ECON7960 User Experience and A/B Testing

Hong Kong Baptist University

Topic 1: A Data Mindset

Content

- Data Driven Decision
- Data Awareness
- Online Experiment
- Workshop: A Simple A/B Testing Example on Landing Page

Big Data Era

- "*Today information technologies make digital interfaces in every aspect of work and livings*, data collection so easy that now our biggest challenge is not access to data, it's avoiding the false belief that using data without effort and the data quality is good."
- "Recognizing that interpreting the data and deriving meaning from it is itself a challenging task. In other words, the ease of gathering data can lead us to be lazy in our thinking, resulting in erroneous conclusions if the data quality is low or unrepresentative or the data analysis is flawed."

- King, Rochelle. Designing with Data (p. 1). O'Reilly Media. Kindle Edition.

Datafication of Everything

- Big data technologies allow us to capture, store, and process increasingly vast amounts of information.
- In 2000, less than one-quarter of the world's information was in digital form. Today less than 2 percent of the world's information is nondigital, macro evidence of profound, lightning-fast change.

  - Chavez, Tom."Data Driven: Harnessing Data and AI to Reinvent Customer Engagement"

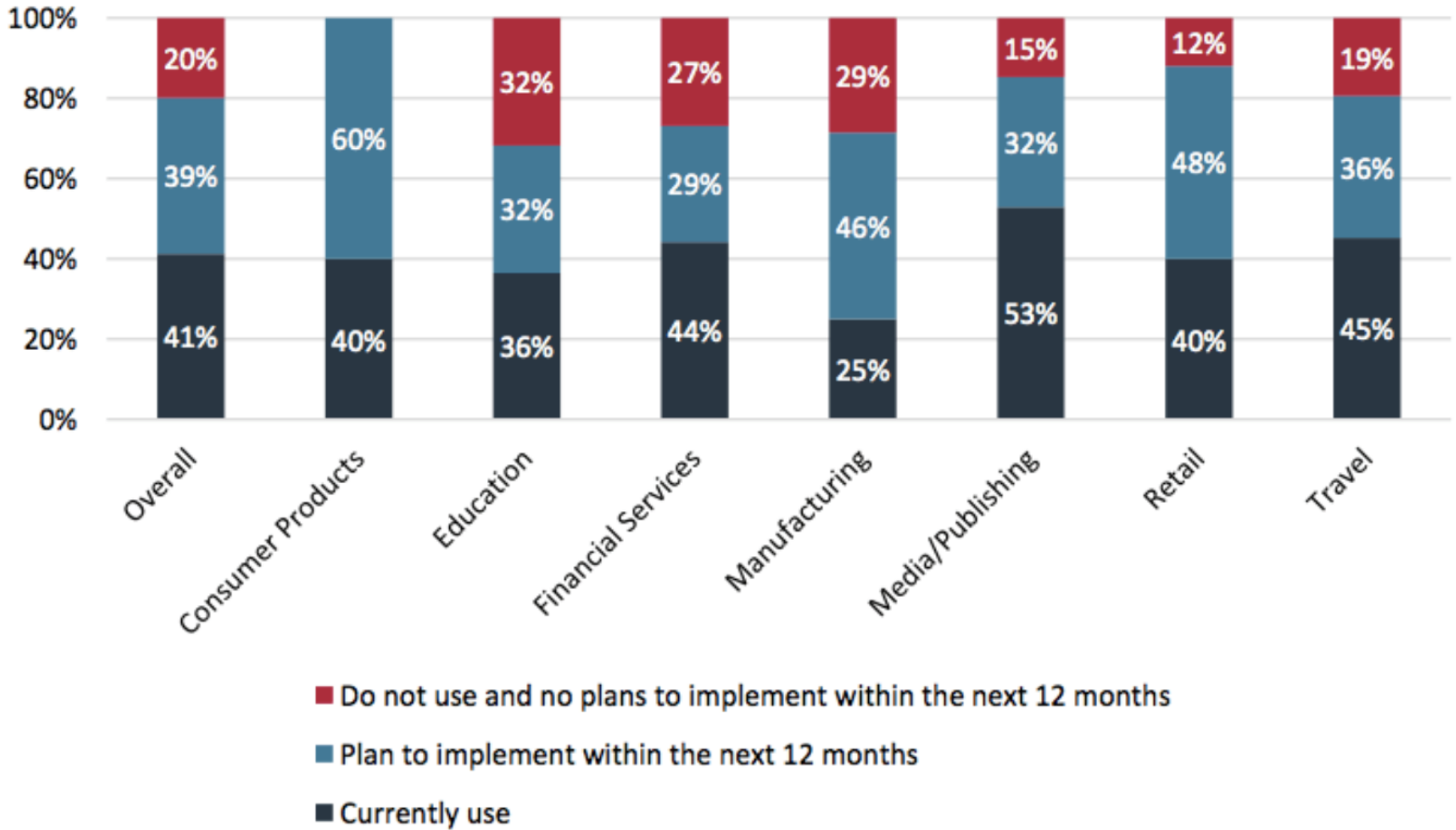
- An interesting example of datafication comes to us from Professor Shigeomi Koshimizu at the Advanced Institute of Industrial Technology in Tokyo, devised a method for recording the contours of your body, your posture, and your weight distribution and turning this information into a personal data signature that's unique
- His system identifies individuals according to how they sit in a chair, on a bench, on a couch, on any surface. And it does so with 98 percent accuracy.

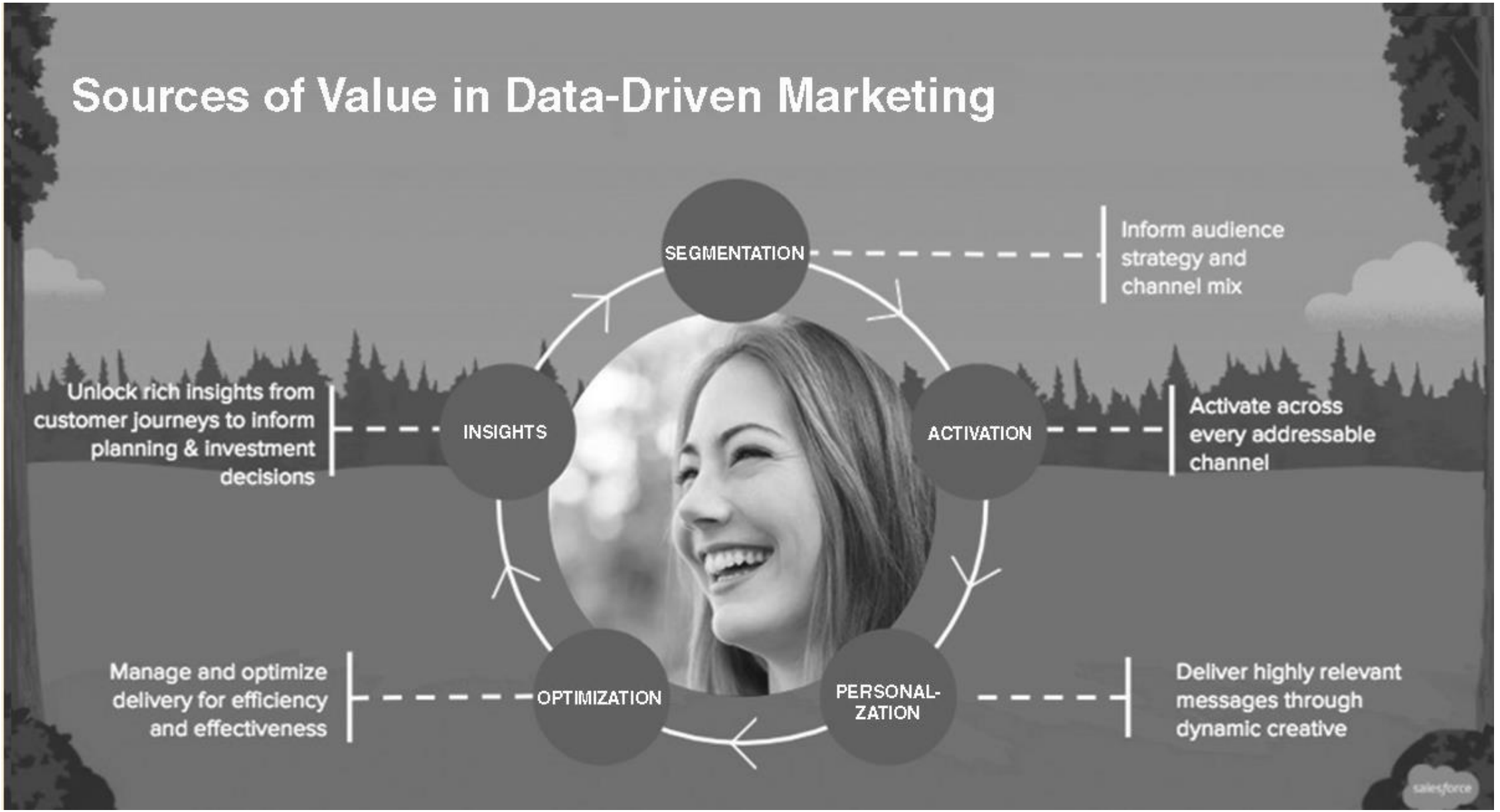
Identity, Multiple version of oneself

- Identity in the digital era is about seeing and managing the multiple versions of oneself.
- Sophisticated new technologies, speed recognition, image recognition, deep learning, IoT, are used to identify one through online cookies, mobile phone identifiers, e-mail addresses, and various device IDs and keys such as Koshimizu's.
- No doubt that devices and browsers do not buy or engage with a brand—people do. In 2016, people owned an average of 3.64 devices per person, and it is estimated that, by 2020, the number will go up to 4.3.

A 2017 study estimated that nearly half of Fortune 500 companies were already licensing a Data Marketing Platform (DMP) to manage their customer data, and another half plan on implementing one. Many enterprises developed data-driven marketing strategies

Figure 6 – Adoption of DMPs by Industry



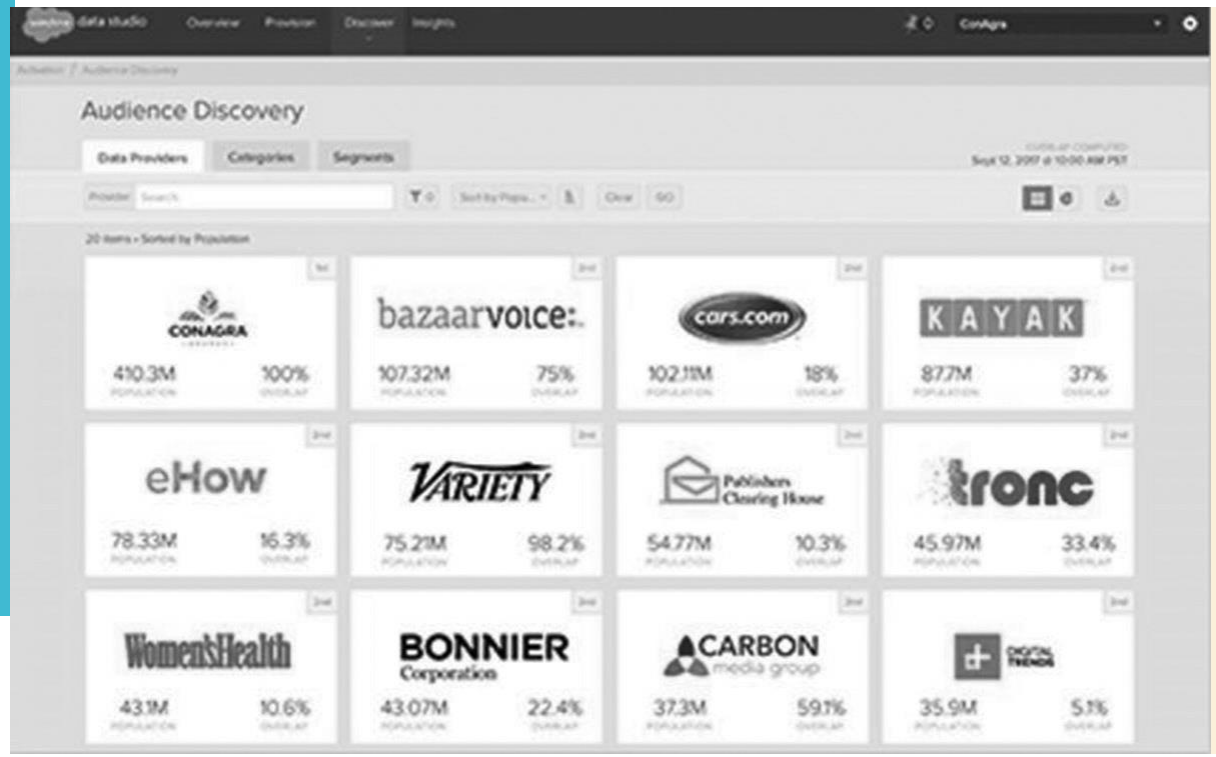

Sources of Value in Data-Driven Marketing
SEGMENTATION
Inform audience strategy and channel mix
Unlock rich insights from customer journeys to inform planning & investment decisions
INSIGHTS
ACTIVATION
Activate across every addressable channel
Manage and optimize delivery for efficiency and effectiveness
OPTIMIZATION
PERSONAL-ZATION
Deliver highly relevant messages through dynamic creative
salesforce

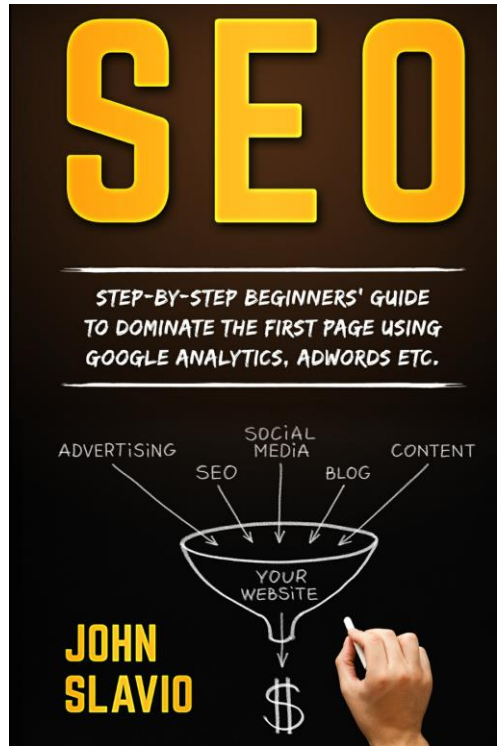
Data Driven Strategy

- Segmentation ("right person"). Better data about people offers the ability to segment them precisely and increase precision in reaching them.
- For example: Heineken had three distinct personas for whom it needed to define a targeted engagement strategy:
  - Mainstream. These were people who were at risk of switching from Heineken brands to mainstream, mass brands like Budweiser and Miller.
  - Craft. These were hipsters and gourmands who loved microbrews and wanted to try a new craft beer all the time—people who loved the experience of tasting beer and were attracted to the new beer culture.
  - Loyalists. These were a core group of Heineken loyalists who had strong brand association with one or more labels.

Data Driven Strategy

- Activation ("right place"). The ability to match data with partners and connect to every system gives marketers the ability to interact with consumers across every addressable touch point.
  - How can one know where are their customer at?
  - Search Engine Optimization
  - The WAMPA—now called the "Audience Discovery Report"—maps the entirety of a marketer's first-party data





Data Driven Strategy

Personalization ("right message"). Tailoring the delivery of content on a website (site-side optimization), a search ad, or a display ad (dynamic creative optimization) enables marketers to target individual segments of users in an impactful way that increases performance.

The simple answer is that customer experience has an enormous impact on both revenue and profitability. Giving new customers the right experience provides a higher probability of winning them, and giving existing customers relevant experiences reduces churn and creates opportunities to sell them more products, more often. When both top-line revenue and profitability can be driven through a single initiative, most CFOs start to invest and will continue to do so as results confirm the initial thesis.

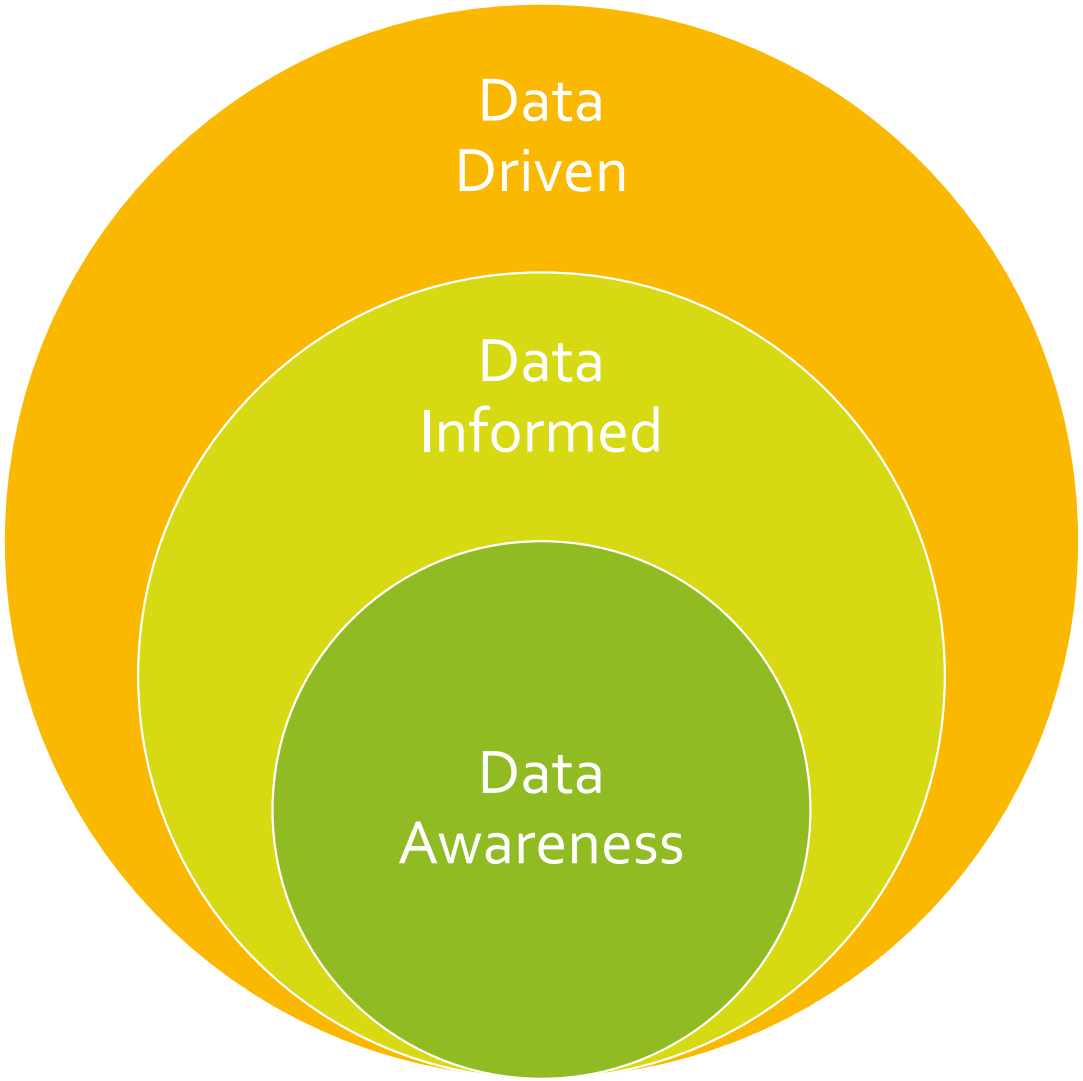
Data Driven Strategy

- Optimization ("right time"). Giving each consumer the optimal number and frequency of messages allows a marketer to achieve new levels of spend efficiency.
  - Everyone in media loves to quote the old John Wanamaker saw, "Half the money I spend on advertising is wasted—the trouble is, I don't know which half."
- Insights ("right idea"). A better understanding of what your customers want, when they want it, and how it fuels the virtuous circle continually forward.

Data Driven Strategy is a User-Centric Orientation

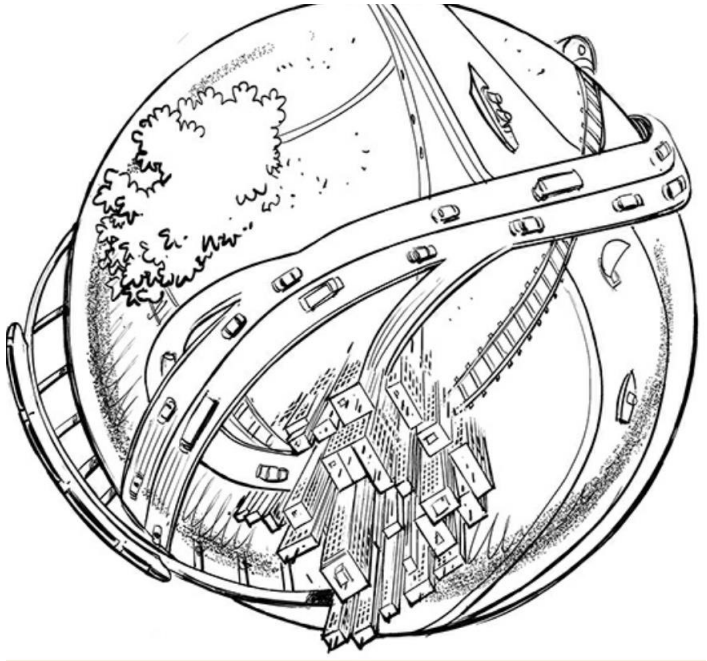
- In the past, without digital interfaces, data is not available to test certain views about the users but today many opportunities are available
- Bringing data and design closer together to get customer
- By using experiment on things to seek out more knowledge about customers and users
- Even though A/B testing could not answer all questions, it can answer certain questions that other methodologies and practices cannot.

Three Ways to Think about Data



Three Ways to Think about Data

- Data-driven means answering well-target questions, where data alone can help drive decision making, like above marketing.
- Being data informed means allowing one to understand how one data-driven decisions fit into a larger design space of products or services on offered.
- Being data aware means recognizing that there are many related questions that many related kinds of data one can draw to answer.



A

B

C

Three Ways to Think about Data

Design Decisions and Create Business

- What data-driven, data-informed and data-awareness mean for a business designers, business planning and business starters?

- The difference between data-aware and instinct-driven design comes down to what one rely on to inform the design decisions: CEO gut feeling or careful analysis.

- Data scientists are
  - Interested in crafting greater user experience
  - Curious about human behavior
  - Knowing who current users are and who might become one's users in the future
  - Problem solvers and provide best services

Design Decisions and Create Business

- Data aware could actively contribute to the creation of meaningful business goals that will focus on the greater asset, users. Of any business, the data capture, analysis and questions are part of the design process
- Data help to articulate the potential impact of design
- Leverage data also help one become a better business designer
- Data-aware approach to design enable to engage with users through the data, resulting in create better user experience

Data Producers: Data Scientists, Data Analysts and User Researchers, Marketers

Data Consumers: Business Managers, Product Managers and Engineers

An important question: Is the data and/ or the analysis used appropriate?

Are one doing what is convenient rather than what is right?

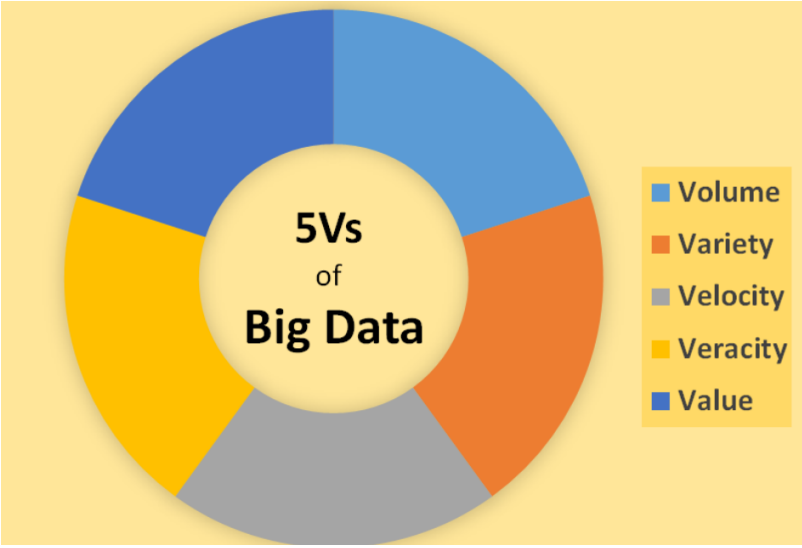
Design is not an art. Design does not exist for designer's sake

Design is about problem solving

Different Dimension of Data

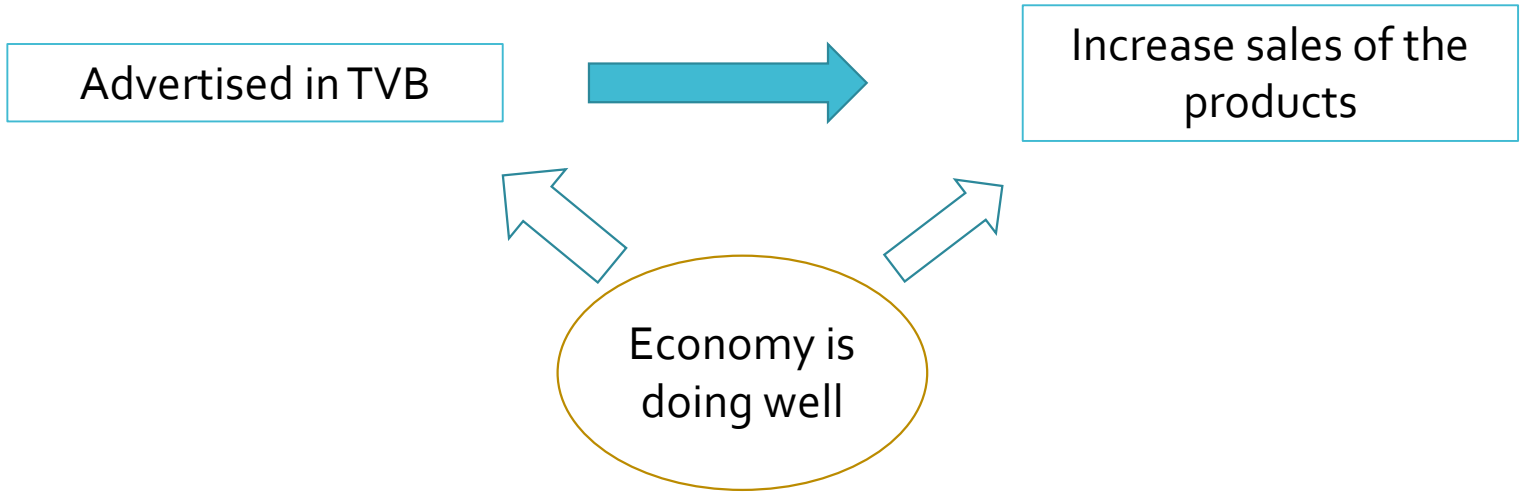
- Not the 5V of Big Data

- But 4 Questions
- Why are you (a corporation or an organization) collecting data?
- When is the data collected?
- How is the data collected?
- How much data is collected?



Why Experiment?

- This course focuses on a single type of data collection: experimentation through A/B testing
- The reason of the type of data collection rather than survey or focus group behind may be that experimentation helps to learn about causality in a way that is grounded in evidence not anecdotal
- Definitely, "correlation does not imply causation"

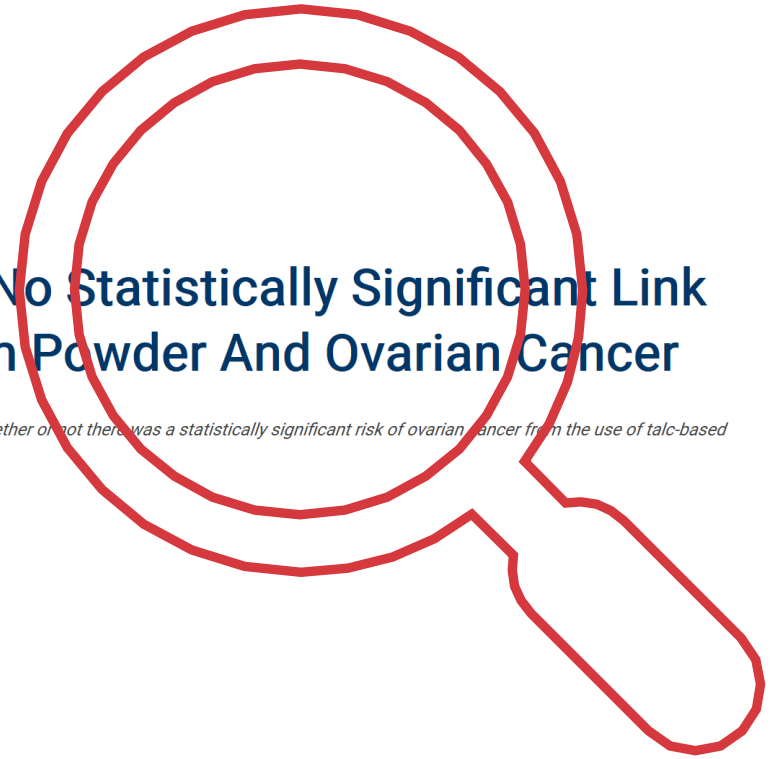


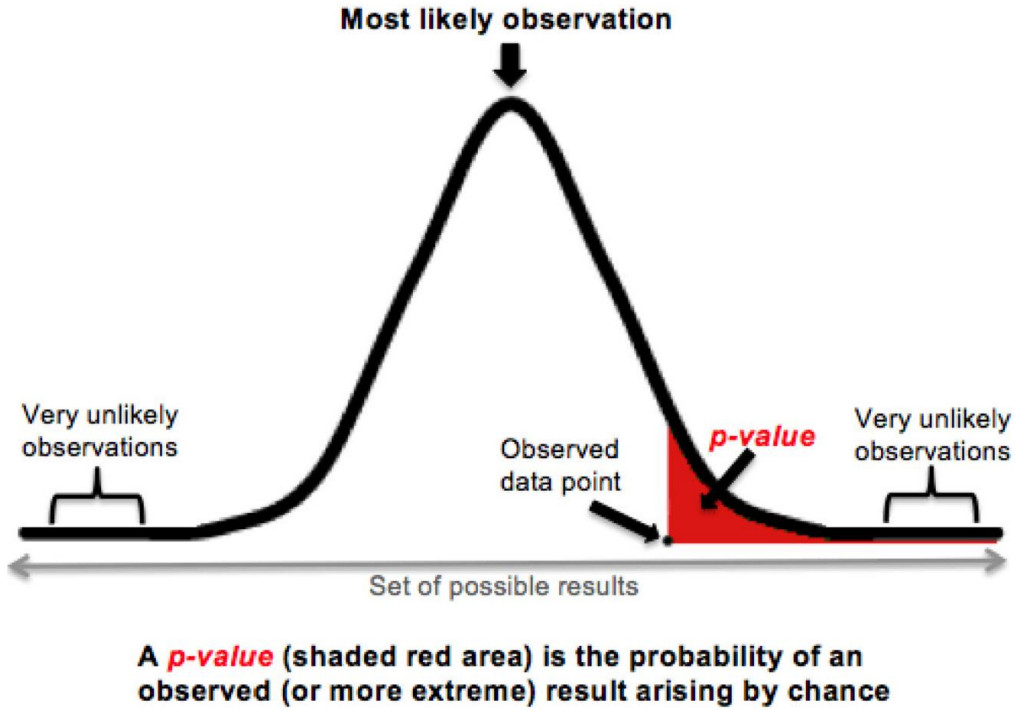
Why Experimentation

- Tread carefully when one hear someone on a team suggesting a new product or a new service direction or design change based on a one-off comment from a friend, acquaintance, or business stakeholder. Most of time, these are anecdotes or opinions rather than true pieces of evidence.
- To ensure that data is meaningful by designing good research, by asking well-thought-out questions that are not biased, bias inducing, or leading to one answer wanted.
- A/B tests are quantitative methods, many judgments are against measures of statistical significance (this term will be looked in future)
- One always heard of a p-value, which measures the probability of the occurrence of a given event given a certain set of circumstances.

Findings Show No Statistically Significant Link Between Talcum Powder And Ovarian Cancer

In a new study, researchers set out to prove whether or not there was a statistically significant risk of ovarian cancer from the use of talc-based powder.





A *p-value* (shaded red area) is the probability of an observed (or more extreme) result arising by chance

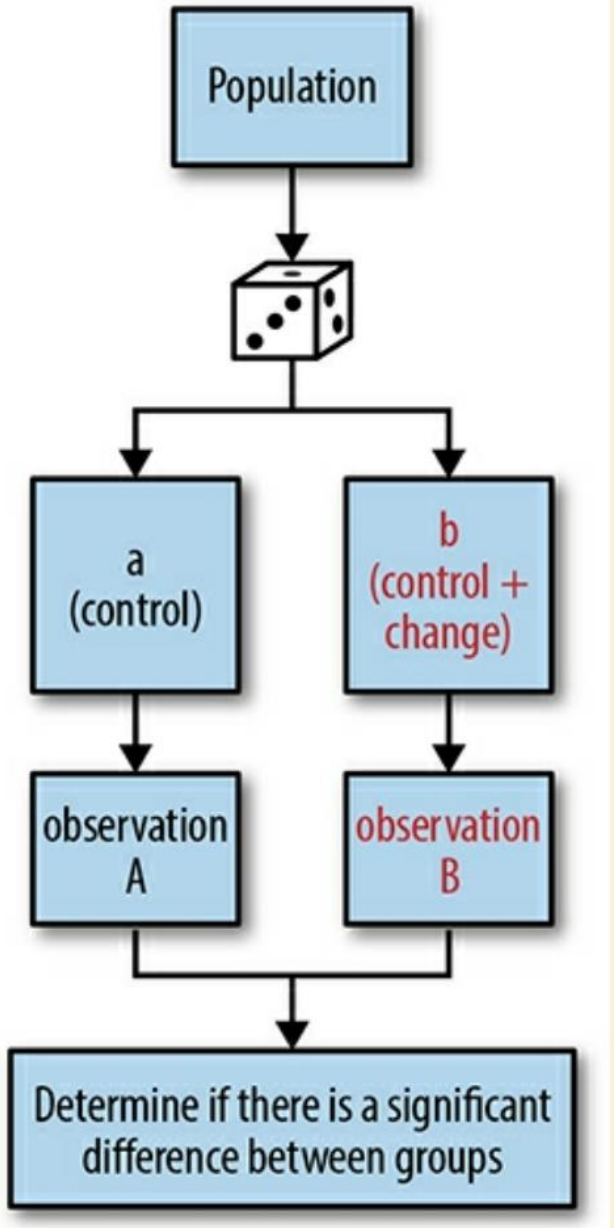
P-value and Statistical Significant (a bench-mark)

https://www.investopedia.com/terms/s/statistically_significant.asp

Why Experimentation?

- Important note: Statistical significance doesn't tell on whether something is "right or wrong" and its doesn't determine the actions to be taken. Instead, statistical significance simply suggests to one that something interesting is going on.
- For example: a weight loss trial may show that a new drug significantly decreases weight compared to a lifestyle intervention with $p < 0.0001$. However, the patients may have serious side effects and only lose one or wo pound more, which does not make taking the drug clinically meaningful or worth taking for the patient.
- Following significance without being thoughtful about what indicating, is not professional.
  - A/B tests are good to identify statistically significant results, allowing one to form beliefs that one observed a true effect rather than something that happened by chance.
  - Well-designed and well-executed experiments can help fill in the gap by providing meaningful insights

Building Blocks of an experiment



In an experiment of e-business, one makes some changes and measures that against a control, to observe whether the changes have led an impact on rate of business

By insert the changes in designs or narrative paths or treatments in one group, the difference between the treatment group and the control group could provide the knowledge of the crucial link with the design changes

Experimentation in the Internet Age

- The digital age radically changes the speed and scalability of experimentation practices. It also enables experimentation extend to subject other than science. (There is a big data biometric field called genomics seeking the causality of gene to cancer and other illness)
  - Let take sharing a photo in Instagram or a video in YouTube in the digital world, through passing around the link and revisit the photo/video, data could be continuously being collected along the way. All kinds of interface information include location, time spent in each step, any comment and any gesture on the picture and video, can be used to get insight about the popularity of the design amongst various groups.
  - Many Internet companies have already deployed A/B tests and collect result helping them make business critical design decisions, LinkedIn has "XCLNT" and Etsy has "Catapult".

A/B Testing: Online Experiments

The concepts – making a change and measuring its effect compared to a control group

Even small differences in the groups one assign to the experimental and control conditions can compound when the sample size are large, resulting in confounded and therefore unreliable experiments

Different experiences that users in the sample can be randomly assigned to, which vary systematically in the way one chooses

A/B Testing: Online Experiment

- By subdividing one user base into either cohorts or segments:
  - A cohort is a group of users who have a shared experience
  - A segment is a group of users who have a common feature
- Gain different insights into their behaviors or motivations that one find difficulties to consider them as one group
- Defining segments, usually based on stabled characteristics, such as demographics

A/B Testing: Online Experiment

- Defining segments, usually based on stabled characteristics, such as demographics
  - Location
  - Age
  - Gender
  - Race
  - Disability
  - Income
- User's value and expectations that might affect their reception to a product
- Technologies
- New users versus existing users – prior experience matter?

A/B Testing: Online Experiment - Status Quo

Old Camp Design

Historical data

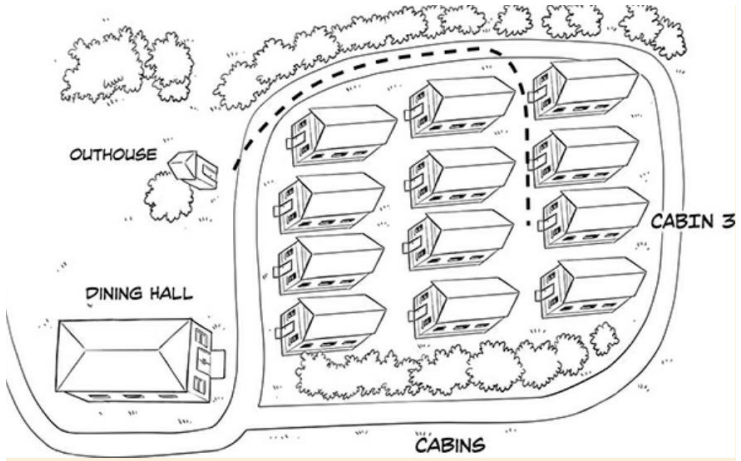


Figure 2-5. The old layout of your summer camp. Old campers have an established habit of walking out to the street and then to the outhouse.

New Camp Design

Features of participants

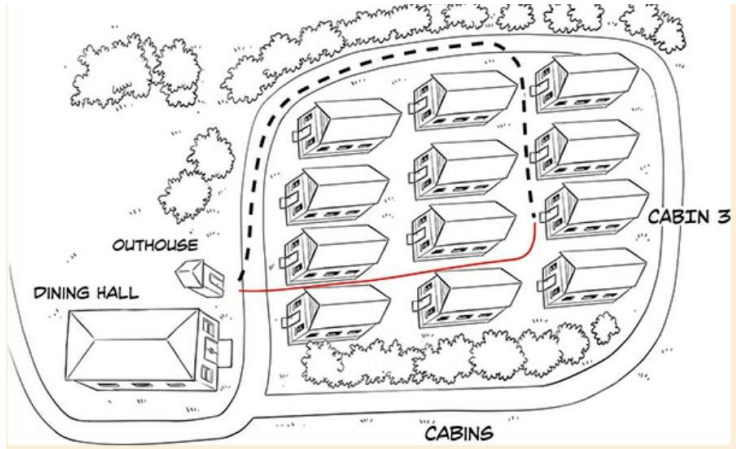


Figure 2-6. Routes taken by old versus new campers on their way to the outhouse. Old campers have learned habits that affect the routes they take, even after the outhouse has moved. New campers don't have these existing habits and therefore take a more direct route.

A/B Testing: Online Experiment - Learning Tools

- Metrics: the Dependent Variables of A/B Testing
  - A metric is a predetermined and evaluative benchmark, which has been determined to have some business value.
  - Metrics relate about the health of one business or one design, examples: acquisition, retention, and activation rates
- Key metrics, like KPI, key performance indicator, the focus of the business
- Proxy metrics, indication of change of behaviour

A/B Testing: Online Experiment - Learning Tools

- An important part designing A/B test makes decisions about what metrics to measure
- Designers have a big role to play in asking thoughtful questions and applying their expertise about users to guiding how a design or experience should be assessed, what matters from a user experience point of view, and how to get meaningful data that informs the following questions
  - What kind of data to track that one want to collect
  - What kind of test related to measures to metrics

A/B Testing: Online Experiment - Learning Process

- Important true: "Measurement design is subjective. Someone decides what to measure, how to measure it, and how to build the model. So all data is subject to human bias."

- Important judgement
  - Detecting a difference
  - How big is the difference want to measure qualified as a "difference" – Minimum detectable effect
  - A big enough sample to power your test
  - Significance level
  - Defining a Hypothesis

A/B Testing: Online Experiment - Learning Process

- When drafting a hypothesis
  - A hypothesis statement that captures the essence of the change one proposes to make and what one think the effect will be
  - A clear understanding and a plan that addresses what one would learn by testing that hypothesis
- Articulate possible learnings for all outcomes of the A/B test will help ensure that no matter what the data shows:
  - If one fail, what did one learn that one will apply to future designs?
  - If one succeed, what did one learn that one will apply in future design?
  - How much work is one willing to put into one testing in order to get the learning?

A/B Testing: Online Experiment - Learning Dynamics and Outcome

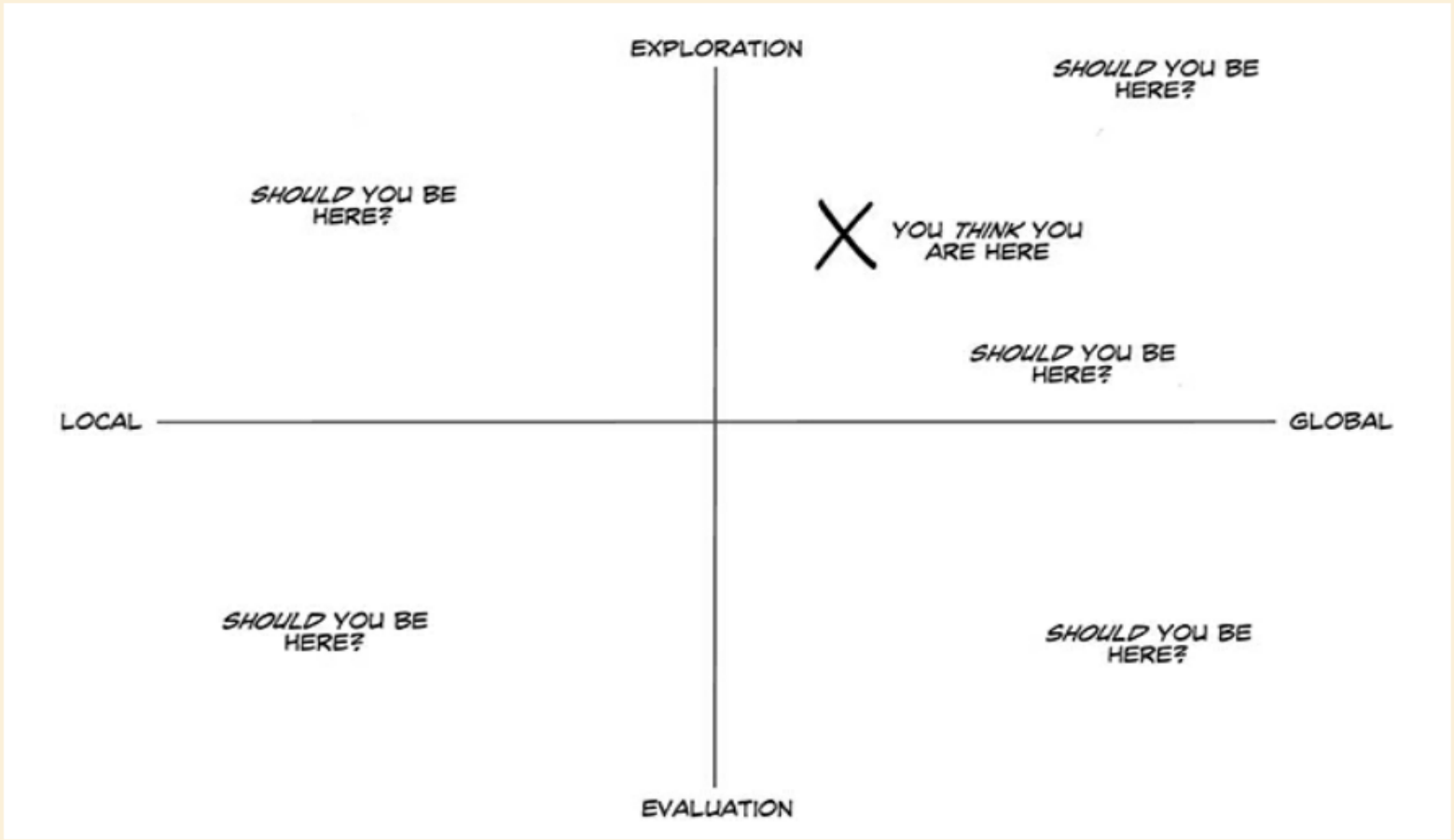


Figure 2-11. This framework helps you think about whether you're approaching the design of your experience and A/B test through the right lens, depending on the scope of your problem, and how close you are to being "finished."