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## Deliverable DN8.0.1\_1: Report on GN2 Training Sessions



### Deliverable DN8.0.1\_1

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### Abstract

This document reviews and assesses progress in the NA8 activity during year 3 of the GN2 project. The title of NA8 is 'Knowledge Transfer' and the activity is also referred to as 'Training'. Progress is assessed in three key areas:

- Courses developed and delivered.
- Online Training.
- Course Design and Development Process

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## 0 Executive Summary

A key aim of GN2 during its third year was to transition three of its joint research activities to service.

A fundamental element of success in such transitions is training. This is vital, because the NREN staff who are to install, configure, use or troubleshoot GN2 services must be taught how to do so.

The role of NA8, which was new in year 3 of the project, is to provide such training. It was originally envisaged that NA8 should begin in September 2006, but in fact 'mission-critical' training was not required for some months after this date. The role of the NA8 activity leader was seen as vital to establishing the activity on a successful footing. The experience and expertise required for the post of NA8 activity leader was substantial. Due to the fact that the requirement for training was somewhat later than expected, it was possible to execute a thorough search for a suitable candidate. A strong candidate was identified who was able to start in month 32. Therefore the NA8 activity only began in April 2007, once the leader was in place. Since April 2007, substantial progress has been made:

- Two important courses have been successfully delivered in support of the perfSONAR pilot programme, and large parts of a third course have been developed.
- A rigorous process for training design and development has been introduced and successfully used.
- Progress has also been made on the examination of options for online training.

NA8 was led by DANTE with participation from TERENA, BELNET, DFN, ISTF, PSNC, and SWITCH.

To sum-up: the NA8 year started late, but in the five months since April 2007 considerable progress has been made. Good foundations have been laid for further progress during year 4.

## 1 The Aims of NA8, Knowledge Transfer

It was envisaged that NA8 would provide training for the three Joint Research Activities (JRAs) that were expected to spawn off operational services in year 3 of GN2. These were:

- JRA1 – Performance Measurement and Management.
- JRA2 – Security.
- JRA5 – Roaming and Authorisation.

The training was to target NREN staff involved in the operation of these services. In particular it was to cover aspects such as:

- Overview of software tools used.
- Installation.
- Configuration.
- Troubleshooting.

It was anticipated that there would be two or three events per year per activity and that each event might last between half a day and two days.

NA8 also aimed to examine ways to support the training's long-term sustainability, by using methods such as video-recording of training, streaming and remote training.

## 2 Progress During Year 3

### 2.1 Summary of Progress

The NA8 activity was new in Year 3 of the project. It was originally envisaged that NA8 should begin in September 2006, but in fact ‘mission-critical’ training was not required for some months after this date. The role of the NA8 activity leader was seen as vital to establishing the activity on a successful footing. The experience and expertise required for the post of NA8 activity leader was substantial. Due to the fact that the requirement for training was somewhat later than expected, it was possible to execute a thorough search for a suitable candidate. A strong candidate was identified who was able to start in month 32. Therefore the NA8 activity began in April 2007, once the leader was in place.

Once the activity leader was in place, a decision was made to focus the available resource on developing and delivering training to support the perfSONAR pilot programme. Indeed, it was necessary to produce two courses very quickly so that five target NRENs could be properly equipped to take part in the programme. These courses were delivered on time and with considerable success. Despite its late start, NA8 managed to successfully deliver two training events in support of JRA1’s transition to service.

Considerable work was also carried out to develop a course about Setting up and Operating a PERT (although this will not be delivered until the beginning of project Year 4).

A new and rigorous process for training course design and development was put in place and progress was also made on NA8’s objective of examining methods of remote or “on-line” training.

NA8 was led by DANTE with participation from TERENA, BELNET, DFN, ISTF, PSNC, and SWITCH.

With input from the NRENs, TERENA and the relevant GN2 activity leaders, DANTE identified the required training, assessed the needs of the audiences of this training and designed courses to satisfy those needs. It developed an overall GN2 training plan and co-ordinated the various activities and parties required to produce the training events. DANTE also produced high quality training material based on the source material provided by the developers and provided guidance and coaching to the NRENs about how the material should be delivered.

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TERENA organised the logistics of the training events, including aspects such as making bookings for meeting rooms and hotel rooms, invitations of participants to the training workshops, announcing the training workshops (by email and on website), handling registrations, copying the training materials and providing them to the trainees and providing on-site logistic support during the training workshops.

Staff from NRENs including BELNET, DFN, ISTF, PSNC and SWITCH identified and where necessary produced basic source material for the training. They carried out technical reviews of the training material. The NRENs also provided presenters to conduct the training, mainly drawn from their development communities.

To sum up: less training was delivered in year 3 than had been predicted, as the need for it emerged later than expected. Nonetheless, since April 2007, substantial progress has been made.

## 2.2 Using the perfSONAR Visualisation Tools Course

### 2.2.1 Overview of the Course

The “Using the perfSONAR Visualisation Tools Course” was developed to support the perfSONAR pilot programme. It aimed to equip NREN participants with the knowledge that they needed for themselves to deliver user training about the visualisation tools to their own end-users. The course also gave participants the opportunity to provide feedback about the perfSONAR visualisation tools.

The course objectives were:

- Describe the range and purpose of available visualisation tools.
- Use the perfSONAR visualization tools.
- Collect participants’ feedback about the perfSONAR visualisation tools.

The following subjects were covered:

- perfSONAR Overview.
- The perfSONAR visualisation Tools.
  - The perfSONAR Visualisation User Interface (UI).
  - Customer Network Management (CNM).
  - The Looking Glass UI.
  - The Hades Visualisation Tool.
- Feedback on the visualisation tools.
- Extended Question and Answer Session for Trainers.

The target audience of the course was drawn from the NRENs who participated in the perfSONAR pilot. The participants were either Multi-Domain-Monitoring (MDM) contacts and/or network engineers. One participant from an interested non-pilot NRENs also attended.

The course featured a mixture of slide presentations and hands-on exercises for the participants to complete. It lasted for one day. Course design and development was led by DANTE with participation from the staff of

BELNET, DFN, ISTF, and SWITCH. The course was organised by TERENA. The course was presented by staff from DANTE, BELNET, DFN and SWITCH.

## 2.2.2 Course Delivery Report

The training course was delivered in May 2007 to eight key NREN participants. All of the perfSONAR pilot NRENS had at least one representative attending the training. Participants were asked to complete an evaluation of the training at the end of the course. The following bullet points summarise the positive aspects of their feedback:

- All eight participants confirmed that the course objectives had been met and that the pace of the course had been right for them.
- On a scale of Excellent, Good, Fair and Poor, all eight participants rated the course slides as either excellent or good.
- Seven of the participants felt that the course was valuable.
- At least seven of the participants rated the trainers as either Excellent or good in the following categories:
  - Product knowledge.
  - Use of examples.
  - Presentation skills.
  - Ability to explain the topic clearly.
  - Ability to answer questions.

The following bullet points summarise participant feedback that identifies areas for future course enhancement:

- Three of the participants only rated the exercises as "fair" (five rated them as "excellent" or "good")
- Two of the participants only rated the relevance of examples as "fair" (six rated them as "excellent" or "good").

Overall, then, it can be seen that the course was received very favourably. One of the participants even stated, "It was actually the best training course I've ever attended. A really high quality one."

## 2.2.3 Conclusion

The "Using the perfSONAR Visualisation Tools Course" was developed successfully in a short space of time. Development was concentrated into the period between the appointment of the activity leader in early April and the deadline of the start of the perfSONAR pilot programme in late May. As one would expect in the first delivery of any course, some areas for enhancement were identified. However, the training was generally very well received and all participants felt that it had achieved its objectives.

## 2.3 Installing and Configuring the perfSONAR Services Course

### 2.3.1 Overview of the course

The "Installing and Configuring the perfSONAR Services Course" was designed to support the perfSONAR pilot programme. It aimed to teach participants how to install and configure perfSONAR services. The course also

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explained how to interact with the service desk and gave participants the opportunity to provide feedback about perfSONAR installation tools.

The course objectives were:

- Describe how to install, configure and deploy the following perfSONAR services:
  - The Lookup service
  - The BWCTL Measurement Point
  - The SSH / Telnet Measurement Point
  - The RRD Measurement Archive
  - The SQL Measurement Archive
- Collect participants' feedback about the perfSONAR installation and configuration processes.
- Identify how to interact with the service desk.

The following subjects were covered:

- perfSONAR Technical Overview.
- General Installation Considerations.
- Installing and Configuring the Lookup Service.
- Installing and Configuring the BWCTL Measurement Point.
- Installing and Configuring the SSH / Telnet Measurement Point.
- Installing and Configuring the RRD Measurement Archive.
- Installing and Configuring the SQL Measurement Archive.
- Participant Feedback on perfSONAR Installation and Configuration.
- Interacting With the Service Desk.

The target audience of the course was mainly drawn from the NRENs who participated in the perfSONAR pilot programme. Participants were either Multi-Domain-Monitoring (MDM) contacts and/or network engineers. A participant from a non-pilot NREN also attended.

The course featured a mixture of slide presentations and hands-on exercises for the participants to complete. It lasted for two days. Course design and development was led by DANTE with participation from the staff of BELNET, DFN, ISTF, and PSNC. The course was organised by TERENA. The course was presented by staff from DANTE, BELNET, DFN and PSNC.

### 2.3.2 Course Delivery Report

The training course was delivered in May 2007 to eight key NREN participants. All of the perfSONAR pilot NRENs had at least one representative attending the training. Participants were asked to complete an evaluation of the training at the end of the course. The following bullet points summarise the positive aspects of their feedback:

- All eight participants confirmed that the course objectives had been met.
- Seven of the participants responded that the pace of the course had been right for them.

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- On a scale of excellent, good, fair and poor, seven participants rated both the course slides and exercises as either excellent or good.
- Seven of the participants felt that the course was valuable.
- All eight of the participants rated the trainers as either excellent or good in the following categories:
  - Product knowledge.
  - Presentation skills.
  - Ability to explain the topic clearly.
  - Ability to answer questions.

The following bullet points summarise participant feedback that identifies areas for future course enhancement:

- One participant felt that the pace of the course was too slow.
- Two participants only rated the relevance of examples to them as "fair".

As with the 'Using the perfSONAR Visualisation Tools' course, it can be seen that, overall, the course was received very favourably.

### 2.3.3 Conclusion

The "Installing and Configuring the perfSONAR Services Course" was developed successfully in a short space of time. Development was concentrated into the period between the appointment of the activity leader in early April and the deadline of the start of the perfSONAR pilot programme in late May. As one would expect in the first delivery of any course, some areas for enhancement were identified. However, the training was generally very well received and all participants felt that it had achieved its objectives.

## 2.4 Setting up and Operating a PERT

### 2.4.1 Overview of the course

This hands-on workshop is designed to equip NREN staff to establish and operate national and local PERTs (Performance Enhancement and Response Teams) within the proposed federated PERT structure. The course will cover both the draft procedures and the technical aspects of running a PERT and will provide technical guidance, tips and information about how to investigate and resolve issues. It will also cover the various tools, techniques and methodologies that you can employ to investigate issues.

The course objectives are:

- Describe the rationale for and the structure and ethos of a federated PERT.
- Be able to set up local and regional PERTs within a federated PERT structure.
- Gather feedback about the evolution of the PERT and its systems.
- Describe the methodologies used to investigate performance issues.
- Be able to use a variety of tools to investigate performance issues.

The following subjects will be covered:

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- Overview: What is the purpose of the PERT and why choose a Federated Structure?
- The 'Workflow' and Procedures of a Federated PERT.
- Setting up PERT Organisations: Roles, Responsibilities and Profile-Raising.
- PERT Systems and Procedures: PERT Tickets and the Knowledge Base.
- Network Performance and User Expectations.
- Bulk Transfers under TCP.
- The Methodology of Performance Issue Investigation.
- Investigative Tools:
  - RTT Measurement with Ping.
  - Network Path Discovery with Traceroute Tools.
  - Throughput Measurement using Iperf-type Tools.
  - TCP Stream Analysis with TCPDUMP and Wireshark.
- How Middleboxes Impact Performance.
- Campus Network Devices – Common Issues.

The target audience of the course will be NREN Technical Managers who are tasked with setting up a national or regional PERT, and Senior Network Engineers who are responsible for investigating network performance problems.

The course will feature a mixture of slide presentations and hands-on exercises for the participants to complete. It will last for one and a half days. Course design and development was led by DANTE with participation from the staff of GRNET and SWITCH. The course will be organised by TERENA. The course will be presented by staff from DANTE, GRNET and SWITCH.

### 2.4.2 Course Development Report

The course is not due to be delivered until mid-September 2007, which falls within Year 4 of the GN2 project. However, approximately eighty percent of the course development will be completed by the end of Year 3 of the project. Course development is currently proceeding in a timely fashion and is expected to continue thus.

## 2.5 On-Line Training

One of the aims of NA8 is stated as, "NA8 will examine ways to support the training's long-term sustainability, by using methods such as video-recording of training, streaming and remote training."

Both of the perfSONAR training courses were recorded on video. Although the results were not made public, this experiment did help to establish clearer requirements with regard to on-line or remote training. For example, there is clearly a need to design specific courses with an on-line format in mind. Typically, such courses will be of relatively short durations (one to two hours) in order to hold the on-line participants' attention and should include interactive features such as quizzes.

Investigation into the technologies used to produce on-line training courses also commenced. Two candidate technologies were identified for further exploration in Year 4 of the project. These are Flash and SMIL (Synchronized Media Integration Language). Both Flash and SMIL facilitate the building of multi-media courses that combine audio, video, images, slides and text. Short demonstration courses were produced to illustrate the

merits of each technology. In Year 4 of the project, the aim will be to produce prototype on-line courses. These will be piloted on small audiences to gauge their popularity and effectiveness.

## 2.6 Course Design and Development Process

During Year 3 of the project a rigorous course design and development process was introduced. The process integrates sound engineering principles with best training practice from industry. It begins with a Training Needs Analysis that asks “who requires training?”, “what do they need training about?”, “when is it required?” and a series of other basic but pertinent questions. Once the answers to these questions have been documented and checked, the process moves into a detailed design phase.

In the detailed design phase, the structure of the course is mapped out. A plan is constructed that shows which topics will be run in what order, what the learning objectives of each topic are, where exercises will be undertaken, how long each topic will take to deliver, and so on. Once the detailed design has been reviewed by key stakeholders, the course materials (slides and exercises) are developed and reviewed. Prior to “live” delivery, the course is subject to a thorough rehearsal. And, after live delivery, course evaluation forms are studied to identify ways in which the course can be improved in the future.

This process was used to develop the two perfSONAR training courses that were delivered during Year 3 of the project. The success of these courses reflects the rigour and appropriateness of the process.

### 3 Conclusions

Although the NA8 activity commenced later than planned, progress was substantial in the five months between the start of the activity and the end of Year 3:

- A new process for the design and development of training courses was successfully introduced.
- Two very-well received training courses were delivered and much of the development work for a third training course was completed.
- Progress was also made in examining methods of on-line training.
- A proven process for course design and development is now in place.

Progress was greatly aided by close cooperation between DANTE, TERENA, BELNET, DFN, ISTF, PSNC, SWITCH and other GN2 project partners.

The requirements for training in Year 4 of the project have already been identified. In Year 4 of the project, therefore, NA8 is well placed to build success in training from firm foundations.

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## 4 Acronyms

<b>BWCTL</b>	Bandwidth Controller
<b>NREN</b>	National Research and Education Network
<b>perfSONAR</b>	Performance Monitoring Service Oriented Architecture
<b>PERT</b>	Performance Enhancement and Response Team
<b>RRD</b>	Round Robin Database
<b>RTT</b>	Round Trip Time
<b>SMIL</b>	Synchronized Media Integration Language
<b>SQL</b>	Sequential Query Language
<b>SSH</b>	Secure Shell
<b>TCP</b>	Transmission Control Protocol