

NMI (NSF Middleware Initiative) Testbed Program Call for Participation

1. Introduction

This document outlines the context for and requirements of institutional participation in the NMI (NSF Middleware Initiative) Testbed Program. Activities of the testbed are specifically in support of "real life" testing and broad implementation of middleware components developed and packaged under the NMI program as they move from concept and development to useful institutional deployment. These middleware components may be software applications but they may also be policies, recommendations, specifications, services or Application Programming Interfaces (APIs).

The NMI itself is based on NSF Cooperative Agreements that have been put in place to support an emerging technology area. This implies program evolution in future years in response to annual NSF reviews as well as ongoing examination of priorities and objectives and necessitates flexibility on the part of all participants. Additional context and background for the NMI program overall can be found on the NMI Web site at <http://www.nsf-middleware.org>.

Institutions or groups of institutions that are interested and qualified to participate in the NMI Testbed Program as described in this Call for Participation should respond by March 8, 2002, following the Guidelines for Response in Section 8 of this document. Final selection of testbed participants will be done through a NMI review panel as described in Section 9, Selection Criteria and Notification.

2. Context and Objectives

Internet2, EDUCAUSE, and SURF (Southeastern Universities Research Association) are partnering in a 3-year Cooperative Agreement with the National Science Foundation under the newly developed NSF Middleware Initiative. As their part in this initiative, the partners will integrate middleware into campus enterprise environments for the purpose of advancing productivity for educators and researchers. This effort will be undertaken as "NMI-EDIT" - Enterprise and Desktop Integration Technologies Consortium.

The GRIDS (Grids Research Integration Deployment and Support) Center was awarded a parallel Cooperative Agreement to focus specifically on the design, integration, testing, packaging, deployment, and support of advanced middleware for collaborative computing. GRIDS Center partners include ISI (Information Sciences Institute at the University of Southern California), University of Chicago, the National Center for Supercomputing Applications (NCSA) at the University of Illinois at Urbana-Champaign, the University of California at San Diego (UCSD) and the University of Wisconsin at Madison.

NMI has outlined the following objectives for the first year:

- Develop and release a first version of GRIDS and Middleware software
- Develop security and directory architectures, mechanisms and best practices for campus integration
- Put in place associated support and training mechanisms
- Develop partnership agreements with external groups focused on adoption of software

- Put in place a communication and outreach plan
- Develop a community repository of NMI software and best practices

Beyond Year 1 the partners will continue to produce enhanced releases of software and best practice specifications although specific future direction will necessarily be based on input from collaborators, assessment of first year progress, and an assessment of the Initiative's success by the NSF upon completion of the first year. Successful middleware integration under this Cooperative Agreement will allow research scientists and educators to rely on consistent, easy-to-use, non-intrusive and privacy-oriented services and interfaces to accomplish scientific collaboration and information sharing with great efficiency.

3. Target Areas and Anticipated Timelines

Testing of middleware within the integration testbed will be addressed at various levels as applicable to each component. These levels are; a) integration at and distribution to desktops, b) interaction with commonly deployed campus infrastructure, c) vertical discipline integration with communities of users, and d) component scalability and consistency. The testbed itself will be developed to be a closely coordinated effort among separate higher education and research institutions, acting to produce a model of how middleware components will be introduced and used in actual deployments within and across institutions. It is designed in such a way as to ensure a useful level of testing through the sponsorship of activity within a core testbed while also stimulating and encouraging broader non-sponsored participation. This configuration will leverage the interest, energy, and expertise of as many qualified institutions as can be accommodated with initial coordinating staff and current resources within the NMI program and from participating campuses.

Year 1 testing is specifically anticipated to focus within the following target areas:

- Testing supplemental to the development and testing currently taking place within recognized R&E identification/authentication initiatives (e.g., Grid Security Infrastructure (GSI), HEPKI, I2 PKI Labs). This includes testing aimed at exploring the technical and policy issues related to the integration and/or co-existence of these initiatives and also technical and policy issues related to the integration of public key infrastructures with local campus authentication and authorization solutions.
- Testing supplemental to the development and testing currently taking place within recognized R&E directory and meta-directory initiatives (e.g., MACE-Dir, DoDHE, eduPerson,, GGF Grid Information Service WG). This includes testing aimed at exploring technical and policy issues relating to the integration of the directory and discovery mechanisms with local campus directory solutions.
- Testing supplemental to the development and testing currently taking place within recognized R&E authorization and security initiatives (e.g., GSI, Shibboleth)
- Testing of GRIDS Center software components and packages as they operate within the campus/enterprise environment. This includes testing aimed at exploring technical and policy issues relating to the integration of mechanisms for remote access to and management of compute clusters and data resources within a local campus environment.
- Testing aimed at exploring technical and policy issues relating to the integration of NMI-R1 mechanisms for remote access to and management of data resources, within a local campus environment.

- Testing of selected open source and standards-based middleware-enabled collaborative conferencing applications emerging from the work of recognized DV development efforts (e.g., Vidmid, The Commons, VRVS, Access Grid, ViDe)

The specific components to be tested will all be part of official NMI releases, beginning with retroactive verification of NMI release v1.0, which will be released at approximately the same time as the initial formation of the testbed. See Appendix A for additional detail regarding components anticipated to require review and evaluation within the first project year. It is also anticipated that NMI releases will occur approximately every 6 months as coordinated sets of core components. However, critical incremental component developments are likely to be introduced and require testing in between full releases.

In addition, the following criteria will be taken into account when determining how much or how quickly and how thoroughly testing can and will be done:

- the resources that are necessary for testing any given component,
- the component's relative importance to the overall success of the middleware program,
- the resources that are presently available to the sponsored testbed institutions,
- the relevant expertise and experience within the testbed at the time to do the required testing and development",
- The extent to which evaluation will involve real users and realistic application scenarios,
- The extent to which evaluation will involve the integrated use and evaluation of several middleware components.

4. Testbed Components

Testbed Program Management

The testbed will be managed by a SURA representative acting in the role of Testbed Manager. The Testbed Manager will work regularly and closely with testbed participants to develop, document, and coordinate the activities of the testbed. The current Testbed Manager is Mary Fran Yafchak, SURA IT Program Coordinator.

Testbed Annual Workshop

The Testbed Manager will work with testbed participants to develop and deliver an annual workshop (working title: "Middlewhere?") to serve as a vehicle for presenting the current status and aggregated results of the testbed to the broader community. This workshop will also provide an opportunity for the NMI to gain input from the community towards the coming years' "areas of opportunity" (as described in the NMI program solicitation).

Sponsored Core Testbed

The Sponsored Testbed will be comprised of four sites each being either a SURA member institution or a single entity that is proposing to represent a group of SURA member institutions. In the latter case, the proposing entity will be considered to be the sponsored testbed site and will be accountable for the participation and performance deliverables of the group. The four sponsored sites will be selected through this Call for Participation and will commit to participating in the testbed for the three-year period under sub-contract to SURA.

Each sponsored testbed site will receive \$60,000 each year to defray the costs of participation. Testbed sub-contracts will be subject to review coincident with the annual renewal of the NMI program grant in September of each calendar year. The focus of the annual review will be to

ensure ongoing motivation, preparedness, and capability on the part of each site as well as continued alignment with NMI target areas and program goals.

Each sponsored testbed site will designate an administrative lead and a technical lead who will work regularly and directly with the Testbed Manager and other testbed participants throughout the project. Sponsored testbed participants will also agree to make themselves available at the request of the NMI project team to speak at educational meetings and to consult within the R&E community regarding their experiences with NMI middleware components. These requests for speakers from the NMI testbed will be determined on an event-by-event basis and are not known at this time. If such requests would incur expenses outside of already existing travel plans and costs, the additional expense would be covered by the NMI-EDIT project outside of testbed funding. In addition, testbed participants and the Testbed Manager may be asked to evaluate dissemination and training materials pertaining to the deployment of components that have already been tested.

Un-sponsored Testbed

In Year 1, four additional sites will be selected to join the testbed as un-sponsored testbed sites. This category of participation seeks to leverage existing activity at institutions that have a desire to contribute to the NMI program in a formal way but either do not meet the SURA membership requirement for sponsored participation or do not require such sponsorship in order to commit to meaningful participation. Un-sponsored sites may be individual institutions or a single entity that is proposing to represent a group of institutions. In the latter case, the proposing entity will be considered to be the testbed site and will be accountable for the participation and performance deliverables of the group. Though un-sponsored testbed sites will not receive NMI funding for their testbed participation, they will be formally recognized as part of the NMI testbed. They will receive the same programmatic support as sponsored sites, will be eligible to act as speakers and/or consultants on behalf of NMI, and will be fully engaged in testbed communication and collaboration towards meeting overall program goals.

Note: The limit on the initial number of un-sponsored testbed sites is in keeping with the resources that are currently available to manage and support testbed activity. In the future, SURA will actively explore ways to incorporate additional institutions into the testbed to the degree that resources permit.

5. Qualifications for Participation in the Sponsored Core Testbed

Required:

Note: The existence of the NMI testbed is intended to guarantee that a minimum level of useful "real life" evaluation takes place within the NMI. In order to meet this objective, applicants for the Testbed should come as close as possible to meeting the following requirements. Candidates meeting all requirements will be strongly preferred.

- Sponsored testbed sites must be institutional members of SURA or a single entity that is proposing to represent a group of SURA member institutions. For a list of SURA members, see http://www.sura.org/welcome/univ_sur.html.
- The site should have one or more research and/or education projects that will be active during the timeframe of the testbed, require or can benefit from the integration of middleware, and are willing to work towards this integration in conjunction with the NMI testing process. Projects that have existing or committed funding are preferred. In addition,

projects that are deeply involved in the use and deployment of grid technologies, videoconferencing, and other collaborative tools at campus-scale are also of high interest.

- In order to evaluate the site's readiness for immediately useful testing, the aforementioned projects should be matched to their ability to serve as test projects for the specific components anticipated to require testing within the first project year as described in Appendix A.
- The site should have enterprise-wide identifiers (aka a unified name space) for key interrealm use (ePPN, email address, etc.) and have implemented enterprise-wide directory services using these identifiers. The site should also be willing and able to implement additional directory services or objectclasses as needed for the support of applications such as the Grid, videoconferencing, etc.
- The site should have a centralized authentication service that can be leveraged for campus-wide use of interrealm services. There is no mandate at this time as to the nature of the underlying local authentication mechanism but the site should be willing to work towards a centralized authentication infrastructure in accordance with the NMI objectives of common interoperable architectures (PKI, Kerberos, etc).
- The NMI effort within the site should work to integrate the institutional community in terms of middleware understanding, acceptance, and deployment. There should be mutual awareness and a demonstrable collaborative spirit between the IT and research departments within the site.
- The site should provide one administrative and one technical lead that are qualified for and committed to the integration and reporting activities outlined in section 7, Interaction and Reporting Responsibilities.
- The site should be willing to embody the current "state" of middleware (as defined by tested and approved NMI releases) through active and ongoing implementation of applicable NMI standards, processes, and components, as broadly within the campus as possible.
- The site should have a demonstrable capacity and willingness to focus local energy and resources towards the goals of broadly beneficial inter-institutional collaborative work.

Desirable:

The following are not required for either sponsored or unsponsored participation. However, they are desirable and may be factored in as part of site selection:

- Existing activity and involvement (explicitly funded or not) in the area of middleware development.
- Contribution of specific organizational resources that directly supplement the site's participation in the NMI testbed.

6. Qualifications for Participation in the Unsponsored Testbed

Unsponsored testbed sites will be evaluated and selected for participation based on the same criteria as sponsored testbed sites with the exception that the requirement of being or representing a SURA member institution is waived for unsponsored sites.

7. Interaction and Reporting Responsibilities

The NMI is an emerging program in a highly developmental technology area. Flexibility on the part of those involved will be required in response to the evolution and growth of both the

program and the technology. It is also anticipated and intended that the activities of the NMI testbed will be a significant factor in the overall success of the NMI. Testbed participants must be willing and able to function both independently and as a contributing member of a well-coordinated team.

In keeping with the above, interaction and reporting responsibilities within the testbed may need to be modified as the program progresses. Whenever possible, modifications will be made after group discussion and based on majority consent. Interaction and reporting responsibilities as they exist at this time for testbed participants are:

- Regular monthly meetings via tele or videoconference
- Regular between-meeting communication via electronic discussion list
- Collaborative development, execution and documentation of test plans, test procedures, and mechanisms for reporting results in coordination with other testbed participants, as needed prior to the introduction of components to be tested
- On-time and complete submission of test reports as defined above
- Willingness to speak at educational meetings and to consult within the R&E community regarding experiences with NMI middleware components
- Willingness to evaluate dissemination and training materials pertaining to the deployment of components that have already been tested
- Participation in the development and implementation of the annual testbed results-oriented conference, "Middlewhere?"

8. Guidelines for Response

Interested institutions or groups of institutions are asked to submit their response on or before March 8, 2002, to Mary Fran Yafchak, maryfran@sura.org. The response should be submitted electronically, should not exceed 7 pages in length (including any attachments) and should include the following:

- Name/title/contact information of the primary institutional contact for any necessary follow-up to the response. In the case of a single entity that is representing a group of institutions, the proposing entity should provide the primary contact.
- An indication of whether the proposing entity is applying to be a sponsored participant, an unsponsored participant, or is willing to be either.
- Discussion points and examples to describe how well the proposed testbed site meets the qualifications listed for the desired type of participation. Though the format of the response is flexible, the extent and description of the proposed site's qualifications as they pertain to each of the specific requirements should be clear.
- A brief but specific description of how and why the institution or group of institutions applying for participation anticipates being able to "get up to speed" quickly and contribute actively and enthusiastically to the success of the testbed.
- Names/titles of the intended administrative and technical leads for the site along with a brief description of their qualifications for both middleware evaluation and inter-institutional collaborative work, as well as assurances of their availability.

9. Selection Criteria and Notification

Testbed sites will be selected for either sponsored or unsponsored participation partially based on the degree to which they meet the qualifications stated in Sections 5 and 6 of this document and on the qualifications and availability of their administrative and technical leads. However, there is a need for the testbed as a whole to have adequate "coverage" (consisting of expertise, resources, and projects) within and across all identified target areas. There is also a need for the testbed to have balanced representation of institutions willing and able to test within the two key areas of the NMI Initiative - NMI-EDIT and NMI-GRIDS. (See Appendix A for more details on the components being developed and deployed under each of these.) Therefore, final sponsored and unsponsored sites will also be evaluated based on how their participation would contribute to the whole. In addition, final sites will be selected in such a manner that at least one of the testbed sites (sponsored or unsponsored) will have a direct connection to the GRIDS Center application community.

Review and final selection of testbed participants will be done via a review panel that will be assembled specifically for this task. The review panel will consist of project team members from the NMI participant organizations (GRIDS Center, NMI-EDIT) and invited experts in the area of middleware development and deployment. Each review panelist will review all proposals and rank each using the following scale to evaluate the listed criteria:

Scale: Outstanding = 4; Excellent = 3; Good = 2; Fair = 1; Poor = 0

Criteria:

- 1) How well the site meets the overall qualifications listed for the desired type of participation.
- 2) How prepared the site is to make immediate and active contributions to testing within each of the six Year 1 target areas (as listed in Section 3), with a separate ranking for each.
- 3) How ready and motivated the site is for immediate and active testbed participation.
- 4) The qualifications and availability of the named administrative and technical leads.

The review panel will use these rankings and the goal of ensuring the desired "testbed whole" as described above to arrive at consensus on the selection of final testbed sites.

Sites that are selected as final testbed sites will be notified via email by March 25, 2002, from the Testbed Manager, Mary Fran Yafchak, to the primary contact named in section 8 above.

Attachment A -

As of the distribution of this Call for Participation, the following components are anticipated to require testing within the first project year (9/01 - 9/02):

NMI-GRIDS components:

Globus Toolkit 2.0 (Resource discovery and management, authenticated access to and scheduling of distributed resources, coordinated performance of selected distributed resources to function as a dynamically configured "single" resource.)

GRAM 1.5

MDS 2.2

GPT v.?

GridFTP

Condor-G

Network Weather Service

All services should accept x.509 credentials for authentication and access control.

This initial release encompasses several specifications that were developed and, in some cases, made available on a limited basis prior to this planning process. A process will be defined for assessing the compatibility of and incorporating additional NMI EDIT and NMI-GRIDS components into the future NMI releases.

NMI-EDIT components:

The deliverables anticipated from NMI-EDIT for NMI Release 1 are of four types:

10. Code - Code is being developed, adapted or identified for desktops (e.g. KX.509, openH.323, SIP clients) and for enterprise use (such as Metamerge connectors, Shibboleth modules for Apache, etc.). Code releases are generally clients, modules, plug-ins and connectors, rather than stand-alone executables.
11. Objects - Objects include data and metadata standards for directories, certificates, and for use with applications such as video. Examples include eduPerson and eduOrg objectclasses, S/MIME certificate profiles, video objectclasses, etc.
12. Documents - This includes white papers, conventions and best practices, and formal policies. There is an implied progression in that the basic development of a new core middleware area results in a white paper (scenarios and alternatives) intended to promote an architectural consensus as well as to inform researchers and campuses. The white paper in turn leads to deployments, which require in conventions, best practices and requisite policies. The various core middleware areas being worked within release 1 include PKI, directories, account management, and video.
13. Services - "Within the net" operations are needed to register unique names and keys for organizations, services, etc. Roots and bridges for security and directory activities must be provided.

The deliverables within each type are grouped below by area of activity, such as core middleware services (identifiers, security directories), support for collaboration, support for Grids, etc.

Code

Enterprise -

- KCA 1.0 (KCA is the server side code that receives a Kerberos ticket and issues a short-term PKI certificate) (UMich)
- CPM 2.0 (CPM is software that allows a designer to make choices about the contents of a certificate and automatically generates a profile of that certificate.) (NEC-Japan)

Desktop -

- KX.509 1.0 (KX.509 is the desktop client that issues a request to the KCA and manages the returned certificate.) (UMich)

Objects

- eduPerson 1.5 (eduPerson contains the inetorgPerson attributes localized to higher ed and research and 8-10 additional attributes for individuals to foster inter-institutional collaborations.)
- eduOrg 1.0 (eduOrg contains institutional attributes, including account management policies, security policies, contacts for key services, etc.)

Documents

White Papers -

1. The Role of Directories in Video on Demand (vidmid-vod)
2. Architectural Issues in videoconferencing: Resource Discovery, Authentication and Authorization, Video Directories, Gateways (vidmid-vc)
3. Approaches to Affiliated Directories: Case Studies within Higher Ed and with Federal Agencies (DIRT, Rob Banz, Michael Gettes)
4. Integrating Grids with Campus Enterprise Infrastructure (???)

Conventions and Best Practices -

1. Recommendations and Best Practices on the use of Groups in Directories 1.0 (Tom Barton, DIRT)
2. LDAP Recipe 2.0 (Michael Gettes, DIRT)

Policies -

- 5) A Campus Certificate Policy for use at the HEBCA (David Wasley, HEPKI-PAG)
- 6) A Lightweight Campus Certificate Policy and Practice Statement (David Wasley, HEPKI-PAG)

Services

Several registry services will be developed and deployed: (In release 1, almost all of the following registry services will be deployed in a static manner; in subsequent releases, new protocols and services will be developed and deployed to make registries dynamic.)

Code registry services -

This will serve as a single server for meta-information about NMI software. It will include pointers to NMI software, pointers to open-source sources (such as Source Forge and Alphaworks), and information about licensing options for contributed NMI components.

Namespace registry service -

urn:mace:edu: registration processes for campus and group extensions in support of XML namespaces and style sheets

Objectclass registry service -

A notation with indexing of objectclasses (expressed in LDIF and XML formats) of importance to higher ed and the research community, along with a service to register new objectclasses. Release 1 will be web based forms; and subsequent releases will accommodate LDIF and XML transfers.

Certificate registry -

Consists of a profile registry, to hold profiles for standard certificate formats for the community and an institutional root certificate service, to provide a functional way for certificate path construction to be done within the community.

Virtual organization registry -

A mechanism to aggregate, ensure uniqueness of key identifiers for virtual organizations, and to provide resource discovery for information about virtual organizations.

R1.5: (Anticipated July 2002)

Code

Enterprise -

- Apache version with Shibboleth
- Shibboleth Target 1.0, including WAYF (Shibboleth is an emergent open interrealm system for the exchange of attributes and authorizations. Targets are sites that provide resources, such as web pages, digital library holdings, or workgroup services.)
- Shibboleth Origin 1.0 alpha (Origins are sites that act as security domains for users and allow users to control the release of personal information.)

Desktop -

- At least two interoperable SIP clients

Objects

- vidmid 1.0 superclass (three objectclasses will be included: H.323zone, H.323user, and SIP)

Services

- Wayfarer and Shibboleth Services
- A register to receive names and keys for origins and targets in the club Shib service and a distribution service to participants.