

NARRATIVE  
NETWORKS EVALUATION PLAN 2012—2014

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### ***Introduction***

For fifteen years, the Maricopa Advanced Technological Education Center (MATEC) has held an exceptional position within the National Science Foundation portfolio for Advanced Technological Education. MATEC was one of the first funded ATE programs, initially as an ATE Center of Excellence and later as a National Resource Center (NetWORKS). In many ways, MATEC and NSF-ATE have grown up together, sharing a variety of intentional and unanticipated learning experiences. Now, as MATEC moves into its final funding cycle, from 2012-2014, it is appropriate for the program evaluation to embody a retrospective, current and prospective analysis.

This Narrative accompanies the 2012-2014 NetWORKS Evaluation Plan, as an appendix of explanation for evaluating DUE grant # xxx. Beyond the particular goal of evaluating NetWORKS, this evaluation will raise issues significant to other senior ATE programs that will be culminating in the near future, as ATE seeks to support other institutions and technologies. It is expected that this evaluation will explore alternatives for MATEC and NSF-ATE as senior programs culminate, so that the lessons MATEC and her senior sisters have learned through 12 years as pivotal hubs of advanced technological education are not lost.

### ***An Historical Context***

MATEC earned its initial funding from the National Science Foundation in 1996, to establish a National Center of Excellence for education in Semiconductor Manufacturing Technology. With its industry and education partners, MATEC developed programs, materials, and training that enabled students, faculty, and technicians to continuously master the evolving competencies in science, mathematics, technology, and communications required by the workforce of the semiconductor, electronics, and advanced manufacturing industries.

In 2005, MATEC became a National Resource Center, branded as NetWORKS, the purpose of which has been to create, share, and promote digital resources and faculty professional development for technical audiences (semiconductor manufacturing, automation, electronics, and alternative/renewable energies), as well as for broader audiences in education and workforce development (curriculum design, pedagogy, assessment and evaluation). The efforts of NetWORKS staff have generally concentrated on three highly visible elements: (a) developing a Digital Library of classroom ready resources that are current, relevant, and easy to implement at local sites; (b) producing and hosting webinars related to advanced technological education; and (c) building communities of practitioners and employers to share up-to-date information about emerging technologies and education issues.<sup>i</sup>

For its 2012-2014 funding cycle, NetWORKS plans to continue these efforts and, at the same time, develop strategies so its products and processes are sustainable after NSF-ATE funding ends. To that end, the NetWORKS National Visiting Committee (NVC)

convened on March 7-8, 2012. Chaired by Rachael Bower of ATE Central, and composed of professionals who were experts in education as well as industry, the NVC tactfully offered guidance for NetWORKS' activities in its final 24 months.

In the following section, this Narrative offers explanation of NetWORKS evaluation elements for 2012-2014. In this Narrative, goals are extracted from the MATEC NetWORKS Proposal 10-539, which was designed for a 4-year grant. From 2010-2011, NSF-ATE postponed a decision on this proposal, agreeing in October 2011 to award two years' of funding for essentially the same set of goals. Strategies to make that adaptation were the subject of thoughtful discussion during the NVC meeting, and are included in this Narrative. As the NVC noted, NetWORKS is already six months or one-quarter into its final funding phase. While this Evaluation Plan encompasses all of the goals and objectives of the NetWORKS proposal for the 2010 round of ATE funding, it is likely that the NVC and NetWORKS staff will revise those goals due to the very truncated timeline.

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**Goal 1:** Expand the contribution to and usage of the Digital Resource Library by the education community. This goal is focused on developing an enhanced *Collection* of Digital Library resources and services.

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NetWorks has engaged in innovative forms of collecting, disseminating and hosting resources through its Digital Library on topics for emerging technologies, program design, curriculum and pedagogy, and program evaluation. Utilization of its resources has increased markedly over this time, and NetWorks' ability to measure use has likewise improved. NetWORKS now houses or hosts 1500 easily accessible separate resources or tools that are ready for classroom or professional development use.

The distinction between "hosting" and "housing" is critical. Some materials have been developed by staff at NetWORKS or in partnership with experts in cutting edge technologies. These are "housed" in NetWORKS Digital Library. In other cases, learning objects are "housed" at other sites, and NetWORKS "hosts" links to those sites.

With such a large collection, there are at least three challenges that NetWORKS plans to resolve in the coming months. The first is that materials become dated. As its name suggests, the Advanced Technological Education program focuses on *emerging* technologies, so that materials quickly become obsolete as new facets are discovered.

The second challenge is that links on the NetWORKS Digital Library suffer URL decay – other organizations or websites close or open or change URL. In many cases, NetWORKS only learns of these changes when a user reports it to NetWORKS. A third challenge is to encourage submissions of materials, so that the Digital Library expands and maintains current offerings.

To address these challenges, NetWORKS staff will immediately need to set priorities: (a) should the goal be to simply add numbers of items in the Digital Library, or should certain topics have priority over others? (b) how should materials in the Digital Library be organized for ease of use? (c) what sort of template or quality checklist might be appropriate for vetting current and future resources? (d) what standard of "signal to noise" should be set to enhance rapid "findability"?

These and related issues are not peculiar to NetWORKS; Bower & Almasy (2012) report that Digital Libraries worldwide struggle with the dual issues of content and access.<sup>ii</sup> They recommend NetWORKS should develop curation strategies, and should focus on purpose-built interface with common terms for search that can be shared with other Digital Libraries. In other words, over the next 18 months, NetWORKS staff should assume the role of and establish protocols for organizing the Digital Library, at the same time they seek to expand the collection to incorporate resources for faculty and student usage.

The Evaluation Plan seeks to analyze this curation function of NetWORKS, by documenting and justifying strategies adopted by NetWORKS, by conducting usability studies, and by reviewing the process for encouraging new contributions. In addition, in discussions with NetWORKS staff, the Evaluator will focus on dissemination tactics that proactively “push” materials to increase usage.

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**Goal 2:** Establish effective approaches and programs for broadly disseminating learning material and faculty professional development. This goal is focused on *Dissemination*.

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NetWORKS is recognized for its production and hosting of webinars. This is a time consuming effort, requiring substantial pre-planning, practice, and production. Objectives 2.1 and 2.2 relate to webinars that NetWORKS produces itself and webinars that NetWORKS hosts for others. The Evaluation Plan for these two objectives follow the approaches used for prior years. Because the activities are similar, and because we have data from a previous grant, the Evaluator will be able to conduct a follow-up study to determine if, and if so what form of, impact continues over time.

In addition, NetWORKS pledges to use the latest social media tools (Web 2.0/3.0) to expand the community of users of NetWORKS materials and professional development. NetWORKS is fortunate to have expertise on its NVC and its advisory groups for experimenting with social media. The Evaluation Plan for this objective will be exploratory.

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**Goal 3:** Accelerate the ability of the national technician education community to adapt as technologies and learner needs change. This goal is focused on *Advancement* of technician education.

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NetWORKS has established a complex stream of input from faculty, industry, and potentially students to assess and respond to rapid changes in technology and employee readiness. Much of these interactions coalesce during the Critical Issues and Best Practices (CIPB) Forum held in conjunction with the annual Hi-TEC Conference. To evaluate these streams, the Evaluator will observe the CIPB and review documentation of input from other discussions and recommendations.

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**Goal 4:** Identify and apply appropriate frameworks for evaluation. This goal is focused on *Discovering* genuine impact of NetWORKS' activities on improving student, faculty and industry learning.

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NetWORKS has led national efforts to define and measure impact of ATE-funded activities on student learning. Validation of impact is now favored by NSF-ATE, and moves beyond what this Evaluator has called “body counts” — the number of people who have accessed materials or participated in different kinds of professional development. Appropriate to its mission to prepare technicians with advanced technological skills, NetWORKS first began applying a human resource development<sup>iii</sup> model favored by industry for validating the impact of NetWORKS goals and objectives on improved student performance.

In collecting feedback from webinars, NetWORKS staff now regularly asks participants if the content was valuable enough to share with my colleagues, if the participant anticipates making instructional changes as the result of attending the webinar, and if the participant has already implemented instructional improvements as a result of attending past webinars. Using this data, in 2010 the Evaluator was able to conduct follow-up phone interviews with webinar participants who reported making instructional changes to gain evidence of those changes.

What we learned is that there is a steep learning curve for ATE programs and for participants in ATE activities regarding the measurement of impact, versus reporting “body counts” or satisfaction with the training. Seeking *evidence* that participants in ATE activities have in fact changed the content, pedagogy or assessment of instruction is still in its infancy, and will be a goal for 2012-2014.

But for NetWORKS to validate the impact of its resources on student learning, participants will need to learn how to provide that documentation. Goal 4 of NetWORKS' plan for the coming months will, in effect, close the loop on Goals 1-3. NetWORKS has an opportunity to pilot test the next generation of evaluation by using Digital Resources, webinars, new social media, and a variety of industry and instructor forums to train faculty in gathering evidence of improvement in student learning. In doing so, NetWORKS can offer to continuing and new ATE programs the kinds of knowledge that can only come from years of experience. In this case, the Evaluator will support NetWORKS' efforts to develop these skills in users and participants of its resources.

**NETWORKS EVALUATION PLAN MATRIX  
2012 – 2014**

***Goal 1: Expand contribution to and usage of Digital Resource Library***

<b>Objectives</b>	<b>Evaluation questions</b>	<b>Year 1</b>	<b>Year 2</b>
1.1 Expand and refine resource collection	<p>a) What is/are effective curation strategy(ies) for NetWORKS' existing and expanded Digital Resources?</p> <p>b) How does/do curation strategy(ies) impact usability of Digital Resource Library?</p> <p>c) How effective are strategies to encourage resource submission by others?</p>	<p>a) NetWORKS establishes strategy(ies) for curating resource collection. Evaluator assists with documenting/ justifying curation strategy(ies).</p> <p>b) Evaluator conducts pilot usability study among current users, applying NetWORKS curation strategy(ies), applying NetWORKS curation goals and strategies</p> <p>c) Evaluator conducts pilot study of satisfaction with contribution process among resource contributors.</p>	<p>a) Evaluator conducts usability study among current users, applying NetWORKS curation goals and strategies</p> <p>c) Evaluator conducts study of satisfaction with contribution process among resource contributors, applying NetWORKS curation goals and strategies</p>
1.2 Develop specific resources for faculty use	<p>a) What value is added for faculty usage of the Digital Library when materials are customized for particular purposes?</p>	<p>a) Using a NetWORKS report of customized resources added in Year 1, Evaluator surveys or interviews users and contributors for usability satisfaction</p>	<p>a) Using a NetWORKS report of customized resources added in Year 2, Evaluator surveys or interviews users and contributors to validate use and evidence of improved student learning</p>
1.3 Create collection of student resources and Student Resource portal	<p>a) How does NetWORKS staff establish criteria and access for student resources</p>	<p>a) Evaluator interviews NetWORKS staff and partners about facilitators and challenges for collecting Student Resources and making them accessible.</p>	<p>a) Evaluator conducts usability study with students and faculty about utility and satisfaction for Student Resource Center and about impact on student achievement.</p>

**Goal 2: Establish effective approaches and programs for broadly disseminating learning materials and faculty professional development**

<b>Objectives</b>	<b>Evaluation questions</b>	<b>Year 1</b>	<b>Year 2</b>
2.1 Produce annual Webinar series	a) How do webinars convey current information about current technologies, teaching and learning, and program building?	a) Using NetWORKS report of Webinar participants, Evaluator conducts phone interviews to validate impact on faculty learning and teaching, and student learning	a) Using NetWORKS report of Webinar participants, Evaluator conducts phone interviews to validate impact on faculty learning and teaching, and student learning
2.2 Provide collaborative Webinar hosting services	a) How does NetWORKS staff identify and collaborate with others to host Webinars and thereby add to Digital Library?	a) Using NetWORKS report of webinar hosting partners, Evaluator conducts phone interviews to analyze motivations and constraints for hosting partners to use the NetWORKS Webinar hosting	a) Using NetWORKS report of webinar hosting partners, Evaluator conducts phone interviews to analyze motivations and constraints for hosting partners to use the NetWORKS Webinar hosting
2.3 Utilize web 2.0/3.0 and social media tools to increase awareness and expand communities of users	a) What kind of social media tools and platforms are effective and efficient for building communities of users?	a) NetWORKS staff identifies new media tools for dissemination and reports relative usage of approaches; Evaluator discusses trends at mid-year Formative Meeting.	a) Using NetWORKS report of new media tools for dissemination and reports relative usage of approaches; Evaluator interviews participants to measure impact of social media tools and platforms.
2.4 Conduct in-person dissemination activities	<ul style="list-style-type: none"> <li>• Evaluated by others</li> </ul>		

**Goal 3: Accelerate the ability of the national technician education community to adapt as technologies and learner/ workforce needs change**

Objectives	Evaluation questions	Year 1	Year 2
3.1 Involve education and industry communities in assessing and responding to technical education needs	a) What are promising practices for initiating and sustaining a variety of faculty and industry relationships to assure that STEM education programs can rapidly adapt to changes in employer, skills and student demand?	a1) Evaluator observes meeting of Faculty Advisory Board at Critical Issues and Best Practices Forum at Hi-TEC a2) Evaluator reviews documentation of discussions and recommendations from annual meetings of Regional NetWORKS Associates, Resource Teams, Faculty Advisory Board, and Industry Advisory Boards a3) Evaluator conducts interviews with members of Faculty Advisory Board, Industry Advisory Board, Regional Network Associates, and Resource Teams regarding role and impact on student learning	a1) Evaluator observes meeting of Faculty Advisory Board at Critical Issues and Best Practices Forum at Hi-TEC A2) Evaluator analyzes methods for adapting to rapid change from faculty, employer and student perspectives
3.2 Produce Critical Issues and Best Practices Forum	Evaluated by others		

**Goal 4: Identify and apply appropriate frameworks for evaluation. This goal is focused on Discovering genuine impact of NetWORKS' activities on improving student, faculty and industry learning.**

Objectives	Evaluation questions	Year 1	Year 2
4.1 Identify and apply appropriate frameworks for evaluation of ATE programs, including Kirkpatrick's 4 Levels of Learning	a) What research-based theories of learning offer meaningful frameworks for evaluating faculty and student learning? b) What research-based theories of organizational change offer meaningful frameworks for the study of sustained industry relationships, adaptation to changing needs, and use of virtual communities?	a1) Conduct interviews with users of Digital Library resources to evaluate impact on student learning a2) Conduct interviews and document collection from 2012 webinar participants to evaluate impact on student learning b) Pilot organizational change framework to evaluate rapid response approaches to changes in workplace needs and student qualifications	a) Conduct follow-up study of impact of webinar content from previous ATE funding to evaluate impact on student learning b) Evaluate ways in which educational organizations can rapidly respond to changes in workplace needs and student qualifications

<sup>i</sup> Maricopa Advanced Technology Education Center (MATEC) website <matecNetWORKS.org>, downloaded March 7, 2012.

<sup>ii</sup> Bower, R. & Almas, E. (2012, March 7). Emerging Trends and Challenges in Digital Resource Libraries. Presentation for NetWORKS National Visiting Committee, Phoenix, AZ.

<sup>iii</sup> Kirkpatrick, D. (1996, January). Great ideas revisited. *Training and Development*.