FUSING LOCAL MARKET NEWSPAPER AUDIENCES

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Introduction and Summary

Scarborough is a local market service, covering 81 top U.S. markets (over 80% of the U.S. adult population). We are a currency service for newspapers. We also measure radio, television, selected magazines and websites, and a broad range of consumer lifestyles and shopping behaviors. Scarborough is the only MRC-accredited multi-media local market service in the U.S.

Web measurement has been a standard part of Scarborough surveys for several years. Respondents are asked about visiting each of about 50 web sites. Almost half are newspaper and other local media-related sites, which are market-specific. The rest are large "national" sites, which are common to all markets.

While these web measures have proven very useful, there is substantial client interest in more, such as matching our web site visitor measures to an Internet currency source, adding page view and time spent metrics, and measurement of the many, many other web sites of interest to our user community.

Fusion with a pure web measurement service such as Nielsen//NetRatings (NNR) appeared to offer a relatively simple, one-stopshopping solution to all these issues, and was suggested by several clients. To explore this possibility, Scarborough recently performed a series of Scarborough/NNR test fusions for our largest market, New York.

Our main findings are:

- Fusion cannot fully match NNR currency audience levels. NNR measures home and work web usage with largely separate panels. Currency estimates for total usage (e.g., unique visitors across work and home combined) are based, in part, on modeling, not on direct tabulation of a single respondent dataset. It is possible to fuse the separate home and work datasets in a manner that approximately matches NNR currency levels on average, but it is not possible to exactly match site by site currency levels or demographics.
- Fusion changes a high proportion of original Scarborough respondent answers. For 30-day visitors to newspaper web sites (15 sites in our study), for example, fusion changes about five times as many respondent answers as would minimally be required to match Scarborough to NNR total visitors by site. Although original Scarborough and NNR 30-day visitor estimates are fairly close, fusion changes about half of original Scarborough visitors to non-visitors and replaces them with original non-visitors.

The incidence of changed respondent web site answers and its consequent potential to impact the relationships of web visiting with newspaper readership and other Scarborough measures is troubling. The inability of fusion to match NNR currency levels by site compromises a key objective.

Together, these findings lead us to pause and reconsider, and we plan to explore other, smaller impact approaches to integrating NNR web measurements into Scarborough.

Over the next several months, we also plan to begin placing NNR meters with Scarborough respondents in one market on an experimental basis. This single source data, using currency instruments to collect real newspaper readership and web usage from one sample, could lead to new insights about paper/web behavior and will serve as an important development and testing resource as we continue to explore Scarborough/NNR integration.

Fusion Datasets

The Scarborough dataset used for fusion testing was the most recent release for New York (Release 1 2007, fieldwork from March 2006 to February 2007). There are about 13,500 total respondents in this dataset, 8,500 of whom reported using the internet in the past 30 days. Internet users also reported their web usage generally (e.g., ISP, where accessed, time spent, purchases and types of online activities, etc.) and which of 52^1 web sites they visited in the past 30 days and which of the 15 newspaper web sites they visited in the past 7 days.

¹ Scarborough questions are updated every six months. The 52 total sites and 15 newspaper web sites are the sites asked about in both six month field periods of Release 1 2007.

The NNR dataset used for fusion testing was the age 18+, New York subset of the January 2007 NetView active panel. NetView is NNR's currency product. January 2007 corresponds to the last full month of fieldwork for the Scarborough dataset.

There are some important characteristics of NetView as a fusion data source, especially for our local market purposes:

- The NetView home and work panels are largely independent. NNR methods for estimating home/work nets do not create the respondent level records required for fusion. For this reason, the home and work datasets were fused to Scarborough separately. This preserves NetView work and home audiences, but combined home/work audiences are fusion outcomes, not currency inputs.
- NetView is primarily a national product. The subsample of panelists age 18+ in the New York market was relatively small about 1,000 in total, with about 850 from the home panel and 150 from the work panel and was not selected or weighted specifically to represent New York.
- NetView in-tab qualification and weighting are performed independently for weekly and monthly data releases. Minor adjustments were made to create respondent records with week/month consistency and a single weight.

Table 1 shows the in-going size and demographic profile of past 30 day Internet users in the Scarborough and NNR datasets before fusion, at home and work separately.

	NY	Used at Home Past 30 Days		Used at Work Past 30 Days		
	<u>Total 18+</u>	Scarborough	NNR	Scarborough	NNR	
Total	16.1 MM	9.6 MM	7.7 MM	5.1 MM	5.2 MM	
Employed	65%	76%	74%	100%	100%	
Male	47%	50%	50%	52%	69%	
Female	53%	50%	50%	48%	31%	
Age 18-24	11%	15%	10%	11%	0%	
Age 25-34	17%	20%	19%	23%	29%	
Age 35-44	20%	24%	22%	28%	23%	
Age 45-54	20%	21%	23%	23%	24%	
Age 55-64	14%	13%	17%	13%	17%	
Age 65+	17%	7%	9%	2%	8%	
High School or Less	46%	32%	24%	25%	11%	
Some College	24%	27%	35%	25%	24%	
College Graduate	18%	24%	25%	28%	35%	
Post Graduate Degree	13%	18%	16%	22%	30%	
Black	16%	13%	15%	12%	12%	
Hispanic	19%	13%	14%	13%	7%	

Table 1: Past 30 Day Internet Users, at Home and at Work

Scarborough has appreciably more New York home internet users than NNR, and there are non-trivial Scarborough-NNR differences in demographic composition, especially for work internet users.

Scarborough and NNR internet user populations both skew employed, better educated and not old or minority. As will be shown later, despite fewer 30-day internet users than Scarborough, NNR reports somewhat more 30-day visitors on average to the 52 web sites.

Fusion Models

Fusion was performed using the approach first described by Roland Soong and Michelle de Montigny at the 2001 WRRS, which matches respondent records in a way that guarantees preservation of total currency audience levels from each dataset (e.g., newspaper audiences from Scarborough, web site audiences from NNR). Output from the process is a new set of records, each containing the newspaper readership and other non-web measures of a Scarborough respondent and the web usage measures of an NNR panelist.

As noted earlier, the home and work NNR datasets were fused to Scarborough separately. This preserves the separate NNR home and work audiences, but total visitors (i.e., home/work nets) are products of the fusion. Preservation of audience levels in demographic sub-groups depends on how much importance is given to demographics in matching respondent records.

Matching was based on distance scoring. A distance function gives each potential pair of respondent records a single distance score based on similarity across many characteristics in combination. The goal is to then find the set of respondent record pairs that minimizes total distance. Since it is impossible to always find perfect matches, several different distance functions were tested.

Results for five fusions will be presented here. Because the fusions control how the NNR home and work datasets are integrated, places the internet was accessed (i.e., home and/or work) was an important matching characteristic in all five fusions. The fusions otherwise differ on the relative importance given to demographics, newspaper web sites visited, and other web sites visited.

- **Fusion 1: Demographics**. Matching primarily based on demographics. Secondary weight given to web sites visited. This was intended more to serve as a reference point than as a serious candidate for a final choice fusion model. Note, however, that this fusion maximizes preservation of NNR home and work audiences by demographic group.
- Fusion 2: Newspaper Web Sites. Matching primarily based on newspaper web sites visited. Secondary weight given to demographics and non-newspaper web sites visited. This model produces the lowest fused newspaper web site audiences (i.e., maximizes the duplication between fused home and work visiting) and minimizes the number of original Scarborough newspaper web visiting responses changed by fusion.
- Fusion 3: Non-Newspaper Web Sites. Matching primarily based on non-newspaper web sites visited. Secondary weight given to demographics and newspaper web sites visited. This model produces the lowest non-newspaper web site audiences and minimizes the number of original Scarborough non-newspaper web visiting responses changed by fusion
- Fusion 4: Demographics and Newspaper Web Sites. A compromise between Fusions 2 and 3, with matching primarily based on all web sites visited (newspaper and non-newspaper) and secondary weight given to demographics.
- Fusion 5: Demographics and all Web Sites. Equal importance given to demographics and all web sites (newspapers and non-newspapers) visited.

Example Results

Before discussing summary results, it may be useful to walk through an example for one newspaper and one fusion model.

Table 2 shows example 30-day visitor results.

Table 2: Example 30-Day Fusion Results, Newspaper A Web Site

Web Visitors Before Fusion (000)	283
Web Visitors After Fusion (000)	<u>277</u>
After/Before Index	98
Minimum Visitor Response Changes Required	6
Fusion Visitor Response Changes	390
Before and After Fusion Visitors	85
% of Before Fusion Visitors	30%

Table 2 reads as follows:

- Before fusion (i.e., the original Scarborough estimate) the web site had 283 thousand 30-day visitors. After fusion it has 277 thousand. The after fusion audience level indexes at 98 compared to the before fusion audience.
- The fused web audience could have been achieved by changing the Scarborough web visiting responses of 6 (thousand weighted) respondents i.e., by changing 6 visitors to non-visitors.
- Fusion changed the visitor status of 390 respondents. With a net change of 6, this works out to fusion adding 192 new visitors (i.e., changing 192 original non-visitors into visitors) and subtracted 198 original visitors.
- Of the original 283 visitors, 85 (283 198) or 30% remain visitors after fusion.

Table 3 shows example 7-day results, for the same newspaper and fusion model.

Table 3: Example 7-Day Fusion Results, Newspaper A

	Original <u>Scarborough</u>	Fusion X
7-Day Readers (000)	698	698
7-Day Web Visitors (000) After/Before Index	167	101 60
INA (combined 7-Day Readers/Visitors) After/Before Index	770	768 100
Duplicated Readers/Visitors % of Visitors	95 57%	30 30%

Table 3 reads as follows:

- There are 698 7-day (cume) readers of Newspaper A. This is a Scarborough currency estimate and is not changed by fusion.
- Before fusion there were 167 7-day visitors to the Newspaper A web site. After fusion there are 101, which indexes at 60 against the original 167.
- Despite 66 fewer 7-day web visitors, the fused INA estimate is virtually the same as the original 768 vs.770.
- The combination of fewer fused 7-day web visitors and the same INA occurred because fusion reduced reader/visitor duplication. Before fusion 95 of 167 (57%) visitors were readers. After fusion, only 30 of 101 (30%) visitors are readers.

Summary Results

Table 4 shows average 30-day results by model, for newspaper and non-newspaper web sites.

Table 4: 30-Day Fusion Results by Site Type and Fusion Model

	Fusion 1	Fusion 2	Fusion 3	Fusion 4	Fusion 5
Average for 15 Newspaper Web Sites					
Web Visitors Before Fusion (000)	396	396	396	396	396
Web Visitors After Fusion (000) After/Before Index	$\frac{417}{105}$	<u>368</u> 93	$\frac{414}{105}$	<u>382</u> 96	<u>394</u> 99
Minimum Visitor Response Changes Required	109	92	109	84	92
Fusion Visitor Response Changes	557	288	673	392	443
Before and After Fusion Visitors	128	238	68	193	174
As // of before rusion visitors	5270	00 %	1770	4970	44 /0
Average for 37 Non-Newspaper Web Sites					
Web Visitors Before Fusion (000)	1,404	1,404	1,404	1,404	1,404
Web Visitors After Fusion (000)	1,708	1,661	1,500	1,587	1,623
After/Before Index	122	118	107	113	116
Minimum Visitor Response Changes Required	745	706	611	661	686
Fusion Visitor Response Changes	1,798	1,526	1,142	1,267	1,414
Before and After Fusion Visitors	657	770	881	862	808
As % of Before Fusion Visitors	47%	55%	63%	62%	58%

For newspaper web sites:

- Fused visitor levels range from a low of 368 for Fusion 2 to a high of 417 for Fusion 1. All are within 10% of the original Scarborough value of 396.
- Lower visitor levels and lower incidences of changed visitor status rates are directly related to the importance of newspaper web sites in the fusion. Newspaper web sites are solely dominant in Fusion 2, share dominance with non-newspaper web sites in Fusion 4, and share dominance with demographics and non-newspaper web sites in Fusion 5.
- All of the fusions change a high proportion of original Scarborough respondent answers from 3 to 6 times as many as minimally required to achieve fused visitor levels. In four of the five fusions less than half (17% to 49%) of respondents who originally reported visiting the site remain visitors after fusion.

For non-newspaper web sites:

- Fused visitor levels range from a low of 1,500 for Fusion 3 to a high of 1,708 for Fusion 1. All are modestly higher than the original Scarborough level of 1,404, by 7% to 22%.
- As with newspaper sites, lower visitor levels and lower indices of changed visitor status are directly related to the importance of the web sites in question in the fusion. Non-newspaper web sites are solely dominant in Fusion 3, share dominance with newspaper web sites in Fusion 4, and share dominance with demographics and newspaper web sites in Fusion 5.
- Fusion makes relatively fewer visitor status changes for non-newspapers than for newspapers (because the audience levels are higher), but still makes about twice as many changes as minimally required to reach the fused levels. Although all the fusions raise the average visitor level of non-newspaper web sites, only about half (47% to 63%) of original Scarborough visitors remain visitors after fusion.

Table 5 shows average 7-day results for the 15 newspapers.

	Original <u>Scarborough</u>	Fusion 1	Fusion 2	Fusion 3	Fusion 4	Fusion 5
Scarborough 7-Day Readers (000)	1,350	1,350	1,350	1,350	1,350	1,350
7-Day Web Visitors (000)	264	176	165	176	167	170
After/Before Index		67	63	67	63	65
INA (combined 7-Day Readers/Visitors)	1,451	1,463	1,432	1,478	1,441	1,448
After//Before Index		101	99	102	99	100
Duplicated Readers/Visitors	162	64	83	48	76	72
As % of Visitors	62%	36%	50%	28%	46%	42%

Table 5: Average 7-Day Results for 15 Newspapers by Fusion Model

- Average fused 7-day newspaper web audiences are considerably lower than original Scarborough 7-day audiences, indexing from a low of 63 to a high of 67. Not shown in the table, fused 7-day web audiences are lower than Scarborough for every newspaper web site in all five fusions.
- Despite sharply lower 7-day web audiences, fused INA is about the same as original Scarborough. Two of the fusions actually produced higher average INA, despite reducing 7-day web audiences by about a third.
- This combination of sharply lower web audiences and about same INA occurs because fusion significantly reduces reader/visitor duplication.
- The patterns by fusion model follow 30-day results for example, Fusion 2 produces the lowest 7-day audience and retains the most duplicated readers/visitors but the differences between fusions are smaller.

Conclusions and Next Steps

The five fusion models discussed here surround the possible fusion options, and it is clear there is no genuinely good choice. One can choose which kinds of web sites have fewest changes from original Scarborough responses, but all the fusions produce many changes for all kinds of sites. These changes have significant impact on the interrelationships of web usage and other Scarborough measures, as shown for newspaper reader/visitor duplication and INA.

All of the fusions maintain the separate NNR home and work web visitor levels on a site by site basis, but combined work and home visitors are products of the fusions and thus vary from fusion to fusion. The real NNR 30-day total visitor currency averages for these newspaper and non-newspaper web sites are 370 and 1,540, respectively.

Fusion 2 comes closest to the NNR currency average for newspaper web sites, makes the fewest changes to original Scarborough newspaper web site responses, and comes closest (albeit not very close) to maintaining original Scarborough reader/visitor duplication. By the same measures, however, Fusion 2 is among the worst fusions for non-newspaper web sites.

For Fusion 3 the same pattern holds, in reverse. It comes closest to the NNR currency average for non-newspaper web sites and makes the fewest changes to original Scarborough non-newspaper web site responses, but it is the worst fusion for newspaper web sites.

Fusion 4 is a compromise between Fusions 2 and 3. It is the second best choice for newspaper and non-newspaper web sites, and produces visitor levels that are slightly higher than NNR currency averages for both.

All of these three fusions -2, 3, and 4 – gave little or no consideration to demographics. Fused demographics were left to the fusion process, and were driven more by original Scarborough than NNR demographic profiles. Adding demographics as a fusion consideration either partly (Fusion 5) or wholly (Fusion 1) produces visitor levels that are higher and further from NNR currency levels and increases the incidence of changes to original Scarborough web sites responses.

To summarize:

- NNR total (i.e., combined work and home) currency visitor measures are based, in part, on modelling processes. They do not come from direct tabulation of a single respondent dataset, so there is no single dataset to fuse with. Instead, there are separate work and home datasets. It is extremely difficult to simultaneously fuse with these datasets in a way that preserves average currency levels, let alone site or demographic currencies. These objectives were important reasons for considering fusion. Failure to achieve them is a major disappointment.
- Fusion changes a high proportion of original Scarborough respondent answers and has considerable impact on the interrelationship of web usage with traditional media and other Scarborough measures. Any data integration must change some respondent answers, but the incidence of changed answers by fusion is much higher than would minimally be required to match the fused results in total. This is the cost of keeping NNR home and work records whole i.e., fusion implicitly gives maintenance of NNR web/web relationships absolute priority over maintenance of reader/visitor (or other web/non-web) relationships.
- Scarborough's original 30-day web visitor measures are, in fact, fairly close to NNR currency levels. Fusion stirs things up changing half of original visitors to non-visitors and replacing them with original non-visitors without changing the totals very much.

These are general issues in any fusion with NNR, though they may be exacerbated by our particulars. Our local market focus means relatively small NNR sample sizes, which constrains matching possibilities. Our newspaper focus means very high reader/visitor duplication and concentration of media in a single category.

At least for now, we are putting further fusion effort on hold and are planning to explore other, smaller impact approaches to integrating NNR web measurements into Scarborough.

For many years Scarborough's standard syndicated processing has included conforming radio listening to Arbitron currency levels, by station and daypart, for both cumes and gross impressions. The process operates on totals and makes the minimum required changes to original respondent answers, otherwise preserving Scarborough demographic profiles and interrelationships. An approach along these lines would actually permit better matching to NNR currency levels by site than fusion, with many fewer changes to original Scarborough responses and smaller effects on web/non-web interrelationships.

Over the next several months, we also plan to begin placing NNR meters with Scarborough respondents in one market on an experimental basis. This single source data, using currency instruments to collect real newspaper readership and web usage from one sample, could lead to new insights about paper/web behavior and will serve as an important development and testing resource as we continue to explore Scarborough/NNR integration.