Integrated Media Planning: Business Analytics and Model building

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Case Study: Toyota Camry

Today's consumers are exposed to an expanding, fragmented array of marketing touch points across media and sales channels.

Imagine that while viewing a TV spot for a Toyota Camry, a consumer say Rita uses her mobile device to Google "sedans. " Up pops a paid search link for Camry, as well as car reviews

She clicks through to Car and Driver's website to read some reviews, and while perusing, she notices a display ad from a local dealership but doesn't click on it

One review contains a link to YouTube videos people have made about their Camrys. On YouTube she also watches Toyota's clever "Camry Reinvented" Super Bowl ad from eight months earlier

During her commute to work that week she sees a Toyota billboard she hadn't noticed before and then RELATED VIDEO receives a direct-mail piece from the company offering a time limited deal

She visits local dealerships' websites, including those promoted on Car and Driver and in the direct-mail piece, and at last heads to a dealer, where she test-drives the car and buys it.

How many off line and online channels has she touched?

Off line

- TV
- Billboards
- Radio
- Print media ad

Online

- Youtube, website, google ads
- Direct mails

To which channel will you attribute the sales?

It becomes impertinent to talk about Various Media Platforms

- TV
- Radio
- Mobile Apps or Alerts
- Paid Search
- Organic Social Media Content
- Website Features
- Influencer Campaigns
- External Press Coverage
- Paid Social Media
- Media: YouTube videos, podcasts
- etc
- etc

What questions you need to address ?

- ??
- Which advertising media? Garners maximum attention, how do you know?
- How do you arrive at right media mix plan? **Cost and benefit??**
- What is my target segment?
- Customer persona
- Preferred platforms for information consumptions?
- Areas visiting
- Design Campaigns and place advertisement

What questions should Toyota's chief marketing officer (digital Marketing) should ask ?

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- How did this combination of ad exposures interact to influence this consumer?

- Is Toyota investing the right amounts at the right points in the customer-decision journey to spark her to action?

Another case

How do ads work across media and sales channels, following is an example

- TV ate up 85% of the budget in one new-product campaign, whereas YouTube ads—a 11% slice of the budget, And search ads, at 4% of the company's total advertising budget
- You Tube ads were nearly twice as effective at prompting online searches
- And search ads, at 4% of the company's total advertising budget
- Armed with those rich findings and the latest predictive analytics, the company reallocated its ad dollars, realizing a 9% lift in sales without spending a penny more on advertising

What is different here?

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So what is different in this case?

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- Capture the data
- Use predictive analytics
- In this case improved sales by just reallocation without spending extra money.

Hence it is important to study analytics arounds advertising spend , media mix and timings of ads, impact on sales
How Data Analytics is helping ?

Media Mix Analytics

- What are the different ways of setting advertising budget?
  - Media decisions (what mix?)
- What are the methods that involve measuring advertising effectiveness?
  - Advertising effectiveness (can normally be done by conducting experiments in controlled advertisement or otherwise)

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Media Mix Budget Decisions

- Advertising expenditure as percentage of sales, how do you decide?
  - Delphi techniques
  - Benchmarking: Advertising investment varies by industry(B2B: Product and Services, B2C: Product and Services)
  - Competitors analysis (what is competition doing, what is the spending etc)

What else is important?

- Sensitivity of sales or other variables to different input variables
- What does that mean?
- One example is…

How sensitive is demand to advertising?

Advertising elasticity of Demand= Proportionate change in demand for the product/ proportionate change in advertising expenditure

If Advertising elasticity of demand (AED) is more than 1 , the product is advertising elastic

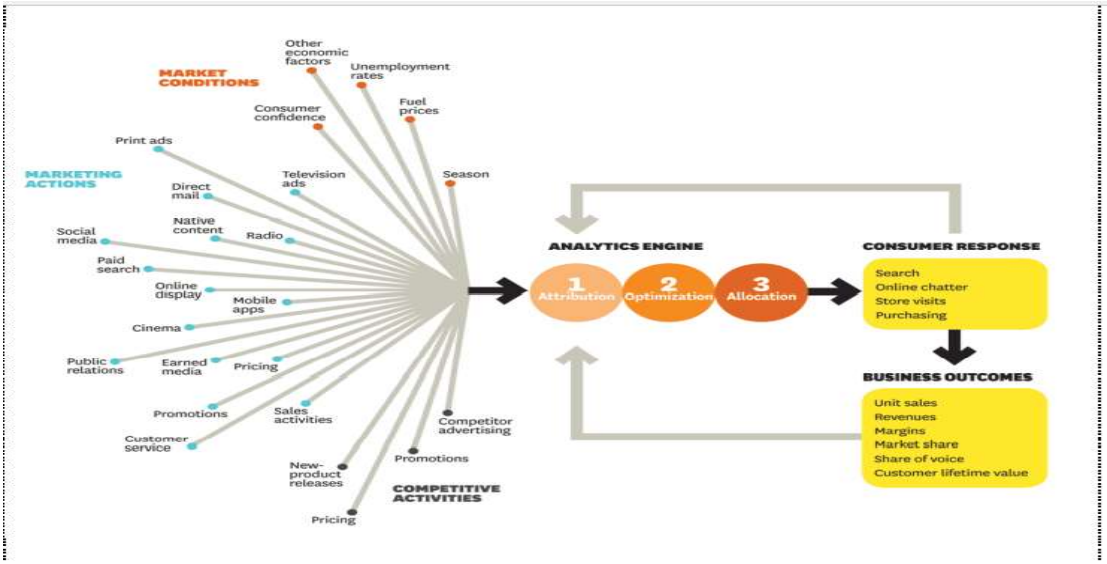
If Advertising elasticity(AED) is less than 1, the product is advertising inelastic

Is this all you want to know?

- ??

- Sensitivity of corona cases on Pay per click?
- Sensitivity of GDP on Sales?
- .
- .
- .
- .

Role of predictive modelling



Decomposition One way of knowing the ad reach is

- This method allows the advertiser to obtain a measure of the reach of the advertisement.

Total Audience	400 million
Total cost of Ad	2,000,000
Profit from each unit sold	Rs 1,000

	Percentage	Percentage of audience
Total market	40%	40%
Exposed to ad	60%	24%
Pay attention to ad	40%	9.6%
Understand Ad	70%	7.72%
Intend to purchase	10%	0.67%
Actually purchase	20%	0.13%
Customers : 53,760	Profit: 53,760,000	ROI: 25.88%

If you are doing digital ads on social media how do you think these figures changing?

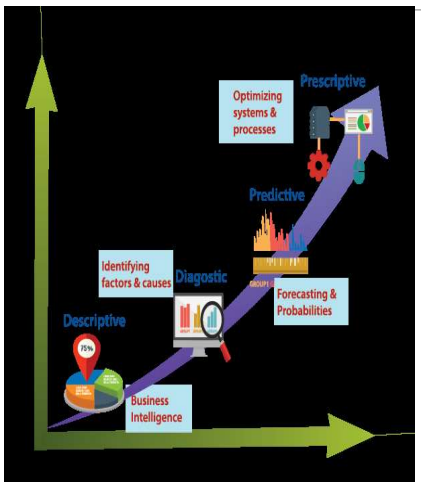
So what next?

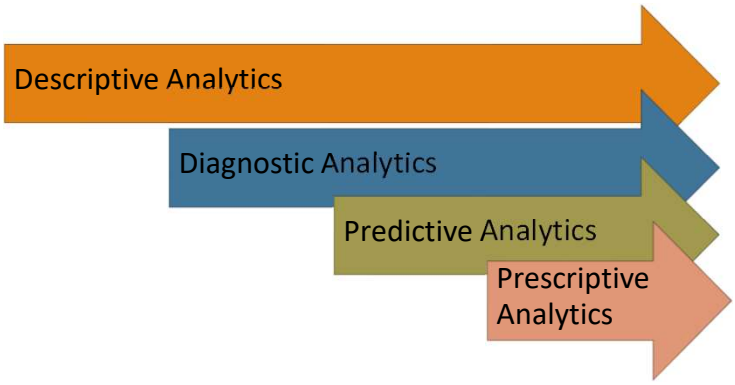
- We all have understanding that there is impact of media (print and digital) of media in garnering interest/ sales, How do we proceed??

- You may want to collect this information for all media points
- You will have to take decision based on that e.g. analyze how to allocate the budget to each media channel

Analytics is playing a huge role here

Business Analytics





Business Analytics

	Descriptive What Happened?	
Statistical Procedures or Calculations	Averages/ mean Standard Deviations Variance Mode/Median Count/ Ratio Trends	
Typical Visualization	Histograms Pie Charts Line Charts Area Charts Frequency Distribution	

Typical Statistical Analysis and Visualization Choices

	Descriptive What Happened?	Diagnostics Why did it happen?
Statistical Procedures or Calculations	Averages/ mean Standard Deviations Variance Mode/Median Count/ Ratio Trends	Correlation Regression Analysis of Variance Factor Analysis Cross Tabulation and Chi Square Principle Component Analysis Correspondence Analysis Multiple Correspondence Analysis
Typical Visualization	Histograms Pie Charts Line Charts Area Charts Frequency Distribution	Scatter Diagrams Regression plot Plots of residuals Box Plots, Multiple Density Curves, Balloon Plots, Mosaic Plots

Typical Statistical Analysis and Visualization Choices

	Predictive What will Happen?	
Statistical Procedures or Calculations	Regression –Linear, curvilinear, logistics, ridge Decision Tree and its Variants Random Forests Boosting and Bagging Discriminant Analysis Partial Least Square Neural Nets	
Typical Visualization	Numeric Information Line Charts Scattergrams / Correlation Plots Categorical Information Decision Trees, ROC Curves AUC Curves, Confusion Matrix	

Typical Statistical Analysis and Visualization Choices

	Predictive **What will Happen?**	Prescriptive How can we make it happen?
Statistical Procedures or Calculations	**Regression –Linear, curvilinear, logistics, ridge** **Decision Tree and its Variants** **Random Forests** **Boosting and Bagging** **Discriminant Analysis** **Partial Least Square** **Neural Nets**	Using the predictive model on new data Either real data or vary the data in model to achieve the desired goal Operations Research Mathematical Models
Typical Visualization	**Numeric Information** **Line Charts** **Scattergrams / Correlation Plots** **Categorical Information** **Decision Trees, ROC Curves** **AUC Curves, Confusion Matrix**	

Allocation of budget: Optimization problem

Objective is to find the promotion mix that maximizes total number of impressions (from all channels together)

The channels being considered are Direct marketing, Pay-per click(PPC) advertising and social media advertising

For direct marketing the available budget if Rs500, and the impression achieved per advertisement is 300

For PPC the available budget per advertisement is Rs 600 and the impression achieved per advertisement is 300

For social media the budget per advertisement is Rs 400 and the impression achieved per advertisement is 400

Cont.

The constraints are Direct marketing can not exceed 2,400 ads, PPC advertising can not exceed 1,600 advertisement and social media can not exceed 800advertisement per month

The objective function is to maximize total advertising impressions for the month promotion mix across the three channels

Marketing Analytics in Media mix involves three broad activities

- ???

- attribution, the process of quantifying the contribution of each element of advertising;
- optimization, or “war gaming” by using predictive analytics tools to run scenarios for business planning; and
- allocation, the real-time redistribution of resources across marketing activities according to optimization scenarios.

Attribution

To determine how your advertising activities interact to drive purchases

start by gathering data, What type of data and Where do you find that data?

market conditions

marketing actions

competitive activities

Individual swimlane without attribution

ADVERTISING MEDIUM	ESTIMATED RESULTING REVENUE
DISPLAY ADS	$40 MILLION
PAID SEARCH	$50 MILLION
SEARCH ENGINE OPTIMIZATION	$40 MILLION
E-MAIL MARKETING	$30 MILLION
TOTAL	**$160 MILLION**

the marketing team presented to finance some campaign results that had been generated using traditional analytics methods

Things quickly became awkward when finance pointed out that the business unit had generated only $110 million in revenue, $50 million short of the reported total.

The discrepancy arose because, leaders in each swim lane claimed the same bucket of revenue

Attribution Models

Management Slant

- At each stage in a consumer's journey toward purchase, different online channels feature most prominently.
- Existing credit-assignment methods, such as the last click, suffer from the problem of attribution—they do not take into account the impact of all those advertising formats that were visited by a consumer contemplating a purchase.
- Four rule-based models can be used for measuring the performance of an advertising campaign—the last-click, time-decay, uniformly distributed, and position-based models.
- Multichannel attribution models have evolved to reflect the growing complexity of attributing credit with each new advertisement format.

Need to study the following

- at what stage in a consumer's journey different online channels feature most prominently for an online business;
- the financial importance of these channels under last-click models;
- the effects of moving to rule-based multichannel attribution models—time decay, uniformly distributed, and position based—and statistics-based multiattribute models.

The study investigated

- whether multichannel attribution models give different channel valuations than last-click models;
- whether these channel valuations vary significantly among the various multichannel models;
- whether statistical multiattribute models have predictive validity.

Following scenarios are discussed

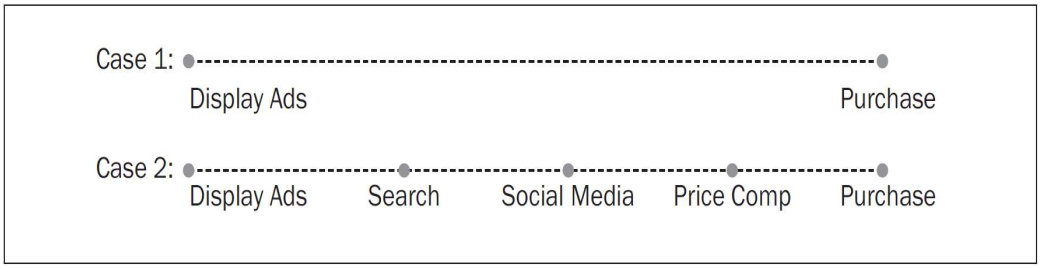
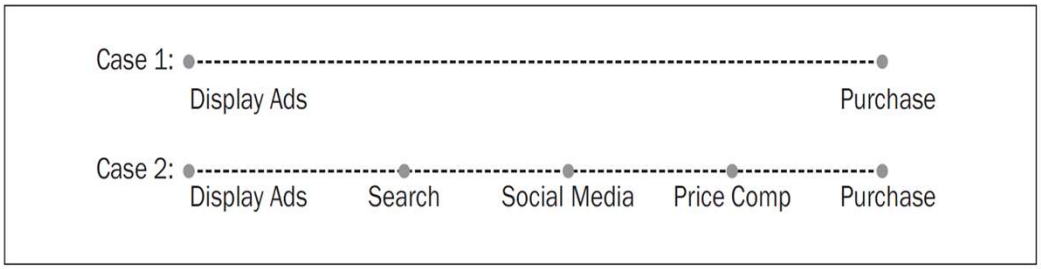


Figure 1 Conceptual Model of Multiplatform Advertising Strategy and Brand Perception

The Role of Online Sales Channels In the Customer Journey

A customer can take different choice actions at different stages of a purchase funnel. There can be three roles in a customer journey—introduction, assist, and conversion (Chandler-Pepelnjak, 2010;

The last click model



The last click model ascribes 100% credit to the last advertisement clicked o before a purchase conversion so in case 2 model would attribute the entire conversion to price comparison

Multichannel attribution Model

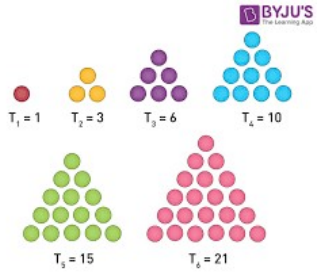
Model no.	Attribution model	Modeling approach
1	Time-decay model	Rule-based modeling assumptions
3	Uniformly distributed attribution	Rule-based modeling assumptions
2	Position-based model	Rule-based modeling assumptions
4	Statistics-based model	Cooperative game theory-based modeling assumptions

The time decay model

This rule-based attribution model follows the triangular numbers ratio of 1:3:6:10. In order to calculate the ratio breakdown for different-length journeys, therefore, the authors used the following formula:

$$\mathrm{Tn} = n\frac{(1+n)}{2} \quad (1)$$

In the above formula, the use of n represents what step number it is; "Tn" is the weighting given to it, and the 100 percent commission is divided up depending on the ratio. A three-step journey, for example, will be divided up under the ratio of 1:3:6, with 10 percent, 30 percent, and 60 percent attributed to the steps in chronological order. For each marketing tool, the model then totals the revenue generated to show the revenue generated by that tool for the time-decay model. It can be envisaged that



Uniform Distribution Model

Uniform distribution across various media mix, if there are 4 , attribute 25% across each of the four

The Position Based Model

A popular position based model uses pareto distribution and hence places gigh values to first and last purchase (80% attribution and equally distribute rest 20% on all other channels

Results of descriptive statistics

TABLE 2 Different Online Marketing Tools and Revenue Generated under the Last-Click Method

Tool	Revenue (%)	Orders (%)	Average order value ($)
Organic search	63	67	106
Display	18	13	159
Paid search	11	10	116
Others	3	3	113
Price comparison	2	2	136
Retargeting	1	2	110
E-mail	1	1	112
Social media	1	2	48

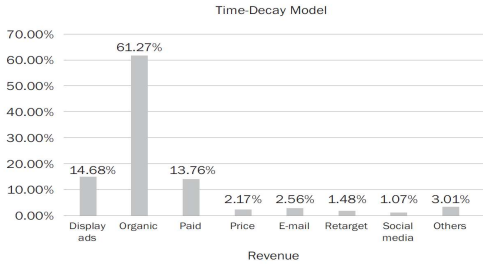
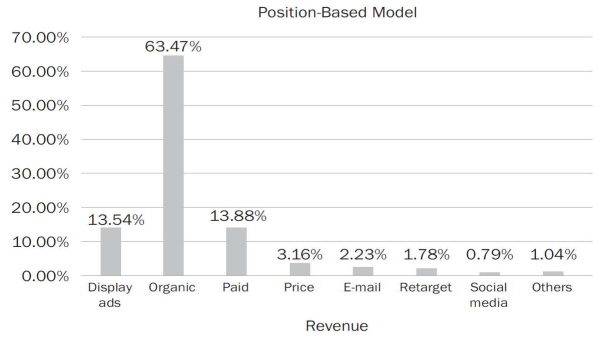
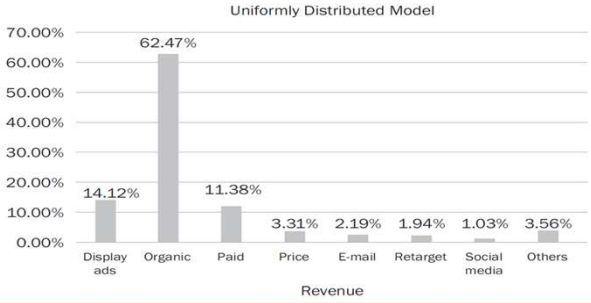
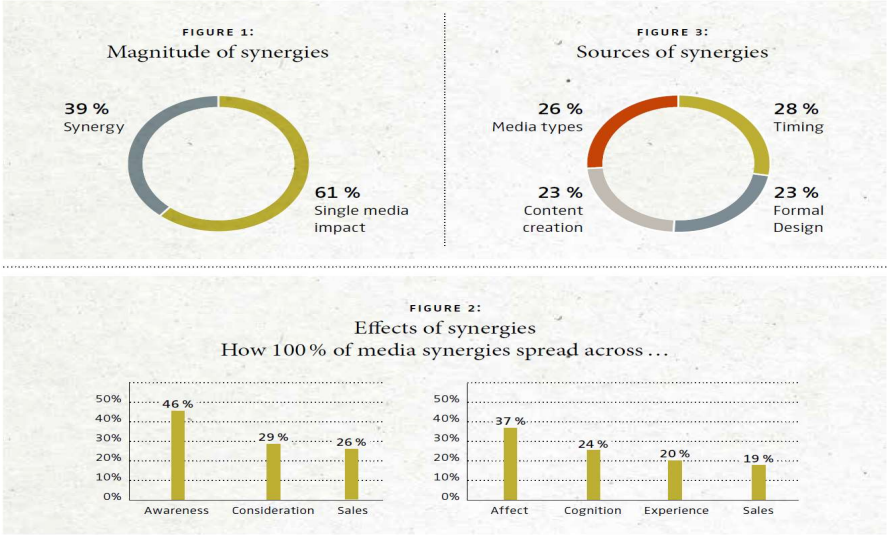


Figure 2 Online Revenue Generation According to Time-Decay Attribution Modeling





Also there is synergy because of multimedia channels i.e. 1+1+1+1+1>=5

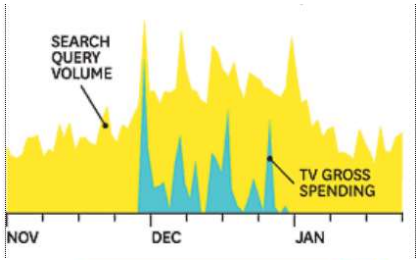


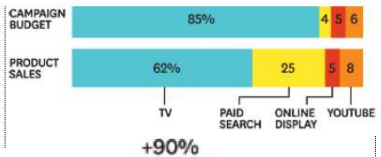
Optimization

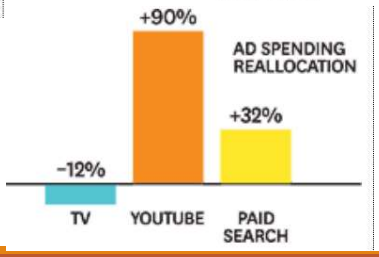
- Once a marketer has quantified the relative contribution of each component of its marketing activities and the influence of important exogenous factors, war gaming is the next step
- It involves using predictive-analytics tools to run **scenarios for business planning**
- Maybe you want to know what will happen to your revenue if you cut outdoor display advertising for a certain product line by 10% in city A—or if you shift 15% of your product-related TV ad spending to online search and display

Remember Elasticity

- Working with data analyzed through the attribution process, you can assign an "elasticity" to every business driver, from TV advertising to search ads to fuel prices and local temperatures
- (Elasticity is the ratio of the percentage change in one variable to the percentage change in another.) Knowing the elasticities of your business drivers helps you predict how specific changes you make will influence particular outcomes
- If your TV ads' elasticity in relation to sales is .03, for example, doubling your TV ad budget will yield a 3% lift in sales, when all other variables remain constant
- In short, analytics modeling reveals how all driver elasticities interact to affect sales





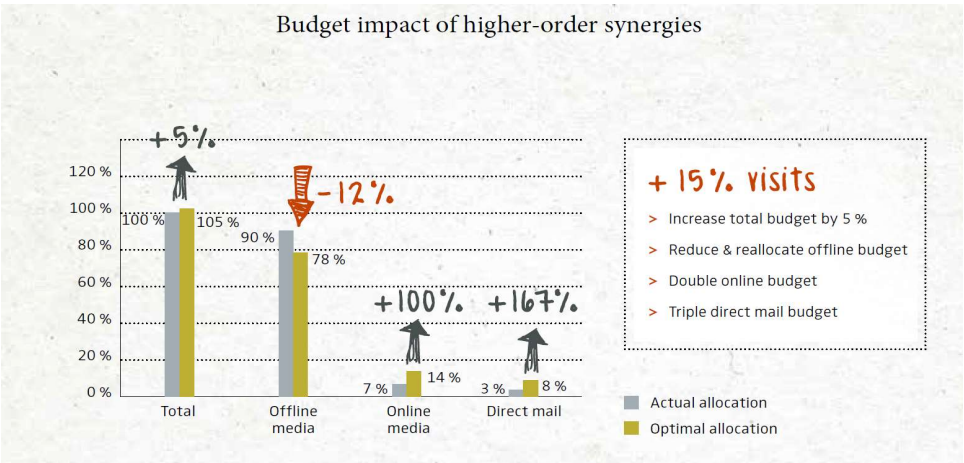


War Gaming

- War gaming uses the actual elasticities of your business drivers to run hundreds or thousands of scenarios within minutes
- In a typical war-gaming process, team members define marketing goals (such as a certain revenue target, share goal, or margin goal), often across multiple products and markets
- Crunching the vast database of driver elasticities, optimization software generates a set of most-likely scenarios along with marketing recommendations to achieve them
- The software also can test specific what-if scenarios: For instance, how will sales of our midsize pickup truck in Denver be affected if gas prices climb 5% and we launch a combined TV and online campaign promoting a $300 rebate?

Allocation

- Allocation involves putting the results of your attribution and war-gaming efforts into the market, measuring outcomes, validating models (that is, running in-market experiments to confirm the findings of an analysis), and making course correction
- Gone are the days of setting a marketing plan and letting it run its course—the so-called run-and-done approach.
- Advertising has become easier to transact, place, measure, and expand or kill.
- Marketers can now readily adjust or allocate advertising in different markets on a monthly, weekly, or daily basis—and, online, even from one fraction of a second to the next.



Can we summarize our learning here

- No one media is the best
- We need to swift through large set of data
- Analyze them in real time and take fast decisions