	Best Practice for OOH Modeling: Attribution	Background/Context
Data Inputs		
Ad Occurrences		
1	Review Attribution best practices every 12 months.	The data needs for attribution are not as well formulated as for marketing mix models There are many data sources and experimentation and development is continuously occurring.
2	Only actual, audited OOH units, complete with posting and take-down dates for each unit, are suitable for measurement.	Audited Geopath data is essential for true analysis of campaign performance.
3	For Digital OOH, Playlogs are required to determine exposure to the specific creative running at the time of exposure. These should be standardized for consistency and efficiency.	For digital OOH, Playlogs report the specific time each ad in the cycle is played. The OOH industry needs standardized formats for Playlogs, reporting latency (delay) and a way of assuring that internal system clocks are synchronized.
4	Standardized ad identifiers (Ad-ID) should be adopted to ensure consistency of reporting.	Ad-ID is a naming system for advertising assets. It attaches a universal identifier to each individual piece of ad creative, and will be an indispensable tool for attribution studies. A standard code per OOH execution would allow for accurate, granular unit-level creative tracking and optimization.
Ad Exposures		
5	Deduplicate mobile location data and balance for representivity on multiple dimensions including geography, device characteristics (e.g. operating system), and demographics.	Multiple sources of mobile location data are generally required for sufficient scale. These are likely to have duplications among them, which should not be double-counted. The resulting data set must be representative in order for the attribution results to provide a sound estimate of campaign performance.
6	Regularly track data scale, coverage and data quality given the deprecation of Mobile Ad IDs and SDKs.	Scale is essential for the attribution model to produce statistically significant estimates of OOH's contribution to the marketplace outcome. Deprecation of IDs will reduce data scale and threaten data representivity.
7	Ensure complete and full coverage of the campaign's geography.	Some areas may differ in terms of likelihood to see a campaign ad, conversion propensity, brand awareness, access to retail locations, socio-economic, cultural or other marketplace factors. If coverage is not complete, coverage deficiencies must be remedied by weighting and projection.
8	The highest level of location data precision should be used, generally GPS, WiFi SSID, or Bluetooth Beacons.	Less precise measures will almost certainly over-count both exposures and retail visits. For more details see: https://oaaa.org/Portals/0/Public%20PDFs/General/DOOHExposureMethodologyStandard_May2021.pdf
9	Latitude/longitude data precision should standardized.	Less precise measures will almost certainly over-count both exposures and retail visits. For more details see: https://oaaa.org/Portals/0/Public%20PDFs/General/DOOHExposureMethodologyStandard_May2021.pdf
10	The OOH industry should establish a standard threshold for mobile persistence/continuity of reporting.	Perfect persistence is too high a standard to be expected. The absence of measure leaves gaps in the data and also bias the data toward non-detection of impressions, as well as outcomes.

11	The OOH industry should establish standards for all aspects of mobile location data.	Any difference between data sets' scale, coverage (and how it is weighted and projected), precision and persistence will result in different impression counts.
12	The industry should establish a standard set of metadata (including minimum requirements) for qualifying Opportunity to See.	Data comparability among data providers would be greatly advanced with standardized Geopath audited viewshed data.
13	Device level exposure data should be validated and calibrated to Geopath data.	This practice would align the exposure data being used for performance measurement with the currency used for audience delivery and buying and selling. It would also bolster confidence in device level exposure data.
14	Device level exposure data should be resolved to the same user-level (household, device, persons) as the outcome data.	For example, retail visit outcomes are associated with a person. CPG purchase data is associated with a household.
Matching Outcome Measures		
15	Understand the role of OOH in the plan. Align the data with the strategic outcome associated with OOH.	Outcome data should be selected to accurately reflect the performance of OOH against its designated role in the media plan, in the geographic area the OOH campaign has been executed. For example, if OOH's objective was to drive retail traffic, it should not be held accountable for driving sales.
16	For retail visits, utilize the same source of mobile data for both exposure and outcomes measurement.	This practice avoids the need for matching two data sets and any potential coverage or bias issues that could result.
17	Use only current, accurate and highly credible POI data that is acceptable to the end client.	Ensure accurate and precise geo-fences for retail locations are fresh and reflect any recent changes in store closings and openings.
18	Other outcome data should be sourced from trusted industry standard 3rd parties.	This will ensure credibility with advertisers.
19	Ensure outcome data covers over the same geographic area as the campaign.	Their data must be representative of the coverage area of the OOH campaign. First, make sure the data covers the area of the OOH campaign. Then, does it capture data from all locations or is it a representative sample? Make sure it is representative of all outlet sales. These concepts apply both offline and online. The simplest way to check this is by comparing some key metrics, in aggregate, with the advertiser's reference data.
20	Match ad exposures and outcome data at the device or household level in a way that ensures enough data for statistically significant attribution analysis. The data, post-match, must remain representative and cover the campaign geography.	There are a number of reputable identity resolution companies that can provide this service in a privacy compliant manner. No match ever includes 100% of the source data. There are 3 questions to ask at this point in the process. (1) Did the matching process leave enough data for a statistically significant attribution analysis? (2) Does the matched data a set still adequately cover the geographic area of the OOH campaign? (3) Is the matched data set still representative of the advertiser's category?
Analytics	*Single channel OOH Attribution studies typically employ Test/Control methodology.*	
21	Ensure the control group consists entirely of unexposed persons/household and mirrors the test group, which consists entirely of persons/households that were exposed.	Exposure to the OOH campaign should be the only difference between the two groups.
22	The control group must never just be the entire set of unexposed persons/households.	Using the entire set of unexposed persons/households will provide a control group largely outside of the campaign's target audience. As a result, they will have a lower probability of performing the desired outcome. The comparison to the exposed, test, group will overstate the contribution of OOH.

23	The control group must match the test group on propensity to perform the desired outcome.	When the campaign is intended to bring in new consumers, it will also be important that the control group match the test group on the characteristics used to target those ads, which might be demographics, or some other marker of consumers' propensity to try, consider, find the brand relevant, etc.
24	If there are other important conversion drivers, the control group must match the test group on these dimensions as well	For example, if the brand is running a large consumer promotion or a big television campaign, the test and control groups should have an equal opportunity of exposure to them. Similarly, if a campaign is tied to an external variable, like weather, the test and control groups should match on exposure to that factor. If it's not possible to ensure comparability between test and control groups for these factors, the attribution can still be used on a relative basis.
25	Test and control groups must also match well on continuity/persistence of data reporting frequency and precision. Locations must have the precision required for the specific task. See: https://oaaa.org/Portals/0/Public%20PDFs/General/DOOHExposureMethodologyStandard_May2021.pdf	Infrequently reported data is more likely to undercount both exposures and outcomes, resulting in generally lower conversion rates. Similarly, lower precision data may overstate retail visit outcomes. These biases must be balanced between test and control groups.
26	Advertising windows must be at least 30-days. Shorter reads can be made, but they will not capture the full value of advertising.	Advertising has a lingering effect on consumers long after the actual exposure. A campaign's impact on the desired outcome will continue to manifest after the campaign ends. This lingering effect is capture by the attribution window, a period of time during which outcomes are still counted, after the campaign ended.
27	Pre-campaign periods should match or correlate for both test and control groups.	If the matching of those groups has been done well, the pre-period should reveal the same incidence of the desired outcome between the two. If there is a big difference, the two groups have not been properly matched for propensity and that balance must be revisited. If there is a small difference, it can be accommodated by calculating the post-pre period difference for each group and then taking the difference of those two differences.
28	Weights must be applied to test result data samples when data does not represent the campaign area, when the outcome propensity is not representative, and when campaign reach is different.	If the data used for attribution did not reflect the total coverage area of the campaign, the results need to be projected to provide an estimate of the campaign's total impact. If it was not fully representative of product and consumer characteristics of the campaign's total coverage area, results should be weighted to bring them more into line with the campaign coverage area. Propensity, itself, will always be the most important weighting factor.
29	Attribution results should be broken-out as granularly as possible by creative and OOH format.	This practice enables identification of strong versus less effective contributors to campaign impact. These insights can lead to increasingly more effective OOH campaigns, and with short enough reporting latency, they can lead to mid-campaign optimization.
30	Do not overstate the contribution of OOH to sales as a result of single channel Attribution studies. Be realistic.	Single channel Attribution studies tend to overstate a medium's contribution in a multimedia campaign. Because attribution generally estimates the impact of OOH in isolation, we need to recognize that it will overstate its contribution in any multi-media campaign, or marketing mix with significant trade or consumer promotion. Attribution is blind to the impact of those other factors and is likely to misattribute them to OOH.