

An ARF Methodological Review of comScore Networks, Inc. netScore

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INTRODUCTION

This is an ARF Methodological Review of the netScore methodology as developed by comScore Networks, Inc. (comScore). The purpose of this review is twofold:

1. To review the objectives, design, methodology and reporting of the service.
2. To render an opinion of the adequacy of the design, methodology and reporting to meet the stated objectives, both in theory and in practice, insofar as that practice or intended practice is represented to the ARF by comScore.

This review is based solely on the assertions and representations of comScore and is not an ARF audit.

OBJECTIVES

The objective of netScore is to provide a 360-degree view of customer behavior and preferences across the entire Internet including Web usage and buying behavior to provide online marketers with:

- Measures of dollar sales, growth rates, market share, visitors, conversion rates for major online commerce categories
- Comparison measures of sales, average transaction size and conversion rates for competitive domains
- Input to profiling and segmentation models and ad serving and media optimization solutions
- Measures of cross-visiting information with top domains

And online media planners, sellers and buyers with measures of a domain's audience, visitor buying power, and cross-visiting characteristics. Currently comScore defines a visitor and a buyer as a computer rather than as a person. However, comScore has recently deployed a capability for passively detecting the person responsible for any visit to a domain, and it intends to introduce new measures of visitors and buyers, this time defining them as people, and to do age/sex segmentations of visitors and buyers. Measures describing a domain's traffic include:

- number of unique visitors
- average number of visits per visitor
- average number of pages viewed per visitor
- average number of pages viewed per visit
- average minutes spent at domain per reporting period
- average minutes spent at domain per visit
- percentage reach

DESIGN

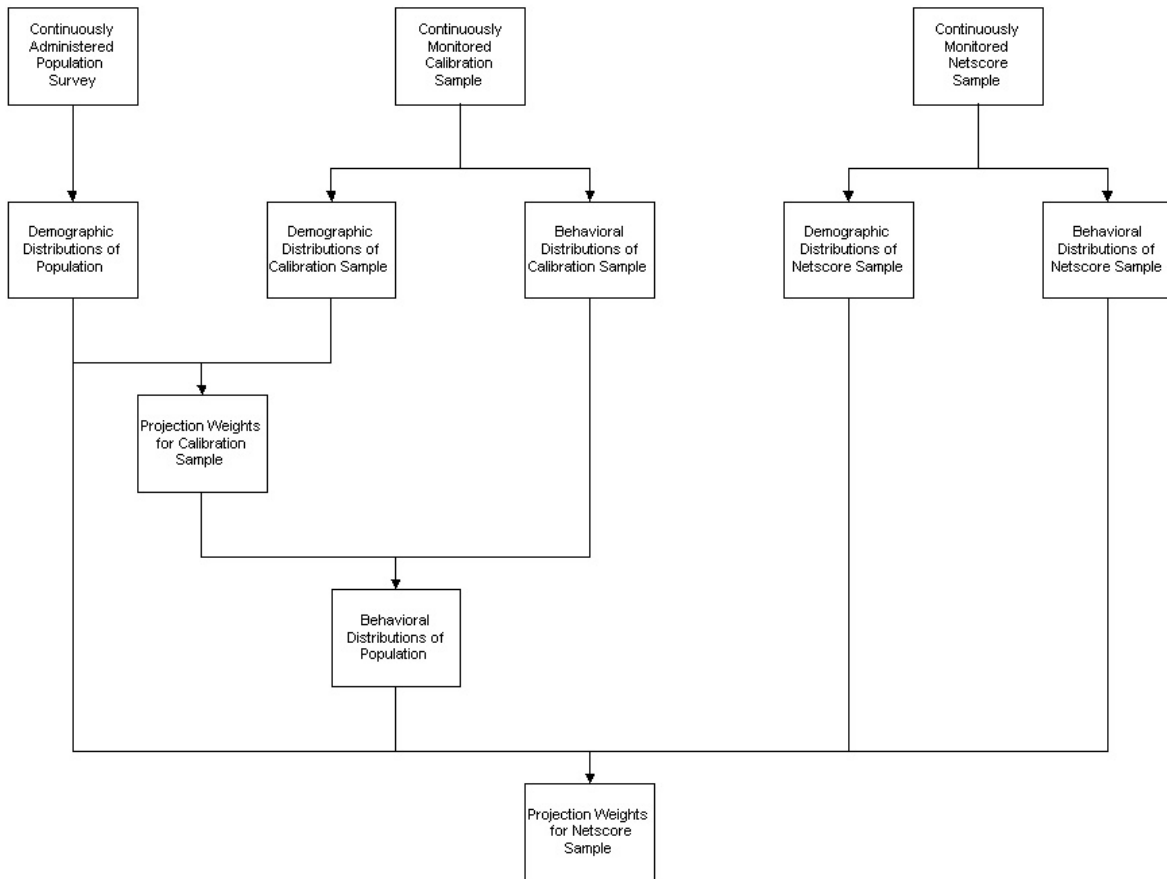
In addition to measuring magnitude and characteristics of online media audiences, netScore is designed to measure consumer behaviors that occur with much less frequency, such as shopping, purchasing and cross-site visiting patterns. Since the look-to-buy ratio for a typical site is less than two percent, to accurately measure and report characteristics of online buyers and their transactions, over a million people need to be monitored. Consequently, netScore's respondent base exceeds the panel size of all the other user-centric measurement services combined by more than an order of magnitude.

To attain the very large number of panelists that comScore has sought in order to measure purchase behavior on the Internet, comScore has deviated from the time-honored use of probability sampling for recruitment of the majority of its panelists.

Probability sampling is employed in recruiting netScore's monthly random digit dialing (RDD) survey via Opinion Research Corporation's Caravan[®] to enumerate the patterns of household composition, computer ownership and internet usage that co-occur (aggregated over latest 20 weeks, or 20,000 surveys). Probability sampling is also used in recruiting the netScore 45,000-plus person *Calibration Panel*. The *Calibration Panel* data are used to measure the incidence of key online usage behaviors for weighting and projecting the general netScore panel data.

Audience measurement services commonly use enumeration surveys to supplement the demographic-segment estimates derived from the U.S. Census Bureau updates. netScore uses two sources of estimates to project its netScore panel: 1.) the ORC Caravan survey, and 2.) an online "*Calibration Panel*." netScore involves two sources, rather than one, to address the potential self-selection bias resulting from allowing respondents to sign up for the *Marketscore Panel* based on responding to email solicitations, online ads and promotions.

Netscore Projection Weight Calculation



In addition to the completely passive electronic measurement of all online activity, netScore's *Marketscore Panel* members are recruited for short online surveys which are used to measure attitudes (both general and behavior-specific) and offline activities. The participation in such surveys is completely at the discretion of the respondent, and requests to do so are limited to no more than one per month, typically, such requests are made far less frequently. More than half of the panel have never been asked to complete a survey or have been asked only once. Overlaying the netScore database with data from Frequent Shopper and other offline purchase-behavior-related databases enable comScore to link online exposure to offline behavior.

METHODOLOGY

comScore has recruited for the *Marketscore Panel* over one and a half million opt-in members who have agreed to have their Internet behavior confidentially monitored and captured on a totally anonymous basis. These members give comScore explicit, opt-in permission to confidentially monitor their online activities in return for valuable benefits such as increased download speed, sweepstake prizes, and the opportunity to help shape the future of the Internet.

To achieve such large-scale data gathering, comScore Networks has created a new way of gathering data about online activity and a new patent-pending technology. The resulting process is very scalable. The systems that comScore have put in place allow them to capture the online buying and surfing behavior of millions of members in a highly cost-effective manner.

Those individuals who choose to be part of the *Marketscore Panel* are asked a series of questions about the people and computers in the household. Then they quickly download comScore's technology to their browser where it unobtrusively routes the member's Internet connection through comScore's network of servers, without requiring any further action on the part of the individual. The technology allows comScore to capture the complete detail of all the communication to and from each individual's computer - on a site-specific, individual-specific basis. Information captured on an individual member basis includes every site visited, page viewed, ad seen, promotion used, product or service bought, and price paid.

Importantly, individual anonymity is guaranteed by comScore. Personal identifying material is removed from the behavior-tracking data file, and it is encrypted and stored in a separate file with carefully controlled access. It is extremely challenging, even with a consumer's opt-in permission, to capture information communicated to and from a browser in a secure session (e.g., any purchase transaction). In order to do this successfully, technology is required that "securely monitors a secure connection." comScore's patent-pending technology does this at no incremental cost to comScore or risk to the panelists.

comScore Networks currently reports measurements for these four populations:

U.S. Home – the population of computers used to access the Internet for more than e-mail in the last 30 days from private residences in the U.S., excluding those that are in private residences for which a head of household is a full-time student and those that are in a home office

U.S. Work – the population of computers used to access the Internet for more than e-mail in the last 30 days from workplaces in the U.S., except for those with more than one user and those for which Internet access is significantly restricted

U.S. School – The population of personally-owned computers that have been used to access the Internet for more than e-mail in the last 30 days by full-time students living in group quarters at colleges and universities and by people living in a private residence for which a head of household is a full-time student

International – the population of computers used to access the Internet for more than e-mail in the last 30 days by people who are not residents of the U.S. and who are reasonably proficient at reading and comprehending English (at least 25% of the websites from which the user has requested pages are English-language websites)

The sample sizes for November, 2001, by population, are:

U.S. Home	405,553 computers
U.S. Work	25,001 computers
U.S. School	28,684 computers
International	177,554 computers

The size of the **U.S. Home population** in any month is estimated in these three steps:

1. The proportion of households that have at least one member accessing the Internet from a computer in the U.S. Home population is estimated from a continuously administered telephone survey (1,000 completed interviews every week) of adults living in private residences in the U.S. The survey is administered by Opinion Research Corporation (ORC), which uses the GENESYS system of Marketing Systems Group to select random digit dialing (RDD) samples of residential telephone numbers. Only one adult in any household is interviewed. For any month, the estimate of the proportion is the average calculated with the data collected during the 20 weeks ending with the week containing the last day of the month. This same survey also yields estimates of the average number of computers per household used to access the Internet in the U.S. Home population calculated across households that have at least one.
2. The total number of households in any month is estimated by linearly interpolating between projections purchased from Geolytics, Inc., that are based on both the decennial census and the Current Population Survey.
3. They multiply the estimated number of households by the estimate of the proportion of households with at least one member accessing the Internet from a computer in the U.S. Home population. The result is multiplied by the average number of computers per household in the U.S. Home population calculated across households with at least one.

The processes used to estimate the size of the U.S. Work, U.S. School, and International populations are described in *Appendix 3* of this Review.

The netScore data projection process involves post-sampling stratification; so it requires descriptive information about the computers in the samples and the households that use them. Most of this information is obtained in the online “registration process” required of the people who elect to include their computer in the *Marketscore Panel*.

Where a registration item is missing or is suspected to be false, surrogate information is substituted where such information is available from Acxiom, or can be inferred from Census data (for details see Appendix 4).

In-Tab Sample Selection

Each month a subset of the computers registered for the *Marketscore Panel* is selected for the in-tab sample based on the criteria:

- The computer must belong to the population being sampled (Home, Work, School, etc.)
- The computer must have been in the *Marketscore Panel* for the entire period
- At least one Internet user session must have originated from the computer during the thirty days ending with the last day of the month¹
- Sufficient descriptive information for the computer must be available to assign it to a stratum when calculating projection weights

Projection Weight Calculation

To calculate projection weights for computers in the U.S. Home population, comScore stratifies the computers on characteristics of both computers and of the households that use them, including certain aggregate measures of Internet activity. These are:

- Demographic Characteristics of the Household
 - household income
 - age of eldest head of household
- Characteristics of the Computer
 - service provider used when Internet is accessed (AOL or other)
 - browser used (Internet Explorer or Netscape Navigator)

¹ Attrition Adjustment

For a computer to qualify for the in-tab sample for any period, certain criteria must be met, one of which is that at least one Internet user session must have occurred from the computer during the 30 days ending with the last day of the period. Among the computers satisfying this requirement there are invariably some that are not still in comScore's network (and so not being monitored) at the end of the period. Moreover, in many cases, the removal from the network will not have been reported to comScore and instead can only be inferred from the data accumulated for the computer. comScore has identified patterns of Internet activity and subsequent inactivity that indicate that a computer is no longer in its network, and it eliminates computers that exhibit these patterns from samples. However, even after eliminating these computers, attrition from the sample is still evident in a gradual, day-by-day decline in the percent of computers that have an Internet user session. Since the specific computers responsible for the decline cannot be specifically identified, comScore measures the daily rate of decline and uses that factor to adjust the projection weights to compensate for within-month attrition from the sample.

- connection type (broadband or non-broadband)
- Internet Activity from the Computer
 - frequency of Internet access
 - whether there has been a visit to any domain in each of two domain groups

Information about the distribution of these characteristics in the population are drawn from two sources. comScore estimates the joint frequencies of the demographic variables with data from the ORC survey. The marginal distributions of service provider, browser used, and connection type are also estimated with data from the ORC survey.

Joint frequencies of the measures of Internet activities are projected from a calibration sample (a probability sample of computers recruited in such a way as to avoid any potential biases that might result from recruiting a panel using online advertising and e-mail solicitations—the primary means of recruiting computers for the *Marketscore Panel*.) While the calibration sample is much smaller than the in-tab sample, at over 20,000 computers and involving over 45,000 people, it is sufficiently large to estimate the frequency distribution of Internet user sessions and the frequency of visits to any domain in a cluster of domains.

Because netScore has different sources for the population distributions, it is necessary for comScore to obtain projection weights by doing an iterative proportional fit of the population distributions (using the Deming-Stephan algorithm). The starting values of the joint frequencies are the in-tab sample joint frequencies, and the weights are derived by dividing the fitted joint frequencies by the in-tab sample joint frequencies.

REPORTING

netScore's e-commerce-related reports include:

Buying Power Report measures the relative value of a site's visitors for netScore's top 5,000 sites based on their buying behavior across the Internet. netScore also reports BPIs across 13 product categories for netScore's top 500 domains.

Competitive Site Report assesses a site's competitors on: sales; average transaction size; buyer-conversion ratios; and customer loyalty.

Cross-Visiting Report provides a look at the online surfing habits of a site's key customer segments to help quantify the penetration levels of key targets.

Exit Analysis Report permits one to contrast the percent of visitors exiting via a referred link with those who exit a site by typing in a URL or using a bookmark.

Co-occurrence of Site Visits Report assesses the overlap between target domains for visit and/or purchase occasions within the same user session.

Source of Traffic Report compares the percent coming from referred visits, e.g., visits coming to a site from other sites via a direct link on a page or through a banner ad with those coming to a site via typing in a URL or using a bookmark.

comScore's advertising planning/selling related reports include:

Internet Traffic Measurement ranks the top 10,000 domains according to seven visiting measures for U.S., Non-U.S., and worldwide audiences for the entire U.S., as well as for the U.S. Home, Work and College & University audiences.

Demographic Report breaks out demographic information for the top 5,000 domains among the total U.S. Internet audience.

Property Roll-Up Report ranks the top 2,000 properties according to seven visiting measures for U.S., Non-U.S., and worldwide audiences for the entire U.S., as well as for the U.S. Home, Work and College & University audiences.

Exit Analysis Report permits one to contrast the percent of visitors exiting via a referred link with those who exit a site by typing in a URL or using a bookmark.

Co-occurrence of Site Visits Report assesses the overlap between target domains for visit and/or purchase occasions within the same user session.

Source of Traffic Report compares the percent coming from referred visits e.g., visits coming to a site from other sites via a direct link on a page or through a banner ad with those coming to a site via typing in a URL or using a bookmark.

ARF OPINION

Overview

In several critical areas, comScore has employed methods that are underpinned by theory and are considered "best practices" in the research industry, such as using random sampling in its survey to enumerate populations through which it projects measurements and in the recruitment of a "calibration panel," and in using iterative proportional fitting to derive weights where estimates of sizes of population strata are drawn from different sources. Additionally, comScore has deployed an extensive capability for monitoring and measuring the performance of its systems for accumulating data to assure the completeness of those data. However, because a central purpose of comScore is to collect and report information about the number and characteristics of transactions occurring on the Internet, and because the incidence of these transactions is very low, comScore does not use probability sampling to recruit its panel and instead uses online advertising and e-mail, so that it can recruit a sufficiently large panel.

comScore acknowledges the bias that this potentially introduces and employs a calibration panel to attempt to eliminate any such bias. Theory cannot be invoked to argue that this works and instead only comparisons of comScore's measurements to others generally accepted as true (for example, audited estimates derived from server logs) can show that it does. An audited demonstration of the efficacy of comScore's use of a calibration panel is forthcoming; however, comparisons between audited server counts and netScore measures have revealed good correspondence in page impressions where definitions of page are

similar. An anticipated objective third party audit is expected to document the soundness of that calibration process.

Relevance of FAST/ARF Principles

For the last four years, the ARF has been a principle player in the industry effort to develop global principles and definitions for online audience measurement. While the resulting FAST/ARF Principles dealt only with online media audience measurement, and the objectives of netScore extend beyond that, we believe that they remain quite relevant to a review of the netScore methodologies.

FAST/ARF Ethical Principles

netScore Compliance

<p><u>Post and practice privacy policies.</u> Researchers must respect the rights of the individual to anonymity (to remain unrecognizable while pursuing individual interests) and privacy (to control what personal information, if any, is revealed and how it may be used).</p> <p>Researchers must also reasonably ensure that any confidential information provided to them is protected against unauthorized access.</p>	<p>comScore has a clearly worded and comprehensive privacy policy posted and links to it are available on the invitations to join. (see Appendix 5)</p> <p>Encryption procedures and secure servers are used to safeguard personal data. Behavioral data is separately stored from personally identifiable information.</p> <p>Access to personal or linkage information is highly restricted and secured to protected against unauthorized access.</p>
<p><u>Fully disclose methodology.</u> Complete information about research methods and practices used, as well as all the data collected, and its ownership, should be revealed to all research subscribers and prospective subscribers. ...all methods used should be as “transparent” as possible, thereby permitting critical evaluation and replication.</p> <p>The details of disclosure should include the following at a minimum:</p> <ul style="list-style-type: none"> – a precise definition of the intended measurement universe – a detailed description of the sampling frame – if sampling is used, descriptions of sample design, selection, incentives, recruitment and screening procedures. – a detailed description of how measurements were made – any empirical evidence, if available, of the validity of the measurement method. – a complete description of the data processing (e.g., qualification, editing, 	<p>comScore provided the ARF technical staff with clear, complete detailed descriptions of its definitions, methods, and validation findings. comScore indicated that this information is also made available to clients and prospects.</p> <p>We recommend that these documents be compiled into a formal Technical Guide which comScore would update periodically</p>

weighting, ascription and the calculation)	
User-centric measurement companies should be subject to a detailed audit of their methods and procedures by a qualified third-party auditor satisfactory to the industry re adherence to industry-agreed technical research principles and to provide full/objective disclosure of the details of the research design and execution.	comScore is currently working with ABC-interactive on a comparison of the estimates of page views and visitors that ABCinteractive has audited for its clients with those produced by comScore. A report on these analyses is forthcoming. The FAST Principles also call for third party research services to submit to an industry process audit and we urge comScore to continue to lay the groundwork for that.
Research companies, online media and ad serving networks must <u>take steps to ensure the responsible use of their data in the public domain</u> – among clients, the press, and others likely to cite their results in public contexts. Research companies should also <u>establish clear guidelines for the grouping of site-specific ratings into larger reporting aggregations.</u>	comScore has established guidelines for the use of its data, particularly regarding ownership and the aggregation or dis-aggregation of web property ratings. (See Appendix 6.) Ernst & Young LLP has certified that comScore meets or exceeds industry standards for member data privacy and security.

FAST/ARF Methodological Principles

netScore Compliance

The <u>foundations</u> for measurement of online media <u>should be laid to maximize comparability to other existing media</u> – that is, measures of exposures, of opportunities to see ads, and of unduplicated reach and frequency of exposure.	netScore currently provides the standard audience measures: number of visitors; number of pages viewed; and Reach.
More <u>advanced measurements... should reflect the unique capabilities of online media.</u> Beyond measures of the reach and frequency distribution of exposures (OTS), the online media have the potential for measuring their marketplace impact in ways keenly relevant to a brand’s marketing objectives. This development should be encouraged as a means of fully valuing online media.	netScore offers the potential to readily link online ad exposure to online purchase behavior. comScore has made the measurement of online transactions a core design criteria for the netScore service and has gone farther in developing this capability than any competing service.
All <u>measurement systems should use best media research practices</u> – follow the quality criteria developed for other media, except where not	comScore has chosen to rely on a much larger sample in lieu of a randomly selected sample; consequently, to properly assess the lack of

<p>applicable, to ensure online audience measurements estimates that are: objective/independent; accurate/unbiased; relevant; timely; precise; and reliable.</p>	<p>bias in its measures, validation comparisons with server centric measures must be used. Such comparisons are made challenging in that server centric measures themselves must be cleansed of errors introduced by inadequate filtering of robots, spiders and other inappropriate logfile entries.</p> <p>By comparing the ratings produced via its <i>Calibration Panel</i> to those produced from the weighted <i>Marketscore Panel</i>, comScore could provide an internal validation for large Web properties of its visits and visitor count projected measures. We recommend that this comparison is added to the ongoing quality control program.</p> <p>netScore measures are obtained in such a way as to offer the desired objectivity; independence; relevance; timeliness; precision; and reliability. There is a potential upward bias on measures of time spent online due to the acceleration of content delivery.</p> <p>Increased speed is one of the incentives for members to join the <i>Marketscore Panel</i>. A controlled test of the effects of comScore's acceleration of page downloads showed no significant effects on the numbers of pages viewed, minutes online, domain visits or Internet user sessions. (A netScore Technical Report on this research is presently in progress.)</p>
<p>All measurement systems should use a clearly <u>defined universe</u>. The universe definition must begin on the basis of an age-delimited population, not be limited to persons with online access, specific place of access (home, work, school, etc) or specific online usage behavior.</p> <p>Identify the available universe – persons with access to online media, regardless of the place of access or technical means of access, and provide frequently updated estimates of this dynamic population.</p> <p>User-centric measurement must engage the appropriate sampling frame, selection and recruitment techniques to deliver an unbiased sample that accurately reflects the universe, without bias. All respondents must have a known probability of selection.</p>	<p>The netScore Home population includes computers used in the home for personal use and excludes those used for business purposes.</p> <p>In addition to the U.S. Home report and the U.S. School report, comScore provides a report for U.S. Work, and a report on Non-U.S. English-Speaking Residential activity.</p> <p>The U.S. School population to which comScore projects measurements consists of computers: that have been used to access the Internet for more than e-mail in the last 30 days by full-time students at Title IV institutions who live either in (1) group quarters, such as dormitories, fraternity houses or sorority houses (about 21% of the U.S. School population); or (2) private residences for which a head of household is a full-time student, such as an off-campus apartment (the remaining 79% of the population).</p>

<p>Panels must be managed to ensure their continued accurate representation of the dynamic online universe.</p> <p>Users of the data must be informed of its statistical precision.</p>	<p>Currently the comScore universe is computers. comScore has recently deployed a capability that, by exploiting screennames and information in posts and queries, enables it to passively identify the person who is responsible for the large majority of site visits that it records. It will soon use this information to provide new measures of visitors and buyers, where a visitor and a buyer are people rather than computers, and will report age/sex-based segmentations of visitors and buyers.</p> <p>netScore findings are reported at levels of data aggregation necessary to ensure stability and reliability of the measures. Minimum reporting standards are carefully enforced.</p>
<p><u>Measurement technologies should accurately measure the behaviors they purport to measure.</u></p> <p>User-Centric systems should employ passive behavioral measurement technologies that capture the full range of online activities avoiding any systematic biases. These technologies should be capable of measuring all varieties of media elements presented to users via online media.</p> <p>Metering technologies that only work on advanced software platforms should be avoided, as should technologies that are difficult for naïve users to implement or use.</p>	<p>The only difference that members might detect is the increased speed of delivery of html pages to their browser. The effect of that has been shown to be negligible. (See “<u>measurement systems should use best media research practices</u>” observation above.)</p>
<p><u>All measurement systems should employ measurement that is non-intrusive.</u> User-centric systems should measure and collect online behavior as passively as possible to avoid influencing the behavior they intend to measure.</p> <p>Moreover, respondents of user-centric systems should not be re-contacted unnecessarily or burdened excessively with secondary research questions.</p> <p>Research design and measurement procedures should scrupulously avoid influencing the behaviors being measured.</p>	<p>The netScore technology as it currently operates is invisible to its members. The only difference that members experience is the increased speed of delivery of html pages to their browser. (See observation above.)</p> <p>Marketscore panelists are contacted to participate in various Marketscore surveys with a restriction that such contacts occur no more than once a month. Survey participation is completely voluntary, and the actual frequency of survey requests is well less than once a month. Because of the large size of the <i>Marketscore Panel</i>, the proportion of the members participating in a survey and contributing to the rating of any one site, or group of sites, is very small.</p> <p>We recommend that comScore develop and publish a policy for the minimization of the impact of surveys on audience behavior and panel attrition; and that comScore conduct a</p>

	study of the impact of member surveys on audience behavior.
<p><u>All measurements must be comparable across measurement systems.</u> If online audience measurement is to be the currency of online media, it is essential that all measurements of the same viewing event indicate the same audience size and composition; more broadly, the same media value. If online audience measurement is to be the currency of online media, it is essential that all measurements of the same viewing event indicate the same audience size and composition; more broadly, the same media value.</p> <p>Within a user-centric measurement system online audience measures are inherently comparable, however, there should also be comparability across measurement systems. If the same measurement and universe definitions are employed by any user-centric measurement system of adequate sample quality, they should produce audience size and composition estimates within sampling tolerances of each other for a given viewing event. Any discrepancies beyond sampling tolerances need to be explained through independent validation.</p>	The measurement across media within any panel-based system is inherently, internally comparable. comScore's use of industry standard metric definitions such as, page impressions, number visits and number visitors promote comparability with other data sources.
<p><u>All measurement systems should use industry standard definitions.</u></p>	netScore is in good compliance with definitions and in some cases, such as in defining web properties (see Appendix 6), appears to lead the industry.

FAST AGENDA FOR METHODOLOGICAL DEVELOPMENT

The Principles laid down both immediate goals for online media audience measurement, and objectives for the industry to pursue next, in the not-too-distant future. The large size of the netScore sample, together with the richness of the data they collect, hold the promise to illuminate the quality of current online media measures, and to improve that quality in the future.

FAST Agenda for Methodological Development

netScore Observations

The nature of non-response in online surveys and panels	<p>Where comScore uses random digit dialing and random direct mail recruitment, they achieve similar levels of compliance to the other user-centric measurement services.</p> <p>The ORC Caravan uses five call-back attempts to reach each respondent, which exceeds the normative survey practice, but due to the length of the omnibus survey, results in response rates of only 8.5%. We</p>
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	recommend that comScore shift to a survey approach that increases the level of response.
Validation experiments for non-standard online sampling techniques	The netScore sampling procedures represent a departure from the traditional media research reliance on probability sampling. Consequently, comScore has both an opportunity and a responsibility to provide substantial independent validation evidence of the netScore audience estimates.
Reconciliation of estimates derived from the different methods, and assessments of the biases associated with each of them	Comparisons of netScore measures with audited server measures offer the potential for significant learning about online audience measurement, and we encourage wide and open disclosure of the findings as the ongoing quality assessment activity progresses.
How do we differentiate the value of various exposure intensities (e.g., by time and degree of interactivity)?	comScore has a unique opportunity to use its dual capabilities to measure transaction and ad/media exposure to conduct experimentation related to online transactions, e.g., how transactions are influenced by online exposure frequencies, recencies, ad formats, etc.

Summary of Key Issues

Non-random sampling – comScore’s bold departure from this touchstone of marketing and media research in their recruitment of their *Marketscore Panel* raises a critical question, “Do we have the statistical tools to overcome the deficit of not having equal probability?” The industry’s veneration of probability samples stems from the conviction that we are less likely to have bias in our measurement with this sampling, and that if bias does somehow sneak in, with random sampling, we are equipped to find it and root it out. However, that conviction has weakened with the continuing declines in response rates to levels that, for some, has made “random” a dubious promise.

comScore uses random sampling in recruiting its *Enumeration Survey* sample and for its *Calibration Panel* along with iterative proportional fitting to derive projection weights. The adequacy of this approach will be best assessed by careful validation studies.

Sample projection based on multiple sources – netScore is not really a departure from traditional media measurement with this practice. Other media measurement services have used enumeration samples to gather measurement of household characteristics, such as ownership of computers, television sets, or being online. netScore has added another source of measures, a *Calibration Panel*, and, while this use of multiple sources adds to the analytic complexity, the adoption of iterative proportional fit algorithm to obtain projection weights, is a well-established procedure.

Effect on online behavior of speeding up content delivery – increased download time and participation in sweepstakes are key incentives offered to netScore members to date, though a broader array of benefits including email virus protection has been added.

A controlled test assessed the impact of speeded content on four measures of online behavior: pages viewed, minutes online, visits and Internet user sessions. No significant effect on any of the four measures was detected. comScore executed the test by switching off page acceleration for a randomly-selected group of 14,000 panelists and comparing the change in each measure from a pre-test period to test period to the change that occurred for a "matched" group of 14,000 panelists for whom page acceleration was not switched off.. The results of that study show that there is no impact on the measures provided.

In-Panel Surveys – Surveying of panelists involved in audience measurement is generally considered to be unacceptable due to the potential for biasing audience ratings. The exceptionally large panels involved in the netScore service can be argued to dilute any such possibility of bias. We recommend that comScore adopt a strict policy to enforce a minimum proportion of survey respondents in any given rating, and that they undertake a study of the impact of in-panel surveys on audience measures.

Recommendations for netScore Methodological Development

We believe that by concurring with the FAST Principles netScore can further increase the contribution it makes to client business success. Specifically, we recommend that comScore add the following to the current list of development initiatives:

- Publish a comprehensive Technical Guide and put in place a schedule for periodic review, revision and republication.
- Provide empirical support for their claim that the massive size of their sample together with their use of a *Calibration Panel* minimizes the risk of bias due to the self-selection by their general panelists. Specifically, we recommend an internal validation analysis performed by rigorously comparing online audience measures produced with the general sample to online audience measures estimated from the *Calibration Panel* alone.
- Provide empirical support for the netScore online audience measures by conducting external validation against server side audience measures that have been properly filtered and audited across each of the website categories that they report on. The external validation should use website publisher.
- Publish a study on the impact of in-panel surveys on audience behavior
- Publish a white paper the documenting the findings of their research on the impact on online behavior of speeding up content
- Publish the response rates and cooperation rates obtained in the *ORC Caravan Enumeration survey* and the *Calibration Panel* and take steps to improve the response rate for the enumeration survey.

- Provide people-based estimates, in addition to machine-based estimates, to promote comparability with the other media (Although we acknowledge that “computers” or “browsers” are what is actually being measured, both in server and user-centric measures and that discerning which of the individuals sharing a computer is online is difficult even with multiple registration, and that the same problem exists with the TV people meter to some degree.)

As comScore continues to gain experience with the implementation of its netScore service, the ARF suggests that they augment their present efforts to corroborate and to enhance the veracity of their data by securing audits of their procedures and data.

netScore Accomplishments and Challenges

In summary, netScore represents a bold departure from traditional media measurement in that it endeavors to measure both audience behavior and transactional behavior in the same respondents at a very fine-grained level. In scope as well as in scale, this undertaking holds significant promise for the research industry as a contributor to online media and commerce.

The projection methodologies relied on by netScore represent a logical extension of the procedures in place for weighting in general marketing and media research practice today. The automation used to enable real-time data collection and processing and to ensure the anonymity and security of data from very large numbers of respondents represents some important advances. The daily assessment of data quality tolerances is worthy of emulation by others.

The sample size involved in netScore is more like that found in marketing databases than it is in research panels. As such, netScore holds promise to take media measurement the “final mile”— from media exposure to advertising exposure and even to linking that exposure to behavioral response.

comScore’s current efforts to increase the size of their panel outside the U.S. is critical. With a truly global medium, such as the Internet, and serving an increasingly global marketing community, there is a great need to provide audience measurement that is comparable around the globe. It is also necessary that these audience measures be obtained in a manner that permits them to be aggregated beyond the national boundaries to regional levels and, where needed, to the global level.

comScore has documented better than any other service, the extent to which online purchase activity and website traffic that comes from outside the U.S. home—either from the workplace, or beyond U.S. borders. These findings, in turn, place large demands on all online measurement services to increase the quality and quantity of their sample in the at-work and non-U.S. domains.

comScore’s alliance with NetValue in Europe offers an opportunity to provide a non-U.S. *Calibration Panel*. The current practice of measuring “Anglophones” (someone for whom at least 25% of the websites from which he or she has requested pages are English-language websites) presents a challenge to project it to the appropriately size population in

each country/region. This will represent a taxing barrier to comparability between user-centric panel measures and server-centric measures as the online world becomes more multinational and multi-lingual.

Current comScore plans to increase the size of its U.S. Work Panel by offering additional incentives to employers to permit, even encourage, employees to participate in Marketscore from the workplace should be pursued diligently and rolled out vigorously. The current at work samples of all the panel services are woefully inadequate in size and representativeness, particularly in the light of the netScore findings of the significant proportion of the online media exposure and commerce activities that take place at work. While we acknowledge that the netScore U.S. Work sample size is 8-10 times larger than the sample sizes currently offered by other online media measurement services, comScore needs to aggressively pursue their plan to increase that panel size and representativeness further.

William A. Cook, Ph.D.
Senior Vice President, Research and Standards
ARF— the Research Authority

Appendix 1: **NetScore Definitions**

Property:

netScore Properties represent an aggregate of websites that are all controlled by a larger entity. The controlling entity must have at least a 50% ownership in the website for the website to be included in the aggregation.

Site session:

a sequence of requests for pages all from the same domain where two consecutive requests are not separated by more than 30 minutes.

Visits:

the estimate of the number of sessions that have occurred at a site during a period of time.

Visitors:

the estimate of the number of unique machines (not unique people) from which at least one session has occurred during some period of time.

Unique Visitors Worldwide (000s):

Provides an unduplicated count of all individually identified machines, located throughout the world whose users understand the English language, that made a visit to a selected property or domain during a given analysis period.

Unique Visitors U.S. (000s):

Provides an unduplicated count of all individually identified machines located in the United States that made a visit to a selected property or domain during a given analysis period. (Unique visitor count for AOL-Time Warner does not include traffic within the AOL-Time Warner proprietary network.)

Full-time Student:

Someone who was enrolled full-time at a post-secondary, title IV institution in the most recent October.

Home Office:

A place in a private residence from which a resident operates a business.

English-Language Proficient/Anglophones:

Someone is assumed to be reasonably proficient at reading and comprehending English if at least 25% of the websites from which he/she has requested pages are English-language websites.

Appendix 2: **FAST Definitions**

Objective ("independent") means that the party responsible for the estimates has no vested interest in the outcome.

Accurate ("unbiased") means that the estimating/counting method is without systematic distortion or bias. That is, the expected value of the estimate equals the mean of the population.

Precise means that the random variation of the estimate provides for an acceptable tolerance for the purposes to which the estimates will be put.

Reliable means that the method minimizes random fluctuation in estimates from report to report, such as result from sampling error. This type of error increases (although not proportionately) as the sample size decreases. Other types of measurement error besides sampling error may also be present, and the effect of their presence upon reported estimates should be evaluated and disclosed fully.

Appendix 3: Definitions of netScore Populations and Measurement Procedures

Definitions

U.S. Work. This is the population of computers used to access the Internet for more than e-mail in the last 30 days from workplaces in the U.S., except for those computers that have more than one user and those for which Internet access is significantly restricted. Workplaces include home offices, where a home office is a place in a private residence from which a resident operates a business. There are four categories of Internet access: unrestricted, screened, targeted, and e-mail only. A computer's access to the Internet is significantly restricted if the access is only "targeted" access, which means that a user can view pages only from domains in some list of domains, like an intranet plus documented research sites, or if the computer can only send and receive e-mail. A computer's access to the Internet is not significantly restricted if the access is "screened," which means that a user cannot view pages from domains in some list of domains, like known adult or gambling sites, or if the access is unrestricted.

U.S. School. This is the population of computers owned by full-time students that have been used to access the Internet for more than e-mail in the last 30 days from group quarters or a private residence for which a head of household is a full-time student. A full-time student is someone who was enrolled full-time at a post-secondary, title IV institution in the most recent October. Group quarters include dormitories and fraternity and sorority houses. This population excludes computers that are not privately owned, such as the computers owned by educational institutions.

International. This is the population of computers used to access the Internet for more than e-mail in the last 30 days by people who are not residents of the U.S. and who are reasonably proficient at reading and comprehending English ("Anglophones"). Someone is reasonably proficient at reading and comprehending English if at least 25% of the web-sites from which he has requested pages are English-language websites.

Measurement Procedures

U.S. Work. The size of the U.S. Work population is similarly estimated in three steps:

1. comScore estimates the proportion of adults who access the Internet from a computer in the U.S. Work population, and calculates the average number of such computers across adults who use at least one. The same ORC survey that provides data for estimating the size of the U.S. Home population also yields the information required to estimate this proportion of adults. The proportion is an average calculated with the data from the 14 weeks ending with the week containing the last day of the month.
2. comScore uses data acquired from Geolytics and linear interpolation to estimate the number of adults in any month.

3. comScore multiplies the estimated number of adults by the estimate of the proportion of adults accessing the Internet from a U.S. Work computer. This then is multiplied by the average number of U.S. Work computers calculated across adults who use at least one.

U.S. School. comScore uses information from both primary research and secondary sources to estimate the total number of computers owned by students and used to access the Internet.

The U.S. School population consists of two segments: computers belonging to students living in group quarters (21%) and computers belonging to students living in a private residence headed by a full-time student (79%). To estimate the size of the first segment, respondents to the Caravan survey are asked how many of their family members are students living in group quarters and how many of them own a computer that they use to access the Internet. The responses are used to derive the rate at which students living in group quarters own computers and use them to access the Internet. This rate is applied to estimates of the total number of students living in group quarters obtained from the National Center for Education Statistics.

To estimate the size of the second segment, responses to the Caravan survey from people in households headed by fulltime students are used. The responses are used to estimate the proportion of households that are headed by fulltime students, the proportion of those for which at least one member uses the Internet, and the average number of computers used to access the Internet among those households with at least one such computer. The product of these three estimates is taken and multiplied by an estimate of the number of households in the U.S.

comScore tests estimates of the number of U.S. School computers by comparing them to information from a periodic survey of college students called the Student Monitor, information published by institutions that require computer ownership, and other public or syndicated research of students.

International. comScore is currently using secondary research to estimate the population of computers used to access the Internet by Anglophones from each of 240 countries. comScore uses a variety of sources, including inter-governmental agencies, like International Telecommunications Union (the United Nations), the Eurobarometer (the European Common Market), government statistical agencies (like Statistics Canada and the Australian Bureau of Statistics), various private research organizations, news releases from other research organizations, and mechanical measurements of the size of the Internet (like netsizer and RIPE). comScore will, in the near future, begin to use data from Netvalue's population surveys to estimate the size of the International population in the countries where those surveys are conducted.

Appendix 4: **Determination of False Data Give in Registration Process**

Sometimes a participant does not answer all questions or answers some questions falsely. comScore tests for false information in several ways:

- Reverse resolution of the IP addresses of a computer yields the name of server, and in most cases the country in which a server is located can be deduced and this is compared to the country of residence reported during *Marketscore Panel* registration.
- For a server located in the U.S. or Canada, an even more specific location can often be inferred from the IP address of the server and that is also compared to the residence address reported by the participant during registration.
- Demographic characteristics of a household are verified and/or refined using demographic data from Acxiom Corporation together with block-level projections of household characteristics based on Census data. By comparing information provided during the registration process to the Acxiom and Census data comScore attempts to identify false data given in registration.

Among the data saved from online transaction confirmations are billing addresses. comScore is developing a capability to compare those billing addresses to the addresses provided during the registration process.

Appendix 5: **Marketscore Privacy Controls and Audit**

Report of Marketscore.com Management on the Privacy Controls for the Marketscore Internet Accelerator

We have adopted a privacy statement and established an array of privacy protection mechanisms so you can understand our commitment to the fair handling of information about our members. To go further and actively demonstrate this commitment to fair information principles, we have undertaken an independent, third party review of our privacy practices.

We have engaged [Ernst & Young LLP](#), a global assurance services firm, to periodically review and report to our members our compliance with our statements to you. Specifically, as the management of Marketscore.com, we are responsible for establishing and maintaining effective controls over the privacy and security of personally identifiable information about our members. The controls that we have established have been designed to provide you reasonable assurance that personally identifiable information is protected in conformity with Marketscore's disclosed privacy practices.

We have established these controls based on the accompanying criteria of the [WebTrust for Online Privacy issued by the American Institute of Certified Public Accountants' \(AICPA\)](#). We have also assessed these controls in relation to these criteria.

In doing this, the specific procedures and controls we have implemented include the following:

- Marketscore, Inc. (Marketscore) maintains a privacy statement that addresses the fair information principles. This privacy statement, located on the Marketscore.com web site, is accessible to all consumers.
- Personally identifiable information about members is not released in the statistical Internet activity reporting provided to Marketscore's customers.
- Terms and conditions have been included in Marketscore's legal agreements that prohibit other parties, who act on the behalf of Marketscore, from using personally identifiable information that Marketscore provides to them for any purpose other than to serve Marketscore.
- Members are given the ability to "opt-out" of any promotional messages or other targeting communications from Marketscore. Marketscore's contact lists are validated against the list of members who have "opted-out" to ensure that such communications are not sent to those individuals. These member's preferences regarding secondary usage are automatically updated and recorded in the Marketscore's member database.
- Marketscore members can submit changes to their account profiles through online access to their registration and account information. These changes are automatically updated and recorded in the Marketscore's member database.
- Information security policies and procedures are documented and communicated to personnel responsible for Marketscore.
- The Marketscore.com's architecture employs technologies to logically restrict access to the Marketscore environment and to protect against unauthorized access. For example, the Marketscore.com web site uses the Secure Socket Layer (SSL) transmission protocol to allow the encryption of member information while it is being transmitted across the Internet.
- Marketscore employees are trained as to how member information can be collected, used, and shared through employee orientation, ongoing communications, and the use of documented member information handling guidelines.
- Marketscore.com maintains an effective dispute resolution process to handle member concerns regarding privacy and displays such recourse and resolution procedures within its posted privacy statement.

Based on the actions we have taken, management of Marketscore asserts that as of September 30, 2001:

- We have disclosed our privacy practices for e-commerce transactions
- We have complied with such privacy practices
- We have maintained effective controls to provide reasonable assurance that personally identifiable information obtained as a result of electronic commerce is protected in conformity with the disclosed privacy practices

based on the AICPA/CICA WebTrust for On-Line Privacy Criteria identified above.

Regards,
Marketscore
September 30, 2001
<http://www.marketscore.com/>

Report of Independent Accountants To the Management of Marketscore, Inc.:

We have examined management's assertion, included in the accompanying report by management titled, [Report of Marketscore.com Management on the Privacy Controls for the Marketscore Internet Accelerator](#), that it believes that, as of September 30, 2001, controls surrounding the Marketscore are suitably designed to provide reasonable, but not absolute, assurance that:

- Marketscore.com discloses its privacy practices, complies with such privacy practices, and maintains effective controls to provide reasonable assurance that personally identifiable information is protected in conformity with its disclosed privacy practices.

This assertion is the responsibility of Marketscore, Inc.'s (Marketscore) management. Our responsibility is to express an opinion on this assertions based on our examination.

Our examination was conducted in accordance with attestation standards established by the American Institute of Certified Public Accountants and, accordingly, included obtaining an understanding of the Marketscore Network's disclosed privacy practices, testing for compliance with its privacy practices, testing and evaluating the operating effectiveness of controls, and performing other procedures as we considered necessary in the circumstances. We believe that our examination provides a reasonable basis for our opinion.

Because of the inherent limitations of controls, errors or fraud may occur and not be detected. Furthermore, the projections of any evaluation of the design of controls over Marketscore to future periods is subject to the risk that controls may become inadequate because of changes in conditions or that the degree of compliance with policies and procedures may deteriorate.

In our opinion, management's assertion that it believes that, as of September 30, 2001 Marketscore

- Disclosed its privacy practices for e-commerce transactions
- Complied with such privacy practices

- Maintained effective controls to provide reasonable assurance that personally identifiable information obtained as a result of electronic commerce is protected in conformity with the disclosed privacy practices

is fairly stated, in all material respects, based upon the AICPA/CICA WebTrust for On-Line Privacy Criteria specified in management's report.

This report is intended solely for the information and use of existing and potential Marketscore members and should not be used for any other purpose.

McLean, Virginia
September 30, 2001

Appendix 6: comScore Property Reporting

comScore defines a Property as the aggregation of websites to the highest level of ownership. By using the highest level of ownership comScore is able to measure the full impact an organization has upon the World Wide Web.

Ownership is determined by comScore and researched through but not limited to:

- Annual reports or 10-k filings
- Privacy Agreements
- Terms of Use Agreements
- Third party sources, e.g. Hoovers
- Website name registration
- Documentation provided by owners

In the case of joint or multiple owners the majority shareholder is credited with the site. When a site is of equal ownership the site is credited to the organization with the strongest associated brand identity. In situations where a government owns the site as a trustee for a corporation the corporation is credited with the site.

comScore does not recognize shared traffic agreements. Site traffic is not parsed and subdomains are not allocated and aggregated to a site because of a contractual agreement to share traffic. Each visitor is credited to one website that is associated to one web property. The result of not recognizing shared traffic agreements are a consistent method for visitor aggregation based on website surfing as opposed to content delivery.