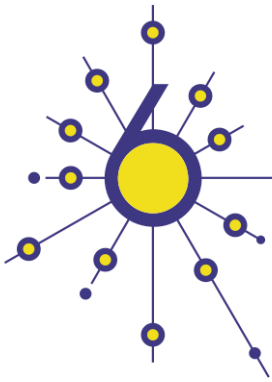
e-infrastructure



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Alvaro Vives	Consulintel	WP1

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Abstract:

This deliverable presents a report from the workshop held in Christchurch (New Zealand) on 25th August 2008, within the 26th APNIC Meeting. The presentation material is listed, the attendees and their affiliations are given and the opportunities for further co-operation and follow-up actions are described.

Keywords:

IPv6, Support, Training, Testbeds, Modules, 6DISS, 6DEPLOY, Hands-on exercises

Disclaimer

Revision History

The following table describes the main changes to the document since created.

Revision	Date	Description	Author (Organization)
v0.1	23/10/2008	Document creation based on Martel's model Added first content	Alvaro Vives (Consulintel)
v0.2	15/01/2009	Added questionnaire statistics and attendees list	Alvaro Vives (Consulintel)
v0.3	04/02/2009	Final review	Jordi Palet (Consulintel)
v0.4	05/02/2009	Document revision	Sarah Kenehan (Martel)
v0.5	05/02/2009	Document revision	Martin Potts (Martel)

Executive Summary

One of the main activities in the 6DEPLOY project is to organise workshops to train the different Internet communities in the areas of IPv6 deployment, configuration, and usage. This project is a follow up of previous project activities within and outside the Framework Programmes of the European Commission.

This deliverable presents a report from the workshop held in Christchurch (New Zealand) on 25th August 2008, within the 26th APNIC Meeting. The following is described in this report: a) the workshop attendees and their affiliations, b) the programme outline, c) the material presented, d) an assessment of the opportunities for further co-operation and follow-up actions planned, and e) an analysis of the participant feedback questionnaires.

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1. INTRODUCTION

1.1 6DEPLOY Objectives

The following comprise the 6DEPLOY objectives:

- organize workshops for the e-Infrastructure community and give practical advice and hands-on support for deploying IPv6 in their environments;
- work on deployments in Europe and in developing countries; exchanging experiences and best practices;
- improve the competitiveness of European industry by sharing experiences from IPv6 deployments in other regions;
- gain expertise with which to support *more commercial* deployments in European industries (e.g. Emergency Services, Health, Broadcast, Transport, Schools, Environment, Gaming, etc.);
- help to build consensus between European researchers by enabling and exploiting synergy among related projects (e.g. GÉANT-2, SEEREN-2, SEE-GRID, EUMEDCONNECT, CLARA, ALICE);
- encourage and enhance the effectiveness of the coordination between National and pan-European e-Infrastructure initiatives by being a focal point for IPv6 activities, giving IPv6 training, and supporting IPv6 deployments;
- open up the ICT programme to the participation of third country organisations in International Cooperation Partner Countries, including countries in Africa, Asia, and Latin America, by involving organisations that influence e-Infrastructures on those continents;
- improve scientific cooperation between Europe and the declared target regions (Africa, Asia and Latin America,) by exchanging knowledge and experiences through direct practical support for deployment, training events, etc. The project therefore also helps support other Community policies, most notably the development policy. Telecommunications infrastructure and the capability to access information worldwide are key measures of a country's progress. IPv6 has been a cornerstone of European Internet policy for several years; and
- support interoperability and standards by sharing information on the latest IPv6 standards, equipment hardware and software releases, and IPv6 policies (RIRs).

One of the main activities in the 6DEPLOY project is therefore to organise workshops to

train the different Internet communities in the areas of IPv6 deployment, configuration, operation, and management. This activity is a follow up of previous projects' activities within and outside the Framework Programmes of the European Commission.

1.2 6DEPLOY Workshop Methodology

The 6DEPLOY methodology relating to the workshops is shown in the diagram below:

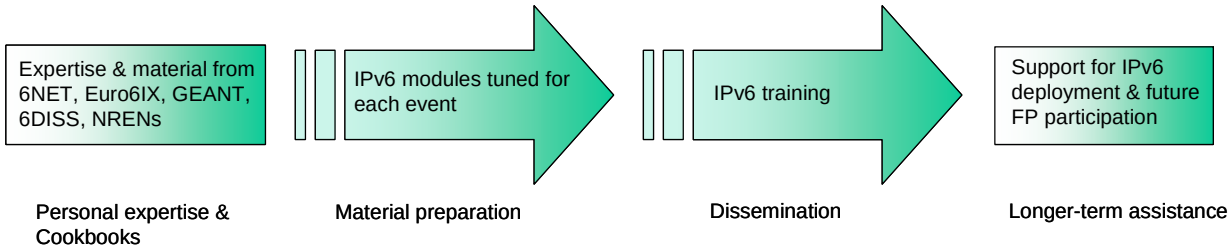

Figure 1-1: 6DEPLOY methodology (diagrammatically)

The approach is to use course material available from 6DISS and elsewhere relating to IPv6, the e-learning course, and the 6NET IPv6 Deployment Guide book as the basis of the training material. This training material is supplemented with knowledge from partners' participation in events such as IPv6 Forum meetings, IPv6 Task Force meetings, Internet2 meetings, and the IETF, and from the experience of similar activities brought to the project by the representatives of the Internet Registries in North and South America, the Asia-Pacific region, Africa, and Europe. The knowledge is disseminated through training sessions that, for practical reasons, are often held in conjunction with AfriNIC, AfNOG, APNIC, APRICOT, ISOC, LACNIC, and RIPE meetings.

After each workshop, feedback reports are collected from the participants, enabling 6DEPLOY to assess the impact of the presentations and identify any areas that need improvement.

The full set of dissemination material (including the e-learning course and 3 managed testbeds) is available from 6DISS and partners´ own sources. This includes presentation slides on all issues of Internet deployment and evolution; especially IPv4-IPv6 transition strategies, DNS, DHCP, routing, QoS, MobileIP, multicast, renumbering, auto-configuration, security, monitoring and management tools, and applications. This material was described in the deliverable D1.1: "IPv6 training material and related usage procedures".

This document describes the workshop held in Christchurch (New Zealand) on 25th August 2008, within the 26th APNIC Meeting. The workshop was very well attended (approximately 100 participants) and comprised both slide presentations and hands-on

exercises (using local equipment).

Chapter 2 of this document explains the general motivation for running IPv6 workshops, and Chapter 3 describes the specific details of this workshop, including descriptions of the attendees, descriptions of the modules that were presented, and descriptions of the "hands-on" exercises that were performed.

Chapter 4 identifies opportunities for further collaboration in the region and follow up actions, and Chapter 5 summarises the analysis of the feedback questionnaires that were filled in by the participants.

2. THE WORKSHOPS (GENERAL)

Workshops are one of the main mechanisms used by 6DEPLOY to transfer information and build collaboration.

6DEPLOY is structured to provide an ideal platform for the discussion of deployment scenarios and the exchange of best practices, thereby avoiding duplication of effort by preventing the waste of time on techniques that are known not to have been fruitful, and generally making the most efficient use of the available resources in a region. Partners in 6DEPLOY have deployed IPv6 on a production basis in their own NRENs and University networks, and have documented their experiences in Cookbooks and in IETF informational / best common practice RFCs. The manufacturer in the consortium is building IPv6 products.

The workshops are not only intended to lead to an improved quality of the Internet infrastructure in developing countries, but will also raise the competence of the attendees and, in exploiting the personal contacts made through 6DEPLOY, facilitate and encourage the participation of their organisations in future FP7 Calls and beyond.

Impacts from the workshops will include:

- a positive effect towards preventing the "brain drain" from developing countries by bringing interesting and state-of-the-art activities into these regions, thus making information and knowledge resources accessible to the scholars both locally and globally;
- an expansion of the conditions for growth by enabling the exchange of ideas, launching joint experiments and projects, disseminating RTD results, and activating market forces; all of which are substantial elements in the process of regional development;
- making European research and industrial concerns aware of the highly skilled personnel who can contribute to the urgently needed improvement of ICT infrastructures; resulting in an increase of the demand for specialized services provided by the highly skilled academics and researchers of the region; and
- the identification of IPv6 deployment activities in the region and an exchange of information about deployment experiences.

While IPv6 standards and services are quite stable, regional variations in practices and operations will require slightly different approaches for collaboration and dissemination. Therefore, the material for this workshop was collected, and the workshop schedule,

format, and contents were tailored in conjunction with the local organisers so as to suit the type of participants, the subjects to be addressed, the location, the host organisation, the sponsors, etc.

3. THE 6DEPLOY WORKSHOP IN CHRISTCHURCH (NEW ZEALAND)

This deliverable presents a report from the workshop held in Christchurch (New Zealand) on 25th August 2008, within the 26th APNIC Meeting. The workshop is described below, in the form of the attendees and their affiliations, the programme outline, and the material that was presented.

3.1 Overview

Presented as a tutorial (Operational IPv6 - Planning and implementing an IPv6 deployment), the participants were given the opportunity to discuss the issues and consider the problems and solutions involved in deploying IPv6 in an ISP operational environment.

The tutorial covered the processes of planning, building, and configuring an IPv6 network, including the deployment of IPv6-capable infrastructure services and establishing connectivity to the global IPv6 network.

While ISPs may not necessarily be content providers, making content available to users via IPv6 will be a crucial factor in making any IPv6 deployment meaningful on an operational and production level. Therefore, this aspect was also examined.

The tutorial also reviewed IPv6 security, the current status of IPv6 deployment, and related APNIC policies.

The tutorial included a deployment rollout demonstration to give participants a clearer picture of the requirements to move forward with IPv6 deployment plans.

Individuals present at the workshop included Jordi Palet (Consulintel) on behalf of 6DEPLOY. Jordi was in charge of presenting both the IPv6 modules and the hands-on modules.

3.1.1 Other IPv6 activities

There were additional IPv6-related activities at the 26th APNIC Meeting:

- **IPv6 at your fingertips** (Tuesday, 26th August 2008, 18:00-19:00): This was an informal session with friendly APNIC staff to discuss what can be expected in the IPv6 connection experiment on Wednesday 27th August 2008. This discussion

also explored how ar laptop can be configured to use IPv6. The session gave practical hands-on experience in configuring and running IPv6, as well as in-depth background information about the IPv6 network at APNIC 26.

- **IPv6: Does it work for you?** (Wednesday 27th August 2008, 9:00-12:30): Several talks about IPv6 issues.

3.2 Attendees

Following is a list of people registered for the IPv6 workshop:

No.	Name
1	Rajesh Aggarwal
2	Dan Alexander
3	Hermin Anggawijaya
4	Einar Bohlin
5	James Burnett
6	Randy Bush
7	Jamie Cairns
8	Zhengyin Cao
9	Rajesh Chharia
10	Chetra Chim
11	Jake Chin
12	Yi Chu
13	'Etuate Cocker
14	Andrew de la Haije
15	Christian Dwinantyo
16	Alan Fagan
17	Neil Fenemor
18	Stu Fleming
19	Mark Foster
20	Miwa Fujii
21	Tomohiro Fujisaki
22	Neil Gardner
23	Nick Griffin
24	Tony Hain
25	Cathy Lynn Handley
26	William Heffernan
27	Michael Hilton
28	Raphael Ho
29	Alastair Johnson
30	Steven Kho
31	Erik Kline
32	Andy Kurniawan
33	Hyun-Joon Kwon
34	Beatty Lane-Davis
35	Ji-Young Lee
36	Martin Levy
37	Guanghao Li
38	Ke LI
39	Andy Linton
40	PAOLA LOGLI
41	Yan Ma

42	Ross Mahon
43	Shiraz Malik
44	sakaio manoa
45	Wei Mao
46	Frank March
47	Jonny Martin
48	Yoshinobu Matsuzaki
49	Andrew Molivurae
50	Indika Nanayakkara
51	Cuong Nguyen Xuan
52	Morgan Nicholson
53	Tshering Norbu
54	Izumi Okutani
55	Stanley Osao
56	Rattapon Pacharawongsakda
57	Jordi Palet Martinez
58	Tulika Pandey
59	Wachira Parathum
60	Simon Paterson
61	Narayana Swamy Perumal
62	Mark Petrie
63	Hong-Anh Pham
64	Pitoon Piluwasandhalai
65	Ray Plzak
66	A. T. M. Nurul Afsar Polash
67	Rajesh Porwal
68	Radha Parvatee Ramphul
69	Oyungerel Rentsen
70	McDonald Richards

Table 3-1: List of participants

Network engineers, managers, and anyone interested in IPv6 deployment were encouraged to attend the workshop.

In all cases, the attendees were technical people whose knowledge about IPv6 ranged from almost no knowledge at all, to having some experience with IPv6 deployment. Some had already performed IPv6 experiments or were planning some level of deployment at their institution.

Section 5 offers more details of the attendees based on their answers to the questionnaire.

3.3 Workshop programme

The agenda was agreed on after close collaboration with the local organisers from APNIC, and tailored set up and configuration exercises were created for this workshop. The meeting agenda and the related material were submitted in advance so that the local organisers could decide which topics should be prioritised and so manage the

logistics accordingly. As was requested by most of the participating organisations, the "hands-on" sessions took around 50% of the overall time of the training workshop. The programme of the workshop is presented in the following table:

Date	Time	Title of session
25/08/08	09:00	IPv6 Basics
25/08/08	14:00	IPv6 Startup
25/08/08	16:00	Broadband Deployment with IPv6

Table 3-2: Programme

3.4 Presentation material

The agenda was agreed on after close collaboration with the local organisers from APNIC, and tailored set up and configuration exercises were created for this workshop. The following material was presented:

Modules	Hands-on exercises	Presented by	Affiliation
IPv6 Basics		Jordi Palet	Consulintel
IPv6 Startup	Basics 1, Basics 2 and Transition Mechanisms	Jordi Palet	Consulintel
Broadband Deployment with IPv6		Jordi Palet	Consulintel

Table 3-3: List of modules and hands-on exercises used

3.4.1 Modules

Below is a brief description of each module's content:

- **IPv6 Basics**: This module explained the reasons for IPv6, the main differences between IPv4 and IPv6, IP mobility, the advantages of IPv6, and the myths surrounding IPv6. Transition technologies were also explained and basic guidelines for the deployment in different scenarios were provided.
- **Broadband deployment with IPv6**: This module described the Autoconfiguration, DHCPv6, and Prefix Delegation concepts. Issues to be taken into account when deploying IPv6 over broadband and different broadband access technologies were considered, as well.

3.4.2 Hands-on exercises

To help ensure the workshop attendees will be able to install IPv6 in their own environment after the course is over, a set of practical exercises has been designed, known as 'hands-on modules'. These exercises were performed on local equipment.

Below is a brief description of the hands-on exercises that were performed:

- **Basics 1:** Exercises illustrate how to install IPv6 on different Operating Systems (mainly Linux, Vista, and Windows XP), how link-local addresses are used, the use of ping and traceroute tools and how to configure static addresses.
- **Basics 2:** In this hands-on exercise, IPv6 protocol is analysed in depth: Neighbour Discovery, Autoconfiguration, Management of static routes, and routing tables are also shown.
- **Transition mechanisms**: In this exercise, the trainees have to configure different transition mechanisms (mainly tunnelled). With the use of public IPv4 address hosts, we were able to use 6to4 to access IPv6 content on the IPv6 Internet.

3.5 Photographs taken at the event

Figure 3-1: Jordi Palet (Consulintel) presenting

Figure 3-2: Attendees of the workshop

4. OPPORTUNITIES FOR FURTHER CO-OPERATION

In all the workshops, the attendees were informed on how to stay in contact with the 6DEPLOY partners in case they have questions regarding IPv6 deployment, addressing plan, etc. In this respect, the role of the *helpdesk* was explained as being the way to submit questions. An e-mail to helpdesk@6deploy.org will be distributed to a mailing list composed of volunteers who are available to answer (or forward) any kind of questions, requests, etc. Also a web form can be used to send requests to the project.

Additionally, the attendees (and trainers from the region) can follow the e-learning course and/or check the availability of the 6DEPLOY remote labs and use these.

Attendees showed interest in further workshops and in the possibility of using the remote labs employed during the workshop.

5. ANALYSIS OF THE FEEDBACK QUESTIONNAIRES

A questionnaire has been specially designed for the purpose of getting feedback from the participants regarding the suitability of the course material, the presenters´ ability to convey information, and the relevance of the information to the expectations of the attendees.

Participants were not required to offer personal information, so as to allow for anonymous responses. Each participant was first asked to indicate:

- his/her organisation and job responsibilities, and
- his/her plans for IPv6 deployment in his/her organisation.

Then, for each theoretical presentation and "hands-on" session, each participant was requested to assess "usefulness", "quality of presentation", "familiarity with the topic", "quality of the course documentation", "general organisation", etc.

5.1 General questions related to participants and IPv6

About the participants 45 participants were present, 41 questionnaires were returned		
Employment sector	Government	6
	University or other higher education	1
	Schools or further education	1
	Research	4
	Health	1
	Commercial	26
	Other (please specify)	2*
Job function	Government Advisor	3
	Senior Manager	5
	IT Manager	8
	Systems Administrator	3
	Network Administrator	16
	Researcher / Postgraduate	2
	Undergraduate	0
	Other (please specify)	4*
Usage of IPv6		
Do you use IPv6 yourself?	Yes	14
	No	24
Does your organisation use IPv6?	Yes	8
	No, but planned in the next year	16
	No, but planned in the longer term	13
	No, and no plans as yet	4

* See the graphics section for more information

Table 5-1: General questions related to participants and IPv6

5.2 Questions regarding the workshop

About the Workshop				
Usefulness of the topic	Very useful	Useful	Slightly useful	Not useful
IPv6 Basics	13	19	4	1
IPv6 Transition	13	21	2	0
IPv6 Deployment in Broadband	7	25	5	0
Quality of the presentation	Excellent	Good	Average	Poor
IPv6 Basics	11	25	1	0
IPv6 Transition	12	23	2	0
IPv6 Deployment in Broadband	10	24	3	0
Familiarity with the topic?	None	Some	Most	All
IPv6 Basics	1	21	11	3
IPv6 Transition	3	27	6	0
IPv6 Deployment in Broadband	12	19	5	0
Quality of the course documentation	Excellent	Good	Average	Poor
	4	27	4	0
General workshop organisation	Excellent	Good	Average	Poor
	4	30	2	0
Recommend to your colleagues?	yes	no		
	34	3		

Table 5-2: Questions regarding the workshop

5.3 Results graphics

Following are some graphics that represent the above results in a more friendly way, so as to ease their interpretation.

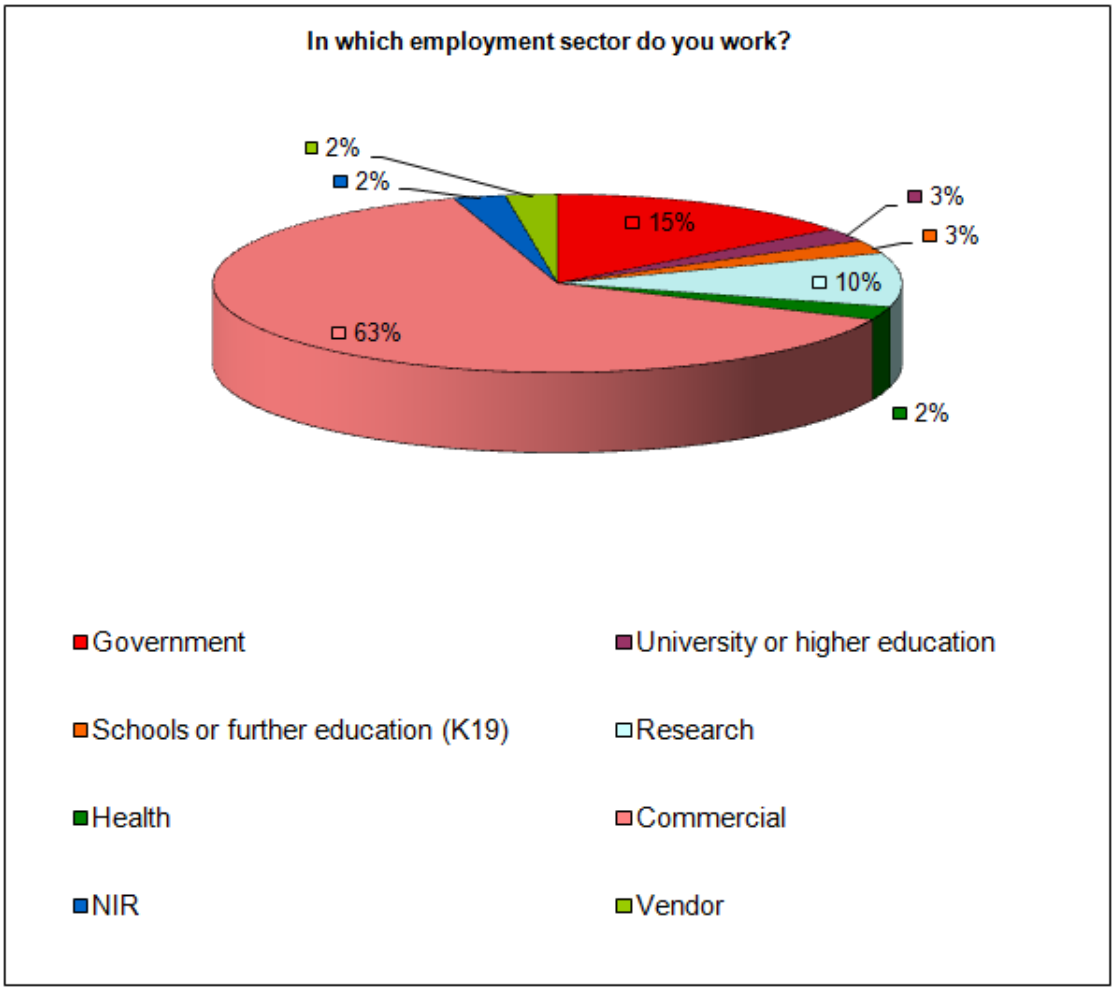

Figure 5-1: In which employment sector do you work?

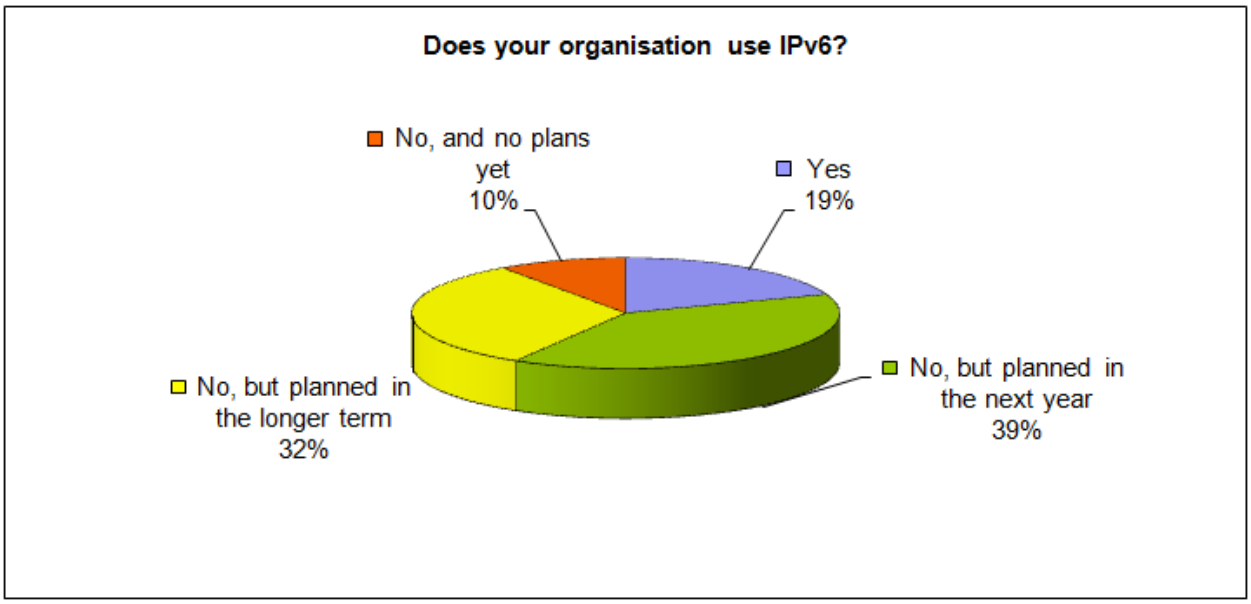

Figure 5-2: Does your organisation use IPv6?

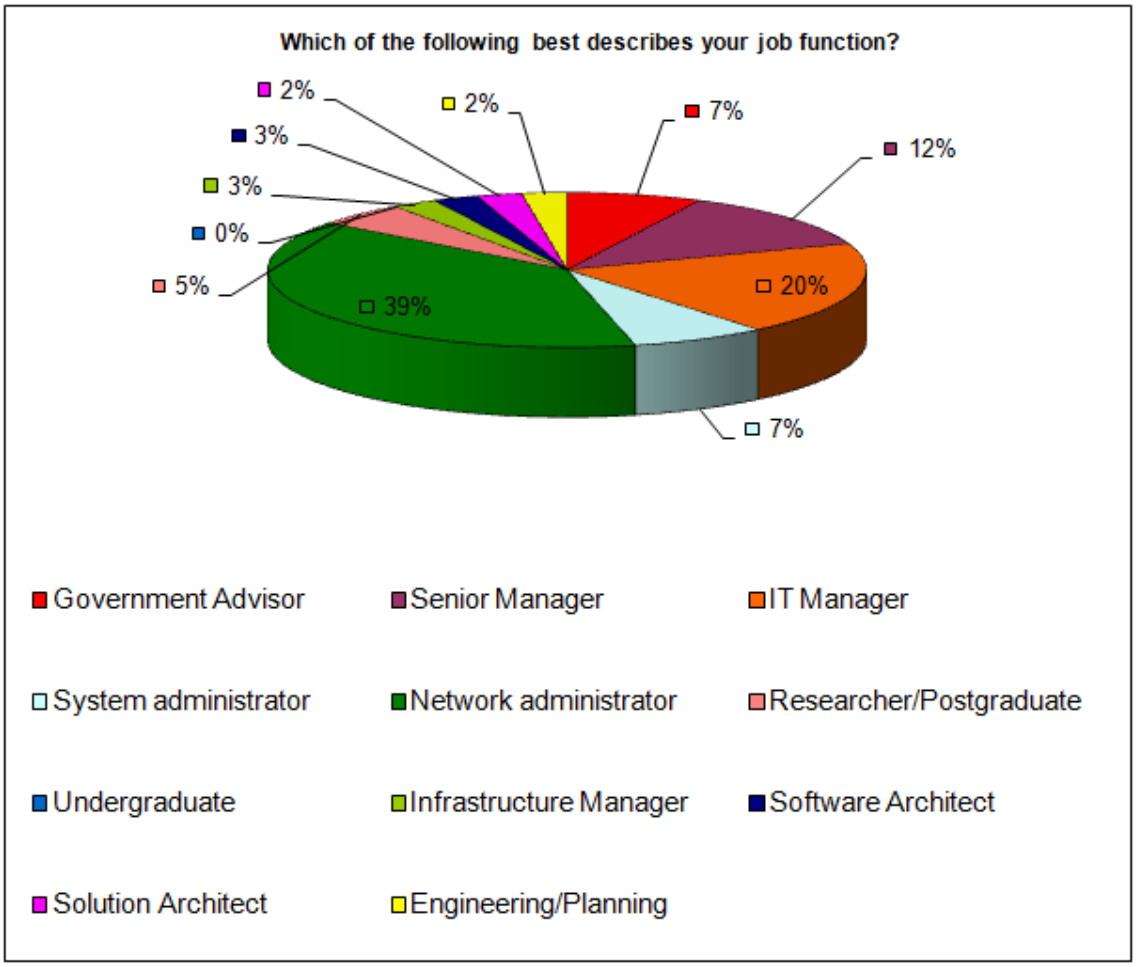

Figure 5-3: Which of the following best describes your job function?

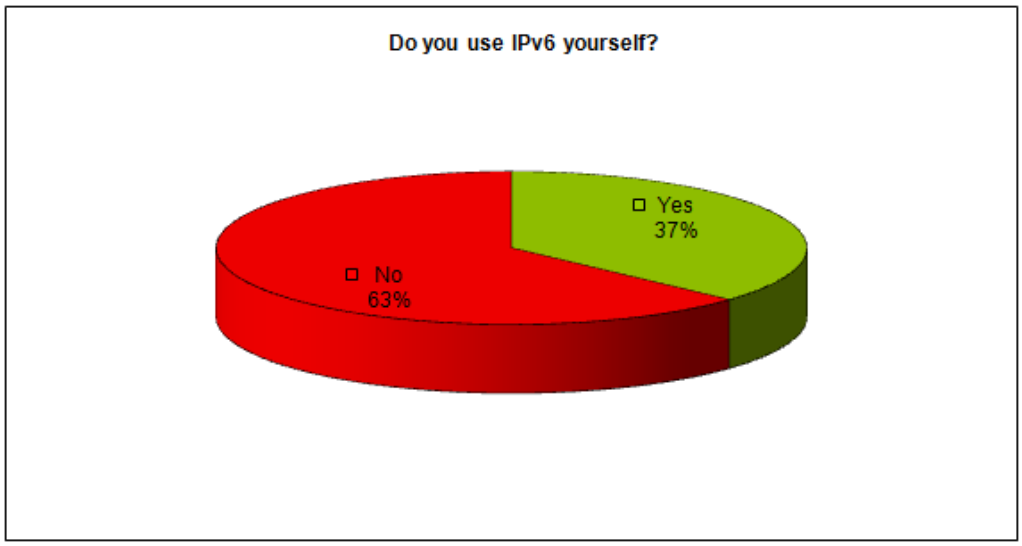

Figure 5-4: Do you use IPv6 yourself?

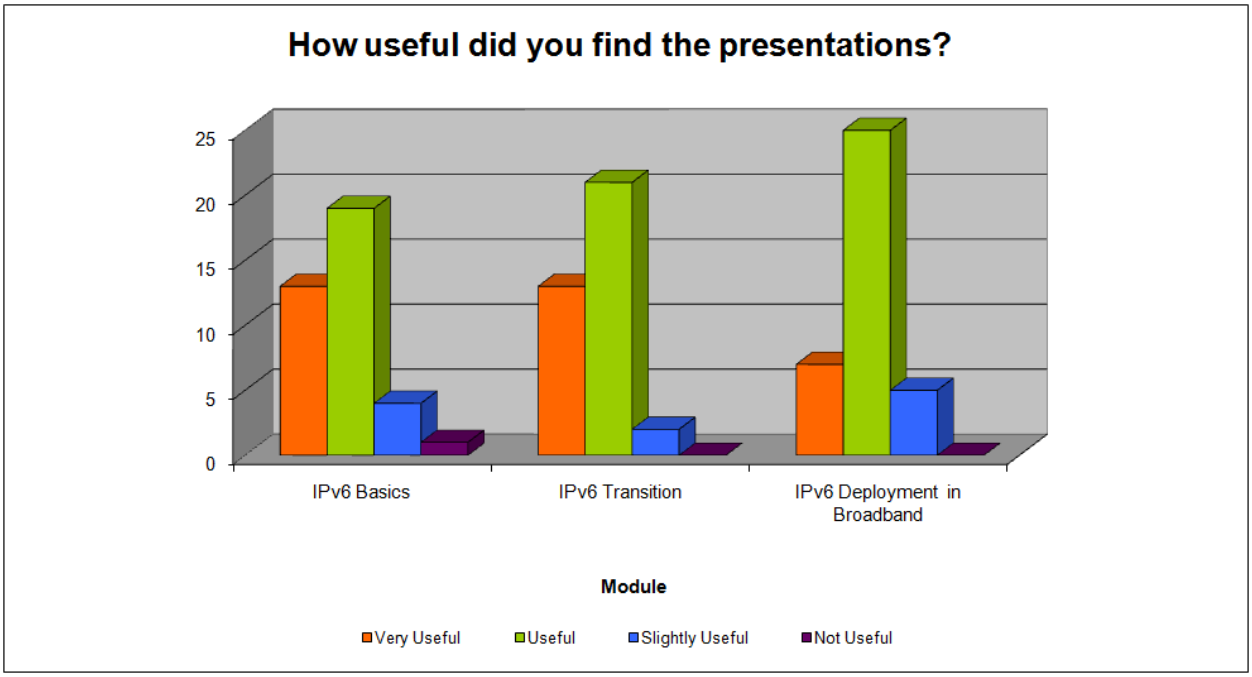

Figure 5-5: How useful did you find the presentations?

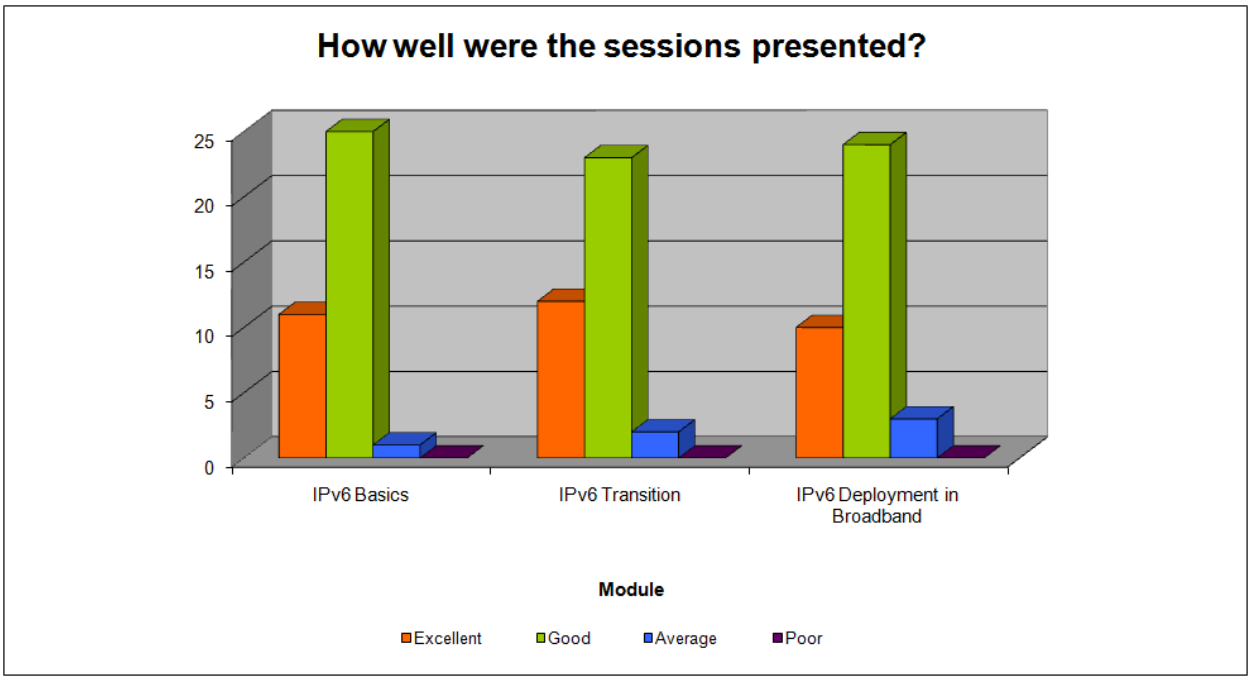

Figure 5-6: How well were the sessions presented?

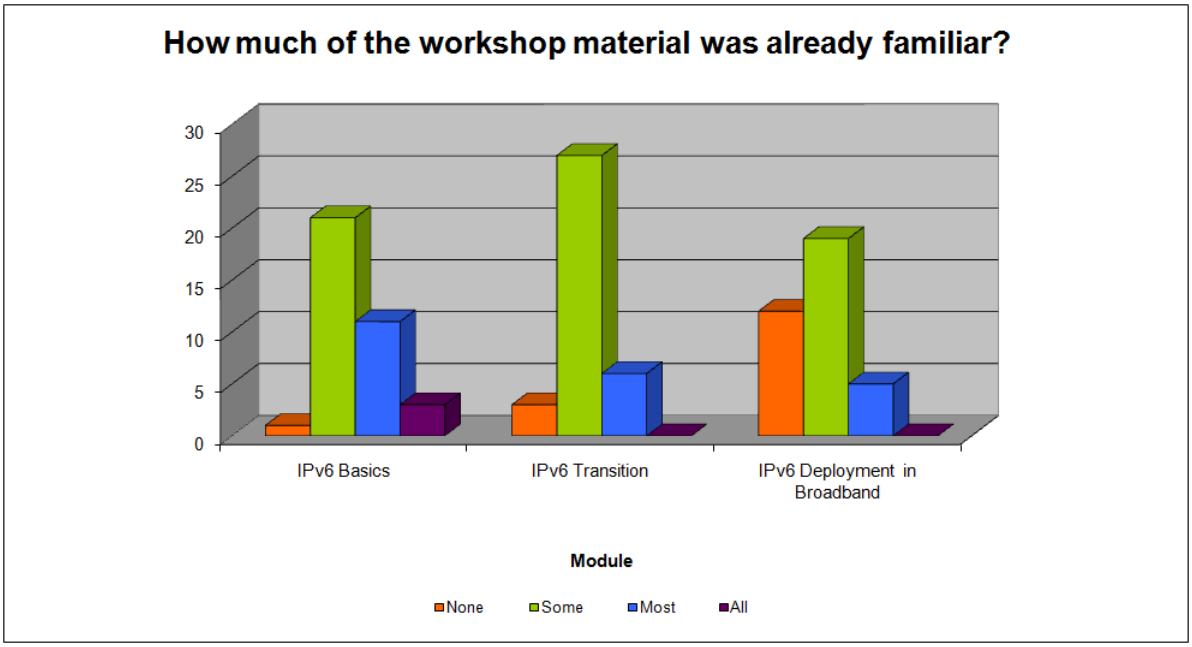

Figure 5-7: How much of the workshop material was already familiar?

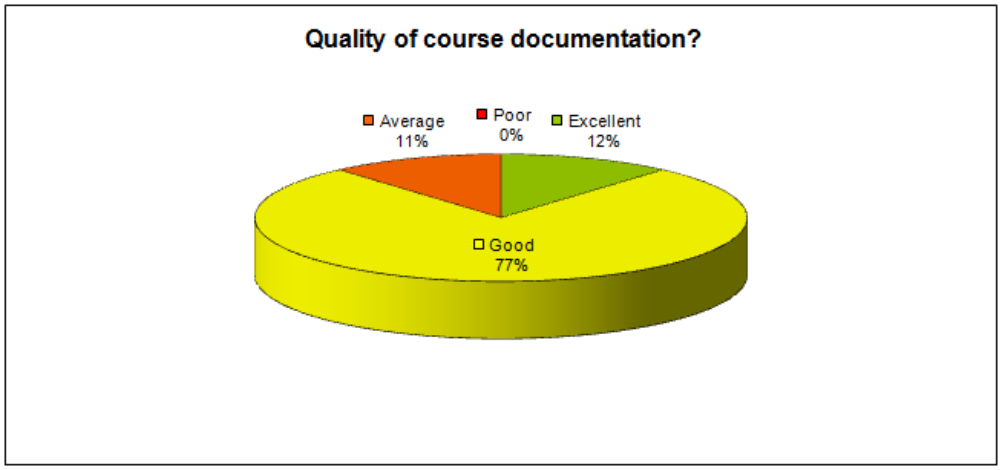

Figure 5-8: Quality of course documentation?

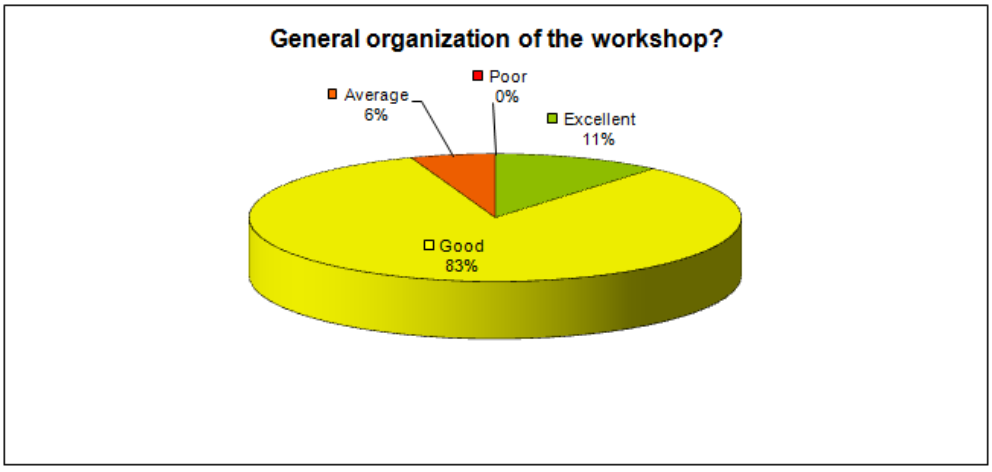

Figure 5-9: General organization of the workshop?

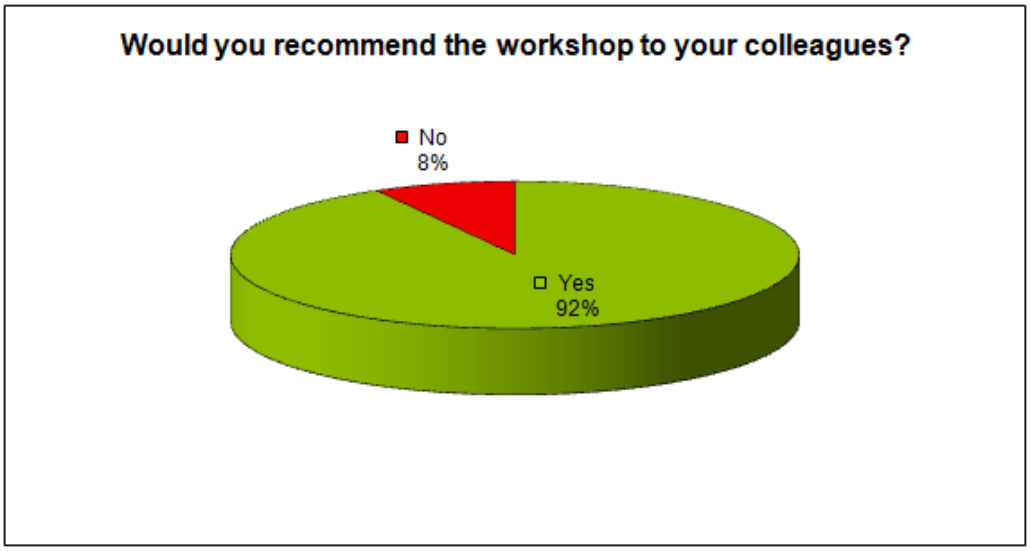

Figure 5-10: Would you recommend the workshop to your colleagues?

5.4 Participants comments

It should be noted that the participants had different technical backgrounds. For example, some were network engineers (and therefore more interested in routing protocols and troubleshooting practices), while others were system administrators (and therefore more interested in applications and monitoring tools). Depending upon their background, some participants would have preferred to spend more time on management, applications, "hands-on" exercises, or to have a "hands-on" session related to security issues. It is also worth mentioning that a few attendees remarked that the sessions where too short, and that they would have been happy to work much later in the evening for more "hands-on" exercises.

Within the questionnaire there were three open questions where the trainees could give their feedback on the workshop. Below are almost all of the responses. Note that some are repeated (number in parentheses).

Here are some comments provided by the trainees:
== Begin of the excerpts
*What topics would you have liked to **hear more about**?:*

- *(25) IPv6 Security.*
- *(17) IPv6 routing, OSPFv3, MP-BGP.*
- *(14) IPv6 Transition.*
- *(9) IPv6 Subnetting and addressing scheme.*
- *(7) IPv6 Application.*
- *(6) IPv6 DNS, deployment.*

- *(3) IPv6 deployment.*
- *(2) IPv6 router configuration.*
- *(2) IPv6 Mobility.*
- *(2) protocols and standards.*
- *(2) Switching and VLAN in IPv6 environments.*
- *(2) DHCPv6.*
- *(2) Labs.*
- *(1) IPv6 Multihoming in BGP.*
- *(1) local and overseas routing.*

*What topics would you have liked to **hear less about**?*

- *(3) Protocols and standards.*
- *(2) Security.*
- *(1) IPv6 policies, protocol and standards.*
- *(1) A step by step guide on how to plan and roll out an IPv6 network.*
- *(1) Mobility.*
- *(1) BGP/OSPF.*
- *(1) History of IPv6.*
- *(1) Theory.*
- *(1) Concentration of Cisco OS, we would like it to be more wholesome include other router hardware, unix, linux and other.*

*Any **other comments**:*

- *(7) Thank you for very good, informative workshop.*
- *(5) Organize more workshop in order to reach all every interested party.*
- *(4) Improve the material used in the OSPF and BGP lab: more detailed steps.*
- *(4) More instructors in place.*
- *(3) More lab work should have been added to the workshop.*
- *(2) Maybe you can get a network simulator and each member to follow principal.*
- *(2) Very informative. You should organise follow-up workshops or form groups for correspondence on the topic.*
- *(2) I think the lecturer would have been better had the sessions been segregated as eg. ISP's, higher educations, small enterprises, since some material was unnecessarily too technical.*

- *(1) Additional training material such as routers (local) should be added to the training material available.*
- *(1) Make sure the labs are more organized and working.*
- *(1) Great work on IPv6 awareness. Keep it up!!*
- *(1) Kindly make the presentation shorter.*
- *(1) Please consider router simulator in future.*
- *(1) The workshop was helpful but I would prefer more practical session in the future than theory.*

End of the excerpts ==

6. CONCLUSIONS

Workshops are a key mechanism through which information, knowledge, and know-how are transferred to less experienced countries and participants. The workshops enable us to build constituencies and raise awareness; disseminate, benchmark, and validate the research results from the EU's Framework Programmes; promote European technologies; exchange best practices; and offer information related to standards and interoperability issues.

This 6DEPLOY workshop took place in Christchurch (New Zealand) on 25th August 2008, at the APNIC event. Consulintel led this workshop, which was targeted at the Asia Pacific region and supported by APNIC.

Thanks to previous projects and training activities, most of the IPv6 education material needed to start the 6DEPLOY workshop training was available from the very beginning. The material included most of the issues of Internet deployment and evolution, especially IPv4-IPv6 transition/co-existence strategies, DNS, autoconfiguration, routing and applications.

According to the evaluation forms and the comments from the participants at the workshop, it is clear that there is significant interest in the region for the IPv6 technology. The participants expressed positive comments on the workshop's usefulness and organisation. They also requested that 6DEPLOY organise more workshops in the region with more specific technical subjects.

During the 6DEPLOY lifetime, stakeholders will continue to enhance today's "knowledge database". The reader and interested parties are referred to the 6DEPLOY website to check for new material.

The content of the workshop has been uploaded to the 6DEPLOY Website and can be found in the Workshops section. This allows the attendees of that workshop to retrieve the information provided during the session, and also allows other people to determine what benefits they could gain by participating in such an event.

7. REFERENCES

6DEPLOY website: http://www.6deploy.org

6DISS website: http://www.6diss.org

Paris Testbed: http://www.renater.fr/spip.php?article439&lang=en

Hands-on modules: http://6diss.6deploy.org/publications/deliverables/hands-on.pdf

How-to organise an IPv6 workshop:

http://6diss.6deploy.org/workshops/workshop-guidelines.pdf

Training the trainers workshop: http://6diss.6deploy.org/workshops/ttt/

e-learning package: http://6diss.6deploy.org/publications/multimedia/e-learning.iso

e-learning on-line: http://6diss.6deploy.org/e-learning/