

**NANOG 2001-2004:
An Analysis of Quantitative Meeting Survey Data**

Prepared by

M.A. Mardis, MILS, EdD
Research Investigator, School of Information
University of Michigan
Project Manager, Learning Systems
Merit Network, Inc.

March 26, 2005

NANOG 2001-2004: An Analysis of Quantitative Meeting Survey Data

This paper describes quantitative data collected during the previous 11 meetings of the North American Network Operators' Group (NANOG). NANOG is an educational and operational forum for the coordination and dissemination of technical information related to backbone/enterprise networking technologies and operational practices.

NANOG evolved from the National Science Foundation NSFNET project awarded to Merit Network, Inc., a non-profit 501(c)3 organization in Michigan, in 1987. The outcomes of the NSFNET projects provided much of the base research and development for the current Internet infrastructure and protocols.

As part of the NSFNET, Merit hosted "Regional-Techs" meetings, where technical staff from the nation's regional networks met to discuss operational issues of common concern with the Merit engineering staff. In 1994, the Regional-Techs meetings were opened to include a broader base of network service providers. The organizers of this larger meeting subsequently adopted NANOG as its new name.

NANOG meetings promote discussion of implementation issues that require community cooperation. Coordination among network service providers helps ensure the stability of overall service to network users.

NANOG meetings are held three times each year, and include two days of short presentations, plus afternoon/evening tutorial sessions. NANOG meetings are organized by Merit Network, Inc. and are hosted by Merit and other organizations around the U.S. and Canada.

This paper reports an overview of the data, the sample reflected in the data set, the methods used to analyze the data, the results of the data analysis, and conclusions and implications of the data analysis.

Overview of the Sample: Meetings and Participants

Registration and survey data for NANOG meetings 22-33 were included in this study. Table 1 gives an overview of the meeting numbers, dates, locations, and attendance for each of the NANOG meetings included in this study. These meetings cover four years, two countries, and 11 states.

Table 1.

Overview of NANOG Meetings Included in This Study

NANOG	Date	Location	Region	Attendees
22	May 2001	Scottsdale, AZ	8	602
23	October 2001	Oakland, CA	9	659
24	February 2002	Miami, FL	3	445
25	June 2002	Richmond Hill, Canada	CA	509
26	October 2002	Eugene, OR	9	505
27	February 2003	Phoenix, AZ	8	377
28	June 2003	Salt Lake City, UT	9	275
29	October 2003	Chicago, IL	6	529
30	February 2004	Miami, FL	3	488
31	May 2004	San Francisco, CA	9	584
32	October 2004	Reston, VA	2	592
33	January 2005	Las Vegas, NV	8	407

At least 5972 individuals attended these 11 meetings with an average of 498 registered participant per meeting. The majority of the meetings were held in region 9. Region 9 includes Alaska, American Samoa, California, Guam, Hawaii, Northern Mariana Islands, Oregon, and Washington. A table of states included in regions 0-9 of the United States can be seen in Appendix A.

An analysis of the location data provided by registrants indicates that the majority of participants, 82.7% (4936) were from the United States, about 4% (244) were from Canada and Mexico, and slightly over 13% (620) represented 37 nations outside of North America. The remainder of registrants did not provide location information.

Of the U.S. attendees, about one-third (1971) were from region 9 and almost 15% (871) were from region 2 (District of Columbia, Maryland, North Carolina, South Carolina, Virginia, West Virginia). The remainder of attendees represented all other regions of the United States.

Registration data indicated that the meeting attendees were predominantly composed of participants from for-profit organizations. As Figure 1 illustrates, Almost 78% (4645) attendees represented for-profit organizations, while almost 12% (739) of attendees were from non-profit organizations either with tax-exempt (501(c)3) or without non-tax exempt statuses. Government organizations were represented among 5.5% (327) of

attendees. The remaining meeting participants noted that they were from the organization type of “other,” or provided no answer to this question on the registration form.

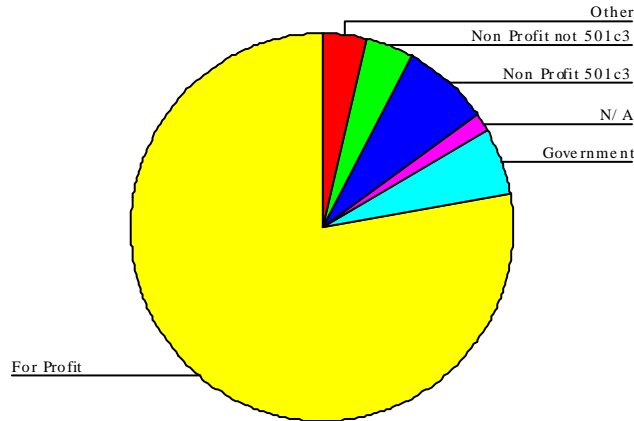


Figure 1. *Types of Organizations Represented at NANOGs 22-33*

Each registrant for the NANOG meetings included in this study was asked to designate a description of his/her organization from a list on the registration form. As Table 2 shows, NANOG attendees represented a wide range of organization descriptions, but mainly represented Internet service providers (1556), equipment vendors (1195), and network operators (1102). These three groups comprise almost 65% of meeting participants.

Table 2.

Descriptions of Organizations Represented by NANOG 22-33 Attendees

Description	N	Percent
Internet Service Provider	1556	26.1
Equipment Vendor	1195	20.0
Network Operator	1102	18.5
Other	629	10.5
Education & Research	574	9.6
Software Vendor	270	4.5
Consulting	198	3.3
Content Provider	163	2.7
Government	108	1.8
N/A	92	1.5
Integration	49	.8
Network User	36	.6
Total	5972	100.0

All of the participants were asked to complete surveys that measured their satisfaction with the meeting; approximately 29% (1733) attendees completed the survey. It should be noted that this response rate is typical as customer satisfaction survey return rates average around 30% (Creswell, 2005).

Survey Instruments

NANOG conference attendees had the option of completing a Web-based survey that contained sections that elicited feedback on four topics: the overall conference, overall presentation topics and speakers, tutorials, and birds-of-a-feather (BOF) meetings. Each section contained quantitative questions that employed option and ranking questions as well as qualitative, open-ended questions. The questions examined in this study are detailed in Appendix B.

Six of the meeting surveys (NANOG meetings 23, 25, 27, 29, 30, and 32) contained one or two unique questions. In the interests of data comparability and generalizability, these questions were suppressed from this report. A list of these questions can be seen in Appendix C.

Research Methods

This paper reports the cumulative result of the quantitative questions common to all 11 survey instruments. This report does not include analyses of the qualitative data collected on these surveys.

Data were examined for each of the instruments' quantitative questions in the order that questions were presented to users. It should be noted that the researcher inserted approximations in the evaluation of questions that used scales. Many questions required respondents to rate their perceptions of particular survey elements on scales of 1 to 5; though 1 was defined on the survey instrument as "Excellent," and 5 was defined as "Poor" or "Unsatisfactory," options 2,3, and 4 were not defined. The scales are defined in the results section of this study for each of the affected questions.

The data were analyzed using the Statistical Package for the Social Sciences (SPSS) in March, 2005.

Results

Results of analyses are presented in topic areas rather than in a sequential fashion. This presentation approach was used to ensure clarity of presentation and to aid thematic interpretation. The topic areas include the overall conference, overall presentation topics and speakers, tutorials, and birds-of-a-feather (BOF) meetings.

Topic 1. The Overall Conference

In this section, respondents were asked to rate, on a standard Likert (1-5) scale, their level of satisfaction with the overall NANOG conference.

Question 1.1 Overall, was this NANOG useful to you?

The first question asked, “Overall, was this NANOG useful to you?” Approximately 77% (1336) of respondents answered this question.

Figure 2 illustrates the overall reaction of respondents. An overwhelming majority of respondents, 91% (1257), rated the NANOG conference as “Very Useful” or “Useful.” One person rated the conference as “Useless,” while only 2% (33) perceived the NANOG conference to be “Not Very Useful.” Three percent (45) of the respondents reported that they had no opinion of the NANOG conference’s usefulness.

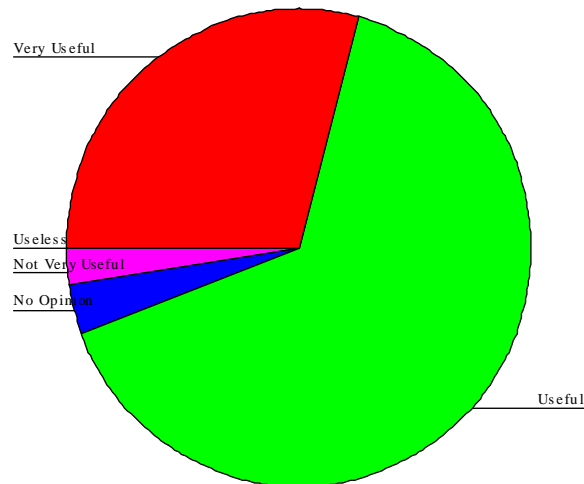


Figure 2. Overall satisfaction with NANOG meetings.

Question 1.2. If you have attended a previous NANOG, how does this NANOG compare?

The second question in this section asked, “If you have attended a previous NANOG, how does this NANOG compare?” New attendees accounted for an average of 61% (with a median of 57%) of each meeting’s participants.

Approximately 74% (1278) of respondents answered this question. Table 3 summarizes the answers to this question provided by respondents at NANOGs 26-33 who had attended previous meetings. These data were not available for NANOG meetings 22-25.

Table 3 lists the number of the NANOG meeting, the number of respondents (N) replying to question 1.2, the number of respondents who rated the current NANOG meeting as better than previous meetings (B), the number of respondents who rated the current meeting as the same as previous meetings (S), the number of respondents who rated the current meeting as worse than previous meetings (W), and the number who of respondents who responded that they had no answer or that the question did not apply to their experiences at previous meetings (N/A).

The final row of Table 3 presents the means (averages) of each of elements. In an effort to clarify returning attendee satisfaction with the current meetings, these data are presented in terms of three ratios: better to same (B:S); better to worse (B:W); and same to worse (S:W).

The data indicated that, on average, for each survey respondent who rated the meeting as better than previous meetings, 2.8 survey respondents rated the current NANOG meeting as the same as previous meetings. For each survey respondent who rated the meeting as worse than previous meetings, 6.6 survey respondents rated the current meeting as better than previous meetings. For each survey respondent who rated the current meeting as worse than previous meetings, 10.6 survey respondents rated the meeting as the same as previous meetings.

On average, most survey respondents (60) rated the current meeting as the same as previous meetings, fewer respondents (33) rated the current meeting as better than previous meetings, and the minority of respondents (10) rated the current meeting as worse than other meetings.

Without a definition of the selection of “N/A” on the survey instrument, these responses were impossible to factor into the data analysis.

Table 3.

Comparison of Current NANOG Meeting to Previous Meetings

NANOG	N	Better (B)	Same (S)	Worse (W)	N/A	Ratio B:S	Ratio B:W	Ratio S:W
26	181	45	50	9	77	1:1.1	5:1	5.5:1
27	161	44	68	2	47	1:1.5	22:1	34:1
28	83	11	34	8	30	1:3.1	1.4:1	4.3:1
29	193	46	64	3	80	1:7.2	15.3:1	21.3:1
30	177	25	63	22	67	1:2.2	1.1:1	2.9:1
31	170	40	67	11	52	1:1.7	3.6:1	6.1:1
32	193	33	79	10	71	1:2.4	3.3:1	7.9:1
33	120	17	53	18	32	1:3.2	1:1.1	3:1
Mean	160	33	60	10	57	1:2.8	6.6:1	10.6:1

Topic 2. General Sessions

The third question, “How did you like the program (the Monday-Tuesday General Session),” was divided into three subquestions. For the purposes of this study, the scaled responses in the following three subquestions were defined as follows:

- 1=Excellent (majority good qualities)
- 2=Very good (many good qualities)
- 3=Good, Satisfactory (equal number of good and bad qualities)
- 4=Fair (many bad qualities)
- 5=Poor, Unsatisfactory (majority bad qualities)

Question 2.1. How did you like the program (the Monday-Tuesday General Session) topics?

In the first subquestion, survey respondents were asked to rate their satisfaction with general session topics on a scale on 1 (Excellent) to 5 (Poor). Approximately 78% (1356) of survey respondents answered this question.

As Figure 3 indicates, the majority of survey respondents (1036, or 76%) identified the General Session topic choices as “Excellent” (333) or very good (703). Considerably fewer respondents (230, or 17%) rated the Session topic choices as Good, and approximately 7% (90) respondents rated the session topics as Fair or “Poor.”

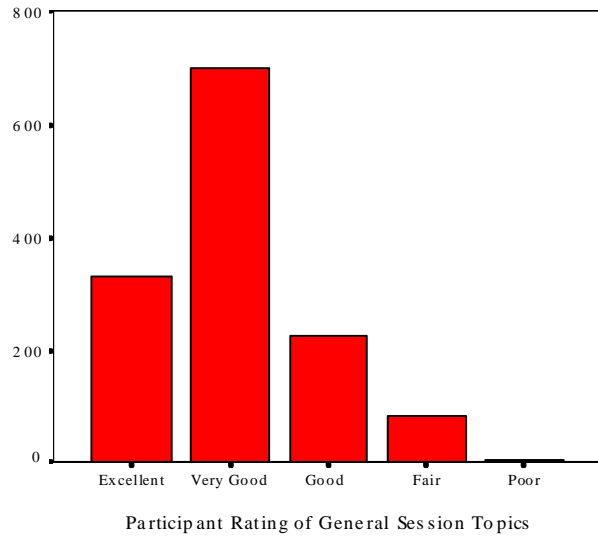


Figure 3. Respondents' ratings of General Session topics.

Question 2.2. How did you like the program (the Monday-Tuesday General Session) level of detail in presentations?

In the second subquestion, respondents were asked to rate their satisfaction with the level of detail in the presentations at the General Session on a scale from 1 (Excellent) to 5 (Unsatisfactory). Approximately 70% (1212) of survey respondents answered this question.

Of the respondents who answered this question, approximately 71% (858) rated the level of detail in the General Session presentations as “Excellent,” or Very Good. Almost 30% (354) respondents described the level of detail as Good or Fair. No respondents rated the level of detail as “Unsatisfactory.”

Question 2.3. How did you like the program (the Monday-Tuesday General Session) speakers?

The third subquestion asked users to rate their satisfaction with the speakers at the General Session on a scale from 1 (Excellent) to 5 (Unsatisfactory). Approximately 76% (1314) of survey respondents answered this question.

Of the respondents who answered this question, approximately 74% (975) rated the speakers in the General Session presentations as “Excellent,” or very good. Almost 22% (287) respondents described the speakers as good or fair. Less than 1% (5) respondents rated the speakers as “Unsatisfactory.”

Topic 3. Tutorials

NANOG meetings provided tutorials so that attendees can build skills, investigate new areas, and work closely with other professionals. The tutorials received an average of 383 participants per meeting. Participants could attend more than one tutorial per meeting.

Survey respondents were asked to rate their satisfaction with the tutorial aspect of the conference program in three subquestions.

For the purposes of this study, the scaled responses in the following three subquestions were defined as follows:

- 1=Excellent, Well chosen (majority good qualities)
- 2=Very Good, Mostly well chosen (many good qualities)
- 3=Good, Moderately well chosen (equal number of good and bad qualities)
- 4=Fair, Somewhat well chosen (many bad qualities)
- 5= Unsatisfactory, Poorly chosen (majority bad qualities)

Question 3.1. The choice of topic (for the tutorials) was...

Approximately 62% (1080) of survey respondents answered the question about the topic choice for tutorial sessions. As Figure 4 indicates, of those respondents, almost 69% (741) rated the tutorial topic choices as “Well Chosen,” or mostly well chosen. Slightly over one-fourth (26% or 287) respondents indicated that the tutorial topics were moderately well chosen. Just less than 5% (53) of survey respondents noted that the tutorial topics were Fair or “Poorly Chosen.”

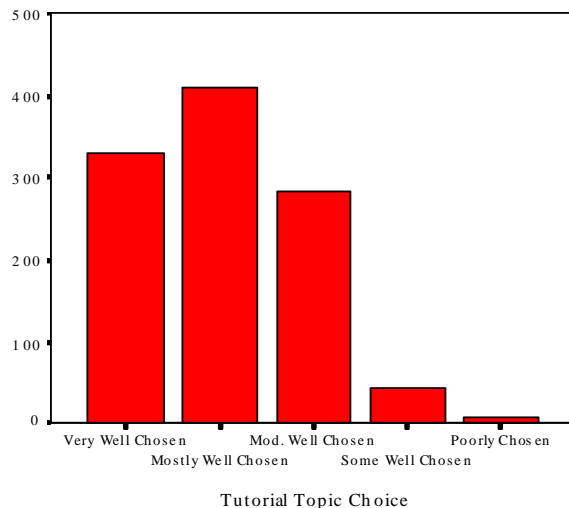


Figure 4. Respondent satisfaction with tutorial topics.

Question 3.2. The level of detail in the presentations (tutorials) was:

In the second subquestion, respondents were asked to rate their satisfaction with the level of detail in the tutorials on a scale from 1 (Excellent) to 5 (Unsatisfactory). Approximately 55% (945) of survey respondents answered this question.

Of the respondents who answered this question, approximately 70% (664) rated the level of detail in the General Session presentations as “Excellent,” or “Very Good.” Almost 23% (220) respondents described the level of detail as good. The remaining 7% (61) of respondents rated the level of detail in tutorials as fair or “unsatisfactory.”

Question 3.3. How did you like the (tutorial) speakers?

The third subquestion asked users to rate their satisfaction with the speakers at the tutorials on a scale from 1 (Excellent) to 5 (Unsatisfactory). Approximately 53% (926) of survey respondents answered this question.

Of the respondents who answered this question, approximately 76% (705) rated that speakers in the tutorials as “Excellent,” or very good. Almost 19% (177) respondents described the tutorial speakers as “good.” The remaining 5% (44) of respondents rated the tutorial speakers as “fair” or “unsatisfactory.”

Topic 4. Birds-of-a-Feather (BOF) meetings

NANOG meetings provided Birds-of-a-Feather (BOF) meetings so that attendees can discuss topics of professional concern and build collegial relationships. The BOF sessions received an average of 261 participants per meeting. Participants could attend more than one BOF session per meeting.

Survey respondents were asked to rate their satisfaction with the BOF aspect of the conference program in three subquestions. For the purposes of this study, the scaled responses in the following three subquestions were defined as follows:

- 1=Excellent, Well chosen (majority good qualities)
- 2=Very Good, Mostly well chosen (many good qualities)
- 3=Good, Moderately well chosen (equal number of good and bad qualities)
- 4=Fair, Somewhat well chosen (many bad qualities)
- 5= Unsatisfactory, Poorly chosen (majority bad qualities)

Question 4.1. The choice of topic (for BOFs) was...

Approximately 52% (897) of survey respondents answered the question about the topic choice for BOF sessions. As Figure 5 indicates, of those respondents, almost 79% (707) rated the BOF topic choices as “Well Chosen,” or mostly well chosen. Almost 18% (160) respondents indicated that the BOF topics were moderately well chosen. About 3% (30) of survey respondents noted that the BOF topics were somewhat or “Poorly Chosen.”

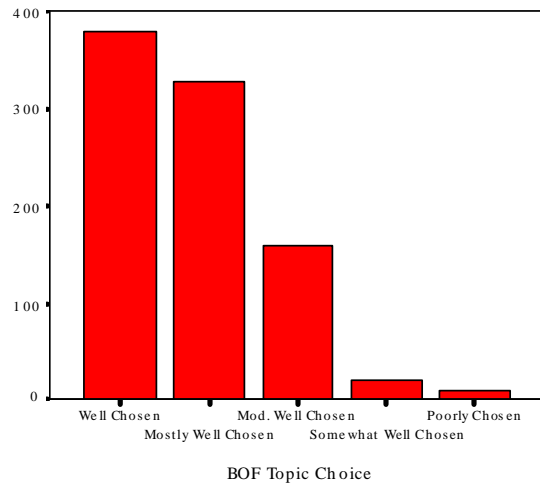


Figure 5. Respondent satisfaction with BOF topic choices.

Question 4.2. The level of detail in the presentations (BOFs) was:

In the second subquestion, respondents were asked to rate their satisfaction with the level of detail in the BOFs on a scale from 1 (Excellent) to 5 (Unsatisfactory). Approximately 52% (894) of survey respondents answered this question.

Of the respondents who answered this question, approximately 78% (669) rated the level of detail in the BOF presentations as “Excellent,” or very good. Almost 20% (182) respondents described the level of detail in the BOF sessions as good. The remaining 2% (43) of respondents rated the level of detail in the BOF sessions as fair or “Unsatisfactory.”

Question 4.3. How did you like the BOF speakers?

In the third subquestion, respondents were asked to rate their satisfaction with the speakers at the BOF sessions on a scale from 1 (Excellent) to 5 (Unsatisfactory). Approximately 49% (849) of survey respondents answered this question.

Of the respondents who answered this question, approximately 75% (661) rated the speakers in the BOFs as “Excellent,” or very good. Almost 16% (146) respondents described the BOF speakers as good. About 9% (32) of respondents rated the BOF speakers as fair or “Unsatisfactory.”

Conclusions

The North American Network Operators Group indeed serves this geographical constituency with 86.8% of meeting participants drawn from North America. The presence of attendees from 37 countries outside of North America suggests that the NANOG meetings had international exposure and reach. For-profit enterprises employed the largest number of meeting attendees in the areas of Internet and network service and operation.

The outstanding conclusion that can be drawn from the survey data is that respondents were consistently satisfied with all aspects of their NANOG experiences. The major conclusions that can be drawn from these data are:

- The NANOG **meetings** were **very useful**;
- For every attendee who found the meetings to be worse than previous years, five to six times as many attendees found the **current meeting** to be **better than or equal to previous years'** meetings;
- NANOG was able to deliver **consistent or improved** meeting program each year;
- **Topic choices** for the General Session presentations, tutorials, and BOFs were **well chosen**;
- The **level of detail** in General Session presentations, tutorials, and BOFs was **extremely good**;
- **Speakers** for the General Session presentations, tutorials, and BOFs were very **well-received**.

The picture that emerged from both the registration and survey data was that the typical NANOG participant, who represented a for-profit service provider or vendor on the West coast of the United States, was very pleased with the consistent quality of the topics, speakers, and level of detail available through the meeting program. This person was likely to return for future meetings.

Limitations of this Study

The survey instrument contained features that may have an impact on conclusions that can be drawn from these data.

First, many of the options for semantic differential scaled survey questions were not defined. Although each end of the rating scales used in many questions were defined, it was difficult to tell how users interpreted the remaining selections on the scale. Given that it is inherently difficult to tell what prompts a user to choose between "Good," and "Fair," for example, this phenomenon is compounded by the absence of any textual guide to the numerical options.

Second, and building upon the previous point, question 1.2 asked previous attendees to NANOG to rate their current experience in reference to previous NANOG experiences. This question contained the option of "N/A," which is not defined in the question. Some

users may have interpreted this option to mean “not applicable,” while others may have interpreted this option to mean “no answer.” Without a textual definition in the question, it is impossible to determine how many of first-time NANOG attendee respondents did not carefully read the question and opted to respond that the question did not apply to them. Given that “N/A” responses comprised 36% (458) of the responses, this issue may have had a notable influence on analysis outcomes.

Directions for Future Research and Practice

This paper represents analysis of questions from the NANOG survey forms that contained quantitative data; the survey forms also included open-ended questions that generated a large amount of qualitative data. Analysis of these data is important to complete the picture of attendee satisfaction that is suggested by the quantitative findings.

This data can also be disaggregated and combined with information about the General Session, tutorial, and BOF topics, attendance levels, and speakers in an effort to gauge interest trends among NANOG attendees.

The design of future surveys should take into account the design issues present in these surveys. Moreover, designers of NANOG meeting surveys will want to consider the time and skill burdens analyses of qualitative data present.

Reference

Creswell, J.W. (2005). *Educational research: Planning, conducting, and evaluating quantitative and qualitative research*. Upper Saddle River, NJ: Pearson.

Appendix A. Region Codes and Definitions

0	Connecticut (CT), Massachusetts (MA), Maine (ME), New Hampshire (NH), New Jersey (NJ), Puerto Rico (PR), Rhode Island (RI), Vermont (VT), Virgin Islands (VI)
1	Delaware (DE), New York (NY), Pennsylvania (PA)
2	District of Columbia (DC), Maryland (MD), North Carolina (NC), South Carolina (SC), Virginia (VA), West Virginia (WV)
3	Alabama (AL), Florida (FL), Georgia (GA), Mississippi (MS), Tennessee (TN)
4	Indiana (IN), Kentucky (KY), Michigan (MI), Ohio (OH)
5	Iowa (IA), Minnesota (MN), Montana (MT), North Dakota (ND), South Dakota (SD), Wisconsin (WI)
6	Illinois (IL), Kansas (KS), Missouri (MO), Nebraska (NE)
7	Arkansas (AR), Louisiana (LA), Oklahoma (OK), Texas (TX)
8	Arizona (AZ), Colorado (CO), Idaho (ID), New Mexico (NM), Nevada (NV), Utah (UT), Wyoming (WY)
9	Alaska (AK), American Samoa (AS), California (CA), Guam (GU), Hawaii (HI), Northern Mariana Islands (MP), Oregon (OR), Washington (WA)

Appendix B. Common NANOG Survey Questions

Below are the NANOG survey questions common to each of the eleven meetings examined in this study. A template of the survey instrument can be seen at <http://www.nanog.org/surveys.html>.

1.1. Overall, was this NANOG useful to you? (choose one)

Very useful μ Useful μ No opinion μ Not very useful μ Useless μ

1.2. If you have attended a previous NANOG, how does this NANOG compare?

Better μ About the same μ Worse μ N/A μ

How did you like the program (the Monday-Tuesday General Session)?

2.1. The choice of topics was:

Well Chosen 1 μ 2 μ 3 μ 4 μ Poorly Chosen 5 μ

2.2. The level of detail in the presentations was:

Excellent 1 μ 2 μ 3 μ 4 μ Unsatisfactory 5 μ

2.3. The speakers were:

Excellent 1 μ 2 μ 3 μ 4 μ Unsatisfactory 5 μ

How did you like the tutorials?

3.1. The choice of topic was:

Well Chosen 1 μ 2 μ 3 μ 4 μ Poorly Chosen 5 μ

3.2. The level of detail in the presentations was:

Excellent 1 μ 2 μ 3 μ 4 μ Unsatisfactory 5 μ

3.3. The speakers were:

Excellent 1 μ 2 μ 3 μ 4 μ Unsatisfactory 5 μ

How did you like the BOFs?

4.1. The choice of topic was:

Well Chosen 1 μ 2 μ 3 μ 4 μ Poorly Chosen 5 μ

4.4. The level of detail in the presentations was:

Excellent 1 μ 2 μ 3 μ 4 μ Unsatisfactory 5 μ

4.3. The speakers were:

Excellent 1μ 2μ 3μ 4μ Unsatisfactory 5 μ

Is this your first time attending NANOG? (NOTE: Results reported in Overview of the Sample section)

Yes μ No μ

Appendix C. Questions Suppressed from Data Analysis

Some of the NANOG surveys contained unique questions. Full text was available for three of the unique questions. These questions have been excluded from this study.

Do you think that having moderators on the stage, introducing speakers, enforcing time limits if they run overtime, and managing the audience questions, is helpful, or distracting?

Very helpful 1 μ 2 μ About the same 3 μ 4 μ Get them outta there! 5 μ

If you think that it's helpful to have moderators on stage, would you prefer to see them taking a more active role, doing about the same as they do now, or staying more in the background?

Very helpful 1 μ 2 μ About the same 3 μ 4 μ Less Active 5 μ

What location would you prefer for future NANOG meetings?

East Coast μ Midwest μ West Coast μ