute, NIST should amend the renewal protocol to explicitly describe how deficiencies in meeting performance standards will be communicated to the institute, and how the potential re-assessment will be conducted.

In considering deficiencies, the institute strategy for incremental change vs. high-risk, high-reward technology investments must be considered to ensure that the institute is not unintentionally penalized for focusing on transformational technologies that may not show progress on the same timelines as incremental change. Also, acceptable failures may result from events outside of the institute's control, such as the closures of universities during the pandemic. While an institute being evaluated in a normal cycle has years to internally assess weaknesses prior to the renewal assessment and work on mitigation

strategies with federal program teams, NIST should be situationally aware of potential failures and ensure that institutes have clear guidance on how much attention should be devoted to a specific performance standard to the detriment of other activities that may have greater impact.

Consideration of Institute Age in Evaluating Performance

The NIST scale for rating the institute's performance (Figure 1) aligns with statutory language that instructs NIST to evaluate the extent to which the institute is *making progress* toward the purposes of the program. It is expected that an institute will have made less progress at the time of its first renewal than at the time of subsequent renewals. For example, during its first renewal assessment after 4 years of performance, an institute may just be moving the needle for outcome measures such as intellectual property created or commercialization of institute-developed technology, while an institute reassessed for renewal in year 9 or 10 would be expected to have more significant outcomes for these measures. In developing future institute performance indicators, outcome measures, and performance standards, NIST recommends taking into account the age of the institute to allow for these expected age-dependent differences.

In the initial trial of the Manufacturing USA Renewal Protocol, assessment panelists were enthusiastic about NIIMBL's future given the progress that had been demonstrated during the first four years of performance. Importantly, the consensus expressed to NIST was that the lower ratings for some of the performance standards were a reflection of the relative youth of the institute, and not a reflection on the strategy or execution of what the panel described as an "ambitious and high-performing organization." It is critical that comments like this are carefully documented in the renewal report provided to the NIST Director to ensure that a rationally lower rating aligned more with the relative maturity of the institute is not superficially interpreted as a performance failure.

Additionally, while this did not factor into NIIMBL's renewal, panelists noted that many of the performance metrics established were more appropriate for institutes in their third or fourth year of operation and are unlikely to offer a realistic view of institute performance in the first two years after launch, given that the first one to two years are necessarily focused on building a productive partnership and efficient infrastructure needed to execute institute strategic goals. Panelists suggested that initial start-up performance metrics could be used for new institutes, with a phase-in for reporting obligations for the more mature set of metrics in later years.

Consideration of Industry-Sector Characteristics in Evaluating Performance

Each Manufacturing USA institute must align technical and workforce activities to meet the needs of the industry sector served. NIST should ensure that performance metrics are flexible enough to allow institutes to pursue the industry priorities of their sector, which may differ in factors such as regulatory environment, risk-tolerance, ownership models, existing connection with U.S. universities, cultural view of the value of external partnerships, degree of familiarity with federal funding requirements, and timelines to fully deliver industrial capability.

It is unrealistic to expect NIST-sponsored institutes to produce similar quantitative outcome measures on similar timelines regardless of these industry sector differences. Because performance metrics form the basis for the performance standards used in assessing institutes for renewal, NIST should take care to ensure that institutes being evaluated for renewal are held to standards appropriate for a given industry.

NIST should also be careful about comparing performance across institutes in different sectors. For example, NIST cannot fruitfully compare the number of patent disclosures for an institute operating in an industry that traditionally relies on patents for intellectual property protection with an institute operating in a sector that does not.

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Appendix 1. Performance Indicators and Measures Stem From Institute Performance Goals

The performance indicators and outcome measures used to evaluate the DOC institutes are derived from the Performance Goals for DOC institutes. Appendix 2 shows the alignment of the Performance Goals for DOC institutes with the Goals and Purposes of the Program.

These institute performance indicators and outcome measures were piloted for the NIIMBL renewal assessment. They will be re-evaluated and updated for future institute renewal assessments.

Table 3. Commerce Institute Performance Goals, Indicators, and Outcome Measures

Performance Goals for DOC Institutes	Institute Performance Indicators	Outcome Measures
INST 1.1-1 Strengthen partnerships with critical U.S. stakeholders	INST 1.1-1a Number of members (total and by member type)	(i) Number of large manufacturers (more than 500 employees)
		(ii) Number of small manufacturers (500 or fewer employees)
		(iii) Number of other entities (government members, government laboratories, not-for-profit organizations, etc.)
		(iv) Number of academic members (universities, community colleges, etc.)
		(v) Total number of members (all member types)
	INST 1.1-1b Percentage of members retained annually	(i) % of large manufacturers retained (more than 500 employees)
		(ii) % of small manufacturers retained (500 or fewer employees)
		(iii) % of other entities retained (government members, government laboratories, not-for-profit organizations, etc.)
		(iv) % of academic members retained (universities, community colleges, etc.)
		(v) Total % of members retained (all member types)
	INST 1.1-1c Geographic Diversity of Members	(i) Total Number of States Represented by Member Organizations
INST 1.1-2 Demonstrate sustained engagement by U.S.	INST 1.1-2a Member participation on technical project	(i) % of large manufacturers participating on technical project teams (more than 500 employees)
		(ii) % of small manufacturers participating on technical project teams (500 or fewer employees)

industry in institute's technical activities	teams (total and by member type)	(iii) % of other entities participating on technical project teams (government members, government laboratories, not-for-profit organizations, etc.)
		(iv) % of academic members participating on technical project teams (universities, community colleges, etc.)
		(v) Total % of partners participating on project teams (all member types)
	INST 1.1-2b Industry co-investment in Technical Projects	(i) Dollar value of co-investment by Industry (any size) members in technical projects during fiscal year
		(ii) Total Dollar Value of Co-Investment by Industry (any size) in technical projects since institute launch
INST 1.2-1 Demonstrate maturation of advanced manufacturing technology from laboratory capabilities to industrial readiness	INST 1.2-1a Size of technical portfolio	(i) Number of technical projects ongoing in fiscal year (projects completed, started, and spanning fiscal year)
		(ii) Total number of technical projects funded by Institute since launch
	INST 1.2-1b Value of technical portfolio	(i) Total dollar value of technical portfolio represented by ongoing projects (includes institute expenditures and partner cost-share)
		(ii) Total dollar value of technical portfolio represented by all projects initiated since institute launch (includes institute expenditures and partner cost-share)
	INST 1.2-1c Technical milestones met	(i) % of Technical milestones met in all ongoing technical projects during fiscal year
		(ii) % of Technical milestones met for all projects initiated since institute launch
INST 1.2-2 Develop robust infrastructure for executing project calls and managing ongoing technical workstreams	INST 1.2-2a Number of project calls executed	(i) Total number of technical project calls launched in fiscal year
		(ii) Total number of technical project calls completed in fiscal year
		(iii) Total number of technical project calls completed since institute launch
INST 1.3-1 Demonstrate institute engagement and leadership in advancing sector-specific needs for industrialization of advanced manufacturing technology	INST 1.3-1a Leadership in sector-specific technical workshops and roadmapping	(i) Number of technical workshops, technology-focused webinars, and roadmapping events hosted or co-hosted in fiscal year
		(ii) Total number of technical workshops, technology-focused webinars, and roadmapping events held since institute launch
	INST 1.3-1b Technical and roadmapping publications	(i) Number of technical roadmaps published by institute since launch
		(ii) Number of technical publications from institute-funded projects in fiscal year
		(iii) Total number of roadmaps and technical publications from institute-funded projects since institute launch
	INST 1.3-1c Sector leadership in technical programs	(i) Number of active institute-led technical projects

INST 1.3-2 Substantively engage with external industry and policy forums	INST 1.3-2a Visibility of institute leadership in industrial ecosystem	(i) Number of events with prominent inclusion of institute leaders (i.e., plenary and keynotes, panel discussants) in fiscal year
		(ii) Total number of events with prominent inclusion of institute leaders (i.e., plenary and keynotes, panel discussants) since institute launch
	INST 1.3-2b Institute leadership in ecosystem's innovation strategy	(i) Number of authored or co-authored opinion pieces or white papers published by institute leadership in fiscal year
		(ii) Total number of authored or co-authored opinion pieces or white papers published by institute leadership since institute launch
INST 2.1-1 Increase access by institute members to industrially relevant materials and equipment	INST 2.1-1a Use of institute facilities by partners	(i) Number of members using institute facilities in fiscal year
	INST 2.1-1b Shared materials	(i) Number of material transfer agreements facilitated by institute during fiscal year
		(ii) Total number of material transfer agreements facilitated by institute since institute launch
	INST 2.1-1c Testbed access	(i) Number of shared testbeds within institute partnership
		(ii) Number of members accessing shared testbeds in fiscal year
INST 2.1-2 Promote partnerships among diverse members on technical project teams	INST 2.1-2a Diversity of technology partnerships	(i) % of active project teams with partners from different membership tiers
	INST 2.1-2b Federal engagement in technical activities	(i) Number of federal agency stakeholders engaged in institute technical activities during fiscal year
INST 2.2-1 Establish institute infrastructure and activities to provide substantive opportunities to foster knowledge sharing within industry sector ecosystem	INST 2.2-1a Participation in institute roadmapping and technical activities	(i) Number of members attending roadmapping and technical activities in fiscal year
		(ii) Number of non-members participating in roadmapping and technical activities in fiscal year
		(iii) Total number of participants (member and non-member) in institute's roadmapping and technical activities in fiscal year
INST 2.2-2 Develop and maintain virtual industrial commons infrastructure for shared learning	INST 2.2-2a Use of institute's virtual infrastructure	(i) Number of individuals with member portal access
		(ii) Number of individuals subscribed to institute newsletters
		(iii) Number of times institute's portal is accessed in fiscal year
INST 2.3-1 Demonstrate engagement across	INST 2.3-1a	(i) Number of co-sponsored/co-hosted activities or publications with other Manufacturing USA institutes since institute launch

Manufacturing USA institutes to share cross-cutting expertise	Engagement with other Manufacturing USA institutes	(ii) Number of other Manufacturing USA institute staff attending institute activities since institute launch
INST 2.3-2 Demonstrate engagement with external cross-cutting technical organizations and initiatives	INST 2.3-2a Engagement with cross-sector technical consortia or professional organizations and initiatives	(i) Number of co-sponsored/co-hosted activities or publications with entities representing complementary expertise since institute launch
INST 3.1 Develop an education and workforce development (EWD) portfolio that strengthens industrially relevant skills and knowledge of the advanced manufacturing workforce	INST 3.1a Size of workforce development portfolio	(i) Number of EWD projects ongoing in fiscal year (projects completed, started, and spanning fiscal year)
		(ii) Total number of EWD projects funded by institute since launch
	INST 3.1b Value of EWD portfolio	(i) Total dollar value of EWD represented by ongoing projects (includes institute expenditures and partner cost-share)
		(ii) Total dollar value of EWD portfolio represented by all projects initiated since institute launch (includes institute expenditures and partner cost-share)
	INST 3.1c Participation in EWD activities	(i) % of member organizations engaged in workforce development projects (all member levels) in fiscal year
		(ii) % of active EWD project teams with at least one industry member in fiscal year
		(iii) Individuals participating in institute-developed EWD training at all levels in fiscal year
		(iv) Individuals completing an institute-aligned professional development certification, apprenticeship, or training program in fiscal year
		(v) Number of institute initiatives focused on diversifying talent pipeline since institute launch
INST 3.2 Support integration of tools, resources, and initiatives into regional, state, and local EWD ecosystems	INST 3.2a Institute-facilitated access to training resources	(i) Number of training courses linked in member portal at end of fiscal year
		(ii) Number of times Education and Training Resources portal is accessed in fiscal year
	INST 3.2b Strategic Partnerships with organizations promoting education and workforce development initiatives	(i) Number of co-sponsored/co-hosted activities or publications with other organizations promoting EWD initiatives in fiscal year
INST 4.1 Demonstrated non-federal leverage in institute's technical and workforce portfolios	INST 4.1a Institute co-investment	(i) Dollar value of total co-investment from all non-federal sources in institute in fiscal year

INST 4.2 Develop, assess, and renew plan for institute's sustainability	INST 4.2a Sufficiency of institute sustainability plan	(i) Current institute sustainability plan sufficient according to NIST-sustainability criteria (met/unmet)
		(ii) Institute sustainability plan reviewed/updated within fiscal year (met/unmet)
	INST 4.2b Relationships with other funding entities	(i) Dollar value of funding received from non-federal funding organizations since institute launch
		(ii) Dollar value of funding received from federal sources outside of primary award funding since institute launch

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Appendix 2. Institute Performance Standards Stem From Manufacturing USA Strategic Goals

The NIST Performance Standards (NPS) used for assessing institute performance during renewal assessments are based on institute performance goals derived from Manufacturing USA strategic program objectives for DOC-sponsored institutes and program strategic goals.[5] Those goals support the program's statutory purposes,[6] as shown below.

Manufacturing USA Strategic Goals	Strategic Program Objectives for DOC-sponsored Institutes*	Performance Goals for DOC Institutes	NIST Performance Standards for Renewal Assessment
GOAL 1: Increase the competitiveness of U.S. manufacturing (supports statutory purposes A, B, I)	Objective 1.1 Grow an end-to-end, inclusive ecosystem to support advanced manufacturing production capabilities in the United States.	INST 1.1-1 Strengthen partnerships with critical U.S. stakeholders	NPS 1.1-1 Year to year membership trends demonstrate that the institute has established a sustainable national innovation ecosystem with representation from all critical stakeholders within the industry sector.
	Objective 1.2 Establish and support a robust technical research portfolio of innovative projects to expand advanced manufacturing capabilities.	INST 1.1-2 Demonstrate sustained engagement by U.S. industry in institute's technical activities	NPS 1.1-2 Data indicates substantial and sustained engagement and co-investment by U.S. industry in institute technical activities.
		INST 1.2-1 Demonstrate maturation of advanced manufacturing technology from laboratory capabilities to industrial readiness	NPS 1.2-1 Data indicate that the institute investments will promote the transition of advanced manufacturing technology from laboratory into industrial capabilities.
		INST 1.2-2 Develop robust infrastructure for executing project calls and managing ongoing technical workstreams	NPS 1.2-2 Evidence indicates that the institute has robust capabilities to establish and manage a broad technical portfolio.

[5] *Manufacturing USA Strategic Plan*, Advanced Manufacturing National Program Office, National Institute of Standards and Technology, (November 2019). https://www.manufacturingusa.com/reports/manufacturing-usa-strategic-plan

[6] 15 U.S.C. § 278s(b)(2), as amended. http://uscode.house.gov/view.xhtml?req=(title:15 section:278s edition:prelim)

	Objective 1.3 Provide leadership in activities that require industry sector-wide engagement to support advanced manufacturing priorities and expand regional and national impact.	INST 1.3-1 Demonstrate institute engagement and leadership in advancing sector-specific needs for industrialization of advanced manufacturing technology	NPS 1.3-1 Data indicates that the institute is an ecosystem leader in promoting industrialization of advanced manufacturing technology
		INST 1.3-2 Substantively engage with external industry, technical, academic and policy forums	NPS 1.3.2 Evidence indicates that the institute is viewed as a domestic thought leader for advanced manufacturing policy
GOAL 2: Facilitate the transition of innovative technologies into scalable, cost-effective, and high-performing domestic manufacturing capabilities (tracks to statutory purposes C, D, F, H, I)	Objective 2.1 Enable Access by U.S. manufacturers to validated manufacturing capabilities, industrially relevant materials, equipment, and capital-intensive infrastructure to encourage growth in the U.S. manufacturing base.	INST 2.1-1 Increase access by institute members to industrially relevant materials and equipment	NPS 2.1-1 Evidence demonstrates that the institute is increasing access to industrially relevant materials and equipment.
		INST 2.1-2 Promote partnerships among diverse members on technical project teams	NPS 2.1-2 Data demonstrates that the institute is promoting partnerships that link members across the innovation ecosystem.
	Objective 2.2 Facilitate documentation and nationwide sharing of best practices for addressing advanced manufacturing challenges and implementing solutions.	INST 2.2-1 Establish institute infrastructure and activities to provide substantive opportunities to foster knowledge sharing within industry sector ecosystem	NPS 2.2-1 Evidence indicates that the institute is promoting knowledge sharing across the industrial ecosystem.
		INST 2.2-2 Develop and maintain virtual industrial commons infrastructure for shared learning	NPS 2.2-2 Data indicates that the institute is providing infrastructure to share learning across the ecosystem.
	Objective 2.3 Encourage cross-sector collaborations to accelerate manufacturing technologies, strengthen domestic supply chains and foster regional innovation ecosystems.	INST 2.3-1 Demonstrate engagement across Manufacturing USA institutes to share cross-cutting expertise	NPS 2.3-1 Evidence demonstrates that the institute is connecting expertise across the Manufacturing USA network.
		INST 2.3-2 Demonstrate engagement with external cross-cutting technical organizations and initiatives	NPS 2.3-2 Evidence demonstrates that the institute is engaging with external organizations for access to cross-cutting technical expertise.

GOAL 3: Accelerate the development of an advanced manufacturing workforce (supports statutory purposes A, B, C, E, H)	Objective 3.1 Establish a robust and industrially relevant workforce development portfolio to increase advanced manufacturing pipeline capacity and skill sets	INST 3.1 Develop an EWD portfolio that promotes partnering opportunities and participation in EWD activities that strengthen the Adv. Manufacturing Workforce	NPS 3.1 Evidence indicates that the institute's EWD portfolio promotes partnering and participation in EWD activities that strengthen the advanced manufacturing workforce.
	Objective 3.2 Support development and integration of advanced manufacturing skills training and certification opportunities into regional, state, and local EWD ecosystems to meet industry sector needs.	INST 3.2 Support integration of tools, resources, and initiatives into regional, state, and local EWD ecosystems.	NPS 3.2 Evidence indicates that institute is increasing access to resources and developing strategic partnerships with traditional EWD providers.
GOAL 4: Support business models that help the Manufacturing USA institutes become stable and sustainable after the initial federal startup funding period. (Tracks to statutory purpose G)	Objective 4.1 Establish membership structures that promote shared-risk and shared investment in institute activities	INST 4.1 Demonstrated non-federal leverage in institute's technical and workforce portfolios	NPS 4.1 Data demonstrates that the institute's technical and workforce portfolios are substantially supported through non-federal resources
	Objective 4.2 Establish realistic institute sustainability models to ensure continuity of operations beyond the initial federal funding period.	INST 4.2 Develop, assess, and renew plan for institute's sustainability	NPS 4.2 Evidence indicates that the institute has planned for sustainable operations and is cultivating relationships to leverage funding from sources outside the primary award.

*Objectives for DOC-sponsored institutes will inform the next triennial Manufacturing USA Strategic Plan.

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