



PM: Product Management and Development

Week 5 – The Product Development Process; A/B and A/A Testing, MVP and Growth Hacking

Module Overview

Module Overview



Module Overview



The New Product Development Process Revisited

Three Levels of a Product or Solution



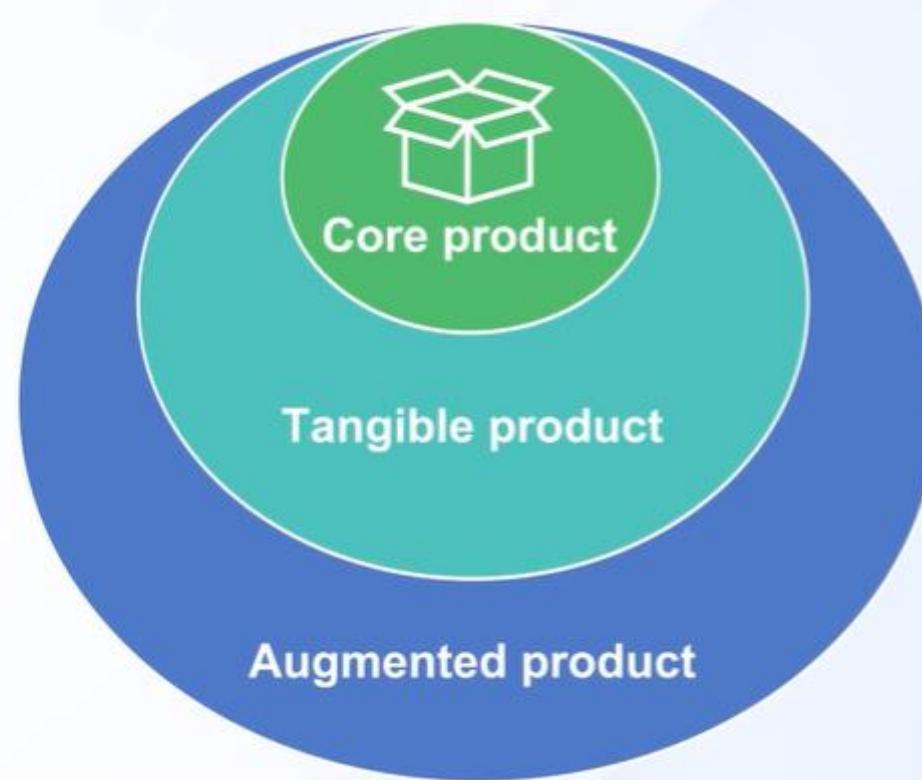
Core product: The need or want a customer satisfies by buying the product

Three Levels of a Product or Solution



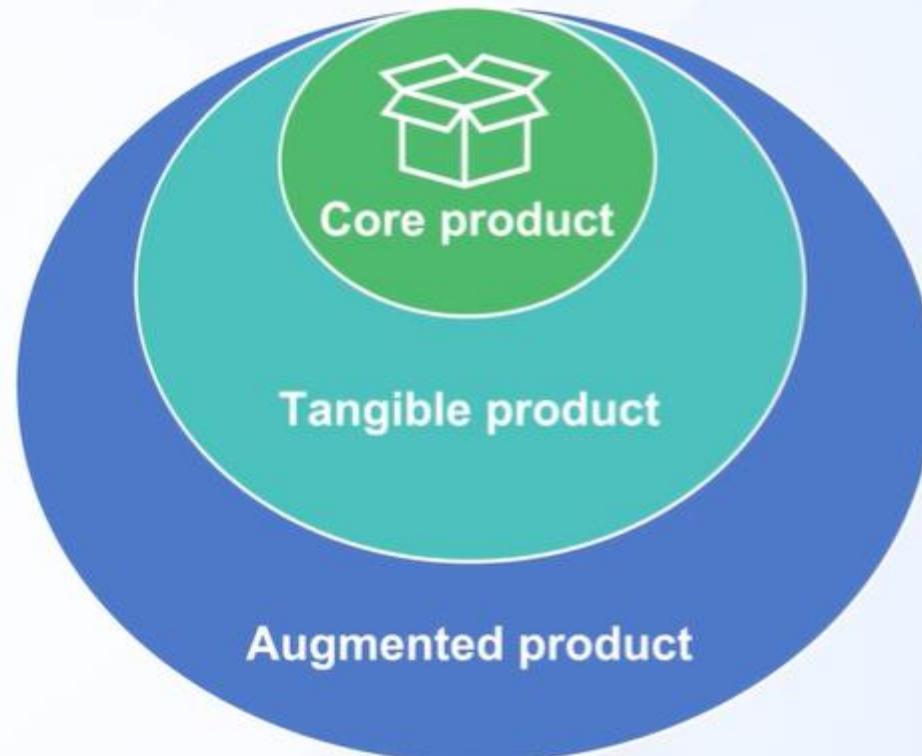
Tangible product: Transformation of core product into something customers can buy

Three Levels of a Product or Solution



Augmented product: Enhancements to the tangible product to make it competitively attractive

Three Levels of a Product or Solution



Augmented product: Enhancements to the tangible product to make it competitively attractive

Three Levels of a Product or Solution : Example



Core product: Quick and secure access to credit when needed

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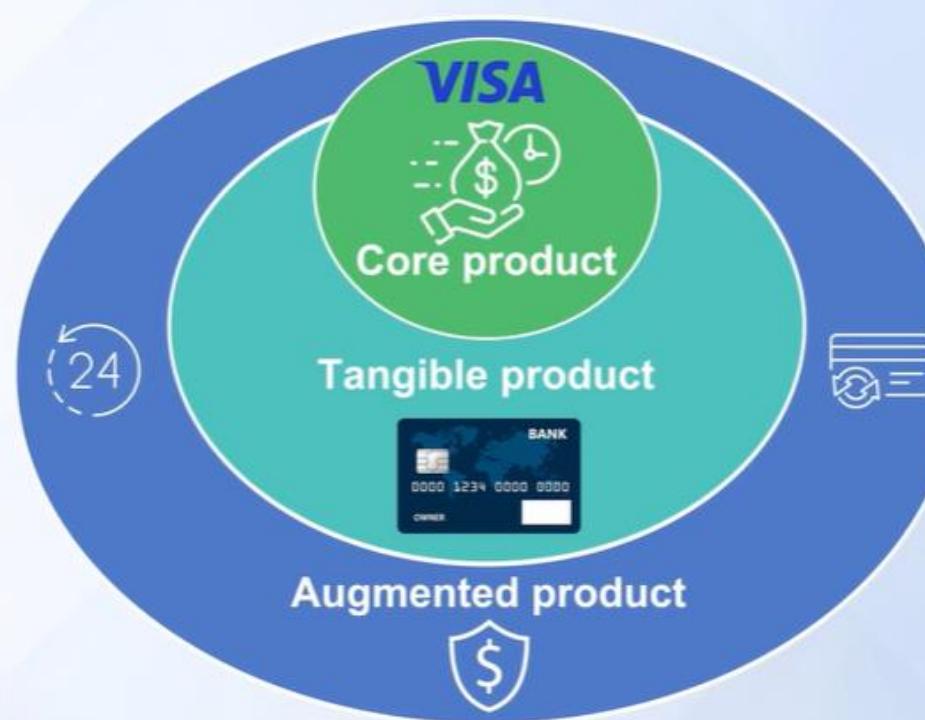
Three Levels of a Product or Solution: Example



Tangible product: The Visa Card

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Three Levels of a Product or Solution: Example



Augmented product: 24 hour customer service, Theft protection and Loyalty points

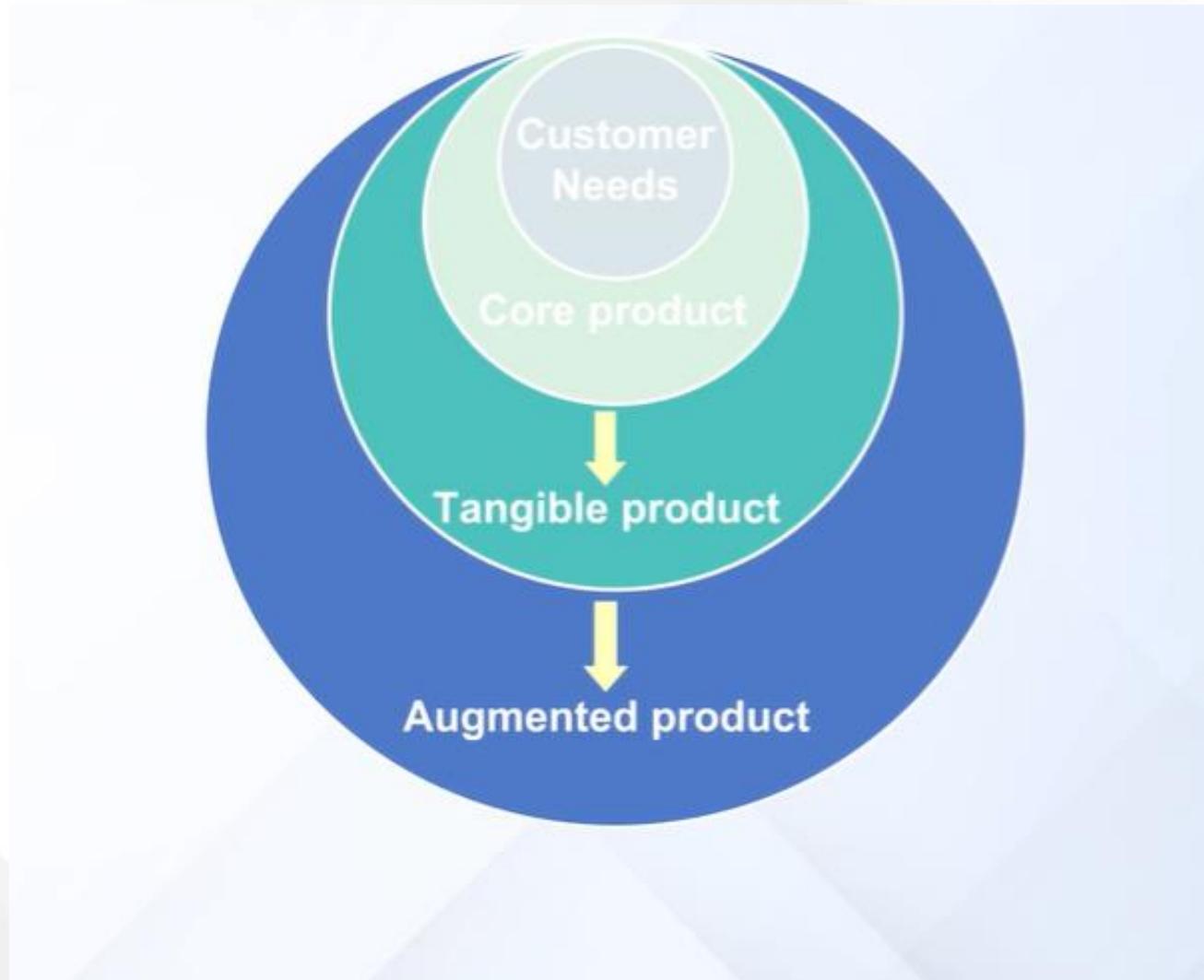
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Three Levels of a Product or Solution



Three Levels of a Product or Solution



New Product Variations

Commonly accepted categories for new products:

- **New-to-the-world products:** Inventions
- **New category entries:** AT&T's Universal Card
- **Additions to product lines:** Bud Light
- **Product improvements**
- **Repositioning** (retargeted for new use): Arm and Hammer



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Non – New Product Variations

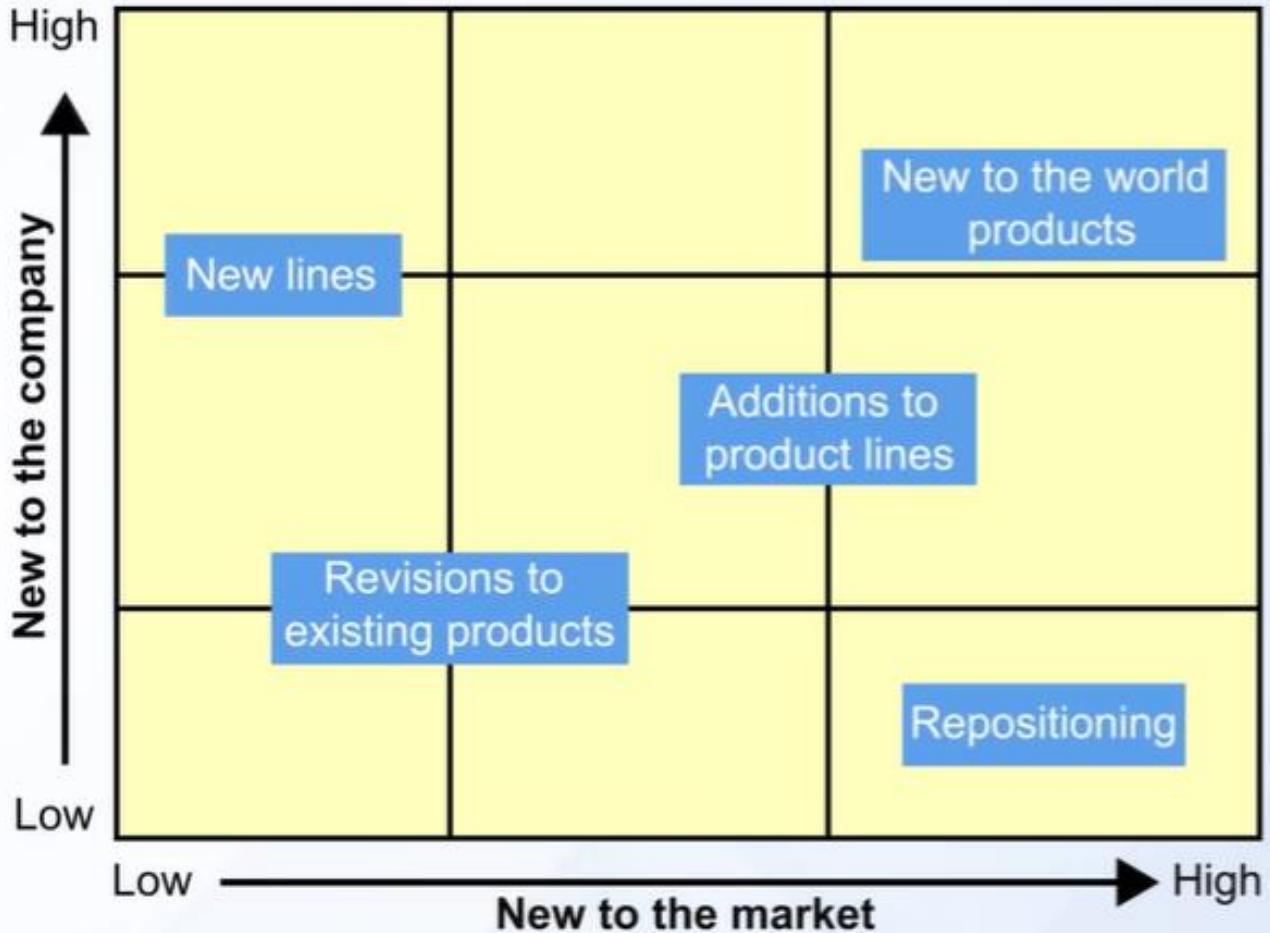
Variations not commonly accepted as new products:

- New to a country
- New channels of distribution
- Packaging improvements
- Different resource or method of manufacture

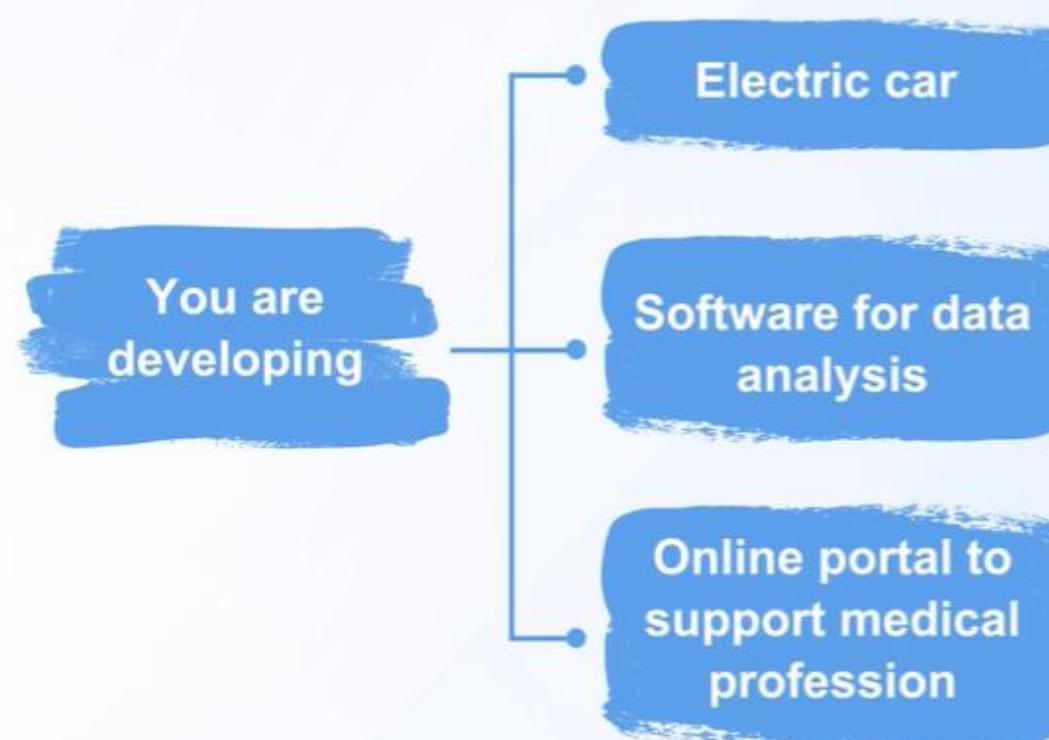


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Types of New Products

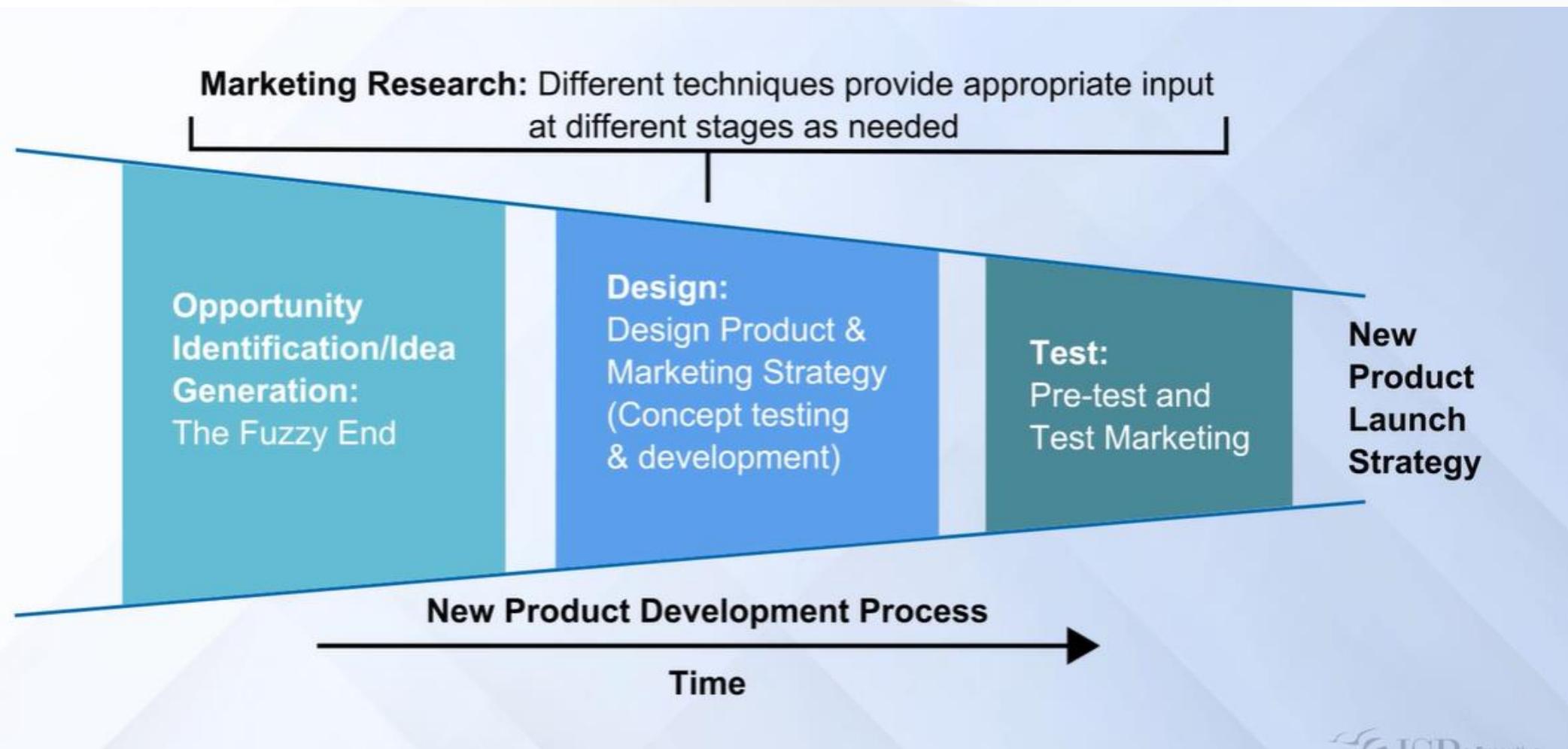


Exercise



- Would the steps involved in the NPD process be same or different?
- How much time would you spend on the NPD process for each of these products?

New Product Development Process



New Product Development Process

Marketing Research: Different techniques provide appropriate input at different stages as needed

Opportunity Identification/Idea Generation:

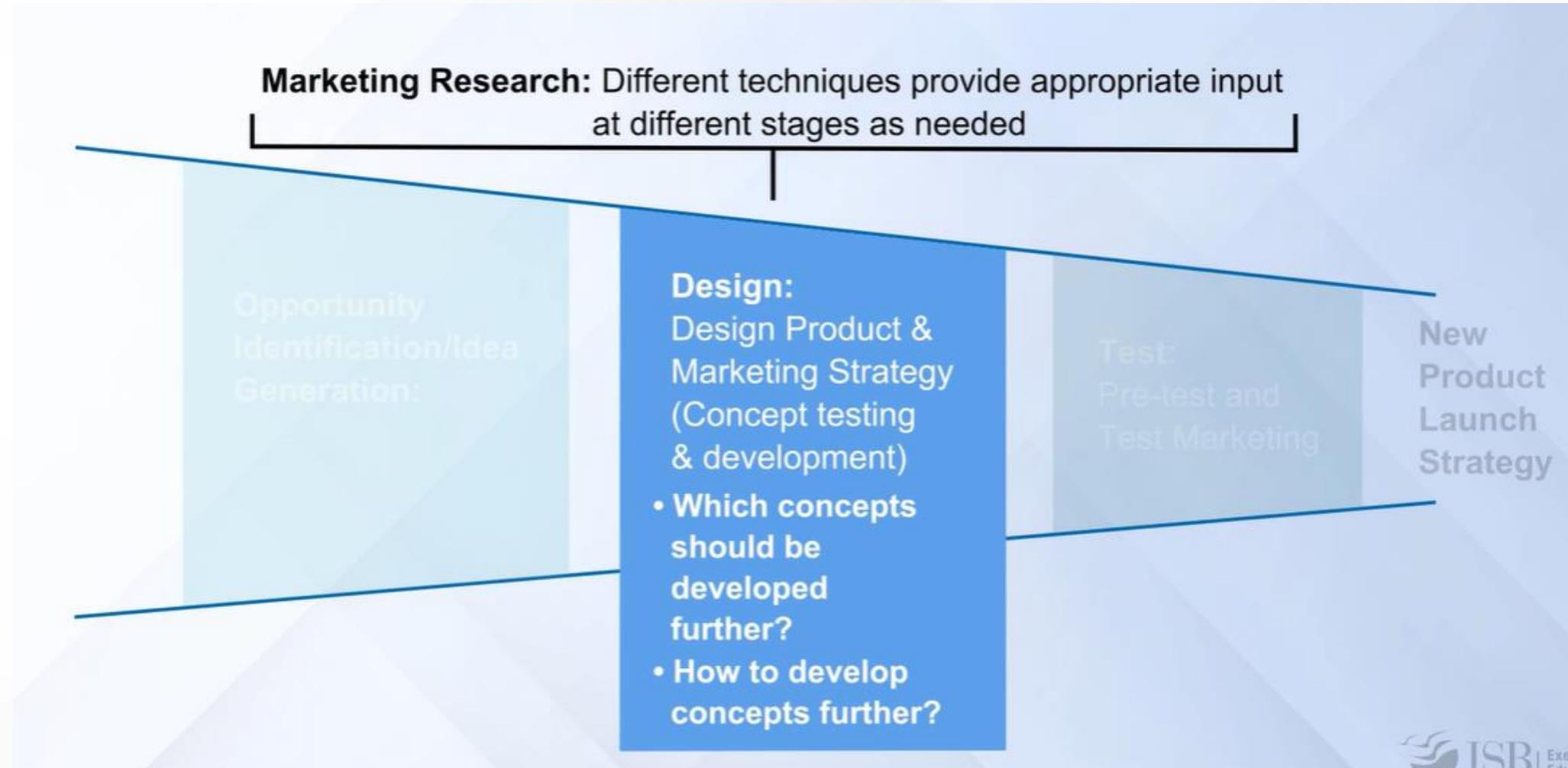
- Whose needs are being satisfied?
- What are those needs?

Design:
Design Product & Marketing Strategy
(Concept testing & development)

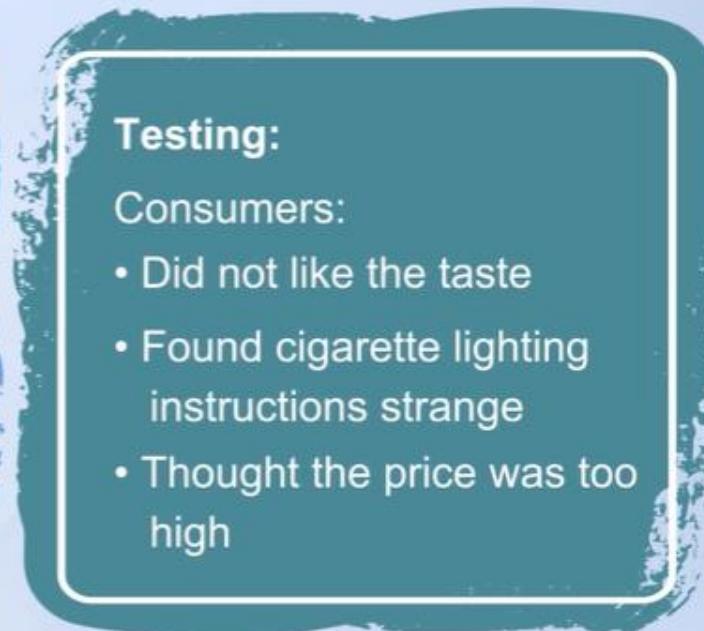
Test:
Pre-test and Test Marketing

New Product Launch Strategy

New Product Development Process



NPD Process: Example



New Product Development Process

Success and Failure of New Products

Systematic Approach



**Increases the probability of success
of the new product**
**Success rate of firms with systematic
approach is 73%**

Product Development



Crucial for new product success

Factors Correlated with New Product Success

Out of 4 research programs, the correlates of success are:

Match to customer needs	3
High value to the customer	2
Innovation	2
Technical superiority	2
Screened on growth potential	3
Favorable competitive environment	1
Fit to internal company strengths	4
Communication among functions	2
Top management support	3
Enthusiastic champion	1
New product organization	2
Use new product process	3
Avoid unnecessary risk	2

Source: *Design and Marketing of New Products* by Urban and Hauser

Factors Correlated with New Product Success

Targeting decision at the opportunity identification stage helps in this.

Out of 4 research programs, the correlates of success are:

Match to customer needs 3

High value to the customer 2

Innovation 2

Technical superiority 2

Screened on growth potential 3

Favorable competitive environment 1

Fit to internal company strengths 4

Communication among functions 2

Top management support 3

Enthusiastic champion 1

New product organization 2

Use new product process 3

Avoid unnecessary risk 2

Product Development Process: Factors



Factors directly addressed:

- Match to customer needs
- Screened on growth potential
- Fit to internal company strengths

Factor already present:

- Top management support

Context of New Product Development

Context for New Product Development

Market research process must be tailored to context set by three factors:

Product's "reason why"

01

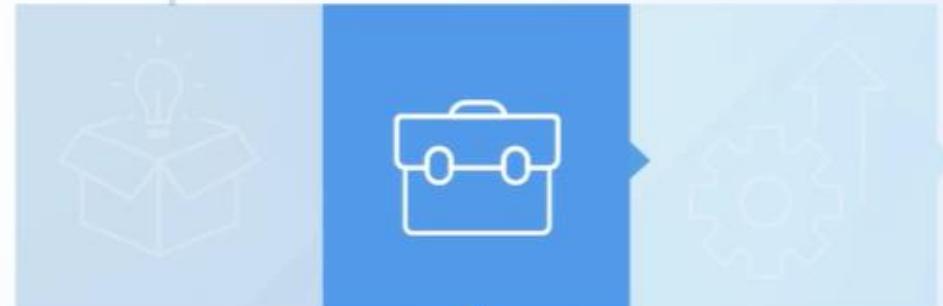


Context for New Product Development

Market research process must be tailored to context set by three factors:

Product's "reason why"

01



02

Market and company newness
of the proposed product

Context for New Product Development

Market research process must be tailored to context set by three factors:

Product's "reason why"

Opportunity cost
and development risk
associated with the product

01



03



02

Market and company newness
of the proposed product

Context and Market Research



Lead to different, optimal new product development processes

Vary the marketing research for developing new product

- Ask different set of questions
- Use different research methods

Factor 1: Reason for New Product



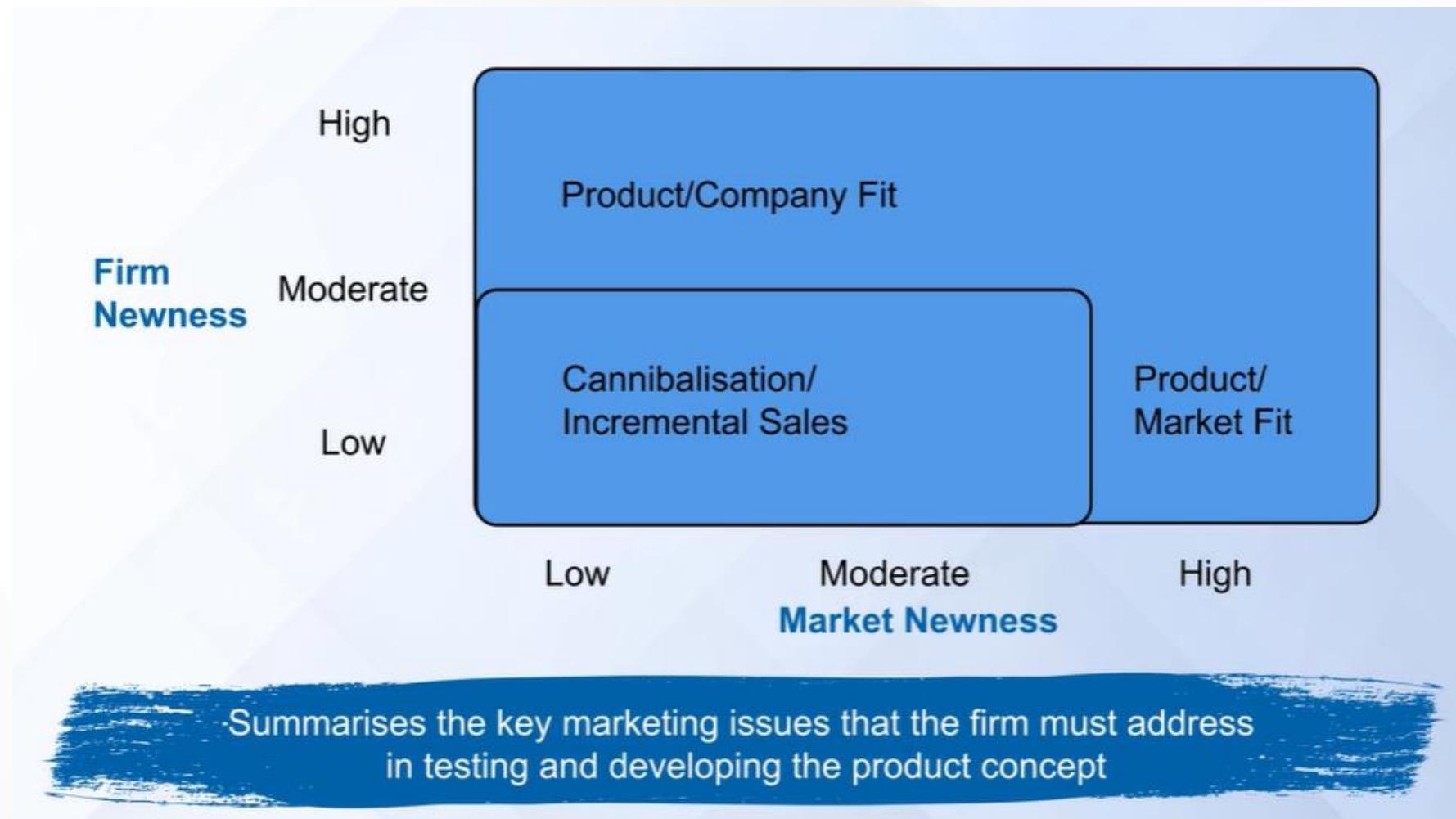
Use marketing research to check how well the concept is a success or failure

New Product Concept Testing



- Check how many new customers are attracted to the new product
- Ensure product pass the concept test before developed further

Factor 2: Firm and Market Newness



Firm Newness

How new is the new product for the firm?



Low firm newness: Firm is familiar with developing and marketing similar products

High firm newness: Firm is not familiar with developing and marketing similar products

Market Newness

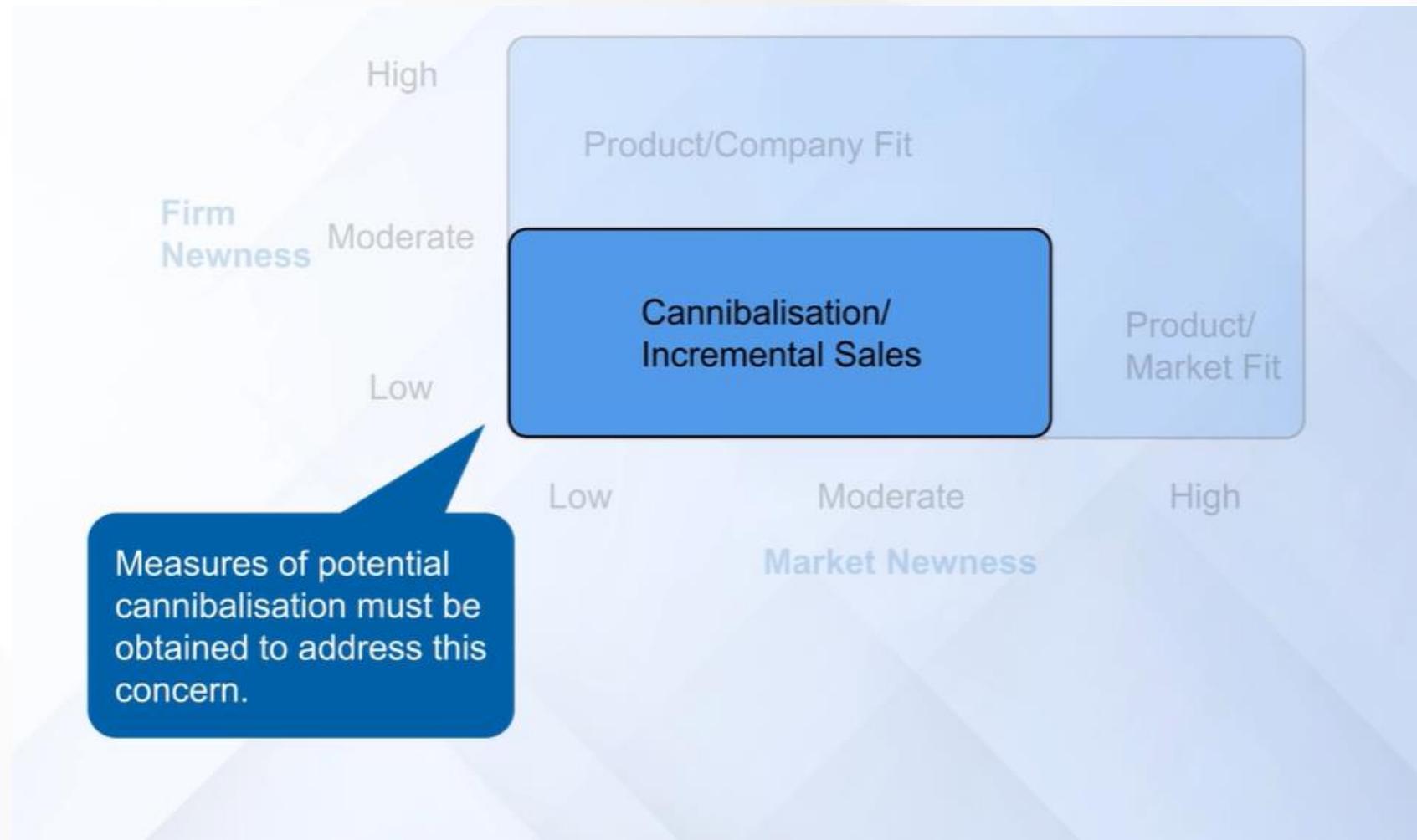


Product
Market
Fit

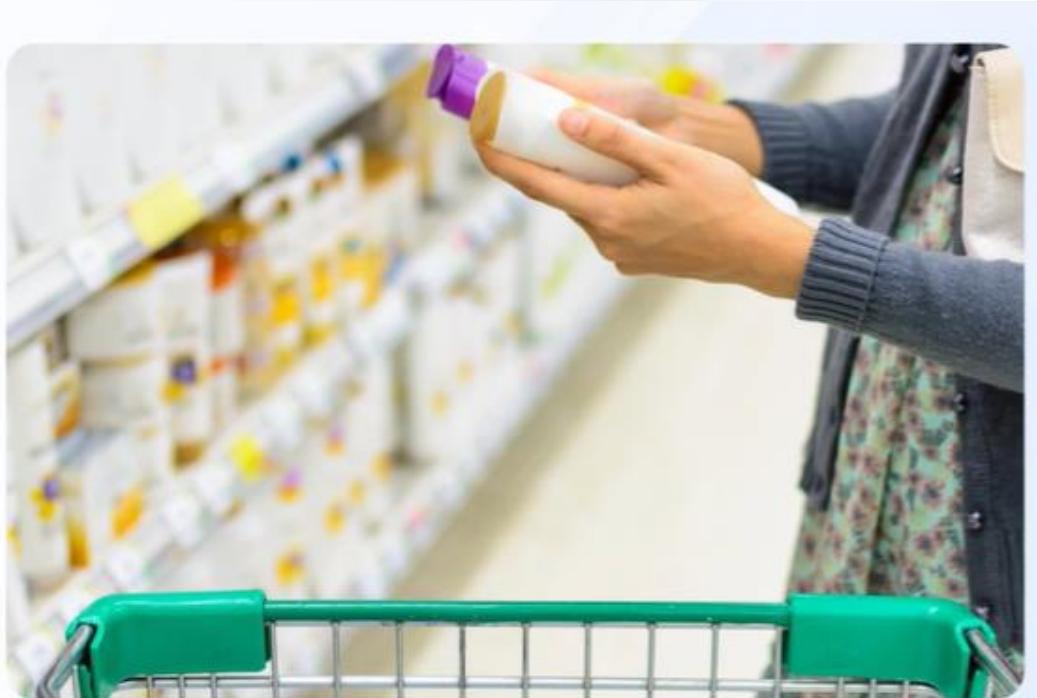
How new is the new product to the market for which it is intended?

Are consumers in the market familiar with such products?

Cannibalisation and Incremental Sales Issue

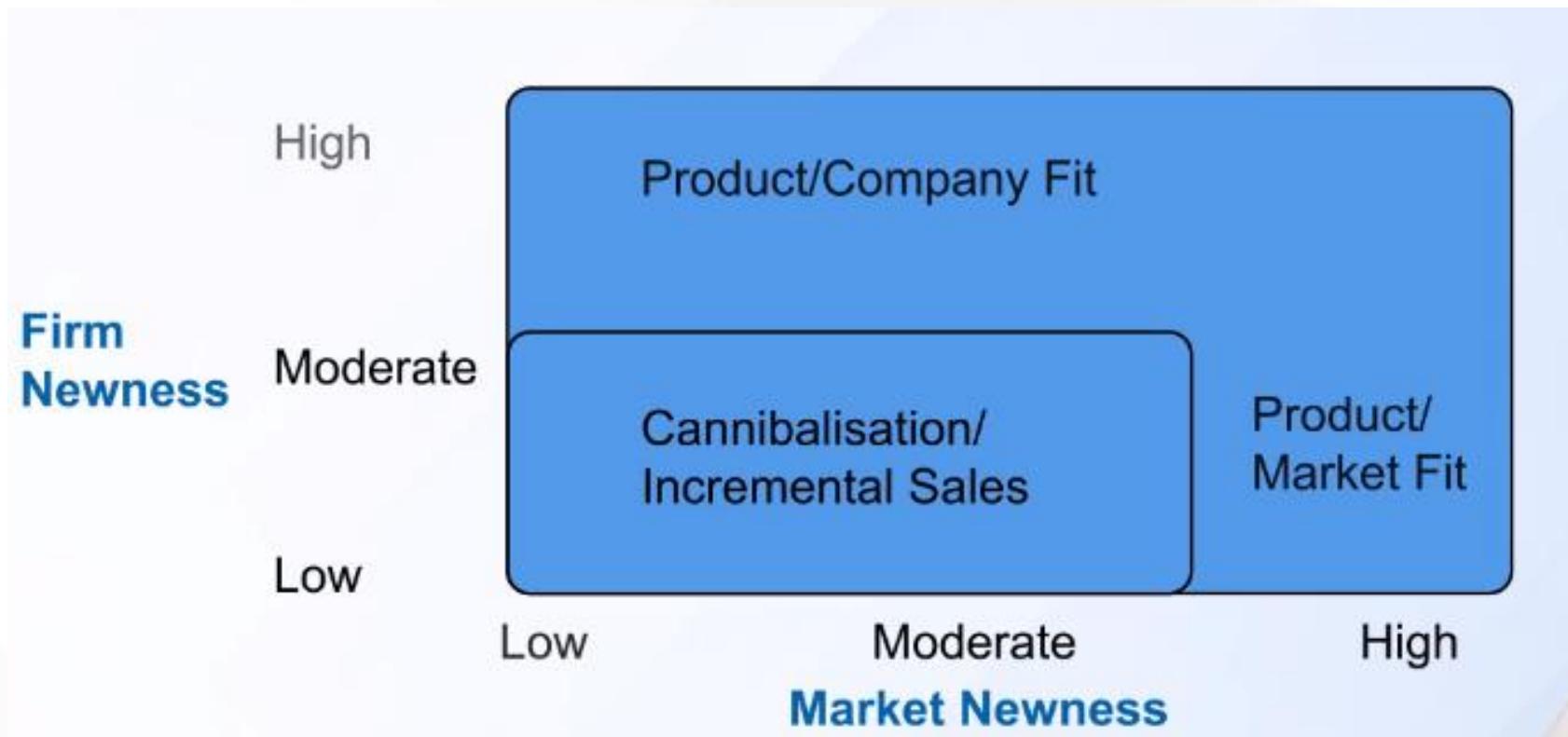


Cannibalisation and Incremental Sales Issue



- What existing products the respondent is currently using ?
- How likely is the respondent going to switch to a new product if available at a reasonable price?

Product/Company Fit Issue



Product/Company Fit Issue



- How well suited are its marketing assets?
- Will R&D and manufacturing capabilities help the new product?
- What impact will the new product have on its other products?
- Would the new product cannibalise its existing products or complement them?
- Should the company diversify into new areas and thus reduce business risk?
- Would it enhance the reputation of the company?

Product/Market Fit Issue



Product/Market Fit Issue



- Does the product satisfy the consumer need well?

- What would be the market size at different prices?

- How much money would be required to build the market?

- How much money would be required to maintain the market?

Opportunity Cost and Development Risk

Opportunity Cost vs Development Risk

Opportunity cost

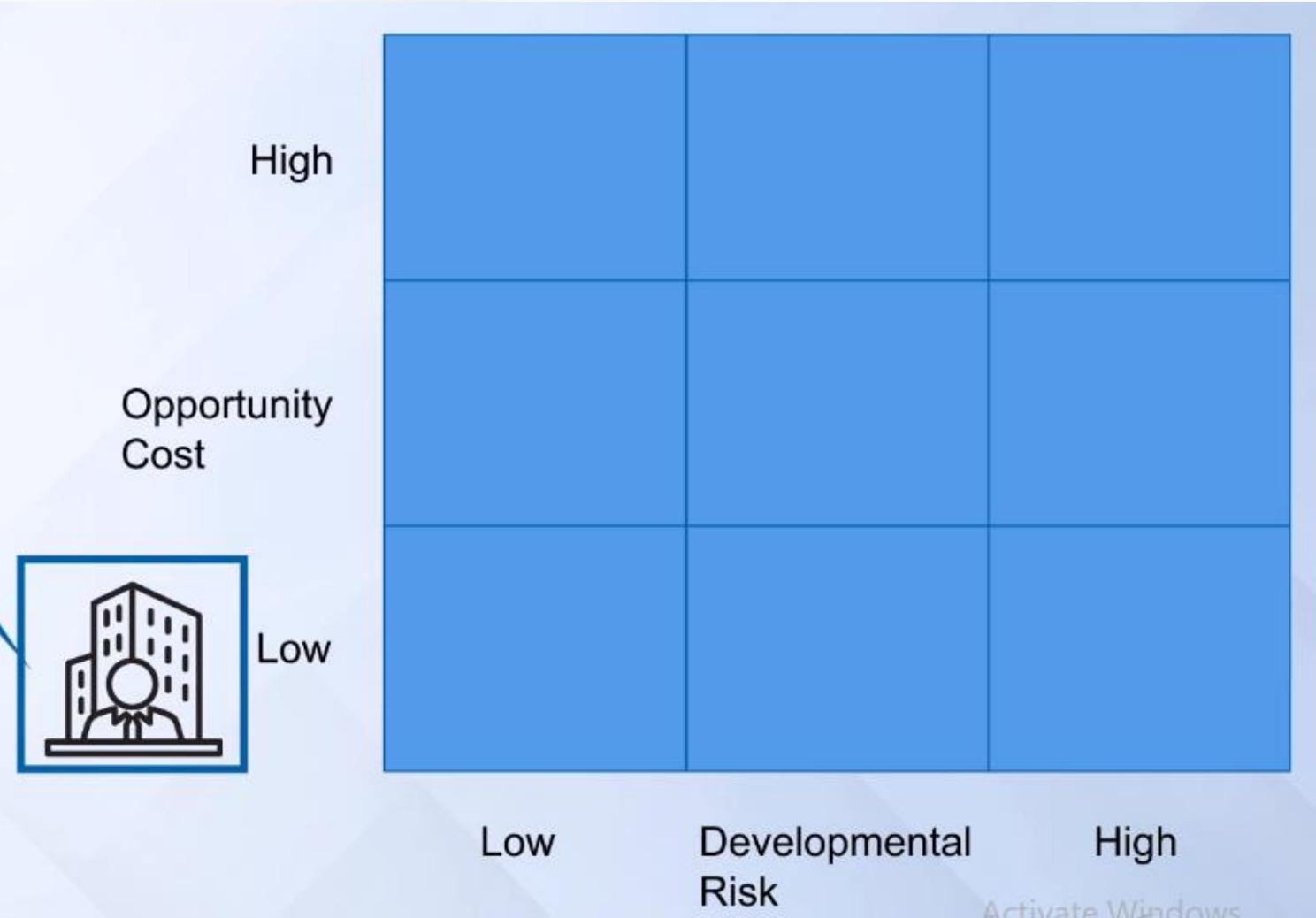
- **Risk:** Losing a fast moving window of opportunity in the market
- **Benefit:** Helps in deciding the pace of new product development process

Development risk

- **Risk:** Launching a wrong product in the market
- **Benefit:** Helps in deciding the speed precision trade-off in marketing research

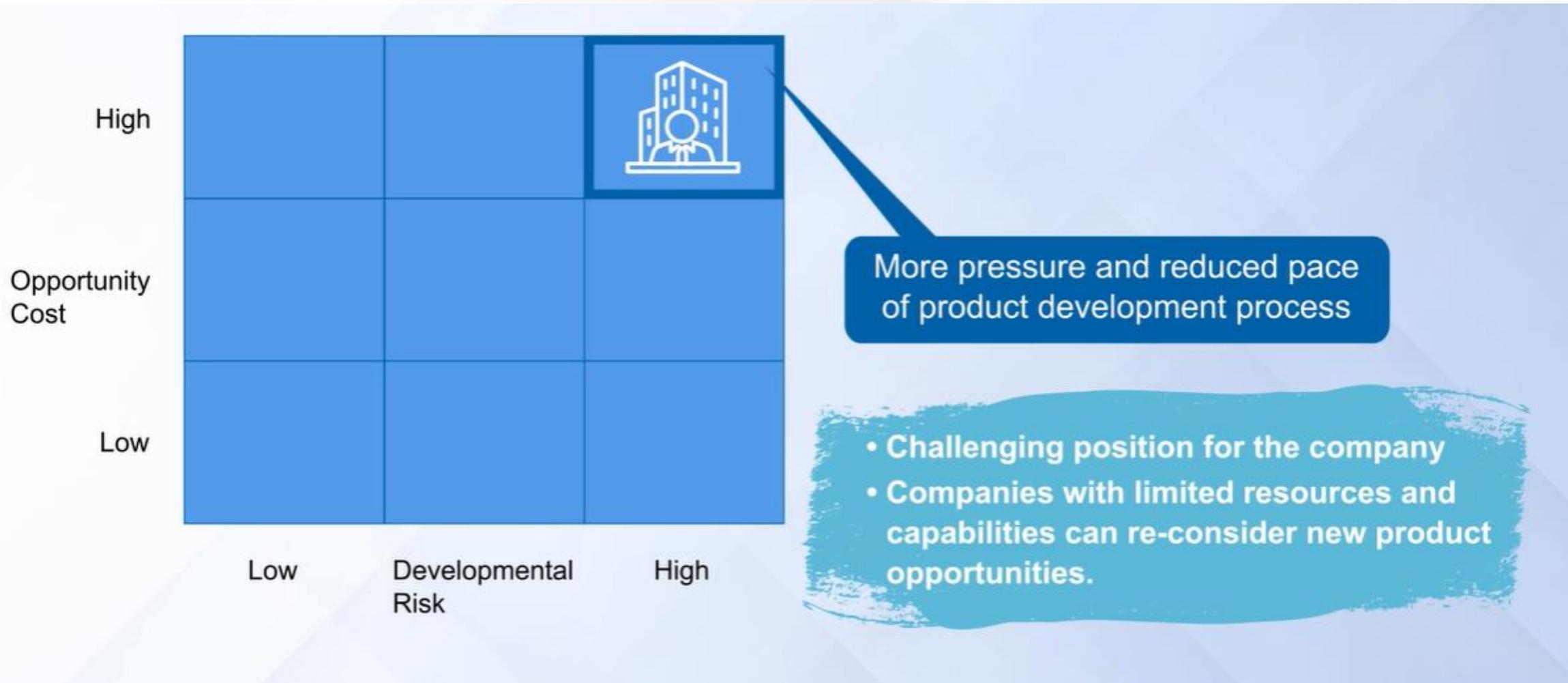
Risk Map

Freedom to manage new product development process



Activate Windows

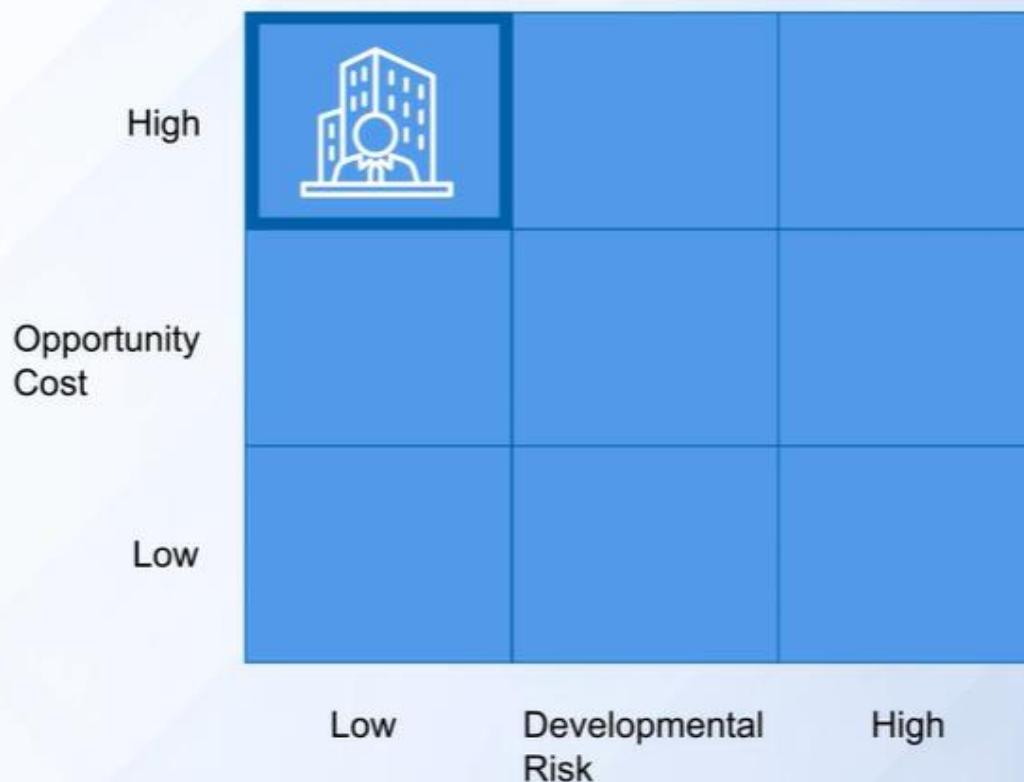
Risk Map



Risk Map

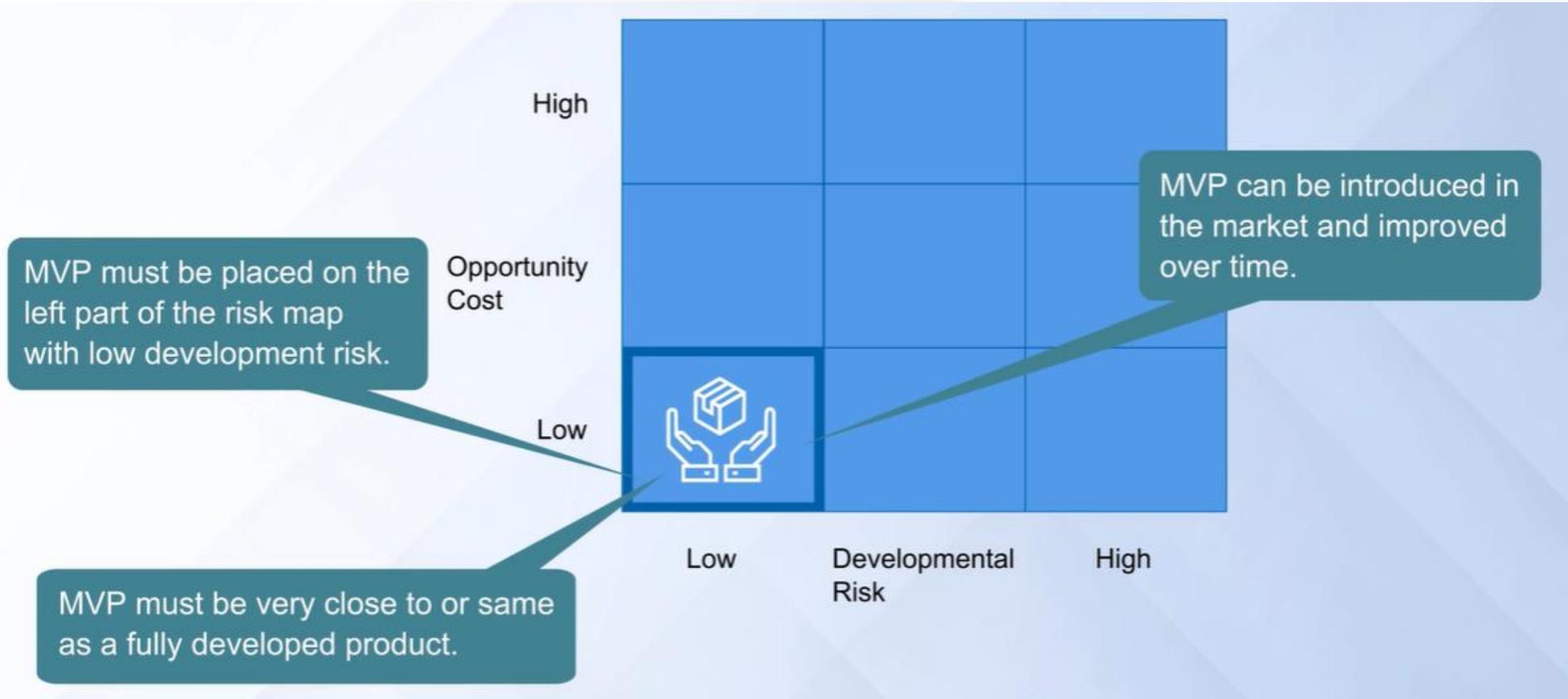


Risk Map

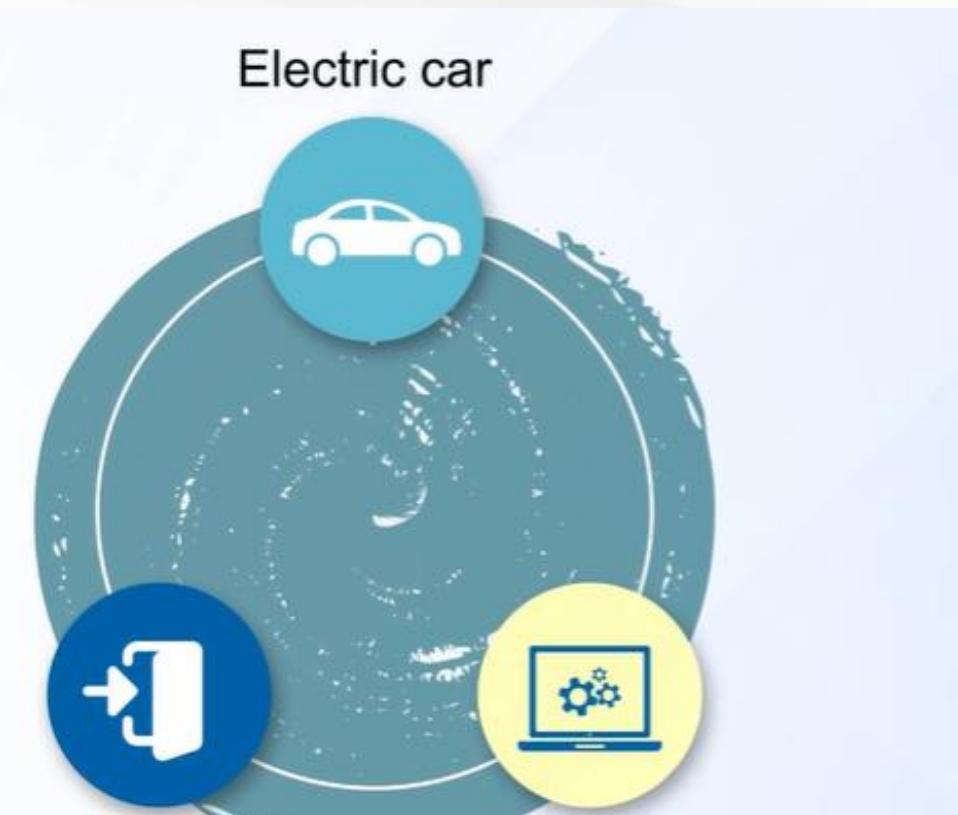


Company enters the market quickly with a good product and improve it over time.

Minimum Viable Product (MVP): Conditions for Success



NPD Process Exercise: Product Development Projects



Software for
data analysis

Online portal to support
medical profession

NPD Process Exercise: Electric Car



Opportunity cost

- Low to medium
- Many models in the market and growing category

Development risk

- Very high
- Risks related to car failure
- High competition in the market

NPD Process Exercise: Software



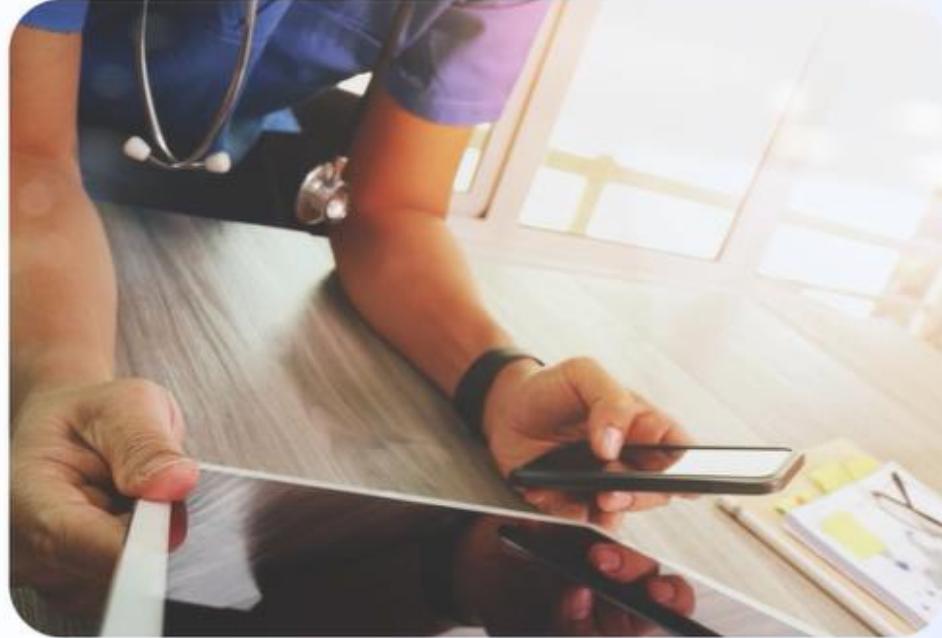
Opportunity cost

- Low to medium
- Depends on factors such as the functions offered

Development risk

- Low
- Software can be launched with a few key functions
- Core data analysis information is commonly available
- Need not be a complete product offering before launch

NPD Process Exercise: Online Portal for Medical Profession



Development risk

- Low
- Company can easily correct mistakes in case of issues

Opportunity cost

- Very high
- Success of the product is critically dependent upon network effects

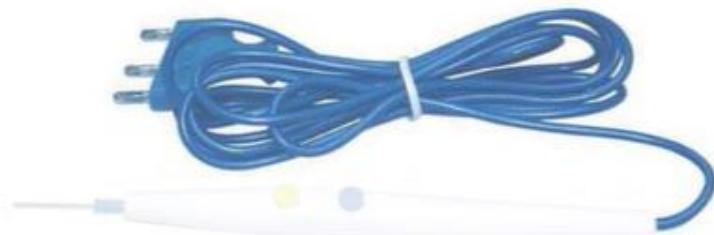
Company can select some key functions to launch an MVP or use an open source option to start the process quickly.

Suture – Uses



Suture is a specialised needle attached with a specialised string to tie layers of tissues together.

Monopolar Pencil



- Requires the patient to lie down on a metal plate
- Includes passage of electric current through the patient's body
- Stops bleeding in tissues with the help of current instead of sutures

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Monopolar Pencils vs Powerstar Bipolar Scissors



Monopolar Pencil

- Current passing through the patient's body could impact other implants
- Causes skin burns at the site of the metal plate

VS



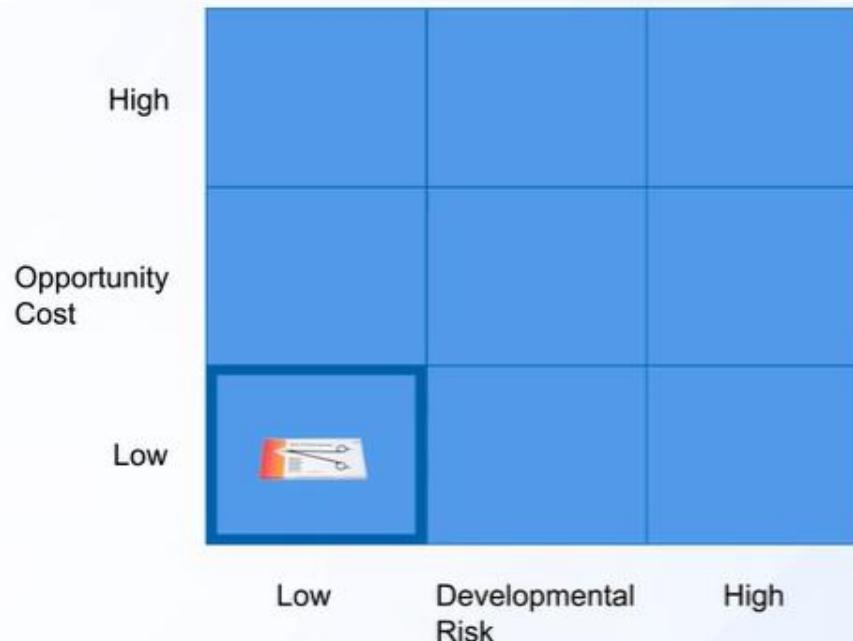
Bipolar Scissors

- Consists of a scissor connecting wires to a power generator
- Causes no harm to the body as only the tissue required to be cut and coagulated experiences the current

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PowerStar – Opportunity Cost

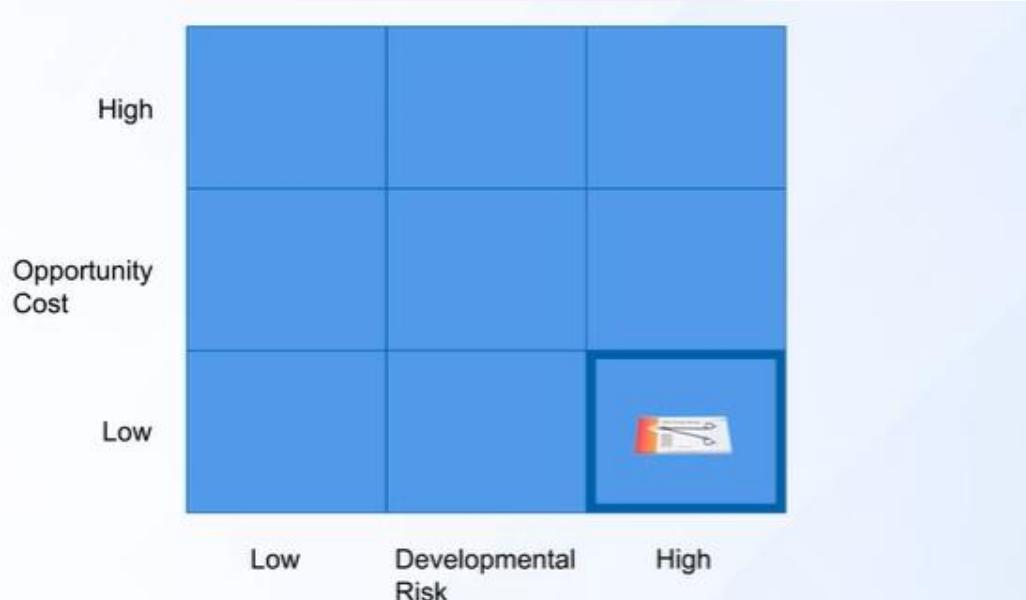


Low opportunity cost

- Product is protected by patents
- Less fear of some other company taking away the window of opportunity

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PowerStar – Opportunity Cost

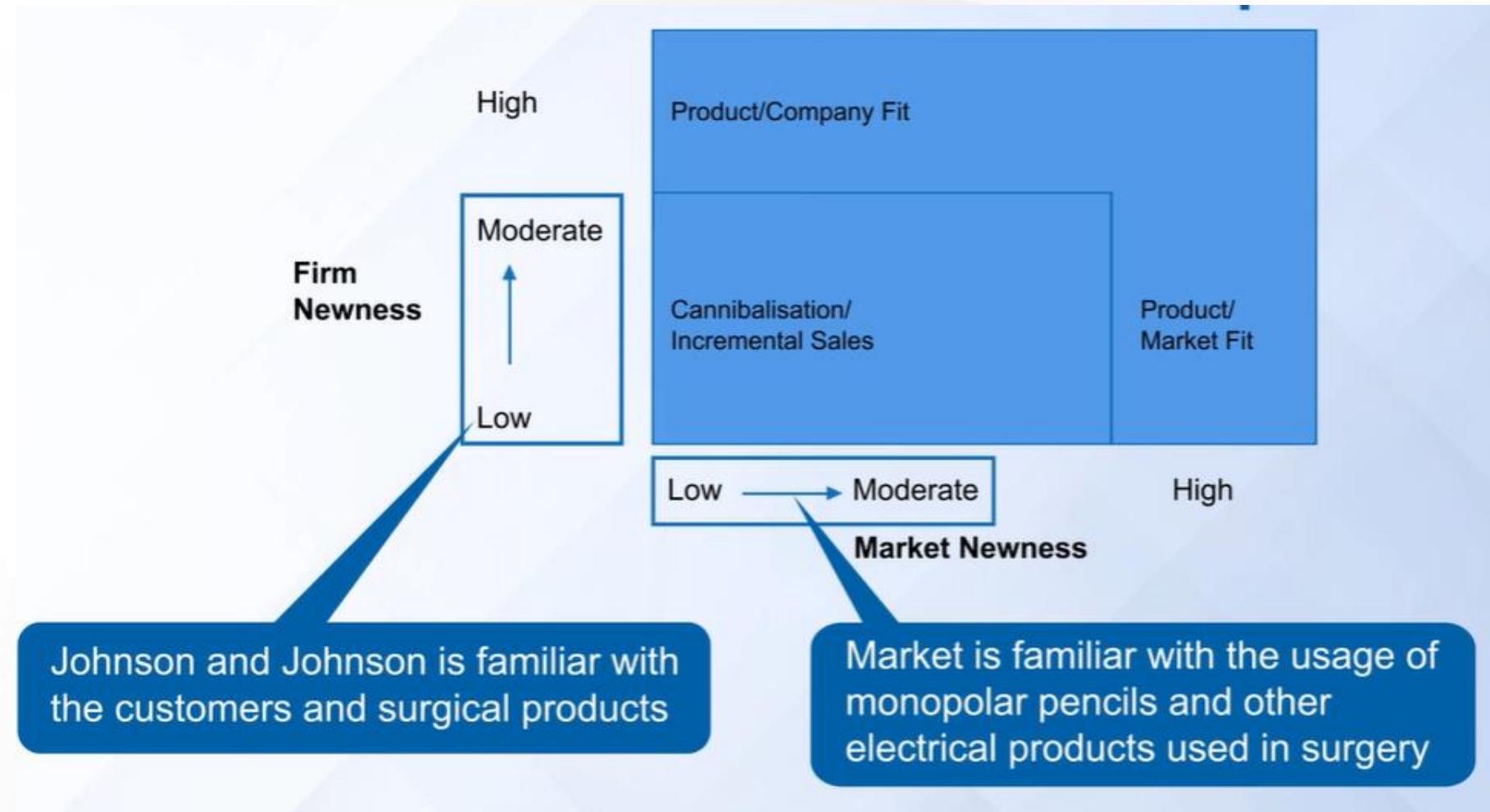


High development risk

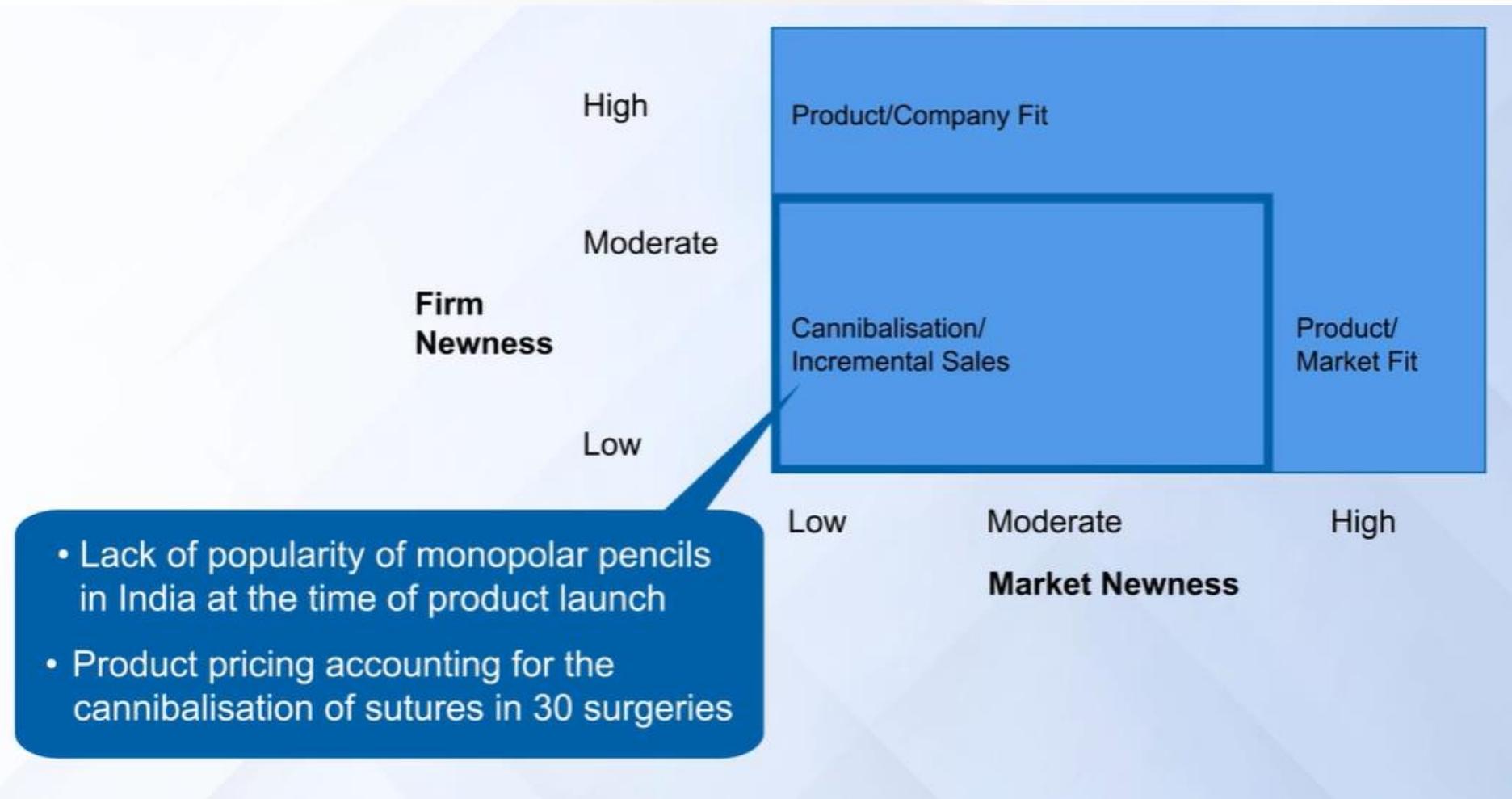
- If something goes wrong during surgery, the patient may die, and company's brand name may suffer
- Long and thorough product development process is adopted

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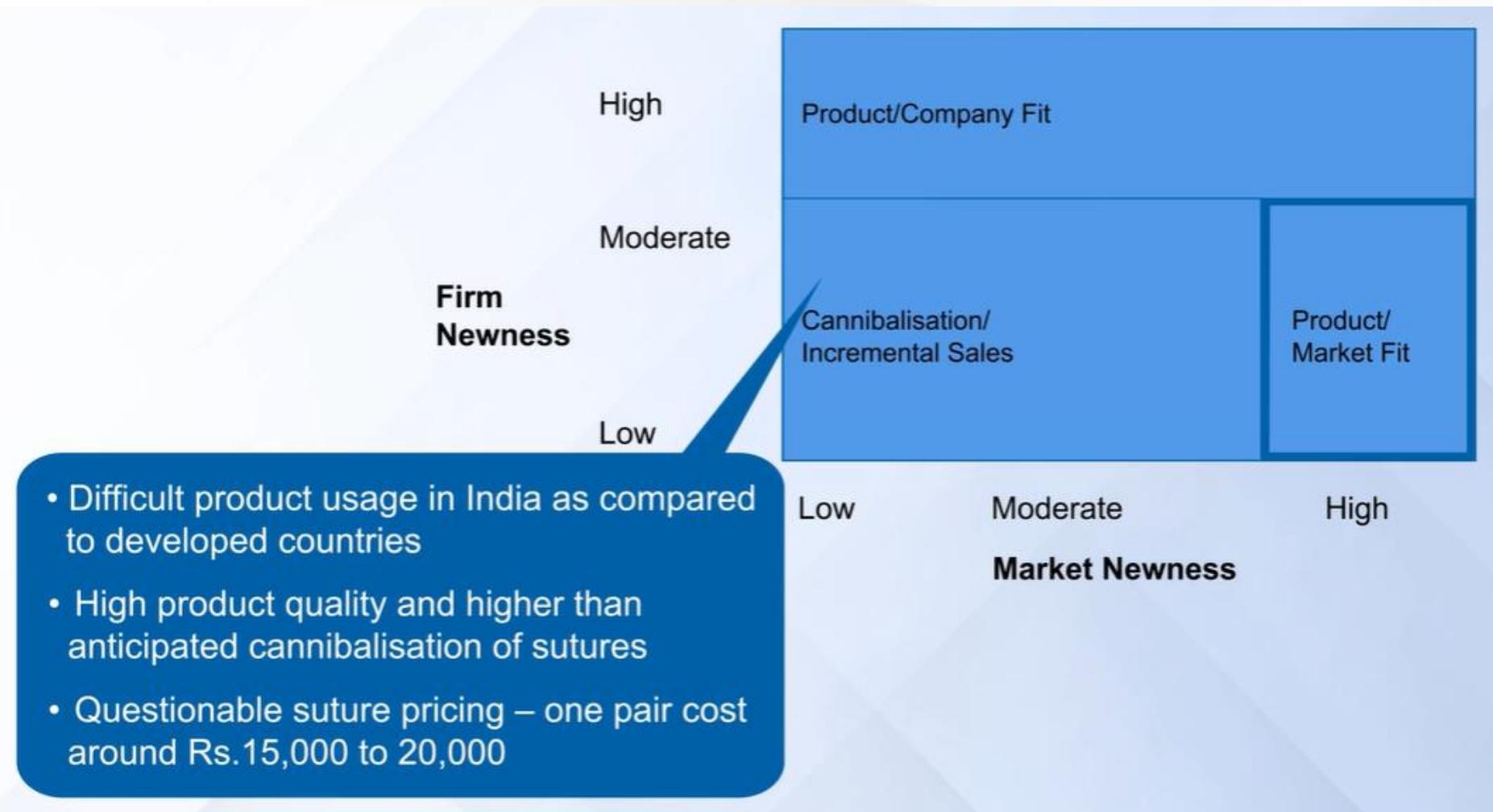
PowerStar – Position in the Newness Map



Product Cannibalisation Issue



Product Market Fit Issues



Increasing The Price of Bipolar Scissors



Impact – Weaken the relationship of the company with doctors as they already considered the current price costly

Barrier – Knowledge of customers regarding surgical products

Online Experimentation

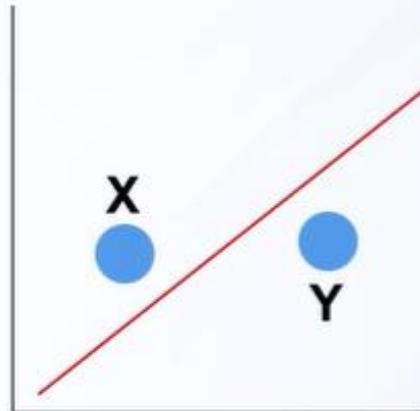
Corelation and Causality



X (Presumed cause)	Y (Presumed effect)
Educational level	Future income
Advertising	Sales

Corelation and Causality

Correlation



X and Y
move together
to some
degree

Causality
 $X \rightarrow Y$

X causes Y

Confusing correlation with causality can have implications

Corelation and Causality – An Example

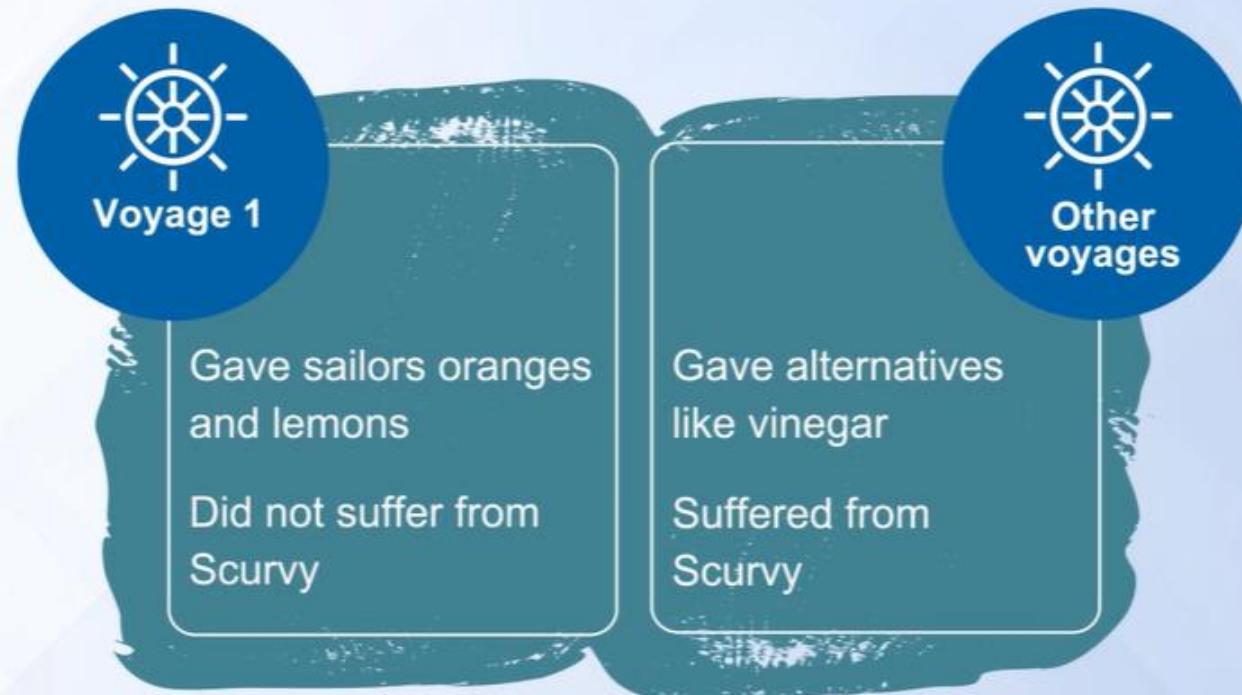


Scurvy is **caused** due to deficiency of vitamin C

<https://hbr.org/2017/09/the-surprising-power-of-online-experiments>

Experiment by Dr. James Lind

Problem: 2 million sailors died due to scurvy from 1500 to 1800



Result: Citrus fruits can prevent scurvy, but reason for the same was not known

Importance of Causality



Study: Two observational studies of two advanced features of MS Office

Conclusion: New features reduced attrition

<https://hbr.org/2017/09/the-surprising-power-of-online-experiments>

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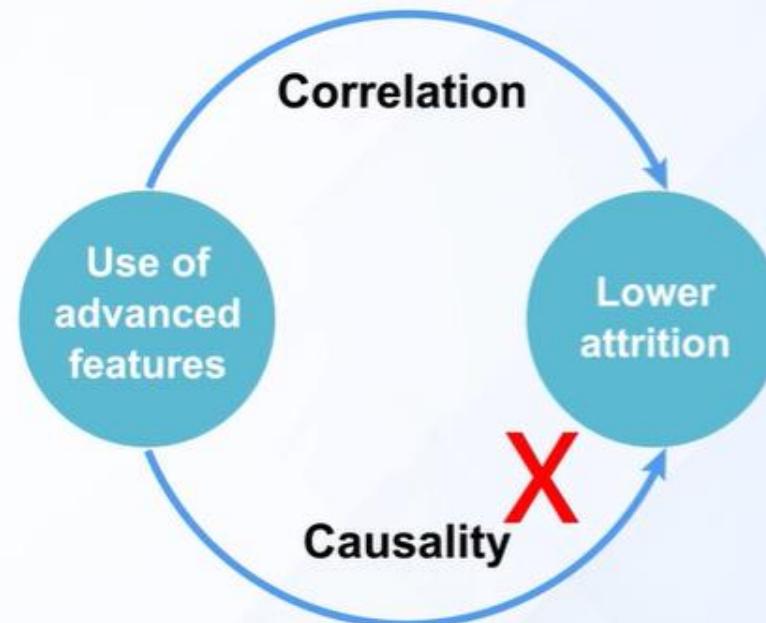
Effect of Attrition

Did the new features reduce attrition?
Company would expend more resources on introducing new features.

Did the new features not cause attrition?
Company will not make this unnecessary expense.

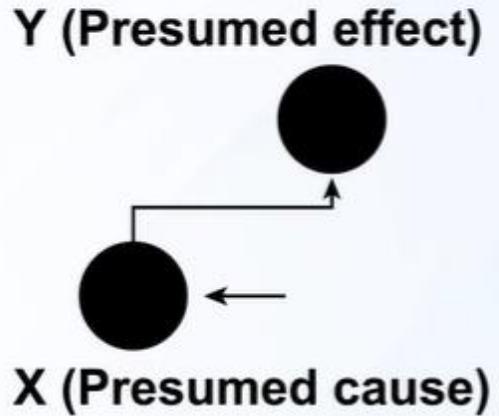
Understanding Causality

Heavy users of MS Office used advanced features more and have lower attrition.



Understanding causality helps in understanding growth

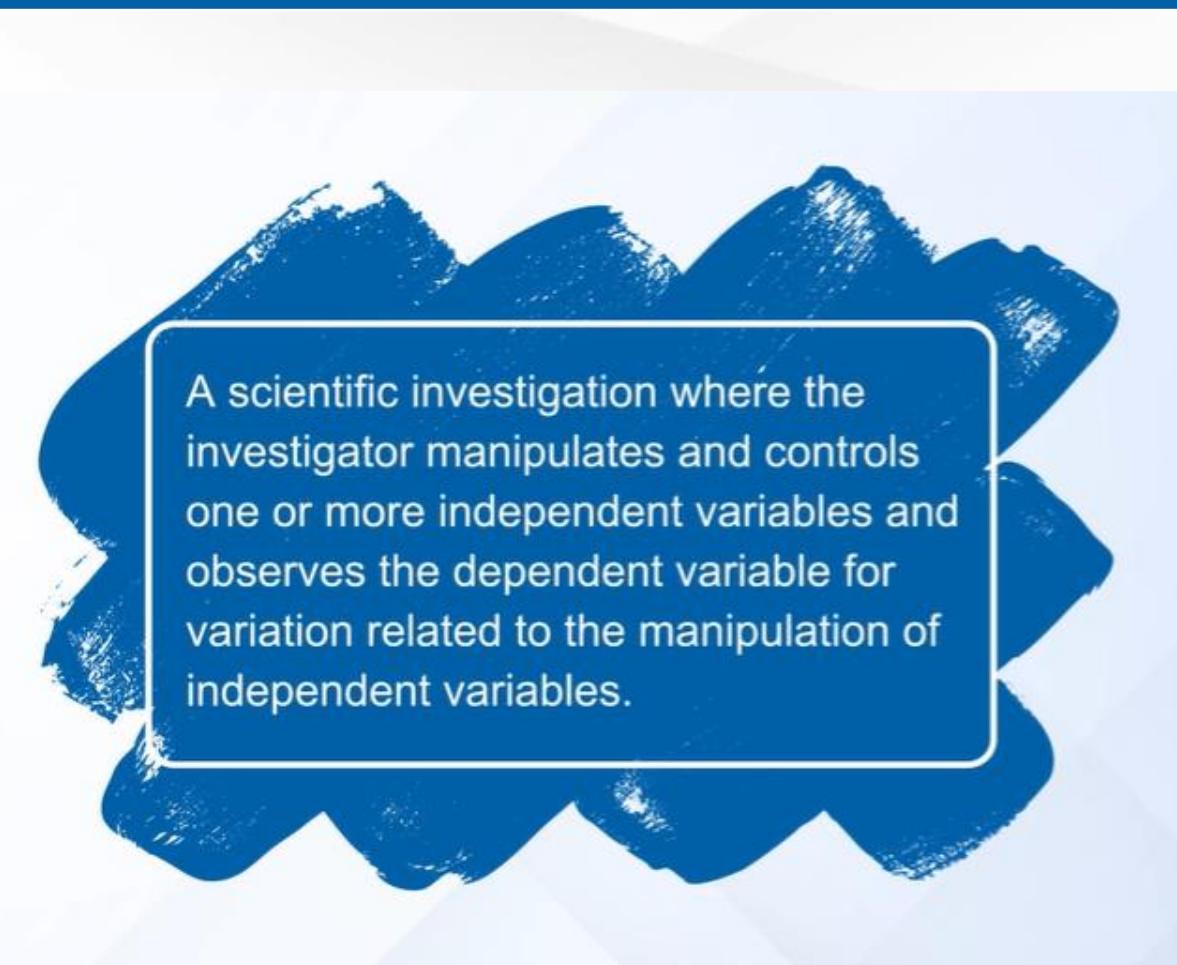
Experiments and causality



Conditions to be satisfied:

- Correlation
- Time sequence
- Alternative explanations

Experiments



A scientific investigation where the investigator manipulates and controls one or more independent variables and observes the dependent variable for variation related to the manipulation of independent variables.

Source: Marketing Research: A Methodological Foundation by Churchill and Lacobucci

Types of Experiments

Laboratory experiment

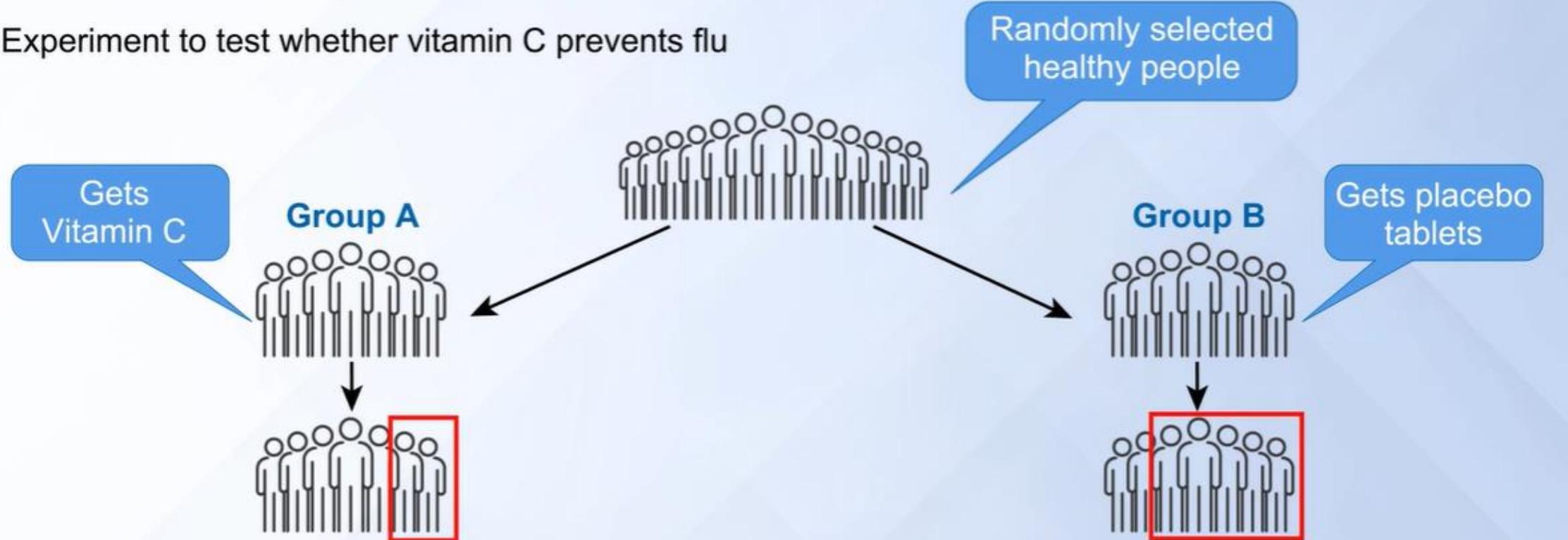
Research investigation in which the investigator creates a situation with exact conditions to control some and manipulate other variables.

Field experiment

Research study in a realistic situation in which one or more independent variables are manipulated by the experimenter under controlled conditions as situations permit.

Example of a Classic Scientific Experiment

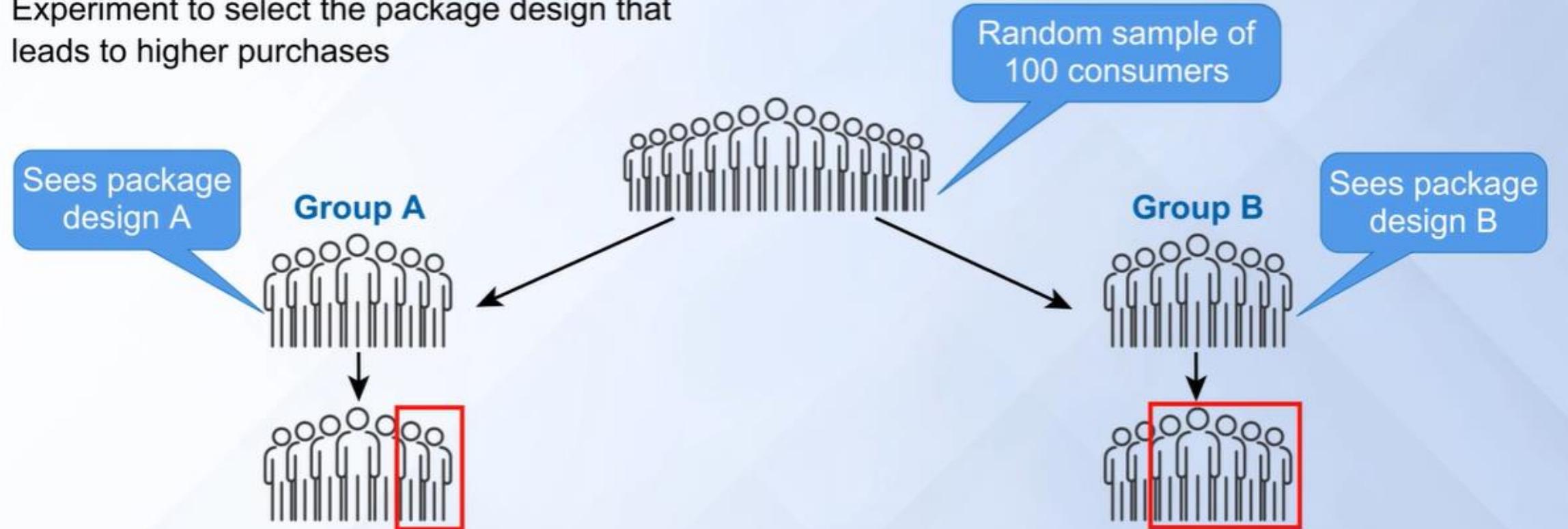
Experiment to test whether vitamin C prevents flu



If number of people with cold is less in group A, it is a scientific evidence that Vitamin C prevents flu.

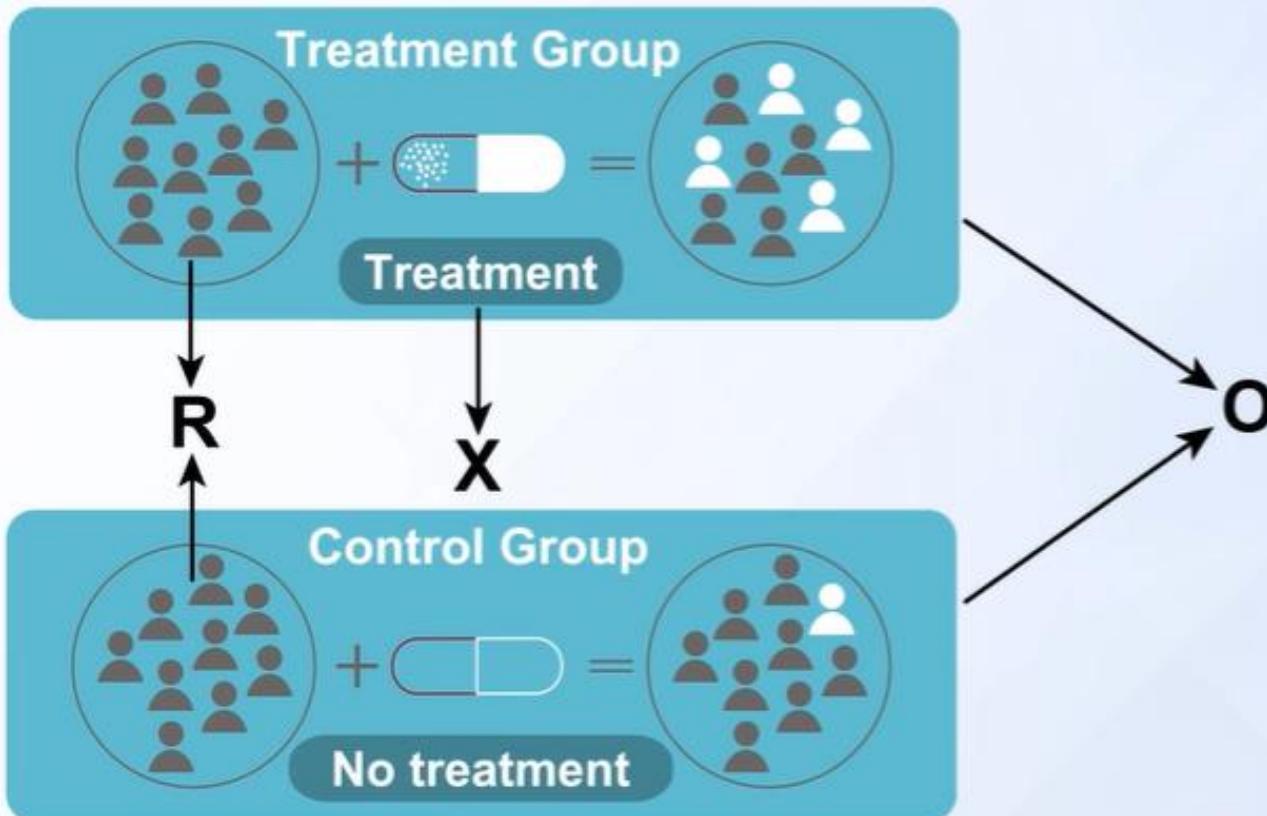
Example of a Market Research Experiment

Experiment to select the package design that leads to higher purchases



The package design of the group with higher number of purchases is selected as it leads to more purchases.

Important Terms in Experimental Design



R: Random assignments to treatment/control groups

X: treatment

O: Observation taken from experiment unit

Experimental Designs: The Static Group Comparison Design

Static group comparison design:

EG: (R) \times 0_1

CG: (R) 0_2

Experimental Designs: The Static Group Comparison Design

Static group comparison design:

EG: (R) X O_1

CG: (R) O_2

EG: Experimental group

CG: Control group

X: Treatment/intervention

O_1/O_2 : Observations taken on the experimental units in each group

The Static Group Comparison Design: Example



- **EG** – Group that gets 5% extra commission
- **CG** – Group that does not get extra commission
- **X** – 5% increase in commission
- **O1/O2** – Overall sales of each group at the end of the study

Before-After-With Control Group Design

Before-after-with control group design:



Pre-measures

In some cases, the dependent variable is measured before the treatment to establish the equivalence of the experimental and control groups

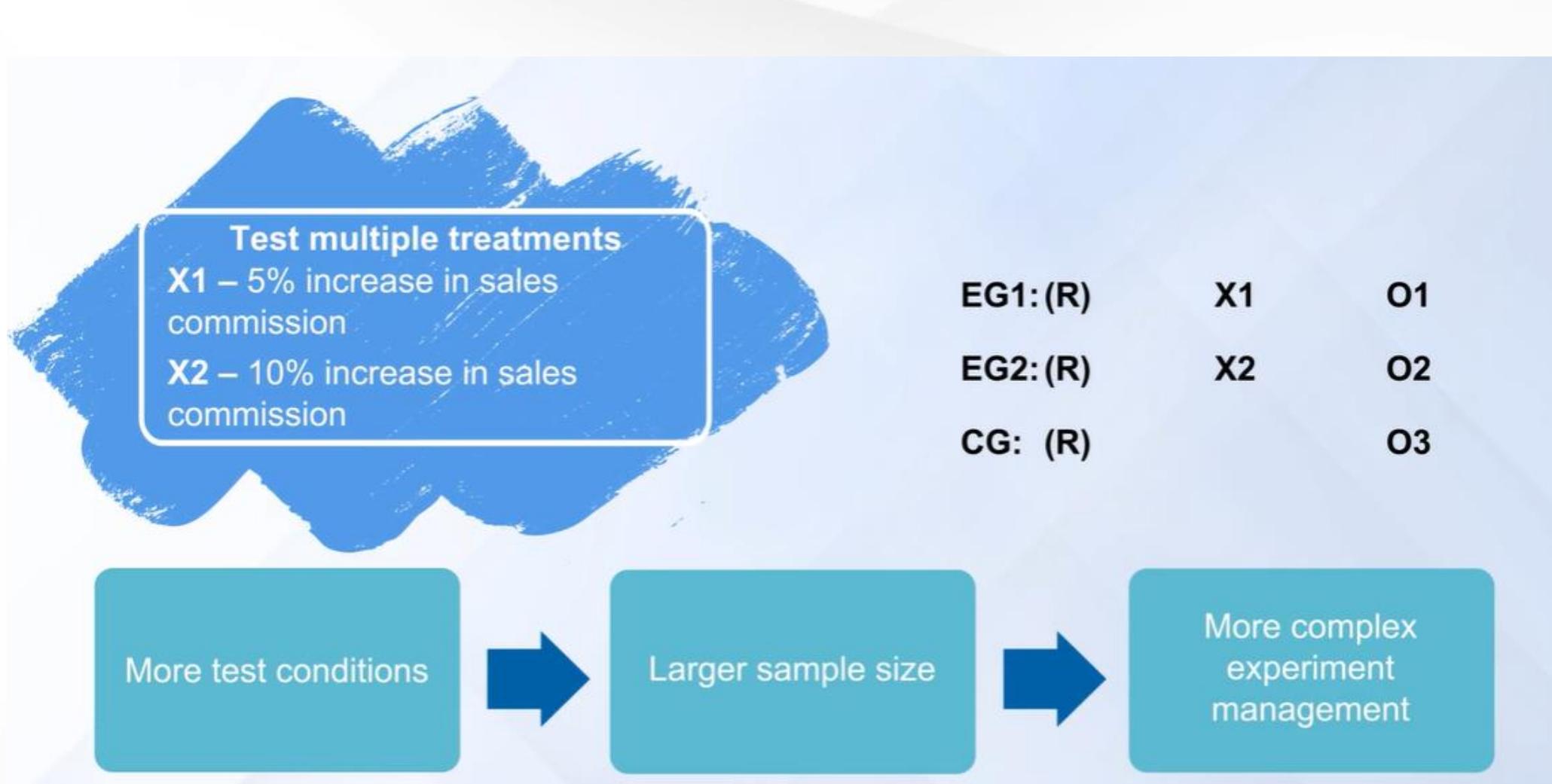
Before-After-With Control Group Design

Before-after-with control group design:

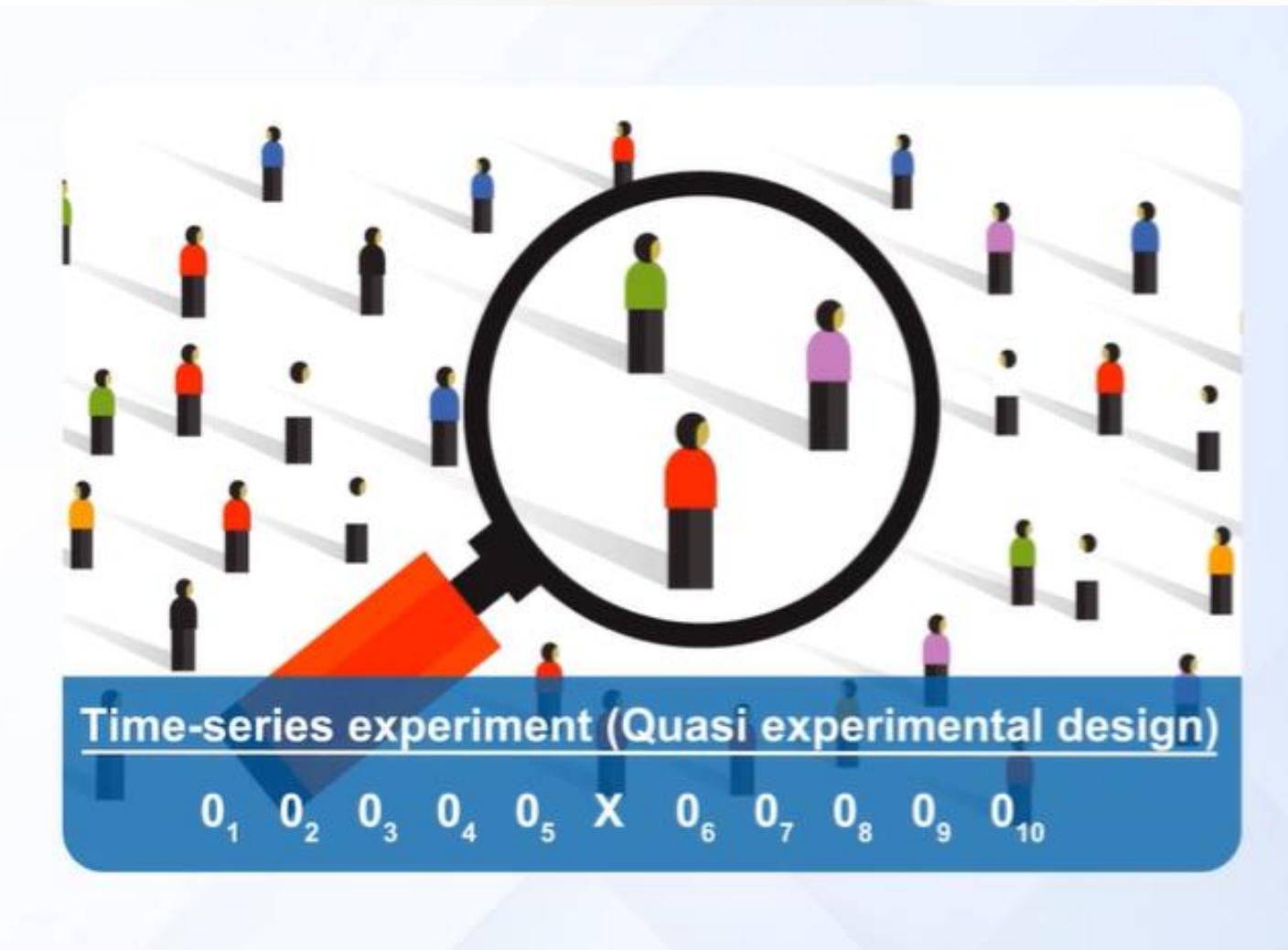


In some cases, the dependent variable is measured before the treatment to establish the equivalence of the experimental and control groups

Variation of Before-After-With Control Group Design

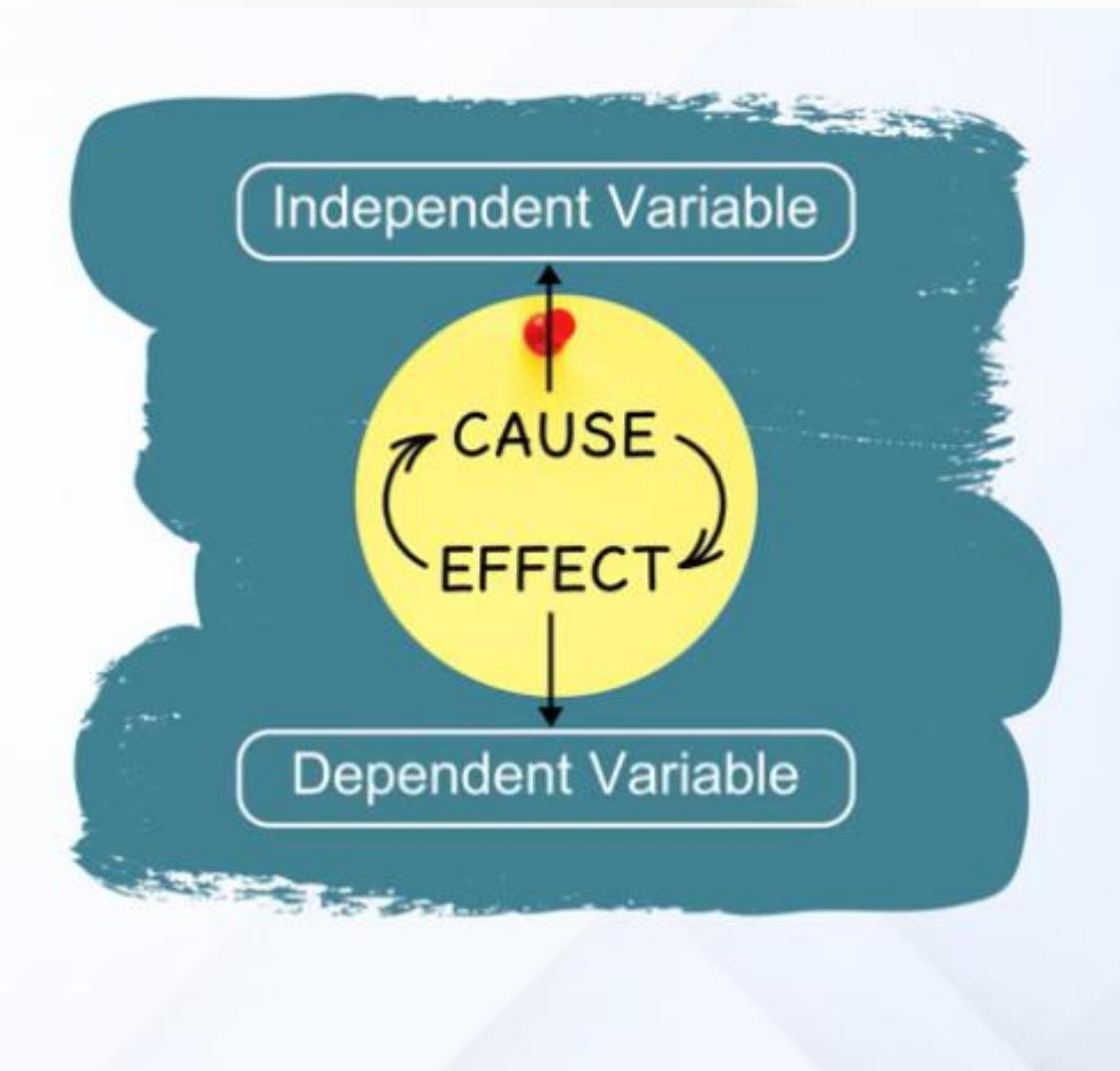


Quasi –Experimental Designs



Experimental Validity in Causal Research

Internal Validity



Internal Validity

High internal validity allows the researcher to rule out alternative explanations.



Internal Validity



Matched samples are used in case random assignment is not possible
Matching is done on multiple observed variables

External Validity



Internal Vs External Validity

In marketing research experiments, there is a trade-off between internal and external validity.

Easy to rule out alternative explanations with homogeneous test units

↑ Internal Validity

Experimental Group

- Test unit 1
- Test unit 2
- Test unit 3

Control Group

- Test unit 1
- Test unit 2
- Test unit 3

↓ External Validity

Results from homogeneous units may not hold for other different units

- Important to have internal validity
- For external validity, conduct experiments with higher sample sizes

Threats to Internal Validity: History



- External event that happens between pre and post measures
- Affects the value of the criterion or response or dependent variable

History: Example



Increase in commission
for rival company
salespersons = 20%

- **EG** – Group that gets 5% extra commission
- **CG** – Group that does not get extra commission
- **X** – 5% increase in commission
- **O1/O2** – Overall sales of each group at the end of the study

Impacts the sales of
the salespersons

Threats to Internal Validity: Maturation



Biological, economic, or psychological processes
that varies systematically with time

Maturation :Example



Measure the impact of 5% increase in sales commission on the salespersons' performance.

Long duration of experiment may lead to little or no intervention

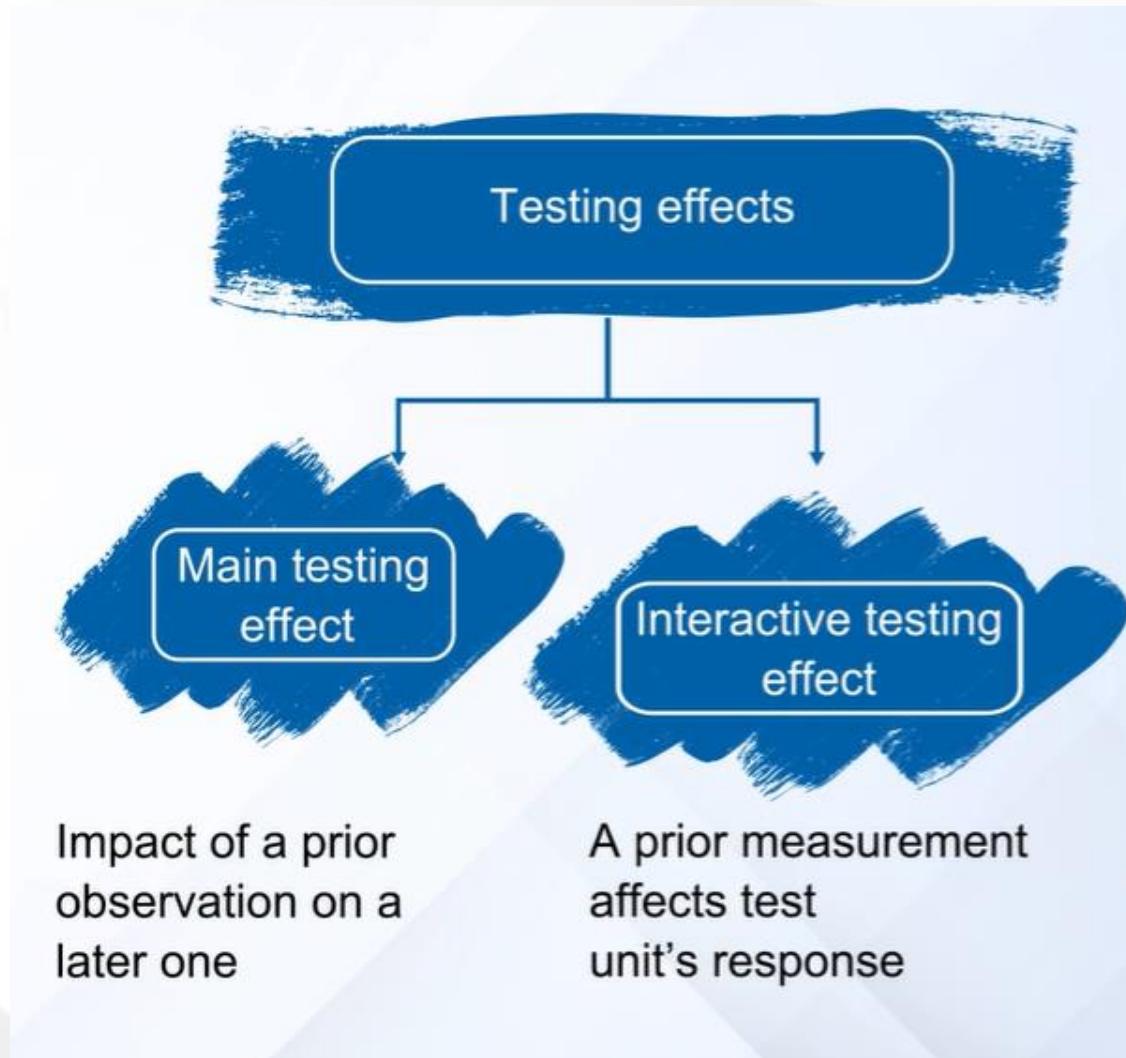
- **EG** – Group that gets 5% extra commission
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- **X** – 5% increase in commission
- **O1/O2** – Overall sales of each group at the end of the study

Threats to Internal Validity : Testing

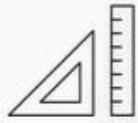


The process of experimentation itself
affects the observed response.

Threats to Internal Validity : Testing



Threats to Internal Validity : Instrument Variation



All changes in the measuring device



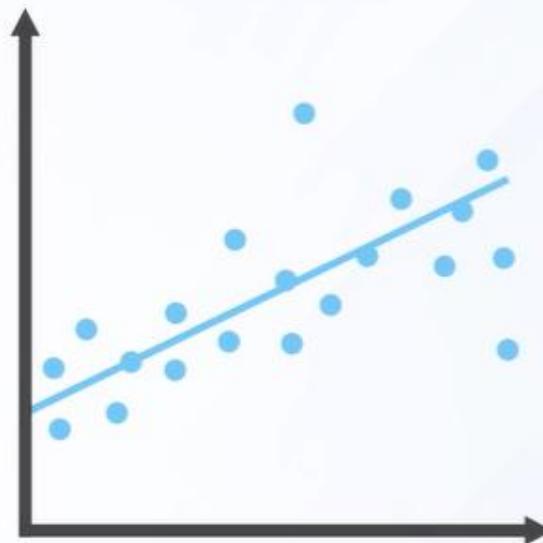
Company may have to adjust to this factor before it impacts the treatment

Threats to Internal Validity : Selection Bias



When treatment and control groups are initially unequal with respect to the dependent variable

Threats to Internal Validity : Statistical Regression



- Tendency of extreme cases to move towards central position
- Individuals are grouped according to scores and their performances regresses towards the mean

Statistical Regression : Example



Measure the impact of 5% increase in sales commission on the salespersons' performance.

Only high performing salespersons are given extra commission

- **EG** – Group that gets 5% extra commission
- **CG** – Group that does not get extra commission
- **X** – 5% increase in commission
- **O1/O2** – Overall sales of each group at the end of the study

Regression of high performing salespersons towards mean gives wrong estimation

Threats to Internal Validity : Experimental Mortality



- Test units are lost during an experiment
- Non-equivalence between control and experimental group

Experimental Mortality : Example



Measure the impact of 5% increase in sales commission on the salespersons' performance.

Salespersons leaving company contaminates the experiment

- **EG** – Group that gets 5% extra commission
- **CG** – Group that does not get extra commission
- **X** – 5% increase in commission
- **O1/O2** – Overall sales of each group at the end of the study

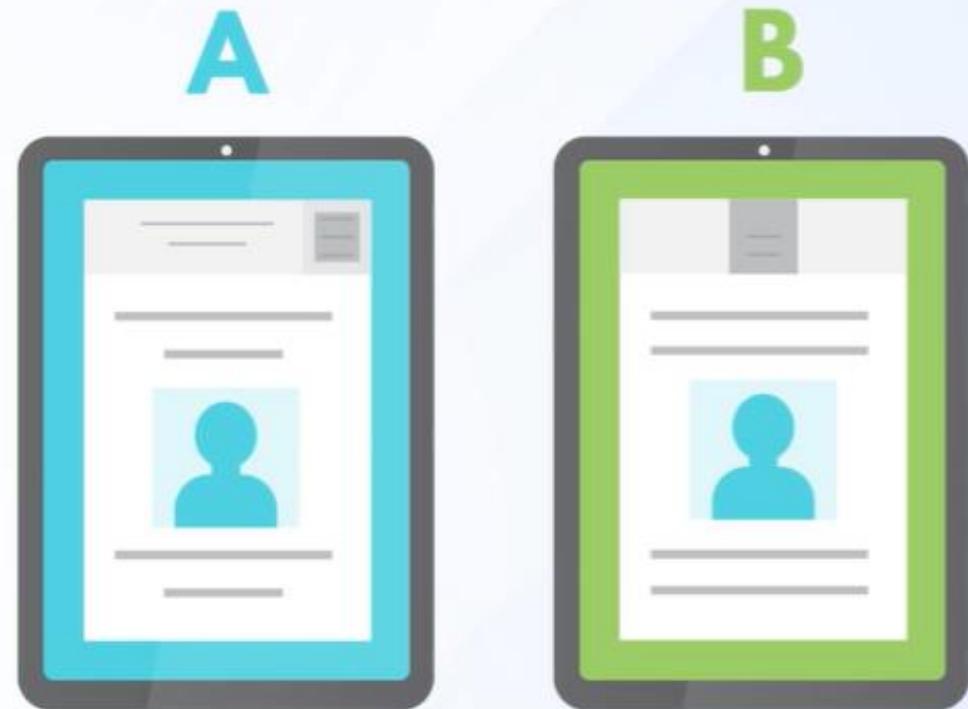
Growth Hacking

New Product Testing for Fast Food Company



Companies experiment directly in the marketplace to grow fast when the development risk is not high.

Online Experimentation



Make quick decisions at a massive scale to grow fast – Growth Hacking

Growth Hacking



- Transforms decision making into a scientific evidence driven process
- Availability of big data does not reduce the importance of understanding causality

Controlled Online Experiments



Online Experimentation



- Engage millions of consumers
- Harvest useful results to be implemented quickly
- Requires specialized knowledge and skills

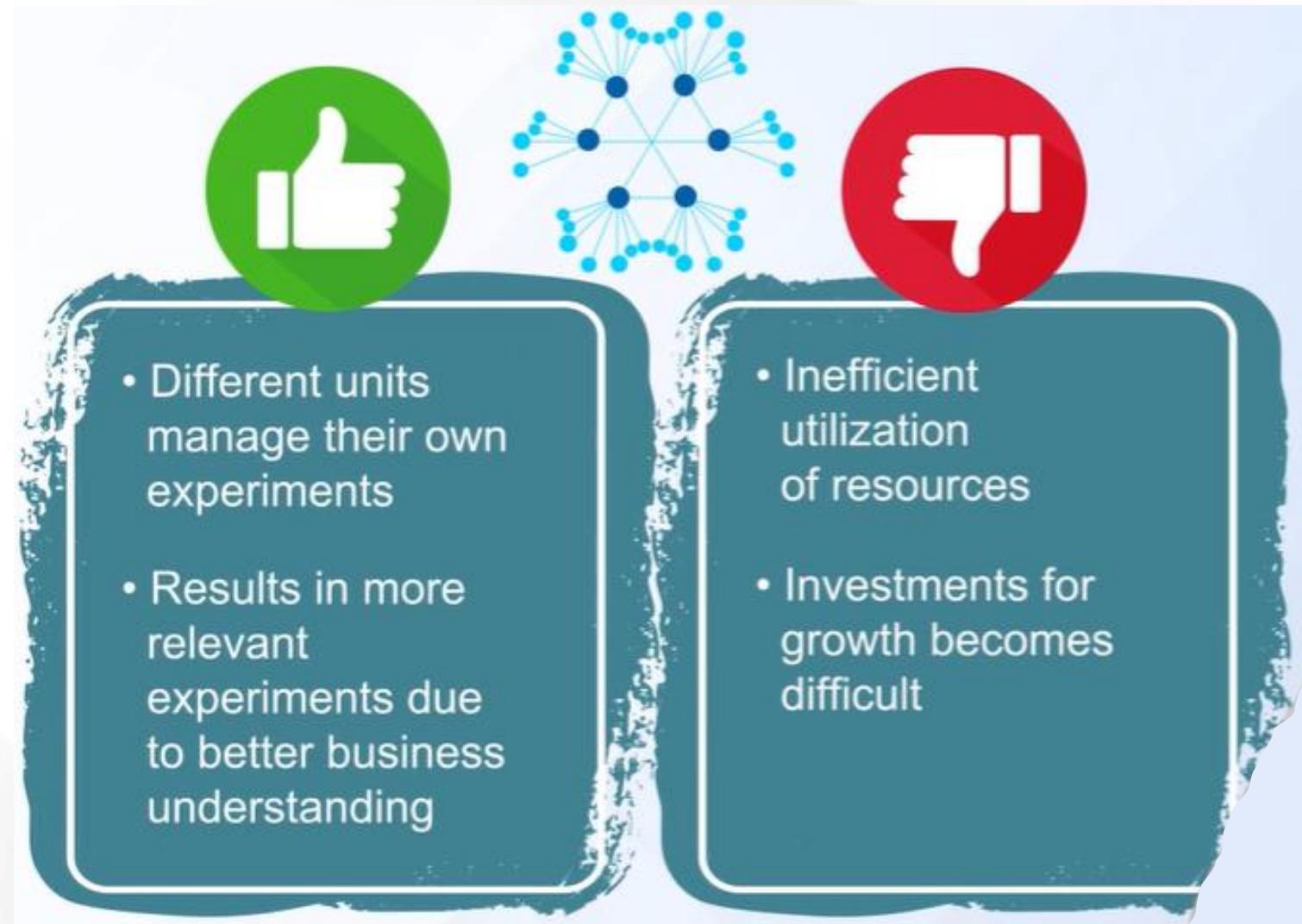
Centralised Experimentation

The diagram features a central light blue circle containing a network of blue dots connected by lines, symbolizing experimentation or data. To the left is a green circle with a white thumbs-up icon, representing positive aspects. To the right is a red circle with a white thumbs-down icon, representing negative aspects. Below each icon is a teal rounded rectangle containing a bulleted list of points.

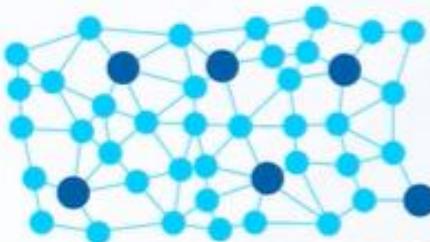
- Specialization can be developed within the unit
- Better tools can be utilized efficiently

- Lack of clarity on reasons of experimentation
- Disconnect between units makes the process less effective

Decentralised Experimentation

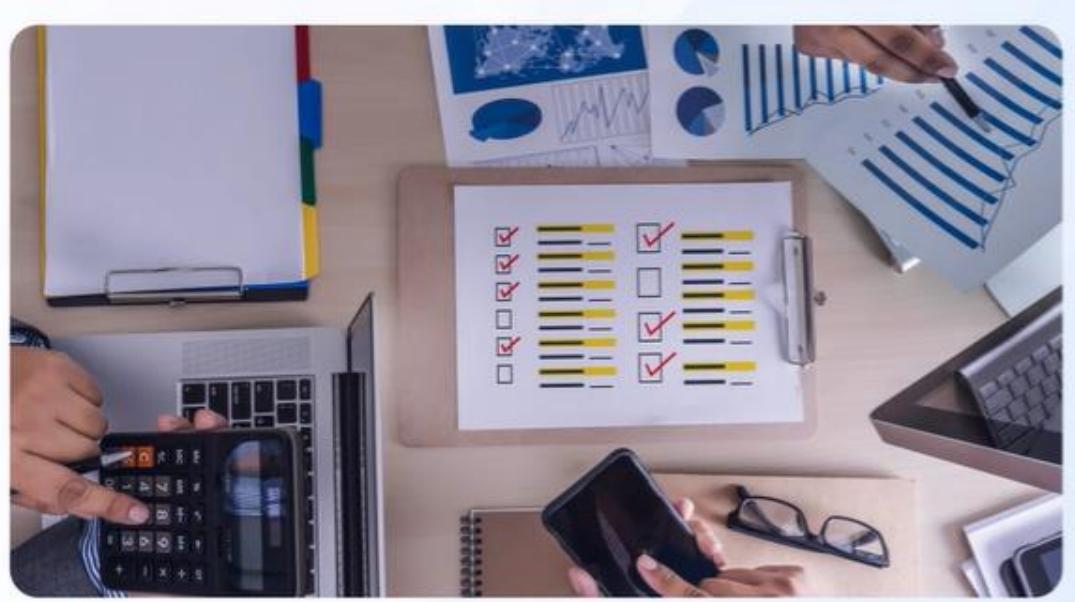


Hybrid Model



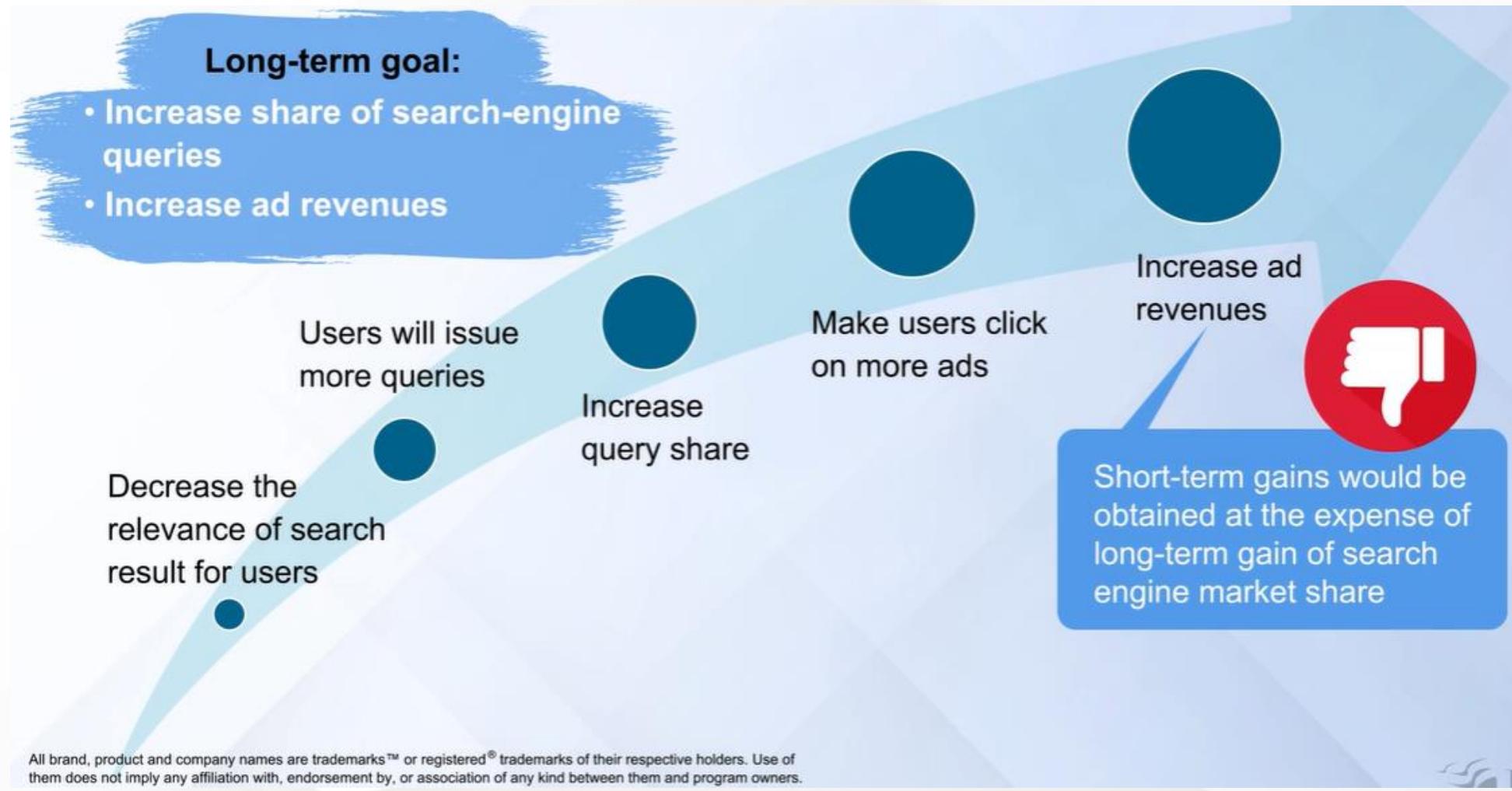
- Small specialised central unit
- Works in close cooperation with decentralised units

Overall Evaluation Criteria (OEC)

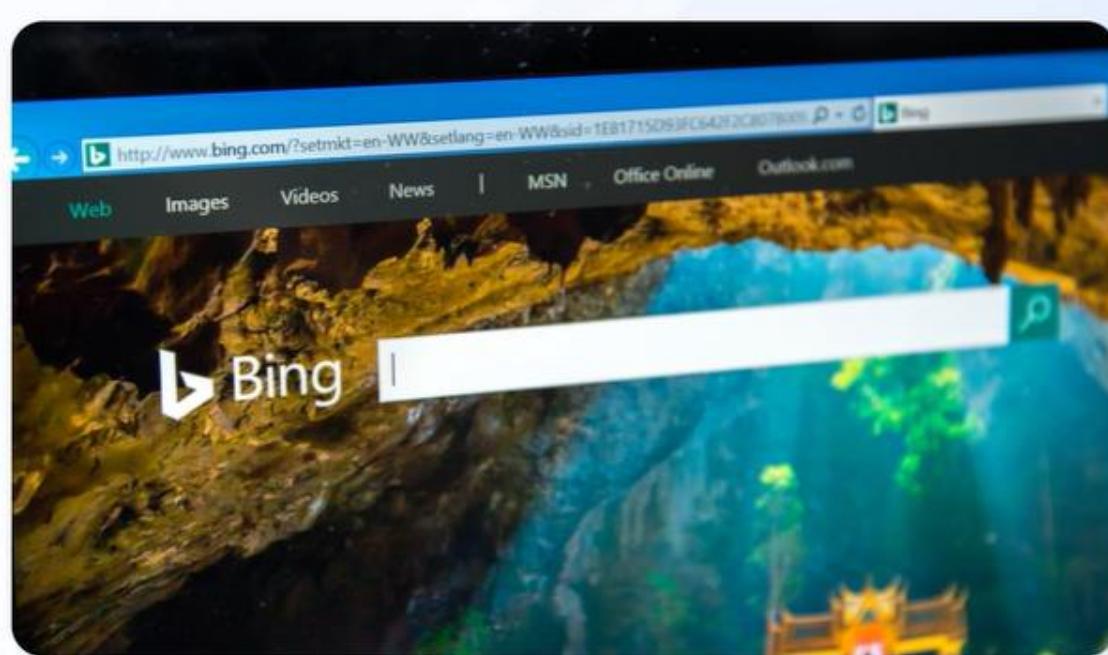


- Measures for the success of the entire process
- Decided through internal discussions by senior management
- Break down the OEC and track success insights

Example of Overall Evaluation Criteria: Bing



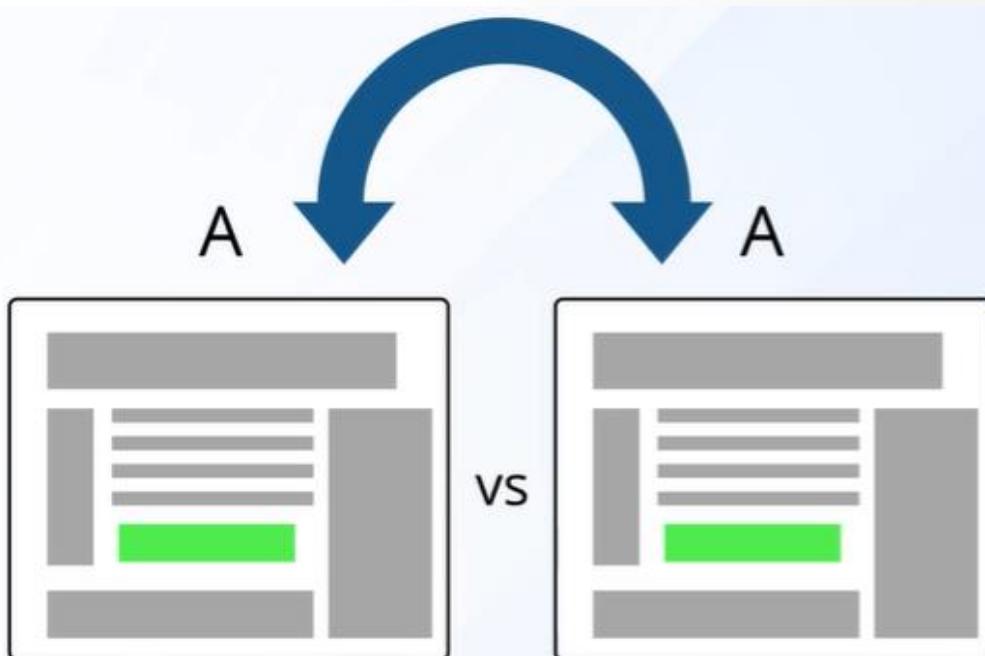
Example of Overall Evaluation Criteria: Bing



- Minimise the number of user queries for each task/session
- Maximise the number of tasks/sessions that users conducted

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A/A Testing



- Done before implementing new A/B testing
- Check the accuracy of A/B tests
- Point out issues before A/B tests

A/A testing should show no significant difference in conversions between control and test groups

Data Quality



- How was data obtained?
- Are there any outliers in the data?
- Are multiple consumers segments grouped into one group?

Summary

Key Learnings

New products revisited

- What are new products?
- Why do they succeed or fail?

New product development process revisited

- Context of the NPD process
- Reason for the new product — the newness map and the risk map

Correlation, causality, and experimentation

Online experimentation and growth hacking



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