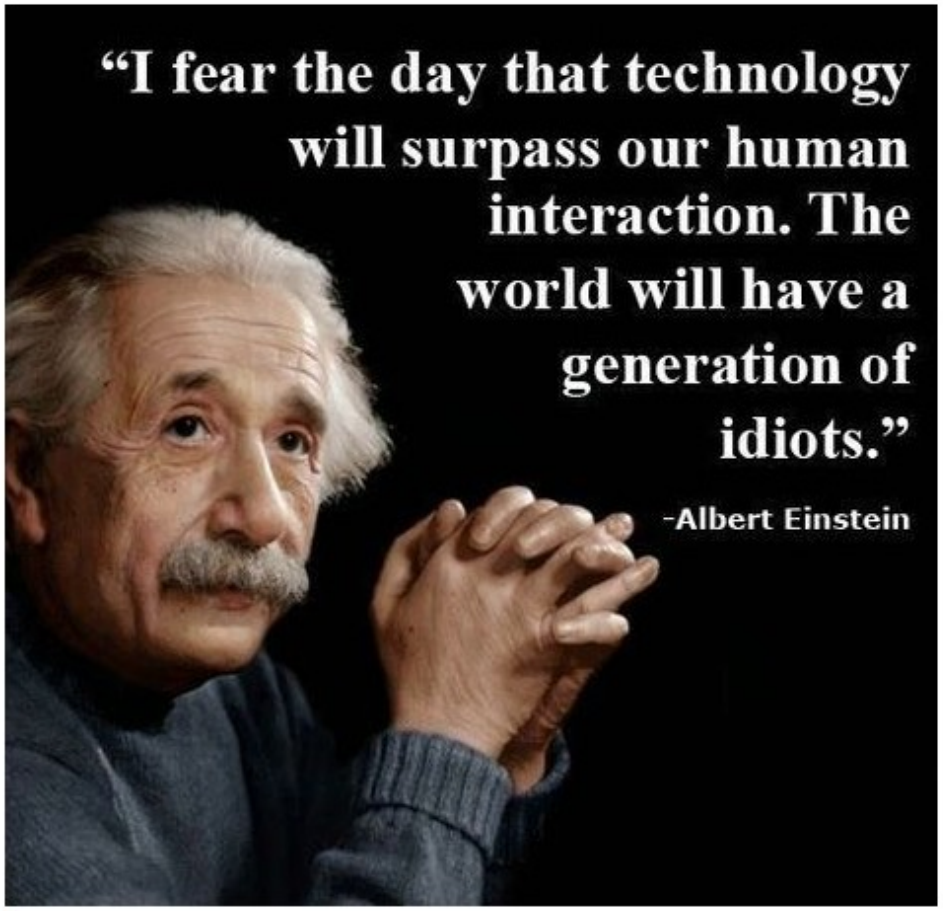
Information Technology and Disruptive Innovation

Role of Data?

Ref. Gallaugher, Chapter 6
Slides used with permission

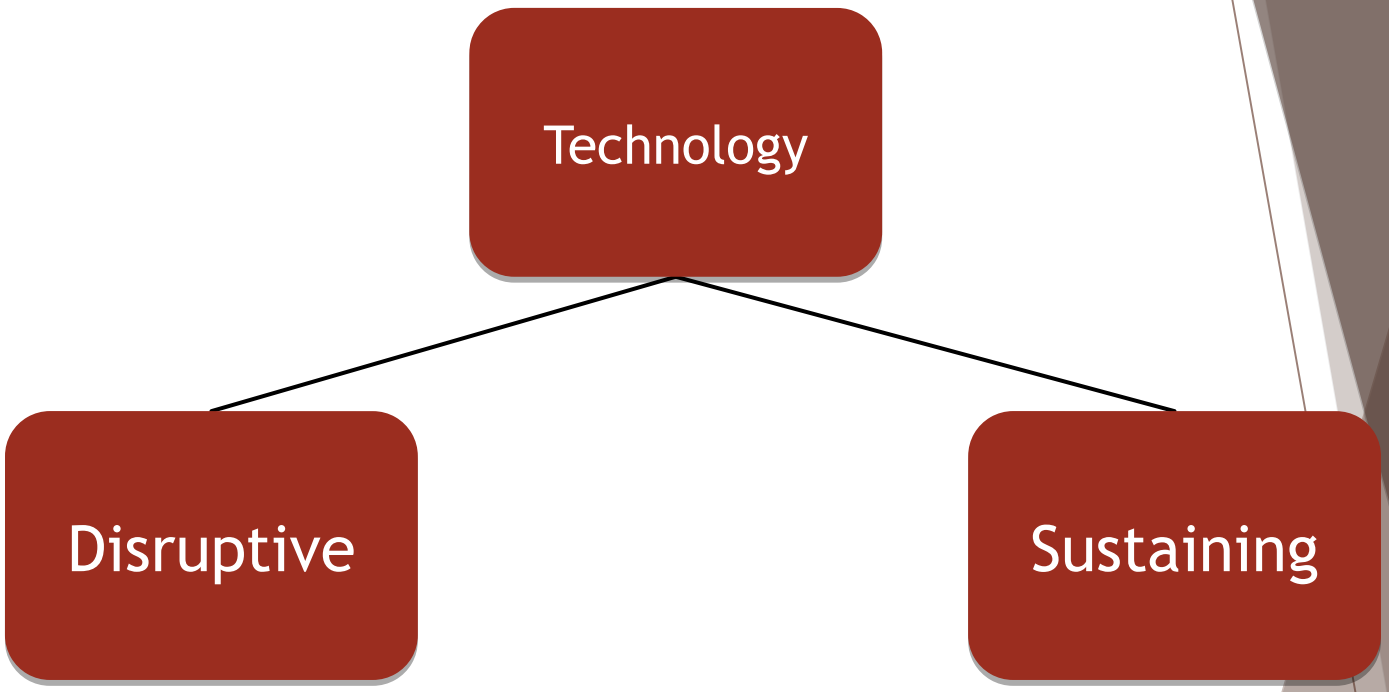


How would you make a rebuttal to this quote?

LEARNING OBJECTIVES

- Identify characteristics of disruptive technology innovations.
- Understand why some firms fail to capitalize on disruptive technology innovations.
- Appreciate the impact of disruptive technologies
- Identify the *role of data* in disruptive technologies

Technology: Disruptive versus Sustaining



- New way of doing things
- Does not meet needs of existing customers
- Opens new markets/destroys old ones
- Start in low end; evolve to high-end competitors

- Produces improved customer product
- Better / faster / cheaper

Ref. Gallaugher

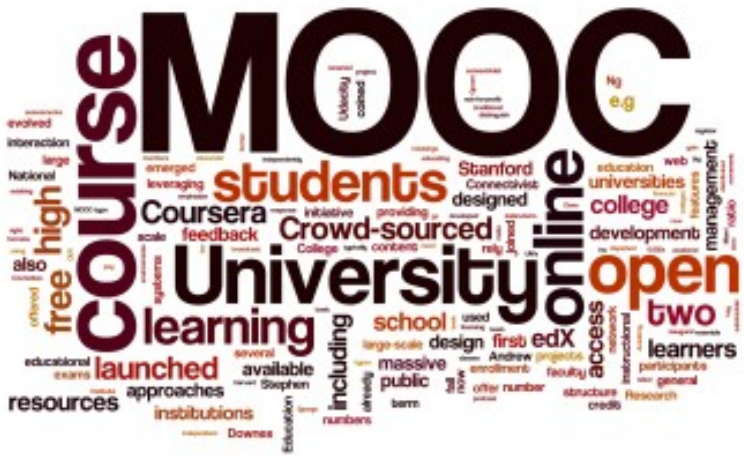
True disruptive technologies

- Performance attributes existing customers do not value.
- Performance attributes improve enough to invade established markets

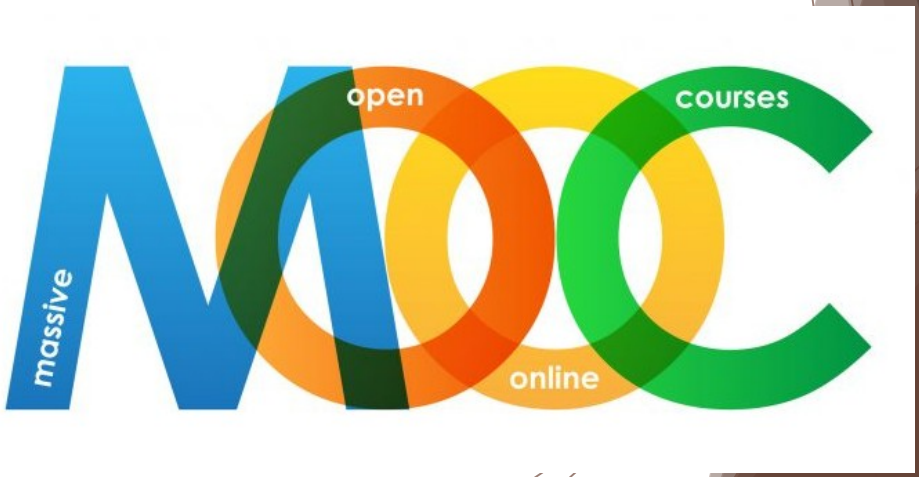
SECOND LIFE

airbnb

TESLA

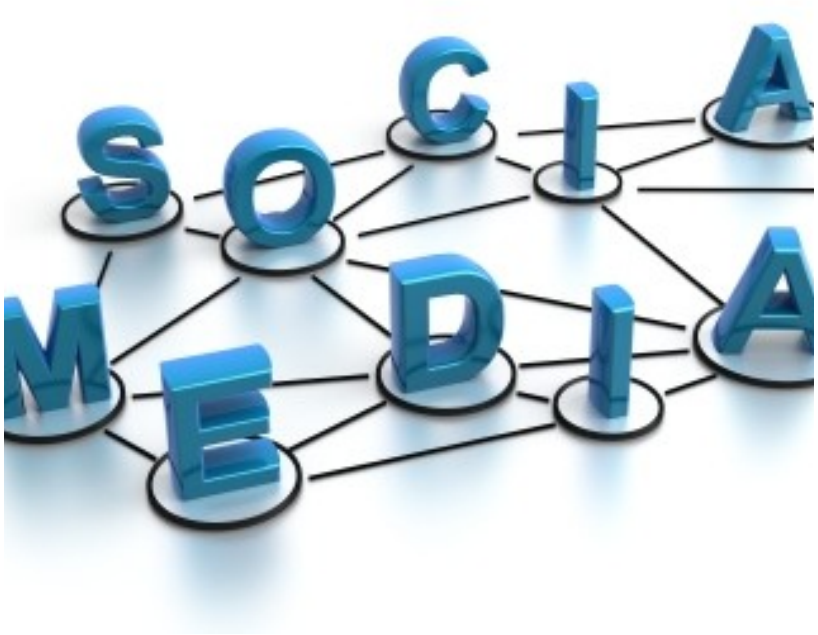


What is on the horizon?

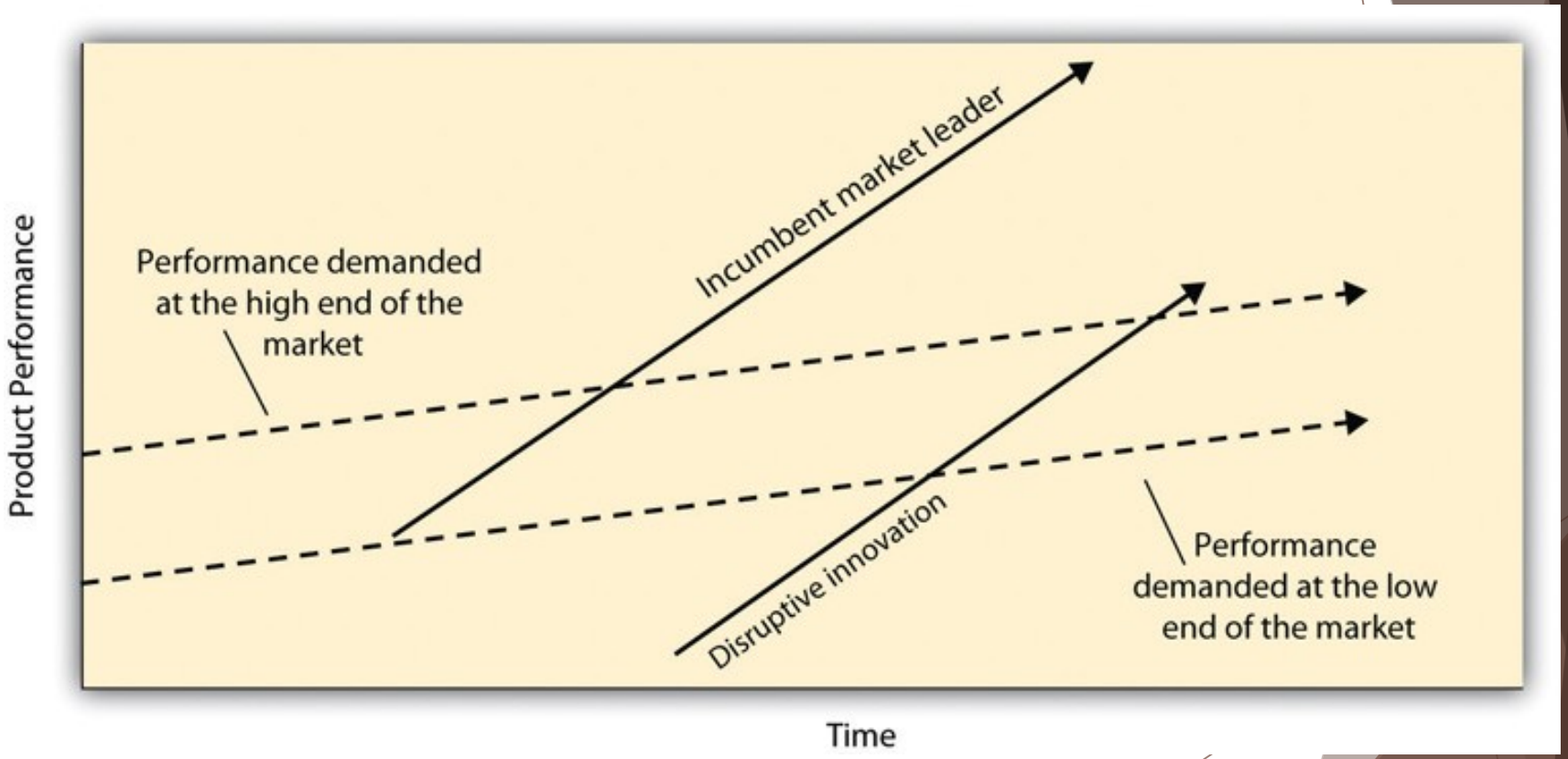


User-generated Content

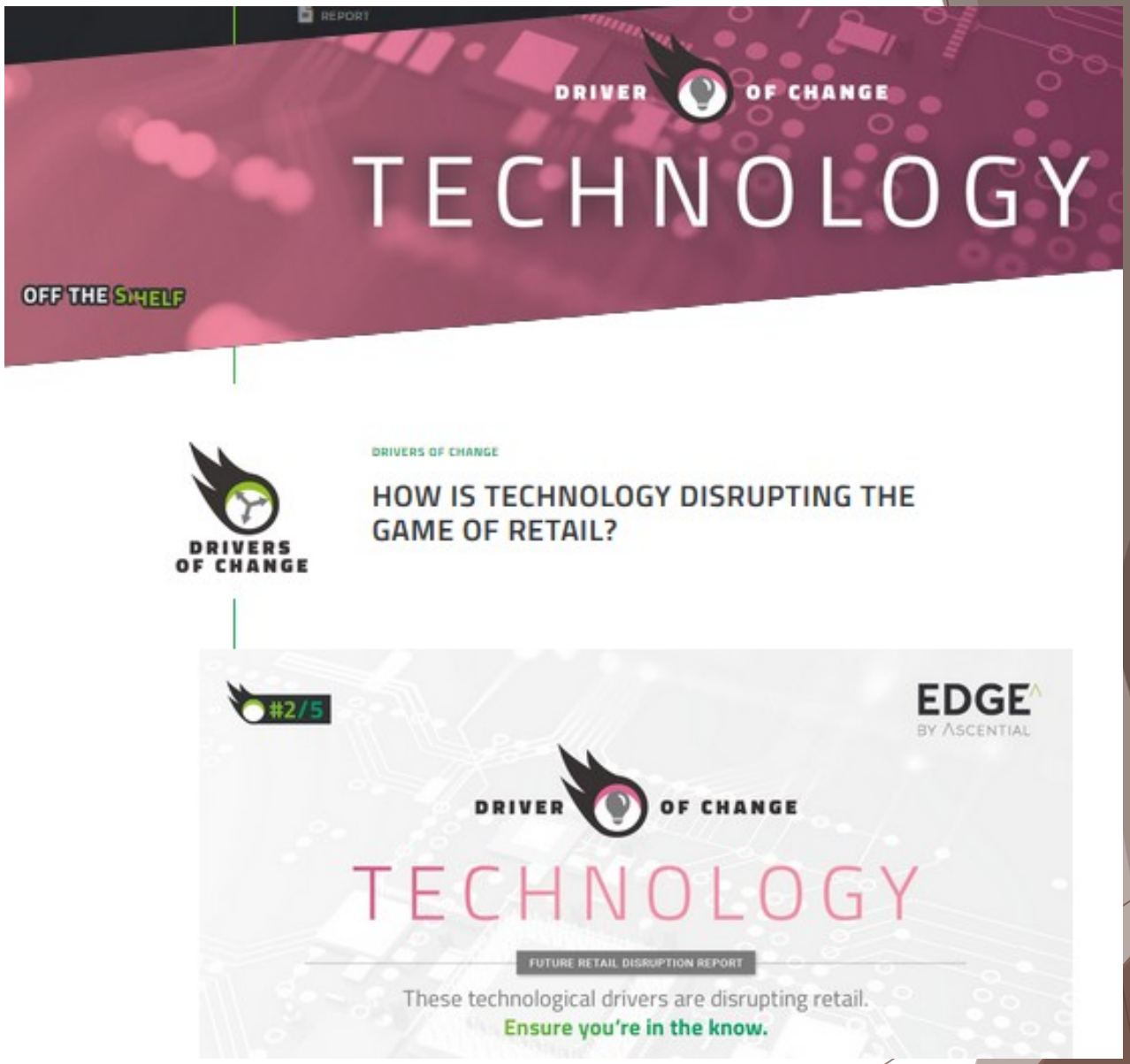
- What is it? Is it important?
- **User-generated content** (**UGC**), alternatively known as **user-created content** (**UCC**), is any form of content, such as images, videos, text, and audio, that has been posted by users on online platforms such as social media and wikis.
- The term "user-generated content" and the concept it refers to entered mainstream usage in the mid-2000s, having arisen in web publishing and new media content production circles.
- Ref. Wikipedia



Incumbent technologies improve over time. Disruptive technologies enter.

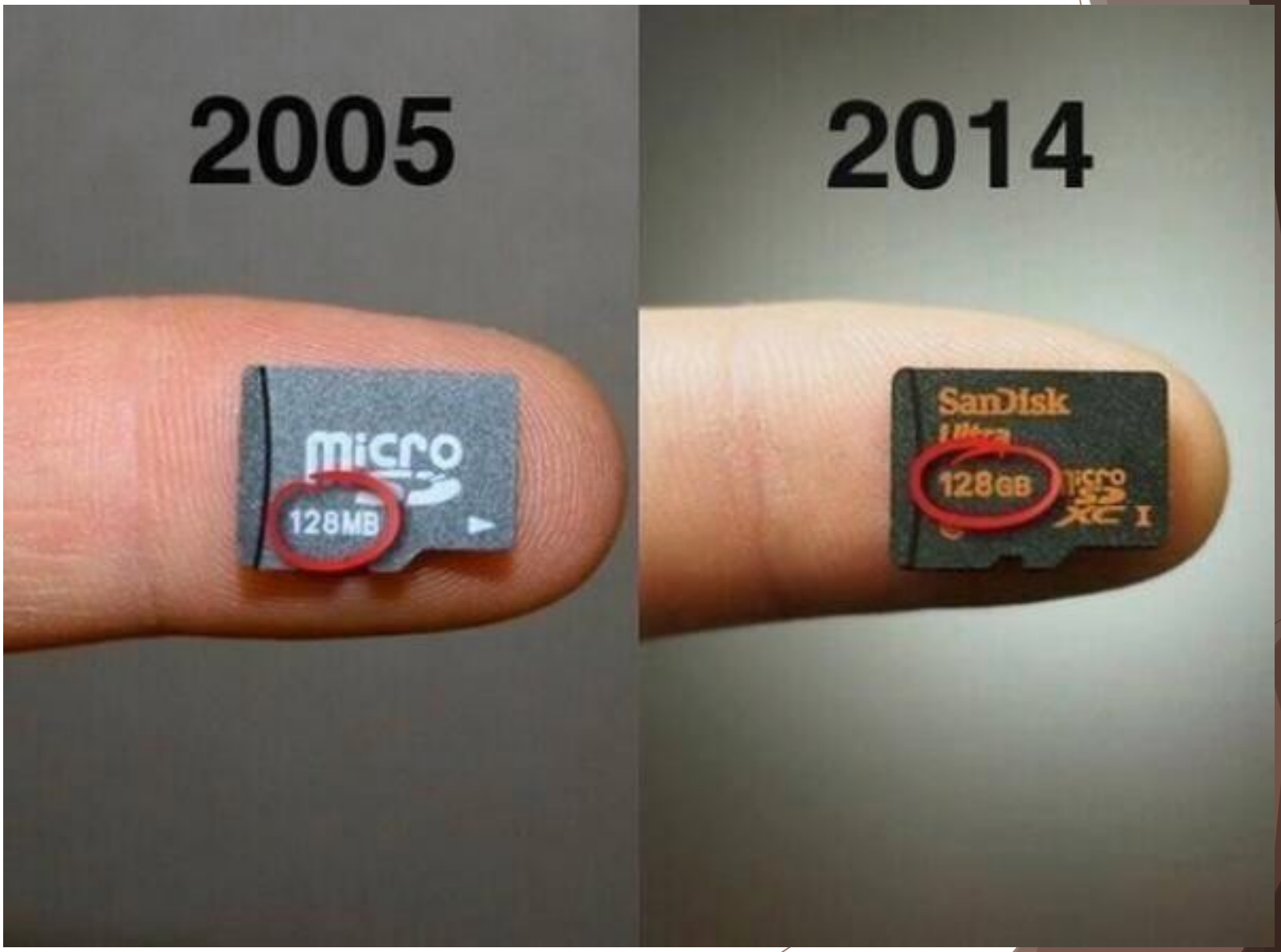


Retail



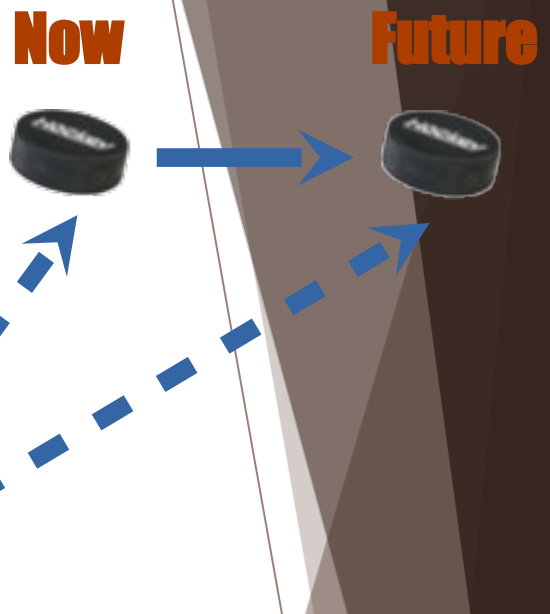
Ref. https://www.ascentialedge.com/insights/ecommerce-report/retail-disruption/drivers-change-technology?utm_source=google&utm_medium=cpc&utm_content=report&utm_campaign=rd2020&lsd=oa-rd2020

Pure Technology Evolution



Failure: Hockey Lessons from Wayne Gretzky and Cisco

"I don't skate to where the puck is. I skate to where it is going to be"



CISCO

FORTUNE 500
Most profitable

FORTUNE
100 BEST
COMPANIES
TO WORK FOR

Over 155
Firms
Acquired

Source: Gallaugher

Cisco buys Pure Digital for $590M

Decade ago

The New iPod Nano Shoots Video

Cisco Kills Flip Camera, Lays Off 550 Employees

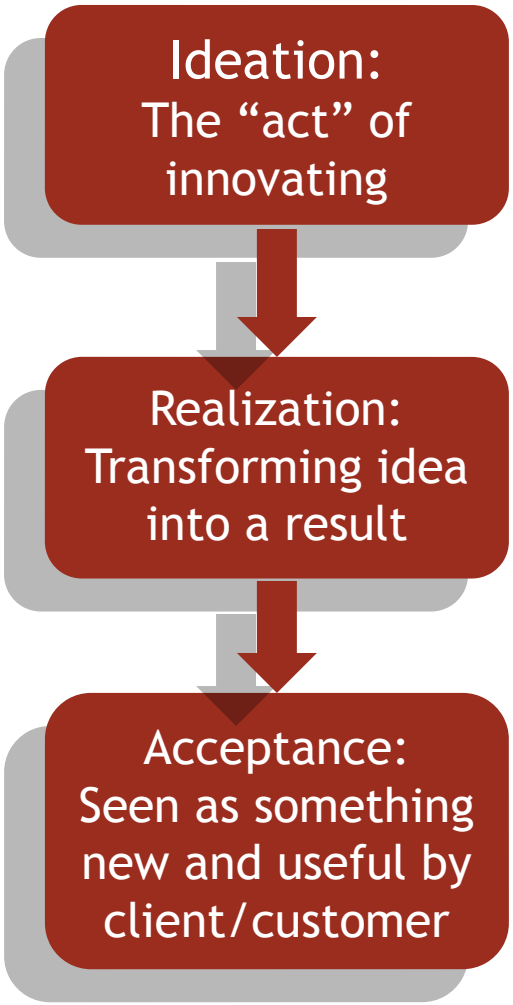
The Huffington Post | Amy Lee | First Posted: 04/12/11 10:08 AM ET | Updated: 04/12/11 10:20 AM ET

2 Years!

Cameras

Multi-purpose device

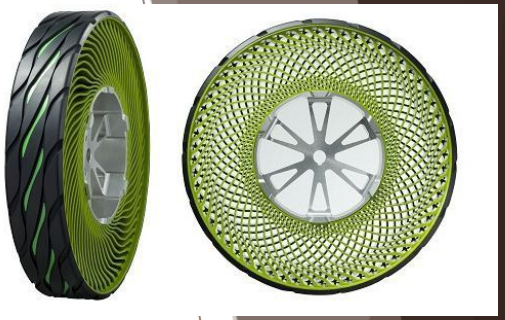
“Innovation”

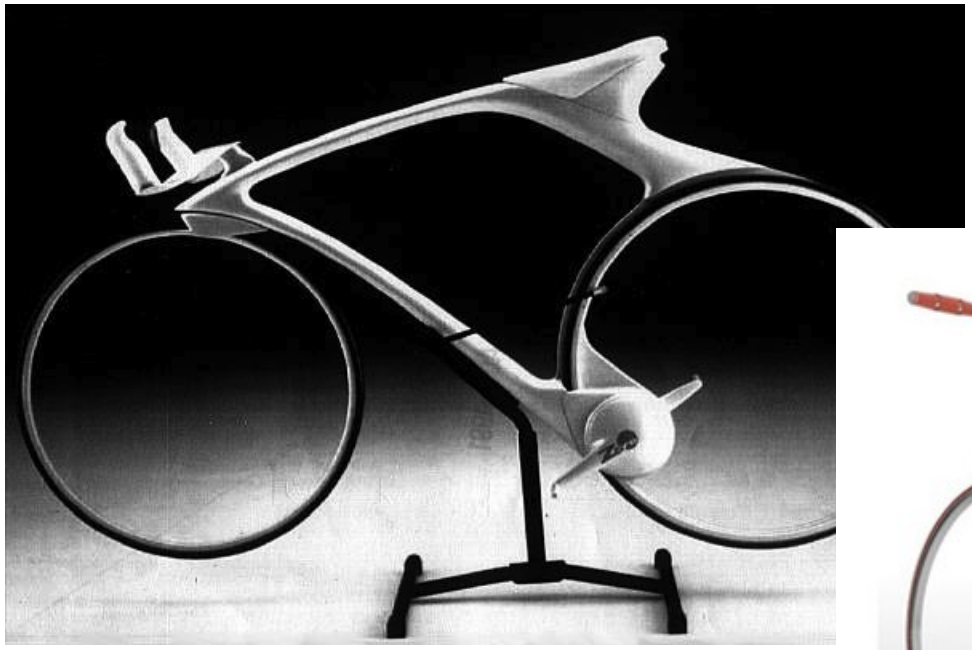


Adapted from: R. Welke

Product innovation

Examples: Spoke-less bicycle;
Wireless tires





Ref: R. Welke

The Rembrand Project

https://news.microsoft.com/europe/features/next-rembrandt/

The Next Rembrand

Relationships between:

- art and algorithms
- data and human design
- technology and emotion.

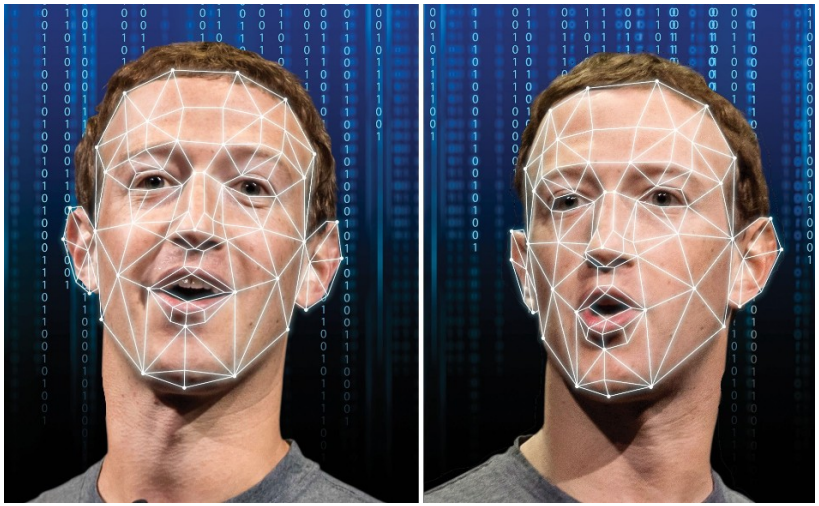
“We wanted to stimulate the discussion on how data and the use of data could lead to innovation,” Ron Augustus, Microsoft Netherlands.

Authentic vs original

Microsoft’s paintings:
authentic but not original

Deep Flakes

Technology used to "create fake videos or audio recordings that look and sound like the real thing using [AI] neural networks."



"The powers that be no longer have to stifle information. They can now overload us with so much of it, there's no way to know what's factual or not. The ability to be an informed public is only going to worsen with advancing deep fake technology." J. Andrew Schrecker

https://towardsdatascience.com/how-deepfake-technology-can-become-more-dangerous-than-a-nuclear-weapon-9d9e6723ea13

CASE #1 – Domino's Pizza's Predictive Ordering System

Background

Company

- Domino Pizza Enterprise (franchisee)
- 2600 stores globally
- 70% online sales

Project

- Project 3TEN
- Use predictive technologies to anticipate customer order

Results

- 2019 in Australia
- Kept delivery times under an average of 5 minutes across an entire week
- Correlation between speed and customer satisfaction

Next Steps

- Now deploying this AI solution in New Zealand, France, Netherlands, Japan and Germany

Source: (Amazon, 2020a)

CASE #2 – Amazon's Predictive Recruitment System

Background

Company

- Multinational technology company
- E-commerce, cloud computing, etc.
- Also an AI solution provider

Project

- Build tools to automate recruitment
- Process resumes and pick the top candidates

Source: (Reuters, 2018; Global News, 2018)

Results

Process

- Model tends to penalize resumes that include the word "women"
- Past successful Amazon hires were mostly men

Project Failure

- Unable to make model neutral to particular terms
- No guarantee it won't sort candidates in another discriminatory way
- Abandoned the project

CASE #3 – Yanolja's Hotel Automation System

Background

Company
- Online travel agency
- The only Unicorn travel company in South Korea
- Top cloud-based hotel PMS (property management system) in global market

Project
- Aims to digitalize the entire customer journey

Results
- Analysis is based on general observation of the entire system. In real practice, should evaluate each use case

Published Success
- Customer satisfaction increased by 25%, sales increased by 38%, and # of reservations increased by 32% as a result of upgrading their system

Source: (Amazon, 2020b)

CASE #4 – Henna-na Hotel's Robotic System

Background

Company
- The world's first hotel run by robots
- First opened in 2015 in Japan
- Parent Company: H.I.S. (travel agency)

Project
- Aim to make this the "most efficient" hotel by reducing manpower and having 90% of its be robotics

Results

- Reduce its 243 robotic workforce by half in 2019 and replaced with human-provided services due to mass complaints

Hotel Failure
- In-room assistant process snoring sound as a command, waking guests
- Front-desk robots fail to answer basic questions
- Can't find a human to fix robot breakdown in time; employees end up working overtime

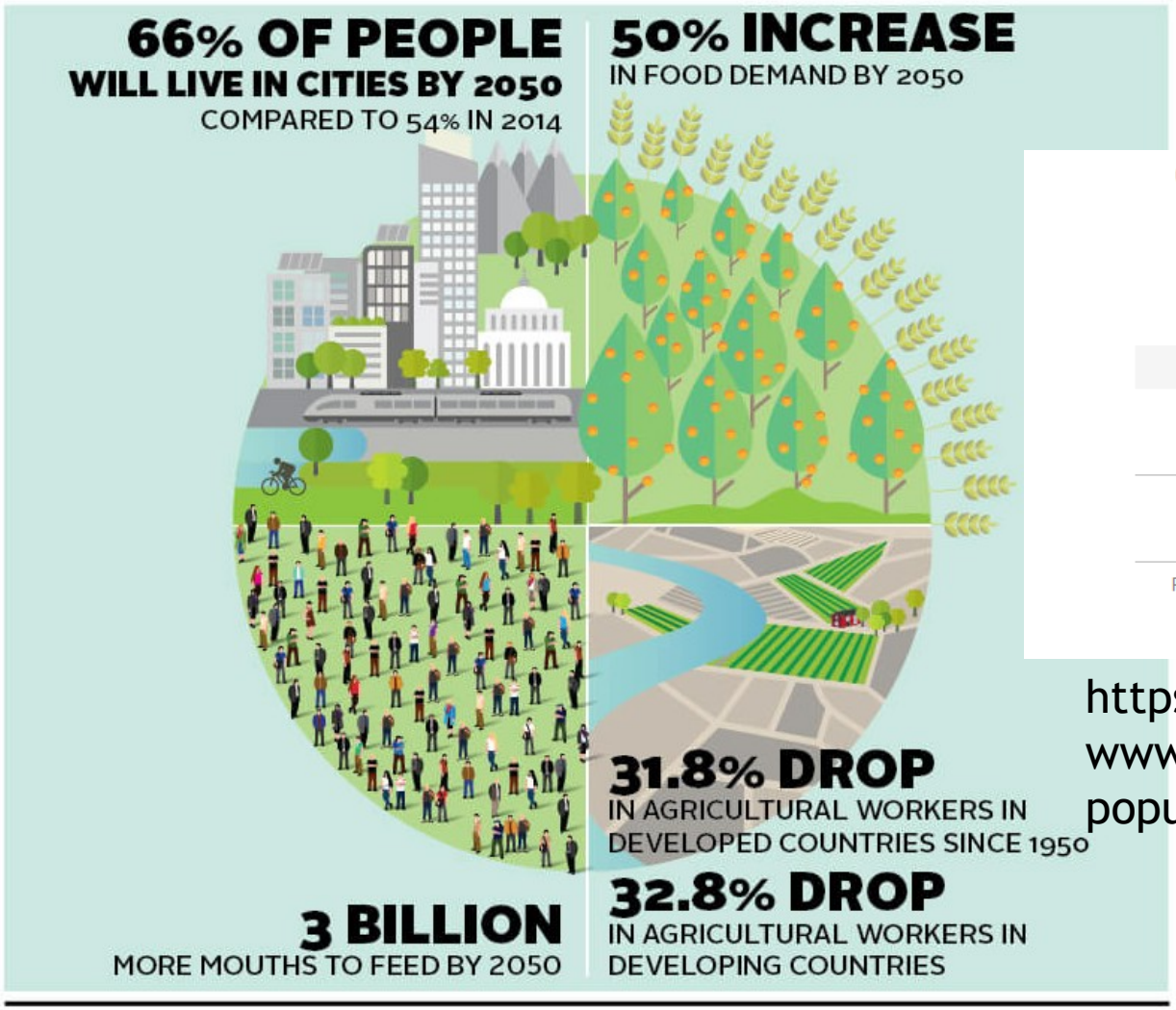
Source: (Amazon, 2020b)

Example: Agriculture

https://www.gsb.stanford.edu/insights/future-food

CONFLATING TRENDS

SEVERAL TRENDS ARE PUSHING AG-TECH FORWARD



SOURCE: FAO

Current World Population

7,905,153,858

view all people on 1 page >

TODAY		THIS YEAR	
Births today	262,636	Births this year	119,223,851
Deaths today	110,261	Deaths this year	50,053,029
Population Growth today	152,375	Population Growth this year	69,170,822

https://www.worldometers.info/world-population/

Changing Needs: World's Food System Desperate for an Overhaul

- By 2050
  - 2 billion more mouths to feed than it does today,
  - demand for food will rise by 50%
  - more people will live in cities, much farther from the traditional source of food — rural farms
- Compounding problems:
  - climate change will put more demands on how food is grown
  - fewer people will work in farming industry.
- Technology
  - "internet-connected world"
  - create a more productive, efficient, sustainable, and resilient food system

Josef Schmidhuber (Deputy director of trade and markets, Food and Agriculture Organization of the United Nations)

- Driverless tractors tilling acres of crops
- Produce growing in massive climate-controlled warehouses
- Seeds genetically altered to require less water
- Experiments: E.g., Smart phone in potato
- Scale: improvements for a relative small number of farmers will help everyone

Using technology

Ref. Mendelson Et al., Stanford Report

nPotato - Concept

- “n” stands for “nociceptive” -- can feel pain
- Hardware: smartphone inside a “potato” shell
- Deep Learning Models for processing of sensory data

Ref. Wolfgang Maass ER 2018
Xidian University

University of Saarsland, Germany

Questions

- What industries are impacted by disruptive technologies?
- Is there a role of data in disruptive technologies?
  - Yes, but varies
- Does a “data-intensive” new technology have the potential to be disruptive?

Managerial Implications

- Many dominant firms have seen their market share evaporate due to the rise of disruptive technologies.
- Disruptive technologies come to market with a set of performance attributes that existing customers do not demand; performance improves over time to the point where new innovations can invade established markets.
- Managers fail to respond to the threat of disruptive technologies, because existing customers are not requesting these innovations and the new innovations would often deliver worse financial performance (lower margins, smaller revenues).
- Firms can improve its monitoring ability to recognize and surface potentially disruptive technologies.
- Piloting a firm through disruptive innovation is extremely difficult.

Ref. John Gallaugher