Report of the
LCG-1 User Support
GDB Working Group 5

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1 Executive Summary

The overall mandate of this working group was stated as follows:

- Initial recommendations for a LCG User Support Model.
  This model should include the following topics:
  - Defining the scope of responsibilities for a call center and/or helpdesk type facility serving the LCG
  - Defining a call center organization (one or more places?)
  - Defining the process for communication to ensure problem resolution tracking
  - Defining acceptable user expectations or service level agreements and the framework to implement the related measuring of success
  - Defining interaction of such Grid support with local support services on sites providing Grid resources
  - Defining tools and procedures to track and coordinate Grid problem resolution
- Definition of services for such global user support centers and recommendations for organization and techniques of centers with respective services.
  The following questions should be answered:
  - One or more distributed centers? - And where should they be located?
  - What kind of organization for user access? (Per mail, phone, web…?)
  - Is a 24/7 service availability in overlapping time-zones possible?
  - What about the interaction and communication between the centers?
  - What are the main tasks of a distributed problem tracking/resolution tool?
  - Is it necessary, to have a standardized distributed problem/resolution database with replication services?
  - Should problems and part of problems shifted between the centers?
  - What kind of problems in a site are global, which are only local?
  - And how could local problems be separated not to swamp the Grid Support?
  - What about the education and training for users and help desk staff?
  - What kind of additional Grid information should be made available for users? (Functional data? documentations? etc.)

This document addresses the main points specified in the mandate and gives answers to the additional questions in the second part. All the information and recommendations given in this report are reviewed and collected during development of this document from other documents and actual existing Grid support reports, such as the Grid User Support Best Practices by GGF, the NASA Information Power Grid Support Model, the NCSA Alliance Virtual Machine Room Support Model, the NPACI Scientific Computing Services Model and the draft for trouble ticket interchange of the Grid Forum User Services Group. Because of that this model for a Grid User Support should be actual and practicable in realization.
Initially the working group doesn't give any recommendations for specific software tools, service level agreements nor standardization of databases or problem ticket formats; such recommendations must be part of continuation of this work.
First in section 3 and 4 it is shown, how a model for a distributed Grid User Support Center with e.g. three cooperating centers could be built up and which services such a center should support.
In this model in evaluation of services it is especially important to consider the interfaces between the services, because of deployment of all the information in problem tickets,

solution database records and documentations over all cooperating centers of the User Support Center. In the second part in section 5 and 6 some recommendations on aspects of organization, techniques and standards in a Grid User Support Center are given.

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3 Introduction

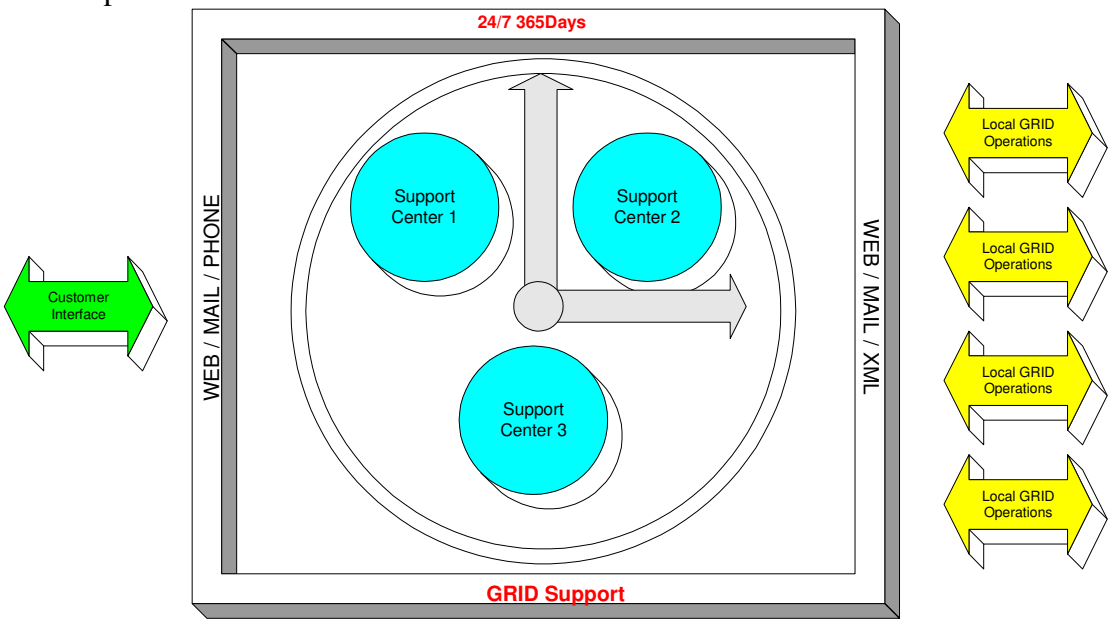
Based on the current development of the Grid environments the need of an effective and efficient support structure and organization is necessary. More and more the Service Levels have been named and the structures develop.
The recommended support structure and organization will cover the following topics:

- User support and Helpdesk
- User Information and training
- Problem documentation and tracking
- Support staff information
- Measuring and reporting of service level agreements (SLA)

These services will all be offered to registered Grid users, except of the global information about the project.

3.1 General Approach

Based on the need of a 24/7 and 365 day support, the idea is, to have three different “master” support centers, which are spread over the world, in three different time zones.
These three support centers will provide a single point of contact to the customers and to the local Grid operations.



The three support centers will work together each in its own day light time zone, so that all support requests within 24h can be captured.
Users resp. Customers can access the support by:

- Web → using a web browser
- Mail → Submitting a problem report or asking general questions
- Phone → Submitting a problem report or asking general questions

The communication between the three service centers will be based on a helpdesk and or ticketing system and replicated databases. Web resources will be redundant over the three locations and will be connected by a failover concept, based on a DNS-Switch (Domain Name Service Switching, that means exchanging the IP Address of the Portal Server) Change and the replicated databases.
The communication between the local operations and the support centers will be based on XML, using direct exchange, email and web interfaces. These communication or exchange

interfaces will be defined in cooperation between WG2, WG3 and WG4 as a standard. It will provide information on:

- What data will be sent from the support
- What data need to be delivered to the support
- When data need to be delivered
- How SLA's will be monitored and escalated

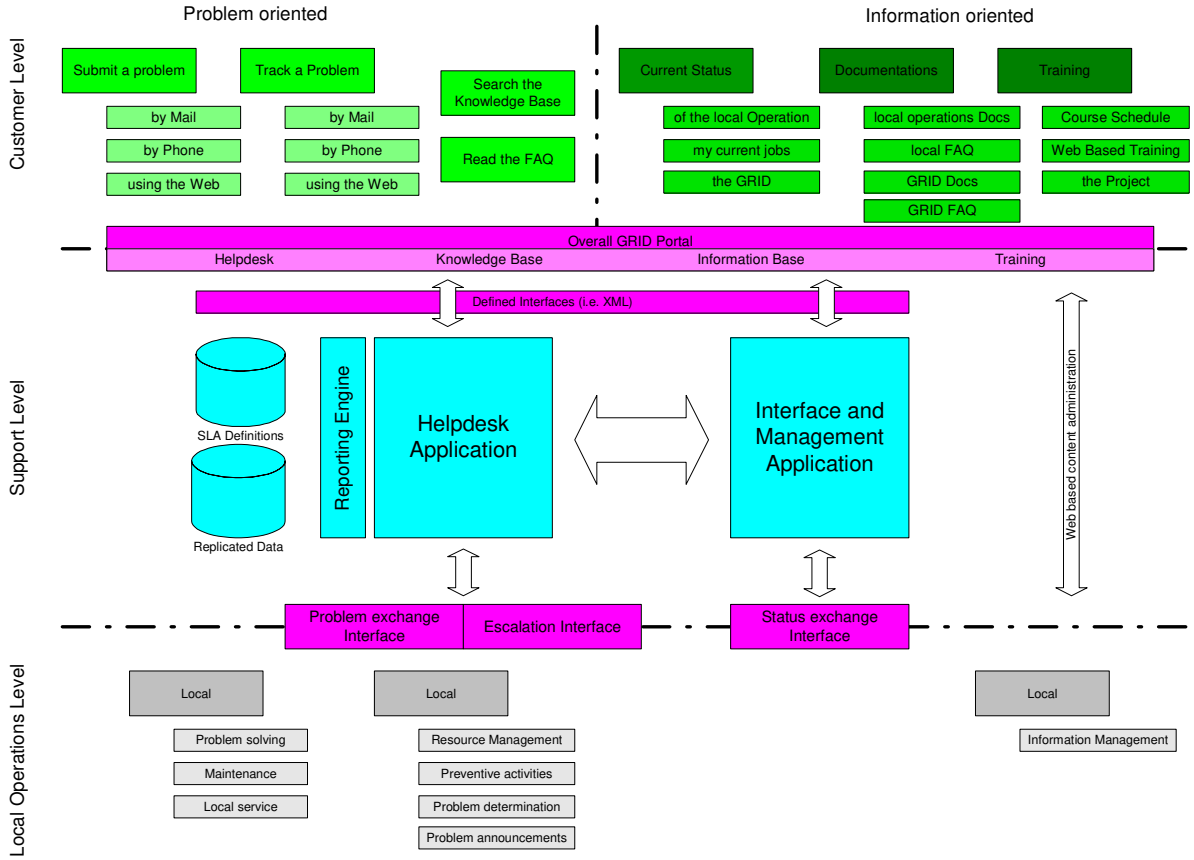
4 Support Model

Based on the needs of the Grid System and the needs of the customers and local operations, this document will provide a recommendation for the following areas:

- User support and Helpdesk
- User Information and training
- Problem documentation and tracking
- Support staff information
- Measuring and reporting of service level agreements (SLA)

4.1 The Model

The following picture will provide an overall model of the recommended support organization:



As you can see in the picture there are three deployment levels and two information access levels we need to have a look at.

4.1.1 Information access scenarios at the customer access level

One angle of vision to the user support is the customer side of view. The customer or in most Grid cases the user has two reasons to access the user support:

1. he has a problem
2. he wants to have information on a topic

Therefore we need to implement a platform where the user has a single point to look for his needs. In addition we should keep all resources open to come in contact with the support team.

We think implementing a web support portal for the users, implementing a world wide usable telephone number and a single email address like support@grid-helpdesk.org will be the best way to go.
Within an overall Grid portal (which is not part or in the scope of this document nor of this working group) the user support portal will be one part that will provide the following tools and information:

- Problem submission
- Problem tracking
- Knowledge base access and FAQs
- Status information regarding the Grid and of the local operations
- Documentation / Information / Howto's
- Access to web based training and other training resources → Not in the responsibility of the user support

This portal resp. this level is besides mail and phone the main interface to the user. The portal provides or uses interfaces for

- The ticketing system
- The information management
- The Status and other interface applications

that will be implemented or provided by the support level.

4.1.2 The support level

The support level consists of the central help desk, that is staff and application and several interface applications that will be used either by the support level or by the customer level or by the lower local operations level.
As the central level it is used to coordinate all activities. This level is in our approach spread over three locations, that all have the same applications and data.
It provides interfaces to the higher and lower levels, supervises the support processes and is used as transport layer for information. The staff will keep in contact with the users and will be the contact for the local operations.
The support level will be responsible for keeping the service levels and for reporting and measuring the overall performance of the support processes. This level will also provide the infrastructure for the support portal (as this will be tripled for high availability) and all necessary applications and interfaces for the support portal and the local operations.
The support level will need interfaces to the user database and the user authentication, as well as interfaces to security models within the Grid.

4.1.3 The local operations level

This level covers the "real" Grid operation centers. These local operations need to provide status information, local documentation and FAQ as well as support in case of local problems. If a problem can not be solved by the central support staff at the support level and it seems to be a local problem, it will be passed to the local operation. This should be done using the ticketing system in conjunction with a local problem tracking tool. If there is no local problem tracking tool, the local operation can use a local operations view of the central ticketing system but it needs to be sure that it will be used.
The local operation will have to provide status information about their local systems and make sure that all maintenance and service schedules will be available to the support site as well. The support level will provide interfaces for the local tools and an application for information management.

4.2 Responsibilities

In this document we see the following responsibilities for the Grid user support:

- User support and Helpdesk
- User Information and pointer to training programs
- Problem documentation and tracking
- Define, control and escalate the service level agreements (SLA)
- Measuring and reporting regarding the service level agreements (SLA)
- Educating the central support staff
- Building and maintaining the support portal site
- Building and maintaining the central ticketing application
- Building and maintaining the data structures and replication services for the distributed support centers
- Build a central knowledge base, FAQ and documentation

The central user support is not responsible for all other stuff, namely:

- User registration services
- The central Grid Portal site
- Maintaining the Grid software, we only provide bug or problem information

4.3 User support and helpdesk processes

No support function would be complete without the core of staff providing day-to-day assistance to the users of the resources and services available. A well understood process for the submission and handling of user contacts is required and must deal with the process followed to take a user query from its inception to resolution and address the levels of required support to affect this. This function is typically supported by an effective trouble ticket system.

User queries, or problem reports, are submitted in a variety of ways. Given that the Grid environment support organization is often distributed, electronic (Web-based) submission of these issues is preferred. Still, users must have the capability to make contact via phone, email or via the web. The support staff must then have an interface for entering these contacts for proper tracking.

A necessary piece of the infrastructure required to support Grid user support activities is an effective ticketing system. The ticketing system should be a web-based helpdesk utility for issuing and tracking support issues or “tickets.” Support staff must be able to access the ticketing system using a standard web browser, though a database engine of some variety will likely power the system. The ticketing infrastructure needs to be scalable and provide inter-site and inter-helpdesk support capabilities, though it should provide a standardized XML interface, so that any trouble ticket system can smoothly and seamlessly be integrated with any existing trouble ticket system at any collaborating sites.

All incoming Email will automatically create a new ticket, so that nothing can be overseen or will be created twice. An additional ticketing system feature, which would make it particularly scalable, is for tickets to be created and assigned and routed by any consultant. Each consultant may, upon seeing a new ticket from a user can catch it up and begin working on the problem. With support staff being geographically distributed, this decentralized workflow model is ideal.

Individual submissions from users or informational submissions from other sources are referenced by ticket number. In our model the support staff people, the system itself by parsing Emails and the customers using the Web interface can create tickets. Tickets are then dispatched or assigned to various groups depending on their local responsibilities. Tickets may, however, be assigned directly to the dispatching group. The ability for consultants or systems staff to assign tickets directly to themselves is an important flexibility that needs to

be provided by the ticketing system. Consultants should typically solve user problems without having to route a ticket to a specialized technical group, and so assigning tickets directly to consultants removes a layer from the support infrastructure; a separate staff for routing and assigning tickets is unnecessary.
In addition the local operations can create tickets e.g. for upcoming downtimes or on local problems. These “special” tickets will also be displayed on the information portal.
Queries should be recorded at the time of submission and updated with each addition to the problem status, up to and including when the query is resolved. Here we also include a minimal set of information to be maintained for each ticket:

- User information and submission data user name
  - User id and associated user information
  - Several timestamps
  - Nature of problem
- Work logs to journal progress
  - Assignments/reassignments to groups/persons
  - Log all work done
  - Individuals must note their actions done for a service request in the ticketing system.
- Solution
  - Summary of Solution
  - Notification to the user
  - Notification to the ticket creator

While support staffs should be given universal access to the ticketing system, users should not been allowed such access, only submitting a new problem report and status tracking should be allowed.

4.4 User Information and training

This is the provision of important information resources and tools to enable the use of a Grid environment and ranges from basic online documentation to information about the current status of resource in the Grid environment and the Grid infrastructure itself to debugging and performance analysis tools. We recommend that this is done using a central web server repository that is maintained using the helpdesk ticketing system in conjunction with a web based content administration.
The users of the Grid need to be educated and trained in its use. Ideally, if a user is trained how to use a Grid, this will mean the user will not have to learn the individual nuances of using all of the various resources within the Grid environment. In practice, this goal may be difficult to achieve, so the need for instruction on some "local" issues for resources on the Grid will likely need to be maintained. Nonetheless, what is new to the majority of users is the distributed Grid environment and, just as documentation of this is needed, training is required to develop a user community fluent in the use the environment.
The central user support will only provide this documentation, but can not provide any training, especially one site training.
We suggest that someone else build WBT (web based training) modules to teach the users online and let the local operations handle the in-person and one site trainings.

4.5 Support staff information

The support staff must have at their disposal a number of “tools of the trade” and information resources to effectively provide support to the user community.

This includes such things as a knowledge base to draw upon, information about the status and scheduling of resources and Grid services, tools to assist in the diagnoses of problems reported, and appropriate levels of access to resources to operate effectively.
The knowledge base will develop over the time and so provide a good base to start with. The exchange interfaces between the local operations and the central support will provide perpetual information on the current system status and online access to the local logfiles will provide an additional resource of information.
Only the time can show which additional tools are necessary for the support team to optimize support, but as most of the tools are available local, we need to find a way to make them usable in our distributed support environment.

4.6 Problem documentation and tracking

A support group needs some way to determine success or failure of problem solving and support methods. This is seldom an easy task because it can be largely subjective. While qualitative information is a more useful indicator of the success of the support organization, it is more difficult to get. Frequently, this information can be obtained from various forms of user feedback. Many organizations collect quantitative metrics, which are fairly easy to collect, but say little about the quality of an organization.
The definition of good SLAs is the most important thing before measuring and reporting can take place. The definition of service levels should be based upon the following reachable targets:

- What is supported?
  - A details description, based on the Grid tasks and processes
- When is it supported?
- What the commitment is to acknowledge problem reports?
- What the commitment is to solve problem reports?

This should on one side be done from a users view and in addition from the local operations view. Then it should be determined what can be achieved and then the SLA should be verbalized and agreed by all parties.
Areas covered should include the following support services infrastructure:

- Consulting/Technical Support
  - Mechanisms for contacting support
  - Web problem report forms
  - Email
  - Phone contacts during specified times of the day
  - Resolve x % of user problems within z working days
  - Resolve y % not within the defined reaction time
  - Problems not resolved within z working days are escalated
  - Mechanisms for users to track problem report
- Use of the grid computing environment, particularly resource access and security
  - Software development
  - Software optimization
  - Allocation procedures
- User Service Performance Metrics
  - User Surveys
  - Other User feedback, formal and informal
  - Support contacts / trouble ticket statistics
  - Annual summaries of metrics made available to users
- System Resource and Grid Environment Notices

- Timely notice of regularly scheduled system downtimes
- Notice of major system downtimes for upgrades, etc., “x” days in advance

5 Organization

In the following chapters we will outline our ideas for a central Grid support organization, but we have taken some assumptions for this:

- There is an overall Grid portal
- Training will be done by someone else
- Staff for the support teams is available and trained
- User registration is done by someone else and authentication is provided as an interface
- All three central support centers must use the same software and comparable hardware systems

5.1 Central support Portal

Based on the general approach that we want to have a 24/7 support all days, we will build the support based on a central Grid support portal website, that is distributed over 3 physical support sites that are spread over the three main time zones.
This means, that the main access for the users will go through the web. Value is often derived for end users, particularly users of distributed environment, by having access to an interface that provides a base set of functionality. This functionality, in most cases, really provides a single interface to execute many of the actions that a user would typically access each of the distributed resources individually to complete. A general Grid support portal provides a central location for access to the various online information and documentation of interest to the grid user community with an integrated presentation. A basic Grid computing environment support portal will provide support services to users in two general categories:

- Information services
  - Documentation
  - FAQ
  - Status information
  - Training
- Interactive services
  - Problem submission
  - Problem tracking
  - Knowledge base searching
  - FAQ

5.2 Ticketing System

The basic tool used within the user support will be the ticketing system. There are several systems available on the market, reaching from high sophisticated commercial tools to high sophisticated open source applications. For most systems installed there is commercial support available.
As different systems are in place over the local Grid operations, we need a ticketing software that is capable of as much software interfaces as possible and will fit the needs of our ticket type, categories, workflows and escalation mechanisms.
It is absolutely necessary that all three support centers have the same software and that the ticketing system is capable of working with replications.
We currently see these possible solutions for choosing software for the ticketing system, after we did a survey and prepare a detailed requirements document

1. Using an open source product

a. Cheap solution, no license fees
b. Must normally be customized to our needs
c. Source available
d. Can be used within the normal operations too, without license costs
e. Support mostly not the best and expensive

2. Using a commercial product
   a. License costs for all three sites
   b. Also needs to be customized, but can be done by the vendor and be included into the license price
   c. No sources
   d. Fair support at normal costs
   e. If spread over the local operations, additional license fees
3. Build our own system
   a. One time development costs
   b. No customization, will be as we need it
   c. Sources available
   d. Support can be done by the developer – if external prices need to be negotiated
   e. No additional license fees if spread over the local operations

As this also depends on which systems are currently used in the support environment of the first center to be established, this has to be discussed within our working group.
In addition it could be useful to have a central bug tracking system for the software development. If this is needed, we probably need to evaluate this too, but the currently used gozilla system can be centralized and seems to be well accepted.

5.3 Distributed support centers

The portal is based on three independent support centers which will replicate all their data:

- Helpdesk Application / ticket system
- Portal Website
- Other information-services

on an event driven base.
That means that the customer sees only one logical support center that is built out of three physical centers all over the world. Even if a user calls the helpdesk, using a world wide accessible and identical number, he does not know where the call is connected. But as all centers will have the same data, this has no influence to the offered support - the user will receive the help he needs.
For example when the support staff will change some data, this will be distributed to all other locations. Even if one center fails (mainly the one with the active pointer to the portal) the other systems can continue their work easily, yes even they can - using a failover mechanism - work as the portal site. Also if an additional center is needed it can be integrated into the replication process.

5.4 User directory

As Grid users, staff and others may access the support portal website and want to have access to different parts of the site, we need to establish internal and external parts of the portal.
All information, that is helpful for the whole world will be public, but status information, ticket tracking and knowledge base should only be accessible by the Grid users.
Therefore we need to have access to an overall Grid user database, so that we can authenticate all users within the portal. In addition we will build up an database for all internal support staff, that needs to be integrated within the global Grid user database, so that these users can access the Grid resources to provide the necessary support to the users.

5.5 Knowledge base

All problem reports and their solutions will end up into a so called knowledge base. This knowledge base will result in a huge amount of information that is the base for developing all FAQ, information and documentation. It will provide valuable information to the Grid developers and the Grid architects for their further decisions.

5.6 Local operations

Ever and ever again it will happen, that problems can only be resolved by involving the local operations. This will include the “local” Grid Team, as technical staff at the location.
Therefore the central support team needs to have access to a local dispatching system. This might be a local ticketing system or a person who has access to the central ticketing system, so that the support staff can assign tickets to them or a person to call.
It is important to the SLA and the overall system work, that the central support can assign a problem to a local team or a person that will immediately work on the problem if necessary. Particularly during the “none working hours”, we need to make sure that there is a “on call” service available at each local site that can be called by the central support staff. Also the rules for calling this “on call” service must be defined.
The interface between the central support and the local operation should be a problem tracking tool. In the central support this will be a ticketing system. The central support will send their tickets to the local operation using an XML exchange format. The local operation needs to import this in their local system and assign a workflow or a comparable mechanism to this ticket.
When the local work is done – and hopefully the problem is solved – the local system has to send a XML file back to the central ticketing system that will incorporate this into the originating ticket. If possible escalations will go a similar way.
But escalations will also be managed by the central support staff and in the worst case will lead into a phone call to the local sites management.

6 Techniques and Standards

6.1 Problem classification and routing

Upon opening a problem report or ticket it must be assigned a problem category. The several categories will be defined by the WG2 for the whole Grid and will help to group and route the tickets.
These categories will also lead into predefined workflows, in case of defined problems. So if someone reports a problem regarding i.e. a user account, this could be lead into a direct user-database lookup and forwarding to the appropriate staff member.
It is not uncommon that a problem must be resolved either by the involvement of staff in other parts of the overall organization (frequently crossing institutional boundaries) or by external entities such as hardware or software vendors who might be either on- or off-site from the relevant resource(s) related to the problem.
We will divide this into 2 groups:

1. Grid related entities. These are all the people and resources that probably need to be involved in case of a problem. Here we will handover the problem report to the local Grid Team within the organization or the Grid contact person. This is done by the central ticket application interfacing the local helpdesk application using an XML exchange format.
2. None Grid related entities like Hardware- or Software vendors. This will normally done be phone and all activities have to be documented within the ticket using the ticketing system.

In addition, there must be a clearly defined escalation policy. This policy must reflect the support commitment made to users in the Grid environment so as to meet the expectations set. The escalation policy must also be attuned to the management chain of the overall organization and not to any particular organization participating in the grid environment.

6.2 Problem determination tools

Various tools need to be available to the support person to assist in the determination of problems and solutions. These tools range from special access methods such as “lsu” (which grants limited “super-user” privileges), to utilities that allow the analyst to assist the user to improve their program such as performance monitoring tools.
In the current Grid environment a few tools are available that provide truly distributed capabilities to assist support staff. Current practice is still largely one of isolating a program to a single system where some tools exist, eliminating everything that can be found in that environment, and then experimenting to determine what is wrong in the distributed environment. One of the challenges of the Grid environment will be identifying or developing a new set of tools to provide at least the following capabilities:

- Debugging
- Performance Monitoring
- Process/job tracking

Current practice at large centers frequently provides limited, or full root access to support staff in order to enable them to act as the user to identify problems in the user’s environment. In the Grid environment this becomes more difficult because the Grid may span different organizations with completely different access and security models. We need to understand how to provide access by the support staff to the user’s environment. The tools that are currently in use such as lsu, sudo, and actual root access will not suffice in the Grid

environment. This topic need to be further investigated and end up in a separate requirements document.
Most systems and batch schedulers provide some type of logging that support personnel can review to locate the time and cause of a problem. Event tracking timelines can serve to identify how things build up to a point of failure. This type of investigation must be provided by the Grid environment and the central support site will setup an central "Monitoring and Interface Application" with standardized XML interfaces, to fill the central databases.
In a multi-system environment being able to check on the status of the systems without having to call someone has been found to be very useful, both for support staff and the end user. This is no less important in the Grid environment. This is one area where tools are already available. Several convenient tools have been developed to provide this kind of information. This information may take several forms such as system load, queue status, disk space, and other useful information about the various systems available to the user. This information needs to be sent to the central "Monitoring and Interface Application" that will gather the information from all sites and present it to the support staff and also – in a more "simple" view – to the users using the support portal website.

6.3 Solution and knowledge database

The first source of information is the knowledge base or expertise of the support staff themselves. This involves understanding or describing the knowledge base / expertise of the collection of support staff that act as resources to each other; provide triage of problem; and have various areas of expertise.
But when the technologies expand and as the central support is not involved in all local operations, not all enhancements will be known to all the support staff, there is a strong need of a knowledge base that builds up upon the helpdesk ticketing system. All tickets – and especially the solutions – must be searchable. In addition this solution database will manually be converted into a knowledge base, by regularly reviewing the solutions and transfer common problem solutions to the knowledge base and make it available to the users this way and build a better index for the support staff. This knowledge base should be incorporated into the ticketing system to make it easier for someone working on a ticket, calling the knowledge base with keywords from the current ticket and if applicable transfer the already known solution into the current instance.
After a short time the most common problems and their solutions are available for all support members and users. When time goes by, this database will help to solve more than 50% of all incoming requests "out of the box".

6.4 Standardized problem/solution-tickets

Especially in the beginning of a centralized user support within the Grid, it will often be necessary to assign a ticket to a local operation, as the central support can not solve a problem or help the user without help of the local operation.
Therefore it is necessary to define a problem resp. ticket interchange format, based on XML. This interchange format should be defined based on the ITIL Standards.
The local operations can then use their own support or ticketing system to work on the problem, but the system should send regular status information to the central ticketing system and provide the solution to the central system. This interface will be defined by the central support working group.
These tickets should at least consist out of the following "items":

- Date & Time ticket was created
- Ticket origination (Mail / Call / etc.)
- Ticket owner

- Ticket requestor / Originator
- Problem Type
- Priority
- Problem description (with time stamp)
- Internal solutions and tracking text (with time stamp)
- External solution text (with time stamp)

6.5 Remarks on Products

As far as we currently know, there are several software systems as ticketing system in use at the different local operations. These products are:

- Remedy (Commercial Product)
- Gnats (Open Source)
- Request Tracker (Open Source)

We think it would be a good starting point for an evaluation, to start evaluating these three products, as there are local experiences available.

6.6 User authentication and authorization

As Grid users, staff and others may access the support portal website and want to have access to different parts of the site, we need to establish internal and external parts of the portal.
All information, that is helpful for the whole world will be public, but status information, ticket tracking and knowledge base should only be accessible by the Grid users.
Therefore we need to have read and authenticate access to the overall Grid user database, so that we can authenticate all users within the portal. In addition we will build up an LDAP tree for all internal support staff, that needs to be integrated within the global Grid user database, so that these users can access the Grid resources to provide the necessary support to the users.

7 Summary/Conclusions

Effective User Services in a Grid Environment are absolutely essential for a greater success of the Grid. We are taught by history that users of computing resources will stop trying to use a resource if they are frustrated while attempting to use that resource. Builders of Grid infrastructures are attempting to make Grids as easy to use as possible, but they will not be "simplistic" in their operation for the foreseeable future. A user service organization, geared up to solve users' problems while using the Grid, is essential to keep users away from being frustrated.

In this document we have attempted to identify the major components of the process of supporting user in a Grid community. This document outlines the best practices known and expected for Grid environments at this point in time and gives recommendations on elements required to provide a solid suite of support services to the user community associated with a Grid, based on the some of the current and planned practices in some developing distributed environments. As stated in the introduction, best practices in user services in a grid environment will be a moving target in the immediate future, and one can envision several revisions to this document. The basic parameters of what a user sees from the support level should not change: a single point of contact and resolution for all of their problems.

To distribute the service over several locations, will provide a reliable background for 24/7 and a failsafe environment, because all Hardware, Software and Staff will be available 3 times.

Implementing a ticketing system and one of the central support centers with a portal site to all the services, will give us a point to start from and helps us to design the missing links between the final, distributed solution.

8 Next steps

As an outcome of this document we propose the following actions as next steps:

Nr.	Remarks	Who?	Deadline?
1	Evaluate a ticketing system / prepare a decision paper		
2	Define procedure for deploying the SLA		
3	Define interfaces to the local operations		
4	Implementation of a first version of a support portal		
5	Creation of some central Documentation and FAQ		
6	Implementation of first (single) support center with a ticketing system		