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Responsible and Editor/Author:	Organization:	Contributing WP:
Alvaro Vives	Consulintel	WP1

Authors (organisations):

Jordi Palet (Consulintel)

Abstract:

This deliverable reports on three workshops that were held in collaboration with APNIC during June 2010. Specifically, this deliverable reports on workshops that took place in Singapore (Singapore), Bali (Indonesia), and Bandar Seri Begawan (Brunei). 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, APNIC, Training, Testbeds, Modules, 6DISS, 6DEPLOY, Hands-on exercises

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Revision History

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

Revision	Date	Description	Author (Organization)
v0.1	24/08/2010	Document creation	Alvaro Vives (Consulintel)
v0.2	20/09/2010	Added missing information	Alvaro Vives (Consulintel)
v1.0	11/10/2010	Final review and editing	A. Higa, M. 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 reports on three workshops that were held in the APNIC region. Specifically, this deliverable reports on workshops that took place in Singapore (Singapore), Bali (Indonesia), and Bandar Seri Begawan (Brunei). The following workshop details are described in this report: a) the workshop attendees and their affiliations, b) the programme outline, c) the material presented, d) an analysis of the feedback questionnaires from the participants, and e) an assessment of the opportunities for further co-operation and follow-up actions planned.

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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 infrastructures 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 project's 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:
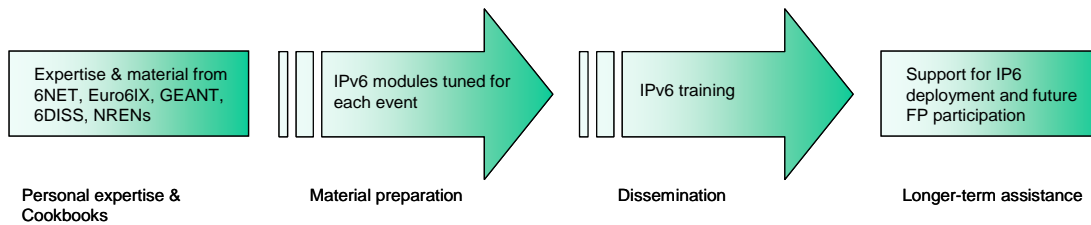
Figure 1-1: 6DEPLOY methodology (diagrammatically)

The approach is to use course material available from 6DISS and elsewhere that relates to IPv6, the e-learning course, and the 6NET IPv6 Deployment Guide book, together which will form 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, LACNIC, APNIC, AfNOG, APRICOT, and ISOC meetings.

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

The full set of dissemination materials (including the e-learning course and 2 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 deliverable reports on three workshops that were held in collaboration with APNIC. Specifically, this deliverable reports on workshops that took place in Singapore

(Singapore), Bali (Indonesia), and Bandar Seri Begawan (Brunei).

Chapter 2 of this document explains the general motivation for running IPv6 workshops, and chapters 3, 4, and 5 describe the specific details of each workshop, in terms of the attendees, the modules that were presented, the "hands-on" exercises (if appropriate), and an analysis of the feedback questionnaires from the participants. Chapter 6 identifies opportunities for further collaboration in the region and follow up actions, and Chapter 7 provides some general conclusions.

2. THE WORKSHOPS (GENERAL)

Workshops are one of the main mechanisms used by 6DEPLOY to transfer information and to 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 deprecated, 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 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 these workshops was collected, and the workshop

schedules, formats, 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 SINGAPORE (SINGAPORE)

This three-day workshop took place in Singapore (Singapore) from 2nd to 4th June 2010. This workshop was part of APNIC's Training programme. In the following paragraphs we provide information about the workshop, including the programme outline, and the material that was presented.

Details of the workshop and the training material used could be found in 6DEPLOY's project web site:

http://www.6deploy.eu/index.php?page=20100602_singapore

3.1   Overview

Individuals present at the workshop included Jordi Palet, from Consulintel representing 6DEPLOY.

On the first day (2nd June) Consulintel was in charge of the 6DEPLOY part of the workshop. Specific IPv6 material was presented, including an introduction to basic IPv6, concepts on the transition and coexistence of IPv4 and IPv6, as well as different transition mechanisms, some of which are automatic, that explain the growth of IPv6 traffic that is being observed at global level despite its low level of deployment on the part of ISPs.

On 3rd and 4th June 2010 APNIC provided further training on IPv6.

3.2 Attendees

Below is a list of people that attended to first day session:

No.	Name	Surname	Affiliation
1	Senthil Kumar	-	Singapore Telecommunications
2	Chee Tian	Chew	SingNet Pte Ltd
3	Kah Loong, David	Cho	M1 Limited
4	Prodip	Datta	Blueberry Telecom Pte Ltd
5	Stephen	DeBrass	SingNet
6	Kalvin	Gao	Singapore Advanced Research and Education Network
7	Chiam	Geak Seng	Cybersite Pte Ltd
8	Lum Hwee	Goh	SingTel Pte Ltd
9	Andrew	Hadinyoto	Republic Polytechnic
10	Ricky	Lai	DOCOMO interTouch Pte Ltd
11	Andy	Lee	Republic Polytechnic
12	Meng Koon	Lim	Microsoft
13	Siu-Po	Lim	1-Net Singapore Pte Ltd

14	Beng Yin	Mak	M1 Limited
15	Tun Tun	Myint	SingTel
16	Chee Beng	Neo	1-Net Singapore Pte Ltd
17	Cassidy	Ng	Blueberry Telecom Pte Ltd
18	Keng Hee	Ng	SingTel
19	Khoon Peng, Denny	Ow	M1 Limited
20	daniel	quiambao	1-net singapore pte ltd
21	Dale	Reyes	Republic Polytechnic
22	Mohd	Saifulamri	Republic Polytechnic
23	Japinder	Singh	Hotspeed Internet Pte Ltd
24	Kevin	Tan	T-Systems Singapore
25	RICKO	TEE	Fishbone Solutions Pte Ltd
26	Maung Min	Thein	Singapore Telecommunication Limited
27	Ivan	Wee	Republic Polytechnic

Table 3-1: Singapore Workshop list of participants

The participants represented a wide range of the ICT community. They were technical people whose knowledge about IPv6 ranged from almost no knowledge at all to having significant experience with IPv6 deployment. Some had already performed IPv6 experiments or were planning some level of deployment at their institutions.

3.3 Workshop programme

The agenda was agreed on after close collaboration with the local organisers. 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. The programme of the workshop is presented in the following table:

Date	Time	Title of session
2/6/2009	14:00	IPv6 Basics
2/6/2009	16:00	IPv6 Startup
2/6/2009	17:30	End of IPv6 Workshop

Table 3-2: Singapore Workshop programme

3.4 Presentation material

The following material was presented:

Modules	Presented by	Affiliation
IPv6 Basics	Jordi Palet	Consulintel
IPv6 Startup	Jordi Palet	Consulintel

Table 3-3: Singapore Workshop list of modules used

3.4.1 Modules

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

- **IPv6 Basics:** This module explains why a new version for IP, IPv6, has been developed. A brief history of IPv6, its motivation and benefits are given. IPv6 packet header, extensions headers and differences with IPv4 headers. Packet size issues and upper layer considerations are also treated. In addition, IPv6 addressing architecture, the different types of addresses (unique local IPv6 addresses, interface IDs, multicast addresses), their textual representation, how these are built and related to a layer 2 address, were explained. Transition concepts are introduced.

- **IPv6 Startup:** Practice basic IPv6 concepts like addresses, autoconfiguration, neighbor discovery protocol using hosts. In addition, some practice with basic transitions mechanisms using hosts.

3.5 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, and the presenters´ ability to convey information, and the relevance of the information to the expectations of the attendees.

Personal information was not mandatory, 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.

3.5.1 General questions related to participants and IPv6

About the participants		
27 participants were present, 10 questionnaires were returned		
Employment sector	Government	2
	University or other higher education	2
	Schools or further education	0
	Research	0
	Health	0
	Commercial	6
	Other (please specify)	0
Job function	Government Advisor	0
	Senior Manager	1
	IT Manager	0
	Systems Administrator	1
	Network Administrator	4
	Researcher / Postgraduate	0
	Undergraduate	0
	Other (please specify)	(1) *
Usage of IPv6		
Do you use IPv6 yourself?	Yes	4
	No	3
Does your organisation use IPv6?	Yes	2
	No, but planned in this year	2
	No, but planned in the next year	1
	No, but planned in the longer term	2
	No, and no plans as yet	1

* See the graphics section for more information

Table 3-4: General questions related to participants and IPv6

3.5.2 Questions regarding the workshop

About the Workshop				
Usefulness of the topic	Very useful	Useful	Slightly useful	Not useful
Presentation 1 - IPv6 Introduction	4	3	1	0
Presentation 2 - IPv6 Transition	3	5	0	0
Quality of the presentation	Excellent	Good	Average	Poor
Presentation 1 - IPv6 Introduction	3	5	0	0
Presentation 2 - IPv6 Transition	2	5	1	0
Familiarity with the topic?	None	Some	Most	All
Presentation 1 - IPv6 Introduction	0	4	3	1
Presentation 2 - IPv6 Transition	0	5	2	1
Quality of the course documentation	Excellent	Good	Average	Poor

		4	3	1	0
General workshop organisation		Excellent	Good	Average	Poor
		2	3	3	0
Recommend to your colleagues?		yes	no		
		7	0		

Table 3-5: Questions regarding the workshop

3.5.3 Results graphics

Following are some graphics that represent the above results in a more friendly way, so as to ease their interpretation.
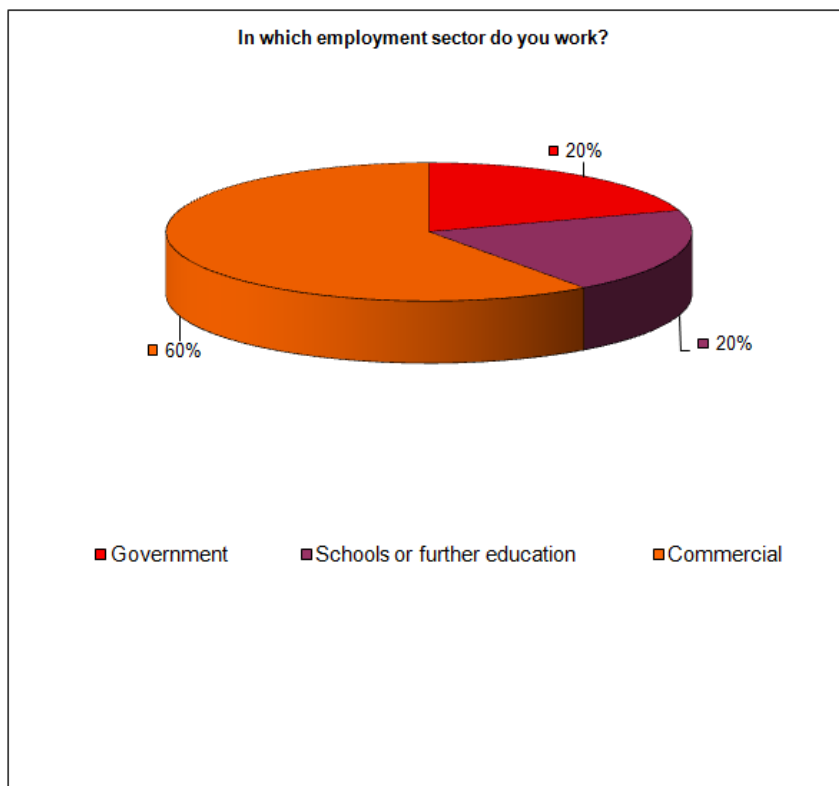
Figure 3-1: In which employment sector do you work?

Does your organisation use IPv6?
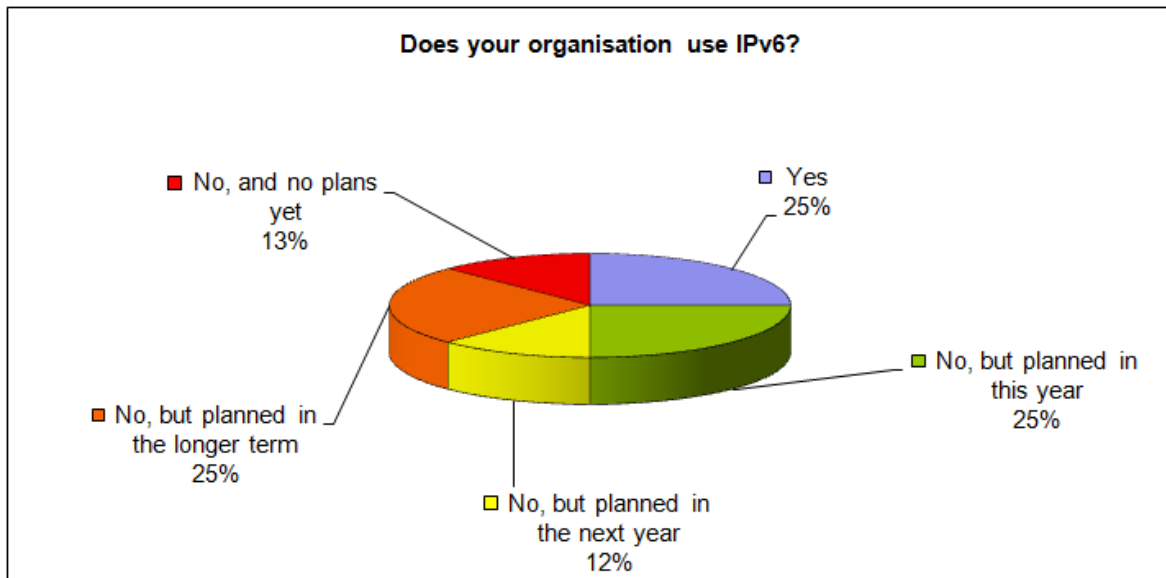
Figure 3-2: Does your organisation use IPv6?

Which of the following best describes your job function?
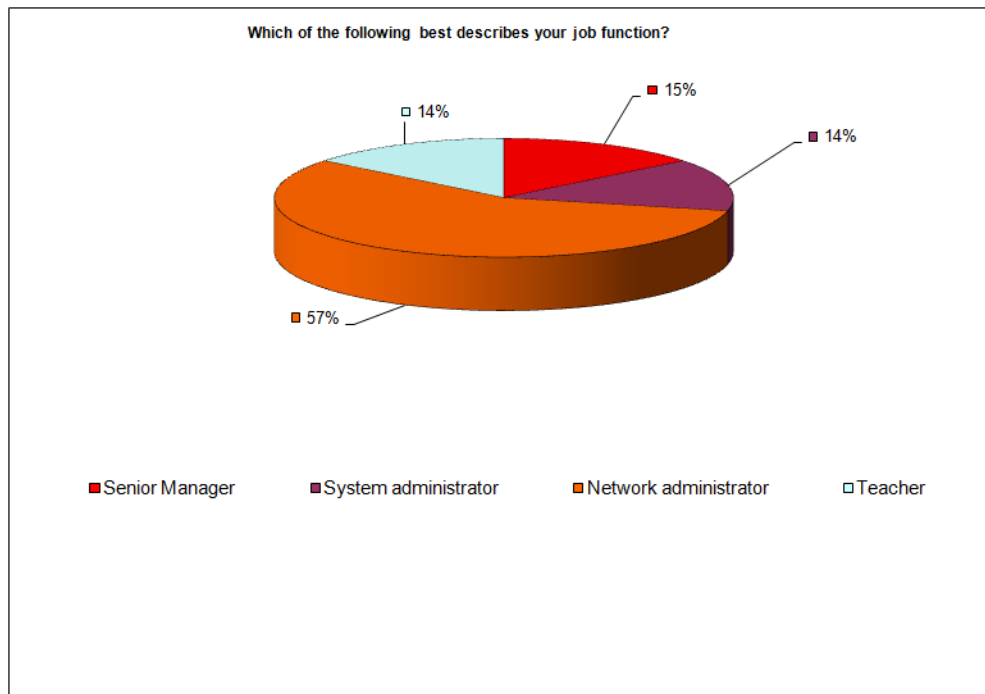
Figure 3-3: Which of the following best describes your job function?
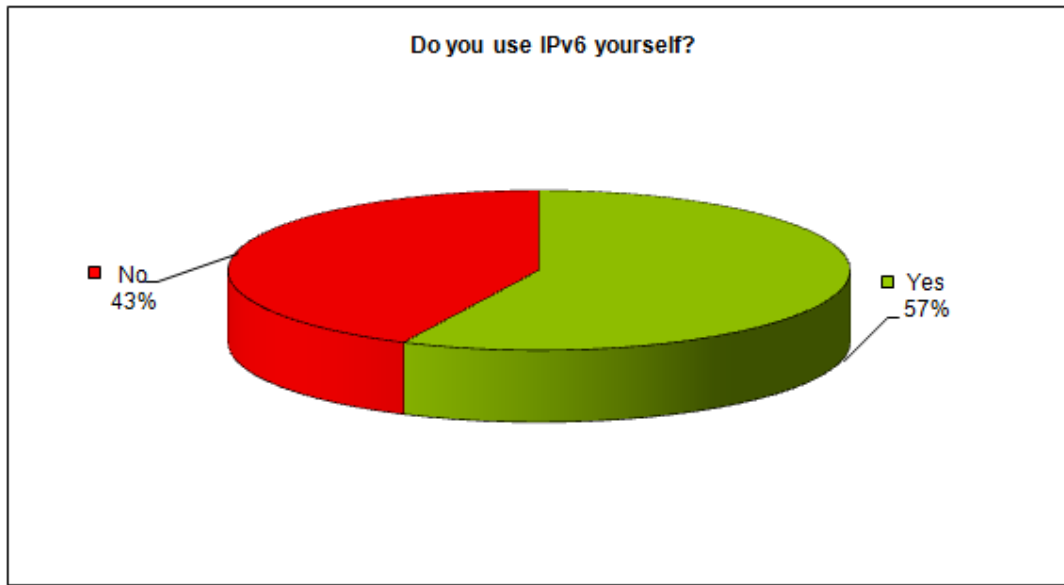
Figure 3-4: Do you use IPv6 yourself?
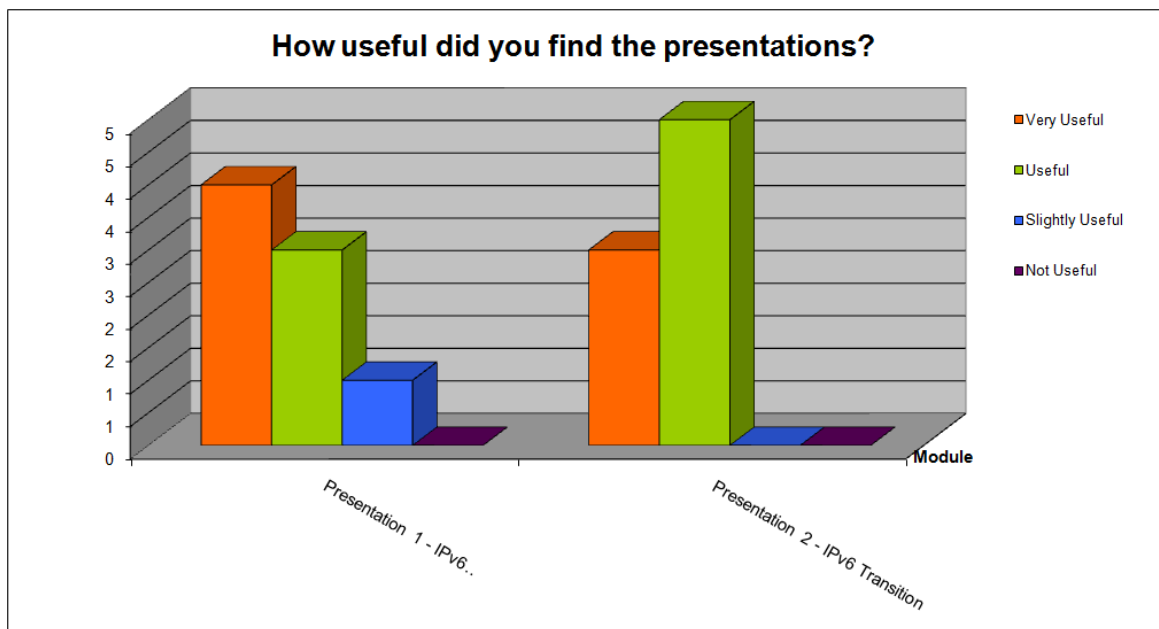
Figure 3-5: How useful did you find the presentations?

How well were the sessions presented?
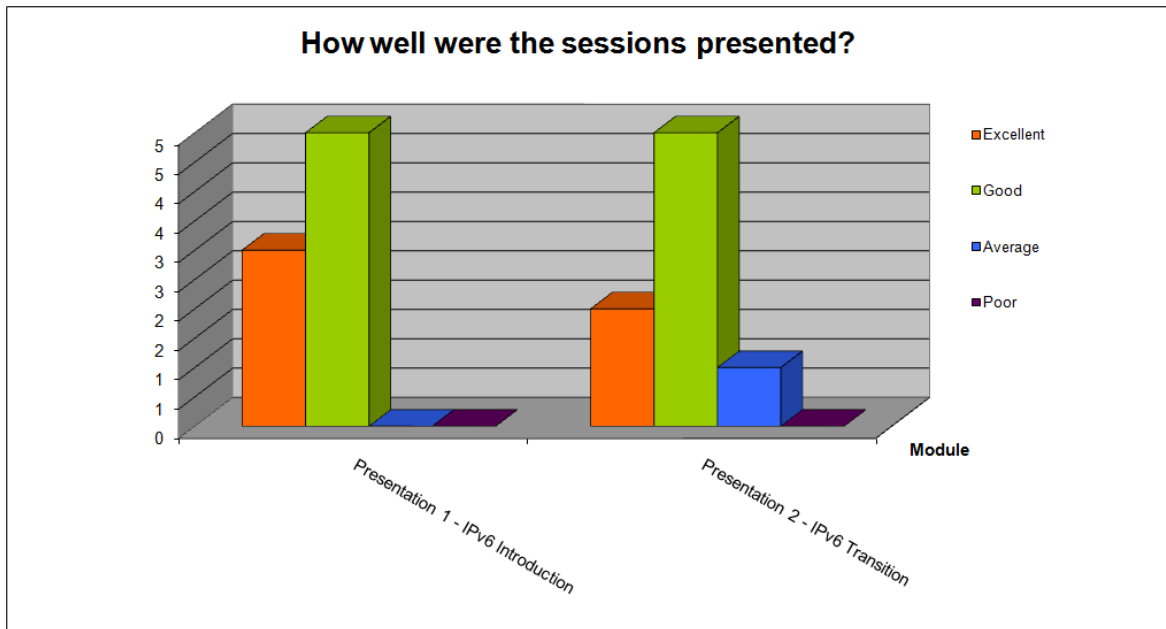
Figure 3-6: How well were the sessions presented?

How much of the workshop material was already familiar?
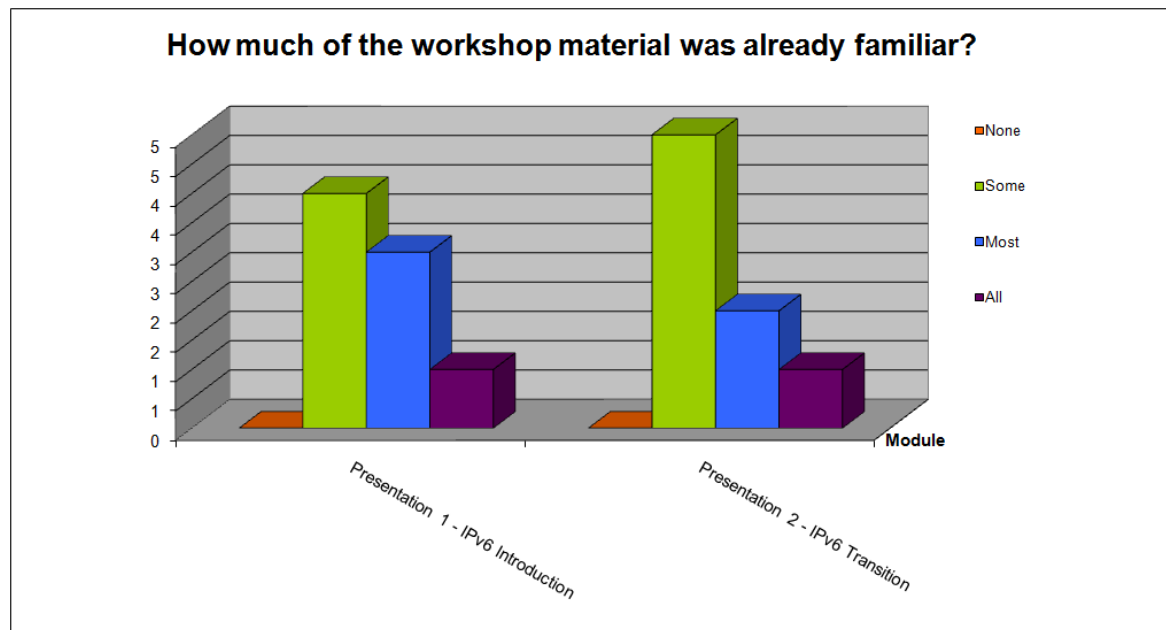
Figure 3-7: How much of the workshop material was already familiar?

Quality of course documentation?

- Poor 0%
- Average 13%
- Excellent 50%
- Good 37%
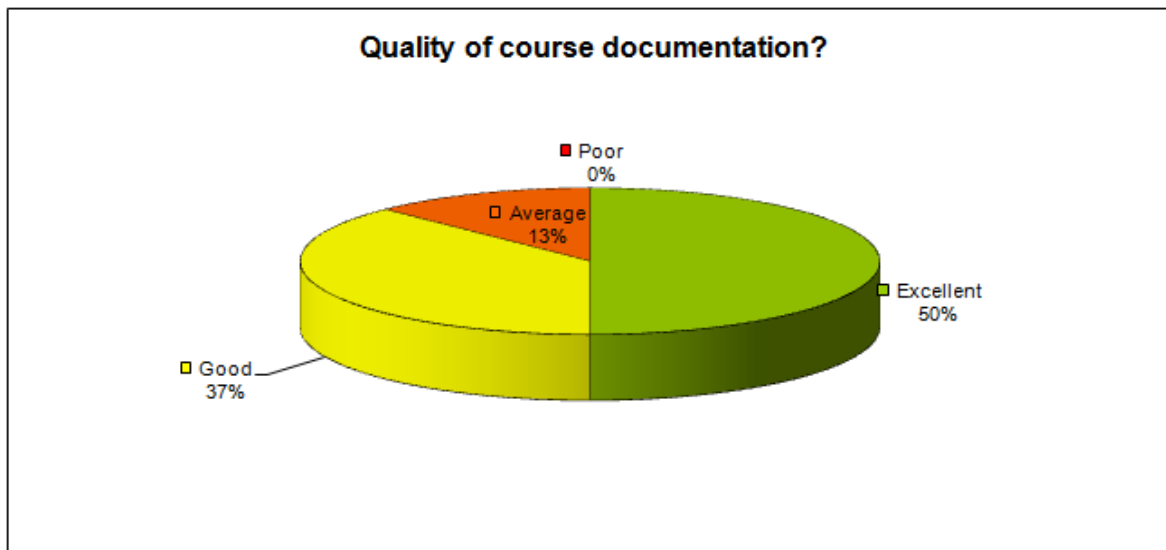
Figure 3-8: Quality of course documentation?

General organization of the workshop?

- Poor 0%
- Excellent 25%
- Average 38%
- Good 37%
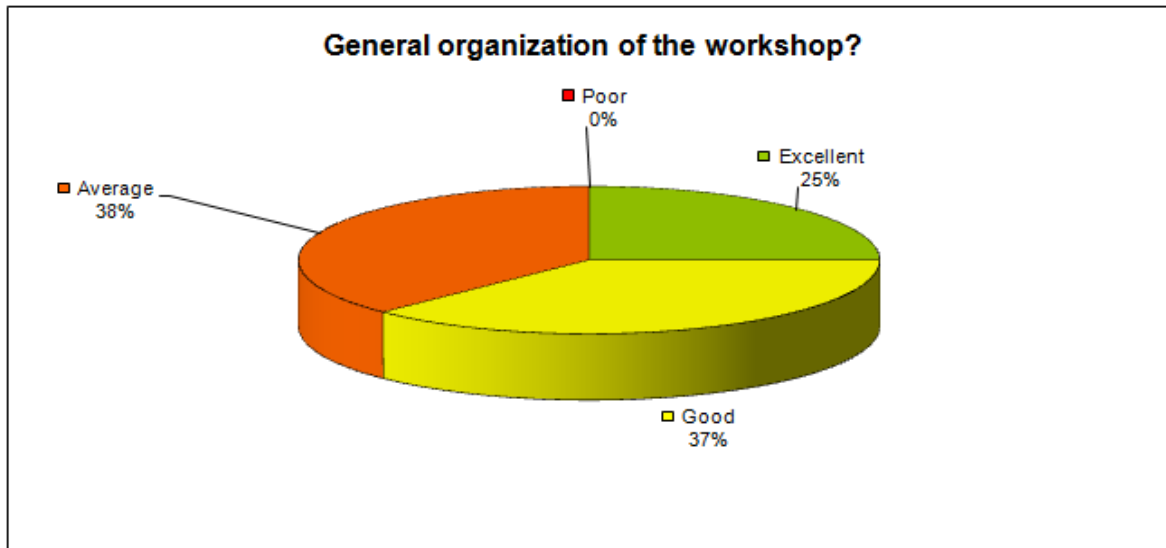
Figure 3-9: General organization of the workshop?
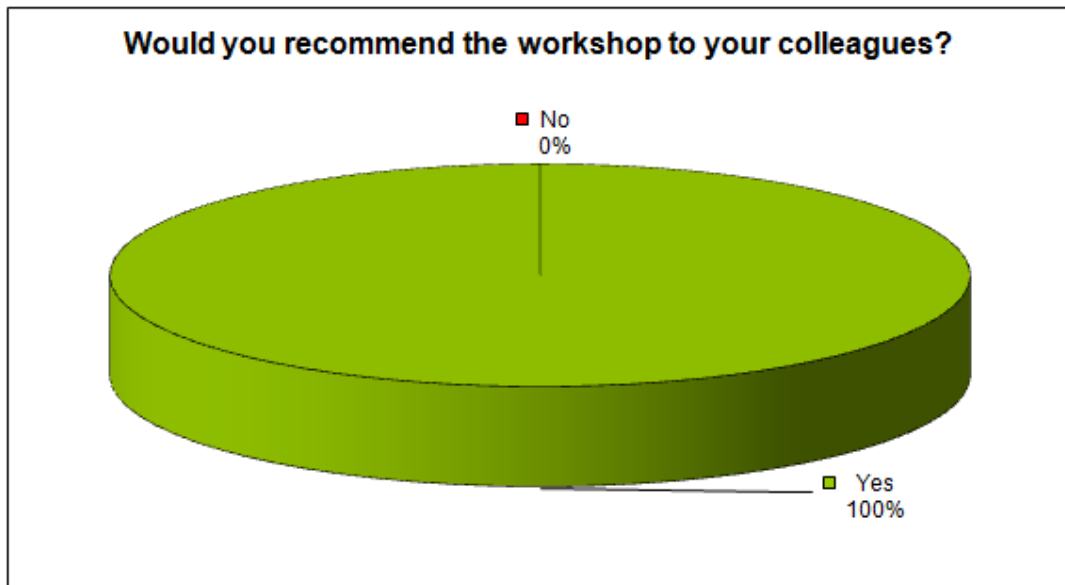
Figure 3-10: Would you recommend the workshop to your colleagues?

3.5.4 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", or to have a "hands-on" session related to security issues.

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 put between parentheses).

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

- *(1) Real challenges as case study in live deployment and transition.*
- *(1) Practical issues in implementation such as DNS, OS, Browsers, etc.*
- *(1) Comparison of transitional technology with real world examples.*
- *(1) IPv6 router configuration.*
- *(1) NAT64 and DNS64.*
- *(1) Transition from IPv4 to IPv6.*

- *(1)   IPv6 deployment/migration scenarios.*
- *(1)   Some advanced transition mechanism like DS-Lite should be covered.*

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

- *(1)   Why IPv6.*
- *(1)   How great IPv6 is.*
- *(1)   History of IPv6.*
- *(1)   What we can do with IPv6 in next few decades.*

*Any **other comments**:*

- *(1)   It was a very good presentation by Jordi, Thanks for all the useful information provided.*
- *(1)   Thanks for conducting workshop!.*

End of the excerpts ==

4. THE 6DEPLOY WORKSHOP IN BALI (INDONESIA)

This one day workshop was held in Bali (Indonesia) on 8th June 2010, within the Indonesia IPv6 Summit. In the following paragraphs we provide information about the workshop, including the programme outline, and the material that was presented.

Details of the workshop and the training material used could be found in 6DEPLOY's project web site:

http://www.6deploy.eu/index.php?page=20100608_bali

4.1 Overview

Individuals present at the workshop included Jordi Palet, from Consulintel representing 6DEPLOY. Miwa Fujii, from APNIC, was present and completed the workshop with her own presentation.

During the workshop, specific IPv6 material were presented, including an introduction to basic IPv6, concepts on the transition and coexistence of IPv4 and IPv6 were presented, as well as different transition mechanisms, some of which are automatic, that explain the growth of IPv6 traffic that is being observed at global level despite its low level of deployment on the part of ISPs.

During Thursday June 9th there was also a "*Session III: IPv6 Services and Applications.*" A presentation by Behcet Sarikaya (Huawei), Prof. Yao Ming Yeh (National Taiwan Normal University), Jordi Palet (6DEPLOY),and Prof. Sureswaran Ramadass (National Advanced IPv6 Centre)".

4.2 Attendees

Below is a list of people that attended to the workshop:

No.	Name	Affiliation
1	Aang Arief Wahyudi	Telkomsel
2	Acil Yanuar	Velo Network
3	Adian Fatchur	Universitas Pelita Harapan
4	Agni Bayuadi	Patrakom
5	Agus Rianto	Media Sarana Data / Gmedia
6	Ahmad Farisy	Bakrie Telecom
7	Ahmad Fauzi	Interkoneksi Internet Indonesia
8	Aidil Putra	Supra Primatama Nusantara
9	Alexander Doliyanto	Angkasa Komunikasi Global Utama
10	Alfonsus Bram Radityo Nugroho	Hipernet Indodata
11	Ambrusius Widiyatmika	Firstmedia
12	Anderson Lumbantobing	Cyberindo Aditama
13	Angky Risandy	Supra Primatama Nusantara
14	Ardiansyah.	Velo Network
15	Arief . K	Mora Telematika
16	Bambang Haryanto	Aplikanusa Lintasarta
17	Bambang Robertus	NTT Indonesia
18	Baskoro Adi Pratomo	Sepuluh Nopember Institute of Technology
19	Bayu Krisnawan	Universitas Ciputra
20	Benny Hermawan	Telkomsel
21	Bintang Sucahyo	Angkasa Komunikasi Global Utama
22	Budi Cahyono	HCPT
23	Budi Prabowo	Bina Satria Agung Perkasa
24	Budi Yanto	Gmedia
25	Bunny Diredja	Supra Primatama Nusantara
26	Cahyono Nugroho	Lima Titik Satu
27	Dani Ramdani	Telkom Indonesia
28	Deddy Suyanto	Telkom Indonesia
29	Didi Rustam	Ditjen Pendidikan Tinggi
30	Dominicus Leonard Prabowo	Universitas Ciputra
31	Donny Nurmi	Bakrie Telecom
32	Duddy Y	Mora Telematika
33	Dudi Rojudin	Badan Meteorologi dan Geofisika
34	Dwi Cahyoko	Indotrans Data
35	F. Prasetyo	Mora Telematika
36	Feizal R	Tangara Mitrakom
37	Fredy Raharja	Bakrie Telecom
38	Gagan Firmansyah	Pasifik Satelit Nusantara
39	Guntur Hippy	Generasi Indonesia Digital
40	Hatta Perdana	Telkom Indonesia
41	Hermawan Prasetya	Audianet Sentra Data
42	Hudan Studiawan	Sepuluh Nopember Institute of Technology
43	I Ketut Mustika Wiguna	Panca Dewata Utama
44	Irfan Fanani	Melvar Lintas Nusa
45	Ismed Daulay	Xirka Silicon Technology
46	Istikmal Istikmal	IT Telkom
47	Jaenudin	Simaya Jejaring Mandiri
48	Jaman	Sekawan Global Komunika
49	Jatmiko Setiawan	Jetcoms
50	Jimmy Agung Gunawan	Firstmedia
51	Lily Wongso	Angkasa Komunikasi Global Utama
52	Marky Yehezkiel	SatnetCom Balikpapan
53	Mohammad Ajmer Abdul Hasan	MYNIC Berhad
54	Muhammad Iqbal	IT Telkom
55	Noramin Che Mat	MYNIC Berhad

56	Nugraha SK	Bina Satria Agung Perkasa
57	Orriyunda	XL
58	Pawira Septiawan	NTT Indonesia
59	Poltak Johnson	Aplikanusa Lintasarta
60	Purnomo Setyo	Universitas Diponegoro
61	Purwanto	Mora Telematika
62	Ridho Udin	Cyber Network Indonesia
63	Rizal Amadani	Transkon Jaya Balikpapan
64	Robert Alvianus	Universitas Pelita Harapan
65	Roni Baskoro	Indotrans Data
66	Ronny Wibowo Lie	Omodata Indonesia
67	Rudi Purwanto	Bakrie Telecom
68	Rudy Marcomin	Khasanah Timur Indonesia
69	Sony V.Shendy	Jetcoms
70	Sukamto Bernat G	Pasifik Satelit Nusantara
71	Syaiful Hakim	Indotrans Data
72	Tedi Supardi	PC24 Cyber Indonesia
73	Teguh Wibowo	Lima Titik Satu
74	Tommy S	Tangara Mitrakom
75	Tri Joko Mahendro	Cyber Network Indonesia
76	Tri Wiharjo	Smartlink Global Media
77	Tunggul Arif	Des Teknologi Informasi
78	Waode Omy Octavian	
79	Widi Amanasto	Telkom Indonesia
80	Wisnu Murdianto	Core Mediatech
81	Yudi Rachmanu	Bakrie Telecom

Table 4-1: Bali (Indonesia) Workshop list of participants

The participants represented a wide range of the ICT community. They were technical people whose knowledge about IPv6 ranged from almost no knowledge at all to having significant experience with IPv6 deployment. Some had already performed IPv6 experiments or were planning some level of deployment at their institutions.

4.3 Workshop programme

The agenda was agreed on after close collaboration with the local organisers. 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. The programme of the workshop is presented in the following table:

Date	Time	Title of session
8/6/2009	9:00	IPv6 Basics
8/6/2009	12:00	IPv6 Startup
8/6/2009	15:00	End of IPv6 Workshop

Table 4-2: Bali (Indonesia) Workshop programme

4.4 Presentation material

The following material was presented:

Modules	Presented by	Affiliation
IPv6 Basics	Jordi Palet	Consulintel
IPv6 Startup	Jordi Palet	Consulintel

Table 4-3: Bali (Indonesia) Workshop list of modules used

4.4.1 Modules

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

- **IPv6 Basics:** This module explains why a new version for IP, IPv6, has been developed. A brief history of IPv6, its motivation and benefits are given. IPv6 packet header, extensions headers and differences with IPv4 headers. Packet size issues and upper layer considerations are also treated. In addition, IPv6 addressing architecture, the different types of addresses (unique local IPv6 addresses, interface IDs, multicast addresses), their textual representation, how these are built and related to a layer 2 address, were explained. Transition concepts are introduced.

- **IPv6 Startup:** Practice basic IPv6 concepts like addresses, autoconfiguration, neighbor discovery protocol using hosts. In addition, some practice with basic transitions mechanisms using hosts.

4.5 Photographs taken at the event

Figure 4-1: IPv6 Summit Entrance

Figure 4-2: Jordi Palet (Consulintel) Presenting

Figure 4-3: Jordi Palet (Consulintel) Presenting

4.6 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, and the presenters´ ability to convey information, and the relevance of the information to the expectations of the attendees.

Personal information was not mandatory, 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.

4.6.1 General questions related to participants and IPv6

About the participants		
81 participants were present, 8 questionnaires were returned		
	Government	0
	University or other higher education	3
	Schools or further education	0
Employment sector	Research	0
	Health	0
	Commercial	3
	Other (please specify)	0
Job function	Government Advisor	0
	Senior Manager	0
	IT Manager	2
	Systems Administrator	2
	Network Administrator	5
	Researcher / Postgraduate	2
	Undergraduate	1

	Other (please specify)	0
Usage of IPv6		
Do you use IPv6 yourself?	Yes	1
	No	4
	Yes	0
Does your organisation use IPv6?	No, but planned in this year	2
	No, but planned in the next year	1
	No, but planned in the longer term	1
	No, and no plans as yet	2

Table 4-4: General questions related to participants and IPv6

4.6.2 Questions regarding the workshop

About the Workshop				
Usefulness of the topic	Very useful	Useful	Slightly useful	Not useful
Presentation 1 - IPv6 Introduction	0	3	2	0
Presentation 2 - IPv6 Transition	1	3	2	0
Quality of the presentation	Excellent	Good	Average	Poor
Presentation 1 - IPv6 Introduction	2	3	0	0
Presentation 2 - IPv6 Transition	2	4	0	0
Familiarity with the topic?	None	Some	Most	All
Presentation 1 - IPv6 Introduction	0	0	3	2
Presentation 2 - IPv6 Transition	0	2	1	3
Quality of the course documentation	Excellent	Good	Average	Poor
	0	3	3	0
General workshop organisation	Excellent	Good	Average	Poor
	0	3	3	0
Recommend to your colleagues?	yes	no		
	5	1		

Table 4-5: Questions regarding the workshop

4.6.3 Results graphics

Following are some graphics that represent the above results in a more friendly way, so as to ease their interpretation.
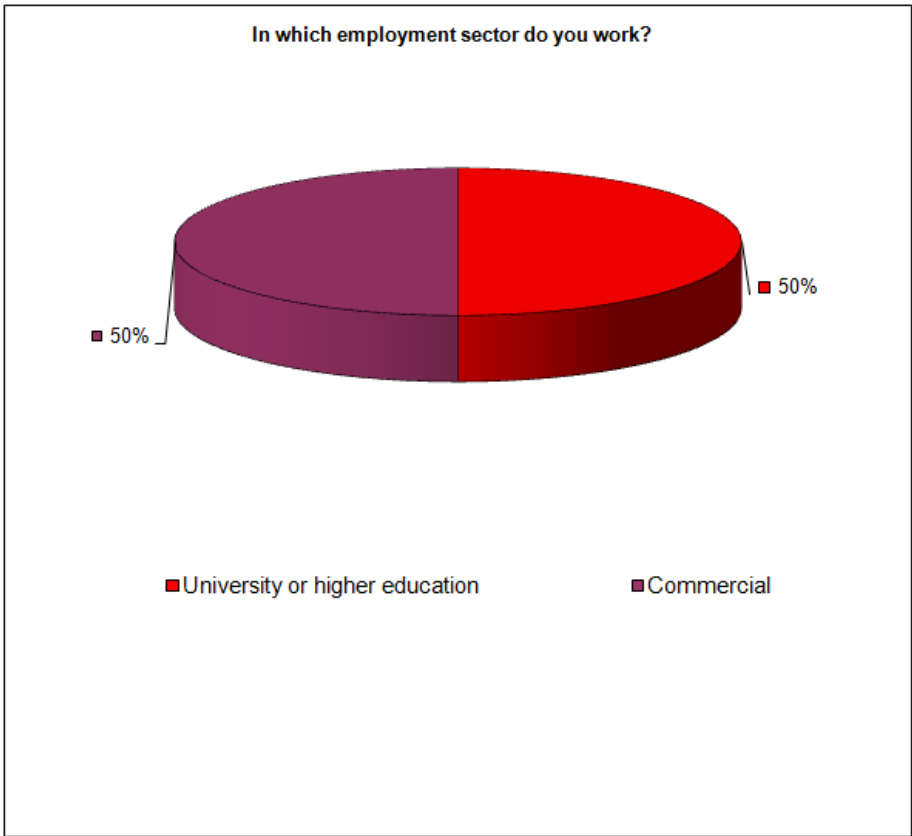
Figure 4-4: In which employment sector do you work?
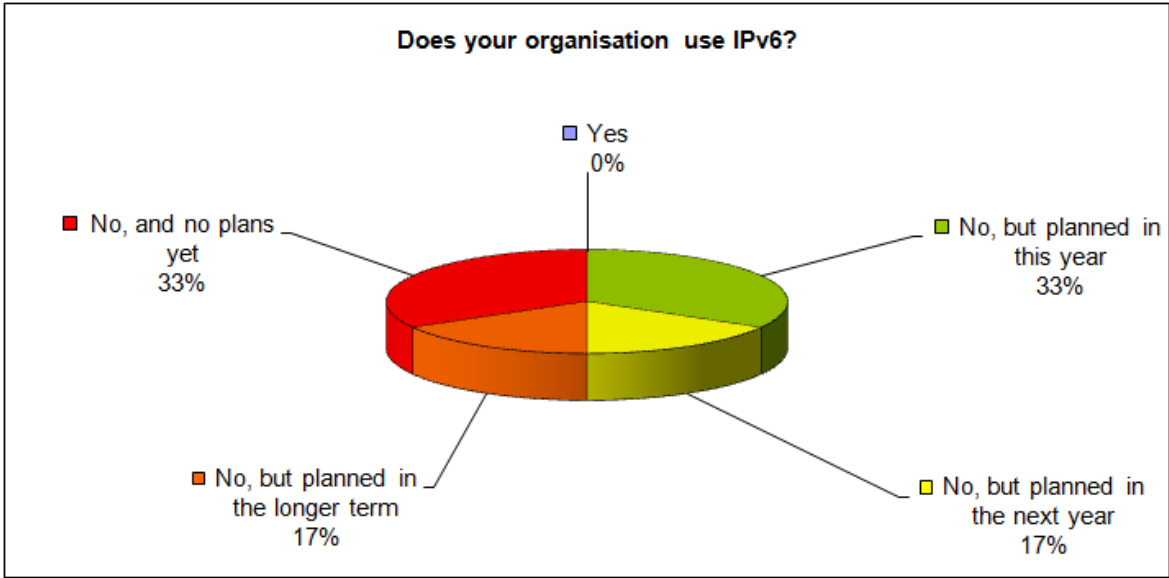

Figure 4-5: Does your organisation use IPv6?
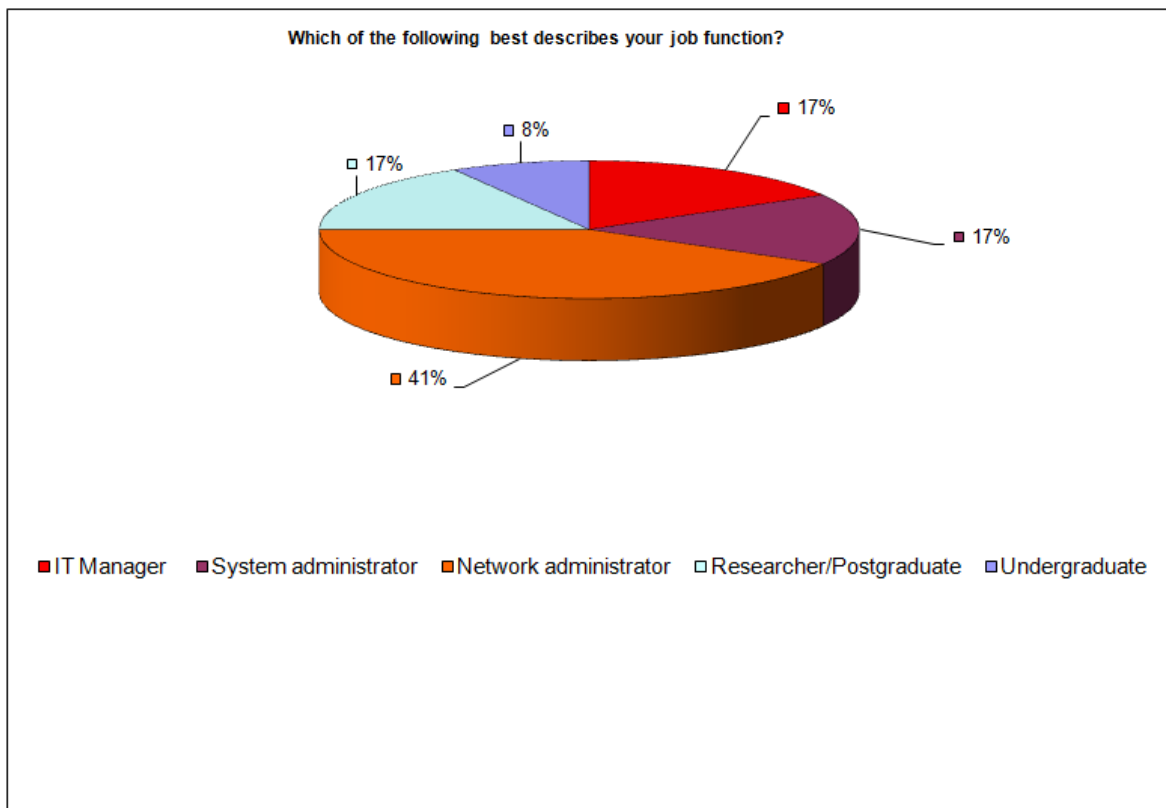
Figure 4-6: Which of the following best describes your job function?
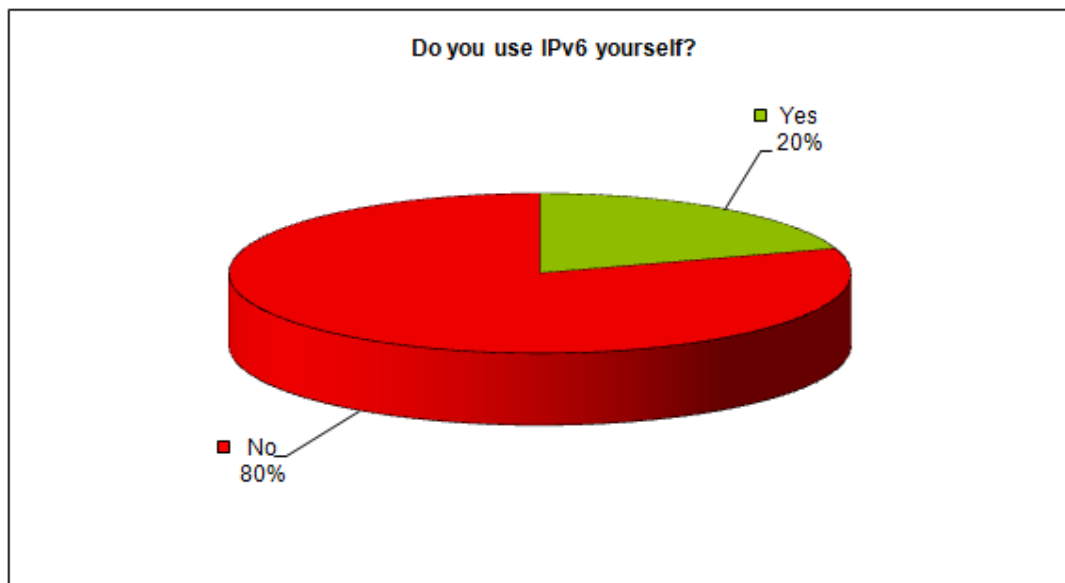

Figure 4-7: Do you use IPv6 yourself?

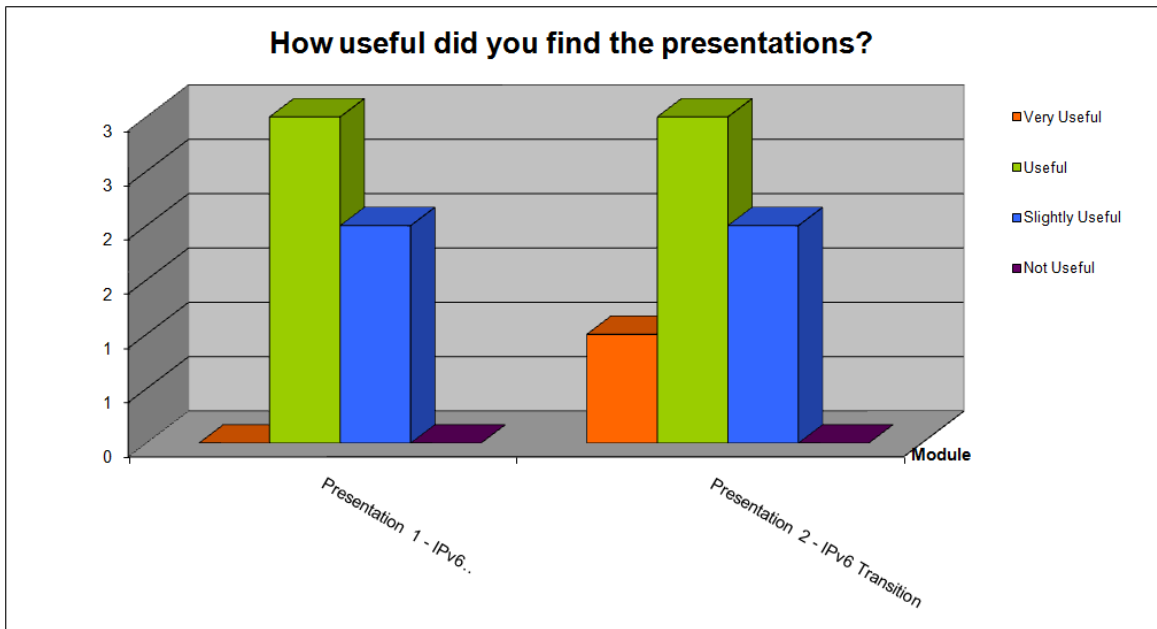**Figure 4-8: How useful did you find the presentations?**

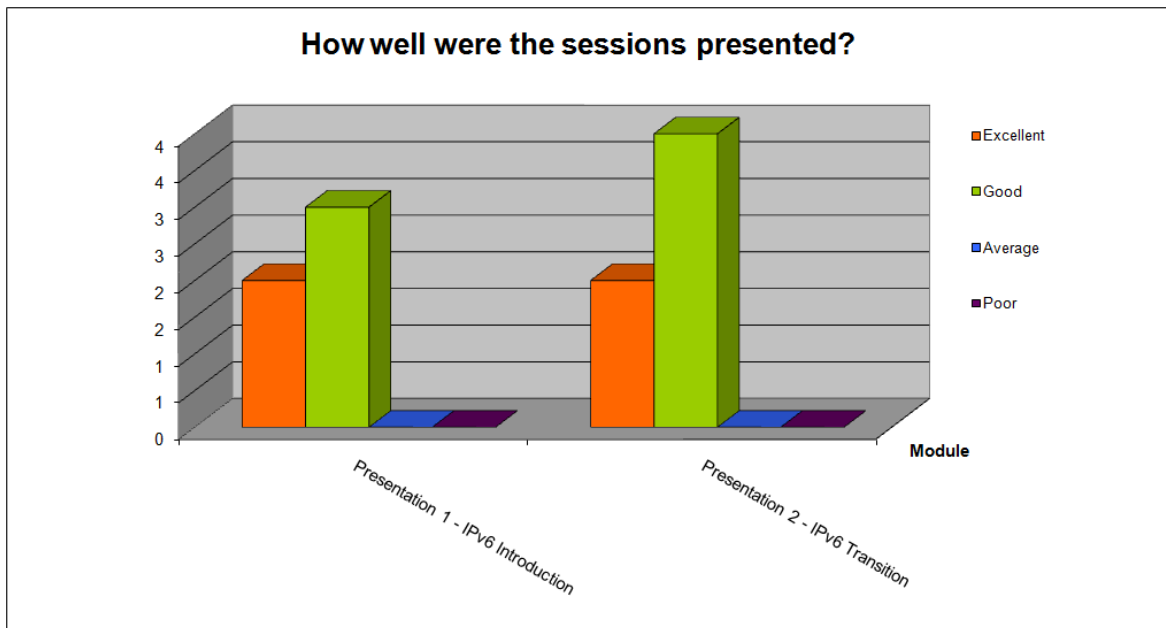**Figure 4-9: How well were the sessions presented?**

How much of the workshop material was already familiar?
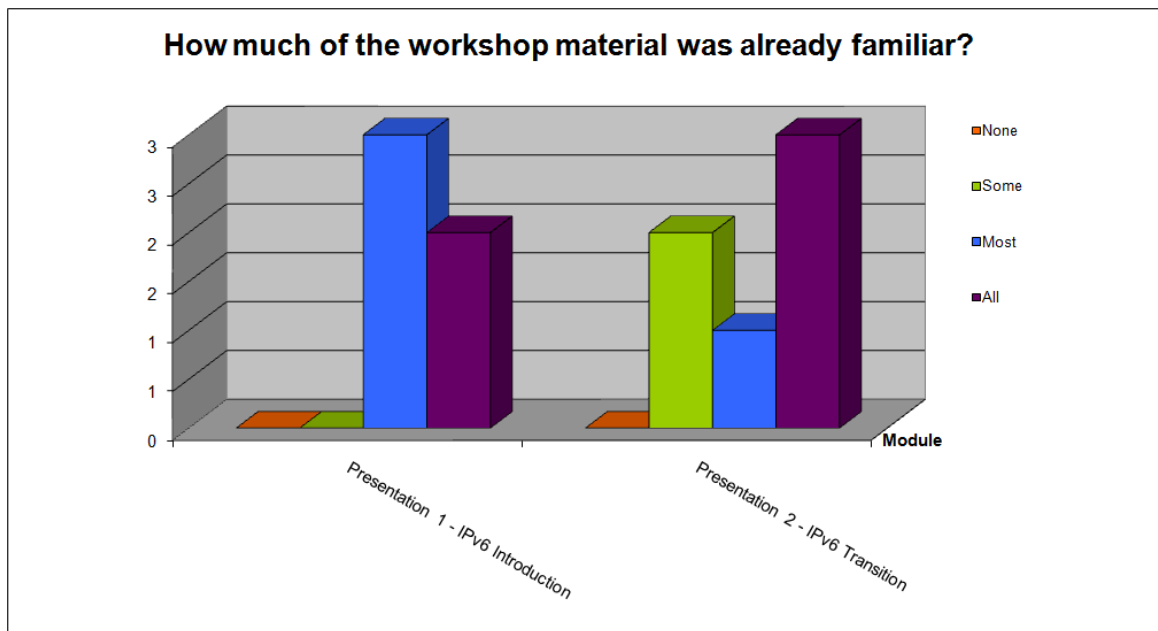
Figure 4-10: How much of the workshop material was already familiar?

Quality of course documentation?
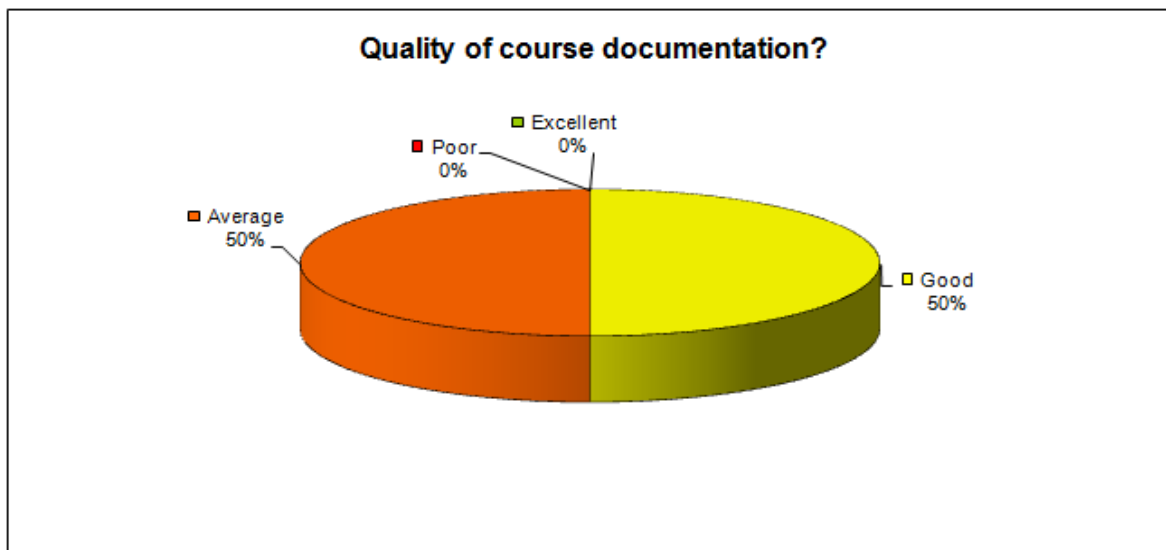
Figure 4-11: Quality of course documentation?

General organization of the workshop?

Figure 4-12: General organization of the workshop?

Would you recommend the workshop to your colleagues?
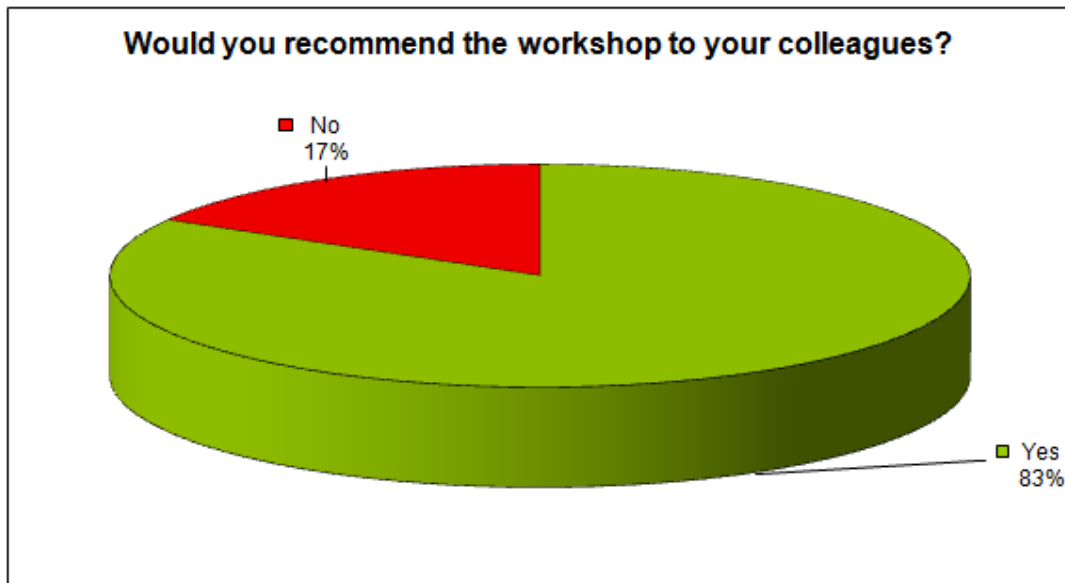
Figure 4-13: Would you recommend the workshop to your colleagues?

4.6.4 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", or to have a "hands-on" session related to security issues.

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 put between parentheses).

Here are some comments provided by the trainees:

== Begin of the excerpts

What topics would you have liked to **hear more about**?:

- *(1)   More detail about IPv6 implementation, like security feature, header extension.*
- *(1)   Practical application and step-by-step deployment.*
- *(1)   IPv6 routing implementation.*
- *(1)   More advanced topics about ipv6 like its security and how to implement.*
- *(1)   IPv6 subnetting, DHCPv6, and some IPv6 application like proxy, VPN, and more.*

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

- *(1)   IPv6 basics.*
- *(1)   IPv4.*

Any **other comments**:

- *(1)   The next training should cover not just basics of IPv6, but more expert.*
- *(1)   Discussion about IPv6 impact on the end user.*

End of the excerpts ==

5. THE 6DEPLOY WORKSHOP IN BANDAR SERI BEGAWAN (BRUNEI)

This two days workshop took place in Bandar Seri Begawan, Brunei, on June 23rd to June 24th 2010. This workshop was part of APNIC's Training programme. In the following paragraphs we provide information about the workshop, including the programme outline, and the material that was presented.

Details of the workshop and the training material used can be found in 6DEPLOY's project web site:

http://www.6deploy.eu/index.php?page=20100623_brunei

5.1 Overview

Individuals present at the workshop included Jordi Palet, from Consulintel representing 6DEPLOY and Nurul Islam Roman (APNIC).

Consultinel was in charge of the 6DEPLOY training for the first two days (23rd and 24th June). . Specific IPv6 material were presented, including an introduction to basic IPv6, concepts on the transition and coexistence of IPv4 and IPv6, as well as different transition mechanisms, some of which are automatic, that explain the growth of IPv6 traffic that is being observed at global level despite its low level of deployment on the part of ISPs. Recommendations were made regarding IPv6 deployment at ISPs and corporate networks.

On 25th June 2010, APNIC provided further training on IPv6.

5.2 Attendees

Below is a list of people that attended to at least one session:

No.	Name	Affiliation
1	Hajah Raedah DP Haji Hamdani	TELBRU
2	Zul Azmi Abdullah	TELBRU
3	Noraziah Ahad	TELBRU
4	Haji Roslin Haji Bakar	TELBRU
5	Pg Mohd Sazali Pg Haji Razali	TELBRU
6	Hendry William Tan	TELBRU
7	Bahrin Haji Rosli	TELBRU
8	Rohana Haji Jamadil	TELBRU
9	Azmi Haji Yahya	TELBRU
10	ADI RANI ILLMY ABD. RAHMAN	TELBRU
11	JEFFREY TAN SIAW WEI	TELBRU

12	Haji Umar Abdul Hakim Bin Haji Abdullah	TELBRU
13	HARTINI BINTI HAJI LAMUDIN	TELBRU
14	RUSDIY ANTO	TELBRU
15	HJ SHAMSOL	TELBRU
16	Awg Koh Chun Hock	EGNC
17	Awg Mohammad Nawi Bin Salleh	EGNC
18	Awg Adimardani Bin Hj Jorsni	EGNC
19	MD. ZULSHOFIYAN ZAKARIA	TELBRU
20	AK MUHD ALI-YUSRIN BIN DP Pg Hj Sani	ILM
21	HJ AHMAD FARHAN BIN HJ RUSNAN ARIZAL	ILM
22	HJ YUNUS BIN HJ TAMIN	ILM
23	HJ JUNAIDI BIN HJ AHMAD	ILM
24	Asli Bin Hj Tengah	

Table 5-1: Brunei Workshop list of participants

The participants represented a wide range of the ICT community. They were technical people whose knowledge about IPv6 ranged from almost no knowledge at all to having significant experience with IPv6 deployment. Some had already performed IPv6 experiments or were planning some level of deployment at their institutions.

5.3 Workshop programme

The agenda was agreed on after close collaboration with the local organisers. 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. The programme of the workshop is presented in the following table:

Date	Time	Title of session
23/6/2009	9:00	IPv6 Basics
24/6/2009	9:00	IPv6 Startup
25/6/2009	9:30	APNIC Training: IPv6 Workshop

Table 5-2: Brunei Workshop programme

5.4 Presentation material

The following material was presented:

Modules	Presented by	Affiliation
IPv6 Basics	Jordi Palet	Consulintel
IPv6 Startup	Jordi Palet	Consulintel
APNIC Training: IPv6 Workshop	Nurul Islam Roman	APNIC

Table 5-3: Brunei Workshop list of modules used

5.4.1 Modules

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

- **IPv6 Basics:** This module explains why a new version for IP, IPv6, has been developed. A brief history of IPv6, its motivation and benefits are given. IPv6 packet header, extensions headers and differences with IPv4 headers. Packet size issues and upper layer considerations are also treated. In addition, IPv6 addressing architecture, the different types of addresses (unique local IPv6 addresses, interface IDs, multicast addresses), their textual representation, how these are built and related to a layer 2 address, were explained. Transition concepts are introduced.

- **IPv6 Startup:** Practice basic IPv6 concepts like addresses, autoconfiguration, neighbor discovery protocol using hosts. In addition, some practice with basic transitions mechanisms using hosts.

5.5 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, and the presenters´ ability to convey information, and the relevance of the information to the expectations of the attendees.

Personal information was not mandatory, 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.

5.5.1 General questions related to participants and IPv6

About the participants		
24 participants were present, 20 questionnaires were returned		
Employment sector	Government	4
	University or other higher education	0
	Schools or further education	0
	Research	1
	Health	0

	Commercial	7
	Other (please specify)	(7)*
Job function	Government Advisor	0
	Senior Manager	1
	IT Manager	1
	Systems Administrator	4
	Network Administrator	8
	Researcher / Postgraduate	0
	Undergraduate	0
	Other (please specify)	(9)*
Usage of IPv6		
Do you use IPv6 yourself?	Yes	1
	No	15
Does your organisation use IPv6?	Yes	0
	No, but planned in this year	7
	No, but planned in the next year	2
	No, but planned in the longer term	7
	No, and no plans as yet	2

* See the graphics section for more information

Table 5-4: General questions related to participants and IPv6

5.5.2 Questions regarding the workshop

About the Workshop				
Usefulness of the topic	Very useful	Useful	Slightly useful	Not useful
Presentation 1 - IPv6 Introduction	14	4	1	0
Presentation 2 - IPv6 Transition	12	5	1	0
Quality of the presentation	Excellent	Good	Average	Poor
Presentation 1 - IPv6 Introduction	11	7	1	0
Presentation 2 - IPv6 Transition	6	11	1	0
Familiarity with the topic?	None	Some	Most	All
Presentation 1 - IPv6 Introduction	1	13	3	0
Presentation 2 - IPv6 Transition	5	11	1	0
Quality of the course documentation	Excellent	Good	Average	Poor
	3	13	2	0
General workshop organisation	Excellent	Good	Average	Poor
	6	11	1	0
Recommend to your colleagues?	yes	no		
	16	0		

Table 5-5: Questions regarding the workshop

5.5.3 Results graphics

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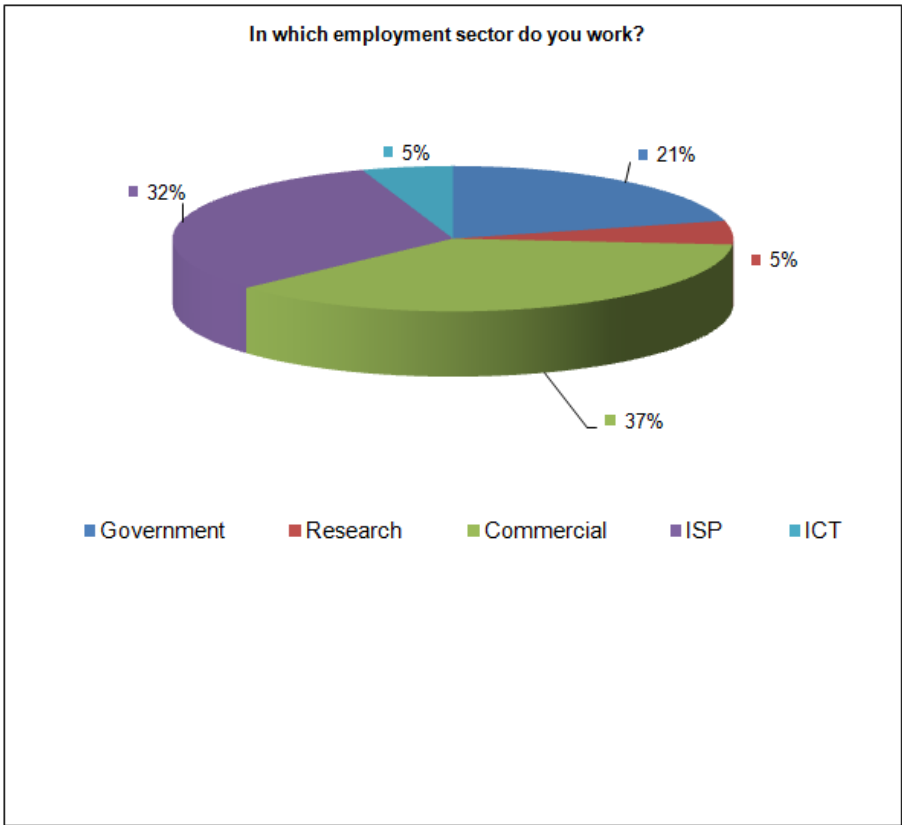

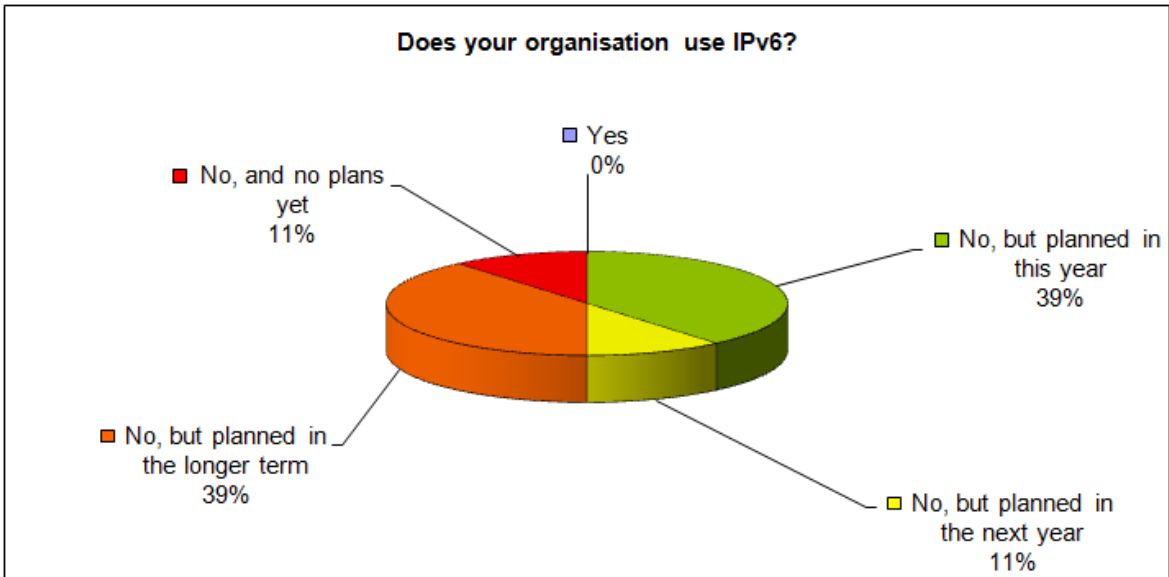
Figure 5-1: In which employment sector do you work?

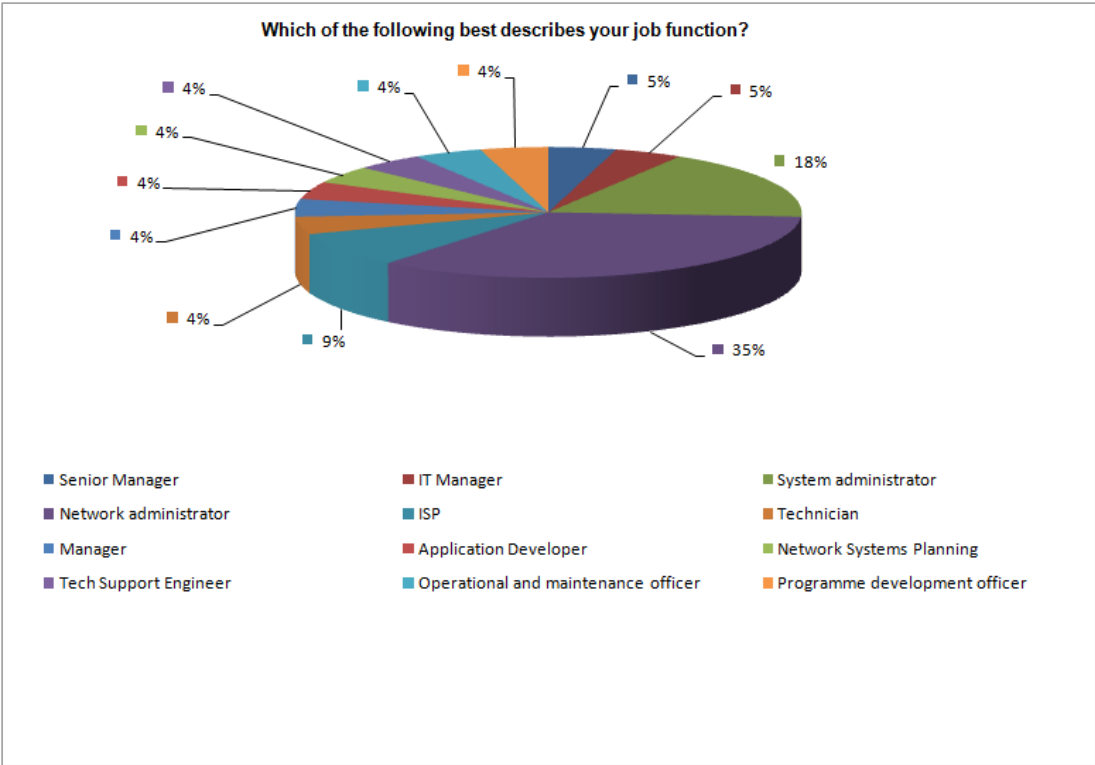**Figure 5-2: Does your organisation use IPv6?**

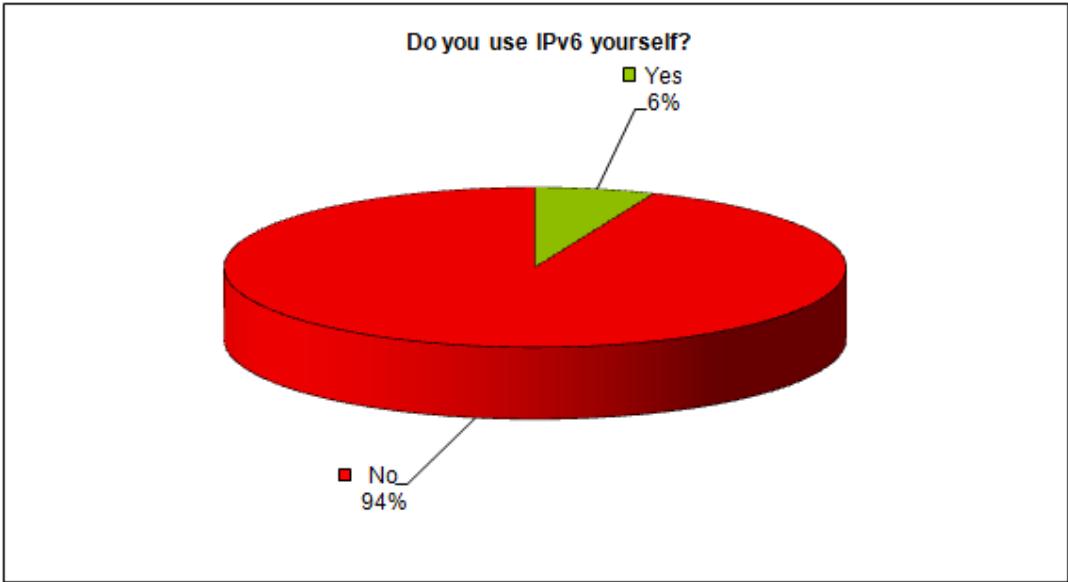**Figure 5-3: Which of the following best describes your job function?**
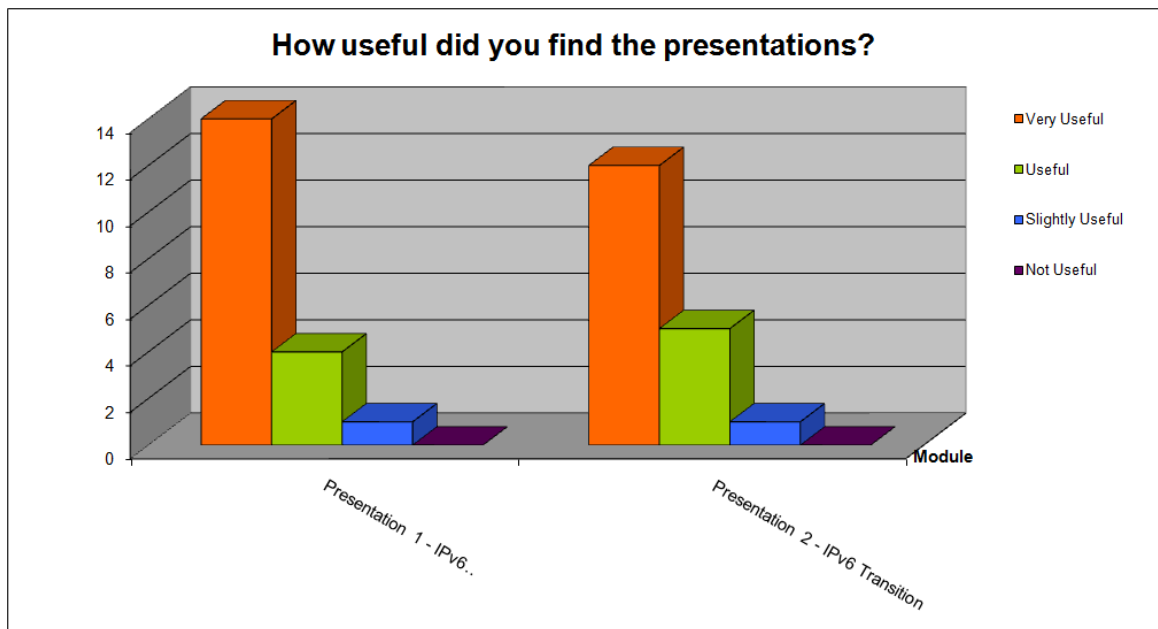

Figure 5-4: Do you use IPv6 yourself?

How useful did you find the presentations?

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

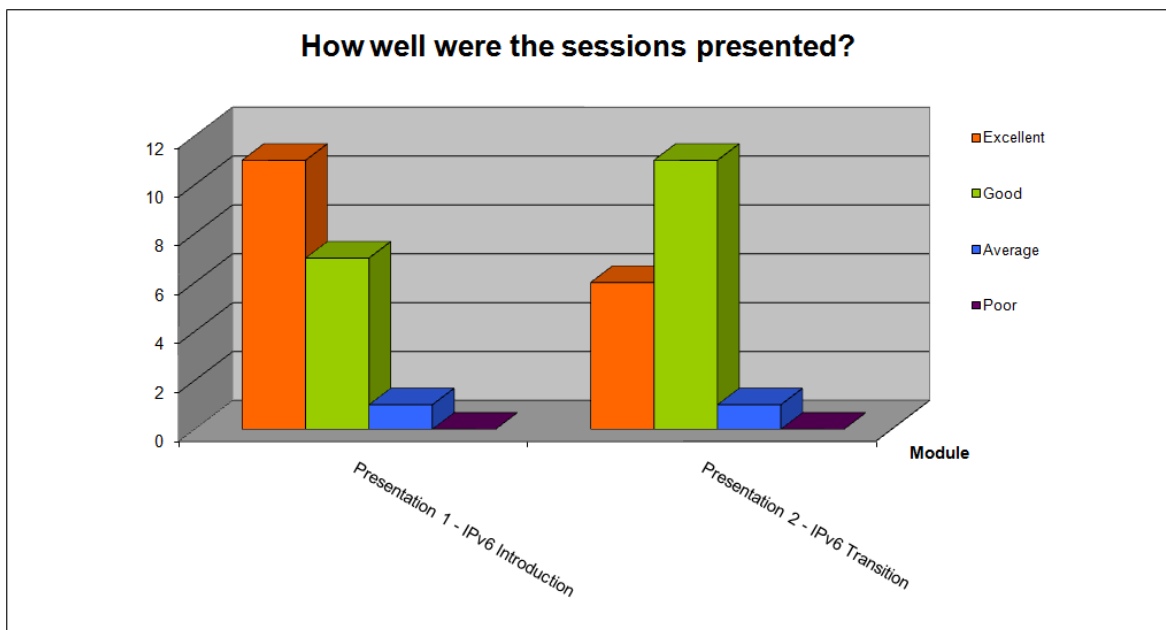**How well were the sessions presented?**
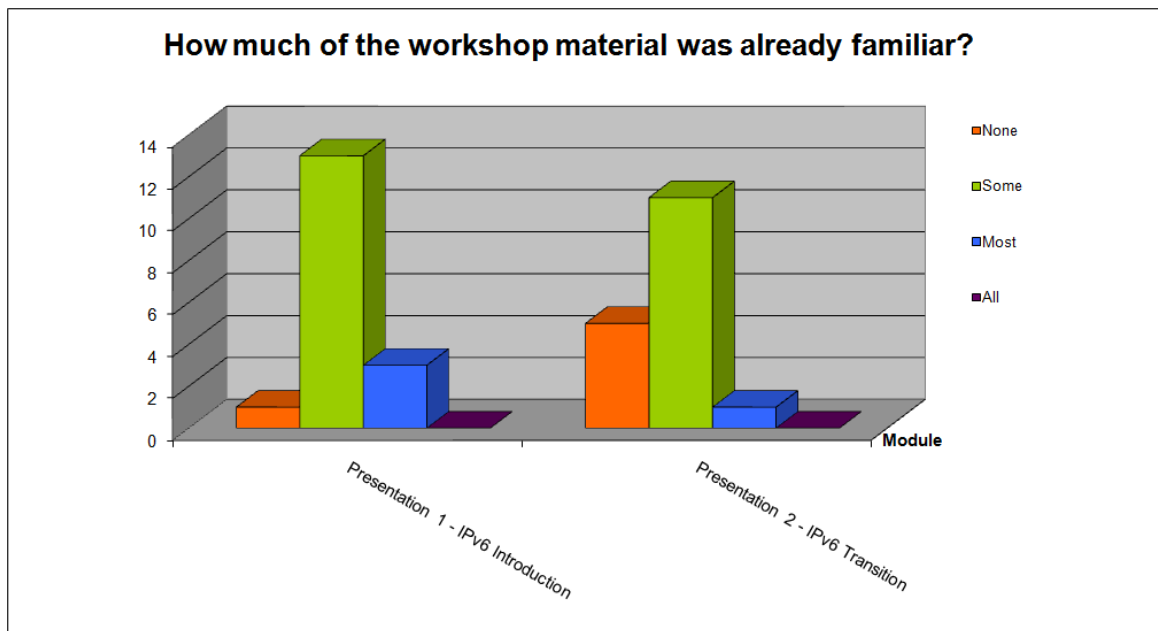

Figure 5-6: How well were the sessions presented?

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

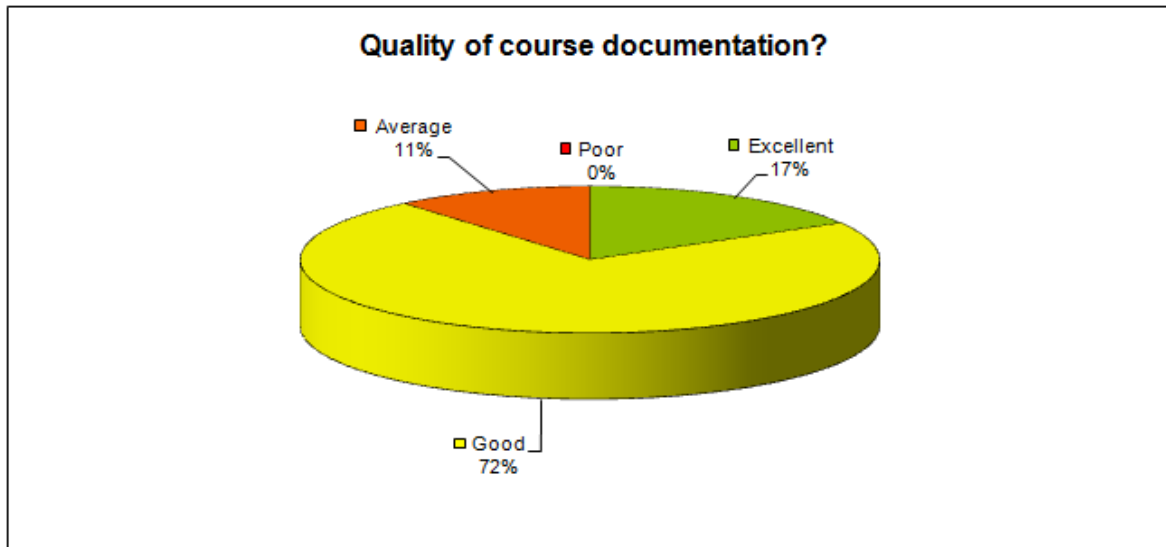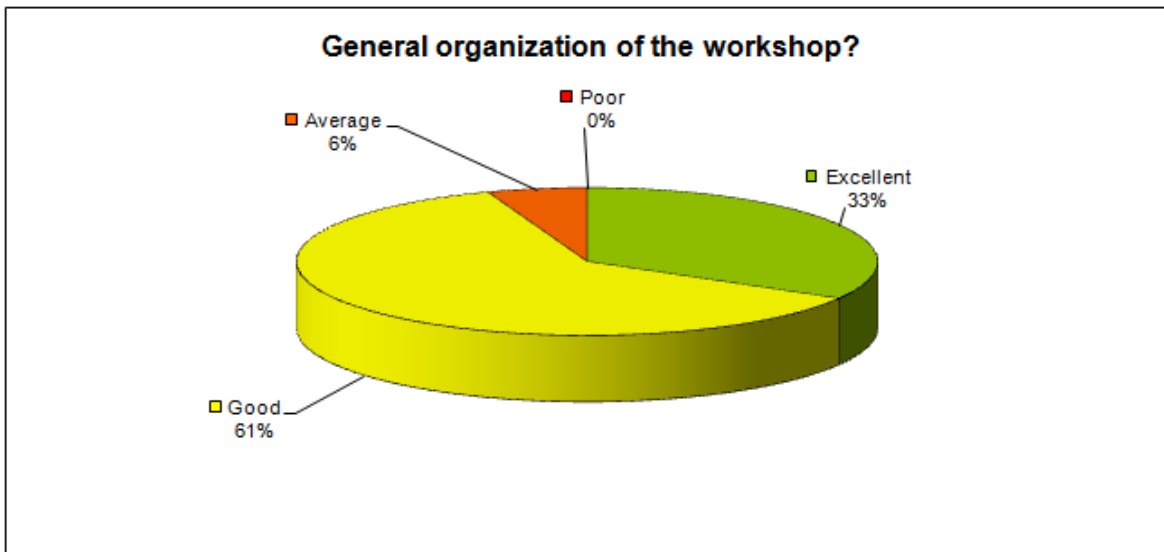**Figure 5-8: Quality of course documentation?**

General organization of the workshop?

- Poor 0%
- Average 6%
- Excellent 33%
- Good 61%

Figure 5-9: General organization of the workshop?

Would you recommend the workshop to your colleagues?
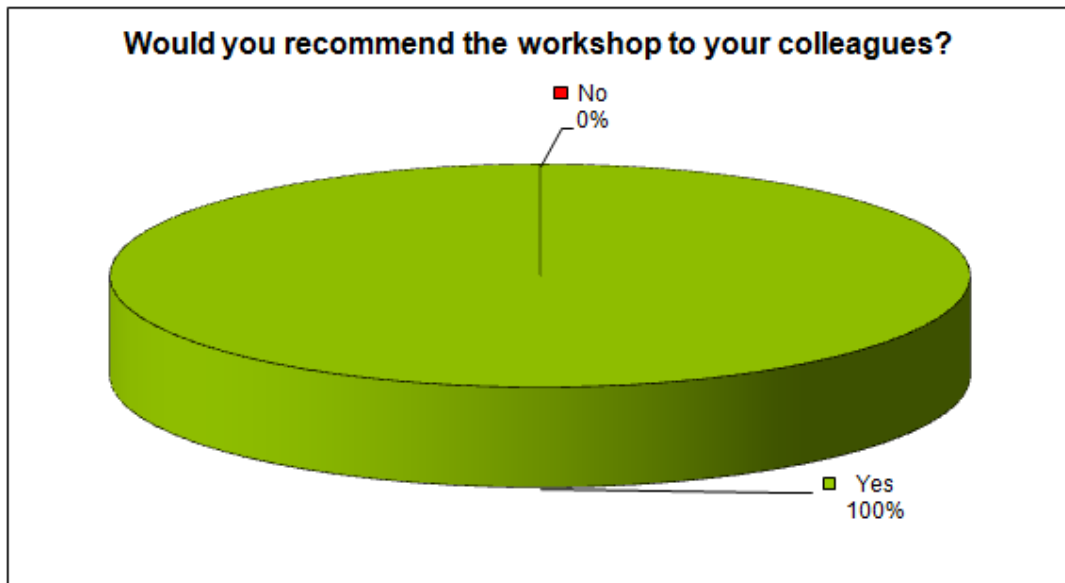
- No 0%
- Yes 100%

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

5.5.4 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", or to have a "hands-on" session related to security issues.

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 put between parentheses).

Here are some comments provided by the trainees:

== Begin of the excerpts

*What topics would you have liked to **hear more about**?:*

- *(1)   DNS IPv6.*
- *(1)   Routing (BGP, OSPF, etc.).*
- *(1)   IPv6 Subneting.*
- *(1)   Security.*
- *(1)   ISP Best Practise and Operations.*
- *(1)   What and how are the current practice and widely used in IPv6.*

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

- *(1)   Intro to IPv6.*
- *(1)   Deprecated.*

*Any **other comments**:*

- *(1)   A more frequent IPv6 workshops locally would enhance the awareness.*
- *(1)   We would like to experience ISP O&M on IPv6.*
- *(1)   It was very useful and interesting.*
- *(1)   Overall presentation was good, information delivered to audience is clear, presentation slides were given for further reading. Good Job, Jordi and Nurul :).*

End of the excerpts ==

6. 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 plans, 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.

7. 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.

Three 6DEPLOY workshops took place during June 2010 in the Asia Pacific region. All of these workshops where coordinated by APCNIC with local authorities and collaboration with Consulintel. Thanks to previous projects and training activities, most of the IPv6 education material needed to start 6DEPLOY workshop training was available from the very beginning. The material included most of the issues of Internet deployment and evolution, especially IPv6 introduction, IPv4-IPv6 transition/co-existence strategies, and broadband issues.

Approximately 132 network engineers, system administrators, and regulators participated in the workshops. The topics presented were selected according to the participants' requirements.

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.

In summary, these workshops should be considered a success with regard to the dissemination of IPv6 in these parts of the AP region, though this is only the first of many steps towards the deployment of real IPv6 networks and services in the region.

8. REFERENCES

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

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

Hands-on modules: http://www.6deploy.eu/index.php?page=hands-on

How-to organise an IPv6 workshop:

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

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

e-learning package: http://www.6deploy.eu/index.php?page=e-learning

6DEPLOY Workshops Agenda and detailed information:

http://www.6deploy.eu/index.php?page=workshops