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Introducing

cimm coalition for innovative media measurement

4As

ROI / Attribution Provider Comparison

Purpose

- Addresses a critical topic in time of evolving, fast-pace innovation
- Industry wrestling with:
  - Range of analytic providers
  - Variety of data sources
  - Wide array of statistical techniques

- Goal of the guide: advance the dialogue between buyers and sellers

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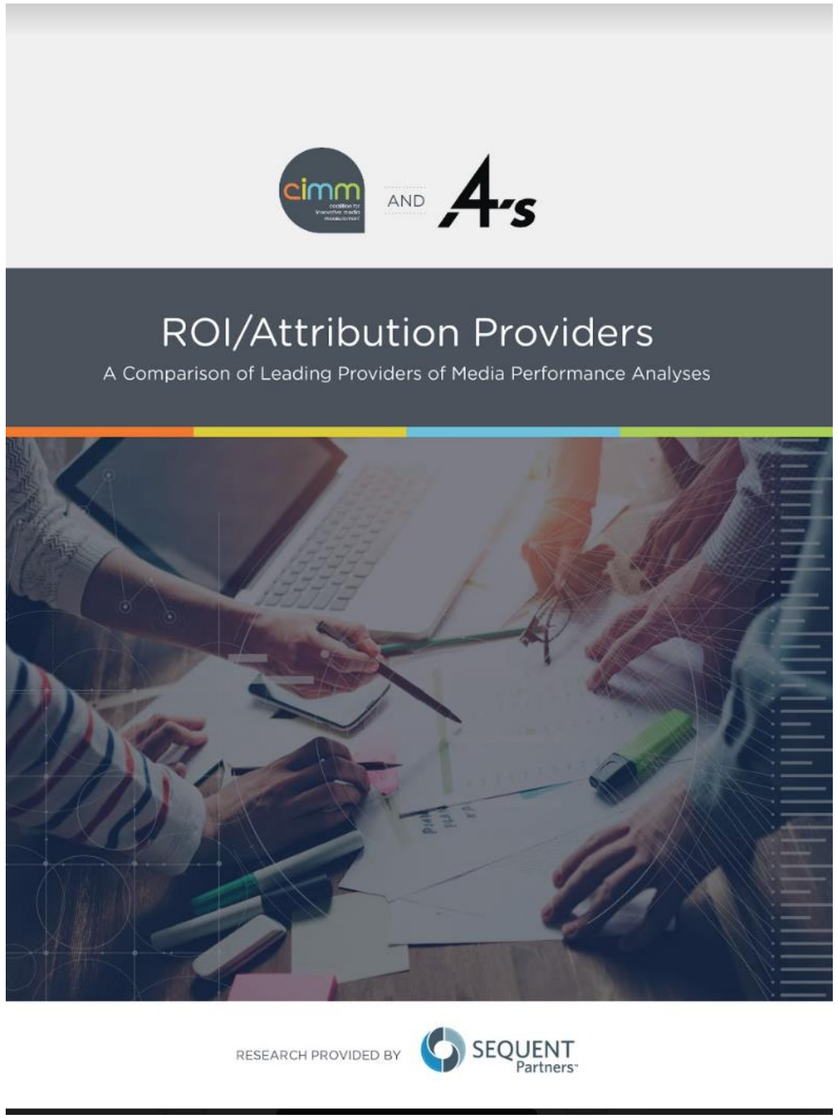
Introducing!



- Committee identified key providers and key variables for comparison
- Comprehensive and collaborative information-gathering process
- Providers reviewed their profiles with twice in the Fall, 2017

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Participants

Providers grouped by primary offering

Shown in alphabetical order

MARKETING MIX MODELERS WITH ATTRIBUTION PRODUCTS

Analytic Partners
in4mation insights
IRI
Marketing Evolution
Millward Brown, *a Kantar subsidiary*
(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*
VisualIQ, *A Nielsen company*

TELEVISION OR DIGITAL ATTRIBUTION PROVIDERS

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

SINGLE SOURCE PROVIDERS

Concentric
IRI Lift
Nielsen Catalina
Oracle
TiVo

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Detailed explanation of the variables used in the comparison

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

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 TVand 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

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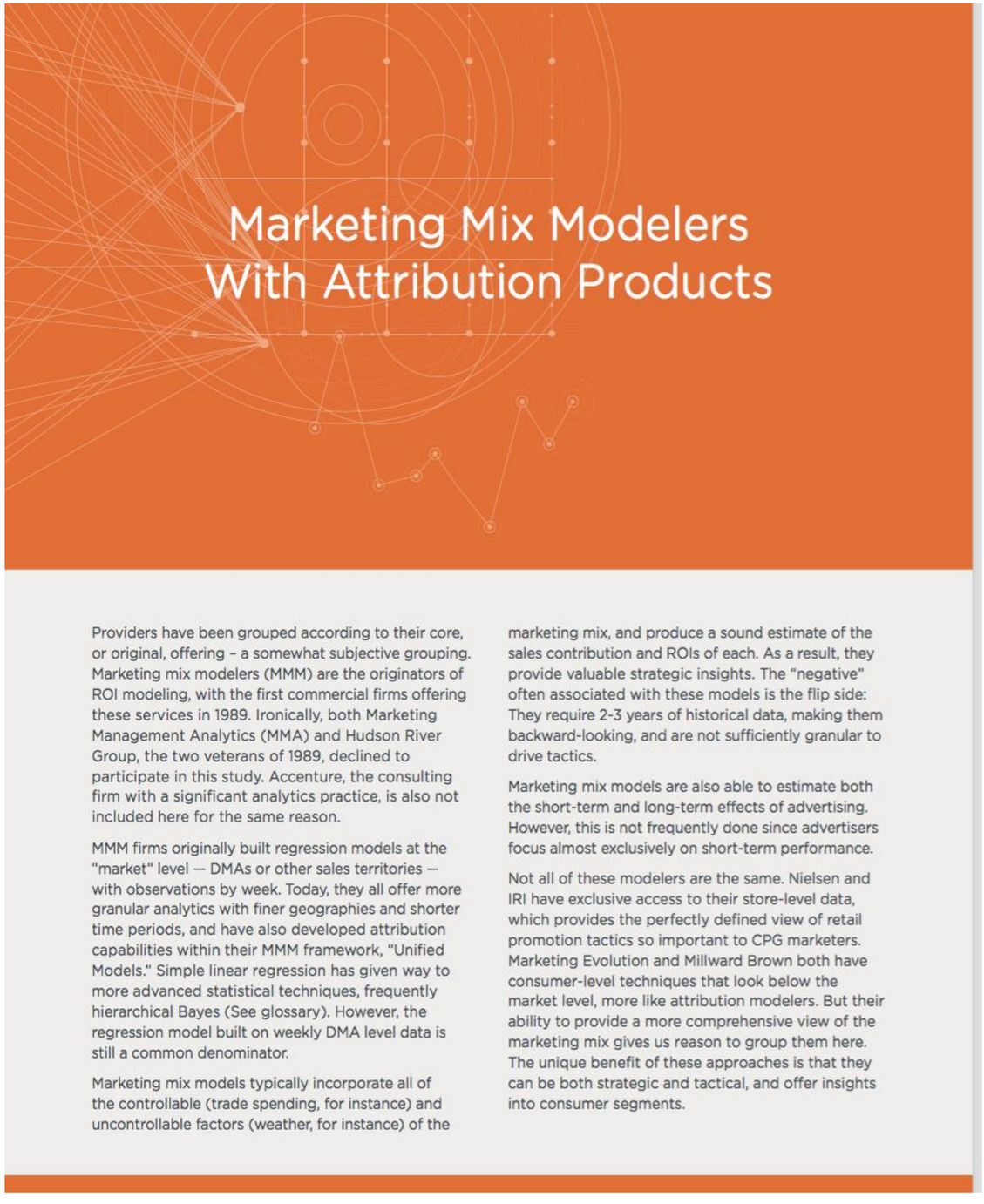
Color-coded “interstitials” with comments on the industry sectors and current offerings



Marketing Mix Modelers With Attribution Products

Providers have been grouped according to their core, or original, offering – a somewhat subjective grouping. 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 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.

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Simple yet comprehensive view of provider offerings

MARKETING MIX MODELERS WITH ATTRIBUTION PRODUCTS

Analytic Partners

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

Marketing Mix Models..... 24%
Digital Attribution..... 8%
TV Attribution..... 30%
Unified Models..... 60%
(20% location)

APPROACH

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

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.

SOURCE OF TV DATA
Rentrak

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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RESEARCH PROVIDED BY SEQUENT Partners

The variables stay the same, but not all providers have “solid dots” in each category

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Attribution Specialists With Cross-Platform Products

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 that 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

ConversionLogic

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

Marketing Mix Models	N/A	TV Attribution	59%
Digital Attribution	76%	Unified Models	59%

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

SOURCE OF TV DATA

Client log files

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

DATA INTEGRATION

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

COLLINEARITY WORKAROUND

Approximated Shapley values in cooperative game theory

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

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.

iSpot

iSpot.tv **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

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

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

SOURCE OF TV DATA

Inscape

LEVEL OF GRANULARITY

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

DATA INTEGRATION

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

COLLINEARITY WORKAROUND

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

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

Single Source Providers

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.

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

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

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

Three pages of glossary terms, from A/B testing to validation

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 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

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Panel Discussion

- Newcombe Clark
  - Global Director, Rapid Learning Lab, AIG
- David Ernst
  - VP, Advanced Targeting Solutions, A+E Networks
- Claire Browne
  - VP, Director of Media Research, RPA