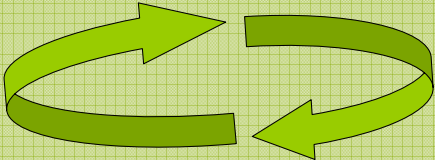


NISE network 
NANOSCALE INFORMAL SCIENCE EDUCATION

Building feedback loops NISE Network

AAM May 2010



www.nisenet.org



NISE Network



Nanoscale Informal Science Education Network

Raise the public's 'nanoawareness'

www.nisenet.org **NISE network**
NANOSCALE INFORMAL SCIENCE EDUCATION

NISE Network stands for Nanoscale Informal Science Education Network.

This network began with funding from the National Science Foundation in 2005 and plans to be in existence for at least another 5 years.

The network has multiple goals – just one of which is to raise the public's awareness of nanoscale science, engineering, and technologies.

NISE Network



Promotes professional and public education on nanoscale science, engineering, and technology

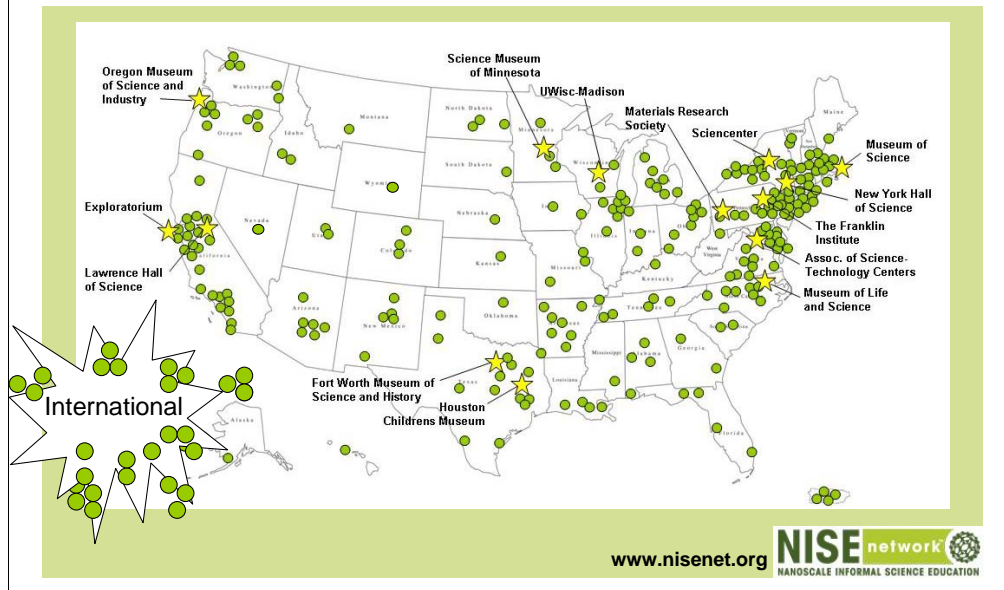
Creates trainings, networking opportunities, and electronic resources for professionals

Creates programs, exhibits, and NanoDays kits for professionals to deliver to the public

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NISE Network



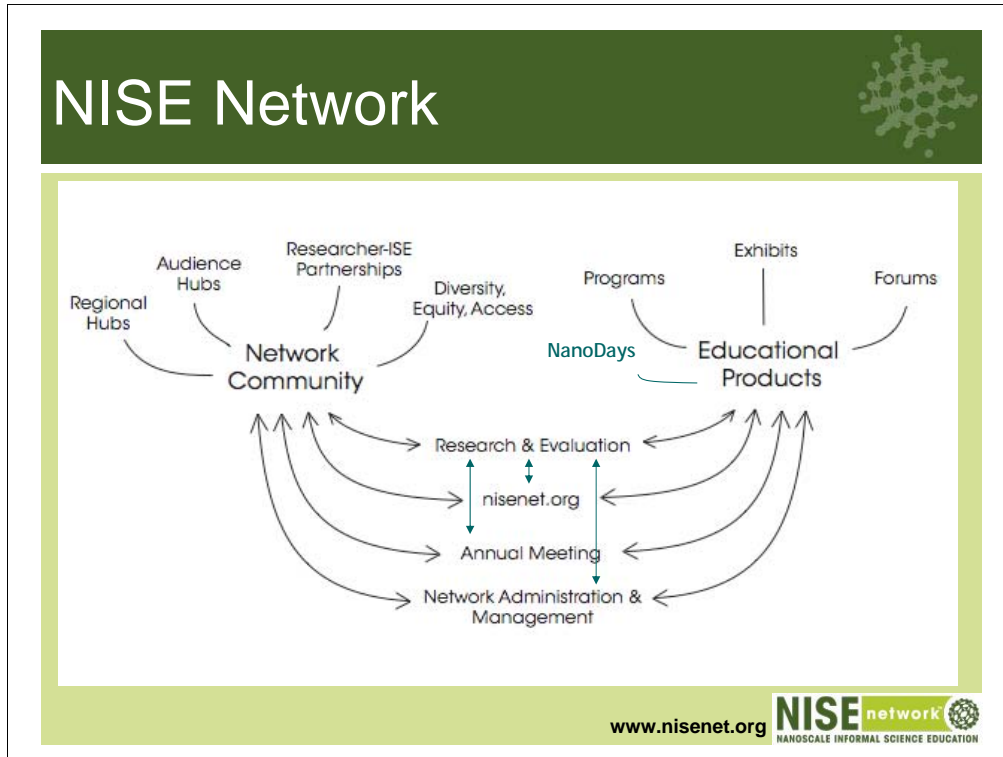
The institutions involved with NISE Net include science museums, children museums, universities, and professional organizations for research scientists.

The network has over 350 active institutions

And over 1,200 active members in 50 states and internationally

One way the network organizes its work is by development and delivery functions, with 14 institutions leading the development of products for professionals and the public and all the other institutions participating in the delivery of the public products. The stars represent the 14 institutions leading the development of products.

One way the network organizes its work is geographically – with nine institutions serving as communication hubs, for example we have hubs in the NE, SE, Mid-west, NW, etc.



A third way the NISE Net organizes its efforts is by working group. Staff from the 14 institutions that are leading development of products participate in working groups to accomplish their work. Because of geographic distribution, much of this work happens via teleconferencing and emails.

Roughly, the working groups include professional support groups, professional development groups, and public product development groups.

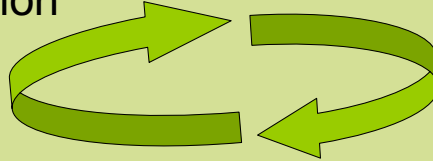
You can see from the variety and number of players, and the different ways we're organized that we have characteristics of complex systems as Christine described. For example, we have:

Many leaders working simultaneously

And activities that are diverse in scope and implementation.

Building feedback loops

Embedding evaluation

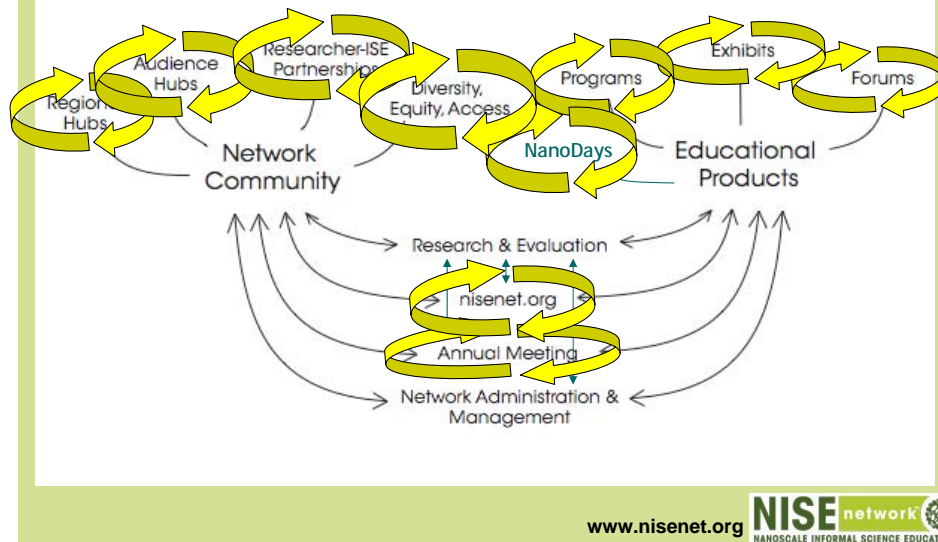


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NISE network
NANOSCALE INFORMAL SCIENCE EDUCATION

One way NISE Net manages this complex system is to embed evaluation in the network to create feedback loops. By including these feedback loops, the network has committed to a cyclic process that includes the steps of reflecting, planning, developing, testing, revising.

Evaluation of activity impact



For the first five years of the network, the strategy has been to embed an evaluator in each of the working groups – the professional support groups, the professional development groups, and the public products groups. This worked well with a complex system because the evaluator working with each group could adapt their services to the leadership style, the product type, and the work phases of each working group. Evaluators communicated with each other and with the NISE Net administration at least monthly - if not more - via phone calls. Much of the work done in this way was front-end and formative evaluation work as the network was new and ideas were being brought into fruition.

Evaluation team



Current

Museum of Science, Boston

Science Museum of Minnesota

Oregon Museum of Science and Industry

Committee of Visitors

– Frances Lawrenz, Bruce Lewenstein, Saul Rockman,
and Carol Weiss

Past

Exploratorium

Inverness Research Associates

Knight-Williams Communications

Multimedia Research

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I need to point out that to embed evaluation into such a large and growing network required a small army of evaluators.

At one point, all of these evaluation teams – probably about 20 evaluators at the peak -- were working on the NISE Net project. Over the years responsibilities have shifted and currently the responsibility for all phases of evaluation, including summative evaluation, rests mainly on evaluation teams at the Museum of Science Boston, Science Museum of Minnesota, Oregon Museum of Science and Industry, and a Committee of Evaluation Experts who oversees our work.

Feedback on activities



Formative refinements

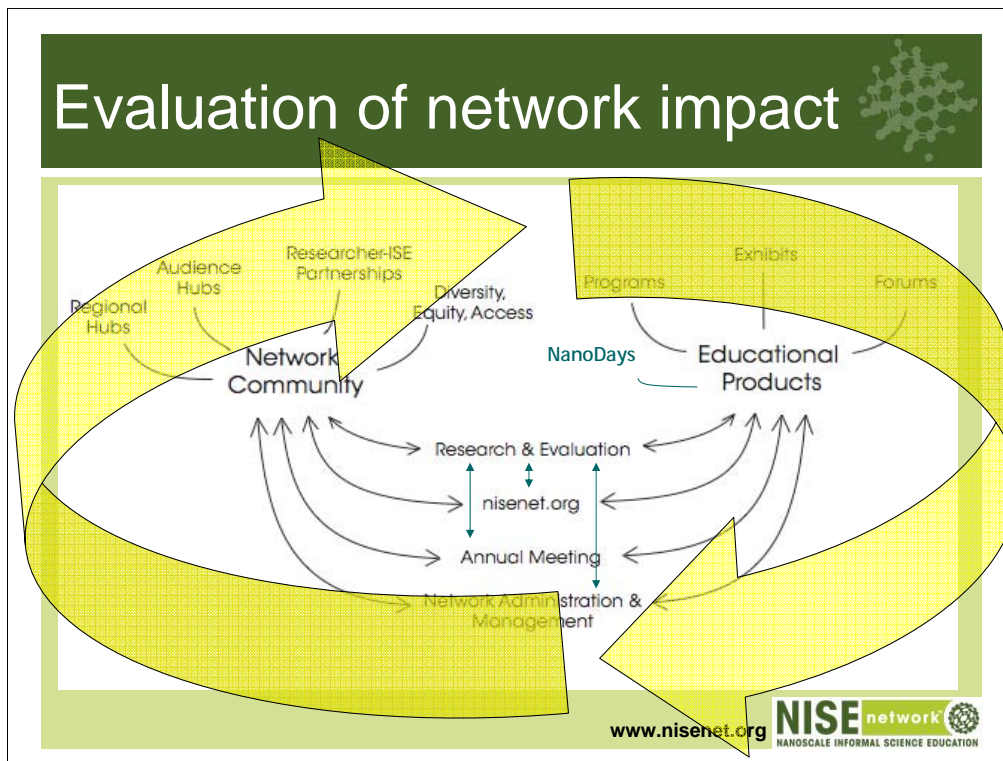
Evidence that objectives and main messages for programs and forums were achieved

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The evaluation team and the working group members have learned much over the past several years of front-end, formative, and even some summative evaluation. Because this is a complex system, I could never tell you all that has happened in this short presentation. But I can tell you that the evaluation team has generated over 200 reports, most of which are available on the network's website, nisenet.org, if you are interested in this topic.

For the sake of this presentation, I will just tell you one of the pieces of feedback that we were able to provide some of the teams. That is, the evaluation efforts revealed evidence that the objectives and main messages for programs and forums were achieved. And those working hard on these projects liked hearing that feedback. Along with this feedback was also useful information that they could use to revise the products each iteration of development. But, each working group had control over their product and this seemed to be expected and manageable.



In addition to looking at the products of the working groups individually, starting in Year 4 we looked at the work of the network as a whole. That is, we attempted to estimate the number of people being reached by the nanoeducation activities delivered through the network. And we attempted to look at the impact of those efforts as a larger group, rather than by isolated programs.

Methodologically, this is very challenging and those of us on the evaluation team can discuss these challenges with you through a conversation outside of this presentation. The issues of sampling, timing, and instrument items involve more details that I can explain here. Today, my message is simply that in addition to working with individual work groups and leaders, embedded evaluation now includes this larger view on the impact of the network.

Feedback on overall



Reached a very large number of people

Lack of clear evidence for impact on public's nanoawareness

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As a result of taking this big picture view, we were able to provide the network with feedback. Again, we provided many messages, and for the sake of time I will share just two of these with you.

For example, NanoDays is a major integrated effort of the Network and brings together many of the professional and public efforts of the different work groups. We were able to estimate how many people the network was reaching as a whole during NanoDays – about 400,000 people.

We were also able to study the public impact of NanoDays – the extent to which the NanoDays programming had an impact on the public's nanoawareness. We found mixed results – but no clear evidence that NanoDays was having much impact on the public's nanawareness.

Feedback to evaluation

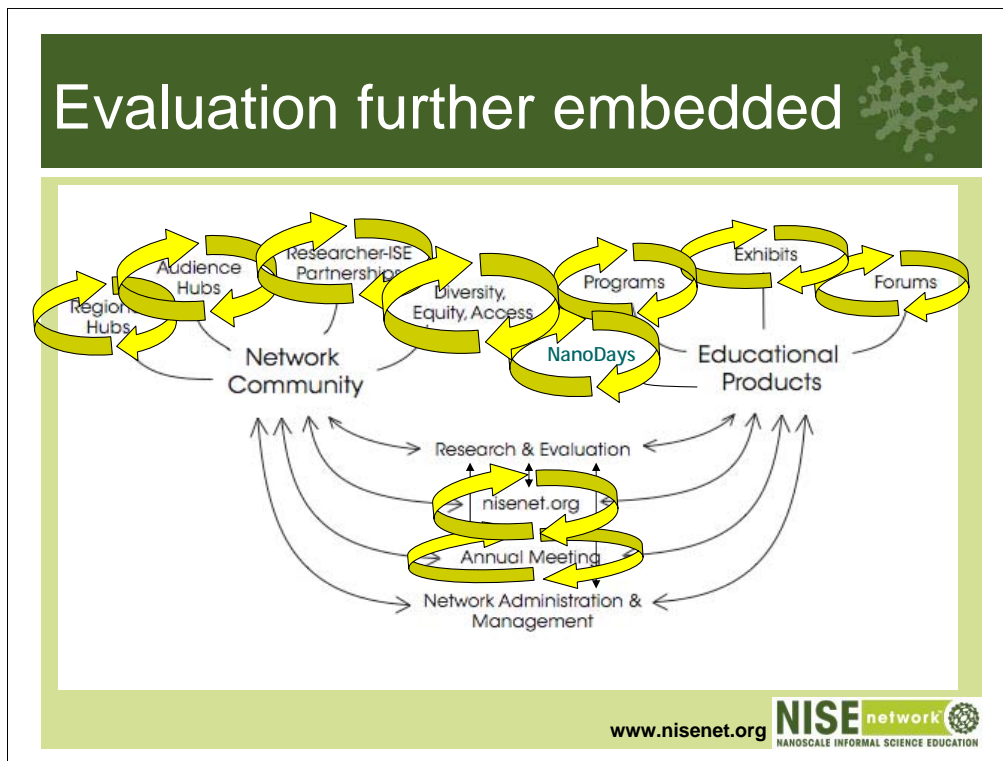


Need for evaluation continues to grow

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As a feedback loop, the evaluation team also got input from the network. That is, that the need for evaluation was larger and growing than already implemented. Resources were not really growing, so we needed to re-think our strategy. Our strategy involved thinking about the long-term professional development of the participants involved.



Moving forward, we will be shifting our approach to the evaluation of network activities, particularly for the working groups.

We are going to take what is called a practitioner inquiry approach to evaluation.

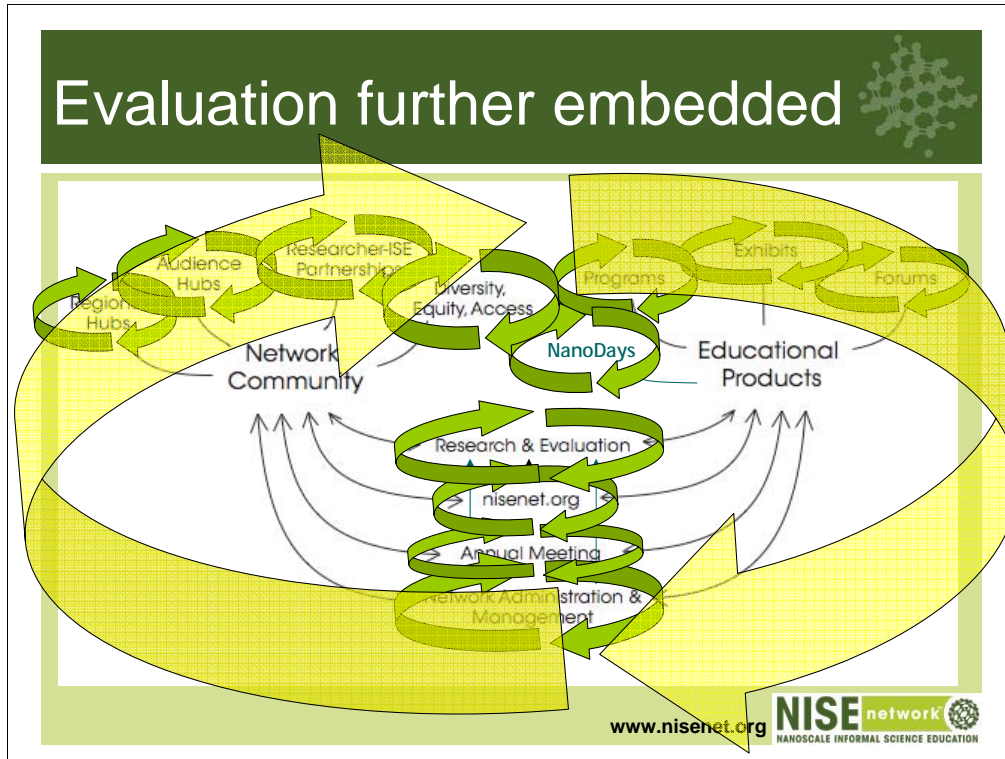
In this approach, the members of the working groups will be empowered through training, mentoring, and consulting to conduct their own evaluations. This approach builds on practices developed within formal education and used by teachers to improve their own work in terms of student outcomes. The incentive for practitioners to adopt their own evaluation practices include immediate feedback on issues of greatest concern and proactively defining and monitoring a path of personal and professional development.

The advantages of this model for the network include feedback loops that are further embedded in the work by professionals that have given attention to the questions, methods, and results of the evaluation.

The working groups can have evaluation activity in an ongoing manner, if they choose. They can ensure the questions address their primary concerns. And they can interpret the results first-hand. They will still have a feedback loop and still handle the data professionally. They will still be accountable to the goals and resource-management of the network.

The persons conducting the evaluation will change – it will be the work group members with the support of the evaluation team.

We will be able to include the admin and evaluation groups in the professional inquiry, too.



And, the evaluation team will still be able to bear the primary load for evaluating the impacts of the network as a whole.

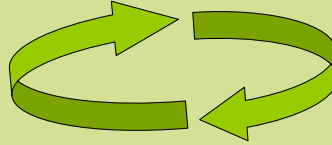
Building feedback loops

Evaluation varies approach

- Need
- Purpose
- Capacity

Evaluation connects

- Working groups
- Phases
- Expertise



Evaluation provides feedback at all levels

- Products
- Professional development
- Network-wide impacts

In this way, the evaluation provides feedback loops within the complex system of the network.

Evaluation within the network connects across working groups, phases, and expertise.

Provides feedback for product and professional development as well as the impacts of the entire network.

And the evaluation efforts are flexible to adapt to the various needs within the network overtime.



Evaluation as a connector and common thread

In many ways, evaluation has served to connect together the work that has been conducted by individuals from many different institutions. There are two different models for how evaluation has worked to accomplish this. For E&P, the same methods were used to conduct the formative evaluation for a wide-variety of products created by many different institutions. This gave the team comparable measures for discussion. For Forums, evaluation was used to help refine a product as it moved from institution to institution. This process was designed to enable the team to make deliberate, informed changes, learn from mistakes, and improve their practices based on feedback from visitors and the museum educators/guest speakers who organized/led the Forum.

Cross-institutional, cross-medium evaluation studies (from Kirsten E.)

Due to the Network aspect of NISE we were able to conduct cross-institutional, cross-medium evaluations at a level that had not previously been capable for the field. Although we did not run large-scale cross-institutional research studies, the coordinated nature of the evaluation enabled common formative evaluation studies of work produced by different organizations (such as that produced through E&P) and coordinated evaluation across types of products - e.g., there are overlaps in the formative evaluation of programs and exhibits, and the Nanoawareness study used the same instrument to assess the impacts of the entire suite of experiences (NanoDays, Forums, Exhibits, Programs, etc.) on the museum-going public's awareness of Nano. The field rarely does this. The few related examples are studies of the same exhibition as it travels to multiple institutions, or limited cases of having one exhibit produced by an institution for an exhibition produced by another institution (like SMM's object theater in MOS's Star Wars).

Evaluation as a strategy for co-development of programs

The Forum team applied a different approach from E&P. This program used evaluation as a tool for critically-examining their collaborative work and for making decisions about how to change design of the program as it moved from institution to institution. The evaluation for this program included data collected from visitors (videotape, surveys, and observations) and from the museum educators who ran the programs (through the form of group debriefs/interviews). The reason for including both audiences in the evaluation is that we wanted to ensure that the eventual program that is produced will not only work for the public audience but is one that will meet the needs of the other product users— museum educators. Findings from the formative evaluation of Forums helped the team to make decisions about how to refine the program that was based on data—and not just on individual opinions or preferences. This process led to many revisions on the designs of the Forums. Based on feedback from visitors as well as insights from the team members, each of the five "tests" of the nanomedicine forum included changes. The team tried different variations of their overarching questions mainly based on the concerns of visitors. Originally visitors were concerned that we were asking them to answer the question: "Should new nanotechnology applications in medicine be made available to the public before we are CONFIDENT of the possible risks?" because visitors were uncomfortable with the word confident and what it means. Therefore, for the second forum the team changed the overarching question to: "Should new nanotechnology applications in medicine be made available to the public before we understand the possible risks?" After this forum it was discovered that people had a hard time rating their agreement with a question and that they wanted a definition of who "the public" was, so the overarching question was changed to a statement and the term "public" was removed and changed to "for use". In addition, the scenarios were changed based on visitor and team member suggestions. The end result was that one scenario was removed from the discussion because it was deemed not to flow well with the other scenarios (it discussed lab testing instead of use of nano products on or in the body), the overarching question was changed to: "Under what conditions, should nanotechnology applications in medicine and personal care products be made available to the public?", and instead of voting visitors were asked to write their response to this question and report-out about it at the end of the forum. Many of these changes would not have been made without the feedback of visitors and the chance for the team to reflect on their forums.

Embedding evaluation into all aspects of project decision-making

One of the aspects that makes NISE unique is how thoroughly evaluation is integrated into all levels of NISE decision-