Innovation for Entrepreneur

Innovation for Entrepreneur

DIN147 (888147) 3(3-0-6)

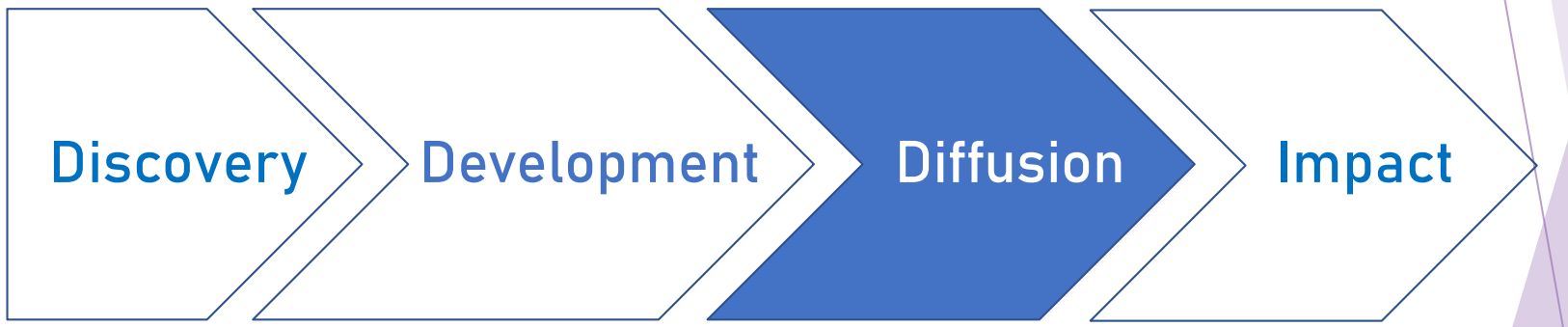
Diffusion

888147 - Innovation for Entrepreneur

Diffusion
Disruptive innovation
economic growth
innovation & society

Diffusion

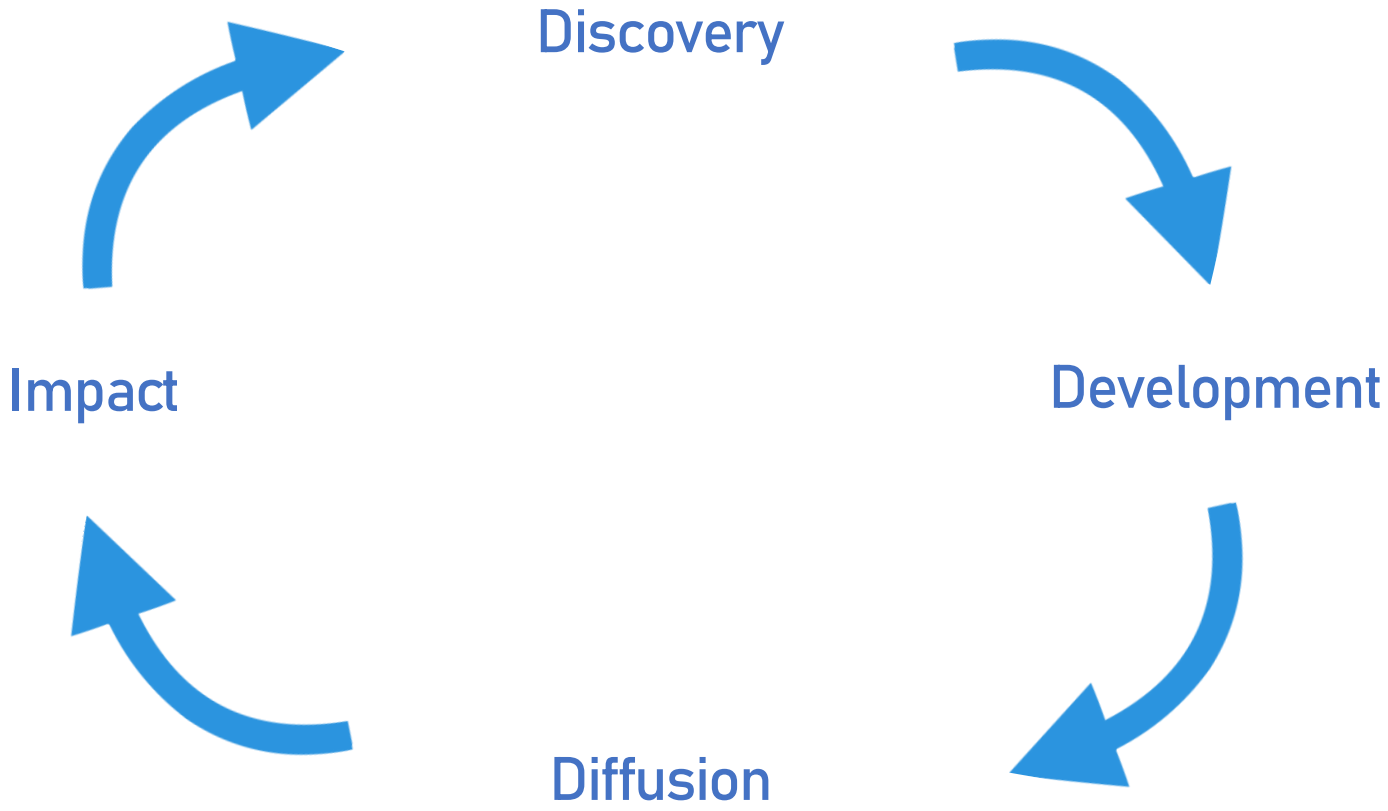
Stages of innovation



Basic stages of innovation

- Diffusion – an innovation spreads across a population of potential users.
- Includes how an innovation is deployed, and how it is assimilated by users

Basic stages of innovation



Innovation

=

Invention/Creativity (newness)

+

Exploitation
(via entrepreneurship)

↓

<u>Sustainable/Scalable</u> Improvement ('value')

Lots of reasons why businesses fail

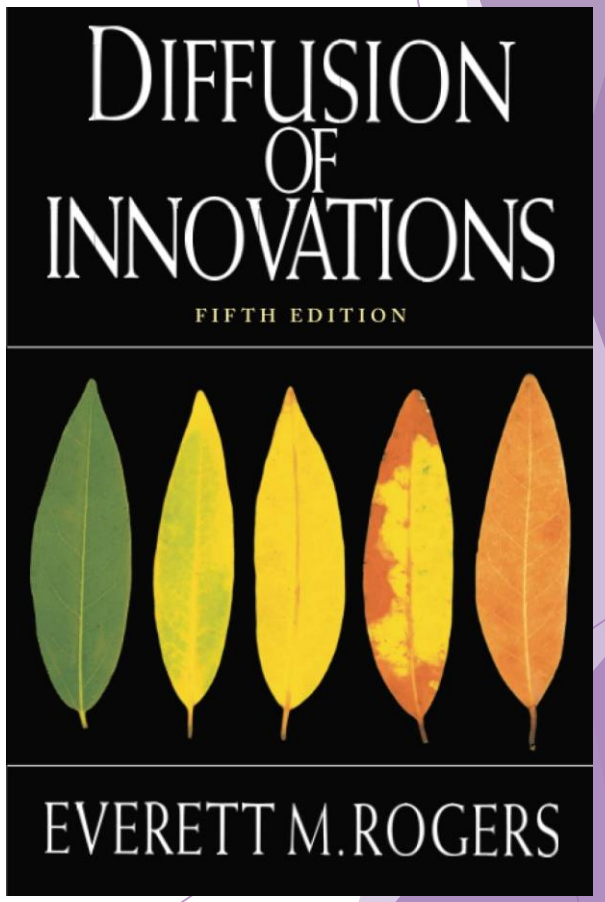
- Bad product/service
- Doesn't really solve a problem/meet a real need
- Not enough customers
- Poor 'execution' (design, delivery, quality)
- Too expensive
- Poor marketing and branding
- Lack of financing etc

…But why do some succeed?

Adoption

Adoption

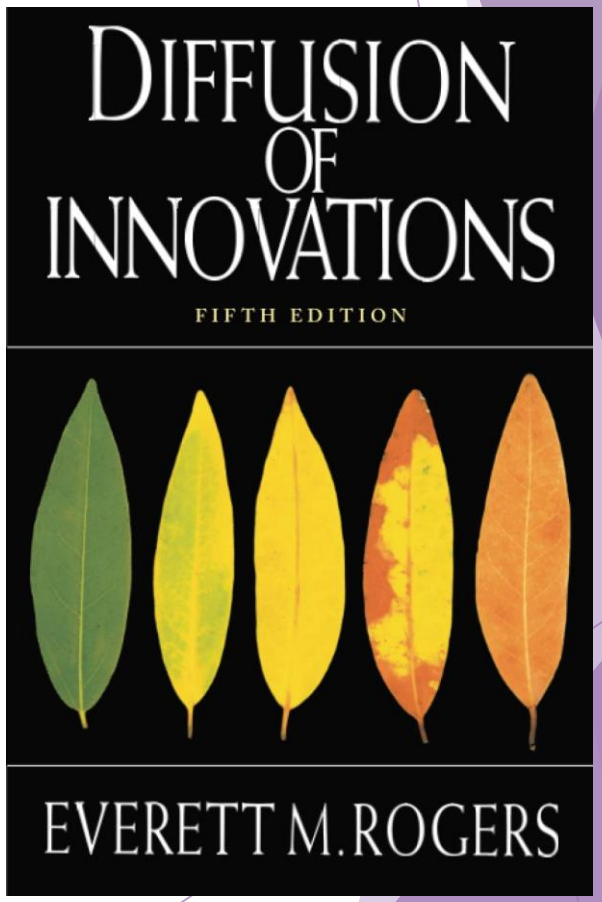
- Can sometimes be decades between invention and widespread use
- People can fall into different categories for different innovations
- Innovations spread through society in an ‘S’ curve – starting off slowly, then spreading much more rapidly until saturation is reached



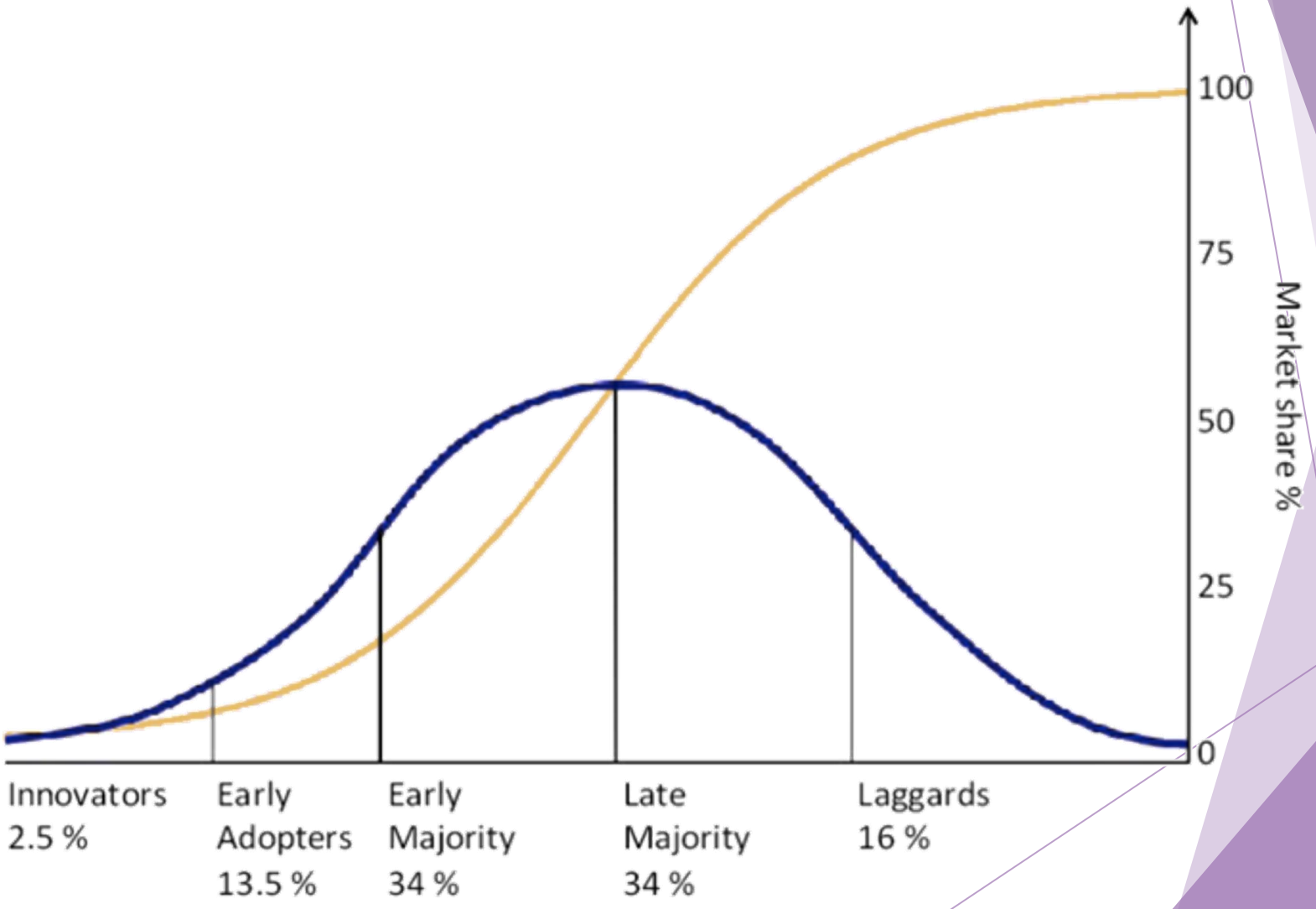
Adoption

- Everett Rogers showed that adopters of an innovation or idea can be categorized as:
  - innovators (2.5%)
  - early adopters (13.5%)
  - early majority (34%)
  - late majority (34%)
  - laggards (16%)

  …roughly fitting a Bell Curve

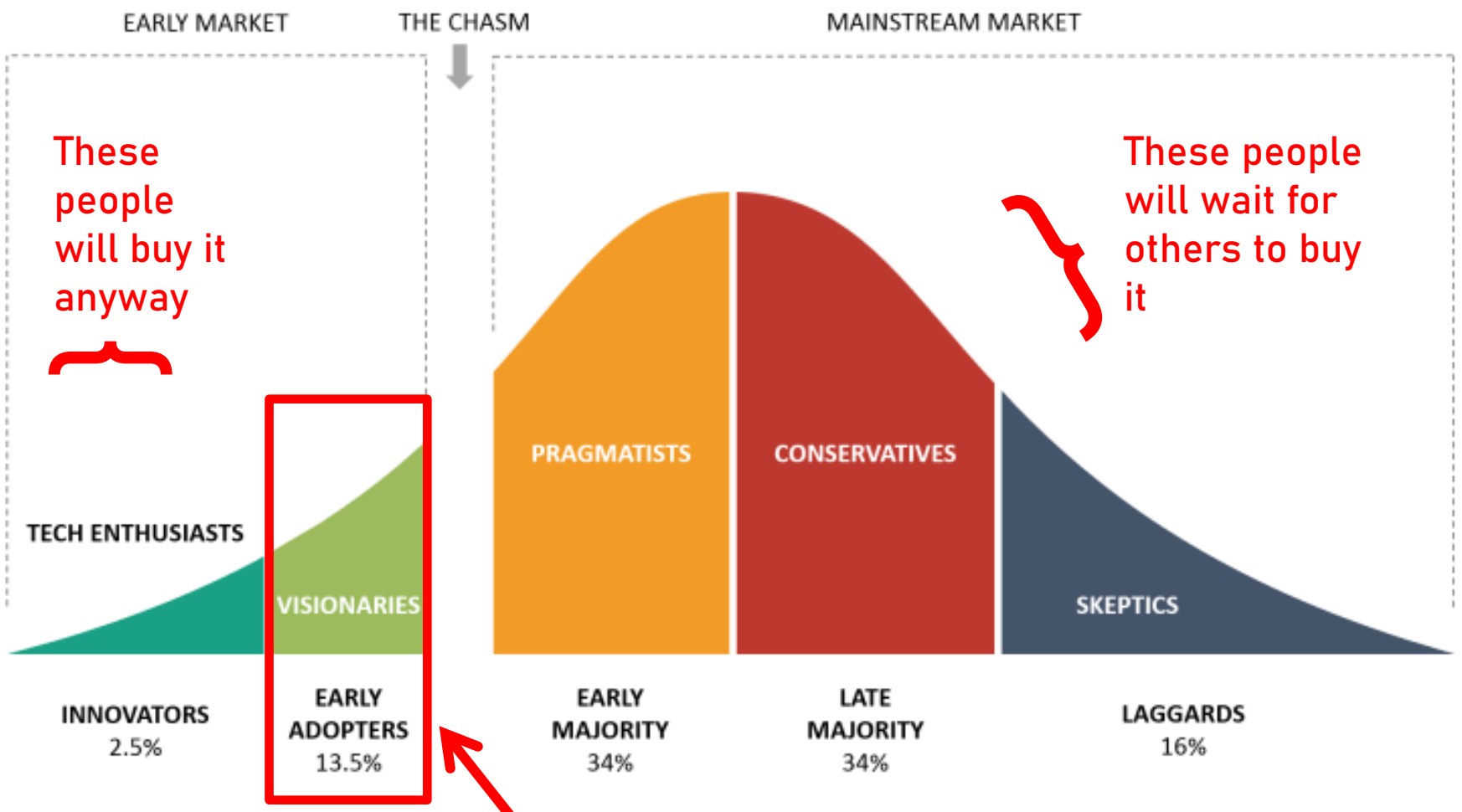


Diffusion


100
75
50
25
0
Market share %
Innovators
2.5 %
Early
Adopters
13.5 %
Early
Majority
34 %
Late
Majority
34 %
Laggards
16 %

Diffusion

The question is, how do you get across this gap?



Sell to these people first

Rate of diffusion

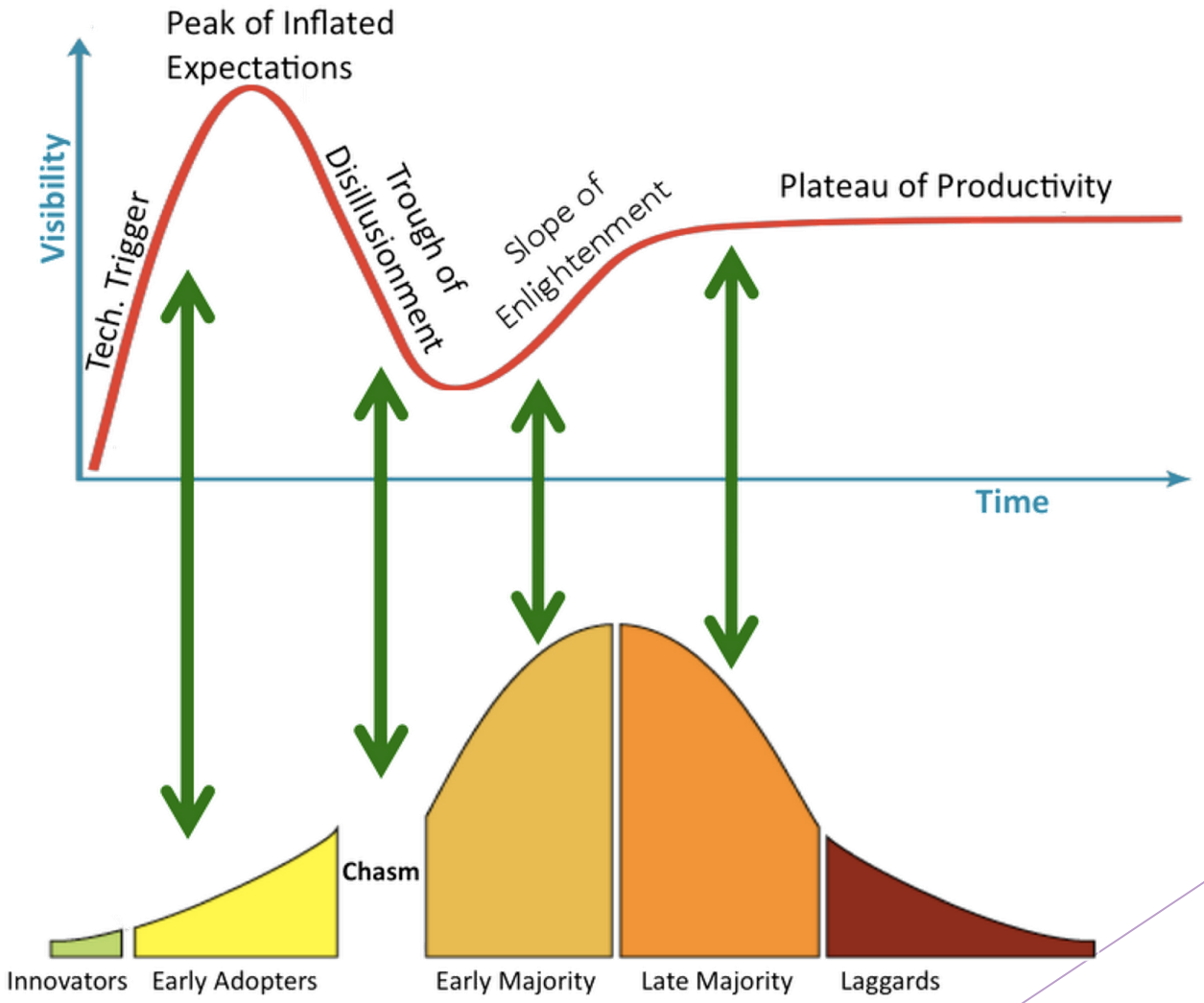
According to Rogers, the rate (speed) of diffusion is highly dependent on:

- The product's advantages or benefits
- The riskiness of purchase
- Ease of product use – complicatedness of the product
- The immediacy of benefits
- Observability – the degree in which the innovation or its results can be seen by others likely to adopt it
- Cost

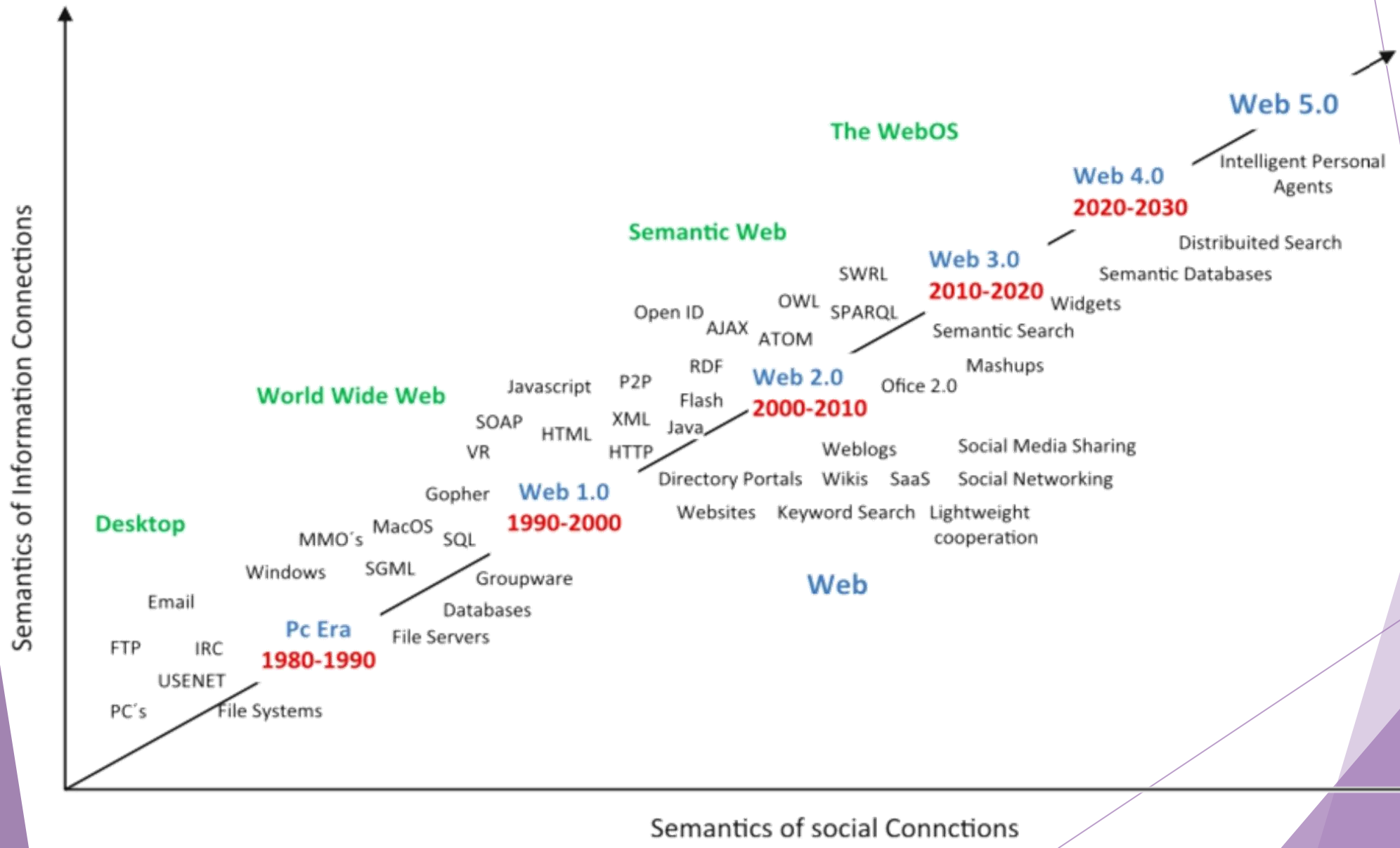
Diffusion often starts at the ‘top’

- For many new products/services, especially newer technologies, adoption starts at the ‘top’ of the market
- The first versions are expensive – more expensive than other options – but (are made to) appeal to higher-end (more demanding) or just wealthier users
- E.g. personal computers, mobile phones, the iPhone, electric vehicles…

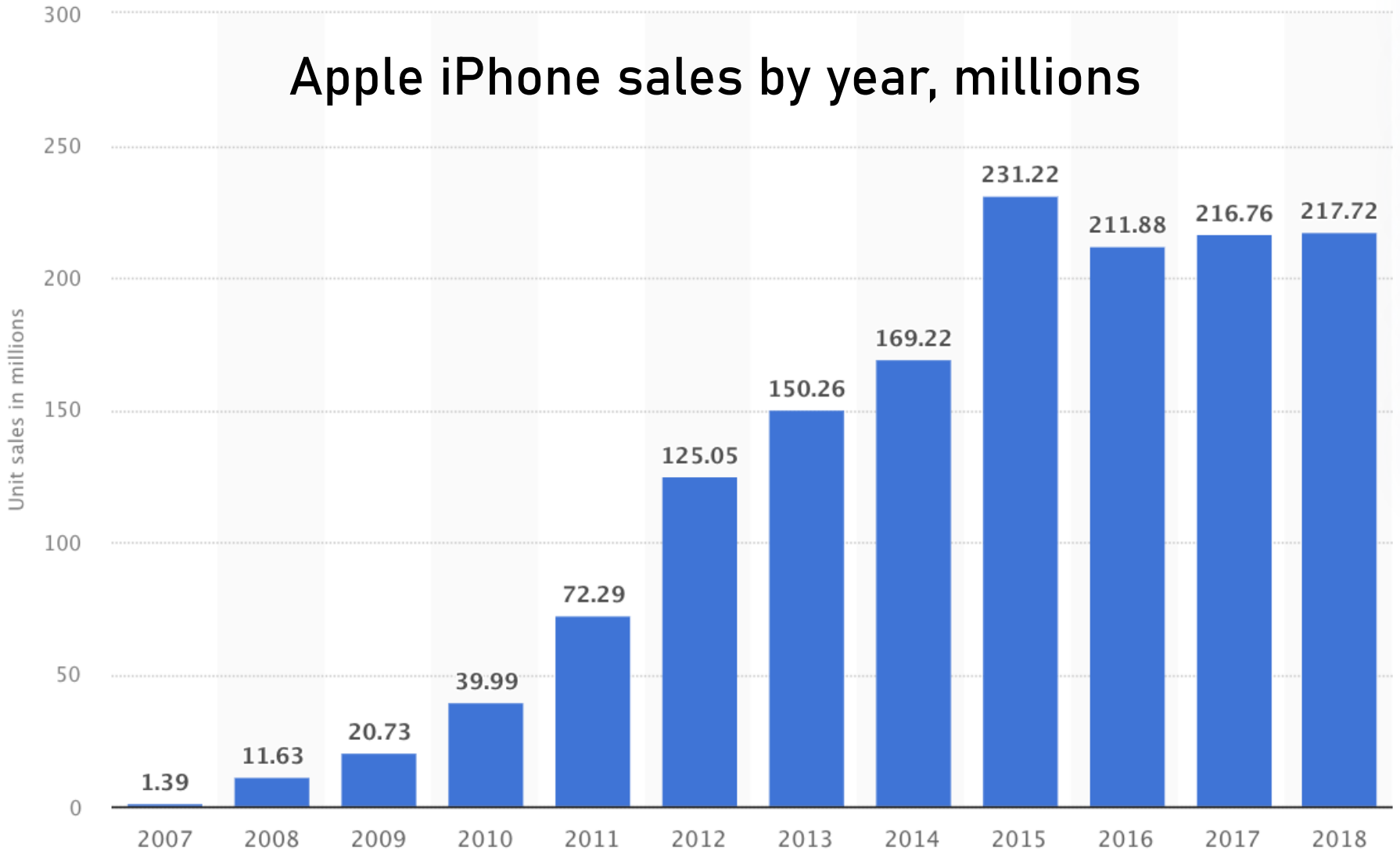
Hype cycle


Peak of Inflated Expectations
Visibility
Tech. Trigger
Disillusionment
Trough of
Slope of Enlightenment
Plateau of Productivity
Time
Chasm
Innovators
Early Adopters
Early Majority
Late Majority
Laggards

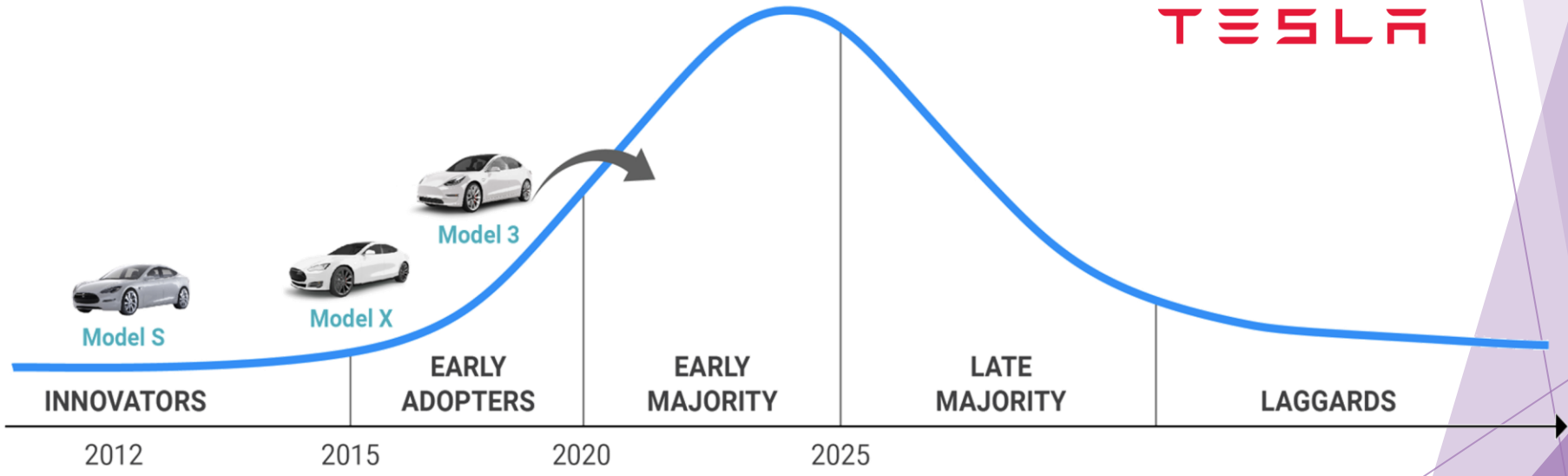
Evolution of World Wide Web



Diffusion

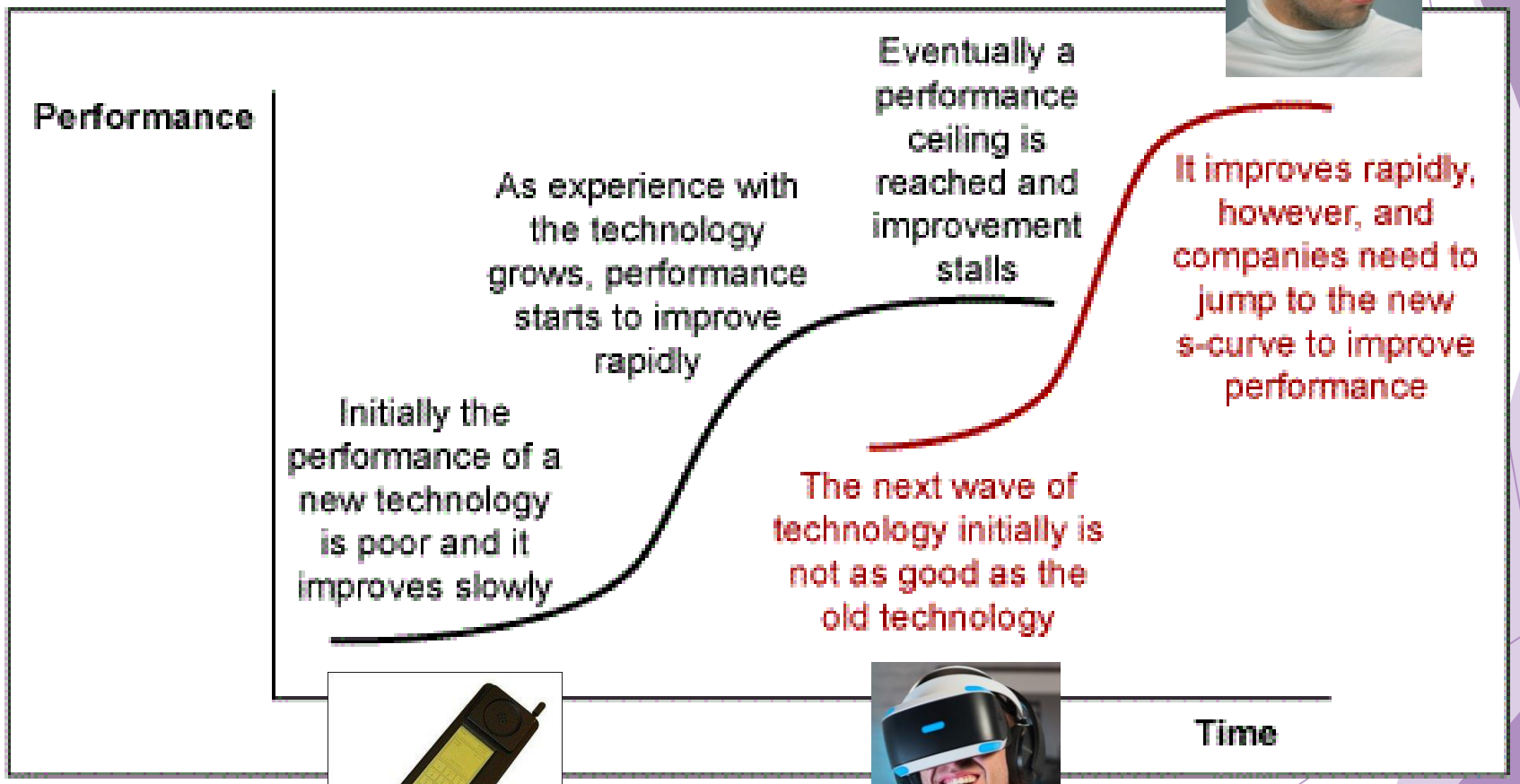

Apple iPhone sales by year, millions
Unit sales in millions
300
250
200
150
100
50
0
1.39
11.63
20.73
39.99
72.29
125.05
150.26
169.22
231.22
211.88
216.76
217.72
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018

Diffusion

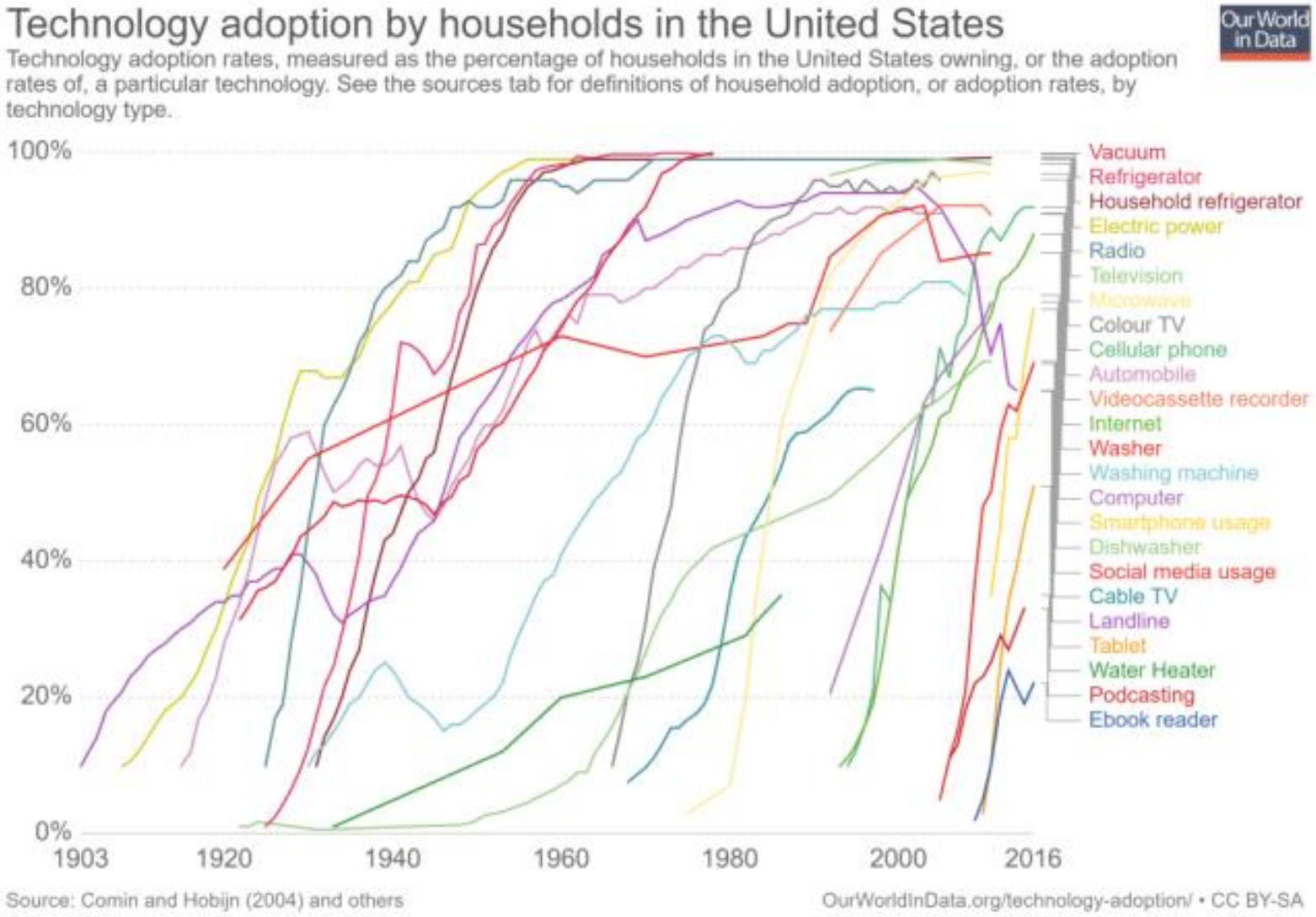

Model S
Model X
Model 3
INNOVATORS
EARLY ADOPTERS
EARLY MAJORITY
LATE MAJORITY
LAGGARDS
2012
2015
2020
2025

Diffusion

14


Performance
Initially the performance of a new technology is poor and it improves slowly
As experience with the technology grows, performance starts to improve rapidly
Eventually a performance ceiling is reached and improvement stalls
The next wave of technology initially is not as good as the old technology
It improves rapidly, however, and companies need to jump to the new s-curve to improve performance
Time

Diffusion


Technology adoption by households in the United States
Technology adoption rates, measured as the percentage of households in the United States owning, or the adoption rates of, a particular technology. See the sources tab for definitions of household adoption, or adoption rates, by technology type.
Our World in Data
100%
80%
60%
40%
20%
0%
1903
1920
1940
1960
1980
2000
2016
Vacuum
Refrigerator
Household refrigerator
Electric power
Radio
Television
Microwave
Colour TV
Cellular phone
Automobile
Videocassette recorder
Internet
Washer
Washing machine
Computer
Smartphone usage
Dishwasher
Social media usage
Cable TV
Landline
Tablet
Water Heater
Podcasting
Ebook reader
Source: Comin and Hobijn (2004) and others
OurWorldInData.org/technology-adoption/ • CC BY-SA

Disruptive Innovation

- Disruptive innovation often works the other way around
- The product/service is adopted at the 'lower' end of the market first and then becomes more popular up the scale
- E.g. transistor radio, low-cost airlines, discount retailers, online learning…

Network effects

- Increased numbers of people or participants improve the value of a good or service, and encourage more providers and complementary products and services
- Examples include: the telephone, the internet, online social networks/social media, e-commerce sites, ride-sharing and delivery services
- Metcalfe's law: the value of a telecommunications network is proportional to the square of the number of connected users of the system

Timing

Product is too early

https://en.wikipedia.org/wiki/MessagePad

Product is too early

https://www.mobilephonemuseum.com/phone-detail/visor

Product is too early

Product is too early

Product is too late

Product is too late

nexus one

nexus S

GALAXY NEXUS

nexus 4

nexus 5

nexus 6

nexus 5X

nexus 6P

Product is too late

iPhone timing

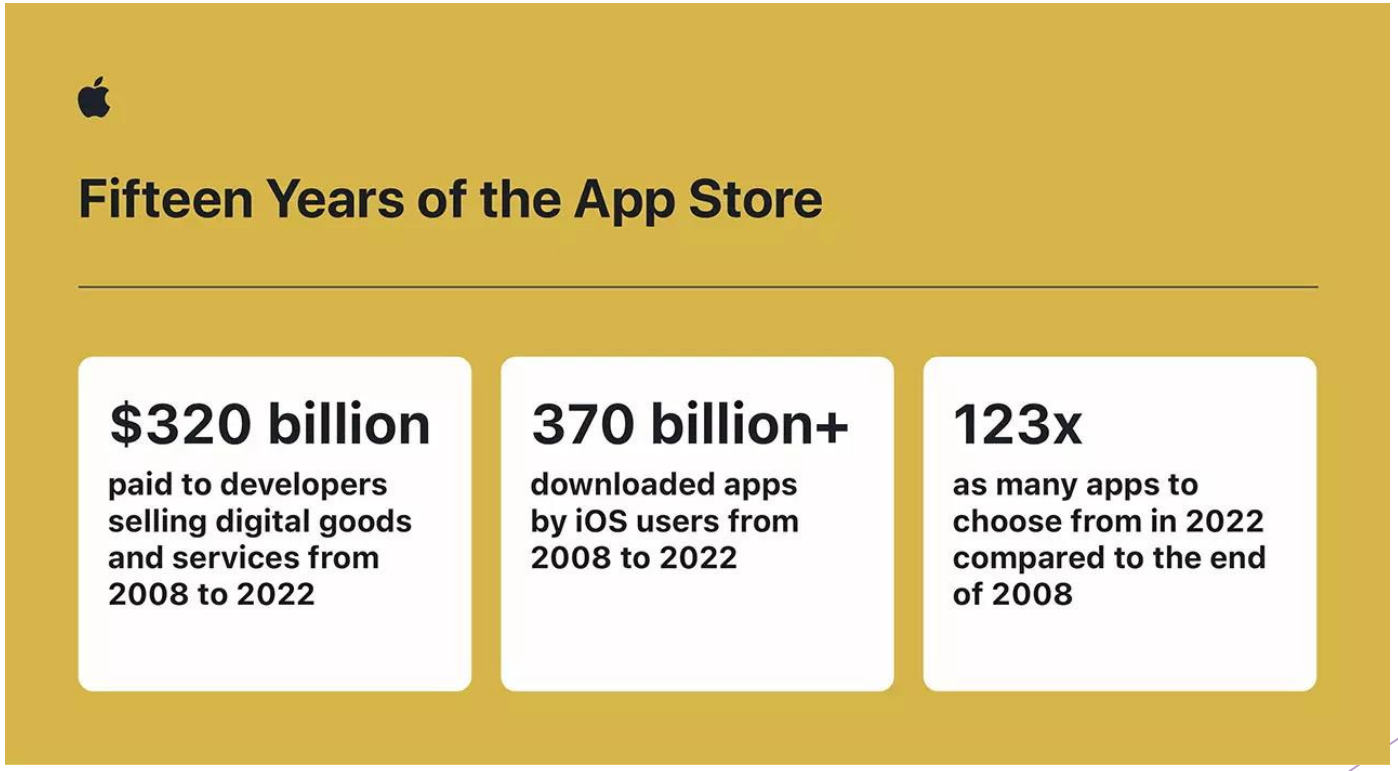
With the iPhone, Apple chose great timing:

- Development of the necessary technology was ready (display screens, miniaturisation/power/efficiency of processors etc)
- Development of mobile telecommunications networks
- Other big technology companies (Microsoft, Google) didn't see the real potential of the mobile internet

But of course, a great product – and some luck – helps

iPhone timing

- Even then, it really needed the Apple App Store to show the possible uses of the product and why ordinary people would want one



Standards

Standards

- Most companies need to cooperate with others to establish standards and create a population of compatible users
- But as soon as the ink is dry on the standards agreement, these same companies shift gears and compete head-to-head for their share of that network

Standards

Standards create new types of markets due to:

- Reduced uncertainty
- Increased network effects
- Reduced consumer lock-in
- Competition for/in the market
- Competition on price vs. features
- Competition to offer proprietary extensions

Standards

- International Telecommunications Union (ITU)
- Institute of Electric and Electronic Engineers (IEEE)
- National Institute of Standards and Technology (NIST)
- Association for Computing Machinery (ACM)
- SIGART (Artificial Intelligence)
- SIGCOMM (Data Communications)
- SIGGRAPH (Computer Graphics)
- SIGIR (Information Retrieval)…

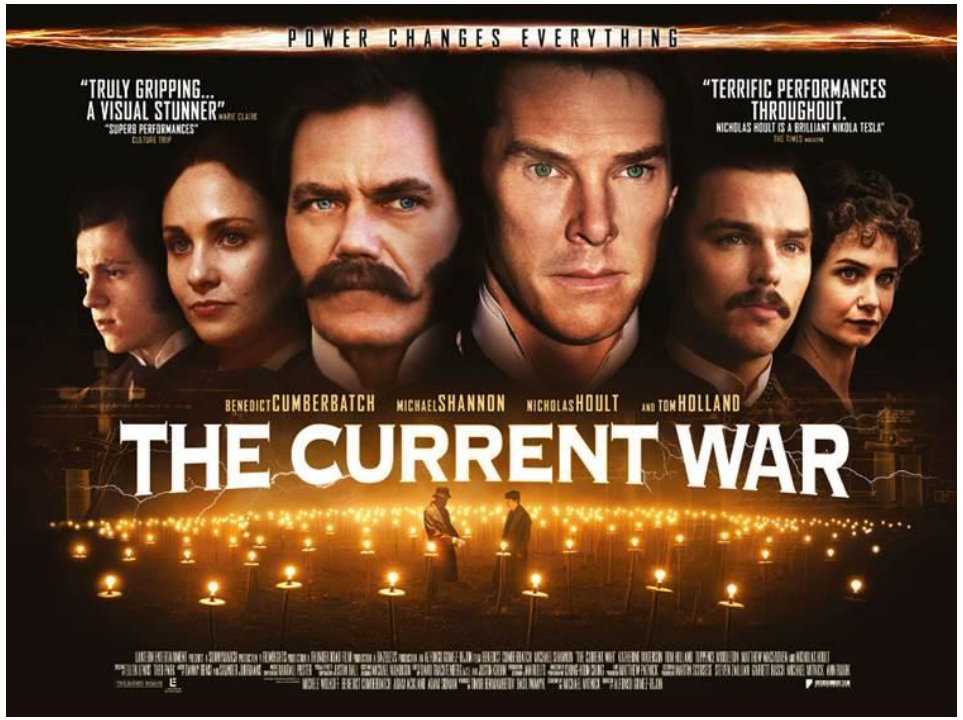
Competitive environment

Electric vs. gasoline cars

- Some of the first cars in the 1880s were electric cars. They were simpler to operate than gas-powered cars, and of course cleaner

- But: the batteries weren't very good and only lasted a few months, and there wasn't the infrastructure of charging stations. The Model—T Ford won the battle to bring cheap motoring to the masses (helped by an electric starter)

‘War of the currents’



- The introduction of competing electric power transmission systems in the late 1880s and early 1890s

- Grew out of two lighting systems developed in the late 1870s and early 1880s: arc lamp street lighting running on high-voltage alternating current (AC), and large-scale low-voltage direct current (DC) indoor incandescent lighting being marketed by Thomas Edison’s company (AC eventually won)

VHS vs. Betamax

- For many people, Sony's Betamax video cassette format was better (picture quality, longer running time). It was also on the market first. But Sony charged more money for other companies to use its format.
- JVC's VHS format was cheaper, which led to more movies and TV programmes being available on VHS, which meant more consumers – and so VHS won the video format war.

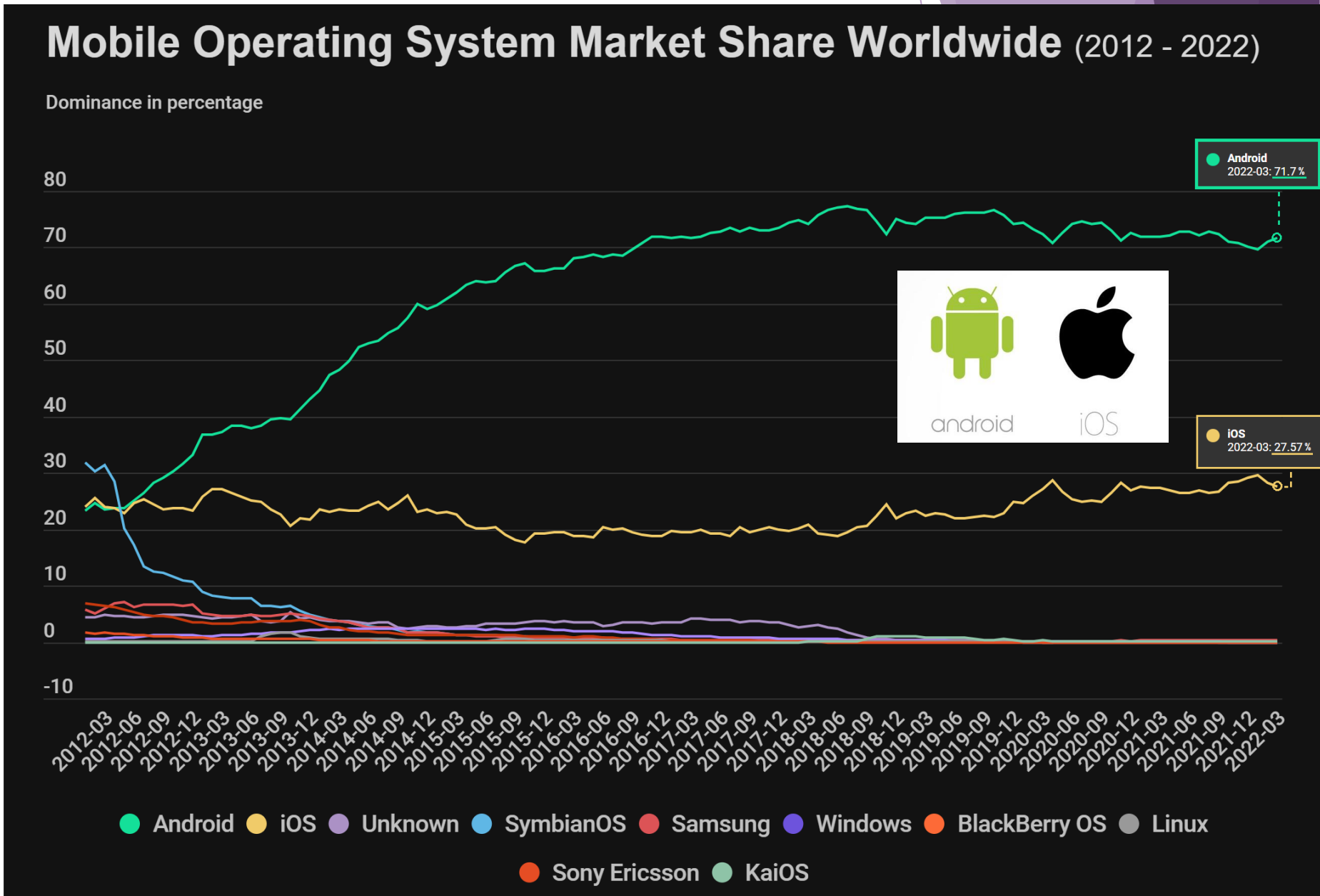
‘Wintel’ vs. everyone else

- In the late 1970s, IBM was dominant in computing. To avoid government scrutiny, it got Intel to build a processor, and Microsoft to create the operating system
- The combination of IBM, Microsoft, and Intel was a big success. By 1983, IBM’s platform was so popular that Compaq decided to clone it. The rise of the ‘clones’ loosened IBM’s grip on the PC market. When Microsoft released the first version of Windows in 1985, hardware had become less important than software

iOS vs. Android vs. Windows

- iOS was developed by Apple as the (exclusive) operating system for its iPhone. Android was originally developed as an operating system for digital cameras. Later it as bought by Google, which made it an open source system that any phone manufacturer could use.

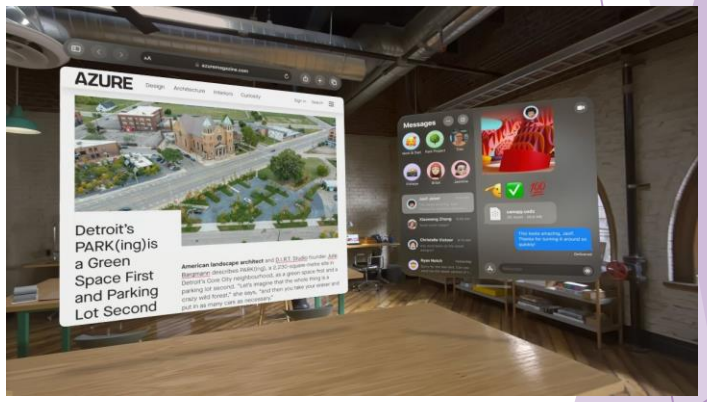
- Android and iOS are now the two dominant mobile operating system platforms.



Blu-ray vs. HD DVD

- But Sony did win the next big (high-definition) video format war. Sony's Blu-ray format was more expensive than Toshiba's HD DVD, but eventually more retailers and movie studios supported its format.
- It also helped a lot that Sony owned Columbia Pictures (now Sony Pictures) movie studio, and included a Blu-ray player in its PlayStation 3 videogame console.

Metaverse – Meta vs. Apple?



- Perhaps the next big format war will again be Apple vs. 'everyone else' for the operating system for the metaverse (virtual and augmented reality).

- Apple has developed its visionOS system for its new Vision Pro headset. Meta (Facebook) has used an Android based system for its Oculus headsets (it was working on its own operating system, but has scrapped this).

Business environment

Infrastructure

- Some innovations – e.g. electric cars – require an extensive infrastructure for people to be more confident in buying them, e.g. the charging network
- The problem is, companies can be reluctant to invest in this infrastructure unless they see that the demand is there…
- …which it isn't, until customers see that the infrastructure is there

Infrastructure

- ‘Technological lock-in’ – when infrastructure or other factors effectively makes it very difficult to use another (better) technology

- ‘Path dependency’ – explains the continued use of a product or practice based on historical preference or use (even if better alternatives are potentially available)

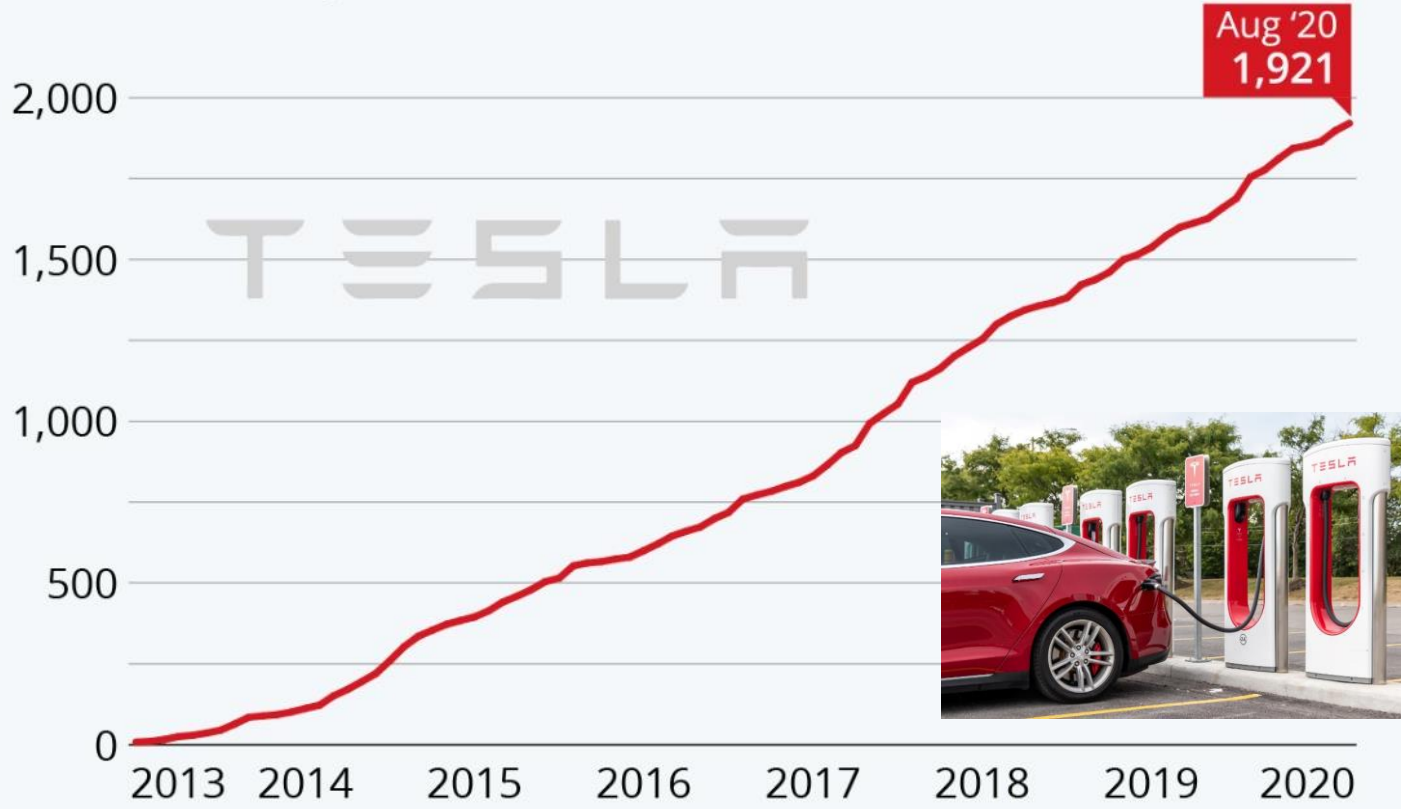
Infrastructure

TESLA

SUPERCHARGER

The Growth Of Tesla's Supercharger Network

Number of active Tesla supercharger stations worldwide by month



Source: Supercharge.info

CC BY NC ND

statista

Social environment

Social norms

- Informal ‘rules’ that govern and shape behavior in groups and societies – collectively held beliefs about what kind of behavior is appropriate in a given situation
- We are social creatures – we tend to follow group behaviors and adapt to our environment
- But these norms can change over time…

Social norms

Would you:

- Get into a stranger's car?
- Stay in a stranger's home?
- Share personal information with strangers?
- Talk to yourself in the street?

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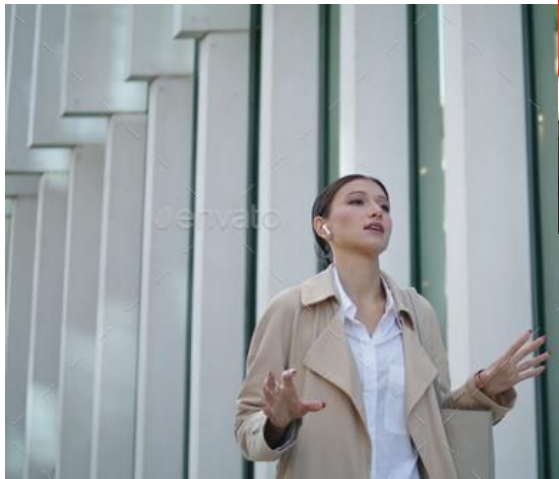
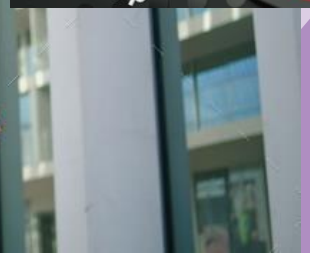
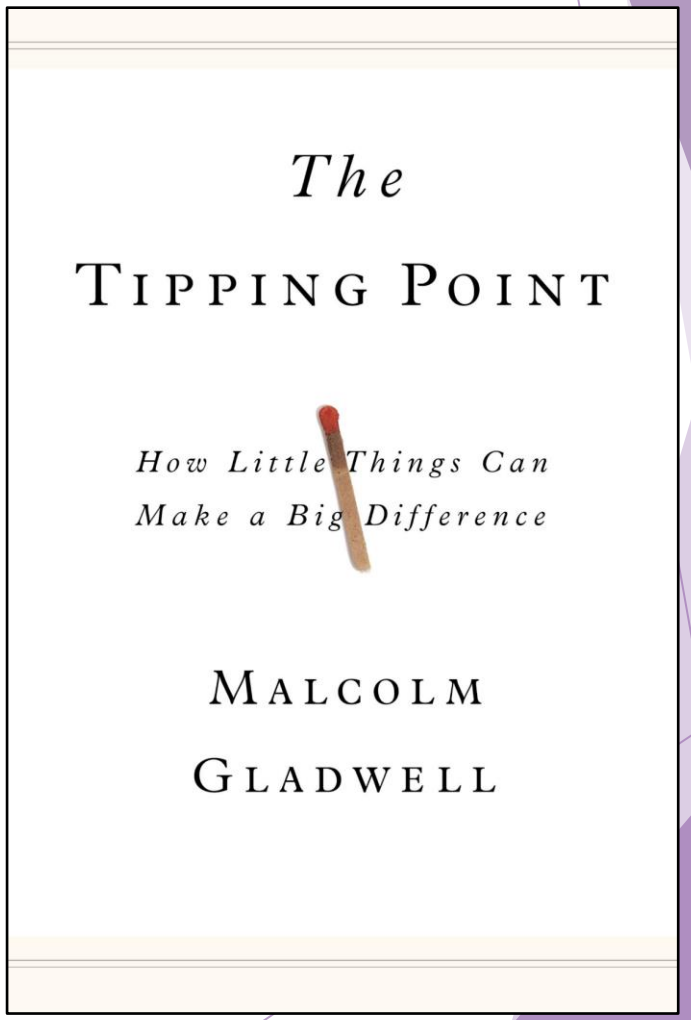




Tipping points

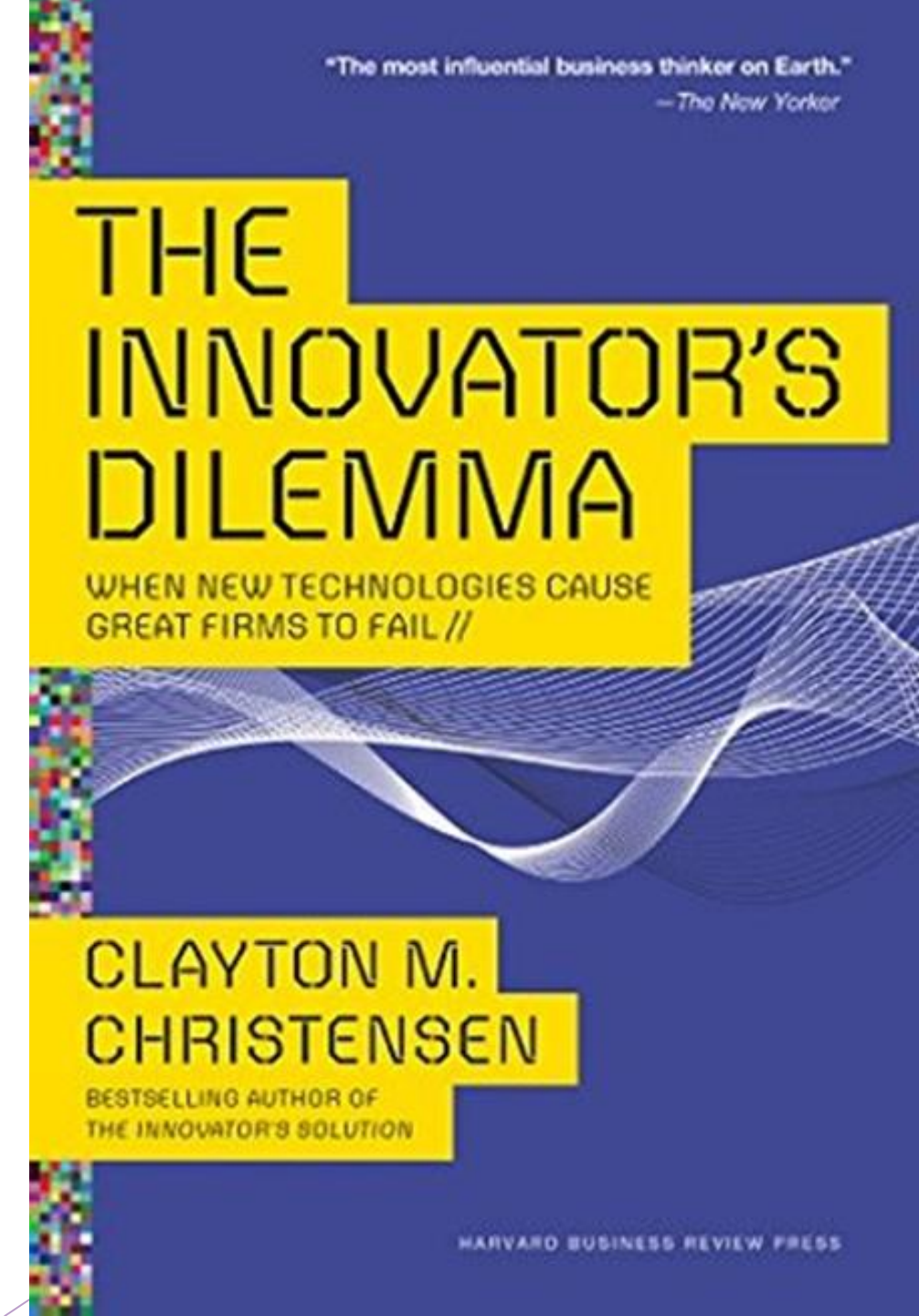
- The tipping point is the moment when an idea, trend, or social behavior crosses a threshold and spreads like wildfire
- Led by people with lots of social connections, or knowledgeable people, or ‘sales people’ – in other words, socially influential people
- The exact figure for a tipping point differs by sector, technology etc – but it can be as low as 10 per cent



Disruptive innovation

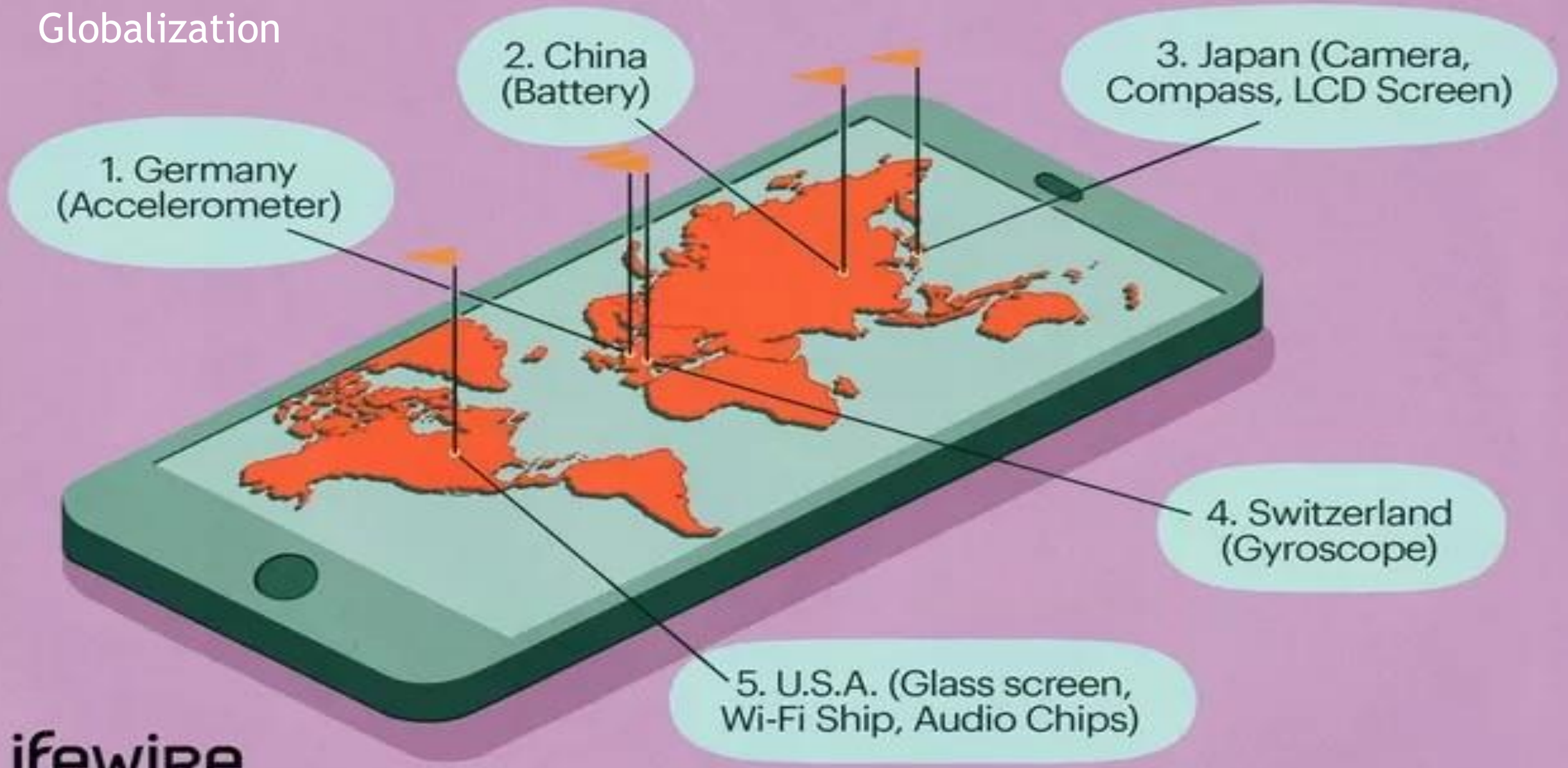
Disruptive innovation

- Disruptive innovation refers to the process of transforming an expensive or highly sophisticated product or service into one that is simpler, more affordable, and more accessible to more people
- Has been called the most influential business idea of the early 21st century



Where Do iPhone Components Come From?

Globalization



Lifewire

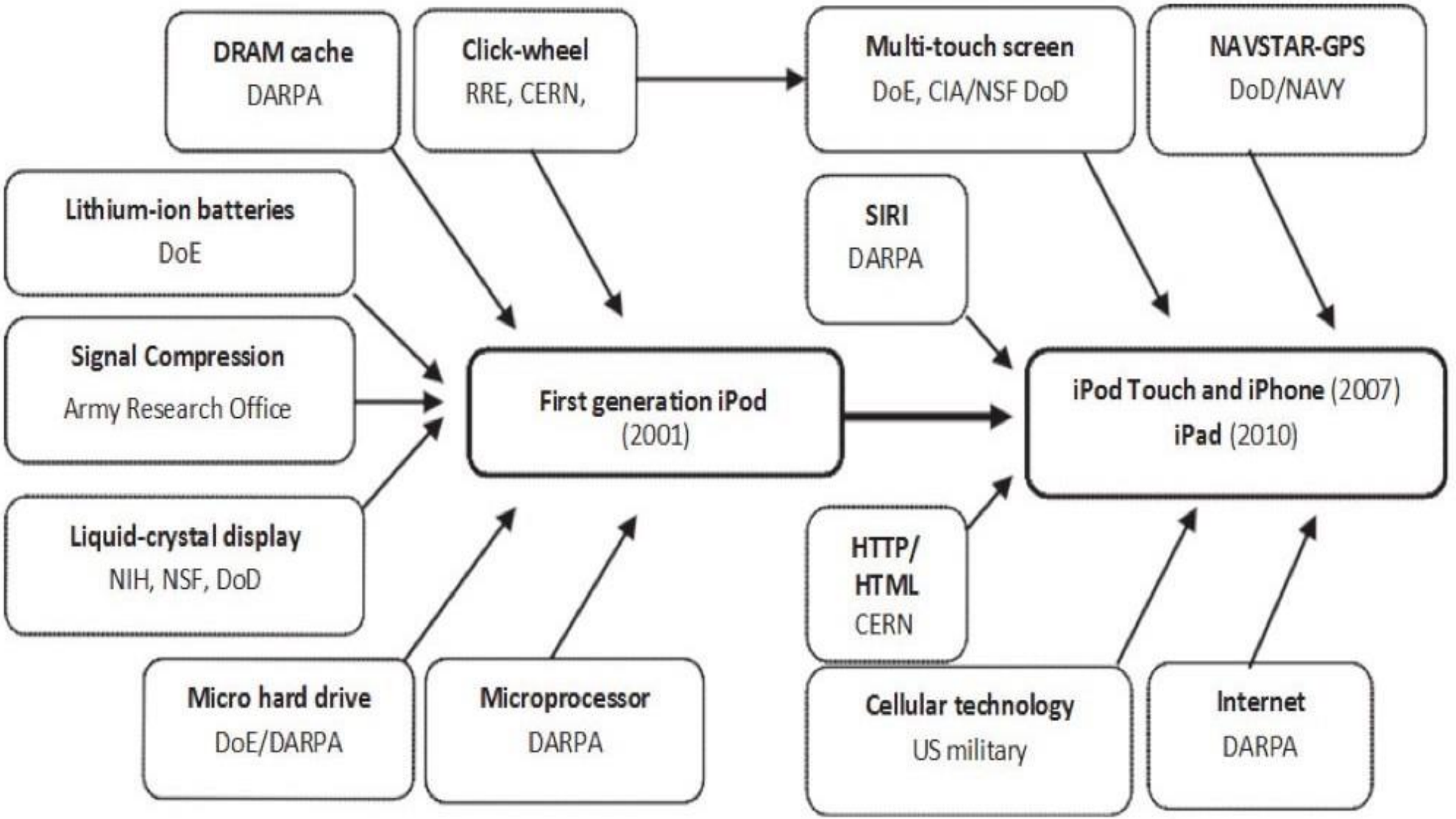


Figure 13 from The Entrepreneurial State: debunking public vs. private sector myths (2015, p. 116)

Challenging the Silicon Valley model of innovation

More investment finance globally

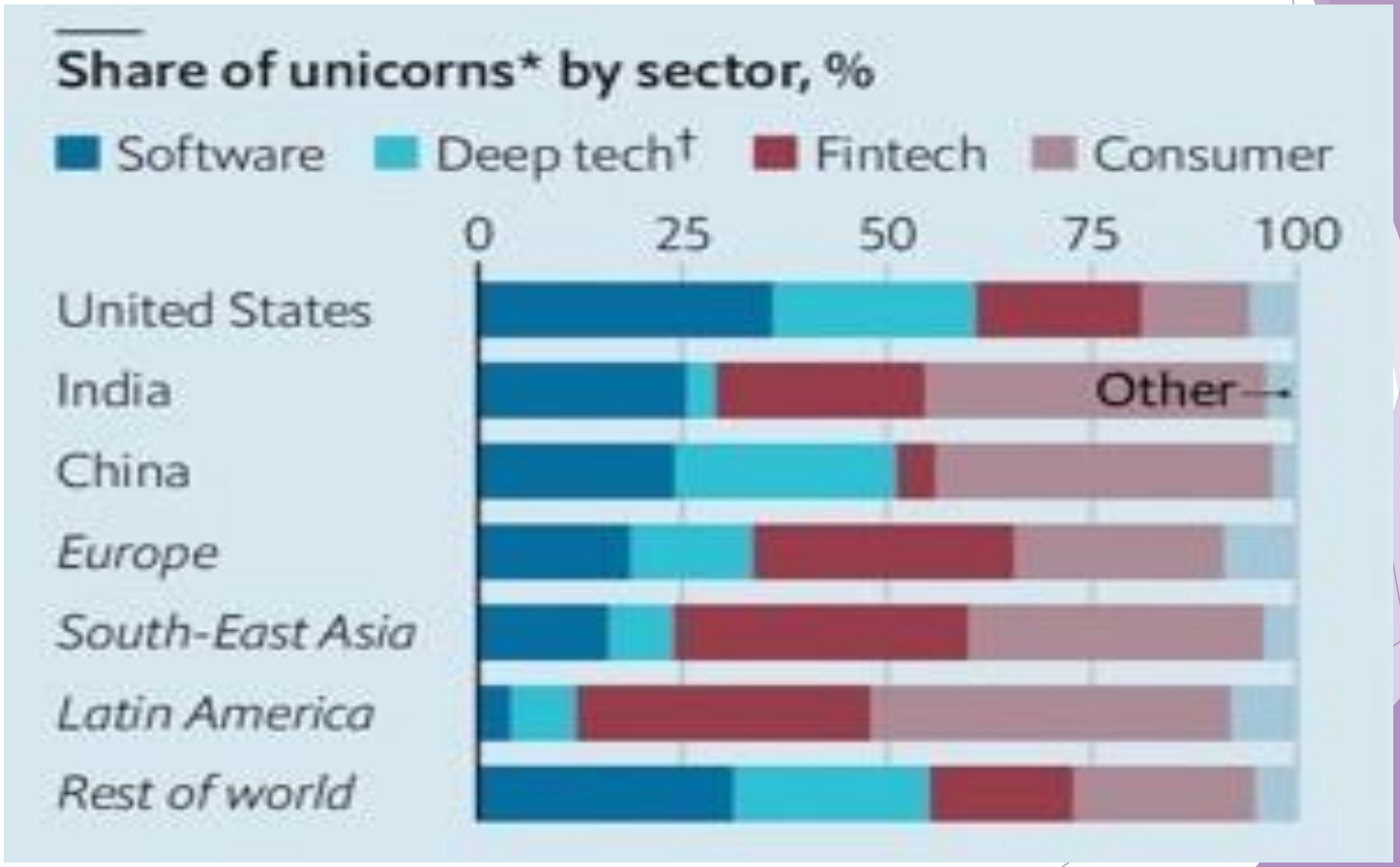
- For decades Silicon Valley's position as the birthplace of high-growth technology companies was unassailable
  – including HP (founded in 1939), Intel (1968), Apple (1976), Google (1998) and Uber (2009)
- As recently as 1999 the Valley attracted a third of global VC investment
- But now, unicorns (privately held start-up companies with a value of over $1 billion) can be found in 45 countries
- There are more than 1,000 globally; nearly half are outside the US
- The share of all VC flowing into American start-ups has declined from 84% two decades ago to less than half now

VC – venture capital

Globalization

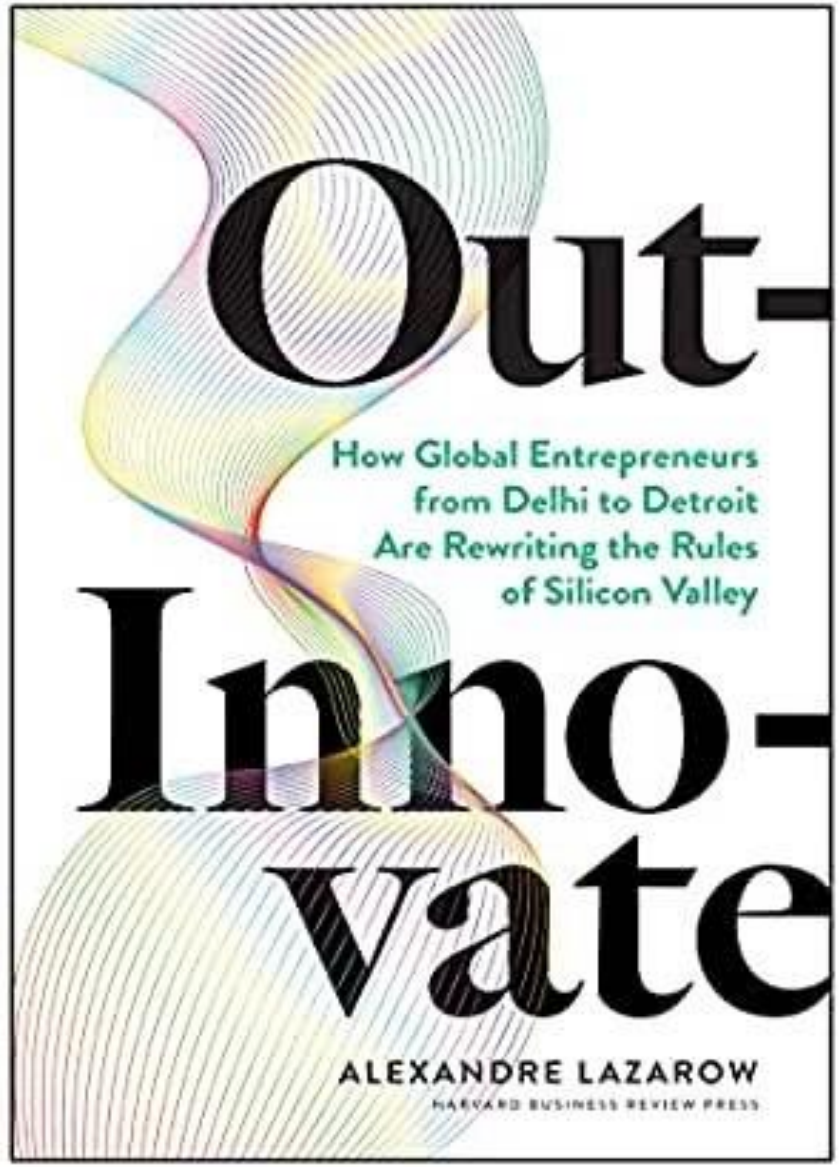
The Economist

More investment finance globally



Innovation from the Global South

- Venture capitalist Alexandre Lazarow writes about companies which begin their lives in ‘frontier markets’ without economic stability or supportive start-up ecosystems
- The companies that launch in frontier markets and scale successfully tend to have different business models and challenges than those in Silicon Valley
- These are organizations that can capitalize on opportunity but also can survive in a drought



More investment finance globally

- Younger innovation hubs tend to have a more regional rather than global focus, e.g. Bengaluru, São Paulo, and Singapore
- they often adapt existing business models to local market conditions
  - eFlipkart (e-commerce) is the Amazon of India;
  - Grab (ride-hailing) is the Uber of South-East Asia
- helped by:
  - the spread of high-speed internet and smartphones
  - cloud computing and freely available developer tools
  - venture capitalists are looking elsewhere for their ‘next big bet’

Developing products for new markets

P&G's leaders recognized that the kind of growth the company was after couldn't come from simply doing more of the same.
It needed to come up with more breakthrough innovations — ones that could create completely new markets.

- Ethnographic research showed that about 80% of consumers in India wash their clothes by hand.
- They had to choose between detergents that were relatively gentle on the skin but not very good at actually cleaning clothes, and more-potent but harsher agents.
- In 2009, a P&G team came up with Tide Naturals, which cleaned well without causing irritation.
- Mindful of the need in emerging markets to provide greater benefit at lower cost, P&G priced Tide Naturals 30% below comparably effective but harsher products.
- This made the Tide brand accessible to 70% of Indian consumers and has helped to significantly increase Tide's share in India.

Frugal innovation

Unilever packages its washing detergents, shampoos etc in smaller single use sachets that consumers in developing and emerging markets can afford to buy, rather than bottles that could cost the equivalent of a week's wages or more. But in the wake of the Global Financial Crisis, this also proved popular in many countries in Europe.

Disruptive innovation

Typically:

- Fewer features (easier to use)
- Less choice/flexibility
- Lower quality
- Cheaper
- Gets the job done (good enough)
- Can be bought and used by more people
- Creates a new market or expands the existing market

- Can be difficult for existing businesses to replicate

Low-cost carriers (LCCs)

Low-cost airlines offer less services (no free food or drink, no free checked bags etc)

But cheaper flights means more people can afford to travel

- Densification of seats
- Electronic ticketing
- Dynamic (demand-led) pricing
- Removal and charging for ancillary services (free meals, seat allocation etc)
- Multiple flights per plane per day, quick turnarounds, maximizing plane usage

- Use of single (new, more efficient) plane type to reduce training and maintenance costs
- Previously under-served short- and medium-length routes
- Preference for secondary uncongested airports
- Point-to-point (P2P) routes, elimination of connecting flights

Frugal innovation

For example, millions of people in Africa rely on M-PESA, a service that enables them to save, spend, and transfer money using their cell phones without having a bank account

Frugal innovation

SELCO

Or SELCO, which provides solar energy at very low prices to over 125,000 households in remote Indian villages, debunking the myth that poor people can’t afford clean technology

INNOVATION

Student Inventor's Cheap, Portable Baby Incubator Wins Dyson Award

An innovative way to take care of premature babies in places with inadequate medical care has won a young inventor this year's Dyson Award.

https://www.nbcnews.com/tech/innovation/student-inventors-cheap-portable-baby-incubator-wins-dyson-award-n241251

Thank you!

any questions?