INNOVATION & INDUSTRY LIFE CYCLES

INTRODUCTION TO BUSINESS 2019-2020

SESSION 2

Marc Goldchstein, October 7 2019

INNOVATION DYNAMICS

Creative destruction

Innovation typologies

Life cycles dynamics in business ecosystems

INNOVATION
DYNAMICS

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CREATIVE DESTRUCTION

THE ESSENCE OF FREE MARKET ECONOMICS

- **Capitalism is an evolutionary process**; capitalism never can be stationary.
- **The fundamental impulse comes from the new** consumers' goods, the new methods of production or transportation, the new markets, the new forms of industrial organization that capitalist enterprise creates.
- These incessantly revolutionize the economic structure from within, incessantly destroying the old one, incessantly creating a new one.
- **Creative destruction is the essential fact about capitalism**. It is what capitalism consists in and what every capitalist concern has got to live in.

Joseph Alois Schumpeter: Capitalism, socialism and democracy (1942)

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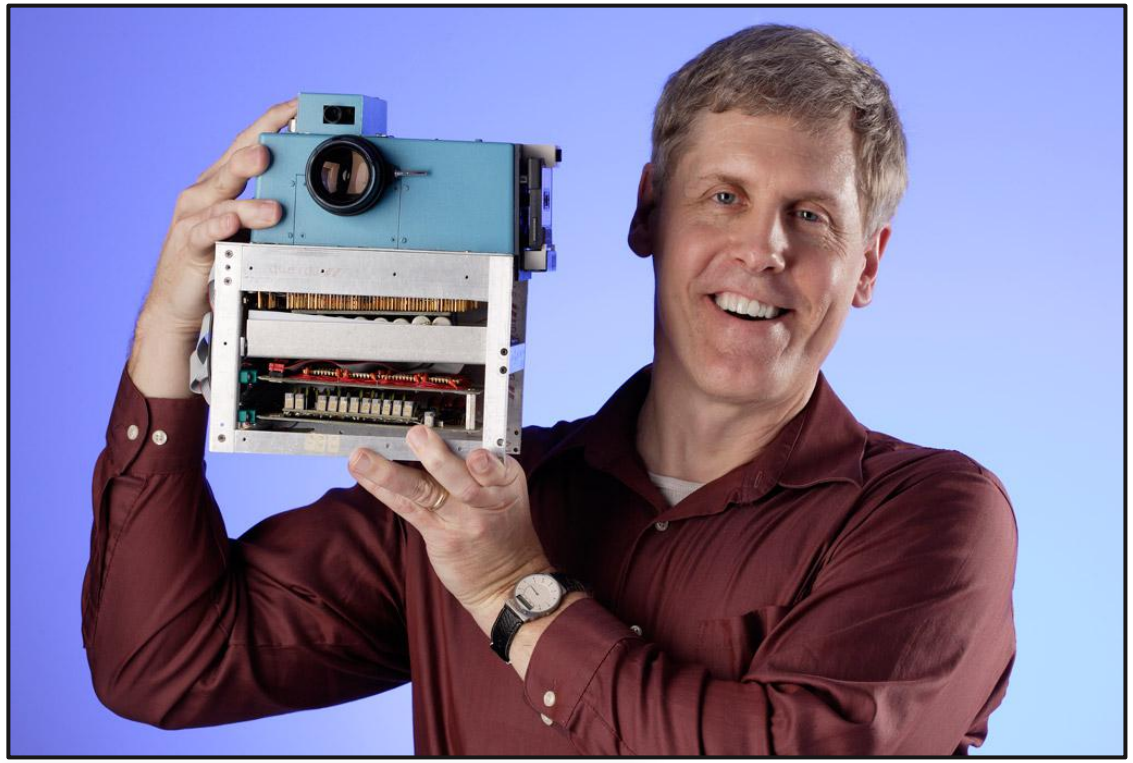


United States Patent [19]
Lloyd et al.

[54] ELECTRONIC STILL CAMERA

[75] Inventors: Gareth A. Lloyd; Steven J. Sasson, both of Rochester, N.Y.

[73] Assignee: Eastman Kodak Company, Rochester, N.Y.

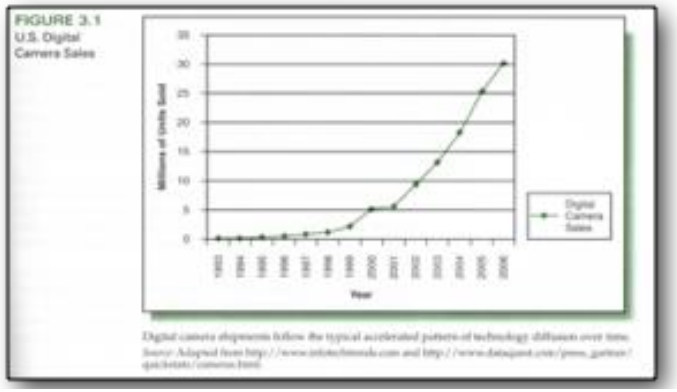
[21] Appl. No.: 798,956

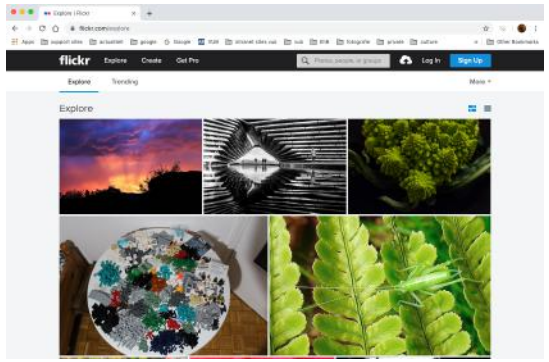
[22] Filed: May 20, 1977

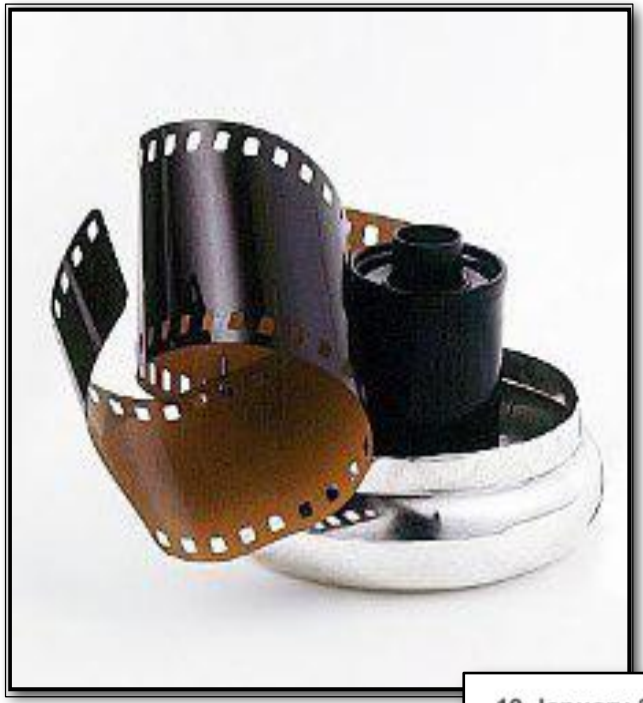
[51] Int. Cl.[2] H04N 5/79

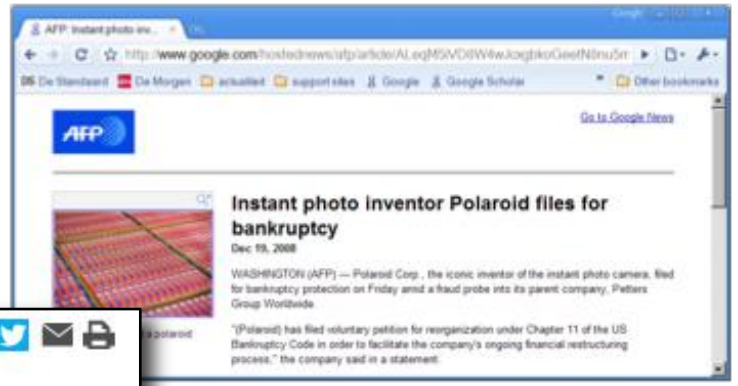
[52] U.S. Cl. 360/9; 360/35; 358/127; 358/134; 358/213

[58] Field of Search ..... 360/9, 10, 8, 35, 33; 179/2 TV; 358/127, 134, 213, 85, 133, 78









19 January 2012 Last updated at 21:22 GMT

Share

Eastman Kodak files for bankruptcy protection

Eastman Kodak, the company that invented the hand-held camera, has filed for bankruptcy protection.

The move gives the company time to reorganise itself without facing its creditors, and **Kodak said** that it would mean business as normal for customers.

The company has recently moved away from cameras to focus on making printers, to try to stem its losses.

Kodak's Philip Cullimore says the company has already begun transforming itself.

Polaroid

AGFA

Kodak

SPECTOP

CREATIVE DESTRUCTION

OOPS…

Technology	Quote	Person
Phonograph	The phonograph . . . is not of any commercial value.	Thomas Alva Edison, inventor of the phonograph, 1880
Airplane	Heavier-than-air flying machines are impossible.	Lord Kelvin, British mathematician, physicist, and President of the British Royal Society, 1895
Computer	I think there is a world market for about five computers.	Thomas J. Watson, Chairman of IBM, 1943
Personal Computer	There is no reason for any individual to have a computer in their home.	Ken Olson, President of Digital Equipment Corporation, 1977
Telephone	The "telephone" has too many shortcomings to be seriously considered as a means of communication. The device is inherently of no value to us.	Western Union internal memo, 1876
Television	Television won't be able to hold on to any market it captures after the first six months. People will soon get tired of staring at a plywood box every night.	Darryl Zanuck, Head of 20th Century Fox Films, 1946
Movies with Sound	Who the hell wants to hear actors talk?	Harry M. Warner, 1927

Sources: Adapted from Schoemaker, P., and V. Mavaddat. 2000. Scenario planning for disruptive technologies. In G. Day and P. Shoemaker (eds.) *Wharton on Emerging Technologies*. New York: John Wiley; and Mohr, J., S. Sengupta, and S. Slater. 2005. *Marketing of High Technology Products and Innovations* (2nd edition). Upper Saddle River, NJ: Prentice Hall.

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INNOVATION
DYNAMICS

Creative destruction

Innovation typologies

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INNOVATION AND INVENTION

- An distinction is made between invention and innovation (Fagerberg, 2003).
  - Invention is the **first occurrence** of an idea for a new product or process.
  - Innovation is the **first commercialization** of the idea.
- Sometimes invention and innovation are closely linked, even hard to distinguish one from another (e.g. biotechnology)
- But often there is a considerable **time lag** between the two; several decades is not uncommon (Rogers 1995). This reflects the difference in requirements for working out ideas and carrying them out in practice.
- While inventions may be carried out anywhere including universities, innovations occur mostly in firms.
- To turn an invention into an innovation one needs to combine several different types of knowledge, capabilities, skills and resources: **production knowledge, skills and facilities, market knowledge, distribution system, financial resources and so on**.
- The role of the innovator, e.g., the person or unit responsible for combining the factors necessary (what Joseph Schumpeter called the “entrepreneur”), may be quite different from that of the inventor.

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WHAT CAN CHANGE?

PRODUCT / TECHNOLOGY INNOVATION

- = Changes in the product or technology offering.
- It can be…
  - **New**
    - *Amazon Kindle*
    - *patent on camel antibodies*
  - **Replacement**
    - *CDs replacing vinyl records*
  - **New feature** to an existing product
    - *power windows to a car*
  - **Improvements** over previous
    - *Smartphone camera resolution*
    - *New versions of Windows, IOS,…*
- Easily perceived by the customer

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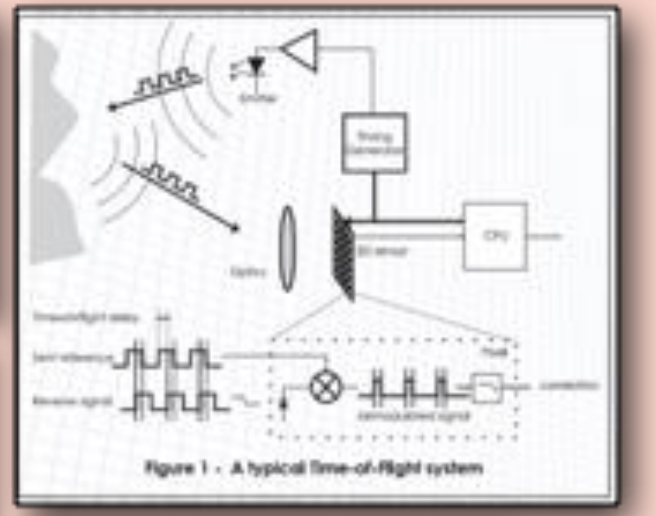

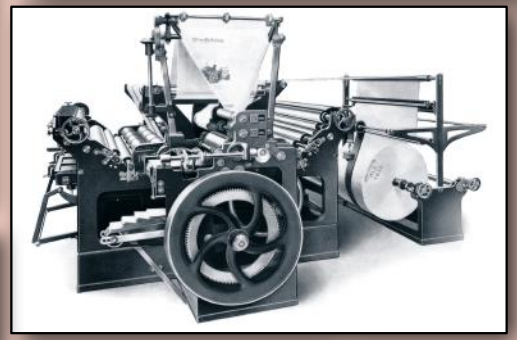

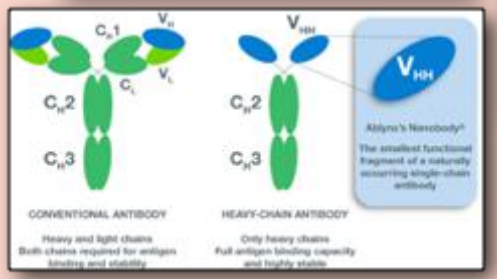

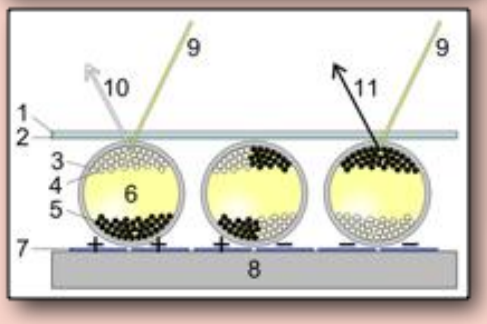

WHAT CAN CHANGE?

PROCESS INNOVATION

- = Changes in the ways in which these offerings are created and delivered; how you use **signature or superior methods** to do your work
- Process innovation can include
  - Changes in manufacturing equipment and technology
  - Changes in supporting software
  - Improvement in tools and techniques in supply chain and delivery system
  - Changes in the tools used to sell and maintain your good
  - Changes in accounting and customer services methods
  - …
- Not so easily perceived by the customer. Usually a firm-internal innovation.

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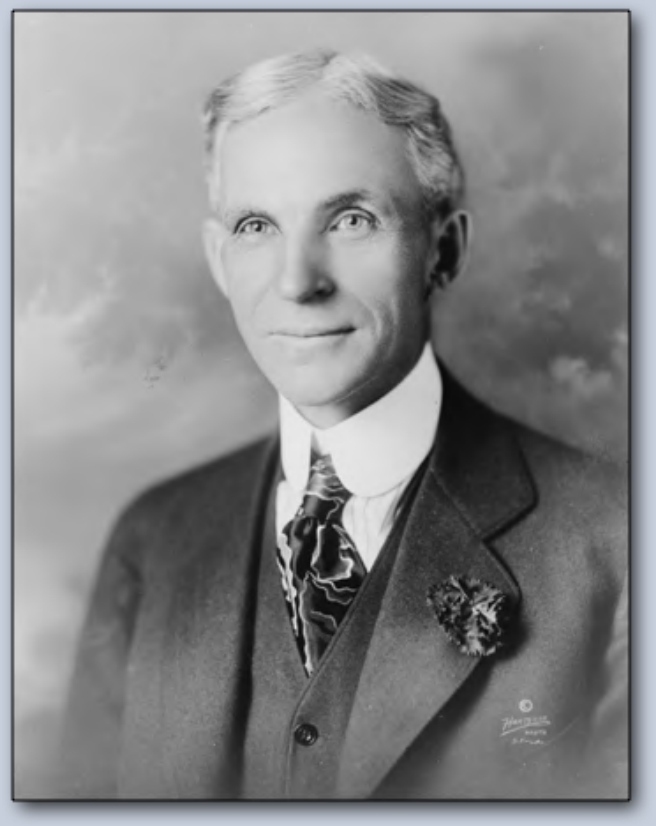
WHAT CAN CHANGE?

PROCESS INNOVATION: THE ASSEMBLY LINE

- **"I will build a car for the great multitude.**
- It will be large enough for the family, but small enough for the individual to run and care for.
- It will be constructed of the best materials, by the best men to be hired, after the simplest designs that modern engineering can devise.
- But it will be so low in price that no man making a good salary will be unable to own one – and enjoy with his family the blessing of hours of pleasure in God's great open spaces."



Henry Ford

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WHAT CAN CHANGE?

PROCESS INNOVATION: THE ASSEMBLY LINE

- **The Model T set 1908 as the historic year that the automobile became popular.**
- It is generally regarded as the **first affordable automobile**, the car that opened travel to the common **middle-class American**
- The Ford Model T was named the world's most influential car of the 20th century in an international poll.
- By 1914 Ford produced more cars than all other automakers combined.
- **By 1918, 50 percent of all cars in the world were Fords.**
- More than 15 million Model T's were manufactured, reaching a rate of 10,000 cars a day in 1925.
- Model T production was finally surpassed by the Volkswagen Beetle

The Model T

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WHAT CAN CHANGE?

PROCESS INNOVATION: THE ASSEMBLY LINE

- **The Model T was the first automobile mass produced on assembly lines with completely interchangeable parts.**
- **Before, a team of craftsmen would create each part of a product and assemble them into the final product,** making cut-and-try changes in the parts until they fit and could work together
- **The assembly line concept was introduced after a visit by an employee to a slaughterhouse and viewing what was referred to as the "disassembly line".** The efficiency of one person removing the same piece over and over caught his attention.

1913 Experimenting with mounting body on Model T chassis. Ford tested various assembly methods to optimize the procedures before permanently installing the equipment. The actual assembly line used an overhead crane to mount the body.

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WHAT CAN CHANGE?

PROCESS INNOVATION: THE ASSEMBLY LINE

- Ford created a massive **publicity machine** in Detroit to ensure every newspaper carried stories and ads about the new product.
- Ford's network of local **dealers** made the car ubiquitous in virtually every city in North America. As independent dealers, the **franchises** grew rich and publicized not just the Ford but the very concept of automobile
- Local **motor clubs** sprang up to help new drivers and to explore the countryside.
- The car was very **simple to drive**, and easy and **cheap to repair**.
- Gas stations, roads...
- By the 1920s, a majority of American drivers had learned to drive on the Model T

Ford and the Whole Product

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WHAT CAN CHANGE?

BUSINESS MODEL INNOVATION

- Business model innovation is **changes in how you make money**
- Business model innovation is value creation by making changes both to the organization's value proposition and to its operating model.
- At the value proposition level changes can be made to:
  - target segments
  - product or service offering
  - revenue model
- And at the operating model level:
  - how to deliver the value proposition
  - how to drive profitability

BCG

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WHAT CAN CHANGE?

BUSINESS MODEL INNOVATION

- Advantage to start-ups
  - Ability to iterate business model rapidly
  - However, large organizations manage to use their customer base and resources to their advantage
- Requires a profound understanding of what customers and users actually cherish and where new revenue opportunities might be found.
- Examples
  - AirBnB
  - Uber
  - Spotify

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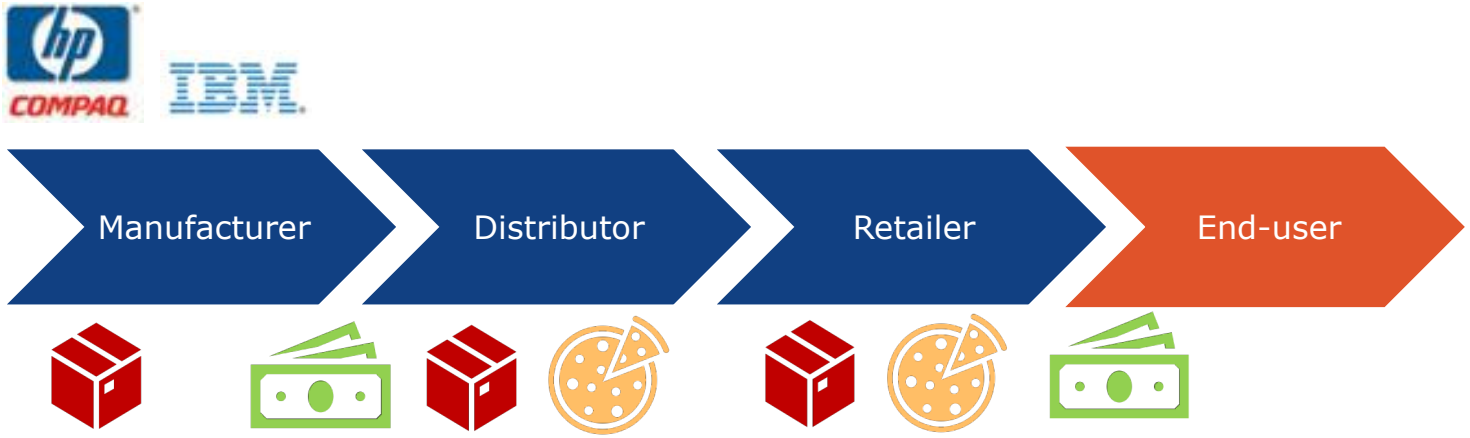
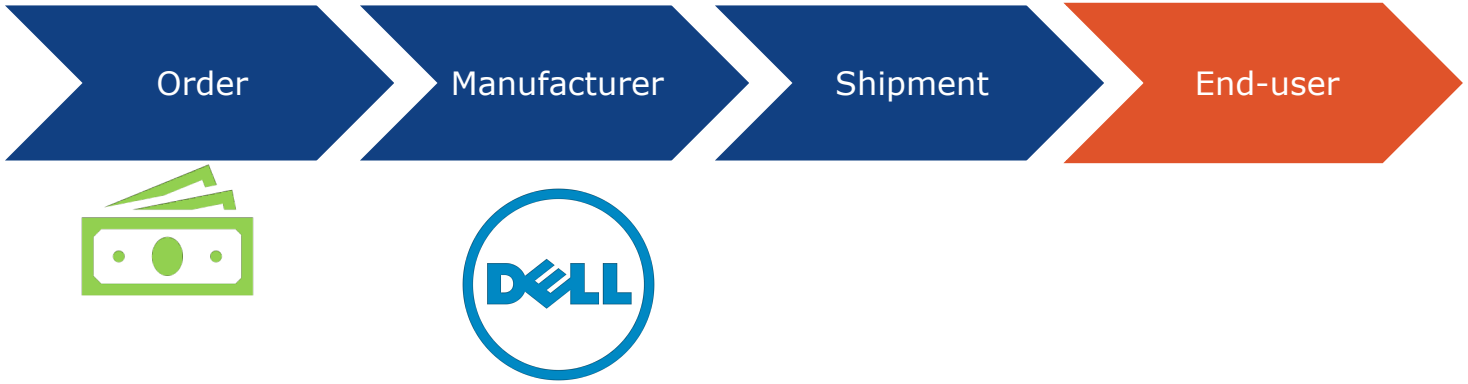
WHAT CAN CHANGE?

BUSINESS MODEL INNOVATION: DELL

Traditional supply chain



Dell's perspective on the supply chain



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WHAT CAN CHANGE?

BUSINESS MODEL INNOVATION: DELL

- Build to order, ship direct
- Existing PC suppliers Compaq, IBM, Olivetti... Were tied to their channel and could (initially) not follow Dell's example
- Advantages of Dell business model
  - No stock @ manufacturer, distributor, retailer -> cost reduction
  - Online custom configuration
  - No outdated inventory
  - (Generally): cash in before production begins
  - Ride on Internet adoption wave

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WHAT CAN CHANGE?

CHANNEL INNOVATION

- = Changes in how you deliver your offerings to customers and users
- Today = about creating immersive experiences
- Tupperware example
  - Tupperware pioneered the direct marketing strategy made famous by the Tupperware party.
  - A Tupperware party is run by a Tupperware consultant for a host who invites friends and neighbors into his or her home to see the product line.
  - Tupperware hosts are rewarded with free products based on the level of sales made at their party. Parties also take place in workplaces, schools, and other community groups.

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CHANGING THE OFFERING

- **Radical innovation**
- = Redefining the engineering specs
- Based on a different set of engineering principles
- May open up whole new markets and potential applications
- May create great difficulties for incumbent firms
- Can be basis for successful entry by insurgent
- It may take while...

- **Incremental innovation**
- = Improvements
- Introduces relatively minor changes
- Often happens once standards has been established
- Typically drives rapid performance improvement
- Exploits the potential of the established design
- Typically reinforces position of incumbent

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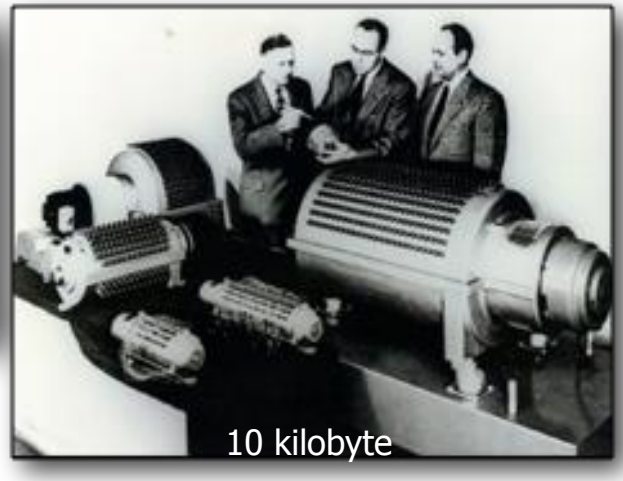
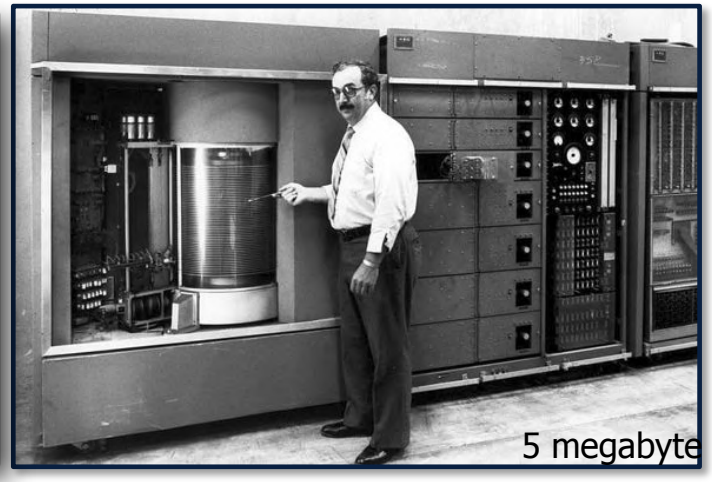
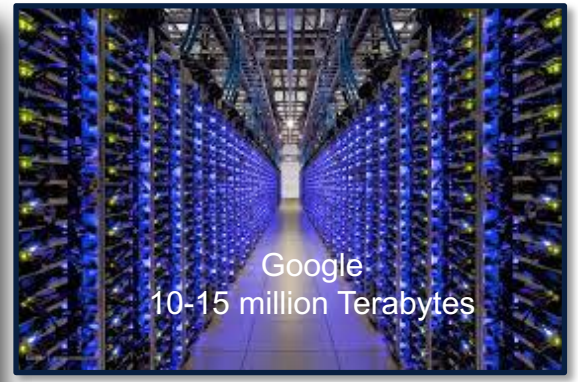
CHANGING THE OFFERING

EXAMPLE OF A RADICAL INNOVATION TRAJECTORY

TECHNOLOGY







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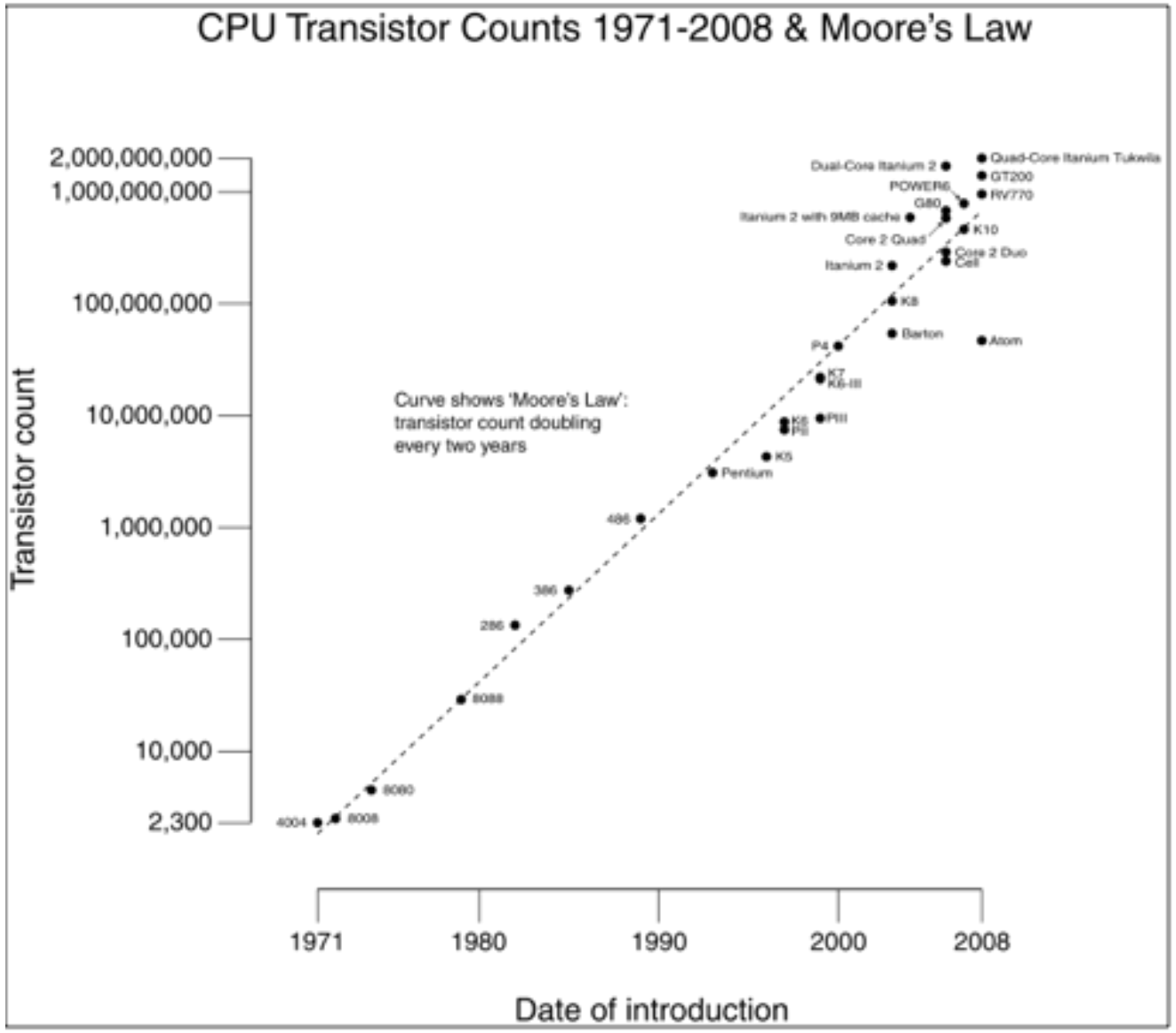
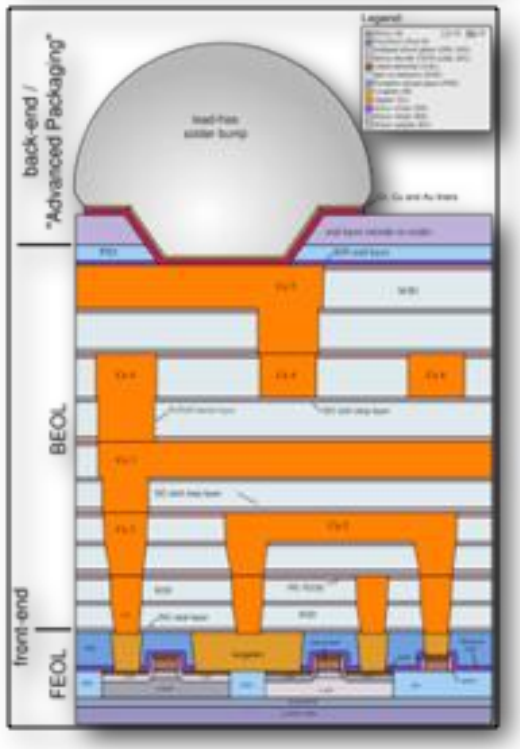
CHANGING THE OFFERING

INCREMENTAL INNOVATION

TECHNOLOGY





The mother of all incremental innovations: Moore's law

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EXAMPLE INCREMENTAL INNOVATION

TECHNOLOGY

- Powershot G5 Features (2003):
  - 5-megapixel CCD
  - Still images up to 2592 x 1944 pixels
  - ISO 50 - 400
  - 1.8-inch 270° Vari-Angle color LCD viewfinder/monitor
  - Movie mode with sound: 320x240 and 160x120 up to 180 sec.

- Powershot G10 Features (2008):
  - 14.7-megapixel CCD
  - Image sizes up to 4416x 3312 pixels
  - ISO 50 - 1600
  - 3.0-inch 270° Vari-Angle color LCD viewfinder/monitor
  - Movie clips 640 x 480 @ 30fps, Maximum clip length 1 hour

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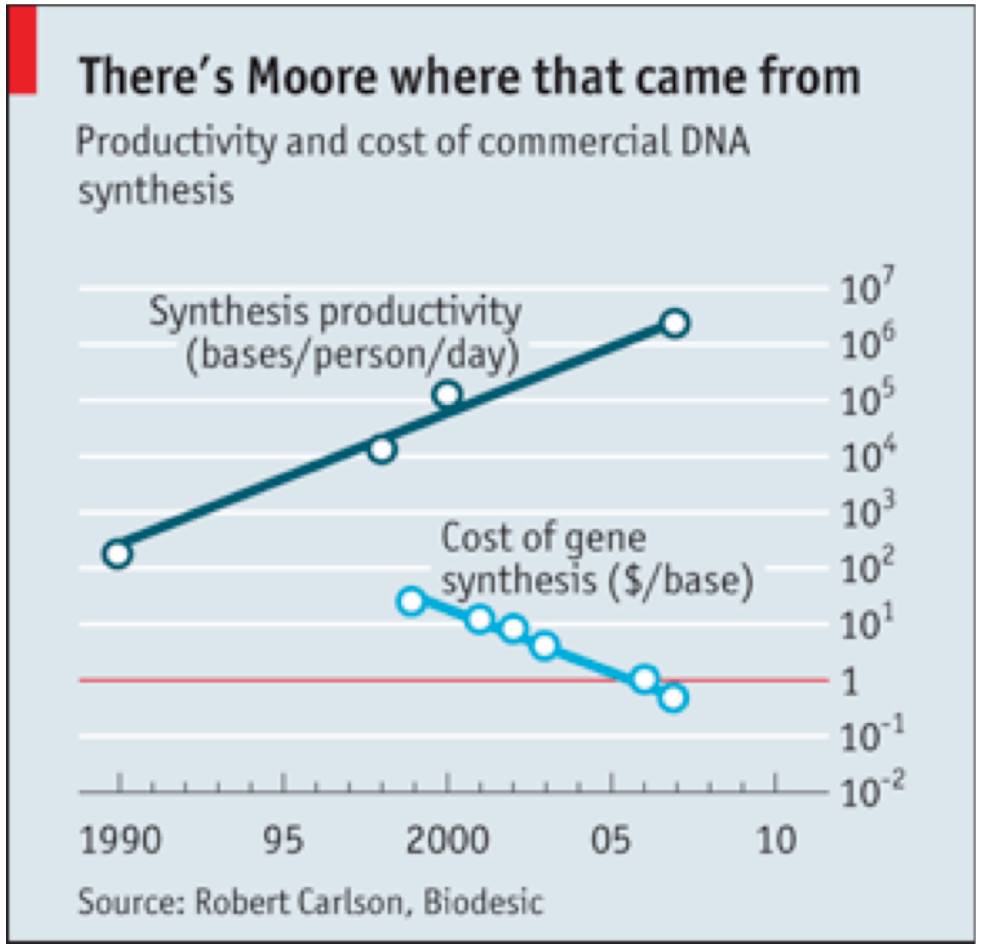
CHANGING THE OFFERING

RADICAL INNOVATION IN BIOTECH

TECHNOLOGY



Productivity and costs of commercial DNA-synthesis, The Economist, 20/05/2010, Genesis Redux

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IMPACT OF CHANGE

SUSTAINING INNOVATION

MARKET

- = Those innovations that respond to the needs of the present (sophisticated) customers of the company
- All sustaining (radical or incremental) innovations were introduced by the market leaders, even if they required investments, write-off of existing expertise…
- Sustaining innovations almost never dislocates a market leader
- Examples in hard-disk industry: all innovations leading to higher storage capacity, more reliability, higher speed, lower cost

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IMPACT OF CHANGE

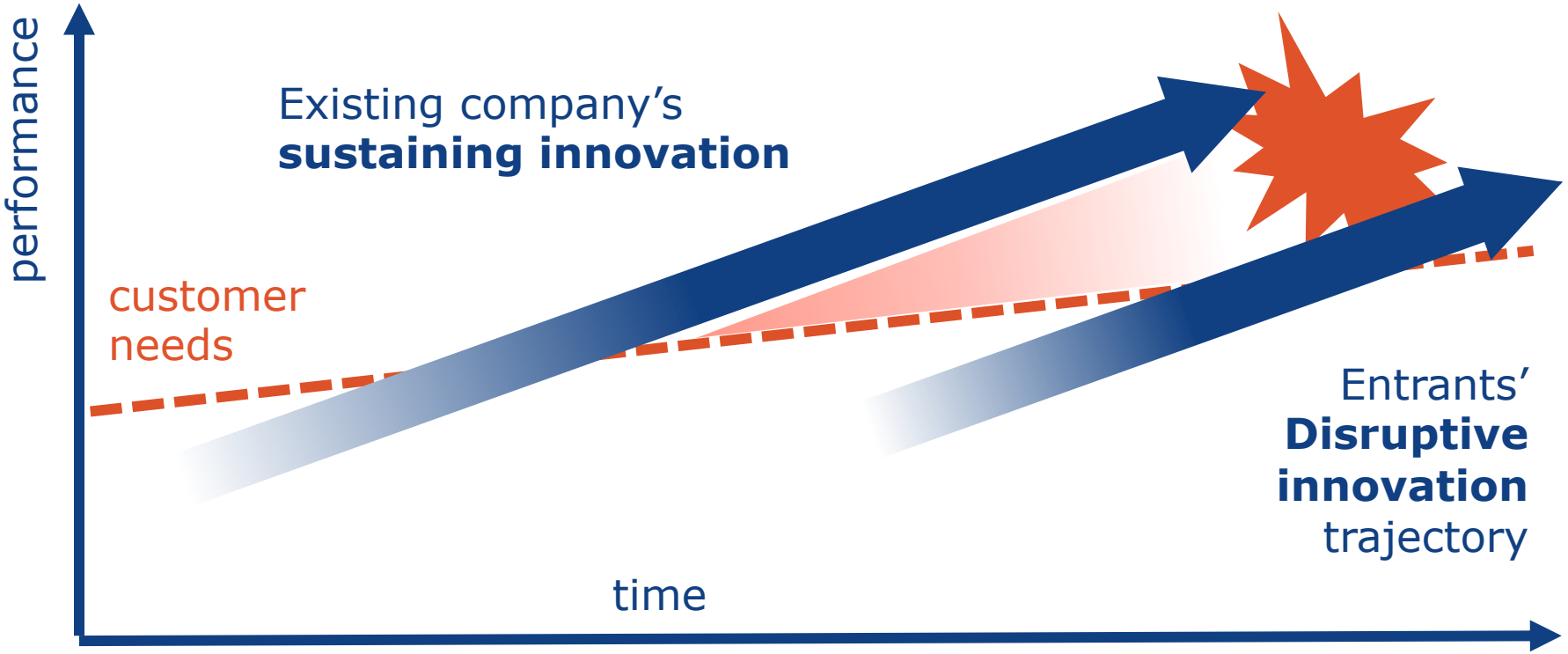
- **Disruption** occurs when a **smaller company** with fewer resources successfully **challenges established incumbent** businesses.

- **Incumbents** focus on improving products and services for most demanding –often most profitable- customers
- -> **Incumbents' products exceed the needs of less demanding segments**.
- **Entrants** begin by **targeting those overlooked segments**, by delivering more-suitable functionality—frequently at a lower price.

- Incumbents, chasing profitability in higher segments, tend not to respond vigorously.
- Entrants then move upmarket, gradually delivering performance required by mainstream customers, while preserving the advantages that drove their early success.
- When mainstream customers start adopting the entrants' offerings in volume, **disruption has occurred**.

DISRUPTIVE INNOVATION

MARKET



Harvard Business Review

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IMPACT OF CHANGE

THE INITIAL CUSTOMERS OF DISRUPTORS

MARKET

- New customers
  - Teenagers and (portable) transistor radio’s
  - Excavation of trenches in city areas
  - PC and 5,25 inch harddisks
- Overserved customers
  - Technologies may evolve too fast for the average customer
  - ‘Don’t need that extra storage’
  - Low-end customers are first to be open for new technology

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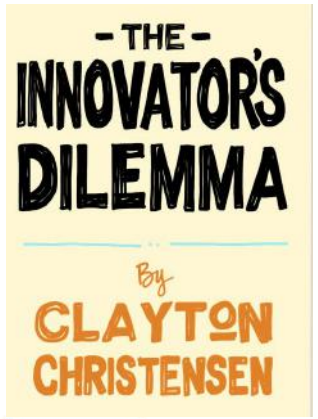
DISRUPTIVE INNOVATION: RADIO’S

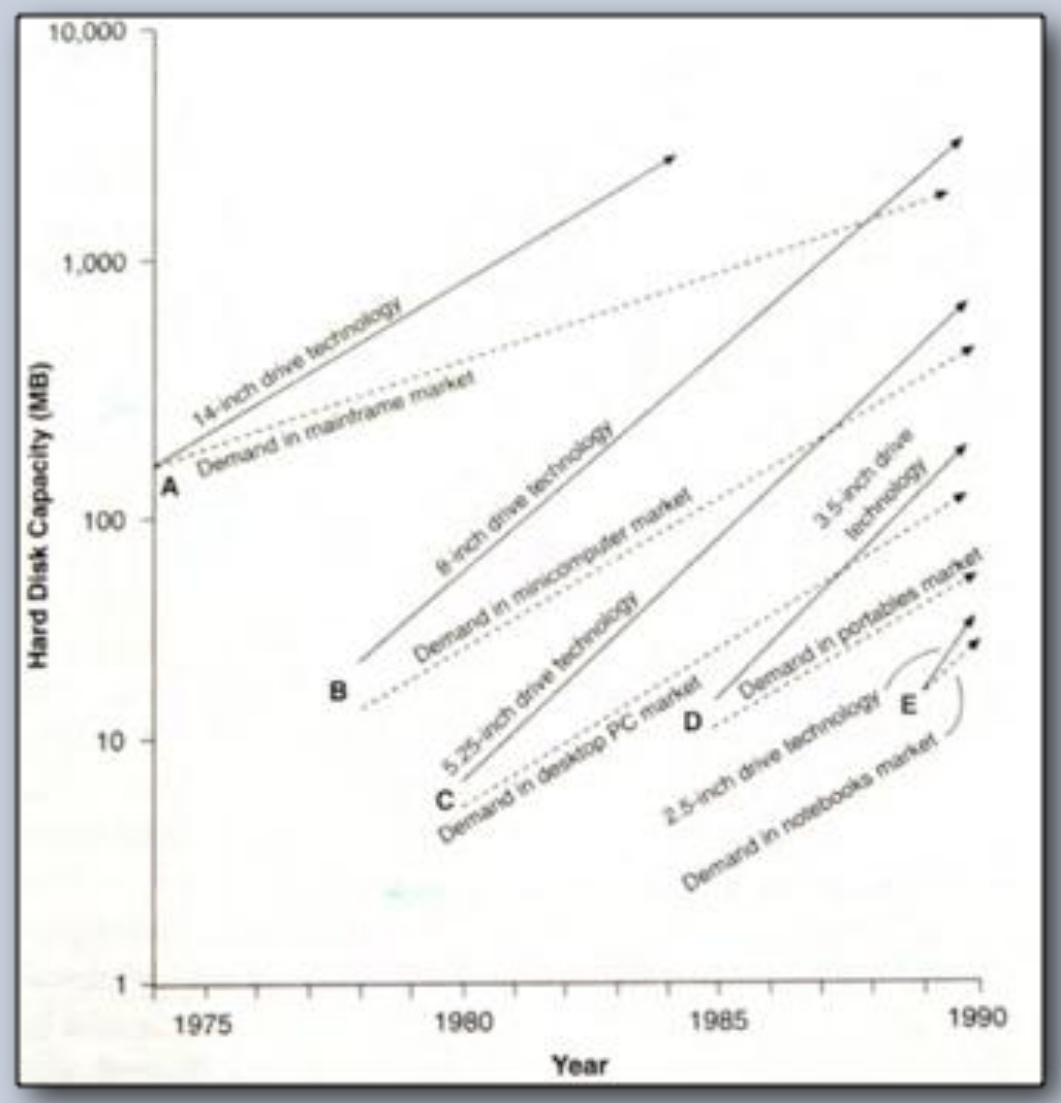
IMPACT OF CHANGE

DISRUPTIVE INNOVATION IN HARD-DISCS

MARKET



- Disruption = different (smaller) size (14" -> 8” -> 5.25” -> 3,5” -> 2,5” -> 1,8”)
- Existing manufacturers listened to their existing customers, who wanted faster, more and more reliable storage for less money
- New manufacturers of smaller hard disks found new customers (Mini, PC industry, game consoles...)
- Smaller form factor gradually reaches performance that is satisfactory for users of larger form factor
  - Through volumes, economies of scale, incremental innovation...
  - Generally at lower cost
- These customers make the switch to the new form factor and the old format dies off
- **Every disruptive innovation in the hard disk market has dislocated the then-market leader**
- Is a typical challenge of high tech companies: being pushed to high-end niches



IMPACT OF CHANGE

DISRUPTIVE INNOVATION IN COMPUTERS

MARKET

- IBM 7094
  - 1960
  - The full works: computer room, tilted floor, airco; operators
  - Switches
  - 150 kilobyte core memory
  - About as fast a PC in late 1980's
  - Set of disks, tape
  - Rented for about $ 30.000 per month
  - Purchase price $ 1,6 million
- The process
  - Submit a desk of cards to an operator through a window
  - Batch processing
  - Receive a listing of computer paper as readout

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IMPACT OF CHANGE

DISRUPTIVE INNOVATION IN COMPUTERS

MARKET

- IBM in the 60's
  - The technostructure (Galbraith): large, highly organized, vertically integrated
  - The Organization Man; The IBM Way
  - 1963: $1,2 billion, 1965 $3 billion, 1970 $7,5 billion
  - 70% market share: IBM and the seven dwarfs
  - Socially responsible company: colored, handicapped employees, benefits..
  - Offered computer at up to 60% discount if universities offer course in computing
- 7 research labs
  - Solid state electronics
  - Tape and disk storage (Silicon Valley)
  - Programming languages
  - Logic circuits
  - Fundamentals of solid state physics and mathematics
- Research gave IBM advantage over its competitors
  - Huge customer base to recoup investments
  - High barriers of entry in industry
  - Take off...

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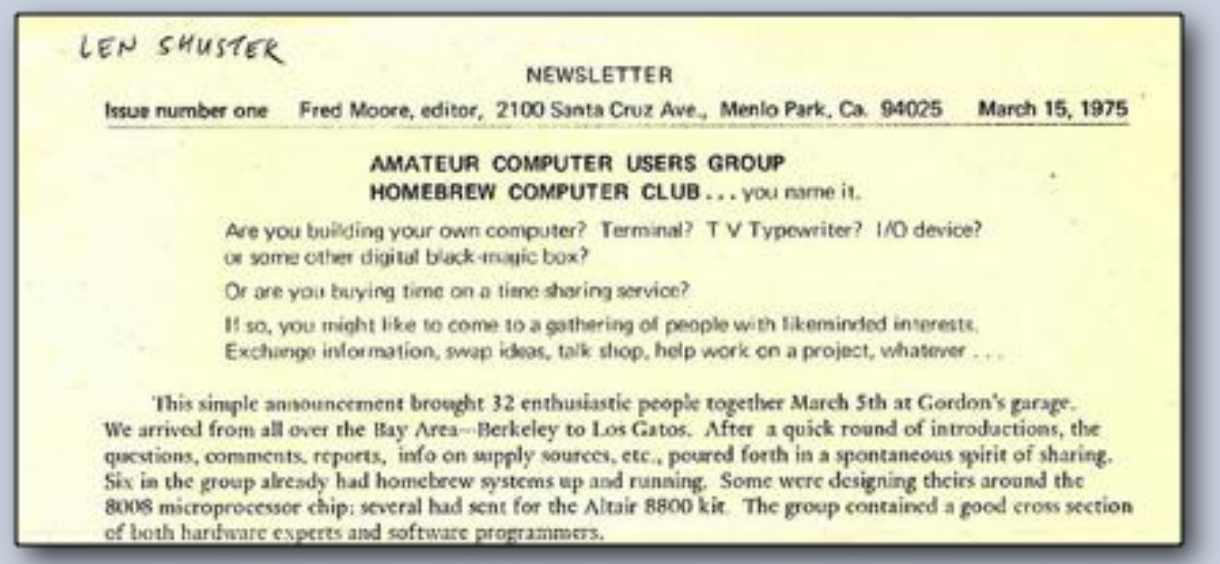
IMPACT OF CHANGE

DISRUPTIVE INNOVATION IN COMPUTERS

MARKET

- Disruption: the microprocessor = A set of integrated circuits that incorporate the basic architecture of a general purpose stored-program computer
- 1971: Intel 4004
  - set of 4 chips
- 1974: Intel 8080
  - More memory, fewer support chips
  - Price: $ 360
  - Compatibility with previous chips
- Substantially less performant than mainframes
- Hobbyists pick up the concept and start building their own computers



LEN SHUSTER

NEWSLETTER

Issue number one Fred Moore, editor, 2100 Santa Cruz Ave., Menlo Park, Ca. 94025 March 15, 1975

AMATEUR COMPUTER USERS GROUP
HOMEBREW COMPUTER CLUB . . . you name it.

Are you building your own computer? Terminal? T V Typewriter? I/O device? or some other digital black-magic box?

Or are you buying time on a time sharing service?

If so, you might like to come to a gathering of people with likeminded interests. Exchange information, swap ideas, talk shop, help work on a project, whatever . . .

This simple announcement brought 32 enthusiastic people together March 5th at Gordon's garage. We arrived from all over the Bay Area—Berkeley to Los Gatos. After a quick round of introductions, the questions, comments, reports, info on supply sources, etc., poured forth in a spontaneous spirit of sharing. Six in the group already had homebrew systems up and running. Some were designing theirs around the 8008 microprocessor chip; several had sent for the Altair 8800 kit. The group contained a good cross section of both hardware experts and software programmers.

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IMPACT OF CHANGE

DISRUPTIVE INNOVATION IN COMPUTERS

MARKET

- Altair 8800
  - Company MITS
  - Edward Robert: designer
  - Small model-rocket hobby shop in Alburquerque...
- Sold as kit for < $400
  - + option fully assembled & tested for $495 (1 year delivery delays...)
  - Around Intel 8080 (Cost $75 each)
- Designed and promoted as a capable minicomputer
- Properties of Altair (and following PC's)
  - Size
  - Micro-processor based
  - Prize
  - Capabilities
  - Open Bus architecture (Plug-in devices possible)
- The first users were hobbyists, and the first uses were games

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IMPACT OF CHANGE

DISRUPTIVE INNOVATION IN COMPUTERS

MARKET

- **After reading the January 1, 1975 issue of Popular Electronics, Bill Gates called the creators of MITS**, offering to demonstrate an implementation of the BASIC programming language for the system.
- Gates had neither an interpreter nor an Altair system, in the eight weeks before the demo he and Allen developed it. The interpreter worked and MITS agreed to distribute Altair BASIC.
- Gates left Harvard University, moved to Albuquerque, New Mexico where MITS was located, and founded Microsoft there.
- Price: $ 60 to $150 for ‘extended version’, sold with memory board. More expensive for other Intel 8080 systems
- Competitors existed, ‘but none was as good and Gate’s and Allen’s, and it was not long before word of that got around’

"to get a workstation (running our software) onto every desk and eventually in every home”

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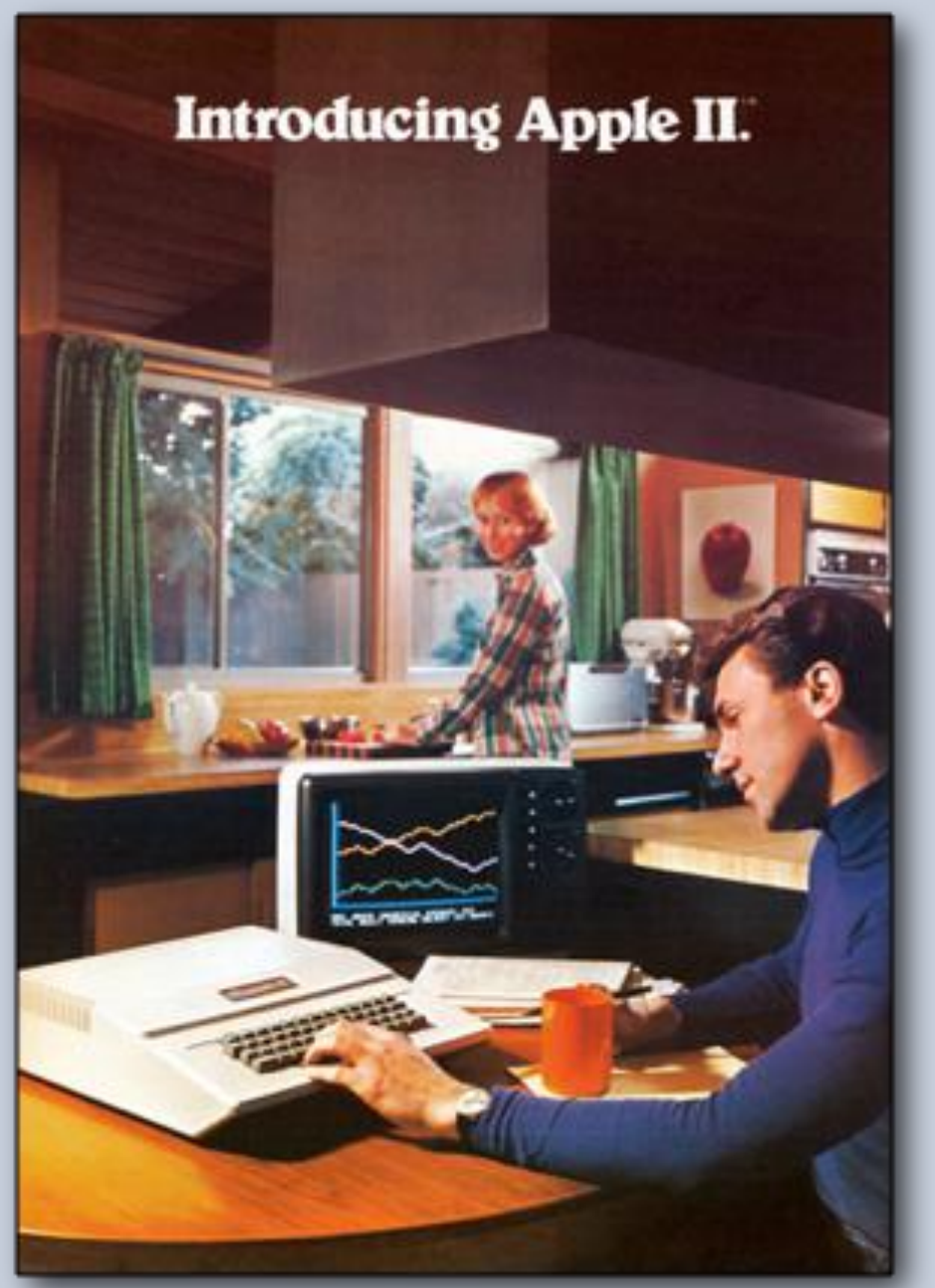
IMPACT OF CHANGE

DISRUPTIVE INNOVATION IN COMPUTERS

MARKET

- Outstanding design:
  - Fewer chips, higher performance
  - Excellent color graphics
  - Attractively designed
  - Open bus
  - Not based on Intel 8080
  - 5 1/4 inch floppy drive
  - -> engineering and design
  - More expensive than competition (Tandy TRS-80, Commodore PET)
- Ships with Microsoft BASIC in ROM
  - ‘a payment in August 1977 from Apple to Microsoft is said to have rescued Microsoft from insolvency at a critical moment of its history’
  - One of most popular extensions: Board with CP/M from Microsoft



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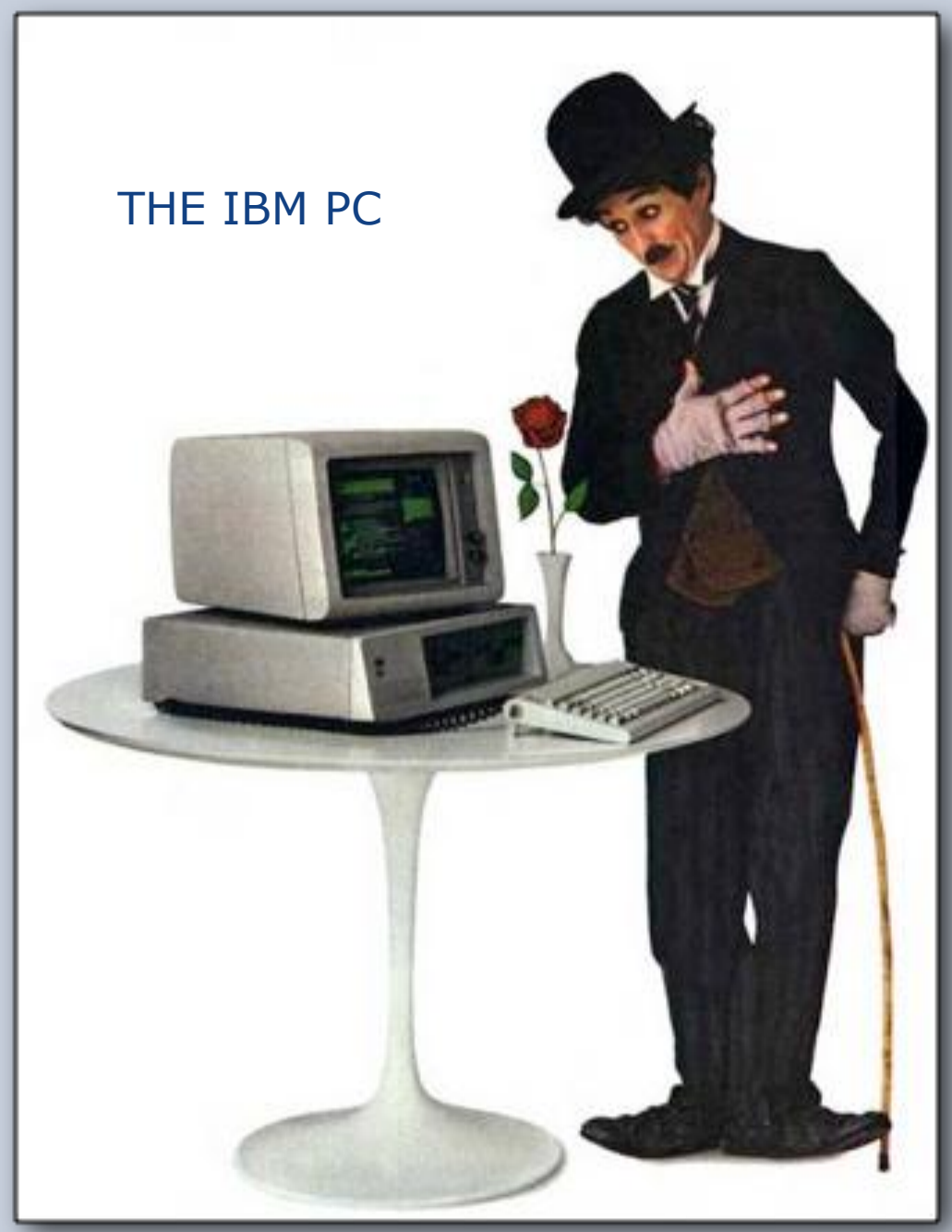
IMPACT OF CHANGE

DISRUPTIVE INNOVATION IN COMPUTERS

MARKET

- 1950: Small group of IBM executives identify importance and urgency
- IMB allowed off-campus skunkworks in Florida
- Team @ iBM in charge of developing PC decide to go outside of IBM and comply to standards for nearly all components
  - Intel 8080
  - ASCII
  - Open bus
  - Published BIOS specifications
  - Made no efforts to enforce patents it held on several aspects of PC design
  - Option of color monitor
  - $4.000 to $5.000



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IMPACT OF CHANGE

DISRUPTIVE INNOVATION IN COMPUTERS

MARKET

Microsoft

Intel

Dell

Novell

Dow Jones

Apple

IBM

Still… (1984 – 1995)

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CREATIVE DESTRUCTION

OOPS…

Ballmer (Microsoft) on the Iphone.

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CREATIVE DESTRUCTION

OOPS…

- Since 2000, Intel has done just about everything right in its core business, the PC microprocessor market and the market for server chips.
- And yet the company finds itself in a very tough position: computers are going mobile, and Intel's share of the microprocessor market is falling off a cliff.
- **61 percent of all computing devices shipped in 2011 were of the mobile variety**—up from less than 1 percent in 2000.
- Because most of those devices rely on technologies other than Intel's, the company's share of the total market for processors in computing devices has fallen from 80 percent to around 30 percent.

MIT Technology Review

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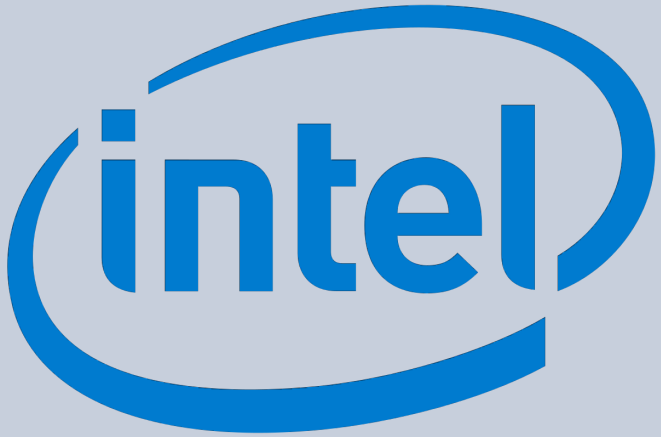
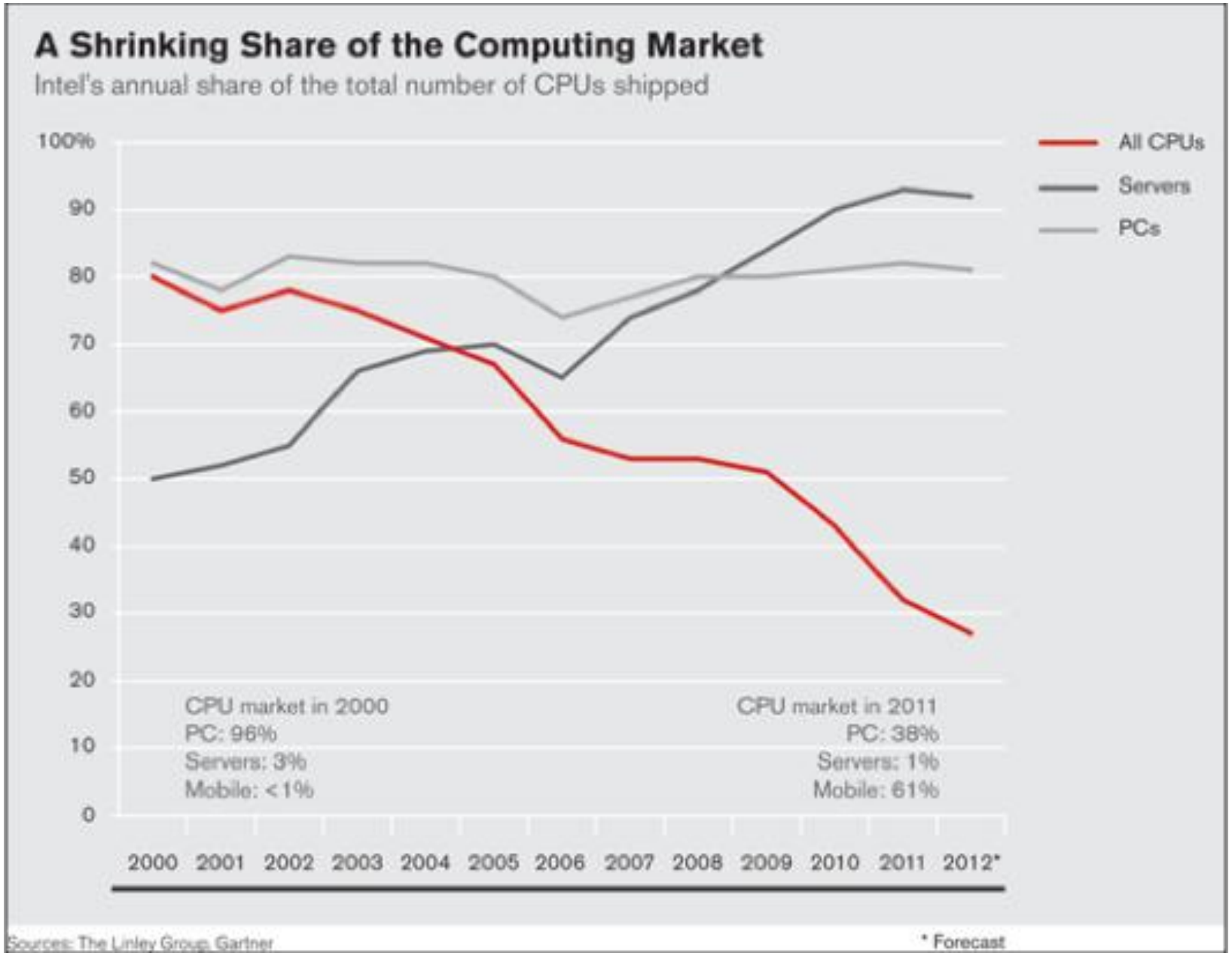


CREATIVE DESTRUCTION

OOPS…



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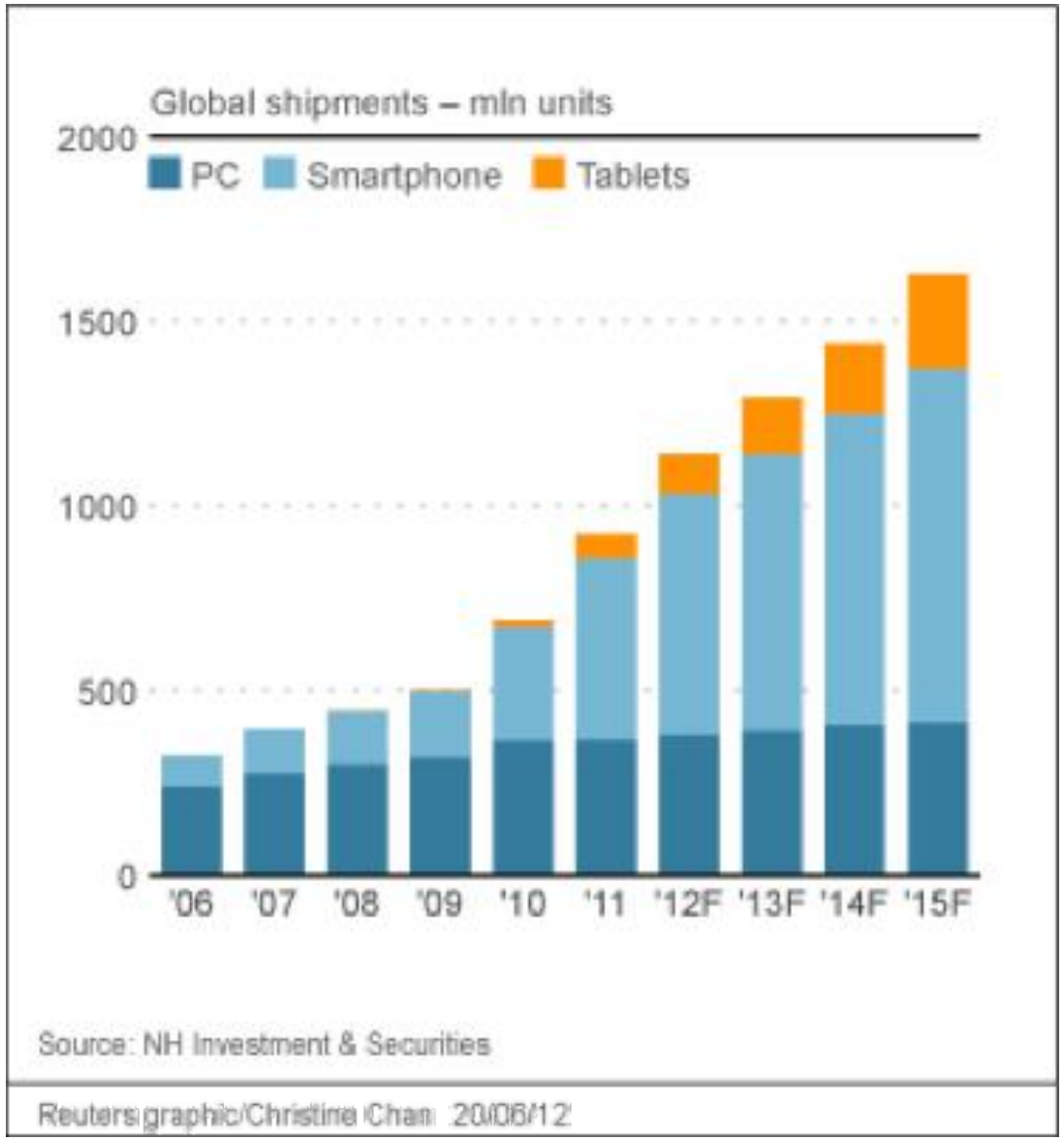
CREATIVE DESTRUCTION

OOPS…



Intel misses out on the smarphone market

CREATIVE DESTRUCTION

OOPS…

- Otellini betrayed a profound sense of disappointment over a decision he made about a then-unreleased product that became the iPhone.
- He decided against doing what it took to be the chip in Apple's product. "We ended up not winning it or passing on it."
- There was a chip that they were interested in that they wanted to pay a certain price for and not a nickel more and that price was below our forecasted cost.
- **I couldn't see it**. It wasn't one of these things you can make up on volume.
- And in hindsight, the forecasted cost was wrong and the volume was 100x what anyone thought."

MIT Technology Review

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IMPACT OF CHANGE

- Disruptive innovation...
  - Address different customers
  - Add different value
  - Use different supply chains
- Radical innovations can be disruptive
  - Digital photography
  - Microprocessor, PC
- Radical innovations can be sustaining...
  - All innovations that increased performance and reliability and decreased cost of HD
  - All innovations that increased performance and reliability and decreased cost of computers

WHY INCUMBENTS MISS THE BOAT

- Managers do not see the technology as a threat or opportunity
  - 'What is this toy?'
- No incentive to introduce new technology
  - 'We're doing just fine'
- Can improve the performance of their technology
  - Disruptive technology often spurs technological development in current technology
- They face organizational obstacles to change their core technology
  - New products will cannibalize existing sales
  - They have investments in existing technology
  - The department in charge of established technology claims resources
- Inability to recognize the value of new, external information, assimilate it, and apply it
- New business incompatible with their business model
  - Channels
    - *You could not at the same time sell via channels and via the internet: current dealer channel (100% of current sales) would revolt*
  - Sales model
    - *selling high-end / high margin solutions on mini-computers through direct sales forces -> difficult to switch to low cost PC's hardware and software*
- Difficult do redirect resources away from current customers

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TYPES OF INNOVATION

WHO DRIVES INNOVATION?

- Industry veterans - '**Product starter**
  - Innovation/ venture started by an individual or a small team with roots in the industry
  - Their business focus is a product, often a creative use of existing technologies to design new ways of solving a business problem.
    - *'Let's port this software from a minicomputer to a Macintosh'*
  - They often leave the company they work for because they could not develop their ideas inside this organization.
    - *Often they become competitors of their previous employer.*
  - As the cycle to get to a product is often quite short and market contacts have been established, they rarely need large amounts of capital to start.
  - Example: Artwork Systems
- Researchers – **"Technology starter"**
  - Innovation generated through science and research
    - *Often results in patents*
  - Often in initial phase, requiring significant developments
  - Extensive funding is a must
  - Researchers often lack industry expertise, should therefore look for partners
  - Example: Softkinetic

Prof.Bart Clarysse

Types of innovation

WHO DRIVES INNOVATION?

INNOVATION
DYNAMICS

Creative destruction

Innovation typologies

Life cycles dynamics in business ecosystems

“Life cycles represent frameworks to understand how innovations propagate inside business ecosystems (and the world at large).”

LIFE CYCLES IN BUSINESS ECOSYSTEMS

DIFFERENT PERSPECTIVES

- Market / Industry
  - **Disruption** within an industry
  - Emergence and nature of **competition**
  - **Complementary products**
- Organizational
  - Shift in **marketing** challenges
  - Different ways of **capturing value**.
  - Changing **organizational** challenges
  - Shift in **innovation** focus & **entrepreneurial** opportunities
- Technology / Product
  - The nature of **technical** work changes.
  - Technological **exhaustion**
  - Progress **irregularity**

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LIFE CYCLES IN BUSINESS ECOSYSTEMS

DISRUPTION WITHIN AN INDUSTRY.

MARKET/ INDUSTRY

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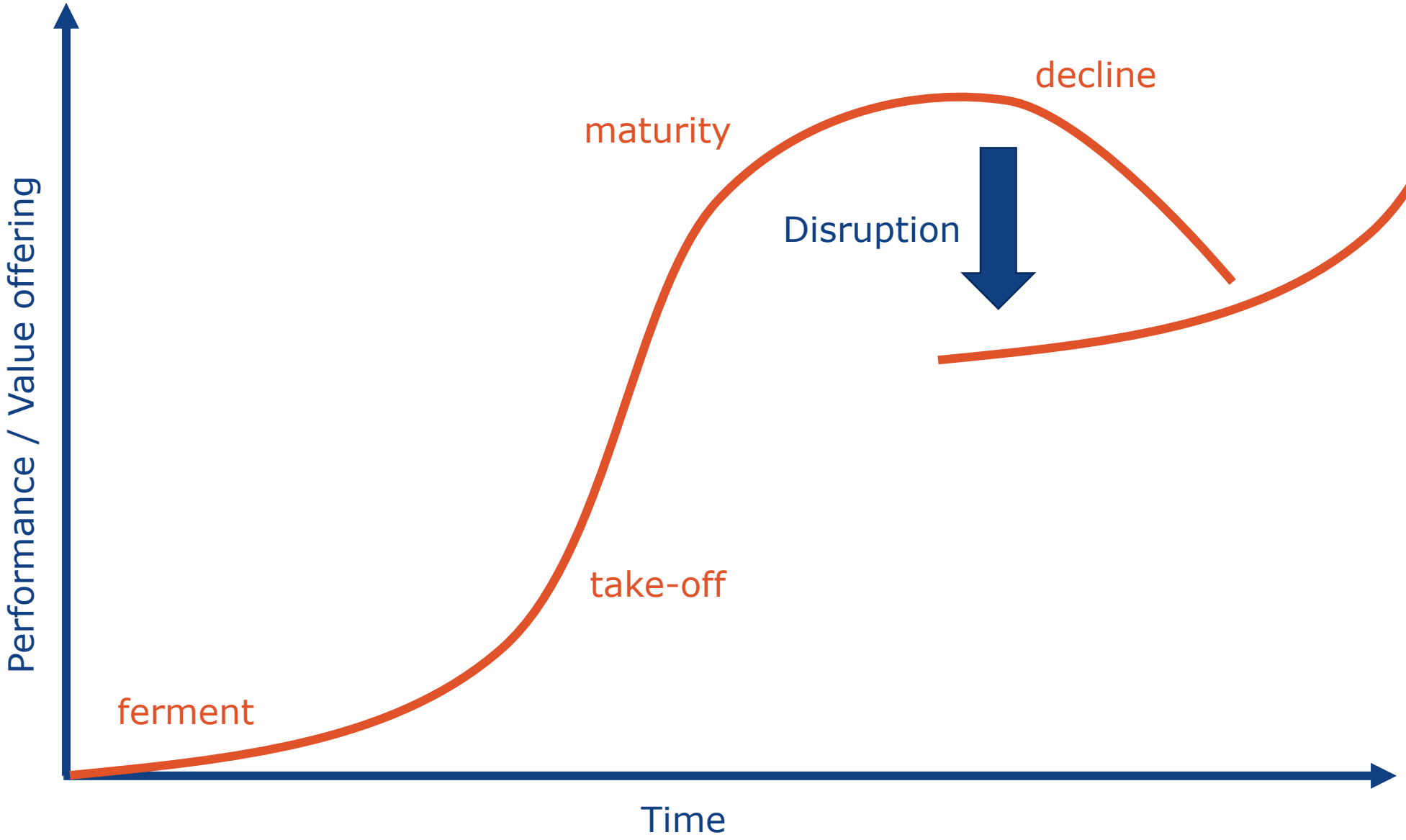

LIFE CYCLES IN BUSINESS ECOSYSTEMS

DISRUPTION WITHIN AN INDUSTRY

MARKET/ INDUSTRY

Massachusetts Institute of Technology

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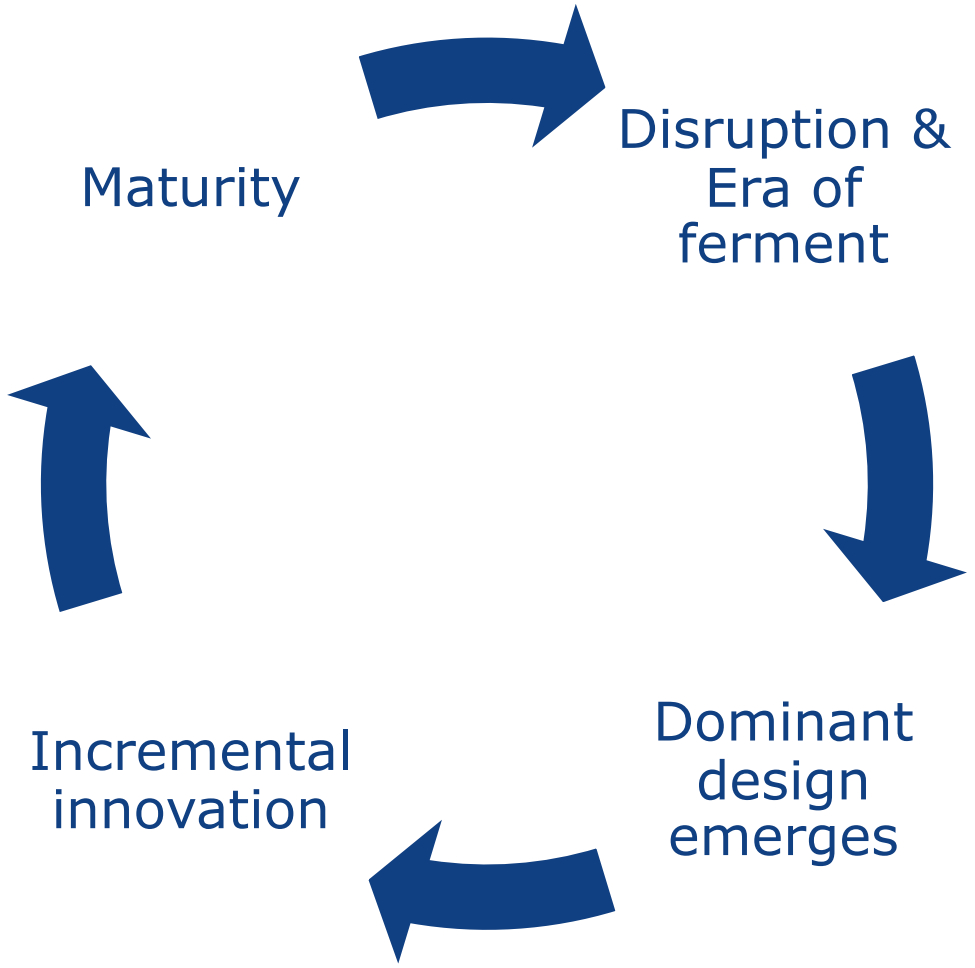
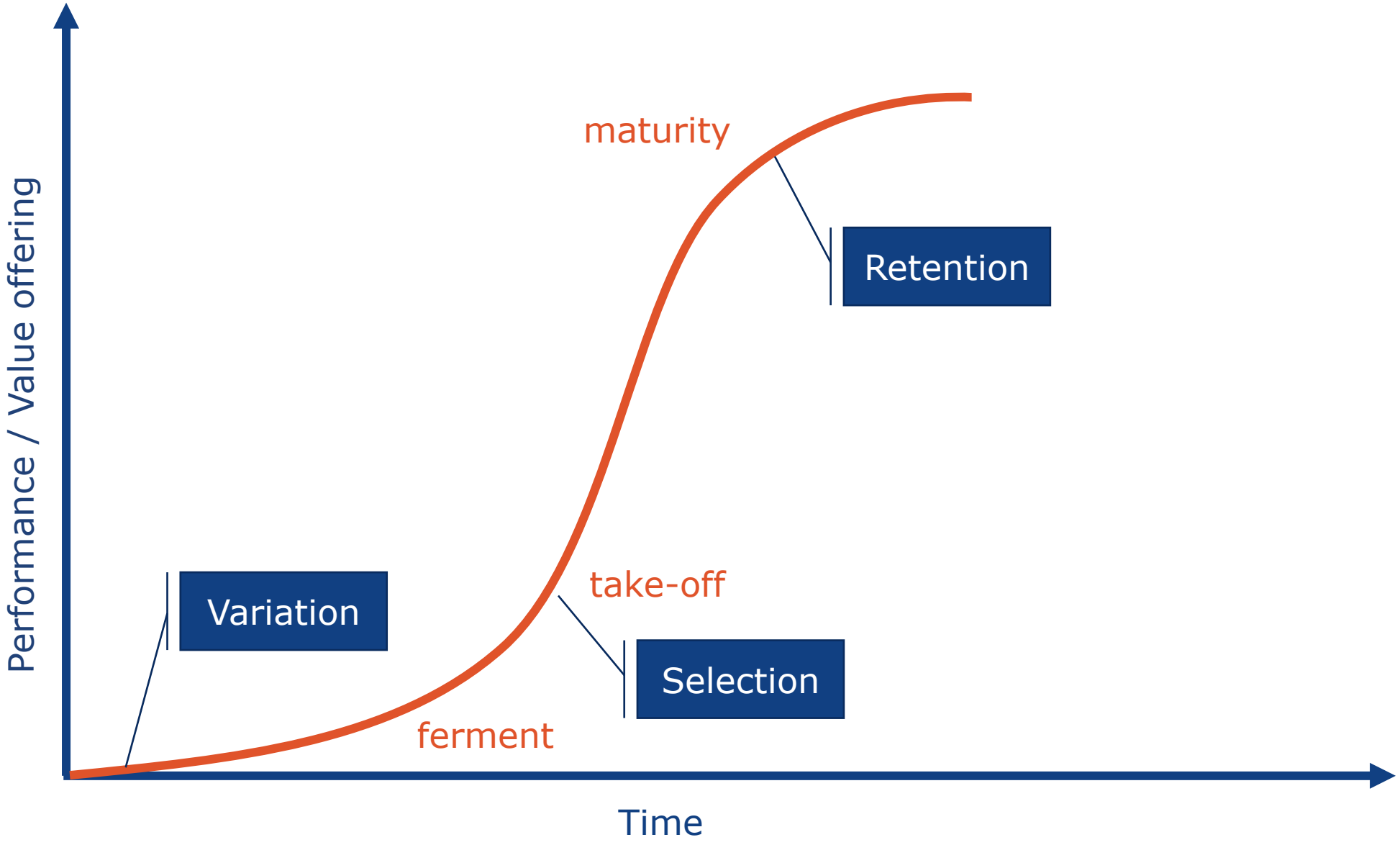


LIFE CYCLES IN BUSINESS ECOSYSTEMS

EMERENCE OF **COMPETITION**: AN EVOLUTIONARY APPROACH

MARKET/
INDUSTRY



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LIFE CYCLES IN BUSINESS ECOSYSTEMS

EMERGENCE OF **COMPETITION**

MARKET/
INDUSTRY

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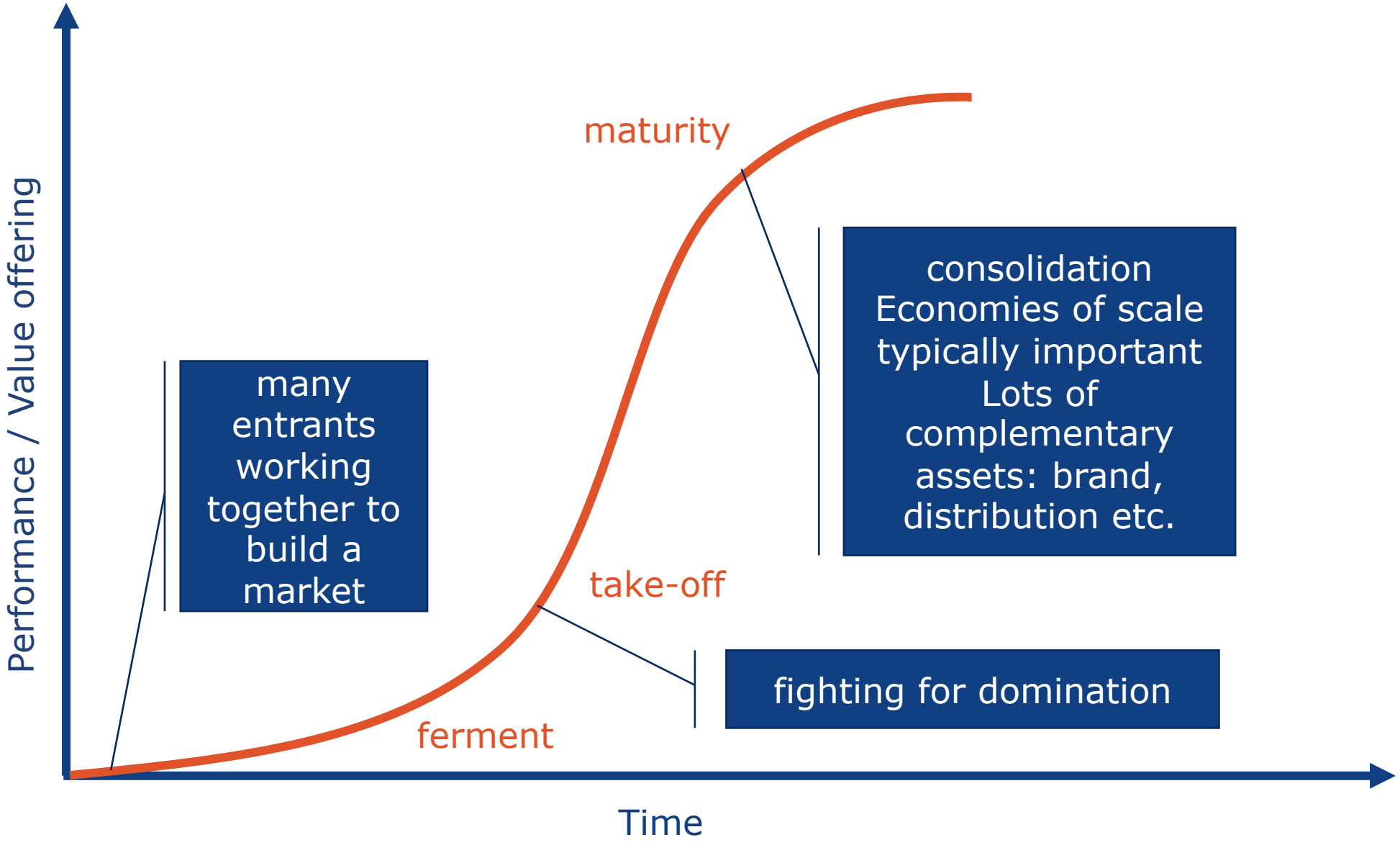
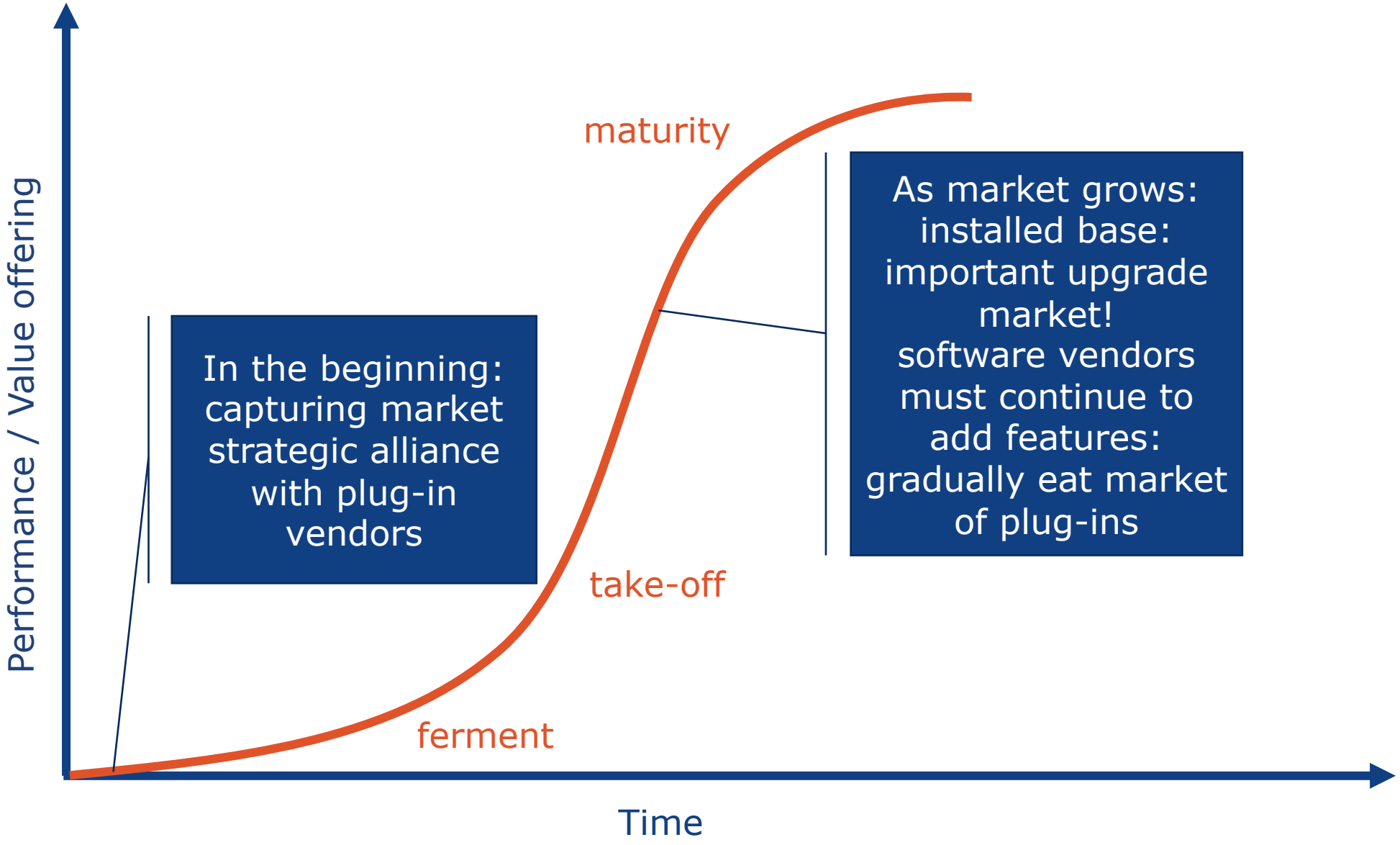


LIFE CYCLES IN BUSINESS ECOSYSTEMS

COMPLEMENTARY PRODUCTS: E.G. THE SOFTWARE APPLICATION MARKET.

MARKET/ INDUSTRY



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LIFE CYCLES IN BUSINESS ECOSYSTEMS

THE **MARKETING** CHALLENGE EVOLVES.

ORGANIZATION

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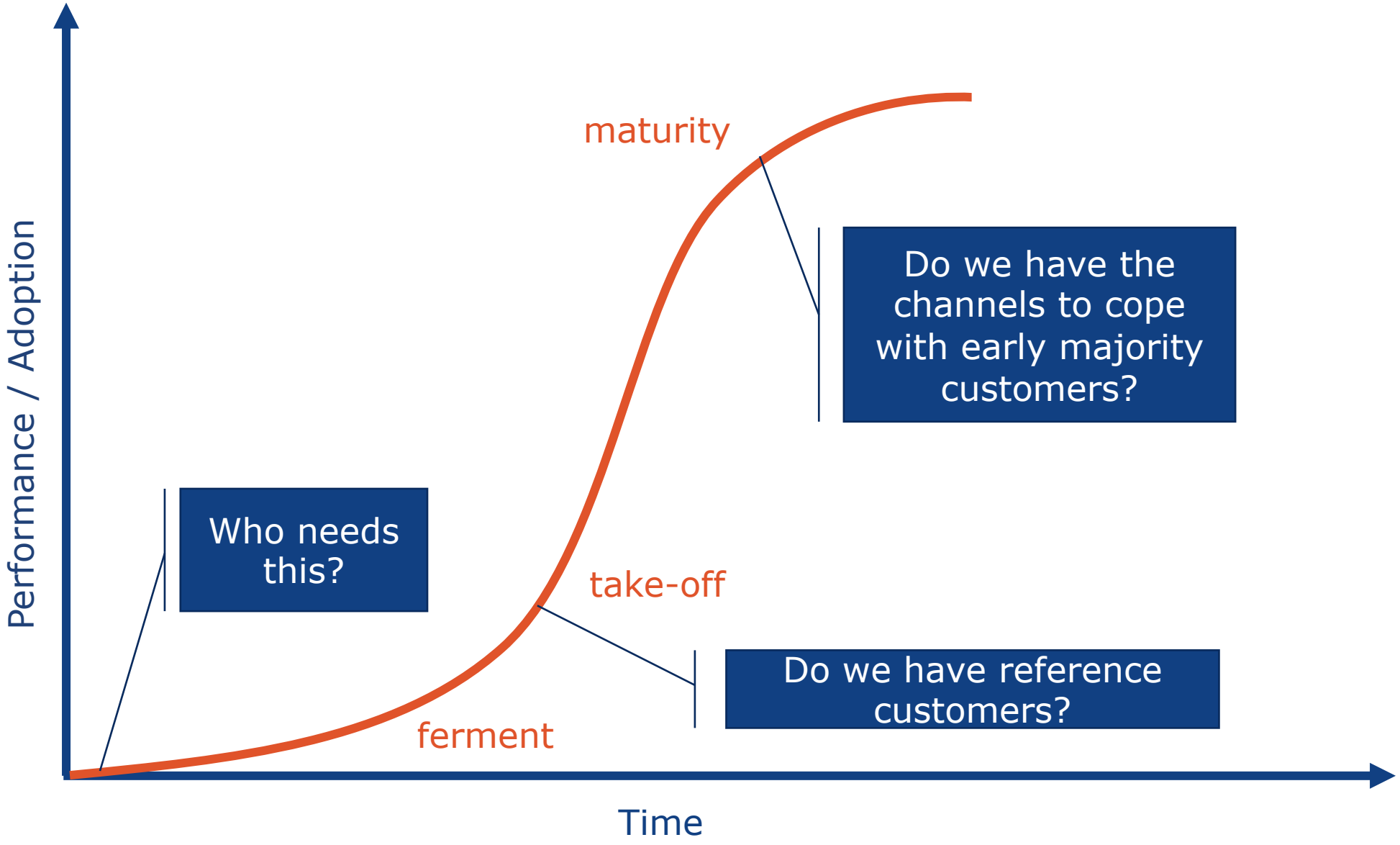

LIFE CYCLES IN BUSINESS ECOSYSTEMS

THE WAY OF **CAPTURING VALUE** EVOLVES.

ORGANIZATION

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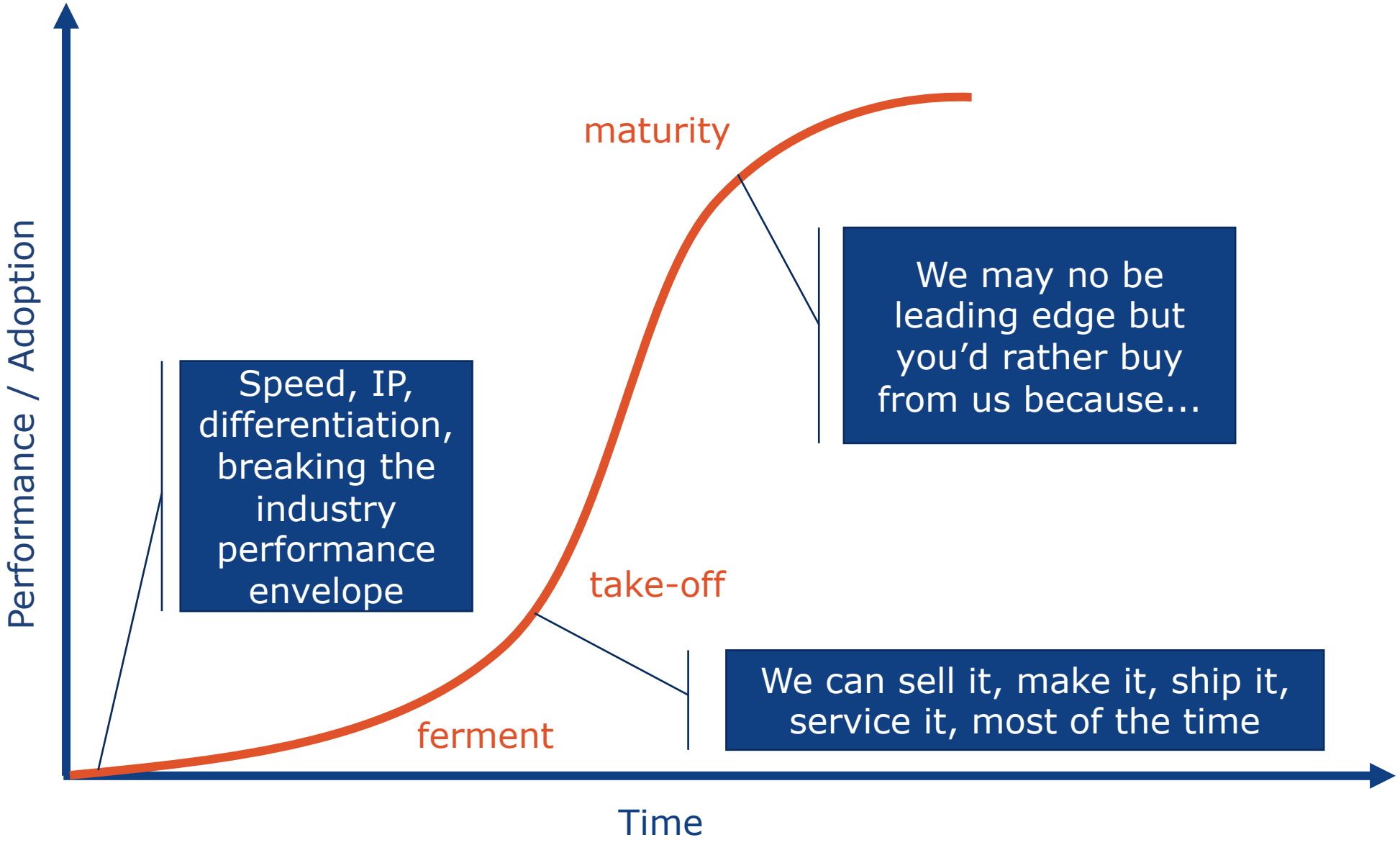

LIFE CYCLES IN BUSINESS ECOSYSTEMS

THE ORGANIZATIONAL CHALLENGES CHANGE.

ORGANIZATION

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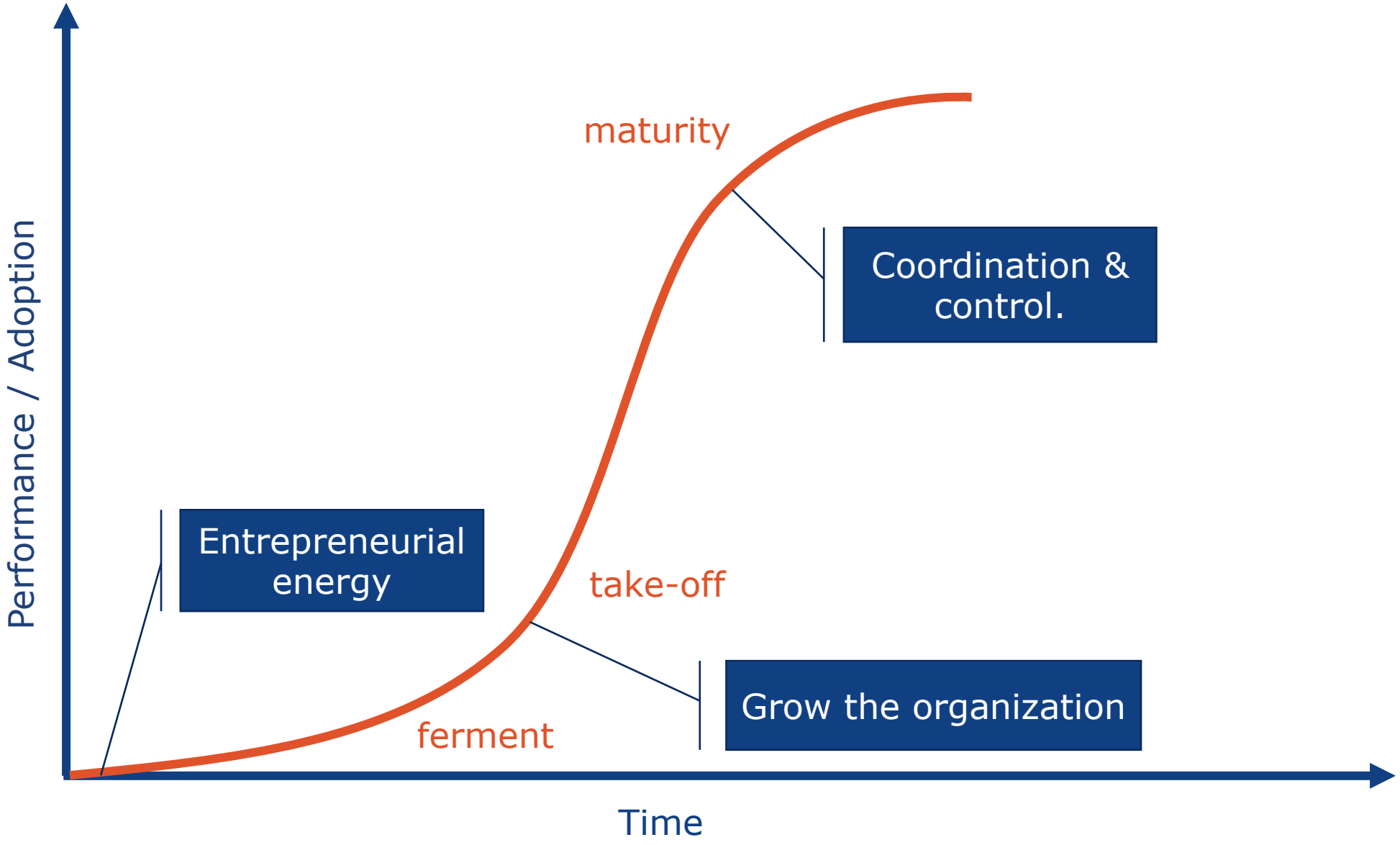
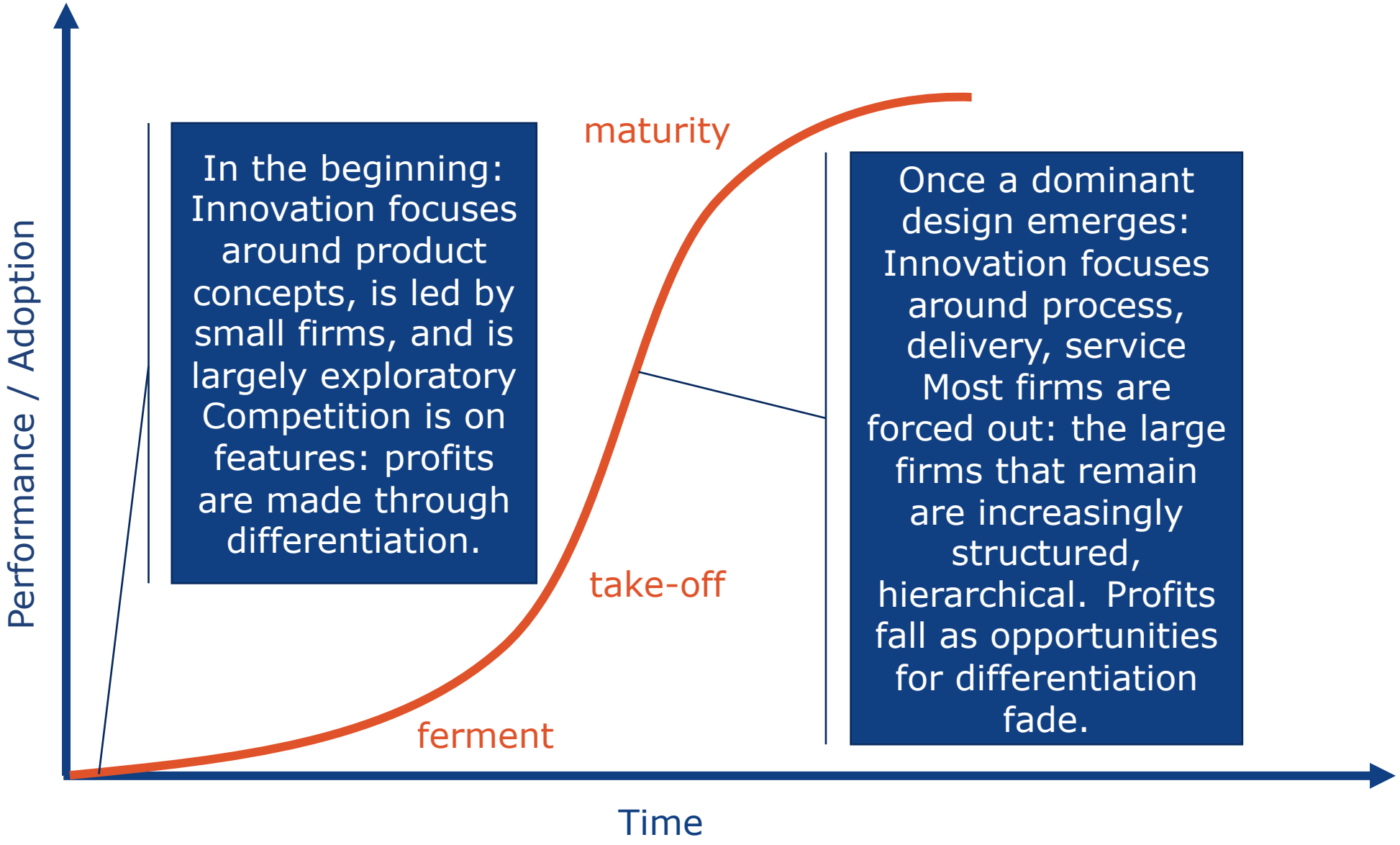


LIFE CYCLES IN BUSINESS ECOSYSTEMS

DIFFERENT PERSPECTIVES

ORGANIZATION



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The product/process transition; **innovation** focus

LIFE CYCLES IN BUSINESS ECOSYSTEMS

ENTREPRENEURIAL OPPORTUNITIES & ACTIONS.

ORGANIZATION

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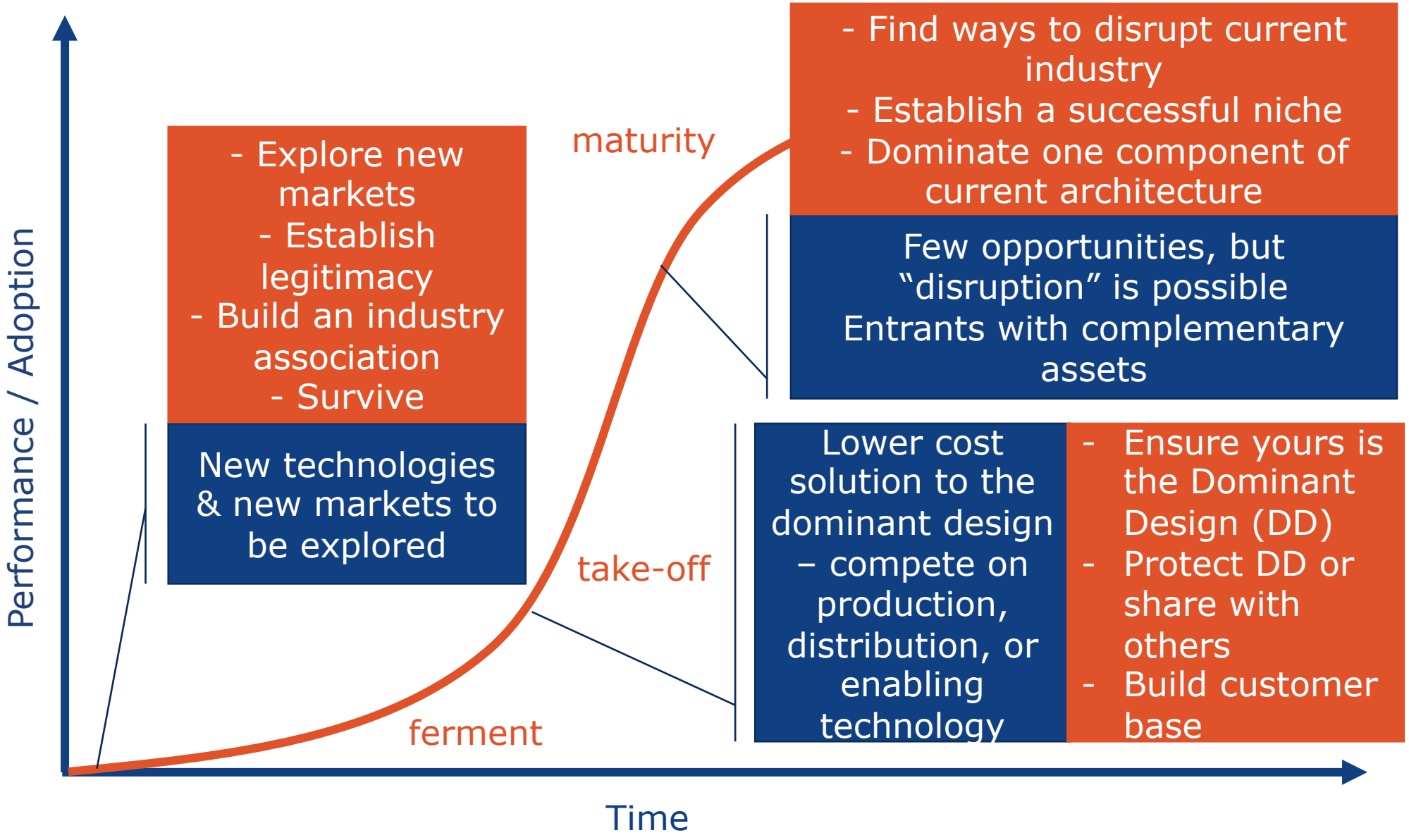
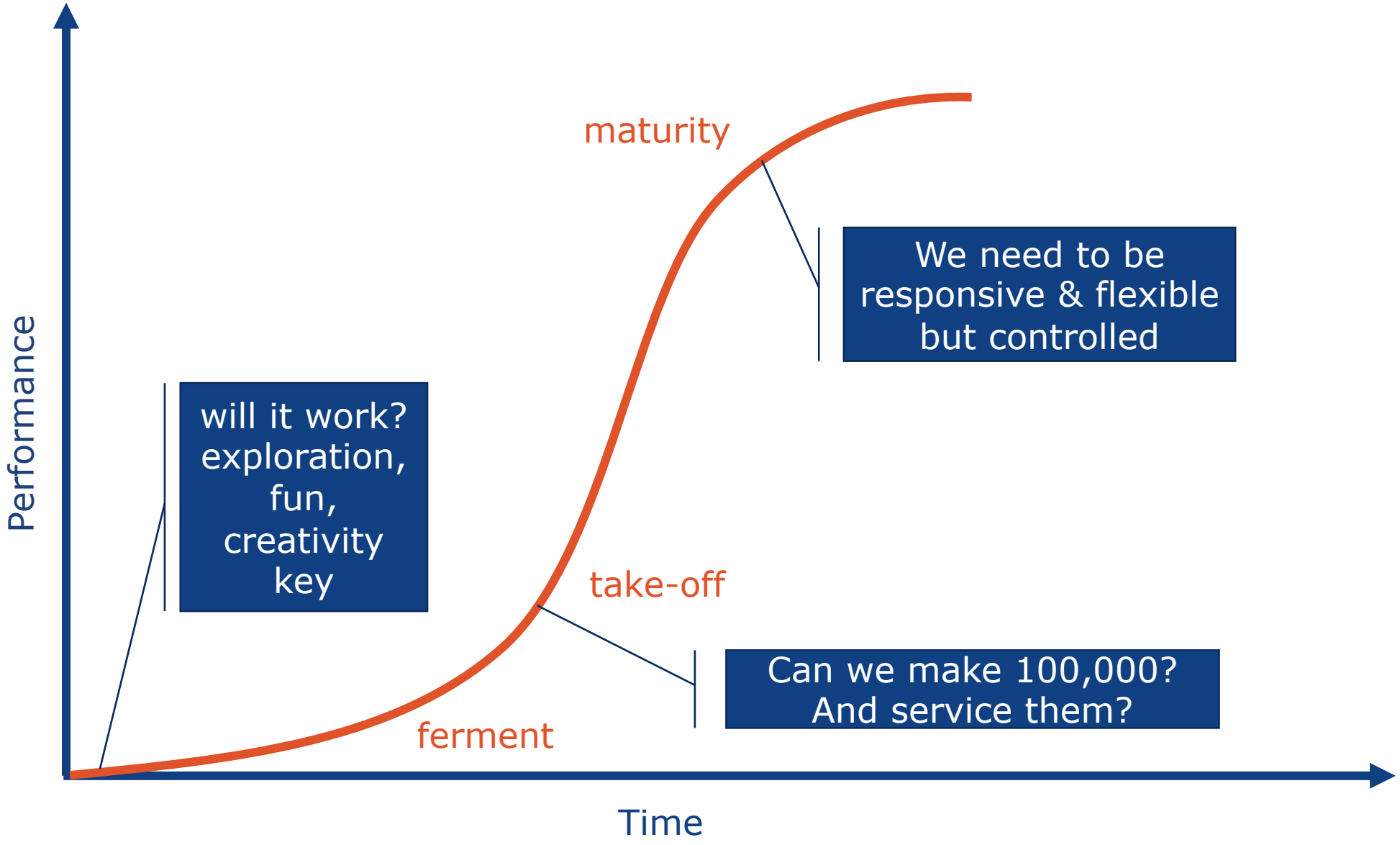


LIFE CYCLES IN BUSINESS ECOSYSTEMS

THE NATURE OF **TECHNICAL WORK** CHANGES.

TECHNOLOGY / PRODUCT



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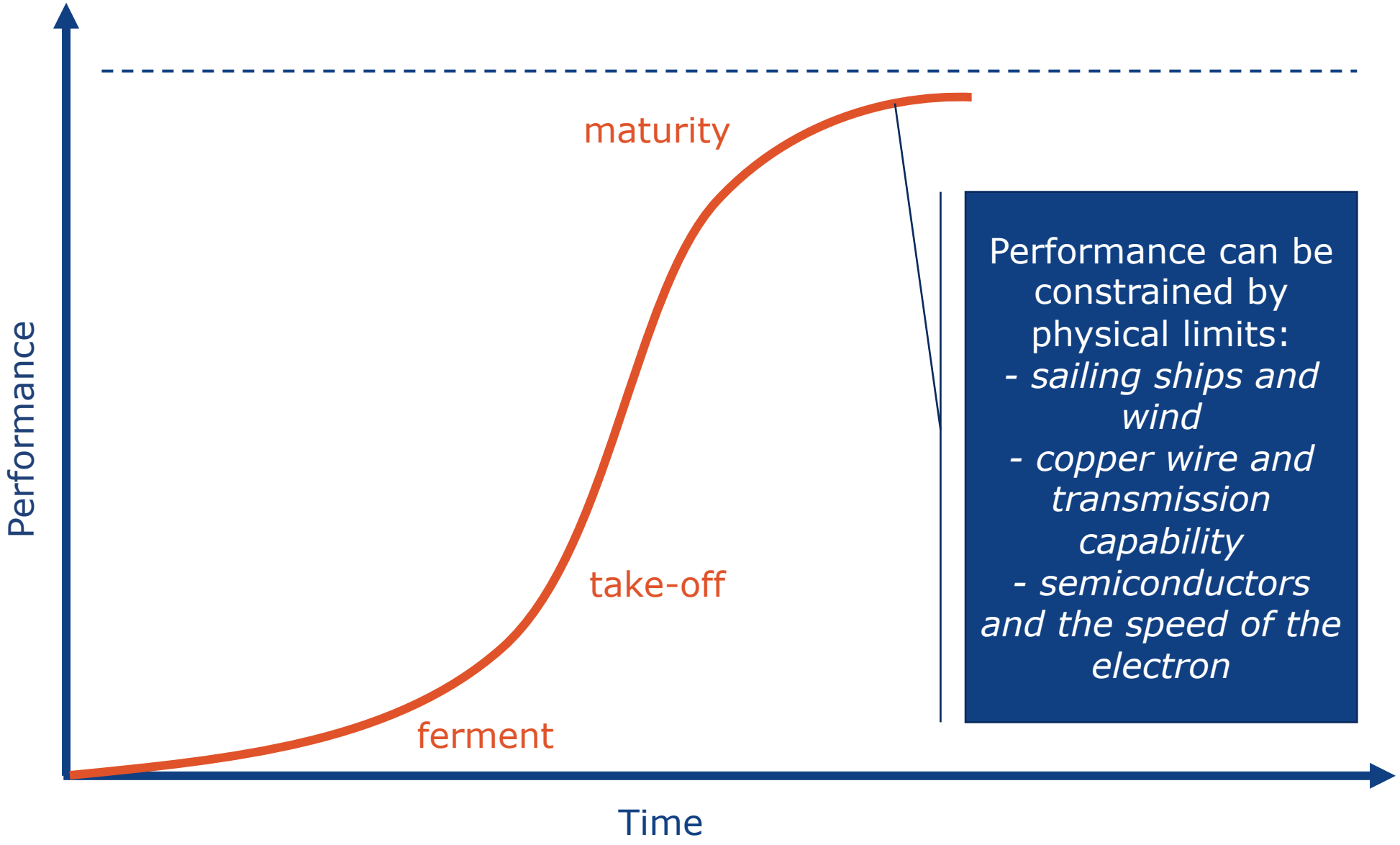
LIFE CYCLES IN BUSINESS ECOSYSTEMS

TECHNOLOGICAL **EXHAUSTION.**

TECHNOLOGY / PRODUCT



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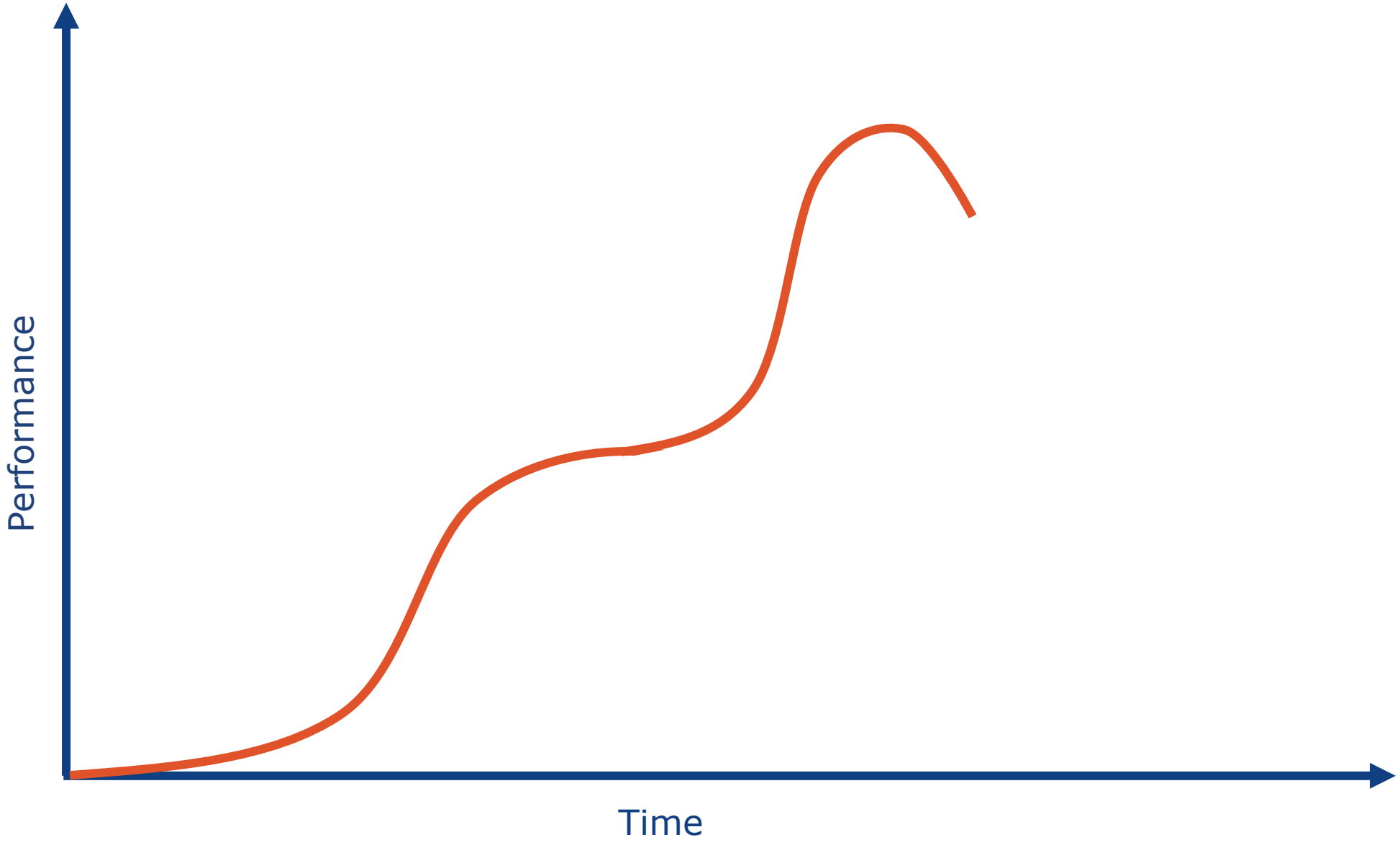
LIFE CYCLES IN BUSINESS ECOSYSTEMS

EVOLUTION OF **PERFORMANCE OVER TIME** IS OFTEN **IRREGULAR**.

TECHNOLOGY / PRODUCT



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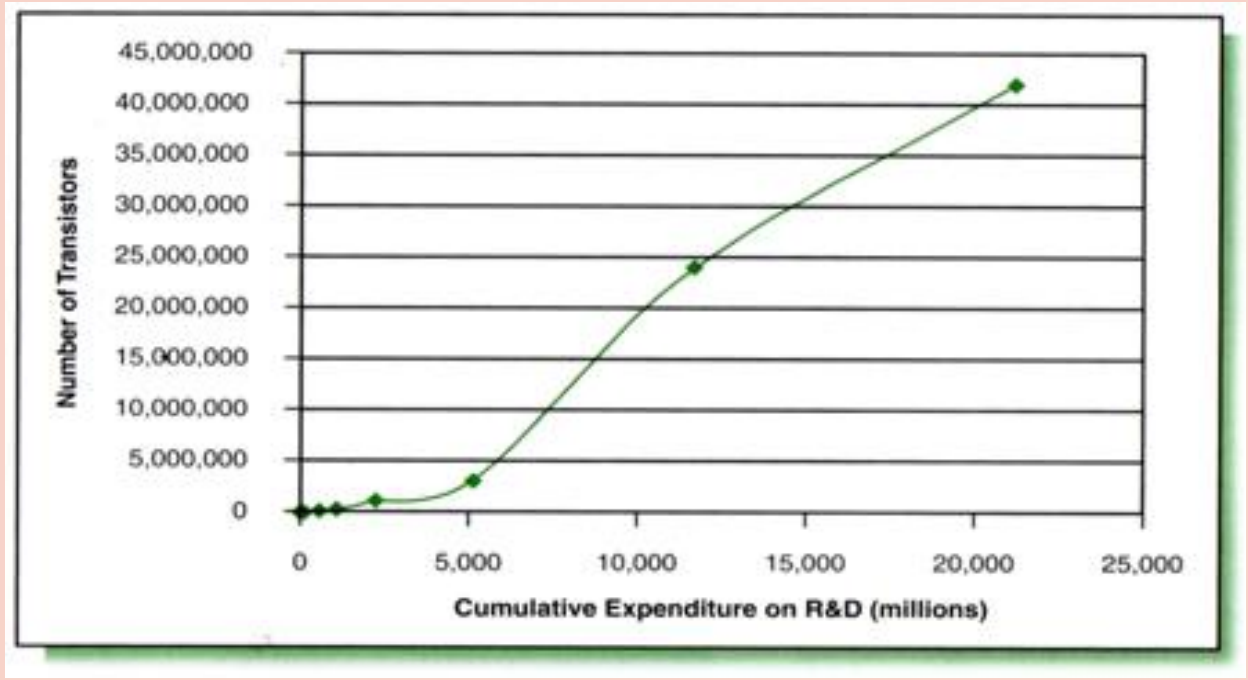
LIFE CYCLE DIMENSIONS

TECHNOLOGY S-CURVE

TECHNOLOGY / PRODUCT

- Graphical representation of the development of a new technology
- compares some measure of performance with some measure of effort
- Often S-curved
- Linked to learning curves
- Companies sometimes bet on technology trajectory
  - E.g. Gmail and storage/network bandwidth



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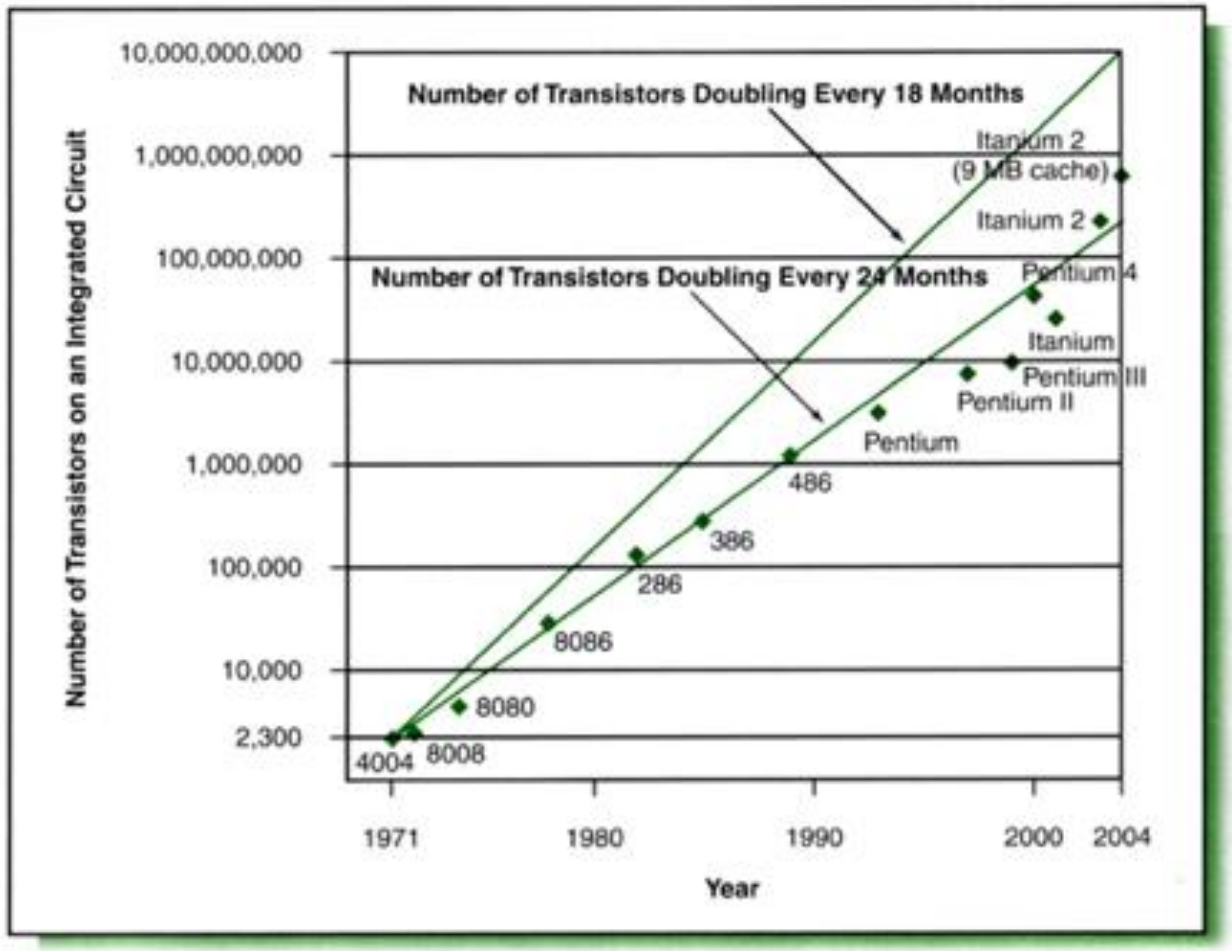
TECHNOLOGY S-CURVE

TECHNOLOGY / PRODUCT



Moore's Law is perhaps the most famous example of a technological trajectory; it indicates that the number of transistors on an integrated circuit has doubled every two years since the 1970s.

Source: http://en.wikipedia.org/wiki/Image:Moore_Law_diagram_%282004%29.png.

The technological trajectory in microprocessors

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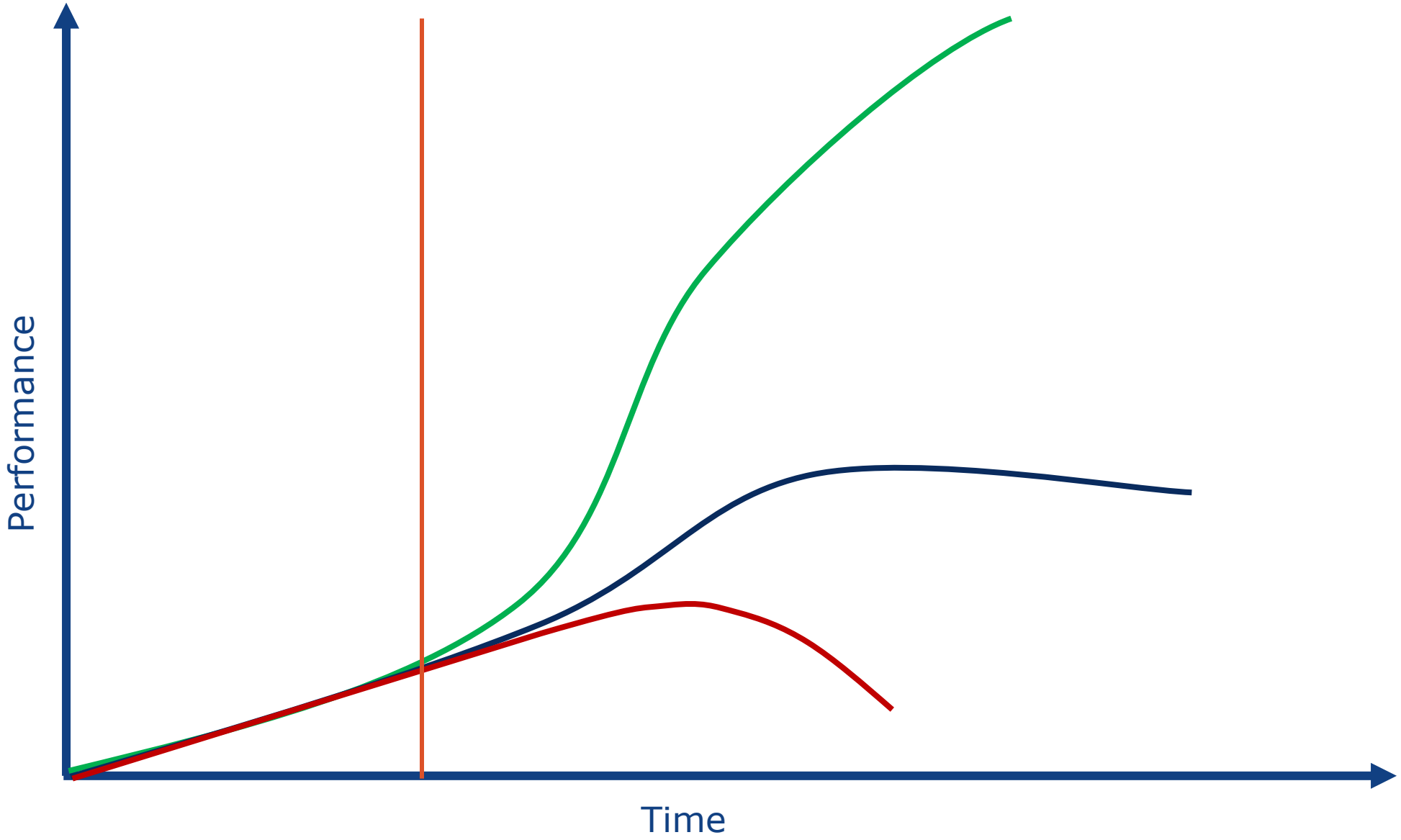
LIFE CYCLE DIMENSIONS

TECHNOLOGY S-CURVE

TECHNOLOGY / PRODUCT



Què sera, sera

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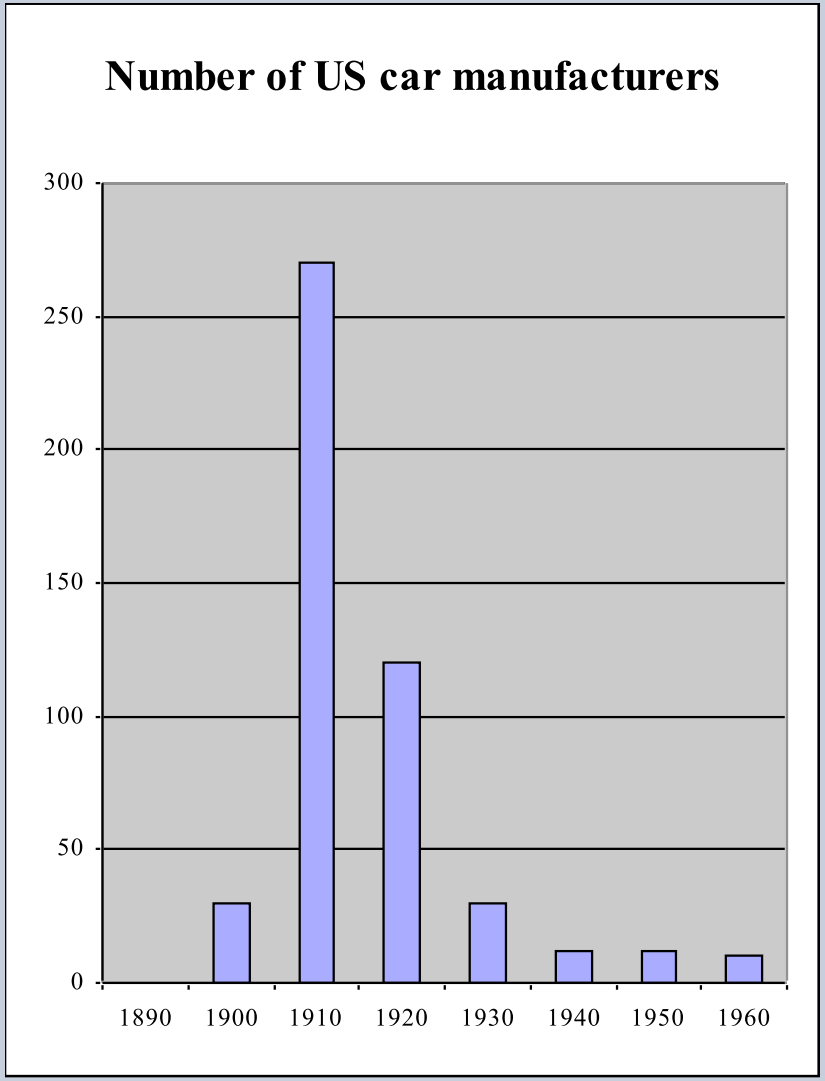
LIFE CYCLE DIMENSIONS

ENTRANTS & SHAKE-OUTS

MARKET/ INDUSTRY

- Fermentation & take-off phase; fluid phase:
  - Many entrants
  - Competition between entrants is initially secondary
  - What counts is adoption of new technology, rather than competition
- Take-off
  - Shake-out
  - Buy or be bought
- New wave of entrants possible during maturity



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ENTRANTS &
SHAKE-OUTS

MARKET/
INDUSTRY

Top Ten PC software Publishers 1984-2001

	1984
MicroPro international	60.000.000
Microsoft Corp	55.000.000
Lotus	53.000.000
Digital Research	45.000.000
VisiCorp	43.000.000
Ashton-Tate	35.000.000
Peachtree	21.700.000
MicroFocus	15.000.000
Software Publishing	14.000.000
Broderbund	13.000.000
total	**354.700.000**

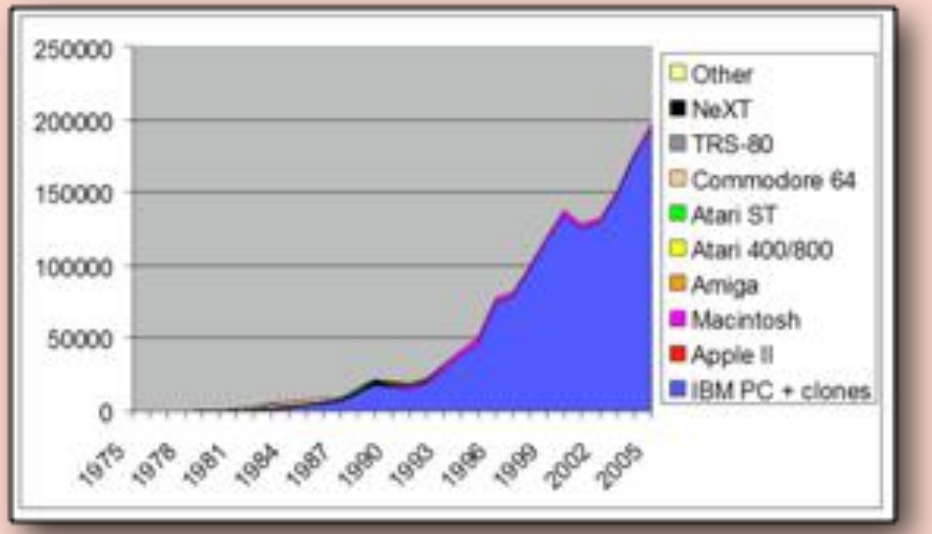
	2001
Microsoft Corp	23.845.000.000
Adobe	1.266.378.000
Novell	1.103.592.000
Intuit	1.076.000.000
Autodesk	926.324.000
Symantec	790.153.000
Network Associates	745.692.000
Citrix	479.446.000
Macromedia	295.997.000
Great Plains	250.231.000
total	**30.778.813.000**

LIFE CYCLE DIMENSIONS

DOMINANT DESIGN

MARKET/ INDUSTRY

- A series of (de-facto) standards is being set in an industry during the initial phases of a life-cycle
  - Often during take-off
  - Often is prerequisite for take-off
  - Markets (PCs) or governments (GSM) can drive the standard setting
- Dominant Designs in technology, business model...
- Examples
  - the combustion engine vs steam, electricity
  - Distribution channel for cars
  - IBM PC -> MSDOS -> Windows



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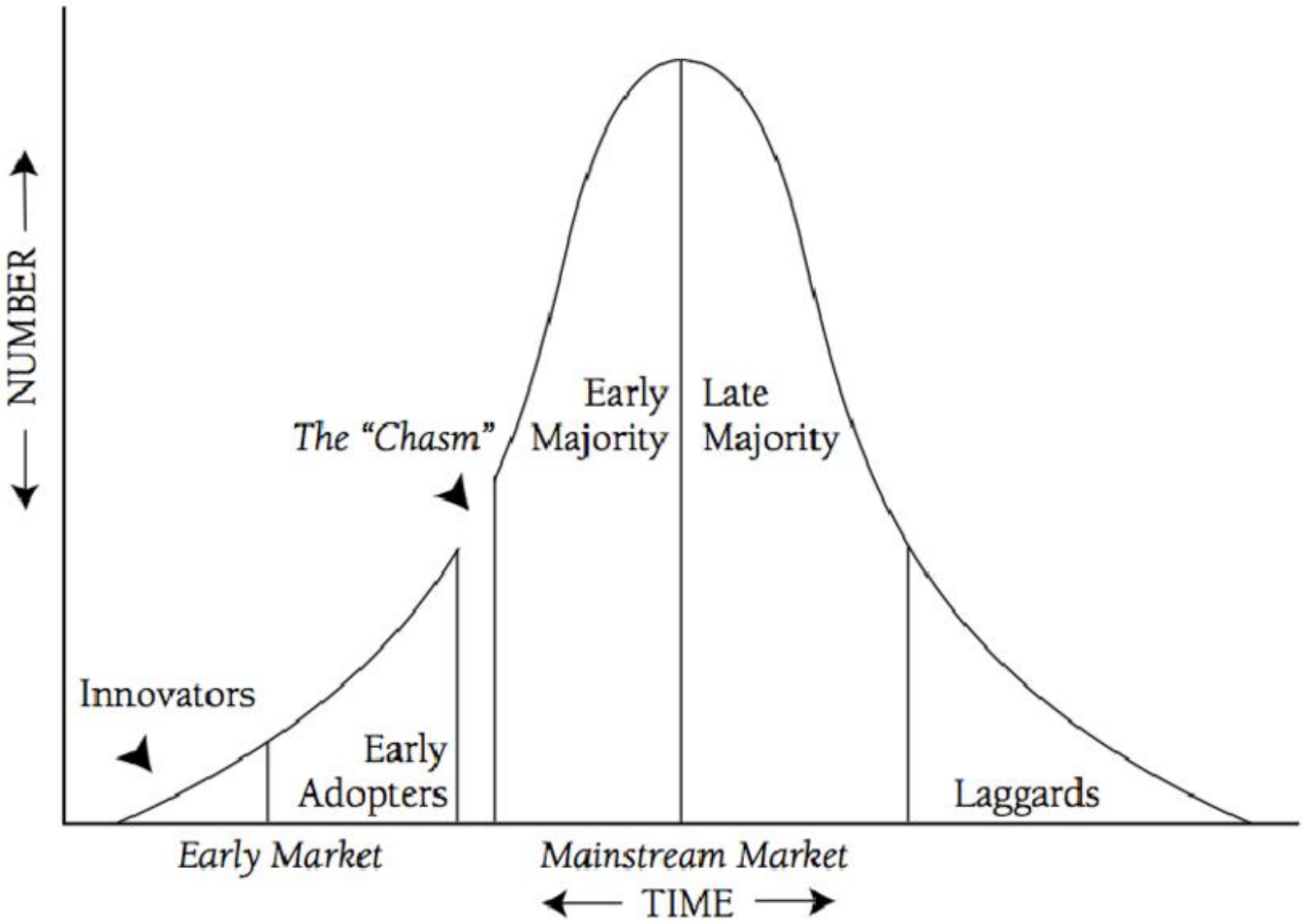
LIFE CYCLE DIMENSIONS

CUSTOMER TYPOLOGIES

MARKET/ INDUSTRY



Number of units bought vs. Time (Gray, 1997)

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LIFE CYCLE DIMENSIONS

CUSTOMER TYPOLOGIES

MARKET/ INDUSTRY

- Innovators: technology enthusiasts
  - Interested in technology an sich
  - Nerds
  - Read technology magazines back to back
  - Easy to reach
  - Some work at tech watch depart-ments, budget to buy one copy of everything
- Early adopters: the visionaries
  - Interested in using state-of-the-art technology to gain substantial business advantage
  - Often senior managers with budget authority
  - Least price sensitive customers, sometimes willing to invest
  - Aware of issues and, disadvantages of new technology, willing to cope with them
  - Love to be in spotlight as reference customer
- Early majority: the pragmatist
  - Risk is a word with a negative connotation
  - Want incremental innovation
  - By proven product from market leader
  - Based on accepted standards
  - Through known channel
  - They don't go to technology fairs, they go to industry fairs
  - They want partners that are knowledgeable about their industry
  - When they have chosen they remain faithful
- Late majority, laggards
  - Don't like technology, are afraid of change and complain about the weather ;-)

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LIFE CYCLE DIMENSIONS

CUSTOMER TYPOLOGIES

- The chasm
  - Arises when early market is saturated and mainstream market is not ready to adopt
  - -> There is no-one to sell to
  - A key challenge for a technology company; many stay stuck with early adopters
- Crossing the chasm
  - Focus all efforts on a single niche, where your product solves the greatest problem (example document management: submission of files of pharmaceutical companies)
  - Size not so important: market leadership is
  - -> Build the whole product, set up distribution channel, conquer this niche
  - Jump to the next niche (parallel bowling pins)
  - Not the sole option, not necessarily successful
    - *Mass adoption of non-specialized technology can supplant your technology*
    - *see PC versus mini-computer*

> A bubble is an (economic) life cycle characterized by the rapid escalation of asset prices followed by a contraction.
>
> It is created by a surge in asset prices unwarranted by the fundamentals of the asset and driven by exuberant market behavior.
>
> When no more investors are willing to buy at the elevated price, a massive sell-off occurs, causing the bubble to deflate.

Investopedia

2019

TULIPMANIA: THE FIRST BUBBLE

MARKET/
INDUSTRY

- What was the first bubble?
- Our Dutch friends…
  - Who also invented the Stock Exchange and New York…
- Tulipmania was a period in the Dutch Golden Age during which contract prices for bulbs of the recently introduced tulip reached extraordinarily high levels and then suddenly collapsed
- By 1635, a sale of 40 bulbs for 100,000 florins was recorded.
  - By way of comparison, a ton of butter cost around 100 florins, a skilled laborer might earn 150 florins a year, and "eight fat swine" cost 240 florins.
- It is generally considered the first recorded speculative bubble
  - (source: wikipedia)

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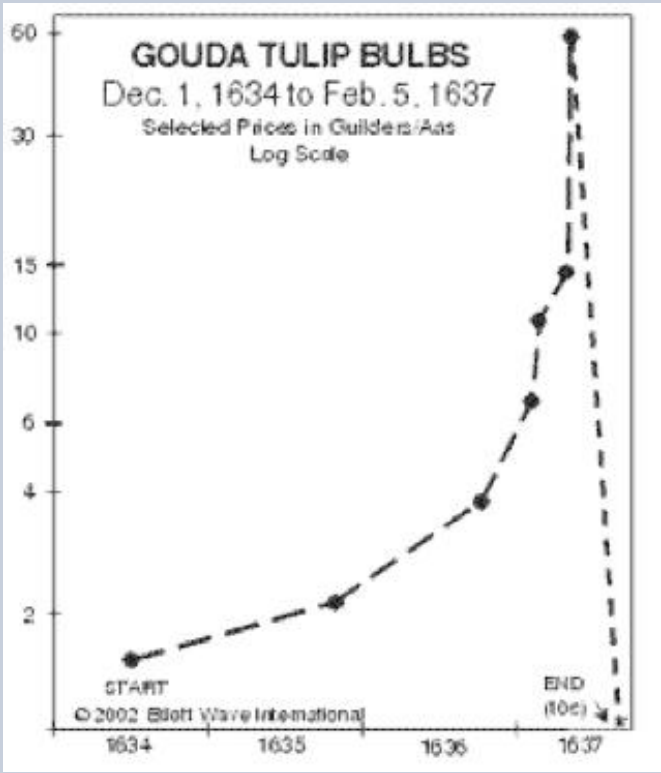
BUBBLES

THE FIRST BUBBLE

MARKET/
INDUSTRY

- At the height of tulipomania in 1635, a single tulip bulb was sold for the following items:
  - four tons of wheat, eight tons of rye
  - one bed, one suit of clothes
  - four oxen, eight pigs, 12 sheep
  - two casks of wine, four tons of beer
  - two tons of butter, 1,000 pounds of cheese
  - one silver drinking cup.
- The present day value of all these items is nearly $35,000!
- By 1637 Tulip prices plunged to less than the present equivalent of a dollar each.
- Feb 2014: Facebook is buying WhatsApp, agreeing to pay $19 billion in cash and stock for the popular smartphone messaging service.
  - (Source: http://www.theflowerbulb.com/plants/Tulipomania.php)



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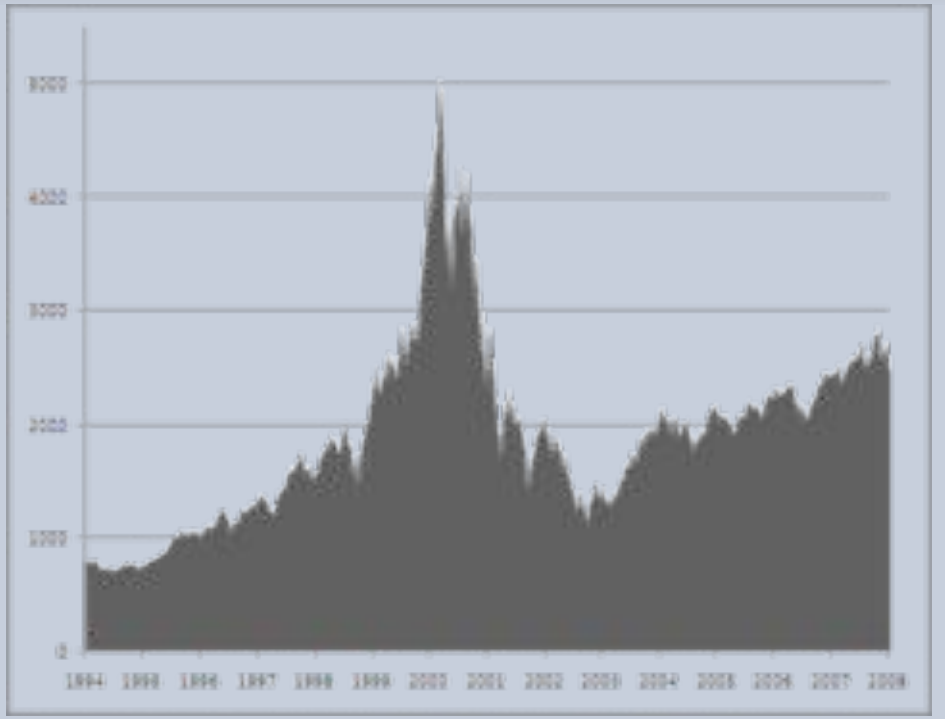
BUBBLES

THE DOT.COM BUBBLE

MARKET/ INDUSTRY

- **Venture capitalists** saw record-setting growth as dot-com companies experienced meteoric rises in their stock prices
- **they moved faster and with less caution** than usual
- During the loss period the companies **relied on venture capital and initial public offerings to pay their expenses while having no source of income at all.**
- The novelty of these stocks, combined with the difficulty of valuing the companies, sent many stocks to dizzying heights and made the initial controllers of the company wildly rich on paper.



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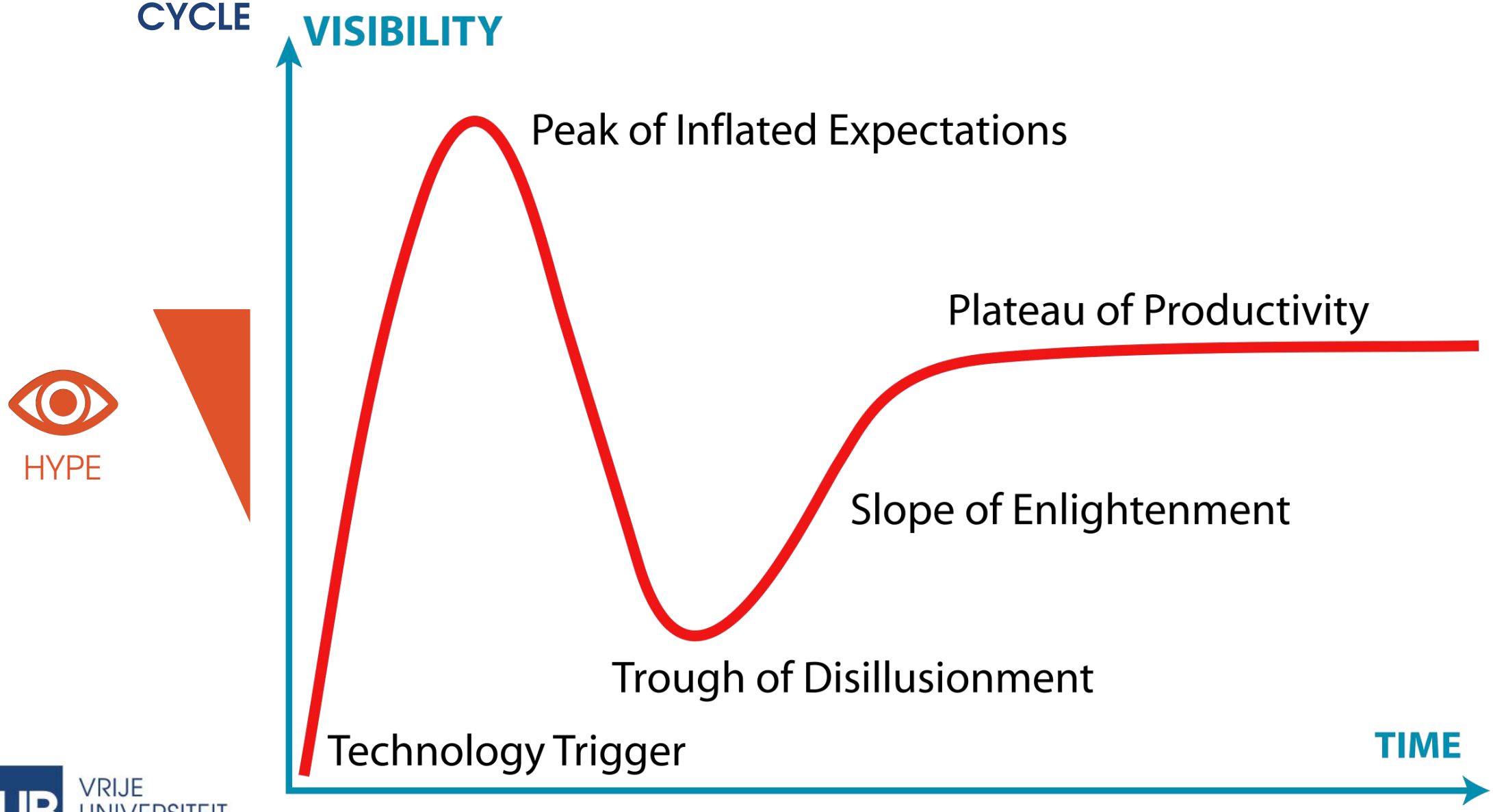
> Gartner hype cycles provide graphic representations of maturity and adoption of technologies and applications, and how they are potentially relevant to solving real business problems and exploiting new opportunities.

Gartner

2019

GARTNER HYPE CYCLE



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GARTNER HYPE CYCLE

FIVE PHASES

1. "**Technology Trigger**" — The first phase is a technological breakthrough, product launch or other event that generates significant press and interest.
2. "**Peak of Inflated Expectations**" — In the next phase, a frenzy of publicity generates over-enthusiasm and unrealistic expectations. There may be some successful applications of a technology, but there are typically more failures.
3. "**Trough of Disillusionment**" — Technologies enter it because they fail to meet expectations and become unfashionable. Consequently, the press abandons the topic and the technology.
4. "**Slope of Enlightenment**" — Although the press may have stopped covering the technology, some businesses continue through the "slope of enlightenment" and experiment to understand the benefits and practical application of the technology.
5. "**Plateau of Productivity**" — A technology reaches the "plateau of productivity" as its benefits become widely demonstrated and accepted. The technology becomes increasingly stable and evolves in second and third generations. The final height of the plateau varies according to whether the technology is broadly applicable or benefits only a niche market.

- (Source: Wikipedia 19/3/2011)

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GARTNER HYPE CYCLE

SOME REMARKS

- Identifying a peak of inflated expectations…
- … and the subsequent fall ...
- It is very hard to judge what is real and what is a bubble
  - Spectacular growth of an industry/market is possible
    - *See Integrated Circuits, GSM...*
  - Companies involved in this market can deliver on a high valuation
- Some considerations
  - Is the market potential real? Will it develop that rapidly?
  - Will the individual company really make money on the adoption wave?
  - Is press and public opinion going in overdrive?

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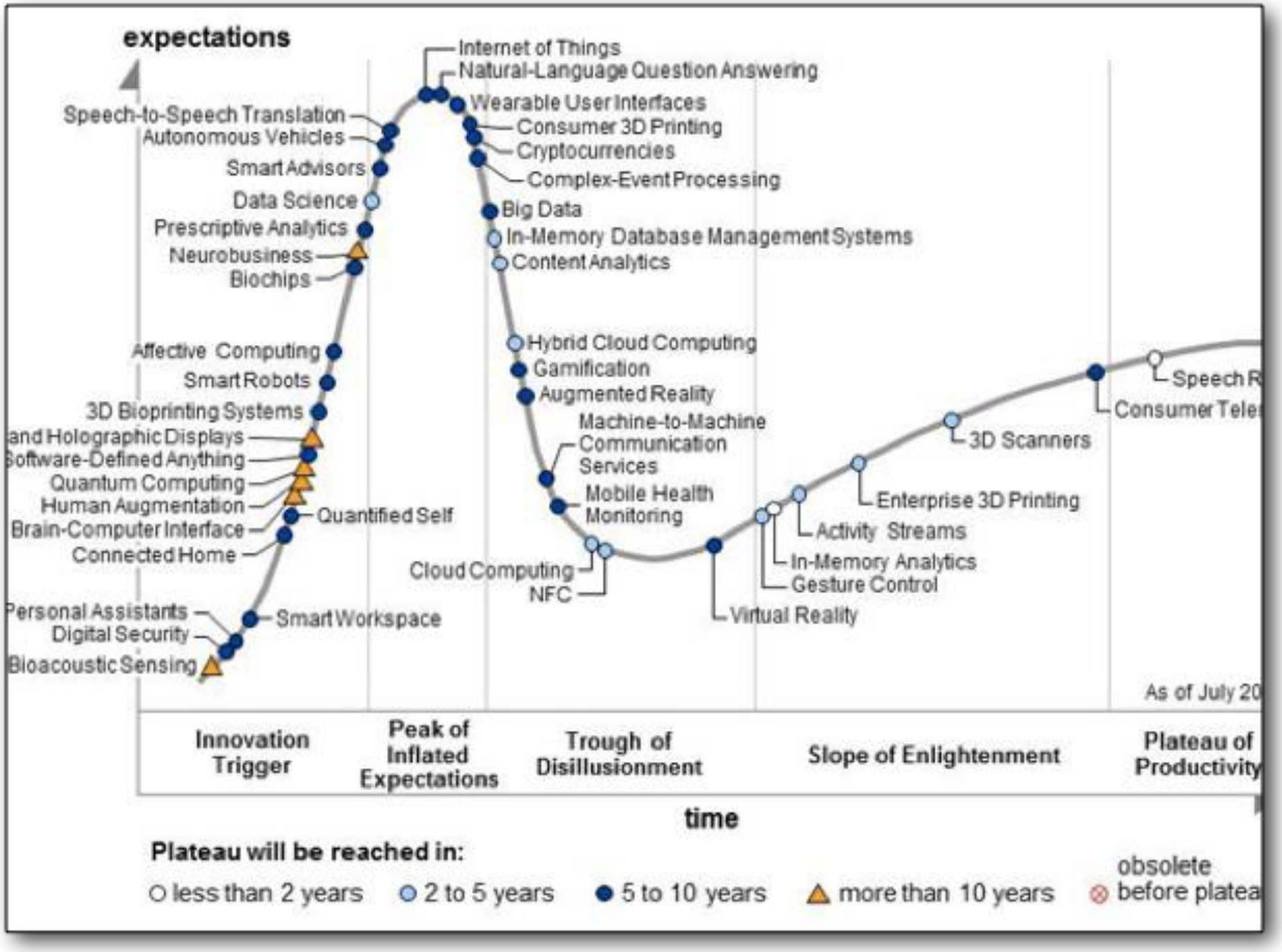
GARTNER HYPE CYCLE

2014



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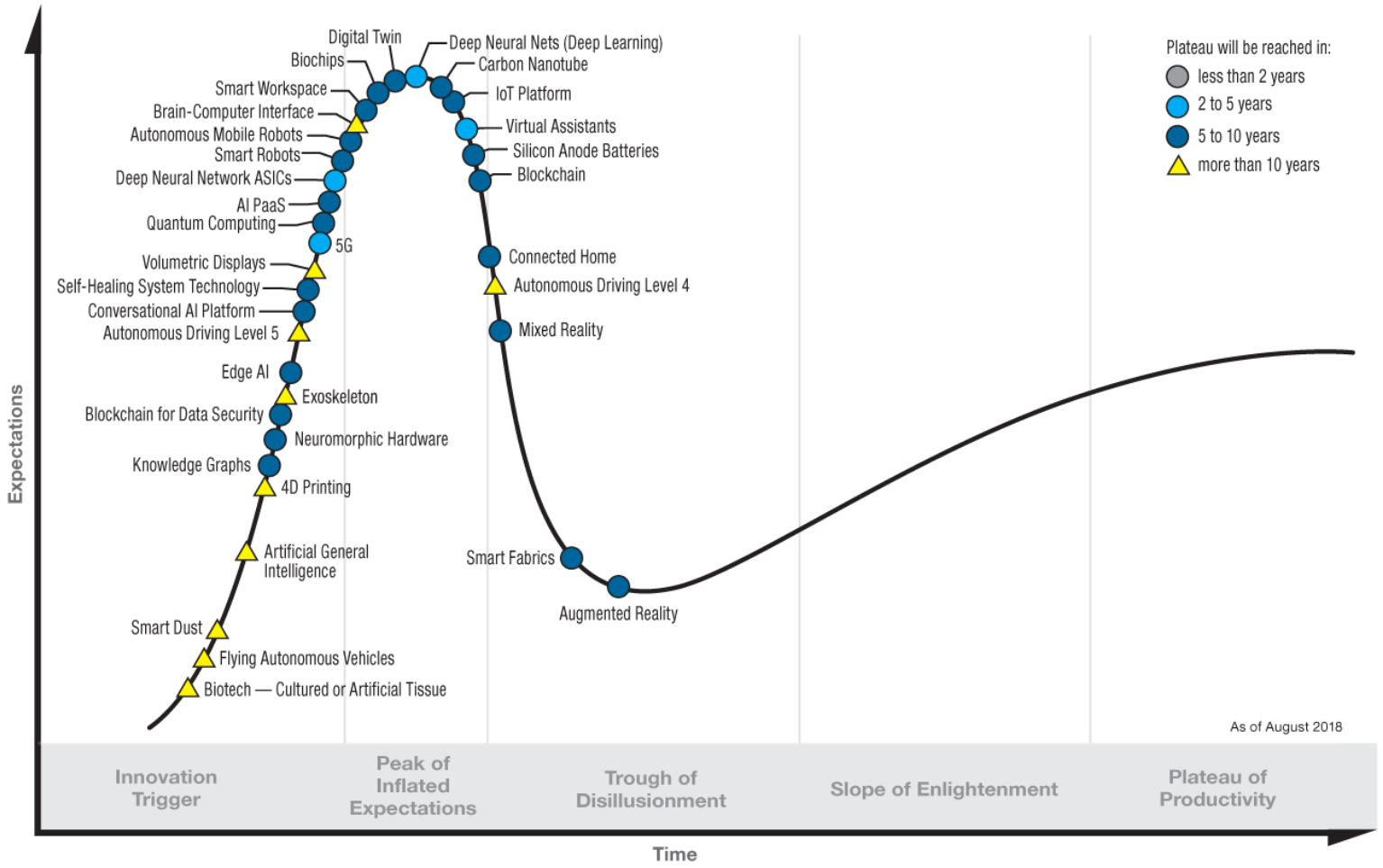
GARTNER HYPE CYCLE

2018

Hype Cycle for Emerging Technologies, 2018



gartner.com/SmarterWithGartner

Source: Gartner (August 2018)

Gartner

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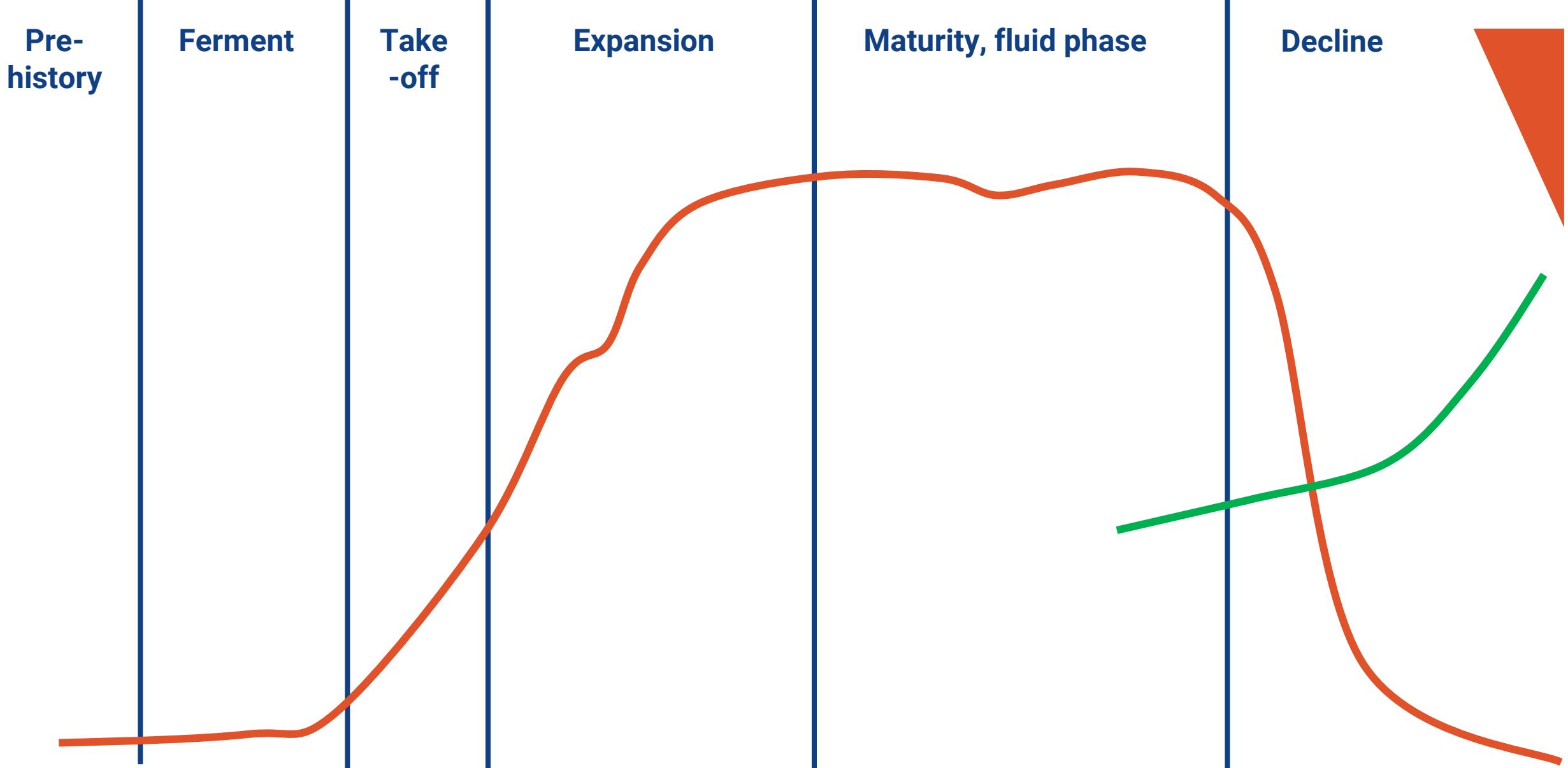

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OUR "BUSINESS ECOSYSTEM" LIFE CYCLE

PREHISTORY

MESO

- All advances happen in a context
- Most innovations are the result of underlying scientific advances
  - An innovation/ILC is always linked to 'what went before'
- Many innovations are a chance event, but the location never is chance
  - Development almost always happens where preceding development happened
- First copy, then innovate (see Japan and China)
- "In the field of observation, chance favors the prepared mind." (Louis Pasteur)
- "the fertile ground"

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OUR "BUSINESS ECOSYSTEM" LIFE CYCLE

FERMENT

MESO

- Gradually the conditions for a major innovation coagulate
  - Technology
  - Complementary technologies, infrastructure, legal context
  - Awareness of importance
- Frantic activity
  - Inventors, entrepreneurs, investors
  - Mostly technologically savvy people
  - Often activity clusters in certain areas
- Nu rules, no references, no standards
- Competitors have a common cause: create buzz, promote acceptance
- The key challenge: validation
  - Does is work?
  - Can you manufacture it?
  - Is there a market?
  - Is there a viable business model?

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OUR "BUSINESS ECOSYSTEM" LIFE CYCLE

- Start of rapid growth of market
- Take-off often starts when
  - The technology is sufficiently mature
  - Surrounding/supporting technologies and infrastructures are available and widely adopted
  - Powerful forces support the adoption
  - (Tacit) agreement on dominant designs
- Tipping point
  - Potentially sudden massive adoption (Cars, fax, GSM; 'Epidemics')
- Lots of media interest
  - Free press coverage for players
- Industry leaders emerge
- Fights for domination
- Industry clusters emerge
- Still lots of entrants (incl. incumbents from neighboring industries)
- Lots of Venture Capital
- Fast incremental, process, complementary innovations
- Industrial aspects increase in importance
- Supply chains emerge
- Customer's view on take-off': when not wanting to be the first is replaced by not wanting to be the last to adopt
- Is it a bubble?
- Keyword: execution
  - Key challenge for entrepreneurs: growing the company
  - Economies of scale, network effects

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OUR "BUSINESS ECOSYSTEM" LIFE CYCLE

EXPANSION

MESO

- A period of spectacular and sustained growth is possible
  - GSM, PC, Google, automotive, pharma…
  - Some innovations permeate into every corner of modern life -> enormous 'collateral growth opportunities'
    - *Vertical players, applying technology to specific markets and problems...*
- Most markets have largest growth after media attention has diminished
- Economies of scale play a major role: revenue generated from initial advantage is used to overwhelm competition, cut prices, give away new products
  - Standard Oil, Microsoft...
- Expansion is difficult moment for newcomers in core industry
  - Economies of scale/network effects
  - Fast incremental innovation
  - Fast company growth
  - Industry consolidation
- But many possibilities for 'peripheral' activities: segments, vertical markets, services, distribution...
  - Pervasiveness of technology defines number of 'segments'
- Market Segmentation -> product differentiation becomes more important
- Geographical extension: new markets open

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OUR "BUSINESS ECOSYSTEM" LIFE CYCLE

WAVES OF INNOVATION

MESO

- **Technology evolves through periods of incremental innovation, interrupted by periods of radical innovations**
- A **radical innovation** leads to a fluid phase, where many **firms enter and compete on the basis of different product designs**
- **Eventually firms converge to a dominant design** which results in a specific phase.
- Competition shifts to **production efficiency and economies of scale**
- Before a dominant design emerges learning curves are weak, and it is easy to enter; after a **dominant design emerges learning curves become more pronounced**
- (Source: Abernathy-Utterback model , Harvard Business School, MIT Sloan School of Management)

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OUR "BUSINESS ECOSYSTEM" LIFE CYCLE

- Innovation trajectory comes to an end
  - Little more to add/improve...
  - Additional features for spreadsheet?
- Innovation shifts to integration of new technologies
  - IT, LEDs, GPS in automotive
- Adoption cycle come to an end
  - Close to 100% penetration
  - May remain large market due to replacement, geographical expansion
- Other dynamics of profitability growth take over
  - economies of scale, synergies
  - mergers and acquisitions
- External shocks
  - New technologies
  - Price of materials, components
  - Geo-economic changes (see the rise of Japan/Korea/China/…)
- Politics, State interests
- Market Entry may become easier again (see waves of innovation)
  - Often driven by complementary assets
    - *Using customer base, brand name, complementary technologies, nationality...*
    - *Google, Apple in mobile telephony; Chinese car manufacturing*
  - Technology of incumbent much easier to copy
    - *Not anymore a moving target*
    - *Restarting design from scratch to match (and top) current offer*
    - *Redefine offer*
- Major challenge: combining size and flexibility
- Even giants can stumble
  - Complacency
  - Disruption

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OUR "BUSINESS ECOSYSTEM" LIFE CYCLE

- And then something happens which makes the technology irrelevant…
  - A new industry life cycle arises, often after a long gestation period
  - Often a series of elements coagulate to create a major impact
  - Often the decline is all of a sudden evident to all
- "I'm not afraid of competition, I'm afraid of becoming irrelevant" (Bill Gates)
- These changes generally happen far above your head, you cannot impact them
  - Many companies are dependent on the success of a certain technology (or region); if the technology (/region) declines, so do they
    - *Photography / newspaper shops*
    - *Supermarkets (regional)*
  - Surfing on the right wave, and getting off in time, is a major success factor in technology entrepreneurship

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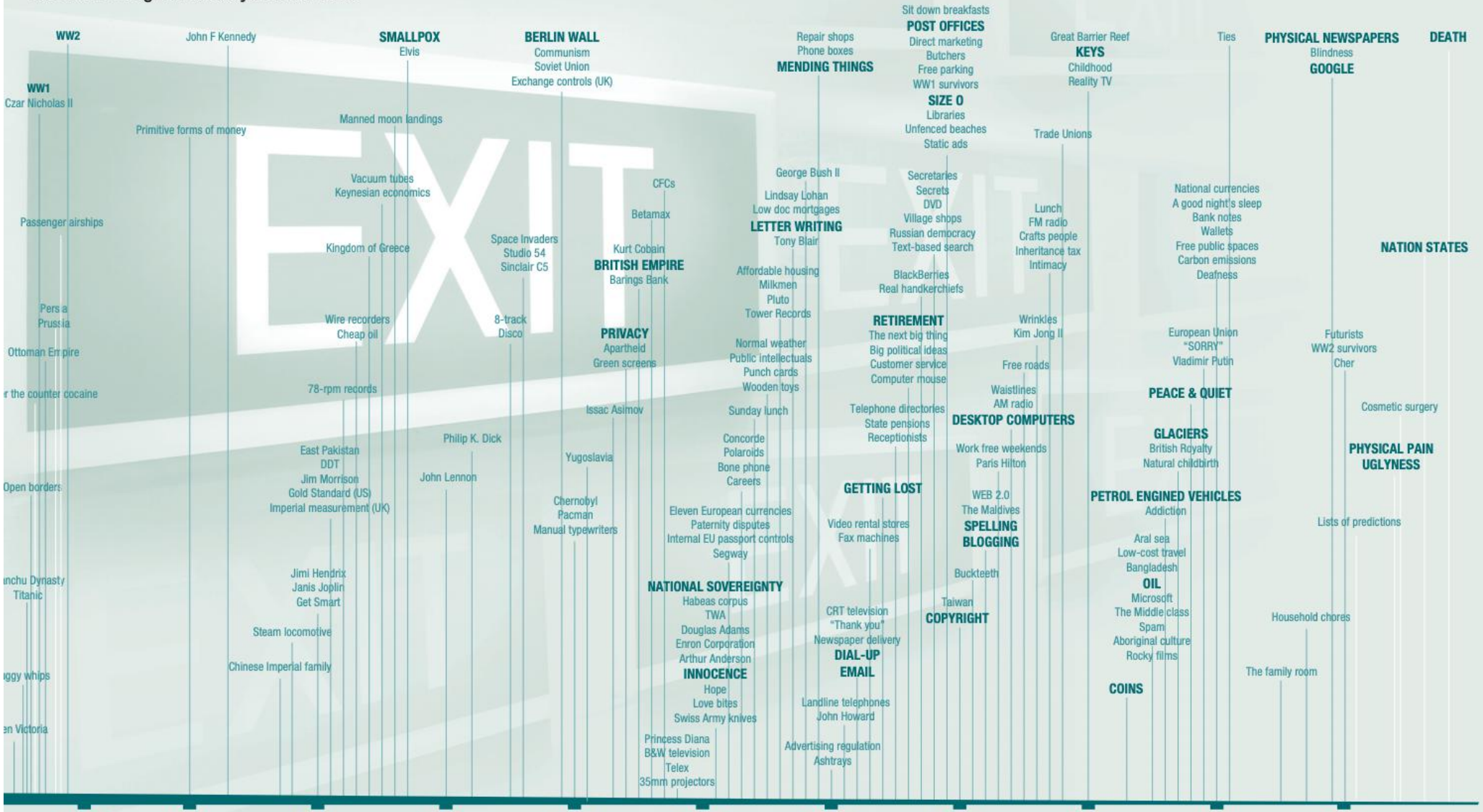
Extinction timeline* 1950-2050

* Existence insignificant beyond this date



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www.futuretrendsbook.com

What'sNext

FUTURE EXPLORATION NETWORK

Predicted Death Date **

** Not to be taken too seriously

OUR "BUSINESS ECOSYSTEM" LIFE CYCLE

CASE BIOTECH

- Prehistory
  - Most innovations are the result of underlying scientific advances
    - *Development of recombinant DNA technology by Boyer and Cohen*
    - *Study of the agrobacterium by Marc Van Montagu and Jeff Schell*
  - An innovation/ILC is always linked to 'what went before'
  - Many innovations are a chance event, but the location never is chance, development almost always happens where preceding development happened
    - *Boyer and Cohen, San Francisco, Genentech*
    - *Van Montagu and Schell, Ghent, Plant Genetic Systems*
    - *'the fertile ground'*
    - *'the prepared mind'*

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OUR "BUSINESS ECOSYSTEM" LIFE CYCLE

CASE BIOTECH

- Ferment
  - Gradually the conditions for a major innovation coagulate
    - *Technology: recombinant DNA technology developed by UCSF and Stanford Scientists Herbert Boyer and Stanley Cohen.*
    - *Complementary technologies, infrastructure, legal context: presence of Silicon Valley, launch of NIH regulations after the Asilomar Moratorium.*
    - *Awareness of importance*
  - Frantic activity
    - *Inventors, entrepreneurs, investors: Boyer believed in commercial viability and together with Robert Swanson (Kleiner and Perkins, Silicon Valley VC) they found Genentech*
    - *Mostly technologically savvy people: scientific pioneers take the lead*
    - *Often activity clusters in certain areas: San Francisco, San Diego (Hybritech, mAB company), Boston…*
  - No rules, no references, no standards
    - *Example: Amgen research portfolio in 1983: human therapeutics, human diagnostics animal health care specialty chemicals*

OUR "BUSINESS ECOSYSTEM" LIFE CYCLE

CASE BIOTECH

- Take-off: Genentech
  - Robert Swanson, first CEO of Genentech, wrote a business plan, 'inventing' a new industry. Target was the synthesis of human **insulin**.
    - *treatment for diabetes*
    - *up till then it was animal insulin (bovine/porcine); so, proven target!*
    - *today: 171m patients 2030: 342m patients*
  - 1978: human insulin synthesized by Genentech and the technology was licensed to Eli Lilly.
  - 1979: human growth hormone cloned by Genentech
  - 1980: IPO raised $35 million. the share opened at $35 and after less than an hour, it reached $88.

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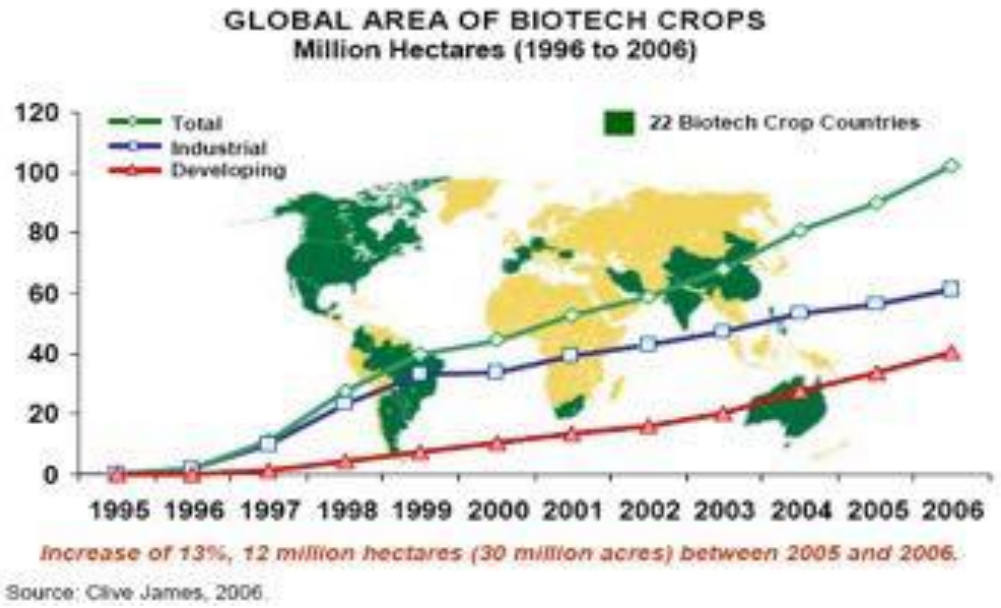
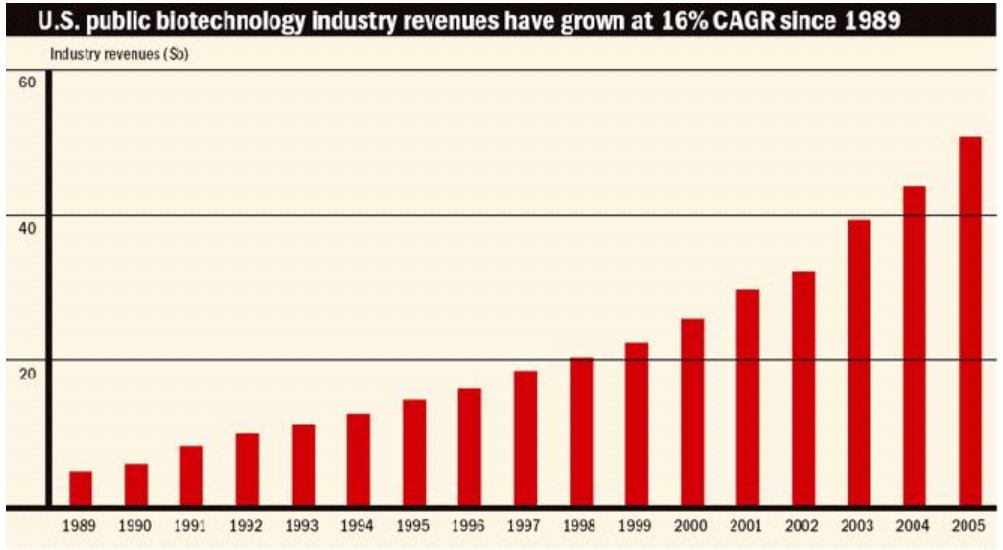
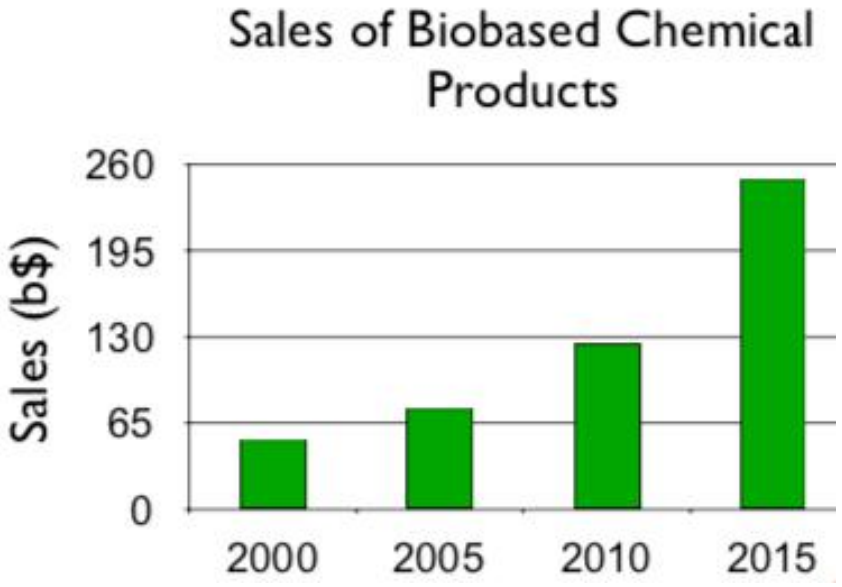
OUR "BUSINESS ECOSYSTEM" LIFE CYCLE

CASE BIOTECH







Expansion…

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QUESTIONS?

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