A Comparison of Leading Providers of Media Performance Analyses

JANUARY 2018

RESEARCH PROVIDED BY

SEQUENT Partners™
Participants

MARKETING MIX MODELERS WITH ATTRIBUTION PRODUCTS

- Analytic Partners
- in4mation insights
- IRI
- Marketing Evolution
- (m)Phasize, a Publicis company
- Neustar
- Nielsen

ATTRIBUTION SPECIALISTS WITH CROSS-PLATFORM PRODUCTS

- Conversion Logic
- Convertro, owned by Oath, a subsidiary of Verizon
- C3 Metrics
- Google Attribution 360
- Merkle, owned by Dentsu Aegis
- Visual IQ, a Nielsen company

TELEVISION OR DIGITAL ATTRIBUTION PROVIDERS

- Data + Math
- iSpot
- Placed
- Samba TV
- SMI
- TVSquared
- WyWy, owned by TVSquared

SINGLE SOURCE PROVIDERS

- Concentric
- IRI Lift
- Nielsen Catalina
- Oracle
- TiVo

Please note that providers have been grouped according to their core, or original, offering — a somewhat subjective grouping. Most providers are constantly refining their offering, so this view of their products may be incomplete. We encourage readers to reach out to the providers for the most updated information.
Introduction

CIMM/4A’s 2016 study of current practices in attribution and marketing mix modeling identified a range of analytics providers using a variety of data sources and techniques.

It’s a complicated and frequently overwhelming space for the industry.

A comparison of the companies, offerings and approaches will help buyers become more comfortable with the providers and their techniques.

Overview

This is a comparison of current offerings in digital, cross-platform, multi-touch and television attribution and marketing mix modeling companies available in the US market today. It is descriptive, not evaluative.

In the guide, providers are grouped according to their main offerings (Marketing Mix Modelers, Digital/Television Attribution Specialists, Single Source Providers), although it’s important to recognize many providers offer a suite of analytic products depending on the needs of the client and availability of data.

The list of providers and the variables with which to compare providers were based on recommendations from CIMM and the 4A’s Media Measurement committee.

Provider Comparison Contents

Company Positioning
Short overview of company’s main reason for being

Primary Offerings
Rough share of business from attribution and marketing mix projects; can exceed 100% due to multiple offerings; in some cases percentages unavailable

Approach
Statistics most commonly employed (see glossary)

Use Cases
Applications of the analytics in digital, cross-platform or full marketing mix assessment

KPIs Delivered
Online traffic/conversion, offline retail traffic/sales and brand metrics

Optimization Areas
Digital or cross-media channels, across sales and brand metrics

Media Covered
Full range of media vehicles included in the models

Source of Television Data
Modelers have a range of television viewing data, including Nielsen, Smart TV and set top box data

Level of Media Granularity
Level of detail at which the modeler works

Model Inputs
Other marketing variables (e.g., price/promotion), external influences (e.g., weather, etc.) and competitive behavior modeled at a similar level

Advertising Parameters
Diminishing returns, adstock, long-term effects, media interactions and halos, baseline and incrementality

Data Integration Methods
Process for combining cross-platform datasets in the model

Collinearity Work-Arounds
Statistical approach to teasing out events or investments that occur at the same time

Model Validation
Method for determining the accuracy of the model findings

Data Delivery Options
Dashboards, inflight-optimizers, programmatic media, data feeds to other applications

Cycle Time
Typical model update intervals

An exhaustive glossary of key terms begins on Page 33.
Marketing mix modelers (MMM) are the originators of ROI modeling, with the first commercial firms offering these services in 1989. Ironically, both Marketing Management Analytics (MMA) and Hudson River Group, the two veterans of 1989, declined to participate in this study. Accenture, the consulting firm with a significant analytics practice, is also not included here for the same reason.

MMM firms originally built regression models at the “market” level — DMAs or other sales territories — with observations by week. Today, they all offer more granular analytics with finer geographies and shorter time periods, and have also developed attribution capabilities within their MMM framework, “Unified Models.” Simple linear regression has given way to more advanced statistical techniques, frequently hierarchical Bayes (see glossary). However, the regression model built on weekly DMA level data is still a common denominator.

Marketing mix models typically incorporate all of the controllable (trade spending, for instance) and uncontrollable factors (weather, for instance) of the marketing mix, and produce a sound estimate of the sales contribution and ROIs of each. As a result, they provide valuable strategic insights. The “negative” often associated with these models is the flip side: They require 2-3 years of historical data, making them backward-looking, and are not sufficiently granular to drive tactics.

Marketing mix models are also able to estimate both the short-term and long-term (quarterly, annual or multi-year) effects of advertising. However, this is not frequently done since advertisers focus almost exclusively on short-term performance.

Not all of these modelers are the same. Nielsen and IRI have exclusive access to their store-level data, which provides the perfectly defined view of retail promotion tactics so important to CPG marketers. Marketing Evolution and Millward Brown both have consumer-level techniques that look below the market level, more like attribution modelers. But their ability to provide a more comprehensive view of the marketing mix gives us reason to group them here. The unique benefit of these approaches is that they can be both strategic and tactical, and offer insights into consumer segments.
**Analytic Partners**

**PRIMARY USE CASE** — Measure, forecast and optimize the impact of marketing investments, short-term and long-term for multiple KPIs, including revenue, profit, brand equity, acquisition, unique visits, store traffic, etc.

**PRIMARY OFFERINGS**

<table>
<thead>
<tr>
<th>Offerings</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Marketing Mix Models</td>
<td>24%</td>
</tr>
<tr>
<td>Digital Attribution</td>
<td>8%</td>
</tr>
<tr>
<td>TV Attribution</td>
<td>30%</td>
</tr>
<tr>
<td>Unified Models</td>
<td>60%</td>
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</tbody>
</table>

(20% location)

**APPROACH**

Integrated store/market/geo/segment-level econometrics and person/user/HH-level discrete choice attribution models using machine learning

**SOURCE OF TV DATA**

Renttrak, Kantar, NMR

**MEDIA COVERED**

All addressable and non-addressable paid, owned and earned media that influence performance, such as TV, Radio, Magazines, Out Of Home, Mobile (Display, Video, Search, In-app, Social), Digital Display, Online Video, Native Ads, Social, Paid Search, Organic Search, Word Of Mouth, Influencer Programs, PR, etc.

**LEVEL OF GRANULARITY**

Geography varies by media type, person/user/HH, DMA, Zip, daily, weekly or event-level media type, genre, sub-type and property; creative at the individual execution-level. Outcomes: customer segment, market or store-level

**DATA INTEGRATION**

CRM data linked by person/customer; non-addressable media aligned on geography and time, partner with panel providers, device maps and onboarding partners

**COLLINEARITY WORKAROUND**

Granular data, raw data transformation, experimental design, statistical techniques

**MODEL/RESULTS VALIDATION**

Normative database and model fit statistics; Experimental Design Holdout, Forecast Accuracy

**CYCLE & REFRESH TIMING**

Real-time (daily and/or weekly) data updates and weekly, monthly or quarterly model refreshes

**USE CASES**

**Contribution Assessment**
- Digital Campaign
- Cross-Media Campaign
- Full Marketing Mix

**KPIs**
- Online Traffic
- Online Conversion
- Offline Retail Traffic
- Offline Sales
- Brand Metrics

**Budget Optimization**
- Across Digital Channels
- Across Cross-Media Channels
- Across Sales & Brand Metrics

**MODEL INPUTS**

- Other Marketing Variables
- External Influences
- Competitors

**ADVERTISING PARAMETERS**

- Diminishing Returns
- Adstock
- Long-term Effects
- Media Interactions and Halos
- Baseline/Incrementality

**DATA DELIVERY & APPLICATIONS**

- Dashboard
- Optimizers
- Programmatic
- Data Feeds to Other Sources

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in4mation insights

PRIMARY USE CASE — Marketing mix — returns on marketing investments, resources allocation, profit optimization, sales performance and change drivers with highly disaggregated data.

PRIMARY OFFERINGS
- Marketing Mix Models: 75%
- Digital Attribution: 0%
- TV Attribution: 0%
- Unified Models: 0%

APPRAOCH
- Econometrics (Hierarchical Bayesian and network models) integrating behavioral and attitudinal metrics, geo-location and other metrics

SOURCE OF TV DATA
- Client provided

LEVEL OF GRANULARITY
- Geo-location (e.g., store) up to national, daypart, daily, weekly or monthly, media type, genre, source, and spot length; campaign-level; outcomes at national, market, or store-level

MEDIA COVERED
- TV Attribution
- Unified Models

DATA INTEGRATION
- Store and market-level data are harmonized by time and geography

COLLINEARITY WORKAROUND
- Bayesian priors, Bayesian variable selection methods and other related techniques

MODEL/RESULTS VALIDATION
- Holdout samples and model fit statistics

CYCLE & REFRESH TIMING
- Typically quarterly

USE CASES
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MEDIA COVERED
- Digital impressions by DMAs, device types, Display/Video, and campaign. TV and Radio by dayparts, day of week, positions in break, program genre, source and spot length, Magazines and OOH

DATA INTEGRATION
- Store and market-level data are harmonized by time and geography

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DATA DELIVERY & APPLICATIONS
- Dashboard
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IRI provides a full suite of solutions — both marketing mix modeling and attribution solutions as well as matched market or matched store testing. Focused on the CPG industry.

**PRIMARY OFFERINGS**

- Marketing Mix Models
- Digital Attribution
- TV Attribution
- Unified Models

**APPROACH**

- Marketing mix modeling and attribution studies

**SOURCE OF TV DATA**

- Rentrak or client

**LEVEL OF GRANULARITY**

- Data at store, zip or DMA level

**DATA INTEGRATION**

- Ingests, normalizes and harmonizes disparate datasets within their data platform.

**COLLINEARITY WORKAROUND**

- Correlation analysis prior to modeling and store-level granularity, data grouped as needed

**CYCLE & REFRESH TIMING**

- 6-8 weeks

**MEDIA COVERED**

- TV, Digital, Social, Print, Radio, Mobile and OOH

**USE CASES**

**Contribution Assessment**

- Digital Campaign
- Cross-Media Campaign
- Full Marketing Mix

**KPIs**

- Online Traffic
- Online Conversion
- Offline Retail Traffic
- Offline Sales
- Brand Metrics

**Budget Optimization**

- Across Digital Channels
- Across Cross-Media Channels
- Across Sales & Brand Metrics

**MODEL INPUTS**

- Other Marketing Variables
- External Influences
- Competitors

**ADVERTISING PARAMETERS**

- Diminishing Returns
- Adstock
- Long-term Effects (On demand)
- Media Interactions and Halos
- Baseline/Incrementality

**DATA DELIVERY & APPLICATIONS**

- Dashboard
- Optimizers
- Programmatic
- Data Feeds to Other Sources

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Marketing Evolution

PRIMARY USE CASE — Holistic understanding of all business drivers and detailed in-campaign pricing, message, targeting, and media mix optimization. Brings together marketing mix, attribution and brand tracking in one platform.

PRIMARY OFFERINGS
Marketing Mix Models.....................N/A
Digital Attribution........................N/A
TV Attribution ................................N/A
Unified Models ..........................100%

APPROACH
Integrated econometrics, person/HH-level attribution

SOURCE OF TV DATA
Media Agency, Smart TV and Set Top Box

LEVEL OF GRANULARITY
Every impression: Log-level media files that capture every digital impression. Person-based analysis measuring every individual impression of offline media, including every TV program, every out-of-home billboard, every direct mail piece, every radio station, etc.

COLLINEARITY WORKAROUND
Experimental design

DATA INTEGRATION
Merged at the individual level

MODEL/RESULTS VALIDATION
Experimental design

CYCLE & REFRESH TIMING
Weekly reporting cycles

USE CASES
Contribution Assessment
• Digital Campaign
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DATA DELIVERY & APPLICATIONS
• Dashboard
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SOURCE OF TV DATA
Media Agency, Smart TV and Set Top Box
Millward Brown, a Kantar Subsidiary

PRIMARY USE CASE — Short-term sales and brand outcomes with brand health metrics and digital and cross-media, consumer journey and digital engagement lifts.

PRIMARY OFFERINGS

- Marketing Mix Models: 70%
- Digital Attribution: 20%
- TV Attribution: 5%
- Unified Models: 5%

MARKETING MIX MODELERS WITH ATTRIBUTION PRODUCTS

APPROACH

Integrated macro-level marketing mix models, micro-level multi-touch attribution and agent-based models

MEDIA COVERED

- All paid, owned and earned digital media; tagged/coded elements of digital advertising (media and content).
- All offline media, direct marketing, shopper marketing and events.

LEVEL OF GRANULARITY

As granular as possible. Media type and sub formats such as Property, Daypart, targeting method, CPC versus CPM, and individual-level data across time and geography

COLLINEARITY WORKAROUND

More granular data, Nested hierarchical models

DATA INTEGRATION

Data fusion and proprietary algorithms for matching and de-duping. Vendors also do match backs using blinded PII data

MODEL/RESULTS VALIDATION

Test/control or advanced simulations

CYCLE & REFRESH TIMING

From measurement to reporting: typically 1-2 months; daily data refresh and real-time reporting

USE CASES

- Contribution Assessment
- Digital Campaign
- Cross-Media Campaign
- Full Marketing Mix

KPIs

- Online Traffic
- Online Conversion
- Offline Retail Traffic
- Offline Sales
- Brand Metrics

Budget Optimization

- Across Digital Channels
- Across Cross-Media Channels
- Across Sales & Brand Metrics

MODEL INPUTS

- Other Marketing Variables
- External Influences
- Competitors

ADVERTISING PARAMETERS

- Diminishing Returns
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CYCLE & REFRESH TIMING

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**PHASIZE**

**PRIMARY USE CASE** — Sales and business drivers who optimize financial resource allocation, forecast future marketing plans, validate media strategies and re-allocate budgets.

### PRIMARY OFFERINGS

<table>
<thead>
<tr>
<th>Service</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Marketing Mix Models</td>
<td>70%</td>
</tr>
<tr>
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<td>25%</td>
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<tr>
<td>(3/4 with retail traffic KPI)</td>
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</tbody>
</table>

**TV Attribution** N/A

**Unified Models** ✔

### APPROACH

An integrated suite of approaches, including MMM, MTA and Digital Attribution, based on a variety of statistical techniques.

### SOURCE OF TV DATA

Nielsen

### MEDIA COVERED

- TV, Print, Radio, OOH, PR, OLA, OLV, Search, Social
- Report both paid and non-paid digital channels and content (from log files). Report at granular level within the ad server (e.g., site, strategy, device type, placement, audience, creative concept, version, keyword, etc.).

### LEVEL OF GRANULARITY

- Publisher, Campaigns, Dayparts, Origination, Unit Length, Genre, Network Types

### DATA INTEGRATION

- Utilize first-, second- and third-party data, including in-store sales data. For outside integrations, Digital (m)PACT ingests unified data sets directly; no need to tag or manage integrations.

### COLLINEARITY WORKAROUND

Variable specification and transformation

### MODEL/RESULTS VALIDATION

- Structured and randomized holdout samples

### CYCLE & REFRESH TIMING

- Most start with monthly reports, then move to semi-monthly and then weekly

### USE CASES

- **Contribution Assessment**
  - Digital Campaign
  - Cross-Media Campaign
  - Full Marketing Mix

- **KPIs**
  - Online Traffic
  - Online Conversion
  - Offline Retail Traffic
  - Offline Sales
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- **Budget Optimization**
  - Across Digital Channels
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### MODEL INPUTS

- Other Marketing Variables
- External Influences
- Competitors

### ADVERTISING PARAMETERS

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**SALES & BUSINESS DRIVERS**

- Optimize financial resource allocation
- Forecast future marketing plans
- Validate media strategies
- Re-allocate budgets

**MARKETING MIX MODELERS WITH ATTRIBUTION PRODUCTS**

**primary_text**: "(m)Phasize, a Publicis company"

**secondary_text**: "PRIMARY USE CASE — Sales and business drivers who optimize financial resource allocation, forecast future marketing plans, validate media strategies and re-allocate budgets.

**primary_table**: | Service                          | Percentage |
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<tbody>
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**primary_table**: | Approach                        |
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<tr>
<td>Publisher, Campaigns, Dayparts, Origination, Unit Length, Genre, Network Types</td>
<td></td>
</tr>
</tbody>
</table>

**primary_table**: | Data Integration |
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Utilize first-, second- and third-party data, including in-store sales data. For outside integrations, Digital (m)PACT ingests unified data sets directly; no need to tag or manage integrations</td>
<td></td>
</tr>
</tbody>
</table>

**primary_table**: | Collinearity Workaround |
<table>
<thead>
<tr>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td>Variable specification and transformation</td>
<td></td>
</tr>
</tbody>
</table>

**primary_table**: | Model/Results Validation |
<table>
<thead>
<tr>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td>Structured and randomized holdout samples</td>
<td></td>
</tr>
</tbody>
</table>

**primary_table**: | Cycle & Refresh Timing |
<table>
<thead>
<tr>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td>Most start with monthly reports, then move to semi-monthly and then weekly</td>
<td></td>
</tr>
</tbody>
</table>

**primary_table**: | Use Cases |
<table>
<thead>
<tr>
<th></th>
<th></th>
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<tbody>
<tr>
<td>Contribution Assessment, Digital Campaign, Cross-Media Campaign, Full Marketing Mix</td>
<td></td>
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</table>

**primary_table**: | KPIs |
<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td>Online Traffic, Online Conversion, Offline Retail Traffic, Offline Sales, Brand Metrics</td>
<td></td>
</tr>
</tbody>
</table>

**primary_table**: | Budget Optimization |
<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>Across Digital Channels, Across Cross-Media Channels, Across Sales &amp; Brand Metrics</td>
<td></td>
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</tbody>
</table>

**primary_table**: | Model Inputs |
<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>Other Marketing Variables, External Influences, Competitors</td>
<td></td>
</tr>
</tbody>
</table>

**primary_table**: | Advertising Parameters |
<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td>Diminishing Returns, Adstock, Long-term Effects, Media Interactions and Halos, Baseline/Incrementality</td>
<td></td>
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**primary_table**: | Data Delivery & Applications |
<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td>Dashboard, Optimizers, Programmatic, Data Feeds to Other Sources</td>
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**primary_table**: | Research Provided By |
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
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<tbody>
<tr>
<td>SEQUENT Partners</td>
<td></td>
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</table>
Neustar

PRIMARY USE CASE — Portfolio-level marketing optimization with customer-level attribution. Budget allocation, driver analysis, long-term and short-term balance return on media performance.

PRIMARY OFFERINGS
Marketing Mix Models ✓
Digital Attribution ✓
TV Attribution ✓
Unified Models ✓

APPROACH
Econometrics, especially Hierarchical Bayes. Cross-Channel Attribution via Logit models at the person/HH level. TV attribution based on immediate response.

SOURCES OF TV DATA
Renttrak, Simulmedia

LEVEL OF GRANULARITY
Addressable media: individual impressions, by customer ID, media channel/type, publisher/ad network, website/program, creative, campaign and placement/keyword.

Non-addressable media is typically analyzed at the media channel/sub channel, tactic, segment, campaign by DMA/store and day of week.

COLLINEARITY WORKAROUND
Bayesian priors

DATA INTEGRATION
Proprietary identity graph system links device IDs to offline identifiers; also third-party tag management system and integrates client SDK and ingests log files.

MODEL/RESULTS VALIDATION
Normative database, holdout samples, model fit statistics, tests

TV Attribution
Unified Models

MEDIA COVERED
Online and offline media, addressable and non-addressable. Search, Display, Video, Email, Affiliate, Social, Mobile, Direct Mail/Catalogue, TV, Radio, Magazine, Newspaper, Cinema, Outdoor, etc.

COLLINEARITY WORKAROUND
Bayesian priors

DATA INTEGRATION
Proprietary identity graph system links device IDs to offline identifiers; also third-party tag management system and integrates client SDK and ingests log files.

MODEL/RESULTS VALIDATION
Normative database, holdout samples, model fit statistics, tests

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DATA INTEGRATION
Proprietary identity graph system links device IDs to offline identifiers; also third-party tag management system and integrates client SDK and ingests log files.

MODEL/RESULTS VALIDATION
Normative database, holdout samples, model fit statistics, tests

CYCLE & REFRESH TIMING
Market-level models estimated monthly; attribution models updated daily

USE CASES

Contribution Assessment
- Digital Campaign
- Cross-Media Campaign
- Full Marketing Mix

KPIs
- Online Traffic
- Offline Sales
- Brand Metrics

Budget Optimization
- Across Digital Channels
- Across Cross-Media Channels
- Across Sales & Brand Metrics

MODEL INPUTS
- Other Marketing Variables
- External Influences
- Competitors

ADVERTISING PARAMETERS
- Diminishing Returns
- Adstock
- Long-term Effects
- Media Interactions and Halos
- Baseline/Incrementality

DATA DELIVERY & APPLICATIONS
- Dashboard
- Optimizers
- Programmatic
- Data Feeds to Other Sources

CYCLE & REFRESH TIMING
Market-level models estimated monthly; attribution models updated daily

SEQUENT Partners
Nielsen

**PRIMARY USE CASE** — Holistic coverage of all business drivers via MMM. Allocate proportional credit to online and offline marketing touchpoints. Impacts budgeting and planning, spend adjustments based on campaign results and ROI metrics.

### PRIMARY OFFERINGS

<table>
<thead>
<tr>
<th>Offerings</th>
<th>✔️</th>
<th>✓</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marketing Mix Models</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Digital Attribution</td>
<td>✔️</td>
<td></td>
</tr>
<tr>
<td>TV Attribution</td>
<td></td>
<td>N/A</td>
</tr>
<tr>
<td>Unified Models</td>
<td></td>
<td>✔️</td>
</tr>
</tbody>
</table>

### APPROACH

- **Store-level econometrics using pooled time-series cross-sectional models**
- **Attribution via Logit-based discrete choice or predictive-score models**

**SOURCE OF TV DATA**

Nielsen

### LEVEL OF GRANULARITY

**Digital**: site, creative, publisher, placement, campaign, search engine, device type and media format level and audience segments

**Marketing mix**: store level

### MEDIA COVERED

**For attribution**: All digital media that take the Nielsen tracking pixel. Walled garden publishers, such as Google, provide impressions via log files.

**For marketing mix**: all measured media.

### USE CASES

- **Contribution Assessment**
  - Digital Campaign
  - Cross-Media Campaign
  - Full Marketing Mix

- **KPIs**
  - Online Traffic
  - Online Conversion
  - Offline Retail Traffic
  - Offline Sales
  - Brand Metrics

- **Budget Optimization**
  - Across Digital Channels
  - Across Cross-Media Channels
  - Across Sales & Brand Metrics

### MODEL INPUTS

- Other Marketing Variables
- External Influences
- Competitors

### ADVERTISING PARAMETERS

- Diminishing Returns
- Adstock
- Long-term Effects
- Media Interactions and Halos
- Baseline/Incrementality

### DATA DELIVERY & APPLICATIONS

- Dashboard
- Optimizers
- Programmatic
- Data Feeds to Other Sources

### COLLINEARITY WORKAROUND

- Variance Inflation Factors and other techniques

### MODEL/RESULTS VALIDATION

- Modeling techniques were validated through experimentation and synthetic data testing

### DATA INTEGRATION

**Attribution**: information provided by onboarding partners; connect individual exposure data to household purchase

**Marketing mix**: integrate Nielsen-owned, client-owned and third-party data sources

### CYCLE & REFRESH TIMING

Clients can choose a model refresh cadence that best fits their needs (monthly, quarterly, etc.)
Attribution modeling was born in the digital media ecosystem as a way of attributing credit to the various digital touchpoints on the path to conversion.

The earliest methods were arbitrary, leading to the notorious “last click attribution” that has been shown to grossly overstate the value of digital search. Over the past few years, there has been a dramatic infusion of science into attribution with all major attribution modelers now using advanced statistical models, most often logistic regression or hierarchical Bayes.

Importantly, these modelers now incorporate all digital touchpoints, qualifying as Multi-Touch Attribution (MTA). However, their treatment of non-digital media, non-media marketing factors and uncontrollable factors like weather and economy are highly varied. When the majority of the causal factors driving sales — or other consumer outcomes — are not included in the model, the chance of mis-attribution and misleading ROI estimates is material. Under these circumstances, relative tactical decisions can still be supported; for example, whether copy “A” is more effective than copy “B.”

Data is a bigger challenge for attribution modelers than it is for marketing mix modelers, although inadequate data is the Achilles’ heel for all modelers. Attribution requires identifying the same consumer wherever they may be exposed — mobile phone, tablet, work computer, home computer or other media.

Device graphs, a map that links an individual to all the devices they use, are the linking data sets used for this purpose. There are many proprietary device graphs, some with impressive scale, but we have seen very little validation work. The potential problem is that despite starting with a comprehensive and representative data set, after all of the variables have been matched to each other, the resulting data set will be much smaller and potentially biased. It is always wise to review the fully matched data set and make sure it portrays your consumers as you know them.

As with the mix modelers, this group is not perfectly homogeneous. Merkle, which was not born in the media world, originated in direct marketing. But the parallels today are striking.
Conversion Logic

**PRIMARY USE CASE** — Help marketers measure and optimize conversion events for online or offline sales, leads, registrations, mobile installs, etc., and enables long-term planning and budgeting decisions. Cross-Channel attribution.

**PRIMARY OFFERINGS**

<table>
<thead>
<tr>
<th>Marketing Mix Models</th>
<th>Digital Attribution</th>
<th>TV Attribution</th>
<th>Unified Models</th>
</tr>
</thead>
<tbody>
<tr>
<td>N/A</td>
<td>76%</td>
<td>59%</td>
<td>59%</td>
</tr>
</tbody>
</table>

**APPROACH**

Person/HH level attribution using machine learning in proprietary ensemble framework

**MEDIA COVERED**

- User-level — Display, Video, Affiliates, Social, Mobile, Search, Email, Direct Mail, Native
- Offline — TV, Radio, Shared mail

**LEVEL OF GRANULARITY**

For offline channels: station, program, campaign, promotion, length, geo, reach down to creative campaign, etc.

For digital: impressions, clicks, campaign, placement, publisher etc.; sub-daily and at user-level support an open schema for granularity limited only by statistical significance

**COLLINEARITY WORKAROUND**

Approximated Shapley values in cooperative game theory

**DATA INTEGRATION**

Person level + time series for TV and radio; deterministic matching

**MODEL/RESULTS VALIDATION**

20% Holdout samples

**CYCLE & REFRESH TIMING**

Designed to run in real time; refreshes hours/days/weeks

**USE CASES**

- Contribution Assessment
  - Digital Campaign
  - Cross-Media Campaign
  - Full Marketing Mix

- Budget Optimization
  - Across Digital Channels
  - Across Cross-Media Channels
  - Across Sales & Brand Metrics

**KPIs**

- Online Traffic
- Online Conversion
- Offline Retail Traffic
- Offline Sales
- Brand Metrics

**MODEL INPUTS**

- Other Marketing Variables
- External Influences
- Competitors

**ADVERTISING PARAMETERS**

- Diminishing Returns
- Adstock
- Long-term Effects
- Media Interactions and Halos
- Baseline/Incrementality

**DATA DELIVERY & APPLICATIONS**

- Dashboard
- Optimizers
- Programmatic
- Data Feeds to Other Sources
**Convertro, owned by Oath, a subsidiary of Verizon**

**PRIMARY USE CASE** — Consumer-level framework that can solve for entire range of marketing measurement, attribution and optimization use cases across all verticals. Map markets to consumers through a unified theory of how consumers behave. Single, cohesive, theoretically consistent framework.

---

**PRIMARY OFFERINGS**

<table>
<thead>
<tr>
<th>Service</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marketing Mix Models</td>
<td>3%</td>
</tr>
<tr>
<td>Digital Attribution</td>
<td>97%</td>
</tr>
<tr>
<td><strong>Unified Models</strong></td>
<td>40%</td>
</tr>
</tbody>
</table>

*Note: 30% used retail location*

---

**APPROACH**

Unified Logit model using both person-level and market-level data

**SOURCES OF TV DATA**

iSpot, Rentrak, Fourthwall Media, Kantar media and proprietary sources like Verizon FiOS

---

**LEVEL OF GRANULARITY**

Media platform, channel, vendor, inventory, content, genre, program, placement, key word, creative, copy

---

**COLLINEARITY WORKAROUND**

Leverage large panels, Ridge regularization to eliminate unidentified parameters and execute

---

**MEDIA COVERED**

TV, Radio, Print, Direct mail, Catalog, OOH, Sponsorships and Events, Email, Search, Display, Video, Affiliate across all Digital Paid-Owned/Earned

---

**DATA INTEGRATION**

Built on cross-device database of deterministic login data. Graph enriched with data from AOL/VZW/Millennial Media and from providers like Liveramp.

---

**MODEL/RESULTS VALIDATION**

Model fit statistics, random control tests and automatic updating of model with test results; ongoing test and learn

---

**COLLINEARITY WORKAROUND**

Leverage large panels, Ridge regularization to eliminate unidentified parameters and execute

---

**CYCLE & REFRESH TIMING**

Updated daily; weekly

---

**USE CASES**

- Contribution Assessment
  - Digital Campaign
  - Cross-Media Campaign
  - Full Marketing Mix

**KPIs**

- Online Traffic
- Online Conversion
- Offline Retail Traffic
- Offline Sales
- Brand Metrics

**MODEL INPUTS**

- Other Marketing Variables
- External Influences
- Competitors

**ADVERTISING PARAMETERS**

- Diminishing Returns
- Adstock
- Long-term Effects
- Media Interactions and Halos
- Baseline/Incrementality

**DATA DELIVERY & APPLICATIONS**

- Dashboard
- Optimizers
- Programmatic
- Data Feeds to Other Sources

---
C3 Metrics

PRIMARY USE CASE — Machine-learning-algorithmic attribution platform natively incorporates viewable impressions, directly integrates with every programmatic trading desk, DSP, and ad network

PRIMARY OFFERINGS
Marketing Mix Models...............15%
Digital Attribution....................85%
(30% use location/traffic data)

APPROACH
Machine learning, Bayesian model

MEDIA COVERED
Paid, owned and earned: Digital, TV, Radio, OOH, Print, Catalog

SOURCE OF TV DATA
Post logs

LEVEL OF GRANULARITY
Impressions-level Date/Time/ DMA/Creative, individual occurrence

DATA INTEGRATION
Digital impressions linked to individuals using tags; offline impressions linked by exact time.

COLLINEARITY WORKAROUND
Algorithmic time decay

MODEL/RESULTS VALIDATION
No information

CYCLE & REFRESH TIMING
Updating in real time

USE CASES
Contribution Assessment
Digital Campaign
Cross-Media Campaign
Full Marketing Mix

KPIs
- Online Traffic
- Online Conversion
- Offline Retail Traffic
- Offline Sales
- Brand Metrics

Budget Optimization
- Across Digital Channels
- Across Cross-Media Channels
- Across Sales & Brand Metrics

MODEL INPUTS
- Other Marketing Variables
- External Influences
- Competitors

ADVERTISING PARAMETERS
- Diminishing Returns
- Adstock
- Long-term Effects
- Media Interactions and Halos
- Baseline/Incrementality

DATA DELIVERY & APPLICATIONS
- Dashboard
- Optimizers
- Programmatic
- Data Feeds to Other Sources
# Google Attribution 360

**PRIMARY USE CASE** — Evaluate TV and digital marketing’s impact on short-term, long-term sales/revenue profit and other KPIs

### PRIMARY OFFERINGS

<table>
<thead>
<tr>
<th>Marketing Mix Models</th>
<th>✓ (Through MMM Partners)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Digital Attribution</td>
<td>✓</td>
</tr>
<tr>
<td>TV Attribution</td>
<td>✓</td>
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<td>Unified Models</td>
<td>N/A</td>
</tr>
</tbody>
</table>

### APPROACH

- Person/HH-level digital and TV attribution
- **SOURCE OF TV DATA**
  - Rentrak

### MEDIA COVERED

- Display, search, programmatic, email, and affiliate, TV network, daypart, program and individual spots

### LEVEL OF GRANULARITY

- If data permits, at ad-level impression; creative, length, network, daypart, and even down to individual airings for specific programs. Impression, click and conversion events: collected through tags or through log files

### DATA INTEGRATION

- Merged at the individual level through CRM integrations, cookie, person or transaction ID. Also leverage third-party audience data sources. Proprietary device graph based on known sign-in activity.

### COLLINEARITY WORKAROUND

- No information provided

### MODEL/RESULTS VALIDATION

- Holdout samples and compare predicted with actual outcomes

### CYCLE & REFRESH TIMING

- Within 24 hours

---

### USE CASES

<table>
<thead>
<tr>
<th>Contribution Assessment</th>
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### KPIs

- Online Traffic
- Online Conversion
- Offline Retail Traffic
- Offline Sales
- Brand Metrics

### Budget Optimization

- Across Digital Channels
- Across Cross-Media Channels
- Across Sales & Brand Metrics

### MODEL INPUTS

- Other Marketing Variables
- External Influences
- Competitors

### ADVERTISING PARAMETERS

- Diminishing Returns
- Adstock
- Long-term Effects
- Media Interactions and Halos
- Baseline/Incrementality

### DATA DELIVERY & APPLICATIONS

- Dashboard
- Optimizers
- Programmatic
- Data Feeds to Other Sources
**Merkle, owned by Dentsu Aegis**

**PRIMARY USE CASE** — Integrated, connected attribution framework for cross-channel attribution at scale. Focused on measurement at all stages of the funnel, from awareness to optimizing customer contact strategies and digital targeting opportunities.

**PRIMARY OFFERINGS**
- Marketing Mix Models: 50%
- Digital Attribution: 40% (2/3 with location KPIs)
- TV Attribution: N/A

**USE CASES**
- Contribution Assessment
- Digital Campaign
- Cross-Media Campaign
- Full Marketing Mix
- **KPIs**
  - Online Traffic
  - Online Conversion
  - Offline Retail Traffic
  - Offline Sales
  - Brand Metrics

**MODEL INPUTS**
- Other Marketing Variables
- External Influences
- Competitors

**ADVERTISING PARAMETERS**
- Diminishing Returns
- Adstock
- Long-term Effects
- Media Interactions and Halos
- Baseline/Incrementality

**DATA DELIVERY & APPLICATIONS**
- Dashboard
- Optimizers
- Programmatic
- Data Feeds to Other Sources

**APPROACH**
Integrated media mix econometrics and person/HH-level attribution, A/B testing, market-level ANCOVA

**MEDIA COVERED**
Integrated holistic application of multiple event streams; all paid, owned and earned media

**LEVEL OF GRANULARITY**
Media vehicles, content, creative, offer, message

**COLLINEARITY WORKAROUND**
Ameliorated by proprietary algorithm

**DATA INTEGRATION**
Proprietary PII data-matching reference file for 95% of US HH; includes device ID connected at individual or HH level

**MODEL/RESULTS VALIDATION**
Controlled holdout tests

**SOURCE OF TV DATA**
Rentrak, Nielsen, client-provided

**CYCLE & REFRESH TIMING**
Quarterly for planning/strategy; weekly/daily for content-related tactics
Visual IQ, a Nielsen company

**PRIMARY USE CASE** — Combined audience data with attributed measurement in a single view, providing cross-channel marketing and advertising performance insights and optimization based on audience segments

---

**PRIMARY OFFERINGS**

- Marketing Mix Models.................✓
- Digital Attribution......................✓
- TV Attribution.............................✓
- Unified Models ......................... N/A

**APPROACH**

- Market-level regression (MMM) with patented HH/person-level attribution based on test/control lift along consumer’s path (MTA)

**SOURCE OF TV DATA**

- Nielsen

**MEDIA COVERED**

- Digital, direct mail, POS, TV, Radio, Print, OOH

**LEVEL OF GRANULARITY**

- Placement/keyword, tactic, publisher, creative, etc. Dimension level: recency, frequency, publisher, placement, keyword, creative, size, tactic, etc.

**DATA INTEGRATION**

- Data partners for MTA integrations across offline sales (Liveramp), cross device (Facebook, Tapad), audience data (Lotame). Offer pixel and tagging management through platform.

**COLLINEARITY WORKAROUND**

- No information provided

**MODEL/RESULTS VALIDATION**

- Data quality controls; model validation; in market testing/analysis

**CYCLE & REFRESH TIMING**

- Designed to run in real time; refreshes hours/days/weeks

---

**USE CASES**

- Contribution Assessment
  - Digital Campaign
  - Cross-Media Campaign
  - Full Marketing Mix

**KPIs**

- Online Traffic
- Online Conversion
- Offline Retail Traffic
- Offline Sales
- Brand Metrics

**Budget Optimization**

- Across Digital Channels
- Across Cross-Media Channels
- Across Sales & Brand Metrics

**MODEL INPUTS**

- Other Marketing Variables
- External Influences
- Competitors

**ADVERTISING PARAMETERS**

- Diminishing Returns
- Adstock
- Long-term Effects
- Media Interactions and Halos
- Baseline/Incrementality

**DATA DELIVERY & APPLICATIONS**

- Dashboard
- Optimizers
- Programmatic
- Data Feeds to Other Sources
Television or Digital Attribution Providers

This set of providers are more recent additions to the analytics marketplace and, while quite varied, are unified to some degree in their focus on either specific media or specific outcomes.

These providers are squarely in the attribution camp, attributing causality to media exposure based on a highly granular analysis of the sequence of events. For instance, exposures that occurred prior to a conversion, retail visit or purchase event. While this may not be entirely suitable for estimating ROI, the granularity and rapid tempo of these models is well suited to driving tactical decisions.

The diversity among these providers is interesting. TVSquared and WyWy are now one company. Along with iSpot and Samba, they leverage Smart TV data to attribute digital activation outcomes to preceding television exposures. However, TVSquared also employs marketing mix models, in a minority of cases, to provide a more comprehensive assessment and also an estimate of the impact on offline sales.

Placed is focused on location data and estimates the impact of television, digital and OOH media on location-based outcomes, like store visits. SMI’s roots are in media spend data and focus on the value of modeling the effectiveness and ROI of competitors’ marketing, which requires granular and accurate competitive spending data.
**Data + Math**

**PRIMARY USE CASE** — Multi-touch attribution to measure the upper and mid-funnel impact of multi-screen TV campaigns on various marketing outcomes. Our solutions provide timely campaign lift readouts and differential scoring of campaign tactics, such as audience target, frequency, program/network/daypart and creative to support campaign optimization.

<table>
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</thead>
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<td>Digital Attribution</td>
</tr>
<tr>
<td>TV Attribution</td>
</tr>
<tr>
<td>Unified Models</td>
</tr>
</tbody>
</table>

**APPROACH**
- Attribution modeling

**SOURCES OF TV DATA**
- MVPDs, SmartTV ACR and network group digital platforms

**LEVEL OF GRANULARITY**
- Household or device level

**MEDIA COVERED**
- Linear, time-shifted and OTT delivered television

**DATA INTEGRATION**
- Integrate multiple datasets at a household or device level into the model. Partnerships with Experian and Acxiom/Liveramp to integrate signals from multiple sources into the model with set-top and ACR data in a privacy-compliant manner.

**COLLINEARITY WORKAROUND**
- Multiple models are trained with different feature sets, enabling us to extract the importance of individual predictors. We use synthetic control techniques to reduce bias and isolate the impact of exposures, as well as regularization and cross-validation to avoid over-fitting.

**MODEL/RESULTS VALIDATION**
- Hold-out samples and cross-validation; internal controls

**CYCLE & REFRESH TIMING**
- Daily

**USE CASES**
- Contribution Assessment
  - Digital Campaign
  - Cross-Media Campaign
  - Full Marketing Mix

**KPIs**
- Online Traffic
- Online Conversion
- Offline Retail Traffic
- Offline Sales
- Brand Metrics

**Budget Optimization**
- Across Digital Channels
- Across Cross-Media Channels
- Across Sales & Brand Metrics

**MODEL INPUTS**
- Other Marketing Variables
- External Influences
- Competitors

**ADVERTISING PARAMETERS**
- Diminishing Returns
- Adstock
- Long-term Effects
- Media Interactions and Halos
- Baseline/Incrementality (Unexposed control group)

**DATA DELIVERY & APPLICATIONS**
- Dashboard
- Optimizers
- Programmatic
- Data Feeds to Other Sources

---

**TV Attribution**
- ✔

**Unified Models**
- N/A
iSpot

**PRIMARY USE CASE** — Measures the conversions of TV ads exposure to digital business outcomes and related KPIs. Used for in-flight optimization of creative and media placements, campaign planning as well as TV investment decisioning.

### PRIMARY OFFERINGS

<table>
<thead>
<tr>
<th>Marketing Mix Models</th>
<th>Digital Attribution</th>
<th>TV Attribution</th>
<th>Unified Models</th>
</tr>
</thead>
<tbody>
<tr>
<td>N/A</td>
<td>N/A</td>
<td>100%</td>
<td>N/A</td>
</tr>
</tbody>
</table>

### APPROACH

Fractional or full attribution of conversion credit based on a variable look-back window at the individual HH/person level

### MEDIA COVERED

TV, Live/SD — 30 days, Broadcast, Cable, Spot, Satellite, VOD and OTT

### LEVEL OF GRANULARITY

Individual exposure/conversion level analysis, reported for individual creative executions, networks, programs, genre, daypart, media unit

### COLLINEARITY WORKAROUND

Assigns (full or partial) credit to all exposures in the look-back window

### DATA INTEGRATION

Proprietary device/ID graph to connect web users to TV IDs

### MODEL/RESULTS VALIDATION

Internal and external audits/benchmarks

### CYCLE & REFRESH TIMING

Daily

---

**USE CASES**

- Contribution Assessment
  - Digital Campaign
  - Cross-Media Campaign (TV cont. to digital KPIs)
  - Full Marketing Mix

**KPIs**

- Online Traffic
- Online Conversion
- Offline Retail Traffic
- Offline Sales
- Brand Metrics

**Budget Optimization**

- Across Digital Channels
- Across Cross-Media Channels
- Across Sales & Brand Metrics

**MODEL INPUTS**

- Other Marketing Variables
- External Influences
- Competitors

**ADVERTISING PARAMETERS**

- Diminishing Returns
- Adstock
- Long-term Effects
- Media Interactions and Halos
- Baseline/Incrementality (Unexposed control group)

**DATA DELIVERY & APPLICATIONS**

- Dashboard
- Optimizers
- Programmatic
- Data Feeds to Other Sources

---

**SOURCE OF TV DATA**

Inscape

---

**MEDIA COVERED**

TV, Live/SD — 30 days, Broadcast, Cable, Spot, Satellite, VOD and OTT

---

**LEVEL OF GRANULARITY**

Individual exposure/conversion level analysis, reported for individual creative executions, networks, programs, genre, daypart, media unit

---

**COLLINEARITY WORKAROUND**

Assigns (full or partial) credit to all exposures in the look-back window

---

**DATA INTEGRATION**

Proprietary device/ID graph to connect web users to TV IDs

---

**MODEL/RESULTS VALIDATION**

Internal and external audits/benchmarks

---

**CYCLE & REFRESH TIMING**

Daily

---

**SOURCE OF TV DATA**

Inscape

---

**MEDIA COVERED**

TV, Live/SD — 30 days, Broadcast, Cable, Spot, Satellite, VOD and OTT

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---

**COLLINEARITY WORKAROUND**

Assigns (full or partial) credit to all exposures in the look-back window

---

**DATA INTEGRATION**

Proprietary device/ID graph to connect web users to TV IDs

---

**MODEL/RESULTS VALIDATION**

Internal and external audits/benchmarks

---

**CYCLE & REFRESH TIMING**

Daily

---

**SOURCE OF TV DATA**

Inscape

---

**MEDIA COVERED**

TV, Live/SD — 30 days, Broadcast, Cable, Spot, Satellite, VOD and OTT

---

**LEVEL OF GRANULARITY**

Individual exposure/conversion level analysis, reported for individual creative executions, networks, programs, genre, daypart, media unit

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**COLLINEARITY WORKAROUND**

Assigns (full or partial) credit to all exposures in the look-back window

---

**DATA INTEGRATION**

Proprietary device/ID graph to connect web users to TV IDs

---

**MODEL/RESULTS VALIDATION**

Internal and external audits/benchmarks

---

**CYCLE & REFRESH TIMING**

Daily

---

**SOURCE OF TV DATA**

Inscape

---

**MEDIA COVERED**

TV, Live/SD — 30 days, Broadcast, Cable, Spot, Satellite, VOD and OTT

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**LEVEL OF GRANULARITY**

Individual exposure/conversion level analysis, reported for individual creative executions, networks, programs, genre, daypart, media unit

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**DATA INTEGRATION**

Proprietary device/ID graph to connect web users to TV IDs

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**MODEL/RESULTS VALIDATION**

Internal and external audits/benchmarks

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**CYCLE & REFRESH TIMING**

Daily

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**SOURCE OF TV DATA**

Inscape

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**MEDIA COVERED**

TV, Live/SD — 30 days, Broadcast, Cable, Spot, Satellite, VOD and OTT

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**LEVEL OF GRANULARITY**

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**COLLINEARITY WORKAROUND**

Assigns (full or partial) credit to all exposures in the look-back window

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**DATA INTEGRATION**

Proprietary device/ID graph to connect web users to TV IDs

---

**MODEL/RESULTS VALIDATION**

Internal and external audits/benchmarks

---

**CYCLE & REFRESH TIMING**

Daily

---

**SOURCE OF TV DATA**

Inscape

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**MEDIA COVERED**

TV, Live/SD — 30 days, Broadcast, Cable, Spot, Satellite, VOD and OTT

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**LEVEL OF GRANULARITY**

Individual exposure/conversion level analysis, reported for individual creative executions, networks, programs, genre, daypart, media unit

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**COLLINEARITY WORKAROUND**

Assigns (full or partial) credit to all exposures in the look-back window

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**DATA INTEGRATION**

Proprietary device/ID graph to connect web users to TV IDs

---

**MODEL/RESULTS VALIDATION**

Internal and external audits/benchmarks

---

**CYCLE & REFRESH TIMING**

Daily

---

**SOURCE OF TV DATA**

Inscape

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**MEDIA COVERED**

TV, Live/SD — 30 days, Broadcast, Cable, Spot, Satellite, VOD and OTT

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**LEVEL OF GRANULARITY**

Individual exposure/conversion level analysis, reported for individual creative executions, networks, programs, genre, daypart, media unit

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**DATA INTEGRATION**

Proprietary device/ID graph to connect web users to TV IDs

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**MODEL/RESULTS VALIDATION**

Internal and external audits/benchmarks

---

**CYCLE & REFRESH TIMING**

Daily

---

**SOURCE OF TV DATA**

Inscape

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**MEDIA COVERED**

TV, Live/SD — 30 days, Broadcast, Cable, Spot, Satellite, VOD and OTT

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Individual exposure/conversion level analysis, reported for individual creative executions, networks, programs, genre, daypart, media unit

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Assigns (full or partial) credit to all exposures in the look-back window

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**DATA INTEGRATION**

Proprietary device/ID graph to connect web users to TV IDs

---

**MODEL/RESULTS VALIDATION**

Internal and external audits/benchmarks

---

**CYCLE & REFRESH TIMING**

Daily

---

**SOURCE OF TV DATA**

Inscape

---

**MEDIA COVERED**

TV, Live/SD — 30 days, Broadcast, Cable, Spot, Satellite, VOD and OTT

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**LEVEL OF GRANULARITY**

Individual exposure/conversion level analysis, reported for individual creative executions, networks, programs, genre, daypart, media unit

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**COLLINEARITY WORKAROUND**

Assigns (full or partial) credit to all exposures in the look-back window

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**DATA INTEGRATION**

Proprietary device/ID graph to connect web users to TV IDs

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**MODEL/RESULTS VALIDATION**

Internal and external audits/benchmarks

---

**CYCLE & REFRESH TIMING**

Daily

---

**SOURCE OF TV DATA**

Inscape

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**MEDIA COVERED**

TV, Live/SD — 30 days, Broadcast, Cable, Spot, Satellite, VOD and OTT

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**LEVEL OF GRANULARITY**

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**COLLINEARITY WORKAROUND**

Assigns (full or partial) credit to all exposures in the look-back window

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**DATA INTEGRATION**

Proprietary device/ID graph to connect web users to TV IDs

---

**MODEL/RESULTS VALIDATION**

Internal and external audits/benchmarks

---

**CYCLE & REFRESH TIMING**

Daily

---

**SOURCE OF TV DATA**

Inscape

---

**MEDIA COVERED**

TV, Live/SD — 30 days, Broadcast, Cable, Spot, Satellite, VOD and OTT

---

**LEVEL OF GRANULARITY**

Individual exposure/conversion level analysis, reported for individual creative executions, networks, programs, genre, daypart, media unit

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**COLLINEARITY WORKAROUND**

Assigns (full or partial) credit to all exposures in the look-back window

---

**DATA INTEGRATION**

Proprietary device/ID graph to connect web users to TV IDs

---

**MODEL/RESULTS VALIDATION**

Internal and external audits/benchmarks

---

**CYCLE & REFRESH TIMING**

Daily
Primary Use Case — Identifies the impact of cross-channel advertising on in-store visitation.

**Primary Offerings**

- Marketing Mix Models: N/A
- Digital Attribution: 100% (100% location KPIs)
- TV Attribution: + OOH
- Unified Models: N/A

**Approach**

Exposed versus matched unexposed to measure incremental visits and lift

**Source of TV Data**

STB and Smart TVs

**Media Covered**

- Mobile, Tablet, Desktop, Linear TV, Addressable TV, Over-the-top and Out Of Home

**Level of Granularity**

Individual person level for each campaign. Factors include 3-hour time granularity for visitation, as well as a large set of person-level descriptors

**Data Integration**

Mobile, web, desktop and TV: We use a mix of third-party and proprietary probabilistic device-matching algorithms; proprietary path analysis algorithm matches a person’s path to OOH

**Collinearity Workaround**

No information provided

**Model/Results Validation**

Surveys validate visits, visits projected against store counter and internal transaction data

**Cycle & Refresh Timing**

Weekly

**Use Cases**

- Contribution Assessment
- Digital Campaign
- Cross-Media Campaign (Digital, TV & OOH contribution to retail traffic)
- Full Marketing Mix

**KPIs**

- Online Traffic
- Online Conversion
- Offline Retail Traffic
- Offline Sales
- Brand Metrics

**Budget Optimization**

- Across Digital Channels
- Across Cross-Media Channels (TV and OOH)
- Across Sales & Brand Metrics

**Model Inputs**

- Other Marketing Variables
- External Influences
- Competitors

**Advertising Parameters**

- Diminishing Returns
- Adstock
- Long-term Effects
- Media Interactions and Halos
- Baseline/Incrementality (Repeat vs. new visitors)

**Data Delivery & Applications**

- Dashboard
- Optimizers
- Programmatic
- Data Feeds to Other Sources

**Cycle & Refresh Timing**

Weekly
Samba TV

PRIMARY USE CASE — Offers essential TV insights to make audiences more addressable and measurable. Through software embedded in over 18M smart TVs globally, amplified by set-top boxes and mapped to connected mobile devices, laptops and PCs, Samba TV helps marketers activate cross-screen campaigns and measure the impact of their media investment by bridging the gap between digital and television.

<table>
<thead>
<tr>
<th>PRIMARY OFFERINGS</th>
<th>MEDIA COVERED</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marketing Mix Models.........................N/A</td>
<td>TV Attribution.................................✓</td>
</tr>
<tr>
<td>Digital Attribution.........................✓</td>
<td>Unified Models .........................N/A</td>
</tr>
</tbody>
</table>

APPROACH
Measures tune-in rate, conversions, RF and brand lift (with Kantar MB), single source matched panel at a HH/individual level

SOURCE OF TV DATA
12 Smart TV brands + STB data

LEVEL OF GRANULARITY
Down to the exact ad occurrence — can report on media, time, geography, consumer segments on a HH basis

COLLINEARITY WORKAROUND
Not applicable due to data granularity; don’t use marketing mix models

DATA INTEGRATION
Direct match, Device IDs

MODEL/RESULTS VALIDATION
Retesting, A/A testing

CYCLE & REFRESH TIMING
Daily, weekly or monthly depending on the need

USE CASES

<table>
<thead>
<tr>
<th>Contribution Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Digital Campaign</td>
</tr>
<tr>
<td>Cross-Media Campaign (TV + Digital)</td>
</tr>
<tr>
<td>Full Marketing Mix</td>
</tr>
</tbody>
</table>

KPIs
- Online Traffic
- Online Conversion
- Offline Retail Traffic
- Offline Sales
- Brand Metrics

Budget Optimization
- Across Digital Channels
- Across Cross-Media Channels
- Across Sales & Brand Metrics

MODEL INPUTS
- Other Marketing Variables
- External Influences
- Competitors (If provided by client)

ADVERTISING PARAMETERS
- Diminishing Returns
- Adstock
- Long-term Effects
- Media Interactions and Halos
- Baseline/Incrementality

DATA DELIVERY & APPLICATIONS
- Dashboard
- Optimizers
- Programmatic
- Data Feeds to Other Sources
SMI


**PRIMARY OFFERINGS**

<table>
<thead>
<tr>
<th>Marketing Mix Models</th>
<th>Digital Attribution</th>
<th>TV Attribution</th>
<th>Unified Models</th>
</tr>
</thead>
<tbody>
<tr>
<td>✓</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

**APPROACH**

National time series regression

**SOURCE OF TV DATA**

Media Agencies

**LEVEL OF GRANULARITY**

Program-level

**MEDIA COVERED**

TV, Digital in all their sub-types and forms

**COLLINEARITY WORKAROUND**

No information provided

**DATA INTEGRATION**

Time series

**MODEL/RESULTS VALIDATION**

A/B tests to verify predictions

**CYCLE & REFRESH TIMING**

Monthly

**SOURCE OF TV DATA**

Media Agencies

**MODEL INPUTS**

- Diminishing Returns
- Adstock
- Long-term Effects
- Media Interactions and Halos
- Baseline/Incrementality (In CPG)

**USE CASES**

- Contribution Assessment
  - Digital Campaign
  - Cross-Media Campaign (TV+ Digital)
  - Full Marketing Mix

**KPIs**

- Online Traffic
- Online Conversion
- Offline Retail Traffic
- Offline Sales
- Brand Metrics (Custom)

**Budget Optimization**

- Across Digital Channels
- Across Cross-Media Channels
- Across Sales & Brand Metrics

**DATA DELIVERY & APPLICATIONS**

- Dashboard
- Optimizers
- Programmatic
- Data Feeds to Other Sources

**SOURCE OF TV DATA**

Media Agencies

**LEVEL OF GRANULARITY**

Program-level

**DATA INTEGRATION**

Time series

**MODEL/RESULTS VALIDATION**

A/B tests to verify predictions

**CYCLE & REFRESH TIMING**

Monthly
**TVSquared**

**PRIMARY USE CASE** — Attribution models estimate TVs immediate impact on web and online sales metrics. Marketing mix models utilize all available data inputs, online and offline, to provide an accurate measurement of marketing’s short- and long-term impacts.

**PRIMARY OFFERINGS**

<table>
<thead>
<tr>
<th>Marketing Mix Models</th>
<th>15%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Digital Attribution</td>
<td>N/A</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TV Attribution</th>
<th>100%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unified Models</td>
<td>N/A</td>
</tr>
</tbody>
</table>

**APPROACH**

Multi-stage attribution process; continuously adjusting baseline constructed to identify spikes that can be explained by the presence of TV

**MEDIA COVERED**

TV and SMS Digital — Computer and Mobile (App/Web)

**SOURCE OF TV DATA**

Client provided

**LEVEL OF GRANULARITY**

TV spot logs, including network, creatives, spot length and audience; location using IP addresses; attribution looks at direct site traffic, and organic and paid search

**COLLINEARITY WORKAROUND**

Large samples from 3+ years of data at the DMA level, plus partial least squares models, where necessary

**MODEL/RESULTS VALIDATION**

Holdout samples with +/- 10% MAPE

**CYCLE & REFRESH TIMING**

Same-day attribution reporting, MMM typically 6-month cycles

**USE CASES**

- Contribution Assessment
  - Digital Campaign
  - (TV Attribution)
  - Cross-Media Campaign (Via MMM)
  - Full Marketing Mix

**KPIs**

- Online Traffic
- Online Conversion
- Offline Retail Traffic
- Offline Sales
- Brand Metrics

**Budget Optimization**

- Across Digital Channels
- Across Cross-Media Channels (TV Optimization)
- Across Sales & Brand Metrics

**MODEL INPUTS**

- Other Marketing Variables
- External Influences
- Competitors

**ADVERTISING PARAMETERS**

- Diminishing Returns
- Adstock
- Long-term Effects (MMM)
- Media Interactions and Halos
- Baseline/Incrementality

**DATA DELIVERY & APPLICATIONS**

- Dashboard
- Optimizers
- Programmatic
- Data Feeds to Other Sources

**DATA INTEGRATION**

Partner with key cross-channel vendors, like LiveRamp, to provide cross-device matching

**COLLINEARITY WORKAROUND**

Large samples from 3+ years of data at the DMA level, plus partial least squares models, where necessary

**MODEL/RESULTS VALIDATION**

Holdout samples with +/- 10% MAPE

**CYCLE & REFRESH TIMING**

Same-day attribution reporting, MMM typically 6-month cycles

**SOURCE OF TV DATA**

Client provided

**LEVEL OF GRANULARITY**

TV spot logs, including network, creatives, spot length and audience; location using IP addresses; attribution looks at direct site traffic, and organic and paid search

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Large samples from 3+ years of data at the DMA level, plus partial least squares models, where necessary

**MODEL/RESULTS VALIDATION**

Holdout samples with +/- 10% MAPE

**CYCLE & REFRESH TIMING**

Same-day attribution reporting, MMM typically 6-month cycles

**SOURCE OF TV DATA**

Client provided

**LEVEL OF GRANULARITY**

TV spot logs, including network, creatives, spot length and audience; location using IP addresses; attribution looks at direct site traffic, and organic and paid search

**COLLINEARITY WORKAROUND**

Large samples from 3+ years of data at the DMA level, plus partial least squares models, where necessary

**MODEL/RESULTS VALIDATION**

Holdout samples with +/- 10% MAPE

**CYCLE & REFRESH TIMING**

Same-day attribution reporting, MMM typically 6-month cycles
**WyWy, owned by TVSquared**

**PRIMARY USE CASE** — Measures the direct impact of TV on website and app traffic (visits and conversions), identifying which daypart, channel, creative or program has the highest viewer engagement; daypart, channel, creative optimization.

### PRIMARY OFFERINGS

<table>
<thead>
<tr>
<th>Marketing Mix Models</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Digital Attribution</td>
<td>N/A</td>
</tr>
<tr>
<td>TV Attribution</td>
<td>100%</td>
</tr>
<tr>
<td>Unified Models</td>
<td>N/A</td>
</tr>
</tbody>
</table>

### APPROACH

Anomaly detection based on graph analysis to determine “unusual spikes” in website traffic; overlay TV schedule

### LEVEL OF GRANULARITY

Airing-level: daypart, channel, creative and program, geography, consumer segments

### SOURCE OF TV DATA

Fingerprint

### MEDIA COVERED

Linear TV program

### DATA INTEGRATION

TV Exposure and online events linked by time of occurrence

### COLLINEARITY WORKAROUND

Not deemed relevant to this method

### MODEL/RESULTS VALIDATION

Technique has been validated with simulations. In production, model results are checked versus graphs.

### CYCLE & REFRESH TIMING

Overnight

### USE CASES

- **Contribution Assessment**
  - Digital Campaign
  - (TV Attribution) Cross-Media Campaign
  - Full Marketing Mix

### KPIs

- Online Traffic
- Online Conversion
- Offline Retail Traffic
- Offline Sales
- Brand Metrics

### Budget Optimization

- Across Digital Channels
- Across Cross-Media Channels
- Across Sales & Brand Metrics

### MODEL INPUTS

- Other Marketing Variables
- External Influences
- Competitors

### ADVERTISING PARAMETERS

- Diminishing Returns
- Adstock
- Long-term Effects
- Media Interactions and Halos
- Baseline/Incrementality (Unexposed Control Group)

### DATA DELIVERY & APPLICATIONS

- Dashboard
- Optimizers
- Programmatic
- Data Feeds to Other Sources

### DATA INTEGRATION

TV Exposure and online events linked by time of occurrence

### COLLINEARITY WORKAROUND

Not deemed relevant to this method

### MODEL/RESULTS VALIDATION

Technique has been validated with simulations. In production, model results are checked versus graphs.

### CYCLE & REFRESH TIMING

Overnight

### TELEVISION OR DIGITAL ATTRIBUTION PROVIDERS

**RESEARCH PROVIDED BY**

---

26
The earliest single source data providers linked television advertising exposures directly to purchases at the household level. IRI’s Behaviorscan, the first of many, actually predates the commercialization of marketing mix modeling by a few years. Each of the early providers built their services on the foundation of traditional research panels, which proved unaffordable time and again.

Today’s single source providers utilize existing data — notably loyalty card, credit card, prescription records and DMV records — to provide measures of sales. These are linked at the household level with television exposure from set-top boxes and digital exposures captured via tags. Matching cause and effect at the household level resembles and begins to overlap with attribution modelers. The difference is one of emphasis and genesis. Attribution was born in digital, whereas single source was born in CPG, matching television ad exposures to supermarket sales.

These techniques are data dependent. NCS and IRI utilize their purchase and store panels, and NCS also employs the Nielsen television and radio ratings data.

The providers grouped here are not completely homogeneous. Oracle’s DataLogix service has roots in direct marketing, not TV like NCS and TiVo. Concentric is the most different; it does not have proprietary data sets, but its agent-based models (ABM) can utilize any suitable data. It is grouped here because it operates at the individual household or consumer level.
Concentric

PRIMARY USE CASE — Software application that simulates individual consumers interacting with each other and with the marketing of brands; accounts for how people make decisions and share information through a unified marketing impact analytic framework.

### PRIMARY OFFERINGS

<table>
<thead>
<tr>
<th>Service</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marketing Mix Models</td>
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<td>Digital Attribution</td>
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</tr>
<tr>
<td>TV Attribution</td>
<td>N/A</td>
</tr>
<tr>
<td>Unified Models</td>
<td>100%</td>
</tr>
<tr>
<td>(12% with location KPIs)</td>
<td></td>
</tr>
</tbody>
</table>

### APPROACH

Agent-based models, behavioral economics, network science, marketing analytics, and machine learning with reinforced learning

### SOURCES OF TV DATA

Nielsen, Kantar

### MEDIA COVERED

TV, Radio, Magazines, Out Of Home, Digital/Mobile Display, Video, Native Search, Social, In-app, Organic Search, Word Of Mouth, Influencer Programs, PR, In-store, Events, etc.

### LEVEL OF GRANULARITY

Ranges from the highest level of granularity to a respondent-level or individual ad impressions — varies by business question and available data

### DATA INTEGRATION

Data integration through the Agent Training Process — two forms: standard API that pulls from the customers database(s) or a data parser that pulls data from multiple sources

### COLLINEARITY WORKAROUND

Agent-level analysis rarely suffers from collinearity

### MODEL/RESULTS VALIDATION

Compare system forecast with in-market results for multiple metrics

### CYCLE & REFRESH TIMING

Real time, weekly or quarterly depending on client needs

### USE CASES

- Contribution Assessment
  - Digital Campaign
  - Cross-Media Campaign
  - Full Marketing Mix

### KPIs

- Online Traffic
- Offline Retail Traffic
- Sales
- Brand Metrics

### BUDGET OPTIMIZATION

- Across Digital Channels
- Across Cross-Media Channels
- Across Sales & Brand Metrics

### MODEL INPUTS

- Other Marketing Variables
- External Influences
- Competitors

### ADVERTISING PARAMETERS

- Diminishing Returns
- Adstock
- Long-term Effects
- Media Interactions and Halos
- Baseline/Incrementality

### DATA DELIVERY & APPLICATIONS

- Dashboard
- Optimizers
- Programmatic
- Data Feeds to Other Sources
IRI Lift

PRIMARY USE CASE — IRI provides a full suite of solutions — both marketing mix modeling and attribution solutions as well as matched market or matched store testing. Focused on the CPG industry.

PRIMARY OFFERINGS
Marketing Mix Models.......................... ✓ Digital Attribution.................................. ✓ TV Attribution ...................................... ✓ Unified Models .................................... ✓

APPROACH
Attribution studies

LEVEL OF GRANULARITY
Household/Frequent Shopper Card

COLLINEARITY WORKAROUND
Statistical significance (p-value check), correlation check, Multi collinearity check, Variance Inflation Factor (VIF)

DATA INTEGRATION
Deterministic match at household level through Experian, LiveRamp, etc.

MODEL/RESULTS VALIDATION
Test/control matching/validation via Kolmogorov Smirnov Test, p-values, multi-collinearity, covariate balancing, goodness of fit test, data hygiene

COLLINEARITY WORKAROUND
Statistical significance (p-value check), correlation check, Multi collinearity check, Variance Inflation Factor (VIF)

DATA INTEGRATION
Deterministic match at household level through Experian, LiveRamp, etc.

MODEL/RESULTS VALIDATION
Test/control matching/validation via Kolmogorov Smirnov Test, p-values, multi-collinearity, covariate balancing, goodness of fit test, data hygiene

CYCLE & REFRESH TIMING
Within weeks of the campaign beginning

SOURCES OF TV DATA
Lotame, Simulmedia and Shareablee

USE CASES

Contribution Assessment
- Digital Campaign
- Cross-Media Campaign
- Full Marketing Mix

Budget Optimization
- Across Digital Channels
- Across Cross-Media Channels
- Across Sales & Brand Metrics

KPIs
- Online Traffic
- Online Conversion
- Offline Retail Traffic
- Offline Sales
- Brand Metrics

MODEL INPUTS
- Other Marketing Variables
- External Influences
- Competitors

ADVERTISING PARAMETERS
- Diminishing Returns
- Adstock
- Long-term Effects
- Media Interactions and Halos
- Baseline/Incrementality

DATA DELIVERY & APPLICATIONS
- Dashboard
- Optimizers
- Programmatic
- Data Feeds to Other Sources
Nielsen Catalina

**PRIMARY USE CASE** — Purchase-based audiences for better targeting, in-flight tracking the impact of advertising on retail sales during campaigns, and sales lift measurements to analyze how advertising drove incremental sales after the campaign

### PRIMARY OFFERINGS

<table>
<thead>
<tr>
<th></th>
<th>N/A</th>
<th>N/A</th>
<th>100%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marketing Mix Models</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Digital Attribution</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TV Attribution</td>
<td>N/A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unified Models</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### APPROACH

Test — control ANCOVA, machine learning, in extreme reach cases

**SOURCE OF TV DATA**

Nielsen

### MEDIA COVERED

Digital (including Mobile, Video, Social and Programmatic) to linear TV, addressable TV, Print, Radio, and CRM

Media type, genre, type, property (e.g., program, website, title), campaign, creative execution

### LEVEL OF GRANULARITY

Analysis at the individual impression and transaction level; reported by media type, genre, type, property (e.g., program, website, title), campaign and creative execution

### DATA INTEGRATION

Direct HH match or via indirect match with on-boarders like Neustar and LiveRamp

### COLLINEARITY WORKAROUND

Exposed/unexposed HH purchases compared to averages between groups

### MODEL/RESULTS VALIDATION

Normative database, holdout samples, model fit statistics, synthetic data comparison

### CYCLE & REFRESH TIMING

Weekly in-flight; 4-6 weeks for sales effect or cross-media

### USE CASES

- **Contribution Assessment**
  - Digital Campaign
  - Cross-Media Campaign
  - Full Marketing Mix

- **KPIs**
  - Online Traffic
  - Online Conversion
  - Offline Retail Traffic
  - Offline Sales (CPG only)
  - Brand Metrics

- **Budget Optimization**
  - Across Digital Channels (Indices provided for manual optimization)
  - Across Cross-Media Channels
  - Across Sales & Brand Metrics

- **MODEL INPUTS**
  - Other Marketing Variables
  - External Influences
  - Competitors

- **ADVERTISING PARAMETERS**
  - Diminishing Returns
  - Adstock
  - Long-term Effects
  - Media Interactions and Halos
  - Baseline/Incrementality

- **DATA DELIVERY & APPLICATIONS**
  - Dashboard
  - Optimizers
  - Programmatic
  - Data Feeds to Other Sources
**Oracle**

**PRIMARY USE CASE** — Determines short- and long-term, offline and online, sales outcomes for digital media and direct mail. Evaluating overall campaign effectiveness and providing a deep dive into the effectiveness of target segments, media types, new and existing buyers, creative, demographics and frequency

<table>
<thead>
<tr>
<th>PRIMARY OFFERINGS</th>
<th>MEDIA COVERED</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marketing Mix Models.......................... N/A</td>
<td>TV Attribution ........................................... N/A</td>
</tr>
<tr>
<td>Digital Attribution.......................... 100%</td>
<td>Unified Models ................................. N/A</td>
</tr>
</tbody>
</table>

**APPROACH**
Exposed/unexposed, test-control and custom analytics

**SOURCE OF TV DATA**
No information

**LEVEL OF GRANULARITY**
Conducted at the household level, but is typically reported at the population, subpopulation or media cut level

**COLLINEARITY WORKAROUND**
Propensity models identify how variables compensate based on the severity. Also utilize gradient boosted regression models

**DATA INTEGRATION**
Utilize data from dozens of sources to create PII to household-level links, and validate with robust truth set based modeling process that updates these connections

**MODEL/RESULTS VALIDATION**
Internal quality control checks

**CYCLE & REFRESH TIMING**
No post period required; 5 weeks to compile and run analysis

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**USE CASES**

- **Contribution Assessment**
  - Digital Campaign
  - Cross-Media Campaign
  - Full Marketing Mix

- **KPIs**
  - Online Traffic
  - Online Conversion
  - Offline Retail Traffic
  - Offline Sales
  - Brand Metrics

- **Budget Optimization**
  - Across Digital Channels
  - Across Cross-Media Channels
  - Across Sales & Brand Metrics

---

**MODEL INPUTS**

- Other Marketing Variables
- External Influences
- Competitors

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**ADVERTISING PARAMETERS**

- Diminishing Returns
- Adstock
- Long-term Effects
- Media Interactions and Halos
- Baseline/Incrementality

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**DATA DELIVERY & APPLICATIONS**

- Dashboard
- Optimizers
- Programmatic
- Data Feeds to Other Sources
**TiVo**

**PRIMARY USE CASE** — Measure cross-platform R&F, the impact of Internet/Mobile and TV ads on business outcomes and related KPIs, and optimization of creative and media placements, campaign planning as well as TV investment decisioning.

<table>
<thead>
<tr>
<th>PRIMARY OFFERINGS</th>
<th>MEDIA COVERED</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marketing Mix Models: N/A</td>
<td>Digital, Mobile, TV, CRM data, segments, third party</td>
</tr>
<tr>
<td>Digital Attribution: N/A</td>
<td></td>
</tr>
<tr>
<td>TV Attribution: N/A</td>
<td></td>
</tr>
<tr>
<td>Unified Models: 100% (a few with location KPIs)</td>
<td></td>
</tr>
</tbody>
</table>

**APPROACH**

HH-level sales lift logistic regression modeling; exposed/unexposed tests and custom analytics

**LEVEL OF GRANULARITY**

HH-level data: platform, network, program, website, creative and ad format level; TV exposure second by second

**DATA INTEGRATION**

Direct match; household level; deterministic match to Experian, LiveRamp and Acxiom

**COLLINEARITY WORKAROUND**

Not a problem due to granularity and volume of data

**MODEL/RESULTS VALIDATION**

Internal checks and industry benchmarks

**SOURCE OF TV DATA**

TiVo STB

**CYCLE & REFRESH TIMING**

Custom modeling takes 3-5 weeks

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**USE CASES**

- Contribution Assessment
  - Digital Campaign
  - Cross-Media Campaign
  - Full Marketing Mix

- Budget Optimization
  - Across Digital Channels
  - Across Cross-Media Channels
  - Across Sales & Brand Metrics

**KPIs**

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**MODEL INPUTS**

- Other Marketing Variables
- External Influences
- Competitors

**ADVERTISING PARAMETERS**

- Diminishing Returns
- Adstock
- Long-term Effects
- Media Interactions and Halos
- Baseline/Incrementality

**DATA DELIVERY & APPLICATIONS**

- Dashboard
- Optimizers
- Programmatic
- Data Feeds to Other Sources
Glossary
Web/Wikipedia-Sourced, Sequent Partners Adapted

A/B Testing
A controlled experiment involving two variables. Used extensively in digital to optimize messaging performance. It is essential that all contextual factors, audience, content environment, time, etc. be perfectly matched to isolate the comparative effect of A versus B.

Adstock
Term coined by Simon Broadbent to describe the prolonged or lagged effect of advertising on consumer purchase behavior. It’s an essential model specification for capturing the full extent of advertising’s contribution.

Agent-Based Models
Model for simulating the actions and interactions of autonomous agents (e.g., consumers) with a view toward assessing the effects of causal factors (e.g., advertising) on their behaviors (e.g. purchasing) and the system as a whole (e.g., market). Provides explanatory insight into the collective behavior of agents following known behavior patterns (e.g., repeat purchase distributions) or simple rules (e.g., average purchase size).

Algorithm
Procedure or formula for solving a problem, based on conducting a sequence of specified calculations or steps. For example, a media optimizer uses an algorithm to sequentially add the next best medium to the plan.

Attribution
The statistical method of assigning credit to the media stimuli consumers encounter along the path to “conversion” — taking action, sales, etc. — a “bottom up,” consumer- and transaction-level model.

Baseline/Incrementality
In modeling, sales that would have occurred without any marketing efforts are considered base sales. Incrementality reflects the sales lift associated with media/marketing stimuli. Important to distinguish between the two to avoid misattributing to a medium, the value of sales that would have occurred naturally. Not measureable, this is a model inference.

Bayesian Priors
In Bayesian statistics, a prior probability distribution — often simply called the prior — of an uncertain quantity is the probability distribution that would express one’s beliefs about this quantity before some evidence is taken into account. This enables facts taken from other sources to be imposed on a model. It also enables a model to work with data sources of different levels of granularity.

Behavioral Economics
Study of the effects of psychological, social, cognitive, and emotional factors on the economic decisions of individuals and the consequences for market prices, returns, etc.

Collinearity
A condition in which some of the independent variables are highly correlated; a linear relationship exists between two explanatory variables. Results in an inability to tease out the effects of either variable, as in television flight running the same time as a digital campaign.

Covariate Controls
Any method for statistically removing the effects of contextual variables from the variables being evaluated. This could be as simple as analyzing two groups separately (e.g., deal-prone vs. full-price consumers) or more complex — fitting a multivariate model and adjusting dependent variable estimates to simulate the average, not actual, level of the covariates.

Cross-Platform Attribution
The process of assigning credit to the touchpoints consumers encounter along the path to conversion, when all touchpoints, online and offline are included. Sometimes driven by “rules” or algorithms that...
arbitrarily assign credit to one touchpoint. More often by statistical models that infer the contribution of each touchpoint to conversion, (e.g., traffic or sales). When only online touchpoints are included, Multi-Touch Attribution is a more descriptive name.

**Dependent Variable**
The variable to be predicted by the model (e.g., sales).

**Diminishing Returns**
The saturation effect where sales increases reach a limit after which each additional advertising dollar has a decreasing incremental effect and, eventually, reaches a ceiling with near zero incremental effect.

**Discrete Choice**
Model of choices customers make between products or services. By identifying patterns in these choices, models predict how different consumers respond to competing products. Allows marketers to examine the share impact of pricing, service bundling, etc., on different classes of customers.

**Econometrics**
Statistical models used in econometrics that specifies the statistical relationship between variables. (See also Regression)

**Exposed vs. Unexposed**
Commonly-used approaches for measuring ad effectiveness in which the subsequent behavior of individuals exposed to an ad is compared to individuals not exposed to the ad. Due to collinearity and the effect of unobserved contextual variables, this approach does not necessarily reveal whether or not ads have a causal effect on outcomes such as purchases and site visits. (See A/B testing)

**External Influences**
Factors that occur entirely beyond the marketers control, but exert influence on the way advertising in a particular category behaves. For instance, weather, consumer confidence, gas prices, etc. (also known as Exogenous factors).

**Game Theory**
Used to fairly distribute credit or value to each individual player/participant. Game theory attribution assigns (with the help of algorithms) each touchpoint fair credit for a conversion based on their true contribution.

**Granularity**
The level of detail considered in a model. The greater the granularity, the deeper the level of detail and potential for actionable insight. Granularity can also be a solution for collinearity.

**Hierarchical Bayesian**
A statistical modeling technique that enables a multi-layered approach (e.g., an upper branding model that identifies consumer preferences and a lower conversion model where brand preference is one of the causal factors).

**Holdout Samples**
Sample of observations withheld from the model fitting process. Model predictive validity can be estimated by its ability to predict the data. Sometimes the holdout is chosen for convenience, but a mixture of random and designed holdouts (to provide a set of specific situations) is preferred.

**Independent Variables**
The variables that, in combination, predict the dependent, or outcome, variable (e.g., sales). They represent the causal factors that drive the outcome variable.

**Logit Models**
A regression model where the dependent variable is categorical (e.g., brand chosen) at the person/HH level. This is the classical statistical model for individual person/HH transaction data.

**Long-term Effects**
Cumulative effect of advertising on consumers’ brand choice behavior, lasting over several years. Measures of loyalty to a brand or consideration set of brands. It can also reflect customer lifetime values. Lacks consistent definition and, in some cases, long-term effects of digital advertising are measured on a “next quarter” basis.

**Lookback Windows**
Defines a time span during which advertising is analyzed prior to a conversion. The period of time the model “looks back” at the ad exposures that may have contributed to a conversion.

**Machine Learning**
An application of artificial intelligence (AI) that provides systems the ability to automatically learn
and improve from experience without being explicitly programmed. In its current rudimentary form, multiple modeling techniques are assembled in a framework. The framework determines which model, or combination of models, best fits the historical data.

**Market Level ANCOVA**
Analysis of covariance. Isolates the effect of a potential causal categorical factor (e.g., an ad exposure) on a dependent outcome variable (e.g., purchase), while statistically controlling for the effects of other continuous variables that are not of primary interest (e.g., price), known as covariates.

**Media Interactions and Halos**
Degree to which media enhance or detract from each other’s effects — coordinated, sequenced for maximum performance. Often called synergies.

**Marketing Mix Models**
Models involving the application of regression and other statistical approaches to estimate the impact of marketing elements on incremental sales. Historical data is used to fit the model, which then can be used for prediction of future outcomes (e.g., sales). They assess the effectiveness of spending by channel over and above a baseline of sales that would have occurred without any marketing efforts. Often called “Top Down” models. These models explain a high proportion of the variance in sales and typically include explanatory factors like seasonality, competitive activities, and trade and consumer promotion. They are most frequently used to inform budget allocation across channels.

**Multi-Touch Attribution**
The process of assigning credit to the touchpoints consumers encounter along the path to conversion. Sometimes driven by “rules” or algorithms that arbitrarily assign credit to one touchpoint. More often by statistical models that infer the contribution of each touchpoint to conversion (e.g., traffic or sales). In practice, MTA most often refers to digital touchpoints and is used to compare the impact of digital vehicles. When online and offline touchpoints are included, Cross-Platform Attribution is a more descriptive name.

**Other Marketing Variables**
Aspects of product marketing besides media and advertising that drive sales. Price, promotion, product features, in-store variables, competitive trade deals and impact provide the full picture of marketplace pressure and consumer response. Models that do not include these factors fail to provide a holistic view and implicitly overstate the contribution of advertising.

**Random Control Tests**
Popular in digital analytics but an elemental research approach involving creating random test and control groups as a way of determining the behavioral lift (e.g., visits, conversions, etc.) associated with exposure to a specific campaign. The estimation of the measured effect is only as good as the controls associated with assigning subjects to each exposed vs. unexposed condition.

**Regression**
A broad set of statistical techniques for estimating the relationships among variables. Helps determine how the typical value of the dependent variable (e.g., sales, conversions, etc.) changes when any one of the independent variables (media weight, media mix) is varied, while the other independent variables are held fixed. Developed in the early 19th century for astronomy, it has been used extensively by marketers for predicting and forecasting sales outcomes for over 30 years.

**Unified Models**
Relatively new statistical approach for integrating strategic marketing mix and tactical digital analytics into a holistic model. Considered best practice in theory; generally involves broader marketing mix model results being applied as constraints for highly granular digital outcomes. Complicated by lack of standard approaches.

**Validation**
A measure of the accuracy and precision of modeled results. There are two common and complimentary approaches. Goodness of fit (MAPE: Mean Average Percent Error, or R2: percent of variance explained) describes how well the model replicates the historical data to which it was fit. Predictive validity: the same statistics can be used to evaluate how well a model replicates hold-out, or future data not used in the original model fitting process. In essence, the extent to which modeled results are well-founded and correspond accurately to real world results.