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# Driving Digital Products Innovation via Experimentation

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#### 1. Products and experiments perspective

- 2. Experimental principles
- 3. Design principles
- 4. Case study

### **Perspective into digital products**

1. Digital products refers to product or tool that can be created once, and sold many times. The underlying concept on digital product differ widely from traditional businesses





#### **The Digital Stack**

# **Experimentation** as a Meta-Capability that Starts with B2C

- 1. Digitally-born companies naturally have business-to-consumer (B2C) business plans
- 2. Rapid and dynamic connection to consumers has helped disrupt traditional consumer facing companies and threaten existing B2B firms

A check on these companies some of these companies have stronger advantage

- → Apple vs Sony
- → Netflix vs Comcast
- → Amazon vs IBM
- → Airbnb vs Marriott

Note: most companies are striving to change to B2B2C or B2C

### Switch between traditional to digital

Digital business stack is far easier for a software product, given it's "digital" foundation, than it is for the physical products that still dominate traditional industries such as construction, transportation, healthcare and education.

But we are seeing deliberate efforts in these sectors to have a strong connection with users in order to improve the ability to quickly evolve products

- → Digital twin create, build, and test your equipment in a virtual environment e.g. manufacturing simulations, 3D CAD models, etc
- → Digital thread communication framework that helps in facilitating an integrated view and connected data flow of the product's data throughout its lifecycle

### **Perspective into experimentation**

- 1. **Experiment** is a procedure carried out to support, refute, or validate a hypothesis.
- 2. **Experimentation** a process of determining the consequences of unknown or novel dependencies among variables customers, partners, and competitors in relation to dependencies currently known.
- 3. A **business/product experiment** is about determining what is consequential for improved **speed**, **lower costs**, **or increased revenue**.

### **Perspective into experimentation**

- 1. Various common types of experiments in products are
  - a. AB testing controlled experiment with two variants, A and B
  - b. Multivariate test more than two versions at the same time or use more controls.





#### AB test example

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### Short (small-loop) vs long term(big loop)

- 1. Short (small-loop) vs long term(big loop)
  - a. Short
    - i. Easy to run. Run over short period
    - ii. Cheap
    - iii. Used to gain new knowledge, update or strengthen a concept.
    - iv. Tools for enhancing business as usual
  - b. Long
    - i. Expensive. Run over long period
    - ii. Used as tools for innovation
    - iii. Wealth of information



#### 5. Update & Analyze

With these run, we need to analyze the data and use it to update our base of knowledge and ultimately our operational choices.

#### 4. Test Association(s)

We then setup an experiment to gather data on the strength of these associations

#### 3. Map to Associative Thread (x → y → Desired Outcome)

Measuring long-term revenue is not possible in a short-term experiment. So instead we will focus on a proxy we can measure (y), like Dwell Time.

#### **Knowledge manifestation process**

- 1. Aspects of conducting experiments
  - a. Need to manipulate certain settings (input variables) and we need to measure what happens (output variables).
  - b. Aim to improve speed, cost and availability
  - c. Experiments don't cover all users
- 2. Challenge to experiment design
  - a. The variable of interest (e.g. long-term revenue) may not be directly calculable in the experiment. In such cases, need a proxy variable
- 3. Knowledge manifestation process includes data on
  - a. Domain knowledge
  - b. Managerial intuitions
  - c. Operational efficiency
  - d. Experimental results

#### Associations/correlations vs causal relations

In business experimentation, where control is nearly impossible, the focus is on correlation rather than establishing causal relations.



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#### Agile development

 Agile software development describes an approach to software development under which requirements and solutions **evolve** through the **collaborative** effort of **self-organizing** cross-functional teams and their customer(s)/end users(s)



#### **Refactoring and recomposition**

1. Refactoring is the rearrangement of code without affecting its behavior in order to improve its **structure and design** and uphold **long term viability** 

2. Recomposition is situation where you minimally modify the product behavior in order to make a design change big enough to support the needed large-scale effort.

### Modularity

Modular systems decompose the design problem into smaller units or "modules."

Characteristics of good modular products

- 1. Functionality
- 2. Separation of concerns
- 3. Interoperability
- 4. Reusability

#### ... Modularity

- 1. Good products design makes experimentation easier, or even possible
- 2. Makes small experiments easier to run
- 3. Able to counter challenges big loop experiments

Examples of modularization outside products are use of microservices, containerization, etc

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#### **Novelty Problem**

→ The what, how and why
→ Knowledge is transferable in small loop experiment



#### Toyota case study



#### **Countermeasure Mentality**

Each intervention taken is only a short-term part of what must be a

continuous process of change and improvement





#### References

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