



AMSAT[®]

The Radio Amateur Satellite Corporation

**AN ANALYSIS OF MEMBER-USER
SATISFACTION WITH AMSAT[®] ON-LINE
PRODUCTS AND SERVICES**

RECOMMENDATIONS TO THE BOARD OF DIRECTORS

by
Keith C. Baker, KB1SF
Executive Vice President
April, 1997

Abstract

The Radio Amateur Satellite Corporation (AMSAT®) is a not-for-profit, 501(c)(3) educational and scientific organization that was first chartered in Washington, DC, USA in 1969. Its objectives include promoting space research and communication by building, launching and controlling Amateur Radio spacecraft. Since its founding, over 25 years ago, many other like-minded organizations have been formed around the world to pursue the same goals and who now also share the AMSAT name. Often acting together, these groups have used predominantly volunteer labor and donated resources to design, construct and, with the added assistance of government and commercial space agencies, successfully launch, over two dozen Amateur Radio communications satellites into Earth orbit. Nearly 20 of these satellites are currently operational.

In addition to providing satellites for the world's Amateur Radio Operators to use, AMSAT's North American group (AMSAT-NA) also freely provides various news bulletins and satellite position reports, including real-time satellite information, of interest to satellite operators via the Internet and World Wide Web. Currently, over 4000 individuals around the globe are signed up with AMSAT-NA to receive one or more of these direct Internet bulletin mailings each week, with an untold number of other users who obtain this same information via AMSAT's Web pages.

To date, no formal feedback mechanism has been developed or employed to survey the overall effectiveness of these products and services in meeting the needs of AMSAT's members. What's more, critical AMSAT monetary and volunteer resources are now being consumed to provide non-reimbursed services *without* a formal feedback mechanism to assess the effectiveness of those services.

This study investigated current customer satisfaction with AMSAT's on-line products and services. In particular, it investigated whether or not AMSAT's intended audience...current AMSAT members...are being served satisfactorily by these services. Overall, it appears that respondents, and in particularly respondents who also called themselves AMSAT members, are well satisfied with AMSAT's current Internet products and services.

MSA 685 PROJECT FINAL REPORT

AN ANALYSIS OF MEMBER-USER SATISFACTION WITH AMSAT® ON-LINE PRODUCTS AND SERVICES

RECOMMENDATIONS TO THE BOARD OF DIRECTORS

**Submitted in Partial Fulfillment of Requirements
for the Degree of
Master of Science in Administration
(Concentration in General Administration)**

**by
Keith C. Baker**

**Project Instructor
Dr. C. Kendrick Gibson**

April, 1997

Dedication

This work is dedicated to the memory of those many Amateur Radio Operators and others who's hard work, sleepless nights and persistence resulted in one of the most successful and exciting endeavors in the history of Amateur Radio:

The Amateur Satellite Service

Acknowledgments

To express my thanks here to all those who helped with this effort would probably fill more pages than the report! However, particular thanks must first go to Bill Tynan, W3XO, AMSAT-North America President, for his strong encouragement in helping me to bring the idea for this project to fruition. Bill, I hope you will find that what I've done here will be worthy of your strong support for this project.

I also express my sincere thanks to Paul Williamson, KB5MU, AMSAT's volunteer Vice President for Electronic Communications, and the person who also serves us as our Web page Administrator, for sharing his patience and superb creative talents with me. Let there be no doubt in anyone's mind that it was Paul's unseen, but yet extremely helpful "hand" that provided a wealth of assistance in editing the initial survey instrument, and who later expertly transcribed the survey forms into electronic format for placement on the AMSAT Web site. Paul also wrote most of the complex computer-based subroutines to extract and arrange the data from the returned surveys in text form. Later still, he provided outstanding follow-up assistance to me with helpful suggestions on how best to automate my own data roll-up and analysis efforts. Paul, I couldn't have done *any* of this without *you*!

Of course, thanks must also go to my Central Michigan University Project Monitor, Dr. Ken Gibson. Ken, I well understand that this project took a lot of *your* time and effort. On behalf of all of us at AMSAT, I offer my sincere personal thanks for your contributions to our cause and for your patience and superb constructive comments along the way.

And, finally, my heartfelt thanks to all those *super* people who took the time from their busy lives to stop by our AMSAT Web site and participate in the survey.



AMSAT[®] The Radio Amateur Satellite Corporation

850 Sligo Avenue, Suite 600, Silver Spring, Maryland 20910-4703 Telephone: 301-589-6062

December 8, 1996

Keith Baker, KB1SF
1324 Fairgrounds Road
Xenia, Ohio 45385

Dear Keith,

I have reviewed your request to conduct research involving the Radio Amateur Satellite Corporation's (AMSAT) Internet products and services, as well as your proposed survey material that will be used in the research.

It is my understanding that the survey will be used in gathering data from the users of our Internet products and services, and that the rights of both AMSAT members as well as others who freely elect to participate in the research will not be compromised. As much as is possible with surveys using this medium, total anonymity will be maintained throughout the data gathering process and that you will not be required to provide raw data that may be connected to a specific individual. It is also my understanding that your intention is to use this data *solely* as a measurement of our effectiveness in providing these electronic membership services related to the Amateur Radio Space program.

I believe his project will be very beneficial to us in providing the very best on-line products and services possible, as well as providing the survey participants with an opportunity to tell us what they would like to have us do for them in the future.

You have my permission and wholehearted support to use AMSAT's membership as well as our electronic and other resources to conduct this research. I look forward to reviewing your conclusions and recommendations once your project is completed.

Sincerely,

---signed---

William A. Tynan, W3XO
President

(Transcribed CMU Permission Letter)
Central Michigan University

College of Extended Learning
(517) 774-3865

February 17, 1997

KEITH C. BAKER
1324 FAIRGROUNDS ROAD
XENIA, OH 45385

Dear Mr. Baker:

Your IRB application for your MSA 685 project paper has been reviewed for compliance with the university's institutional review board policies and procedures and has been approved as an "exempt from full board review" proposal. You may proceed to collect your data. Once your data has been collected, please complete and return your End of Data Collection Report (formerly called End of Project Report). This form can be found in the *Student Guide to the MSA 685 Project* or is available at your program center.

This approval is good for one year only. If you have not conducted your research and submitted your End of Data Collection Report within one year, you will need to submit another complete IRB application. Please contact your monitor if you have any questions.

Sincerely,

--signed--

Kim Gribben
MSA Coordinator

KG: das

c: Program Center
Student File
C. Gibson

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Chapter 1: Definition of the Problem/Issue

Introduction

The Radio Amateur Satellite Corporation (AMSAT®) is a not-for-profit, 501(c)(3) educational and scientific organization that was first chartered in Washington, DC, USA in 1969. Its objectives include promoting space research and communication by building, launching and controlling Amateur Radio spacecraft. Since its founding, over 25 years ago, many other like-minded organizations have been formed around the world to pursue the same goals and who now also share the AMSAT name. Often acting together, these groups have used predominantly volunteer labor and donated resources to design, construct and, with the added assistance of government and commercial space agencies, successfully launch, over two dozen Amateur Radio communications satellites into Earth orbit. Nearly 20 of these satellites are currently operational.

In addition to providing satellites for the world's Amateur Radio Operators to use, AMSAT's North American group (AMSAT-NA) also freely provides various news bulletins and satellite position reports, including a series of real-time Internet World Wide Web (WWW or just "the Web") satellite information pages, of interest to those satellite operators equipped with computer access to the Internet. Currently, over 4000 individuals around the globe are signed up with AMSAT-NA to receive one or more of these direct Internet bulletin mailings each week, with an untold number of other users who obtain this same information via AMSAT's Web pages.

Purpose and Research Objective

With some 4000 users from a potential worldwide user base of about 18,500 now receiving AMSAT's free News Service and Keplerian Element bulletins into their electronic mailboxes each week, it can be argued that current recipients are generally satisfied with the services they receive in return or else they would cancel their free subscriptions and look elsewhere for this information. The number of people currently signed up to receive these bulletins is also the largest user population in the history of AMSAT providing this service.

Likewise, in the past, AMSAT's Web page has regularly received about two hundred "hits" (electronic visits by individuals) per day, many of whom are AMSAT members. However, as previously stated, to date, AMSAT has conducted no research to find out if it is providing the right information, in the right form, and on the right schedule to properly service its membership. Therefore, this research proceeded to gather information to help either prove or disprove the following hypotheses:

That a majority of members who now partake of AMSAT's Web and Bulletin services *are* generally satisfied with the content and usefulness of the material they contain, and that the services offered *are* meeting member's perceived expectations.

Related Problems and Issues

AMSAT's bulletin, remailing and Web services are provided free of charge to anyone who asks for them, not just AMSAT members. Anyone who sends the appropriate electronic mail message to AMSAT asking to be included in the mailings can receive them. The Web site and remailing database are maintained by AMSAT using a combination of AMSAT-owned and donated computer hardware linked to a donated Internet access connection at University of California at San Diego. While AMSAT's Internet services are provided gratis to all, it is hoped those individuals who are not yet members of an AMSAT organization will like what they are getting "for free" and will eventually become new or sustaining AMSAT members and help support the Amateur Radio Space program.

The electronically mailed products include weekly AMSAT News Service (ANS) bulletins, a weekly satellite Keplerian Element (KEPS) (satellite position) report bulletin, non-recurring bulletins of information pertaining to Amateur Radio operations aboard the National Aeronautics and Space Administration (NASA) Space Shuttle, as well as non-

recurring bulletins relating to other NASA operations. In addition, these services also include a free-form, news group-like remailing service bulletin board (called the AMSAT-BB) where Amateur Radio satellite operators can electronically post information to all others in the group who share similar interests.

In addition to these recurring products, AMSAT-NA also provides several pages of Amateur Radio satellite information accessible via its World Wide Web site, with multiple links to other similar pages of interest on the Internet. Likewise, Web sites elsewhere on the Internet with similar goals, such as the Web site maintained by the American Radio Relay League (ARRL) containing information about Amateur Radio in general, provide direct links to the AMSAT-NA Web site and vice versa.

What's more, while other AMSAT organizations around the world have since set up their own Web sites, AMSAT-NA remains the *only* AMSAT organization that also offers multiple electronic bulletin services. AMSAT-NA, being the largest AMSAT organization worldwide in terms of both membership and monetary resources, believes it is obligated to share these resources with the other, smaller AMSAT organizations in the worldwide "family" who simply don't have the resources to set up their own remailing and bulletin services.

While there are no costs or fees assessed by AMSAT to receive any of these services, a large amount of volunteer effort is expended each week to keep the information contained in these mailings and postings current. To date, no formal feedback mechanism has been employed to survey the overall effectiveness of these products and services in meeting the needs of AMSAT's members. That is, other than simply counting the numbers of recipients who receive each set of bulletins, as well as counting the number of electronic visitor accesses ("hits") on its Web site, AMSAT-NA's Board of Directors and others involved in the preparation, distribution and maintenance of these materials have received little, if any, structured feedback as to whether or not this information is actually meeting the needs and expectations of its members.

This lack of knowledge is further complicated by the fact that non-members can also freely receive these services, and what little informal feedback has been received to date may *not* be representative of the thoughts and feelings of AMSAT's dues-paying members, who remain the primary target audience for this information. In short, critical AMSAT monetary

and volunteer resources are now being consumed to provide non-reimbursed services *without* a formal feedback mechanism to assess the effectiveness of those services.

Assumptions

This research proceeded with a number of assumptions in mind. Probably foremost among these was the idea that conducting surveys among such a far flung membership base as is AMSAT's by mail would be cost-prohibitive. Moreover, previous attempts by AMSAT to gather information this way yielded less than satisfactory response rates, and even lesser data quality. Therefore, for this project, it was decided to scrap the mailed survey approach in favor of trying something entirely new...surveying AMSAT members and other users via the very medium used to deliver those services...the Internet itself. More specifically, as such a survey approach had never been used before by the AMSAT organization, it was further decided to use AMSAT's World Wide Web page for this effort, because it was believed that such an approach would be a relatively easy way to design and post a survey instrument, as well as to collect the survey data.

In the course of preparing for this project, it soon became clear to the AMSAT leadership that such an approach would represent a number of AMSAT corporate "firsts". It would be AMSAT's first attempt at gathering a large volume of *real* survey data. It would also be the first time that AMSAT had used the Internet as the survey medium. Needless to say, there were a number of significant uncertainties associated with such an undertaking. While the main objective of the research was to gather usable information about member satisfaction with some of its Internet services, the AMSAT leadership also hoped that the study would be helpful as a vehicle for building and testing some automated survey and analysis tools to be used for subsequent AMSAT membership survey projects.

Since this project represented a first attempt at filling both objectives, decision criteria were left relatively loose. That is, if any interesting results came from the analysis of data in the course of trying out these automated tools and techniques, these would be treated more as indicators of areas that might warrant subsequent study and analysis, vice hard and fast "findings" calling for immediate action.

This is also why this researcher deliberately refrained from drawing strong conclusions or making firm recommendations in the study. Rather, the results were presented

more as indicators that something *might* warrant further analysis, and, recommendations, where offered, were viewed with these assumptions firmly in mind.

Definition of Terms

First, it should be understood that the acronym AMSAT is a registered trademark of the Radio Amateur Satellite Corporation, and is used extensively throughout the report with the express permission of that organization.

In addition, it is recognized that not every reader will understand some of the computer and other "jargon" used in this analysis, particularly those related to AMSAT's organizational objectives, products and services as well as those related to the workings of the Internet. Therefore, where possible and practical, the researcher has made a concerted attempt to define and explain these concepts as they are discussed in the text.

Summary

It should by now be quite clear that this project represented "pioneering" research in a number of ways. That is, not only did it constitute the first ever survey of AMSAT's members and its other "customers" about their satisfaction with AMSAT's Internet products and services, it also represented the first-ever attempt by the organization to gather such information by way of this new medium called the Internet and the World Wide Web. For that reason, this research was viewed from the start to have *both* the objective of gathering live data with which to gauge current customer satisfaction with AMSAT's Internet offerings, as well as a vehicle to develop and test new automated tools with which to replicate and/or improve this newly discovered automated survey process. Of course, the latter would be beneficial only if the initial survey results proved that the Internet was, in fact, a practical and reliable medium for doing so.

Chapter II: Literature Review

Introduction

The subject of customer satisfaction, and its related topic, consumer satisfaction, is arguably one of the most studied topics in the business world. Without customers, there would be no business, for it is the purchase of goods and services by users (customers) that is the central reason for a business being in business, and it is the proceeds from such activity that keeps the business alive as an entity. It follows that when customers are *satisfied* with a particular product or service, they will continue to use it. If not, they will discontinue that use or look elsewhere for their subsequent purchases. Thus, the almost overwhelming attention, and the large amount of research focused by businesses throughout the world, on the fundamental issue of making and keeping customers satisfied.

While a non-profit organization like AMSAT derives its revenues primarily from membership dues, the satisfaction of those members with the goods and services they receive in return can be favorably compared with a customer making a purchase of, for example, auto repair services at a garage, or from the purchase of items in a store. That is, even though these services are provided "for free" with volunteer labor and donated computer resources, they still require an expenditure of time and effort that could be used elsewhere in AMSAT. On the other hand, these services have become one of the major member benefits now provided by the organization.

For example, most Amateur Radio satellite enthusiasts now use their own personal computers to track AMSAT's satellites. The software used to accomplish this task requires periodic updates of satellite position data in order for the tracking outputs to be reliable. For this reason, AMSAT's weekly KEPS (satellite position) and satellite status bulletins have become a *very* important product among the membership. It should logically follow that member satisfaction with the goods and services that AMSAT offers, including its on-line services, should be an important part of their decision to join or remain a member of AMSAT.

Thus, AMSAT has "customers" (its membership who support the organization and its goals with their annual dues and donations) and "products" (such as AMSAT's electronic bulletins). These customers also have choices due to the non-commercial nature of Amateur Radio. By law, AMSAT *cannot* charge access fees for the use of its satellites.

So, today, Amateur Radio satellite enthusiasts have several choices regarding how and where they obtain this information, just like the customers in a store would have. They can "freeload" on the satellites, never contributing a dime to their birth and upkeep, or they can become a member of AMSAT and support its ongoing work to build and launch new satellites. Likewise, they can get their satellite position information from one of several other sources, such as NASA, or they can get it from AMSAT's weekly bulletins or its Web page.

The point of this (rather lengthy) discussion is to show that, even though AMSAT is a non-profit organization, it still produces products that consumers consume. Likewise, its customers have choices about where they obtain those products, and if they are unsatisfied with the services offered by AMSAT, just like every other consumer, they can refuse to participate in the sale (refrain from paying their dues) or go elsewhere for what they need. Moreover, it logically follows that the findings of the large bulk of past research on the subject of customer satisfaction *is* relevant to AMSAT and the current research, and therefore worthy of review.

Theoretical Background

The Meaning of Satisfaction

First, finding a clear definition as to what constitutes satisfaction yielded a number of different concepts. Linder-Pelz (1980) says that satisfaction is defined primarily as an affective (i.e. that it influences) response to a specific consumptive experience. On the other hand, Caddotte (et al) (1977) found that satisfaction is more of an emotional response to external stimuli in the acquisition of need fulfillment. Thus, it becomes immediately quite clear that the concept of satisfaction is not as simple as it first appears, exhibiting both complex (and very human) emotional and behavioral dimensions.

Further, Churchill and Surprenant (1982) add a time dimension to the concept by noting that satisfaction is a conscious evaluation or judgment that a product or service has performed poorly or relatively well by linking processes that culminate in purchase and consumption with post-purchase phenomena such as attitude change and repeat purchases. Thus, it appears that satisfaction is both an attitude and an emotion that occurs *over time*. In much the same way, Hayes (1992) looks at satisfaction as one or more *critical incidents*, that is, specific examples that a customer experiences that help describe (in the customer's mind) either a positive or negative impression of the product or service, and, in a larger sense, the

provider of that product or service. Steven Taylor's (1994) research into the concept of consumer satisfaction found that it is best described as a moderating influence to the service-quality-purchase intention relationship. That is, Taylor found that satisfaction plays an interactive, but still only moderating, impact on decisions to purchase goods and services.

Oliver's research (1977,1980) found that early studies on satisfaction cited little empirical evidence in the product performance area to support a seemingly obvious conclusion that satisfaction increases as the performance/expectation ratio increases. That is, as something meets or exceeds someone's expectations of how it *should* perform, satisfaction should increase. Oliver's subsequent extensive research into this particular area of the satisfaction concept showed that customers do, indeed, acquire cognitive (conscious) expectations of the most probable level of product performance, usually before the acquisition of the item or service. The extent to which these expectations are met (or not met) determines the perceived level of satisfaction with that product. One's expectations will be negatively disconfirmed if the product performs more poorly than expected, confirmed if it performs as expected, and positively disconfirmed if it performs better than expectations. Put another way, product performance is a *perception* in the mind of the customer and becomes a function of what the customer *expects* it to be. The amount those perceptions (good or bad) are later confirmed (or not confirmed) by actual use or experience with the product greatly impact the consumer's overall satisfaction with it. Thus, Oliver's research added yet another angle...expectations...to the concept of satisfaction.

Oliver's (1980) later work also documented a flurry of related laboratory research, including that of Anderson (1973), Cohen and Goldberg (1970); Olshavsky and Miller (1972); Olson and Dover (1976) and Woodside (1972), as well as a number of other longitudinal surveys in the field, all suggesting that the satisfaction decision is a *very* complex one. But, almost without exception, his early research, as well as later research by himself and others, tended to confirm the idea that satisfaction is a function of an initial standard and some perceived discrepancy from the initial reference point.

Research by Bone (1995) noted that there is yet another aspect of the confirmation/disconfirmation experience relating to the influences "word-of-mouth" effects have on these judgments. Bone found that word-of-mouth activity influences both short-term and long term product judgments. Specifically, her research found that this influence is greater when a consumer faces a disconfirmation (surprise) experience with a product and also when the word-of-mouth information is coming from a perceived expert. Interestingly,

personal characteristics, such as the person's susceptibility to interpersonal influence, did not appear to moderate this effect. Thus, according to Bone, the perception of the satisfaction or dissatisfaction (and in particular "dissatisfaction") of a product or service can be influenced not only by what the customer expects it to be, but by what *other* people also have to say about it to the customer.

Helson (1959) defined satisfaction as an adaptive process whereby one's satisfaction with a product or service is based initially on the product itself, including one's prior experiences, brand connotations and symbolic elements. Another element of Helson's concept is based on the context of the transactions taking place surrounding the acquisition of the good or service, including the content of communications from sales people and social referents. Finally, Helson indicated that satisfaction is also dependent on the individual characteristics of the people being satisfied, including their persuadability and susceptibility to perceptual distortion. Helson's research, which surveyed participants in the National Flu Shot program, tends to confirm Oliver's ideas because he found that post-decision deviations from an expected satisfaction are thought to be caused by the degree to which the product exceeds, meets, or falls short of one's expectations. Much like Oliver, Helson points out that satisfaction can be seen as an additive combination of the expectation level and the resulting disconfirmation of those expectations.

Richins and Bloch's (1991) research into still another area in the concept of satisfaction with a product or service suggests that the amount of product involvement a consumer has with it also becomes a factor. *Product involvement* is defined by Richins and Bloch as the amount of interest or attention a consumer directs toward the product. While doing research into the satisfaction new car owners had with their automobiles over time, they found that consumers with high product involvement showed slightly greater satisfaction with their autos than low involvement customers over the entire term of ownership. However, they also found that high product involvement customers showed a *decline* in satisfaction with their new purchase in the two month period immediately following their purchases, whereas low involvement consumer's satisfaction actually *increased* during this period. Thus, product involvement also appears to be included as yet another element that makes up the concept of customer satisfaction.

Adding still another dimension to satisfaction, this one involving both the timeliness of service *and* customer perceptions, comes from research performed by Shirley Taylor (1994) who studied consumer reactions to delays in service in the airline industry. She found

that the degree to which the service provider (in this case the airline) is perceived to have control over the causes of the delay, and the degree to which the customer's time is productively filled while waiting for service to resume, indirectly affected overall customer evaluations regarding the quality of service. Her research suggested that the greater the degree of control a provider is perceived to have in avoiding service delays, the less satisfied customers are when such delays occur. Thus, perceptions of how much control service providers have over service shortfalls also appears to affect customer's overall feelings of satisfaction.

Keaveny 's (1995) research along a similar path also investigated the impact the amount of control a service provider has over customer situations. During her study into the main factors why customers switch service providers in the service industry, she found that the main causes of switching behavior include price, customer inconvenience, failure of the organizations main (core) service capability, and unsatisfactory encounters between service personnel and customers. Keaveny found that an organization's response to failures in providing services when they occur, competition, ethical problems, and a wealth of other, less critical reasons also had an impact on customer's reasons for switching. The principal findings of her research suggested that, of all the reasons subjects participating in her research cited most often for switching their service providers, all but one (competition) were controllable by the organization's own management!

Measuring Customer Satisfaction

Hayes (1992) has researched and built some practical information on how to construct and administer customer satisfaction surveys. Based on his work as a consultant to organizations looking for assistance in customer service satisfaction assessments, he makes the point that the objective of such measurement should be toward the goal of learning how well the business processes are working in the organization, how and where to make changes to create improvements, as well as to determine if changes made actually led to improvements. He looks at customer satisfaction measurement as an ongoing *process*, rather than an event.

Hayes' work suggests that measurement instruments need to be made up of two broad components, what he calls the "hard" and "soft" dimensions. Measuring the hard dimension might include measuring the amount of rework that is needed on a repair task, or measuring the amount of scrap that is produced in a manufacturing process. Another example of a hard

measure would be the time required to compete various activities. But, according to Hayes, measuring an organization's overall effectiveness in the marketplace cannot be done simply by looking at the hard measures alone. Hayes found that measuring the other side of the equation, the soft dimension, was far more difficult to do, because it includes such imprecise attributes as human perceptions and attitudes of employees and customers. Hayes concluded that the soft dimensions of customer satisfaction can be far more important than the hard ones. He cited criteria used in selecting awardees for the annual Malcom Baldrige award by the US Commerce Department, noting that they are heavily weighted toward customer satisfaction rather than the hard measurements of rework, scrap and the time to complete activities.

Hayes also found that the most common problems associated with customer satisfaction surveys is that they are either unreliable or are simply not valid. Hayes has found that reliability can best be maintained if measurements are free from random errors, and true underlying perceptions of quality or satisfaction are accurately reflected in the scoring. He calls reliability problems "errors of measurement" problems and usually stem from internal inconsistencies within survey instruments. Hayes has also encountered problems with the validity of survey instruments. He defined validity as the degree to which the scale of the measurement device actually measures what it is supposed to measure.

Hayes also noted that the best way to insure validity is to include a set of items that *best* represent the domain universe. In the case of customer satisfaction with a service received, asking a customer's agreement with a statement like, "I am happy with the service received," would be a valid item to include. However, asking the customer to agree or disagree with a statement like, "I am happy with the product," would be a valid one to measure *product* satisfaction, not service satisfaction!

Prasur, Zeithaml and Berry (1990) note that service quality should be measured on the basis of several dimensions, the most important of which are: tangibles, reliability, responsiveness, assurance and empathy. Kennedy and Young (1989) expanded on those ideas to suggest that customer satisfaction in provider/customer relationships can be determined by measuring the degree to which the customer can contact the provider (availability); the degree to which the provider reacts promptly to the customer (responsiveness); the degree to which the job is accomplished within the customer's stated time frame (timeliness); the degree to which the total job is finished (completeness); and the

degree to which the provider uses suitable professional behavior and manners while working with the customer (pleasantness of support).

Kennedy and Young then suggested a series of questionnaire statements and responses relating to each topic that could be used to measure each dimension, such as, "I can get help when I need it," or "The staff is always available to help me," or "The staff was always available when I needed them," for measuring availability. Likewise, responsiveness could be gauged by statements such as, "They were quick to respond when I asked for help," or "They immediately helped me when I needed it." Timeliness can be measured by seeking responses to statements like, "They completed the job when I expected," or, "They met my deadline."

Kennedy and Young found that statements like, "They insured every aspect of the job was completed," or, "They said what they would do and then they did it," as statements to use when looking for measurement of feelings of completeness. Finally, Kennedy and Young found that pleasantness of support could be measured using statements such as, "They conducted themselves professionally," or, "They were very courteous to me."

For overall customer satisfaction they found that using such statements as, "The quality of the final product is high," for a product survey, or "The job met my expectations," for a service-oriented analysis were most applicable. Thus, Kennedy and Young's thoughts largely echo those of Oliver, because, according to them, satisfaction *does* appear to include a "meeting expectations" component. They also noted that having the customer agree or disagree with statements involving a customer's *feelings* toward a specific customer service experience helps the customer remember not only exactly what happened (the content of the transaction), but also how the customer *felt* about what happened. According to Kennedy and Young, *both* dimensions are very important parts to consider when measuring satisfaction.

Bell and Zemke (1992) offer far more practical (and blunt) advice. They sum up customer satisfaction in a series of simple statements such as, "...good service is whatever the customer says it is..." and "...good enough usually isn't..." Their thoughts, again, appear to echo Oliver's research and experiences when they say that today's customer's expectations keep changing nearly every day, and much faster than any product ever could. They go on to comment that customer loyalty in today's marketplace is difficult to win and easily squandered. They also noted that today's customers have come to expect instant gratification,

that listening is a "contact sport" and that the value, *not* the price, of goods and services has become the major issue in today's marketplace.

Bell and Zemke also pointed out that when a customer suggests ways that a business could do more for them, the instinctive response from employees usually is to think how much more work will be required to do what the customer asks. They suggest a way around this natural tendency is for employees to start listening to *themselves* being their own customers. They pointed out that a complaining customer should be viewed as a provider's "best friend" rather than an inconvenience.

Expanding on this central theme, Bell and Zemke noted that customers who take the time to bring their problems to a provider or offer advice on how that provider can get better at meeting their needs are customers who also believe the provider cares enough to act on their complaints, not just feel good about their compliments. They indicated that the average business only receives complaints from about 4% of their unhappy customers (or only about 4 out of 100) with the rest of the unhappy customer base suffering in silence. These are unhappy customers who would, in their words, "rather switch than fight." Put another way, when this occurs, Bell and Zemke say that, "no news is definitely *not* good news" for the business.

Bly (1993) examined the effect modern technology is having on customer service by noting that while such technology may have its benefits, it has speeded up the pace at which our society moves. According to Bly, voice mail, modems, on-line data bases, fax machines, electronic bulletin boards and the accessibility of overnight delivery services have all conspired to create a customer who, "...wants it now, if not yesterday." That is, according to Bly, as with Bell and Zemke, today's customers have come to expect instant gratification, and that customer loyalty is a thing of the past. On the other hand, Bly notes that customers today are demanding more services without also paying more.

Bly's thoughts support many of the same concepts as others when he found that serving clients successfully requires providing a product or service that meets a client's needs rather than simply offering them what's in stock. He further noted that the best way to find out about client's needs is to *ask* them! His research found that customers are more impressed when a business or organization takes the time to ask its clients about their needs *first* rather than trying to sell them something. Bly's thoughts leads one to conclude that a

customer satisfaction questionnaire should also be viewed as a sales tool rather than just a diagnostic instrument.

Customer Dissatisfaction

Research by Cannie and Caplin (1991) into the leading causes of customer dissatisfaction listed a number of reasons that customers become dissatisfied with the services some organizations provide. Their research found that among the top dissatisfiers were such things as companies whose workforce was overly specialized, or where there was seemingly no coordination of the customer servicing process. Decision-making that was remote from customers and arbitrary (sub-optimized) service policies, where the primary priority of the organization was cost containment, delivered by indifferent, unmotivated, powerless employees also topped their list. To these top dissatisfiers, Cannie and Caplin often found that not enough creative problem solving is done in today's organizations and that front-line people are usually powerless to solve most customer's problems. They rounded out their listing by noting that the customer service and complaint departments of some companies were one and the same, and that frequently, companies promise *far* more to their customers than they can possibly deliver.

To remedy these problems, Cannie and Caplin proposed that companies should always include feedback devices somewhere in the delivery system for the goods or services that a company provides. To this, they suggested customers be given some kind of incentive to provide their feedback. For example, free computer software (if the company deals in such products) might be a way to encourage customers to respond with their comments. In designing these feedback tools, Cannie and Caplin found that the most successful organizations always kept the mission of the organization clearly in mind, particularly as it related to what the function the organization was trying to provide, who their customers were at that moment, and who they (the organization) would have liked for their customers to be.

Cannie and Caplin found that the organizations most successful at using these techniques were also using open-ended questioning techniques to learn what people think are the most important customer issues. The results of their work also suggest that sometimes customer's comments about a supplier are more candid when talking to others than when they are talking to the supplier. This concept supports Bell and Zemke's (1992) analysis that only about 4% of dissatisfied customers actually complain to a provider when they are unsatisfied.

Cannie and Caplin's experiences and research reiterate the theme that customers will not necessarily tell a service or product provider how they feel (good or bad) with the service or products offered. Rather, their experience has shown that it remains the responsibility of the product or service provider to learn what its customer's needs are and to find out what satisfaction means to *each* customer.

This Project and Satisfaction

As the research for this AMSAT Internet services project was to be done via computer, the possibility that the administration method of the survey instrument (computer versus paper-and-pencil) might bias the results was an obvious concern. Extensive research by King (1995) into this issue has been done to determine whether the administration mode (paper and pencil versus computer) of surveys causes measurement inequivalence.

King's work cited previous work by Lautenschlager (1990), who in turn cited other work by Bradburn and Sudman (1979), Nederhof (1984), and Wiseman (1972), suggesting that observed levels of socially desirable ("stretching of the truth" in an effort to make a good impression) behavior varies as the anonymity level of the responses varies. That is, greater levels of perceived anonymity tends to yield *less* socially desirable (truth stretching) in responses. Lautenschlager's findings, however, ran counter to a widely held belief that because computer administration of questionnaires gives more anonymity, surveys completed in this way *automatically* bring about more truthful responses.

Citing Lautenschlager's results, King, too, challenged the conventional wisdom that administration of sensitive questions via computer always yields more accurate results than those instruments administered by way of paper-and-pencil due to greater anonymity. And, like Lautenschlager, King found that comparisons between computer and paper-and-pencil modes of administration tended to yield similarly accurate results. However, he still cautions that much work remains to be done in this area and that the equivalence of paper-and-pencil versus computerized test administration should be demonstrated rather than merely assumed.

While the intent of this research was also to provide AMSAT's first real attempt at formally gathering customer comments regarding its Internet products and services, AMSAT is *not* the first organization to use the Internet to distribute its services, nor the first organization to use that emerging medium for feedback on the services it provides. In fact, a quick search of the World Wide Web indicates that there are several organizations that are

now marketing themselves on the Internet to assist organizations like AMSAT with these efforts. Some of this information, also gathered on-line, describes today's "connected" customer as quite different from those normally encountered in the rest of the business world. Gulledge (1995) says that in today's electronic marketplace, customers are no longer uninformed, and blindly loyal. Rather, they are, in his words, "...educated, sophisticated, turned on and tuned in..." Gulledge goes on to note that customers also understand the potency of customer satisfaction because nearly every time they spend money, they are, as he puts it, "...queried, quizzed, questioned or surveyed about their level of contentment with the product, the producer, the service, the server, the price, (and) the value..." He also concluded that today's customer knows that product providers have to outperform their competition, and that savvy providers should never forget that customers can--and often will--take their business elsewhere if all is not right.

John Sumser (1996) echoed Gulledge's thoughts in his evaluation of the effectiveness of World Wide Web pages on the Internet. Sumser found that measuring customer satisfaction on the Internet using traditional marketing and survey methods often doesn't work because the questions used aren't valid for that environment. For example, citing his professional experience helping people market their goods and services via the Internet, he noted that the age-old axiom of providers simply "doing things right" isn't enough to attract and keep electronic customers. Rather, he suggested measuring the time electronic visitors actually use a Web site (the more time spent in the site, the better) and measuring the number of transactions (movements from one screen to the next) that customers complete while they are in the site are *far* better indicators of satisfaction. He concluded that measuring the number of contacts and links that a particular Web site attracts from others elsewhere on the Web network are also better indicators of customer satisfaction in the Internet environment than are most traditional measures.

Review of Other Studies

Unfortunately, to the best of this researcher's knowledge, and as stated previously, no serious formal studies have yet been performed to assess the satisfaction of AMSAT's customers with its Internet products or services. What's more, little or no formal written AMSAT policy guidance exist to direct these Internet on-line activities. In a recent discussion-type interview with Dr. Thomas Clark (1996), President Emeritus of AMSAT-NA and a current member of the Board of Directors, he remarked that the original concept for what is today's AMSAT Internet bulletin services and World Wide Web site grew out of the

need for AMSAT to communicate among its senior officers in the late 1970s and early 1980s. During this period, there was also a need to look for quicker ways to disseminate time-sensitive satellite orbital position data, in electronic format, from the National Aeronautics and Space Administration (NASA) to AMSAT's worldwide membership.

Clark related that, during the late 1970s when the personal computer was still in its infancy, AMSAT-NA was already a "virtual" corporation, as both its Board of Directors and Officers were scattered throughout the United States and needed a way to inexpensively communicate to do the corporation's business. In the past, AMSAT's elected officers have lived in a variety of countries. Also, since its inception as a non-profit corporation in 1969, AMSAT-NA has maintained an office in the Washington, DC suburb of Silver Spring, Maryland where its single, full-time employee handles membership duties and other administrative matters. The remainder of its officers and Board members have always resided elsewhere (Clark, 1996).

For example, currently, the AMSAT-NA President resides in Texas, the Vice President (this researcher) lives in Ohio, and the Chief Engineer resides in Florida. While most AMSAT-NA Board members reside in the United States, one currently resides in Brazil. In the past, Board members have resided in the USA, England and Japan. Thus, facilitating communications among Board members and other AMSAT leaders without incurring enormous communication charges has always been a high priority for the corporation.

In the late 1970s, Clark noted that the organization's first attempts at electronic connectivity were done with a text-based service called Telemail. Similar to Western Union telegraphic services, it proved cheaper than using the telephone, and faster than the postal system. However, it was still slow and inefficient. With the advent of the personal computer, and with the birth of other, more up-to-date on-line services such as CompuServe in the early to mid 1980s, Clark noted that AMSAT's business soon shifted to the use of these services to operate the far-flung corporation (Clark, 1996).

In addition, and as I have related to the many thousands of readers in my own published work by AMSAT called *How to Use the Amateur Radio Satellites* (Baker, 1995), one of the essential requirements for active Amateur Radio Satellite operators is to quickly find a reliable source for orbital tracking data known as Keplerian Elements. These are numerical data issued weekly by NASA that show the latest orbital motion of AMSAT's

satellite fleet. As satellite orbits decay over time, this data is *very* time sensitive. Finding a quick and reliable source for disseminating this information to AMSAT members has, according to Clark, always been another high AMSAT priority.

Clark went on to note that when Amateur Radio operators began to set up and use their own worldwide over-the-air packet (digital) radio networks (similar in form and function to today's wired Internet services) in the early 1980s, AMSAT soon capitalized on this achievement. Selected AMSAT members were designated to receive the weekly news and orbital bulletins from AMSAT Headquarters by way of their own CompuServe accounts, and then reload the information onto the Amateur Radio packet network for further dissemination to the membership. Clark notes this technique is still used extensively by AMSAT as a means to pass operational satellite information to its many members and others who have yet to get their own Internet access capability (Clark, 1996).

So, in the late 1980s, Clark set up AMSAT's very first bulletin board system using his own personal computer and connected it to the (then fledgling) Internet via a computer node at his place of employment, which just happened to be the Goddard Space Flight Center of NASA, from which all NASA Keplerian data are disseminated. Called TOMCAT (an acronym for "Tom Clark's AT"), this text-only bulletin board and electronic mail system served AMSAT's growing membership and officer corps very well for many years until the whole operation was moved onto an AMSAT-owned Sun workstation located at the University of California, San Diego (UCSD), in 1992.

Since that time, Clark noted that the AMSAT Internet system hardware and software have been skillfully maintained and upgraded using a combination of AMSAT-owned as well as donated corporate and university resources. Today, AMSAT's Internet bulletin service and Web site is hosted on a PC-based BSDI Unix computer, also located at UCSD. The current AMSAT System Administrator, himself an AMSAT member and appointed AMSAT Officer, donates many hours of his personal time administering to the electronic needs of the over 4000 AMSAT members (and uncounted others) who regularly use AMSAT's Internet products and services (Clark, 1996).

Today, a wealth of AMSAT brochures and publications, as well as others published by the American Radio Relay League (ARRL) relating to the Amateur Radio space program (Davidoff 1990),(Rosenoy 1996) cite the AMSAT Bulletins and the AMSAT World Wide Web site as excellent sources for orbital and other information.

But, as noted earlier, very little previous survey work has been done by AMSAT to assess the feelings of its far-flung membership, let alone to study their satisfaction with AMSAT's Internet offerings. Soifer (1996), building on some preliminary work by this researcher and others, recently completed some published research to derive a preliminary estimate of the size of the worldwide Amateur Radio Satellite enthusiast population. Soifer estimated that there are about 18,500 Amateur Radio operators worldwide who now participate in the Amateur Satellite Service in one way or another. He also estimates about 16,000 of the 18,500 also belong to an AMSAT organization somewhere in the world.

In his paper, Soifer went on to note that only about half of these 18,500 enthusiasts actually operate on the current fleet of Amateur Radio Satellites now in orbit at least once per month. Soifer based his research on responses from a recent AMSAT-NA mail survey that queried some 800 of its 7500 member population (with about a 30 percent return rate) and then extrapolated them, using various inputs from the other AMSAT organizations throughout the world, to build a rough estimate of AMSAT's worldwide user base. The technique he used to draw these conclusions was, by his own admission, anything but scientific. Nevertheless, these figures comprise the very first attempt by AMSAT to gauge the size of its satellite user and membership base throughout the world.

Summary

After an extensive review of the literature, it appears that the concept of customer satisfaction is, at best, a concept that is uniquely individual. It apparently has an expectation and confirmation (or disconfirmation) component that needs to be considered and measured. Satisfaction appears to be both an attitude and an emotion that can be influenced by what others say, and also appears to be an ongoing process vice a one-time event. Satisfaction with a product or service can also be influenced by any number of factors including how much we are involved with the product or service, to how much control we think the provider has over things that go wrong in the process of providing the product or service to us.

All of these classical components of satisfaction are now being challenged, or, in some cases, totally re-written, with the advent of ever-expanding technology. Today's consumer is increasingly "plugged-in" and "turned on". He or she is used to being quizzed and queried, questioned or surveyed about every facet of the provider-customer relationship, and is becoming increasingly more vocal when things don't go right.

Today's consumer is also demanding (and getting) instant gratification, and the concept of customer loyalty is becoming a thing of the past. What's more, customers are becoming increasingly less tolerant of providers who do not put the customer first. Lame excuses offered by providers for lousy service due to internal company policies that seem designed to better serve the provider vice the customer simply don't wash with today's consumer. As a result, consumers are voting ever more frequently "with their feet" by taking their business elsewhere.

AMSAT has been on the cutting edge in electronic communication technology development since its incorporation in 1961. It was one of the very first organizations to use the emerging Internet as a tool to distribute its products, besides also using the Internet to actually help run the corporation. However, little work has been done to date to assess the satisfaction of its customer base with these products and services. Only recently has AMSAT begun to express interest in researching its potential customer base, now conservatively estimated at some 18,500 satellite enthusiasts worldwide, with about 16,000 of those comprising the worldwide AMSAT membership.

Thus, with the concepts of satisfaction that have been investigated before clearly in mind, this researcher applied most or all of these "lessons learned" and embarked on the first-ever formal measurement of AMSAT member's satisfaction with its selected Internet products and services. It is hoped that this research will provide the starting point for future analysis to help AMSAT's leaders better prepare the corporation for the inevitable challenges they will face as the organization prepares to move into the 21st century.

Chapter III: Methodology

Introduction

This research took the form of a program evaluation and analysis. It relied almost exclusively on questions posed via a questionnaire electronically placed on AMSAT's Internet World Wide Web site "Home Page" asking those who wished to participate about their perceived satisfaction with selected Internet services currently offered by AMSAT. Specifically, using predominantly five point (1 to 5) Likert-type rating scales, and a place for written comments, survey participants were asked their level of agreement or disagreement with statements regarding their attitudes, expectations and the usefulness of AMSAT's' Web site and bulletin services. Once the surveys were completed, they were electronically "mailed" to the AMSAT Web site Administrator where they were held until all surveys were completed. Once that occurred, the data was transferred to this researcher (also electronically) and then entered into a computer spreadsheet for further analysis. It was from this data that findings, conclusions and recommendations were made and incorporated into this final report.

Methodology

The Overall Plan

As stated previously, the overall plan of this research was fulfilled by an electronic questionnaire placed on AMSAT's World Wide Web site on the Internet. For some statements on the questionnaire, respondents were asked how much they either agreed or disagreed with the statements presented by clicking on the response (category) on the electronic survey form that best represented their feelings. If they strongly agreed with the statement made, they were asked to click their computer "mouse" on a *high* number. If they strongly disagreed with the statement, they were asked to use their mouse to click on a *low* number. The rating scale respondents were asked to use for these questions was as follows:

STRONGLY DISAGREE	Click on response 1
DISAGREE	Click on response 2
NEITHER AGREE NOR DISAGREE	Click on response 3
AGREE	Click on response 4
STRONGLY AGREE	Click on response 5

Other questions encouraged respondents to voice their feelings about the amount of particular attributes of AMSAT's current Internet offerings using a "too little/ about right/too much" scale for the items in question. For example, respondents who believed there is currently too little of the item in question were asked to click their computer mouse on response number 1. If they believed the amount of the item was about right, they were asked to click on response number 2. If they believed there is too much of the item, they were asked to click on response number 3. Straight demographic (yes/no) questions were also included as well as some other questions dealing with respondent's computer hardware capabilities. The draft survey questionnaire is shown in Appendix 1, and a copy of the questionnaire as it finally appeared on AMSAT's Web Site is shown in Appendix 2.

Survey responses were tallied, sorted, and arranged, primarily in a tabular format, to aid analysis and evaluation of the survey data. This approach also provided support for subsequent conclusions and recommendations to the AMSAT Board of Directors.

Once the raw data was arranged in tabular format with the aid of automated computer tools, quantitative techniques were then applied to the data to provide statistical validity to the interpretation of questionnaire results, using such commonly used concepts as displaying the number (frequency) of responses given in each category, as well as the proportion of each response given as compared to the total for all responses received for that particular question or statement. The mean and median "score" of responses for each appropriate question were derived and are shown via a series of tables. The frequency and proportion of responses that were missing (respondent did not answer) were also shown. From this analysis, trends in the data were explored and further analyzed where appropriate and significant. Tables derived from the raw survey data, are shown in the Data Analysis portion (Chapter IV) of this report and will be discussed in detail during that part of the analysis.

Similarly, demographic data gathered from the survey was used to sort responses between various groups for further comparison and analysis. A comparison of selected responses given by AMSAT members versus non-AMSAT members was performed. While considered, cause-effect relationships, such as using a respondent's modem speed status as a basis for comparing negative responses regarding graphic content, were not explored due to the apparent overwhelming satisfaction shown by survey respondents with the current balance between graphics and text on the Web site. Tables showing comparisons between AMSAT members and non-members are also shown in the Data Analysis chapter of this report.

Non-quantitative approaches, including the interpretation and analysis of respondent's additional (written) comments to survey questions and other concerns about these services were also employed. Suggested improvements to AMSAT's Internet services were selected and then subjectively categorized and summarized. This information is shown in Table 20, again in the Data Analysis chapter of this report.

Population Definition

Gauging the size of the population that might answer such a survey conducted via a fairly popular Web site on the Internet was very difficult to predict. It was assumed that survey participants would be drawn from an initial, potential audience (population) of some 18,500 satellite enthusiasts, based on Soifer's estimates. Using those estimates it was believed that some 16,000 of those individuals were current AMSAT members at the time of the survey. Furthermore, it was also believed that an unknown, but presumably large number of these individuals *did not* have Internet access. The only population information this researcher could ascertain with any certainty was that some 4000 individuals and organizations were currently registered in AMSAT's Internet database as users of one or more of AMSAT's Internet services at the time of the survey.

What's more, gauging the size of the AMSAT member and nonmember Web site audience, and hence the possible number of responses to a survey placed there, was even harder to do. Until the completion of this survey, little was known about AMSAT's Web page user base, other than the knowledge that it got about 200 "hits" (electronic visits from individuals) per day. The demographics of these visitors were largely a mystery until this survey was conducted.

So, a final estimate of the population for this survey consisted of a group of between 4000 and 18,500 satellite enthusiasts worldwide plus an unknown number of other potential respondents using only AMSAT's World Wide Web site. The sample size was further reduced by those who attempted to take the survey but were found to be under 18 years of age.

Data Collection

The initial questionnaire in Appendix 1 was transcribed and electronically placed in a publicly accessible area via AMSAT's World Wide Web site "home" page for a 13 day period from February 28th to March 12, 1997. Slight modifications in content and form were made to the initial paper-and-pencil survey instrument to better adapt it to the electronic medium used. These modifications also included adding various color-graphic boxes, "push buttons" for response choices, as well as the AMSAT corporate logo where applicable.

Notices in the form of a banner headline inviting visitors to participate were also prominently placed on the first page viewed by AMSAT Web site visitors. In addition, during the survey period, an electronic bulletin noting the ongoing survey was sent from this researcher to all recipients of AMSAT's bulletin services. These announcements invited those interested in participating in the survey to visit the AMSAT Web Page to electronically complete a survey questionnaire.

Participants were self-selected. Those participants wishing to take part in the survey did so by first directing their own on-line Internet providers to electronically connect them to AMSAT-NA's Web site on the Internet. Then, using their computer mouse pointers to click on various icons specifically placed on AMSAT's home page at the site, they were electronically directed to the survey area.

Participants were then informed, by on-screen instructions for the questionnaire, that their participation in the survey was voluntary, that there was no compensation for them by doing so, and that there were no known risks. They were also informed that their identities, including their individual Internet addresses, would not be included or connected in any way with their responses. Additionally, they were asked to complete the survey only *once*. Their viewing of these instructions, and the subsequent completion of the survey instrument by participants, served as their informed consent.

Minors (those under 18 years of age) were *not* allowed to participate in the survey. An age check certification statement was also prominently placed in the questionnaire's initial instructions. Clicking on a "no" response to the statement, "Yes, I am at least 18 years old" immediately returned a minor who so stated that fact back to the Home Page on the Web site. Once doing so, they were not even allowed to view the remainder of the questionnaire.

Next, participants who qualified were asked to fill out the electronically displayed survey instrument, again by clicking their computer pointers on various Icons and boxes contained in the blank survey form. In that sense, the computer screen become their "piece of paper" containing the survey, and each participant's mouse pointer became their electronic "pencil", filling in the boxes containing their responses.

Once completed, each participant "sent" their completed survey to a special electronic holding area that was set up by the AMSAT System Administrator on the Web page. Sending responses for tabulation to this researcher was accomplished by participants clicking their mouse pointers on a specified box on their computer screens. Completed surveys were electronically gathered and bundled for forwarding (also electronically) to this researcher after completion of the survey period. A combination of paper-and-pencil as well as automated tools were employed to further refine, sort and analyze the data.

As suspected, collecting data via the Internet presented both unique challenges as well as unique advantages and opportunities. Once the survey instrument was opened for completion it became a virtual "hands off" operation. In fact, during most of the data gathering period, this researcher was traveling on corporate business in another state, far away geographically from his normal place of work, and, thus, not directly involved in the data gathering process. He was, however, kept informed of the survey's progress by an ongoing tally of the number of surveys completed to date by the AMSAT System Administrator. This was accomplished by electronic mail exchanges back and forth over the Internet.

What's more, as the data stream of responses from completed surveys was already in digital (albeit text) format, data roll-up was *greatly* simplified. Unlike traditional paper-and-pencil surveys, where survey responses must be individually and manually transferred from questionnaire sheets to some form of scatter diagram, the entire data roll-up for this project, consisting of well over 1000 completed surveys, was accomplished in a single afternoon using a computer spreadsheet. It is believed that the overall accuracy of this process was greatly improved over manual scatter diagram methods as well.

On the other hand, because this would be a "hands off" survey via the Internet, and as the primary target audience for this survey were adult, dues-paying AMSAT members, additional demographic checks had to be included in the survey instrument to separate member responses from non-member responses. This was accomplished by the addition of a

demographic section in the questionnaire (Section III) that asked respondents to state their AMSAT membership status. Membership in any AMSAT organization, not just AMSAT-NA, qualified for a "yes" response to this question.

Once the electronic survey instrument was completed and prior to full-scale implementation, a small (8) convenience sample of AMSAT senior officers completed the survey and provided feedback to those conducting this research regarding the clarity of the statements and arrangement of the survey instrument.

Questions 1 through 4 were meant to gather data regarding respondent's satisfaction and expectations about AMSAT's Web site content. Question 5 was designed to gather data on how often each respondent visited the AMSAT Web site. This question was based on Sumser's belief that a good measure of a user's satisfaction with today's electronic Web site offerings can best be gauged by how often a person visits a site. Question 6 was designed to tell whether the amount of technical information contained on the Web site was suitable and meaningful for AMSAT's audience. Question 7 was intended to measure each visitor's feelings about the current balance on AMSAT's Web site between computer graphics and text content.

In Section II of the questionnaire, questions 8 through 13 asked respondents to state their degree of satisfaction with AMSAT's ANS and KEPS bulletins. As not everyone who uses the Web site also subscribes to the bulletins, and vice versa, the questionnaire was designed to quickly direct those who do *not* use either of these services to the demographic data in Section III. Questions in Section II allowed those who only subscribed to a single Bulletin service to so state their status, thus precluding them from responding to questions for bulletins they do not receive. This was accomplished by including a "don't subscribe" option for questions 8 through 11.

This approach was also designed to serve as an internal check during data roll-up. Unfortunately, some respondents appeared to miss (or misinterpret) the "skip to section III" instruction, and checked the "don't subscribe" boxes for all four questions relating to those bulletins in Section II. This activity might have also had an unknown impact on the overall results of the survey, an issue that will be discussed later in the Data Analysis chapter.

Questions 12 and 13 asked for opinions on known irritants with the current ANS and KEPS bulletin sign-up and distribution processes. Inclusion of these questions was specifically requested by the AMSAT leadership in an effort to better gauge the breadth and depth of those suspected concerns.

The questions in Section III were primarily intended to solicit demographic data. Question 14 was intended to help the Web site administrator better understand the electronic equipment capabilities of AMSAT's Internet users. In conjunction with responses generated by Question 7, responses from this question were included to help the AMSAT System Administrator assess user satisfaction with the current balance between graphic and text content on the Web site. Users with slower computer modems often find that graphics take longer to send and download than text, and as such, more graphic content becomes a possible contributing factor to overall user dissatisfaction. Question 15 was designed to be a purely demographic question to help the researcher separate responses from AMSAT members versus those from non-members.

Data Analysis

Statistical And Other Tools Used

Data from returned surveys were first validated for completeness by noting the dates and times of when the surveys were completed. This information was also sent to this researcher from the AMSAT Web site Administrator. Then, the data stream, which consisted of a single line of numeric output from each validated questionnaire, was loaded into a computer spreadsheet (Microsoft EXCEL) and arranged, primarily in multiple tabular fashion, showing each question and various totals of the frequency of responses given by participants for each possible answer to each question. Cross checks and manual trial balance totals were obtained to verify the spreadsheet's various formulas and logic. Additionally, two other spreadsheets were also constructed from the raw survey data. The first consisted of responses to all questions by AMSAT members, as well as another consisting of responses by non-AMSAT members. This "cut" of the data was based on respondent's answers to Question 15 in the survey.

The data was then submitted to further statistical evaluation using such common statistical measures as measures of central tendency (mean, median, frequency of response and proportion-of-the-whole calculations) by response category for each question on the

survey. Sample means and medians were derived using procedures and formulas for group data as suggested by Willis and Chervany (1974). Selected comparisons of survey results based on respondents' AMSAT member status were also employed by creating three sets of 6 tables, plus one additional membership status table (20 total) showing survey results from all respondents, as well as AMSAT members and AMSAT-non-members.

Written comments were also evaluated. Where possible, they were subjectively grouped into "positive" and "negative" categories as well as loosely grouped, again subjectively, and categorized based on the type of responses given. While some cumulative frequencies of similar responses were obtained, these were *not* subjected to the same statistical evaluation techniques as those for the specific questions on the survey questionnaire. However, selected respondent comments from the surveys *were* used as specific examples to support the findings, conclusions and recommendations of this study.

Assumptions

Bell and Zemke make the point that "satisfaction is whatever the customer says it is". In line with this approach, the survey instrument was carefully constructed with this concept firmly in mind. It was assumed to be a valid measurement tool for the information sought in the survey, and for drawing conclusions from the data using whatever statistical measures might be appropriately applied.

The survey was assumed to be valid because it simply asked respondents' agreement or disagreement with statements of personal feelings based on the individual's own perception of AMSAT's Internet offerings as he or she sees it. For example, the survey asked whether or not AMSAT's Internet services met (or failed to meet) *each individual's* expectations, whatever those expectations were. Likewise, respondents were asked to state their agreement or disagreement with simple statements on whether the offerings were useful to them or contained too much or too little of a particular element. Because each response was constructed to deliberately force respondents to state *their own* personal agreement or disagreement with various hypothetical outcomes, it is believed the resulting data reflected *each individual's point of view*, which is precisely the kind of information that was sought in the survey. Conversely, demographic data regarding AMSAT membership asked for a simple "yes" or "no" or a similar categorical response.

In addition, relying on Sumser's and Gullledge's experiences, an attempt has also made to mix more traditional survey questions in with others designed for the unique on-line environment under study. It was assumed that questions relating specifically to the time issue, such as the time respondents spend in the AMSAT Web site and the time it took them to get signed up for bulletins, would be, according to Sumser, better (more valid) measures of satisfaction in the Internet environment. Thus, to help insure validity, respondents were also asked to compare their own personal feelings and perceptions with various hypothetical statements, and to answer some questions designed specifically for the on-line environment.

Limitations of the Project

This study was limited to measuring AMSAT member-user and other respondent's satisfaction with AMSAT's Web site offerings as well as with two of its recurring formal bulletin services. AMSAT's other Internet offerings, such as its infrequent Shuttle Amateur Radio Experiment (SAREX) and NASA bulletin distributions as well as its Internet bulletin board (AMSAT-BB) services, use a free form, user-directed format. That is, users are largely responsible for the content of these postings, and no attempt is made by AMSAT to control the content of items distributed by these other Internet services. Therefore, as the AMSAT-NA leadership has (and will continue to have) little influence over their content, a study of user satisfaction with these other services would be meaningless. Therefore, these services were *not* included in this research.

In addition, no attempt was made to seek or to gather support for proposed changes to AMSAT's current Internet offerings. In addition, no attempt was made to survey non-participants to boost circulation. Rather, it was anticipated that this study would constitute the first step in a (hopefully) ongoing *process* to periodically assess the overall effectiveness of selected AMSAT Internet services in meeting the needs of current member-users.

Therefore, this research approached the selected issues under study from a "what is?" perspective vice a "what should it be?" or "what would you like to see?" perspective. It was anticipated the latter issues might be the subjects of subsequent analysis once the results and written comments from this research were collected and analyzed.

As participants in the survey were self-selected, it was also understood that such an approach introduced an unknown bias to the results. That is, it could be argued that only

those with strong feelings about the on-line services under study (positive or negative) were motivated to participate.

As has been stated previously, much of the motivation to conduct this research by way of the Internet was driven, in part, by the realization that AMSAT's members and other users of these services are scattered, quite literally, around the world. This fact, alone, made interviewing or even administration of a survey instrument by mail impractical, if not impossible, due to the high cost to conduct even minimal surveys of this kind. What's more, as Soifer pointed out in his study, AMSAT's previous experiences with mailed membership surveys produced less than satisfactory results. The AMSAT leadership has since concluded that the value received from conducting surveys by mail has simply not been worth their cost.

Performing the current study by surveying only those users with Internet access to the World Wide Web also limited responses to those who have such capability. However, as the subject of this research was satisfaction with AMSAT-NA's Internet products and services, those members and others without the appropriate access to the Internet will not be users of these services and therefore, should not have been subjects for this study.

There was also some concern that the ease and low cost associated with conducting this analysis by way of the Internet would generate *many* more responses than could be effectively analyzed, given the resources available to perform the analysis and within the time frame allotted to complete the project. Prior to actually conducting the survey, the ultimate volume of valid responses this survey might generate was unknown, given the lack of precise data on AMSAT's Internet user base and the "wide open" nature of the Internet.

For this reason, the volume of initial responses to the survey were carefully monitored by both the researcher and the AMSAT Web site Administrator in an effort to help predict the overall volume of responses that might eventually result from the survey. This periodic feedback on the number of surveys completed during each day of the survey did help the researcher to effectively gauge the time frame the survey should be available for completion. This approach in turn, helped to keep the total volume of completed questionnaires within reason.

Had the number of responses been overwhelming, this researcher was prepared to draw a systematic or random sample of all completed and valid surveys, and then perform analysis on this "sample of the sample" to draw conclusions. While this would have made

the data roll-up much easier to accomplish, it would have also made the analysis far less precise in a number of unknown ways. Fortunately, initial concerns about being overwhelmed with responses were not substantiated. What's more, by the development and use of automated roll-up tools, it now appears that *many* more responses could have been easily handled during the course of this study without also sacrificing data integrity, or by adding an unreasonable amount of time to the data analysis phase of the project.

As respondents were self-selected to complete the survey instrument via the Internet, controls to insure that qualified participants completed only a *single* survey instrument were difficult, if not impossible to put in place. The possibility of the same respondent completing multiple surveys existed throughout the survey. However, to help prevent this from happening, potential respondents were strongly cautioned in the survey instructions *not* to complete more than one survey instrument, noting that to do so would bias the results of the survey. In addition, those individuals likely to exhibit this behavior (for example, those with strong feelings about one or more of the subjects in the survey) were asked to express their comments verbally at the end of the questionnaire. A special area was set up for them to do so in the survey instrument, and over 300 written comments were gathered via the survey in this way.

Finally, as no attempt was made to administer this survey more than once, a corresponding test of reliability of the survey instrument was also *not* conducted as part of this project. The survey instrument was simply assumed to be valid. Therefore, users of this report are cautioned that the findings conclusions and recommendations based on the results obtained from this survey should be viewed with a certain amount of skepticism. What's more, AMSAT's decision makers should implement the recommendations resulting from this study with extreme caution, as no guarantees or assurances about the stability of the results obtained from the survey instrument over time can be made.

Summary

Overall, despite this researcher's lack of previous experience in data gathering for a study of this size and complexity, along with the "newness" of the medium used, the data gathering portion of this project was accomplished quite smoothly. The development and implementation of automated tools that would later be used in the data analysis helped to minimize fears on the part of those doing this research that an overwhelming number of responses would make analysis of the data difficult and/or force the use of far less precise

"sample of a sample" routines for data analysis. In fact, as these automated data gathering and analysis tools have now been developed, they can also be made available for additional AMSAT research projects in the future.

Chapter IV: Data Analysis

Introduction

From an analysis of the survey data and written comments, 20 tables of information were developed to assist in displaying the results of this study. Information derived from these presentations clearly show that both AMSAT members and non-AMSAT members are well satisfied with AMSAT's current Internet products and services. However, as with any endeavor, the survey responses showed that there is still room for improvement to AMSAT's Internet offerings.

Discussion of Findings

Overall, 1125 valid surveys were returned and were included in this analysis. This total does not include the 8 "dry run" surveys that were completed by selected AMSAT officers prior to the release of the survey instrument to the public. However, as data from these 8 surveys were also included in the data stream of all returned surveys, for purposes of reporting, these 8 were considered "withdrawals". For that reason, their inputs *did not* become a part of the final analysis, conclusions, nor this researcher's final recommendations.

The results from the roll-up of the returned surveys are presented in tabular format in Tables 1 through 20 that follow. Note, again, that the tables appear in groups of three. That is, there are respective tables for each question area containing data and analysis from the entire 1125 respondent base. These are immediately followed by tables showing data and analysis for just the 583 respondents who also considered themselves AMSAT members (based on a "yes" response to survey question 15). Likewise, these tables are followed by data and analysis based on the remaining 542 others who considered themselves to be AMSAT non-members, determined by their "no" (or missing) response to survey question 15.

Overall, it appears that respondents are well satisfied with AMSAT's Internet products and services. However, there were some surprises as a result of this survey, along with a number of areas for possible improvement that were cited by respondents. These suggestions appeared through analysis of answers to specific satisfaction questions, as well as by an analysis of written comments.

In the following discussions, while mention and comparisons are made among all respondents (AMSAT members and non-members alike) it must again be emphasized that these discussions only relate to those members and others *who actually answered the survey!* As noted previously, due to the "single data point" nature of this survey project, attempts to draw inferences about the entire population of AMSAT members versus non-members should be done with extreme caution, and only after careful consideration of the possible consequences of "fixing something that might not really be broken".

Both members and non-members who answered the survey appeared to find AMSAT's World Wide Web and File Transfer Protocol (FTP) services relevant, helpful, useful, and meeting their expectations. This is shown in the analysis of the information contained in Tables 1, 2 and 3 by the overwhelmingly positive answers to questions 1 through 4 of the survey. These questions related to respondent's satisfaction with the services as outlined above. In each case, the combined totals for "agree" and "strongly agree" responses to these questions exceeded 80 percent, and in some cases, such as in question 1 for all respondents relating to the usefulness of information they get from AMSAT's World Wide Web Page, it exceeded 90 percent. A comparison of sample means between responses by AMSAT members versus non-members for survey questions 1 through 4 seems to indicate that AMSAT members were slightly more satisfied with these services than were non-members.

A similar trend appears by comparing the responses to question 5 in Tables 4, 5 and 6. Question 5 asked respondents to state how frequently they visited the AMSAT Web site. Overall, most respondents (nearly 33 percent) said they visited the AMSAT Web site at least weekly, with a large percentage (about 30 percent) who said they visited the site monthly, and another slightly smaller percentage (about 22 percent) that said they visited the site 1 to 2 times per week. Once again (and as expected) a comparison of actual results as well as sample means of responses between AMSAT members and non-members for this question appears to show that most AMSAT members tend to visit the site slightly more frequently (weekly) than do most non-members (monthly).

Table 1: Satisfaction with AMSAT Web/FTP Services (All Respondents) n=1125

Response:	1*	2	3	4	5	Missing	Mean Score	Median
Question:	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	x	y
1. The information I get from AMSAT's World Wide Web site is useful to me.	23 (2.1)	2 (.1)	37 (3.3)	547 (48.6)	488 (43.4)	28 (2.5)	4.345	4.000
2. Links to other Web sites are relevant and helpful to me.	12 (1.1)	9 (.8)	105 (9.3)	664 (59.0)	307 (27.3)	28 (2.5)	4.135	4.000
3. Programs and other information available for download via AMSAT's File Transfer Protocol (FTP) service are relevant and useful to me.	13 (1.2)	15 (1.3)	134 (11.9)	516 (45.9)	417 (37.1)	30 (2.6)	4.195	4.000
4. Overall, the AMSAT World Wide Web site has met my expectations.	7 (.6)	28 (2.5)	107 (9.5)	629 (55.9)	322 (28.6)	32 (2.9)	4.126	4.000

Table 2: Satisfaction with AMSAT Web/FTP Services (AMSAT Members) n=583

Response:	1*	2	3	4	5	Missing	Mean Score	Median
Question:	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	x	y
1. The information I get from AMSAT's World Wide Web site is useful to me.	9 (1.5)	1 (.2)	9 (1.5)	270 (46.3)	288 (49.4)	6 (1.1)	4.433	4.000
2. Links to other Web sites are relevant and helpful to me.	4 (.7)	3 (.5)	54 (9.2)	343 (58.8)	173 (29.7)	6 (1.1)	4.175	4.000
3. Programs and other information available for download via AMSAT's File Transfer Protocol (FTP) service are relevant and useful to me.	4 (.7)	7 (1.2)	70 (12.0)	245 (42.0)	250 (42.9)	7 (1.2)	4.267	4.000
4. Overall, the AMSAT World Wide Web site has met my expectations.	4 (.7)	14 (2.4)	39 (6.7)	337 (57.8)	182 (31.2)	7 (1.2)	4.179	4.000

*1= Strongly Disagree
 2= Disagree
 3= Neither Agree nor Disagree
 4= Agree
 5= Strongly Agree

n= Frequency of response by category for each question
 %= Percentage (proportion) of all responses by category for each question
 x= Mean Score of all responses to that question
 y= Median Score of all responses to that question

Table 3: Satisfaction with AMSAT Web/FTP Services (Non-AMSAT Members) n=542

Response: Question:	<u>1</u> *		<u>2</u>		<u>3</u>		<u>4</u>		<u>5</u>		Missing		Mean Score x	Median y
	n	(%)	n	(%)	n	(%)	n	(%)	n	(%)	n	(%)		
1. The information I get from AMSAT's World Wide Web site is useful to me.	14	(2.6)	1	(.1)	28	(5.2)	277	(51.1)	200	(36.9)	22	(4.1)	4.246	4.000
2. Links to other Web sites are relevant and helpful to me.	8	(1.5)	6	(1.1)	51	(9.4)	321	(59.2)	134	(24.7)	22	(4.1)	4.090	4.000
3. Programs and other information available for download via AMSAT's File Transfer Protocol (FTP) service are relevant and useful to me.	9	(1.7)	8	(1.5)	64	(11.8)	271	(50.0)	167	(30.8)	23	(4.2)	4.115	4.000
4. Overall, the AMSAT World Wide Web site has met my expectations.	3	(.6)	14	(2.6)	68	(12.5)	292	(53.9)	140	(25.8)	25	(4.6)	4.068	4.000

*1= Strongly Disagree
 2= Disagree
 3= Neither Agree nor Disagree
 4= Agree
 5= Strongly Agree

n= Frequency of response by category for each question
 %= Percentage (proportion) of all responses by category for each question
 x= Mean Score of all responses to that question
 y= Median Score of all responses to that question

Table 4: Visiting Habits of Web Page Users (All Respondents) n=1125

Response:	Rarely	Monthly	Weekly	1-2x /Wk.	Daily	Missing	Mean Score	Median
Question:	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	x	y
5. I visit the AMSAT World Wide Web site..	83 (7.4)	331 (29.4)	369 (32.8)	242 (21.5)	72 (6.4)	28 (2.5)	2.889	3.000

Table 5: Visiting Habits of Web Page Users (AMSAT Members) n=583

Response:	Rarely	Monthly	Weekly	1-2x /Wk.	Daily	Missing	Mean Score	Median
Question:	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	x	y
5. I visit the AMSAT World Wide Web site..	23 (3.9)	142 (24.4)	217 (37.2)	153 (26.2)	43 (7.4)	5 (.9)	3.088	3.000

Table 6: Visiting Habits of Web Page Users (Non-AMSAT Members) n=542

Response:	Rarely	Monthly	Weekly	1-2x /Wk.	Daily	Missing	Mean Score	Median
Question:	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	x	y
5. I visit the AMSAT World Wide Web site..	60 (11.1)	189 (34.9)	152 (28.0)	89 (16.4)	29 (5.4)	23 (4.2)	2.688	3.000

Results of survey respondent's feelings toward the technical and graphical content of AMSAT's Web site yielded a few surprises. This information was gathered via answers to survey question number 6 which asked respondent's beliefs about the amount of technical content the Web page contained. While the vast majority (almost 67 percent) of all respondents (Table 7) believed that the technical content of AMSAT's Web site was "about right", a significant number (nearly 30 percent) of AMSAT members (Table 8) and nearly 27 percent (Table 9) of non-members believed the technical content of the pages was "too little" and could stand some improvement. A number of written comments also supported these findings and will be discussed later in this report.

From a comparison of sample means between the two data sets, it also appears that AMSAT members are demanding slightly more technical content in AMSAT's Web pages

than their non-member counterparts. The same trend held true for the graphic content of the Web Pages as well. Again, while the vast majority of all respondents (79 percent) believed that the graphic content of AMSAT's Web pages was "about right", a somewhat smaller number (14 percent overall) believed the graphic content of the pages could be beefed up. Some 16 percent of AMSAT members appeared to agree with the need to add more graphic content to the Web pages. One possible explanation for this finding might be substantiated by comparing and contrasting these results with those from question 14, which will be discussed in a moment.

Table 7: Technical and Graphic Content (All Respondents) n=1125

Question:	Response:				Mean Score x	Median y
	Too Little n (%)	Abt. Right n (%)	Too Much n (%)	Missing n (%)		
6. I believe the technical content of the information on AMSAT's World Wide Web site is...	318 (28.3)	752 (66.9)	14 (1.2)	41 (3.6)	1.720	2.000
7. I believe the graphic content of the information on AMSAT's World Wide Web site is.....	160 (14.3)	889 (79.0)	33 (2.9)	43 (3.8)	1.883	2.000

Table 8: Technical and Graphic Content (AMSAT Members) n=583

Question:	Response:				Mean Score x	Median y
	Too Little n (%)	Abt. Right n (%)	Too Much n (%)	Missing n (%)		
6. I believe the technical content of the information on AMSAT's World Wide Web site is...	173 (29.7)	395 (67.7)	6 (1.1)	9 (1.5)	1.709	2.000
7. I believe the graphic content of the information on AMSAT's World Wide Web site is.....	93 (16.0)	464 (79.6)	14 (2.4)	12 (2.0)	1.862	2.000

Table 9: Technical and Graphic Content (Non-AMSAT Members) n=542

Question:	Response:				Mean Score	Median
	Too Little n (%)	Abt. Right n (%)	Too Much n (%)	Missing n (%)	x	y
6. I believe the technical content of the information on AMSAT's World Wide Web site is...	145 (26.8)	357 (65.8)	8 (1.5)	32 (5.9)	1.731	2.000
7. I believe the graphic content of the information on AMSAT's World Wide Web site is.....	67 (12.4)	425 (78.4)	19 (3.5)	31 (5.7)	1.906	2.000

Another somewhat surprising finding from the survey came when the results of survey questions 8 through 13 which dealt with respondent's satisfaction with AMSAT's News Service and Keplerian Element bulletin services were analyzed. These results are shown in Tables 10, 11 and 12. Unfortunately, results from these questions did not yield the large volume of data that this researcher had initially hoped, due to the unexpectedly large numbers of respondents who indicated they did not subscribe to these bulletins.

It was expected that a somewhat larger percentage of AMSAT members than non-members would be subscribers to one or more of AMSAT's bulletin services. What was not expected was the comparatively large numbers of both members and non-members who apparently subscribe to neither one! Overall, results from survey questions 8 through 13, as shown in detail in Table 10, indicate that a large number (well over 50 percent) of all survey respondents opted to skip this part of the questionnaire, *presumably* based on the premise that these questions did not apply to them, or by their active admission (by electing option 6 ("don't subscribe") on the questionnaire questions for questions 8 through 11) that they do not subscribe to these bulletins. Regardless of the reason, an unexpectedly *large* number of responses were missing from respondent's replies in this section.

Complicating this issue is the fact that the survey instrument was constructed on the premise that not every respondent answering questions via AMSAT's Web page would also be on the distribution list for one or more of AMSAT's weekly Keplerian or AMSAT News Service bulletins. This is why respondents were given a choice in the survey instrument to either answer the questions contained in this section of the survey (Section II) or to skip these questions entirely and move directly to Section III. In addition, it was also expected that some respondents who subscribed to one of the bulletin services in question might not also

subscribe to the other. This was the basis for the "don't subscribe" option added to questions 8 through 11 on the survey.

However, from an analysis of the data derived from these questions, it now appears that at least *some* respondents might have also thought the preamble questions at the end of Section I applied to *all* AMSAT bulletin services vice only the two specifically addressed (ANS and KEPS) in these questions. This issue, when combined with the very large percentage of respondents who stated that they do not currently subscribe to either of these services, made analysis of the data from these questions somewhat more difficult to complete.

Based on this turn of events, and realizing that there may have also been some confusion caused by the questioning technique in the survey instrument itself, the research proceeded with analysis of these questions on the premise that if a respondent took the time to complete one or more parts of one or more of these questions, then it could safely be assumed these individuals were also subscribers to that particular bulletin service. For this reason, the large number of "Missing/Don't Subscribe" elections were removed from the data prior to further statistical analysis, and a separate set of tables was then constructed to analyze these questions (Tables 13, 14 and 15).

It is unclear exactly why so many respondents indicated they did not subscribe to these bulletins. AMSAT's Web page is a relatively new addition (within the last three years) to AMSAT's other Internet services, as compared to the bulletin services which have been in operation for several years longer. Further, much of the same material contained in AMSAT's bulletins now also are posted on its Web site, either as feature articles, or archived in some fashion. So, users with Web capability now have a choice as to where and how they get this information from AMSAT.

What's more, when one compares the overall lack of subscribers to AMSAT's bulletin services as indicated by results from questions 8 through 11 with the results from questions 12 and 13 (discussed below and that suggested some respondent's apparent dissatisfaction over the excessive amount of non-bulletin information now apparently mixed in with regular bulletin mailings) yet another possible finding emerges. That is, it appears that a number of former subscribers to these services may now be simply opting to *by-pass AMSAT's regular bulletin mailings entirely* in favor of obtaining this information directly from the AMSAT Web site at their leisure.

Table 10: Satisfaction with AMSAT Bulletin Services (All Respondents) n=1125

Response: Question:	1*	2	3	4	5	Missing/ Don't Subscribe n (%)	Mean Score x	Median y
	n (%)	n (%)	n (%)	n (%)	n (%)			
8. The information I get from AMSAT's News Service Bulletins are useful to me.	9 (.8)	6 (.5)	25 (2.2)	242 (21.5)	200 (17.8)	643 (57.2)	4.282	4.000
9. Overall, the AMSAT News Service Bulletins have met my expectations.	8 (.7)	11 (1.0)	44 (3.9)	285 (25.4)	131 (11.6)	646 (57.4)	4.086	4.000
10 The information I get from the AMSAT Keplerian Element Bulletins is useful to me.	8 (.7)	6 (.5)	23 (2.1)	113 (10.1)	330 (29.3)	645 (57.3)	4.565	5.000
11. Overall, The AMSAT Keplerian Element Bulletins have met my expectations.	7 (.6)	8 (.7)	30 (2.7)	187 (16.6)	246 (21.9)	647 (57.5)	4.374	5.000
12. I am satisfied with the time it took for AMSAT to process my request to start/stop receiving one or more of these bulletins.	10 (.9)	17 (1.5)	60 (5.3)	257 (22.9)	156 (13.9)	625 (55.5)	4.064	4.000
13. Mixing non-bulletin information with bulletins via one or both of these distribution lists is not a distraction for me.	33 (2.9)	75 (6.7)	128 (11.4)	248 (22.0)	35 (3.1)	606 (53.9)	3.341	4.000

Table 11: Satisfaction with AMSAT Bulletin Services (AMSAT Members) n=583

Response: Question:	1*	2	3	4	5	Missing/ Don't Subscribe n (%)	Mean Score x	Median y
	n (%)	n (%)	n (%)	n (%)	n (%)			
8. The information I get from AMSAT's News Service Bulletins are useful to me.	4 (.7)	1 (.2)	13 (2.2)	168 (28.8)	133 (22.8)	264 (45.3)	4.332	4.000
9. Overall, the AMSAT News Service Bulletins have met my expectations.	2 (.3)	6 (1.1)	29 (5.0)	191 (32.7)	91 (15.6)	264 (45.3)	4.138	4.000
10 The information I get from the AMSAT Keplerian Element Bulletins is useful to me.	2 (.3)	4 (.7)	10 (1.7)	79 (13.6)	221 (37.9)	267 (45.8)	4.623	5.000
11. Overall, The AMSAT Keplerian Element Bulletins have met my expectations.	2 (.3)	4 (.7)	14 (2.4)	130 (22.3)	165 (28.4)	268 (45.9)	4.441	5.000
12. I am satisfied with the time it took for AMSAT to process my request to start/stop receiving one or more of these bulletins.	5 (.9)	16 (2.7)	46 (7.9)	177 (30.4)	90 (15.4)	249 (42.7)	3.991	4.000
13. Mixing non-bulletin information with bulletins via one or both of these distribution lists is not a distraction for me.	18 (3.1)	56 (9.6)	80 (13.7)	167 (28.6)	22 (3.8)	240 (41.2)	3.347	4.000

*1= Strongly Disagree
 2= Disagree
 3= Neither Agree nor Disagree
 4= Agree
 5= Strongly Agree

n= Frequency of response by category for each question
 %= Percentage (proportion) of all responses by category for each question
 x= Mean Score of all responses to that question
 y= Median Score of all responses to that question

Table 12: Satisfaction with AMSAT Bulletin Services (Non-AMSAT Members) n=542

Response: Question:	1*	2	3	4	5	Missing/ Don't Subscribe n (%)	Mean Score x	Median y
	n (%)	n (%)	n (%)	n (%)	n (%)			
8. The information I get from AMSAT's News Service Bulletins are useful to me.	5 (.9)	5 (.9)	12 (2.2)	74 (13.6)	67 (12.4)	379 (70.0)	4.184	4.000
9. Overall, the AMSAT News Service Bulletins have met my expectations.	6 (1.1)	5 (.9)	15 (2.8)	94 (17.3)	40 (7.4)	382 (70.5)	3.981	4.000
10 The information I get from the AMSAT Keplerian Element Bulletins is useful to me.	6 (1.1)	2 (.4)	13 (2.4)	34 (6.3)	109 (20.1)	378 (69.7)	4.451	5.000
11. Overall, The AMSAT Keplerian Element Bulletins have met my expectations.	5 (.9)	4 (.8)	16 (3.0)	57 (10.6)	81 (15.0)	379 (69.7)	4.258	4.000
12. I am satisfied with the time it took for AMSAT to process my request to start/stop receiving one or more of these bulletins.	5 (.9)	1 (.1)	14 (2.6)	80 (14.8)	66 (12.2)	376 (69.4)	4.211	4.000
13. Mixing non-bulletin information with bulletins via one or both of these distribution lists is not a distraction for me.	15 (2.8)	19 (3.5)	48 (8.9)	81 (14.9)	13 (2.4)	366 (67.5)	3.330	4.000

*1= Strongly Disagree
 2= Disagree
 3= Neither Agree nor Disagree
 4= Agree
 5= Strongly Agree

n= Frequency of response by category for each question
 %= Percentage (proportion) of all responses by category for each question
 x= Mean Score of all responses to that question
 y= Median Score of all responses to that question

As noted previously, the detailed results of the analysis of survey questions 8 through 11 for each group were then re-computed and are presented in Tables 13, 14 and 15. In analyzing results for questions relating to the satisfaction of all those respondents who appear to subscribe to these bulletins, it appears that these subscribers are well satisfied with their usefulness, and also that these services appear to be meeting, or in some cases, exceeding their expectations. As shown by the overwhelmingly positive answers to questions 8 through 11 in the analysis of the information contained in the corresponding tables, the combined totals for "agree" and "strongly agree" responses exceeded 80 percent. In three cases (questions 8, 10 and 11 for all respondents) it exceeded 90 percent.

Once again, a comparison of sample means between responses offered by AMSAT members versus non-members was performed on the responses by each for questions 8 through 11. The results appear to indicate that AMSAT members are slightly more satisfied with these bulletin services than are non-members.

However, subscriber responses to questions 12 and 13, as alluded to earlier, painted a slightly different picture. These two questions asked respondents about known irritants in the sign-up and delivery process for these bulletins. AMSAT senior officials specifically asked that they be included in the survey to help them gauge the breadth and depth of that irritation, particularly among AMSAT members.

At issue is AMSAT's manual approach to subscriber sign-up and termination to start or stop receiving these bulletins. Currently, these requests must be sent to a different E-mail address than to the list itself. Once received, the AMSAT Administrator manually process these requests and either adds the user to the bulletin remailer list, or drops them from it, based on the subscriber's wishes. This process can take up to several weeks if there is a large backlog of requests. Unfortunately, what frequently happens is that potential subscribers send their requests to the list address itself, and *everyone* currently receiving that list sees their futile request to "subscribe" or "unsubscribe". This, in turn, generates additional mail on the reflector directed at the poor soul who doesn't know that they sent their request to the wrong E-mail address, usually followed by a number of "flames" and stern lectures from other users (self-appointed list helpers) about the proper way one should start and stop these bulletins. This "snowball effect" can sometimes create as many as 10 additional (often negative) comments addressed to the entire list based on one simple mis-routed subscription request.

Overall, most respondents agreed they were satisfied with the time it took for AMSAT to process their requests to start/stop these services (survey question 12) and that mixing bulletin and non-bulletin information in with their electronic mailings (survey question 13) did *not* distract them. However, the number of responses in the "Disagree" and below categories, particularly among AMSAT members (nearly 22 percent) in response to the question about their tolerance for mixing bulletin and non-bulletin information, tends to add tacit support AMSAT's corporate belief that these issues remain an irritant, and that the degree of irritation is not insignificant.

Sample means for these two questions were also found to be somewhat lower for both of these questions than for the other questions about these services. What's more, as previously stated, AMSAT members appear to be slightly less satisfied (tolerant?) with AMSAT's overall performance in alleviating these two known irritants than their non-member counterparts. Several written (negative) comments were also made about these issues that added support to this finding.

Table 13: Satisfaction with AMSAT Bulletin Services
(All Respondents--Subscribers Only) n = As Shown

Response: Question:	<u>1*</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	n	Mean Score x	Median y
	n (%)	n (%)	n (%)	n (%)	n (%)			
8. The information I get from AMSAT's News Service Bulletins are useful to me.	9 (1.9)	6 (1.2)	25 (5.2)	242 (50.2)	200 (41.5)	482	4.282	4.000
9. Overall, the AMSAT News Service Bulletins have met my expectations.	8 (1.7)	11 (2.3)	44 (9.2)	285 (59.5)	131 (27.3)	479	4.086	4.000
10 The information I get from the AMSAT Keplerian Element Bulletins is useful to me.	8 (1.6)	6 (1.3)	23 (4.8)	113 (23.5)	330 (68.8)	480	4.565	5.000
11. Overall, The AMSAT Keplerian Element Bulletins have met my expectations.	7 (1.5)	8 (1.6)	30 (6.3)	187 (39.1)	246 (51.5)	478	4.374	5.000
12. I am satisfied with the time it took for AMSAT to process my request to start/stop receiving one or more of these bulletins.	10 (2.0)	17 (3.4)	60 (12.0)	257 (51.4)	156 (31.2)	500	4.064	4.000
13. Mixing non-bulletin information with bulletins via one or both of these distribution lists is <i>not</i> a distraction for me.	33 (6.4)	75 (14.5)	128 (24.7)	248 (47.7)	35 (6.7)	519	3.341	4.000

Table 14: Satisfaction with AMSAT Bulletin Services
(AMSAT Members--Subscribers Only) n = As Shown

Response: Question:	<u>1*</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	n	Mean Score x	Median y
	n (%)	n (%)	n (%)	n (%)	n (%)			
8. The information I get from AMSAT's News Service Bulletins are useful to me.	4 (1.3)	1 (.3)	13 (4.1)	168 (52.6)	133 (41.7)	319	4.332	4.000
9. Overall, the AMSAT News Service Bulletins have met my expectations.	2 (.6)	6 (1.9)	29 (9.1)	191 (59.9)	91 (28.5)	319	4.138	4.000
10 The information I get from the AMSAT Keplerian Element Bulletins is useful to me.	2 (.6)	4 (1.3)	10 (3.2)	79 (25.0)	221 (69.9)	316	4.623	5.000
11. Overall, The AMSAT Keplerian Element Bulletins have met my expectations.	2 (.6)	4 (1.3)	14 (4.4)	130 (41.3)	165 (52.4)	315	4.441	5.000
12. I am satisfied with the time it took for AMSAT to process my request to start/stop receiving one or more of these bulletins.	5 (1.5)	16 (4.8)	46 (13.8)	177 (53.0)	90 (26.9)	334	3.991	4.000
13. Mixing non-bulletin information with bulletins via one or both of these distribution lists is <i>not</i> a distraction for me.	18 (5.2)	56 (16.4)	80 (23.3)	167 (48.7)	22 (6.4)	343	3.347	4.000

Table 15: Satisfaction with AMSAT Bulletin Services
(Non-AMSAT Members--Subscribers Only) **n = As Shown**

Response: Question:	<u>1</u> *	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	n	Mean Score x	Median y
	n (%)	n (%)	n (%)	n (%)	n (%)			
8. The information I get from AMSAT's News Service Bulletins are useful to me.	5 (3.1)	5 (3.1)	12 (7.3)	74 (45.4)	67 (41.1)	163	4.184	4.000
9. Overall, the AMSAT News Service Bulletins have met my expectations.	6 (3.7)	5 (3.1)	15 (9.4)	94 (58.8)	40 (25.0)	160	3.981	4.000
10 The information I get from the AMSAT Keplerian Element Bulletins is useful to me.	6 (3.7)	2 (1.2)	13 (7.9)	34 (20.7)	109 (66.5)	164	4.451	5.000
11. Overall, The AMSAT Keplerian Element Bulletins have met my expectations.	5 (3.1)	4 (2.4)	16 (9.8)	57 (35.0)	81 (49.7)	163	4.258	4.000
12. I am satisfied with the time it took for AMSAT to process my request to start/stop receiving one or more of these bulletins.	5 (3.0)	1 (.6)	14 (8.4)	80 (48.2)	66 (39.8)	166	4.211	4.000
13. Mixing non-bulletin information with bulletins via one or both of these distribution lists is <i>not</i> a distraction for me.	15 (8.5)	19 (10.8)	48 (27.3)	81 (46.0)	13 (7.4)	176	3.330	4.000

- *1= Strongly Disagree
- 2= Disagree
- 3= Neither Agree nor Disagree
- 4= Agree
- 5= Strongly Agree

- n= Frequency of response by category for each question
- %= Percentage (proportion) of all responses by category for each question
- x= Mean Score of all responses to that question
- y= Median Score of all responses to that question

Question 14 was included in the survey to gain a better understanding about the kinds of computer modem hardware member-user subscribers are currently using to interact with AMSAT's Web Site and bulletin services. Modems are the computer hardware devices used by subscribers to connect their computers via some form of network (usually a telephone line) to their Internet provider, and thence to AMSAT's Web site. Usually, the link from the subscriber's computer to the telephone line is the limiting factor in the overall speed of the communications (uploading and downloading of data), and the faster the modem (measured in Kbps), the faster such data can be handled. As stated previously, it was believed that obtaining this information would help the Web site Administrator better gauge the balance between graphics and text contained on AMSAT's Web pages.

Overall, the results from this question were not overly surprising, considering 28.8 Kbps computer modems are the standard in today's computer marketplace, and it appears that

a large majority (over 60 percent) of all respondents interacting with AMSAT's Web page and bulletin services are now doing so using this (fairly fast) modem hardware in their computers. What's more, as AMSAT members tend to be a more progressive group technically, it is also not surprising that a slightly higher percentage (70 percent) of AMSAT's members use this modem speed (28.8 Kbps) to interact with AMSAT's Internet services than non-members. The results of this question for all three groups are shown in Tables 16, 17 and 18.

It is interesting to compare and contrast the findings from this question with those given for question 7, relating to respondent's feelings about the graphic content of the Web site. That is, as more graphic information is contained on a Web site, more information needs to be downloaded during a single visit. A slower modem speed combined with a large amount of graphic content on the Web site means that the overall look and feel of the site as observed by the user will appear to slow down. Conversely, as modem speed is increased, and/or the graphic content is decreased, overall throughput will increase and the look and feel of the Web site will speed up accordingly. Findings from this question apparently support the assumption that most AMSAT Web user's computer setups are now *well* equipped to handle a somewhat greater amount of graphic material if AMSAT were to add more to its Web site at some point in the future.

Finally, it appears from the answers given to question 15 that users of AMSAT's Web page are about evenly split between AMSAT members (about 52 percent) and non-members (about 46 percent plus the 2 percent who didn't answer the question). While this finding is not a real surprise, it does (finally) add empirical evidence to the widely held belief among AMSAT's leaders that a large number of "other" people are apparently now also using AMSAT's World Wide Web besides just AMSAT's members.

In addition to the actual question responses, some 302 written responses from survey participants were also captured during the course of the survey. These were subjectively categorized into one or more of a number of categories as shown in Table 20. Some 110 of these comments were overwhelmingly positive, such as, "thanks for asking!" or "keep up the good work!" and "you guys are doing a great job!" Some 43 of the 302 comments had a somewhat negative tone, while 44 contained one or more suggestions for improvement for either AMSAT's Internet services or the AMSAT organization as a whole (or both).

Table 16: Modem Speed of Web Users (All Respondents) n=1125

Response:	2400 Baud or <	9600 Baud	14.4 K Baud	28.8 K Baud	ISDN or Dir. LAN	Missing	Mean Score	Median
Question:	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	x	y
14. The current speed capability of my computer modem is...	3 (.2)	7 (.6)	219 (19.5)	729 (64.8)	154 (13.7)	13 (1.2)	3.921	4.000

Table 17: Modem Speed of Web Users (AMSAT Members) n=583

Response:	2400 Baud or <	9600 Baud	14.4 K Baud	28.8 K Baud	ISDN or Dir. LAN	Missing	Mean Score	Median
Question:	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	x	y
14. The current speed capability of my computer modem is...	2 (.3)	2 (.3)	97 (16.7)	410 (70.3)	72 (12.4)	0 (0)	3.940	4.000

Table 18: Modem Speed of Web Users (Non-AMSAT Members) n=542

Response:	2400 Baud or <	9600 Baud	14.4 K Baud	28.8 K Baud	ISDN or Dir. LAN	Missing	Mean Score	Median
Question:	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	x	y
14. The current speed capability of my computer modem is...	1 (.1)	5 (.9)	122 (22.5)	319 (58.9)	82 (15.2)	13 (2.4)	3.990	4.000

Table 19: Membership Status of Respondents

Response:	Yes	No	Missing
Question:	n (%)	n (%)	n (%)
15. I am a member of at least one AMSAT organization	583 (51.8)	520 (46.2)	22 (2.0)

The remainder of the written comments could not be clearly categorized into any of the above areas. Many were requests for AMSAT membership materials or other administrative information, or to help clarify and emphasize responses given by the respondents to survey questions. What's more, many single written comments often contained multiple suggestions, gripes, complaints and/or compliments. Therefore, a detailed statistical analysis of written comments was not performed. However, it must again be emphasized that most of the comments were *very* supportive of the work AMSAT is doing via its Internet and Web page services, which, in turn, adds still more credence to the overall positive findings in the study as expressed by the detailed analysis of results from survey questions.

However, in order to add some comparability to a number of the suggestions offered in the written comments, a subjective analysis of their content was performed and a loose grouping was created. A subsequent tally of the number of times a particular suggestion for improvement occurred was then obtained and analyzed. The "top six" suggested improvements and their frequency of occurrence are shown in Table 20.

Table 20: Comments For Suggested Improvements to AMSAT's Internet Services

Comment	Number of Comments Observed
1. "Fix" the Subscribe/Unsubscribe process for AMSAT Bulletin Services.	26
2. Provide more technical satellite information and data on the AMSAT Web pages.	21
3. Provide more frequent updates of satellite and other data stored on the Web site.	16
4. Provide more "how to" information on ground station setup, particularly on radios and antennas.	14
5. Provide more "how to" information for beginners on the AMSAT Web Pages.	11
6. Provide more extensive archives of AMSAT Journal articles and other material on the Web site.	4

Summary

Overall, it now appears that the results of this survey confirm what most AMSAT leaders, officers and members have thought for quite some time...that AMSAT's Internet products and services *are* filling a need among its members and others who use them. However, it also appears that this study has now revealed some additional "food for thought" about these products and services that may warrant further study.

Specifically, the large number of AMSAT members and others taking part in the study who are not currently receiving AMSAT bulletins, while not necessarily a cause for concern, does appear to reflect a shifting user base, and/or possible dissatisfaction with the way these bulletin services are now being administered.

What's more, it appears that the vast majority of those individuals interacting with AMSAT's Web page now possess computer modem capacities that are well able to handle more graphically based Web information. Such information could include such items as tables, graphs, photos and charts., as well as more colorful displays of data and information.

Finally, it appears that a small, but yet significant number of Web users would like to see more technical and "hands on" satellite user information posted and archived on AMSAT's Web site, as well as more information suited for those just beginning in satellite work. Such information might include more technical information about AMSAT satellite capabilities as well as user reviews of ground station equipment and antennas.

Chapter V: Summary, Conclusions, and Recommendations

Introduction

In summary, and with the few exceptions as outlined and discussed above, it appears that the initial hypothesis of this project has now been shown to be essentially correct. That is, based on responses received from this survey, most users, and in particular AMSAT member-users, are satisfied (in some cases *well* satisfied) with AMSAT's Web page Internet Service. It also appears that those members and others who are partaking of AMSAT's bulletin services are, for the most part, satisfied with their content and with the way they are administered. Finally, it appears that AMSAT's Internet services are, for the most part, and with a few exceptions, meeting the expectations of the vast majority of the user base.

Summary and Conclusions

Before any further discussion is made, it must again be emphasized that the *overwhelming majority* of survey respondents in this study appeared quite satisfied with the information and services they are now receiving via AMSAT's Web site and by way of its Internet bulletin services. This conclusion should be taken both as a compliment as well as an indicator that the hard work and dedication shown by AMSAT's VP of Electronic Communications and the others on his team in maintaining these services is very much appreciated by most users. However, as with any endeavor, there is always room for improvement and the conclusions and recommendations that follow are offered in the hope of making an already outstanding and well-run program even better.

Besides adding support to prove the hypothesis for this study, the research also revealed some very interesting information about the popularity and continuing utility of AMSAT bulletins as compared to AMSAT's on-line (Web) services. As previously discussed, the survey data suggests that a much larger percentage of AMSAT members and others might now be choosing to obtain their satellite status and Keplerian Element bulletin information via an "on demand" Web site visit vice receiving one or more weekly E-mail bulletins sent to their electronic mailboxes. A number of written comments suggesting that AMSAT needs to do a better job at keeping Web page information current, not to mention somewhat lower survey scores and negative written comments about questions relating to bulletin sign-up satisfaction may also be contributing factor to this apparent turn of events.

The current manual bulletin sign-up process results in a number of unwanted subscribe/unsubscribe requests from uninformed users being sent to the entire list vice to the list administrator. While some users commented that they didn't mind seeing an occasional subscribe or unsubscribe request, others said were now growing quite weary of all the "flames" thrown back and forth on the bulletin reflector by other users as a result of someone's occasional indiscretion.

In addition, while most members and others appear pleased with both the technical and graphic content of AMSAT's web pages, a small, but yet significant number of (apparently) current users suggested that the technical content of the Web pages could be improved. Written comments relating to adding more "hands on" information about current satellite capabilities as well as ground station requirements to the Web site, including information relating to the best choices of radio equipment and antennas as well as more information of use for beginning satellite users, added support this conclusion.

It appears from the survey analysis that most users are now connecting to AMSAT's Internet services with current state-of-the-art (i.e. "fast") modems that are well capable of handling more graphic content. While the main objective of AMSAT's Web site should remain the dissemination of satellite and other satellite-related information in the most efficient manner possible. Currently, the lack of graphical data contained therein helps speed up the overall throughput of data flowing between users and the Web site.

However, in this researcher's own experience, AMSAT's Web site is now one of the very few remaining on the Web that is virtually devoid of multi-color graphic backgrounds, graphs, charts and Icons, as well as graphic "push buttons" and the like. The rest of the on-line world has changed dramatically in the 3 or 4 years since AMSAT first added its site to the World Wide Web, and its current home page configuration and graphic content has changed very little since it was first placed there. Today, rich colors and sophisticated graphics for most Web sites are becoming more the rule than the exception.

One written survey comment about the lack of graphics on the AMSAT Web page probably summed it up best by (bluntly) noting that, "(AMSAT's) Web site looks *bare!* Relevant graphics and pictures would help." While this issue does not appear to be a major finding of this research, AMSAT's leaders may still wish to re-evaluate their policies in this area, particularly now that it appears that the vast majority of users now interacting with

AMSAT's Web site have *more* than enough modem capacity to support even a modest increase in the Web site's graphical interface and content.

Providing an on-line graphic and technical environment that is more in line with what others are providing on the Internet also becomes an important consideration when the (now apparently large) number of non-members using AMSAT's Web pages and Internet Bulletin mailing services are taken into account. Granted, these individuals are now receiving the fruits of other member's dues and AMSAT's Web site volunteer labor to obtain one of the larger benefits of AMSAT membership without paying for it. However, because these individuals appear to be interacting with AMSAT's Web pages on a more or less regular basis, this finding also now presents AMSAT with a wonderful opportunity to use its Internet Web resources to possibly target this audience as potential future members in the organization. For this reason, the membership marketing opportunities that the AMSAT Web page presents should also not be overlooked.

While this researcher has cautioned the AMSAT Board from drawing too many inferences from the results of this study, if the rough 50/50 split of members versus non-members who completed this survey is even *marginally* representative of reality, there are a substantial number of potential new AMSAT members stopping by the AMSAT Web site each week. These individuals could well constitute a new and sustaining membership for the AMSAT organization of tomorrow.

That is, besides substantiating its reputation as a good source of satellite information to its paying members, results from this survey also appear to suggest that the AMSAT Web site has the potential to become a very powerful AMSAT membership recruiting device as well. In many ways, AMSAT's Web site and Internet services have now become the organization's largest window to the public about who it is and what it does. AMSAT leaders need to continually insure that they are "putting AMSAT's best foot forward" via their Web pages and Internet services. Probably the best way the AMSAT Board of Directors can do so is by continually giving AMSAT's VP of Electronic Communication all the support, both monetary and otherwise, that they can possibly muster to help keep its Web site and bulletin services "top notch".

Recommendations

From this analysis, a number of specific recommendations can be made. Because of the uncertain nature of this research and at the risk of "fixing something that isn't broken" these recommendations are presented to the Board of Directors as more as suggestions for further study and analysis, vice "must do's". However, this researcher believes there is enough evidence, as suggested by the survey results and written comments, to at least warrant further study and analysis in these areas.

1. It is suggested that the AMSAT Board of Directors encourage the Vice President for Electronic Communications to begin investigating ways to automate the subscribe and unsubscribe process for its Internet bulletin services, and to also set aside the necessary resources to do so.
2. It is further suggested that the AMSAT Board of Directors encourage the Vice President for Electronic Communications to begin investigating how more graphical information as well as more technical satellite operational information can be obtained, archived and prominently placed for easy access on the AMSAT Web site.
3. It is further suggested that the AMSAT Board of Directors encourage the Vice President for Electronic Communications to begin investigating ways to more easily post and update current satellite data and information on the AMSAT Web site.
4. It is also suggested that the AMSAT Board of Directors encourage the Vice President for Electronic Communications and the AMSAT Vice President for Field Operations to begin investigating ways how more "hands on" ground station information and as well as information of interest to beginning satellite users can be prominently displayed and kept current via AMSAT's Web site.
5. It is further suggested that the AMSAT Board of Directors encourage the Vice President for Electronic Communications to look for ways how AMSAT membership information and sign up procedures can be more prominently displayed on the AMSAT Web site.
- 6.. Finally, it is suggested that the AMSAT Board of Directors encourage the Vice President for Electronic Communications to investigate ways how the survey process and tools used by this research project can be adapted to gather similar or related survey data in the future.

Contributions of the Project

Beyond the obvious conclusions and recommendations resulting from this study, it is hoped that this research will also now serve as the starting point for a far more comprehensive program of survey research and data gathering by AMSAT. If this study has done nothing else, it has proven beyond a shadow of a doubt that AMSAT's Internet resources *can* be effectively used to gather useful information from its far-flung membership about the perceived quality, accuracy and satisfaction with the products and services it provides.

In this age of higher costs for satellite construction and launch, it is hoped that the automated tools and techniques that this pioneering research created as a by-product of this effort will also be useful to gather additional information about its membership, as well as its products and services as the organization now prepares to move itself into the next Century.

Appendixes

Appendix 1: Initial Questionnaire

AMSAT-NA INTERNET SERVICES QUESTIONNAIRE

Dear Participant,

Date

The Radio Amateur Satellite Corporation-North America(AMSAT ®) is dedicated to providing the highest quality of information to its members regarding the Amateur Radio Space Program.

I am Keith Baker, KB1SF, AMSAT-NA's Executive Vice President, and I am also a graduate student at Central Michigan University in the USA. As part of my degree requirements, I am examining the attitudes and perceptions of users regarding AMSAT's Internet services as a basis for possible improvement of these services to our users. The following questionnaire will require approximately ten minutes (or less) of your time to complete. There is no compensation for responding, nor is there any known risk. By completing the questionnaire, you are also giving us your implied consent that you wish to participate. In addition, your participation in this study is *strictly voluntary*.

However, in order to ensure that all information remains confidential, please DO NOT include your name or Internet address with your response *anywhere* on the form. Your Internet address is also being automatically stripped from your completed questionnaire at the time of submittal to help insure that your responses remain confidential.

In addition, please participate in this survey ONLY ONCE! Multiple surveys completed by the same individual will bias the results. If you feel strongly about a particular statement in the questionnaire and would like to comment further about it, or you would like to add comments about our Internet offerings in general, we have made a special place for you to do so at the *very end of the survey*. Again, your comments expressed there will also be held in the strictest confidence and will not be attributed to you in any way.

This survey is intended to be completed by an adult audience. Due to some potentially "sticky" legal issues involved if we were to also include minors in this effort, we cannot allow those individuals under 18 years of age to participate. Sorry!

So, before you begin, please click on the appropriate response below. Clicking on a "no" response will immediately return you to the AMSAT-NA home page. Clicking on a "yes" response will take you directly to the first page of the survey.

Thanks and 73!

I certify that I am at least 18 years old.

Yes	No
<input type="checkbox"/>	<input type="checkbox"/>

AMSAT INTERNET SERVICES CUSTOMER SURVEY

This survey is meant to gather information about your attitudes toward some of the various Internet services that we offer. Please complete the following survey questions according to the instructions in each section.

Many Thanks!

SECTION I:

For each of the statements that follow, please tell us how much you either agree or disagree with the statement by clicking on the box that best represents your feelings. If you STRONGLY AGREE with the statement made, use your computer mouse to click on a *high* number. If you STRONGLY DISAGREE with the statement, use your mouse to click on a *low* number. Specific number responses are as follows:

STRONGLY DISAGREE	Click on box	1
DISAGREE	Click on box	2
NEITHER AGREE NOR DISAGREE	Click on box	3
AGREE	Click on box	4
STRONGLY AGREE	Click on box	5

The following questions relate specifically to your feelings about AMSAT's World Wide Web Pages and File Transfer Protocol service ONLY! We'll ask you about your feelings regarding AMSAT's Internet Bulletin Services in the next section.

Strongly disagree-----Strongly Agree

1. The information I get from AMSAT's World Wide Web site is useful to me.

1	2	3	4	5
---	---	---	---	---

2. Links to other Web sites are relevant and helpful to me.

1	2	3	4	5
---	---	---	---	---

3. Programs and other information available for download via AMSAT's File Transfer Protocol (FTP) service are relevant and useful to me.

1	2	3	4	5
---	---	---	---	---

4. Overall, the AMSAT World Wide Web site has met my expectations.

1	2	3	4	5
---	---	---	---	---

The following question asks you about how often you access AMSAT's Web site. Please click on the box that best completes the statement describing your visiting habits.

Rarely Monthly Weekly **1 or 2x** Almost
a Week Daily

5. I visit the AMSAT World Wide Web site...

1	2	3	4	5
---	---	---	---	---

The following questions deal with the technical and graphic content of AMSAT's current Web site. Please click on the appropriate boxes regarding your feelings relating to the amount of the item in question. If you believe there is TOO LITTLE of the item in italics, click on box number 1. If you believe the amount of the item is ABOUT RIGHT, click on box number 2. If you believe there is TOO MUCH of the item, click on box number 3.

Too Little About Right Too Much

6. I believe the *technical content* of the information on AMSAT's World Wide Web site is...

1	2	3
----------	----------	----------

7. I believe the *graphic content* of the information on AMSAT's World Wide Web site is...

1	2	3
----------	----------	----------

The following questions are about AMSAT's Internet Bulletin Services. If you *do not* subscribe to either the AMSAT' News Service Bulletin *or* the Keplerian Element Bulletin Service, then

Click here:

and you'll be immediately taken to Section III. Please answer the questions contained there.

If you *do* subscribe to either the AMSAT News Service *or* the Keplerian Element Bulletin Service, then please answer the questions that follow in Section II.

SECTION II:

If you currently receive one or both of AMSAT's Bulletin Services listed above, please answer the following questions. As before, if you STRONGLY AGREE with the statement, click on a *high* number. If you STRONGLY DISAGREE with the statement, click on a *low* number. If you don't subscribe to that particular bulletin service, click on the box marked DON'T SUBSCRIBE.

Strongly Disagree-----Strongly Agree Don't
Subscribe

8. The information I get from the AMSAT News Service Bulletins is useful to me.

1	2	3	4	5	
---	---	---	---	---	--

9. Overall, the AMSAT News Service Bulletins have met my expectations.

1	2	3	4	5	
---	---	---	---	---	--

10. The information I get from the AMSAT Keplerian Element Bulletins is useful to me.

1	2	3	4	5	
---	---	---	---	---	--

11. Overall, the AMSAT Keplerian Element Bulletins have met my expectations.

1	2	3	4	5	
---	---	---	---	---	--

12. I am satisfied with the time it took for AMSAT to process my request to start/stop receiving one or more of these bulletins.

1	2	3	4	5
---	---	---	---	---

13. Mixing non-bulletin information with bulletins via one or both of these distribution lists is *not* a distraction for me.

1	2	3	4	5
---	---	---	---	---

SECTION III:

The following questions ask you about the speed capabilities of your computer modem, as well as your membership status in AMSAT. Click on the box that best completes the statement describing your computer's modem capability and best describes your membership status.

14. The current speed capability of my computer modem is...

2400 Baud or <	9600 Baud	14.4K Baud	28.8K Baud	ISDN or Direct LAN
1	2	3	4	5

15. I am currently a member of at least one AMSAT organization.

Yes	No

SECTION IV:

If you have additional comments or concerns about the subjects in this survey, please briefly describe them in the box below:

Please take a few moments to insure your survey is complete. Then, click on the box below to send it for tabulation.

CLICK HERE: TO SEND YOUR RESPONSE FOR PROCESSING

Thank you for taking the time to complete this survey!

Appendix 2: Actual Survey Instrument as it appeared on the AMSAT-NA Web Site



AMSAT-NA Internet Services

Questionnaire

The Radio Amateur Satellite Corporation-North America is dedicated to providing the highest quality of information to its members regarding the Amateur Radio Space Program.

I am Keith Baker, KB1SF, AMSAT-NA's Executive Vice President, and I am also a graduate student at Central Michigan University in the USA. As part of my degree requirements, I am examining the attitudes and perceptions of users regarding AMSAT's Internet services. The following questionnaire will require approximately ten minutes (or less) of your time to complete. There is no compensation for responding, nor is there any known risk. By completing the questionnaire, you are also giving us your implied consent that you wish to participate. In addition, your participation in this study is *strictly voluntary*.

However, in order to ensure that all information remains confidential, please **DO NOT** include your name or Internet address with your response *anywhere* on the form. Your Internet address is also being automatically stripped from your completed questionnaire at the time of submittal to help insure that your responses remain confidential.

In addition, please participate in this survey **ONLY ONCE!** Multiple surveys completed by the same individual will bias the results. If you feel strongly about a particular statement in the questionnaire and would like to comment further about it, or you would like to add comments about our Internet offerings in general, we have made a special place for you to do so at the *very end of the survey*. Again, your comments expressed there will also be held in the strictest confidence and will not be attributed to you in any way.

This survey is intended to be completed by an adult audience. Due to some potentially "sticky" legal issues involved if we were to also include minors in this effort, we cannot allow those individuals under 18 years of age to participate. Sorry!

So, before you begin, please select the appropriate response below. Selecting a "no" response will immediately return you to the AMSAT-NA home page. Selecting a "yes" response will take you directly to the first page of the survey.

Thanks and 73!

Yes, I am at least 18 years old.

No, I am not 18 yet.



AMSAT Internet Services Customer

Survey

This survey is meant to gather information about your attitudes toward some of the various Internet services that we offer. Please complete the following survey questions according to the instructions in each section.

Many Thanks!

Section I

For each of the statements that follow, please tell us how much you either agree or disagree with the statement.

The following questions relate specifically to your feelings about AMSAT's World Wide Web Pages and File Transfer Protocol service ONLY! We'll ask you about your feelings regarding AMSAT's Internet Bulletin Services in the next section.

1. The information I get from AMSAT's World Wide Web site is useful to me.

- Strongly Disagree
- Disagree
- Neither Agree nor Disagree
- Agree
- Strongly Agree

2. Links to other Web sites are relevant and helpful to me.

- Strongly Disagree
- Disagree
- Neither Agree nor Disagree
- Agree
- Strongly Agree

3. Programs and other information available for download via AMSAT's File Transfer Protocol (FTP) service are relevant and useful to me.

- Strongly Disagree
- Disagree
- Neither Agree nor Disagree
- Agree
- Strongly Agree

4. Overall, the AMSAT World Wide Web site has met my expectations.

- Strongly Disagree
- Disagree
- Neither Agree nor Disagree
- Agree

Strongly Agree

The following question asks you about how often you access AMSAT's Web site. Please select the answer that best completes the statement describing your visiting habits.

5. I visit the AMSAT World Wide Web site...

- Rarely
- Monthly
- Weekly
- Once or Twice a Week
- Almost Daily

The following questions deal with the technical and graphic content of AMSAT's current Web site. Please select the answer that best describes your feelings relating to the amount of the item in question.

6. I believe the *technical content* of the information on AMSAT's World Wide Web site is...

- Too Little
- About Right
- Too Much

7. I believe the *graphic content* of the information on AMSAT's World Wide Web site is...

- Too Little
- About Right
- Too Much

The following questions are about AMSAT's Internet Bulletin Services. If you **do not** subscribe to either the AMSAT' NewsService Bulletin or the Keplerian Element Bulletin Service, then select this button:

I Don't Subscribe

and you'll be immediately taken to Section III. Please answer the questions contained there.

If you **do** subscribe to either the AMSAT News Service or the Keplerian Element Bulletin Service, then please answer the questions that follow in Section II.

Section II

If you currently receive one or both of AMSAT's Bulletin Services listed above, please answer the following questions.

8. The information I get from the AMSAT News Service Bulletins is useful to me.

- Strongly Disagree
- Disagree
- Neither Agree nor Disagree
- Agree
- Strongly Agree
- Don't Subscribe

9. Overall, the AMSAT News Service Bulletins have met my expectations.

- Strongly Disagree
- Disagree
- Neither Agree nor Disagree
- Agree
- Strongly Agree
- Don't Subscribe

10. The information I get from the AMSAT Keplerian Element Bulletins is useful to me.

- Strongly Disagree
- Disagree
- Neither Agree nor Disagree
- Agree
- Strongly Agree
- Don't Subscribe

11. Overall, the AMSAT Keplerian Element Bulletins have met my expectations.

- Strongly Disagree
- Disagree
- Neither Agree nor Disagree
- Agree
- Strongly Agree
- Don't Subscribe

12. I am satisfied with the time it took for AMSAT to process my request to start/stop receiving one or more of these bulletins.

- Strongly Disagree
- Disagree
- Neither Agree nor Disagree
- Agree
- Strongly Agree
- Not Applicable

13. Mixing non-bulletin information with bulletins via one or both of these distribution lists is not a distraction for me.

- Strongly Disagree
- Disagree
- Neither Agree nor Disagree
- Agree
- Strongly Agree

Section III

The following questions ask you about the speed capabilities of your computer modem, as well as your membership status in AMSAT. Select the answer that best completes the statement describing your computer's modem capability and best describes your membership status.

14. The current speed capability of my computer modem is...

- 2400 bps or less
- 9600 bps
- 14.4 kbps

- 28.8 kbps
- ISDN or Direct LAN

15. I am currently a member of at least one AMSAT organization.

- Yes
- No

Section IV

If you have additional comments or concerns about the subjects in this survey, please briefly describe them in the box below. Remember, please don't include your name or email address.

Please take a few moments to insure your survey is complete. Then, select this button to send it for tabulation.

Submit Survey

Thank you for taking the time to complete this survey!

References

- Andersen, R.E. (1973), "Consumer Satisfaction: The Effect of Disconfirmed Expectancy on Perceived Product Performance", *Journal of Marketing Research*, Vol. 10, Number 2, 38-44.
- Baker, K.C. (1995), *How to Use the Amateur Radio Satellites (Fifth Edition)*. Silver Spring, MD: AMSAT, 31.
- Bell, C.R., and Zemke, R.V. (1992) *Managing Knock Your Socks Off Service*. New York: AMACOM.
- Bly, R.W.(1993), *Keeping Clients Satisfied*, Englewood Cliffs, NJ: Prentice Hall.
- Bone, P.F. (1995), "Word-of-Mouth Effects on Short Term and Long Term Product Judgments", *Journal of Business Research*, Vol. 32, Number 3, 213-223.
- Bradburn, N.M., and Sudman, S. (1979), *Improving Interview Methods and Questionnaire Design*, San Francisco: Josley-Bass.
- Caddie, E.R., Woodruff, R.B., and Jenkins, R.L. (1977), "Expectations and Norms in Models of Consumer Satisfaction", *Journal of Marketing Research*, Vol. 24, 305-314.
- Cannie, J.K, and Caplin, D. (1991), *Keeping Customers for Life*, New York: AMACOM
- Churchill, G.A., and Surprenant, C. (1982), "An Investigation Into the Determinants of Customer Satisfaction", *Journal of Marketing Research*, Vol. 19, Number 11, 491-504.
- Clark, T.R. (1996), *Remarks before the 1996 AMSAT Annual Meeting and Space Symposium*, (Unpublished) Tucson AZ.
- Cohen, J.B., and Goldberg, M.E. (1970), "The Dissonance Model in Post-Decision Product Evaluation", *Journal of Marketing Research*, Vol. 7, Number 8, 315-321.
- Davidoff, M. (1990) *The Satellite Experimenter's Handbook, Second Edition*. Newington, CT: The American Radio Relay League, 6-17.
- Gulledge, L.G. (1995) "Customer Satisfaction Management System", *Elrick and Lavidge, Inc. Internet World Wide Web pages*.
- Hayes, R.B., (1992), *Measuring Customer Satisfaction--Development and Use of Questionnaires*. Milwaukee Wisconsin: ASQC Press.

- Helson, H. (1959), Adaptation Level as a Basis for a Quantitative Theory of Frames of Reference", *Psychology Review*, Vol. 55, Number 11, 297-313.
- Kennedy, D.A., and Young, B.J. (1989), "Managing Quality in Staff Areas", *Quality Progress*, Vol. 22, Number 10 87-91.
- Keaveny, S.M. (1995), "Consumer Switching Behavior in Service Industries: An Exploratory Study", *Journal of Marketing*, Vol. 59, Number 2, 71-82
- King, W.C. (1995), "A Quasi-Experimental Assessment of the Effect of Computerizing Noncognitive Paper-and-Pencil Measurements: A Test of Measurement Equivalence", *Journal of Applied Psychology*, Vol. 80, Number 6, 643-665.
- Lautenschlager, G.L., and Flaherty, V.L. (1990), "Computer Administration of Questions: More Desirable or More Social Desirability?", *Journal of Applied Psychology*, Vol. 75, Number 3, 310-314.
- Linder-Pelz, S. (1980), "Toward a theory of Patient Satisfaction", *Social Science and Medicine*, Vol. 16, 577-582.
- Nederhof, A.J.(1984), "Visibility of Response as a Mediating Factor in Equity Research", *Journal of Social Psychology*, Vol. 122, 211-215.
- Oliver, R.L. (1977), "Effect of Expectation and Disconfirmation on Post Exposure Product Evaluations: An Alternative Explanation", *Journal of Applied Psychology*, Vol. 62, Number 4, 480-486.
- Oliver, R.L. (1980), "A Cognitive Model of Antecedents and Consequences of Satisfaction Decisions", *Journal of Marketing Research*, Vol. 17, Number 11, 460-468.
- Olshavsky, R.W. and Miller, J.A. (1972), "Product Performance and Perceived Product Quality", *Journal of Marketing Research*, Vol. 9, Number 2, 19-21.
- Olson, J.C., and Dover, P. (1976)," Effects of Expectation Creation and Disconfirmation on Belief Elements of Cognitive Structure", *Advances in Consumer Research*, Vol. 3, Anderson, B.B, (ed.) Chicago: Association for Consumer Research.
- Prasur, A., Zeithaml, V.A., and Berry, L.L. (1990), *Delivering Quality Service: Balancing Customer Perceptions and Expectations*. New York: The Free Press.
- Richins, M.L., and Bloch, P.H. (1991), "Post-Purchase Product Satisfaction Incorporating the Effects of Involvement and Time", *Journal of Business Research*, Vol. 23, Number 2, 145-158.

- Roznoy, R. (ed.) (1996), *The ARRL Satellite Anthology, Fourth Edition*. Newington, CT: The American Radio Relay League, 139-140.
- Soifer, R. (1996), "The Amateur Satellite Service in 1996", *The AMSAT Journal*, Vol. 19, Number 5, 5-8.
- Sumser, J. (1996) "Internet Business Network Consulting Services", *Internet Business Network World Wide Web pages*.
- Taylor, Shirley, (1994), "Waiting for Service: The Relationship Between Delays and Evaluations of Service", *Journal of Marketing Research*, Vol. 58, Number 2, 56-59.
- Taylor, Steven A. (1994), "An Assessment of the Relationship Between Service Quality and Consumer Satisfaction in the Formation of Consumer's Purchase Intentions", *Journal of Retailing*, Vol. 70, Number 2, 163-178.
- Willis, R.E., and Chervany, N.L. (1974), *Statistical Analysis and Modeling for Management Decision-Making*. Belmont, CA: Wadsworth Publishing Company, P61-66.
- Wiseman, F. (1972), "Methodological Bias in Public Opinion Surveys", *Public Opinion Quarterly*, Vol. 36 P105-108.
- Woodside, A.G. (1972) "Positive Disconfirmation of Expectation and the Effect of Effort on Evaluation", *Proceedings of the 80th Annual Convention of the American Psychological Association*.