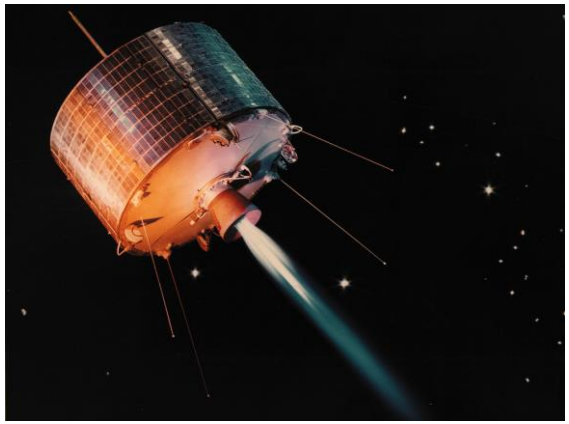
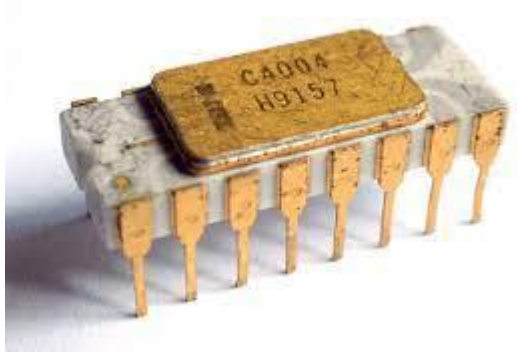
MOT132A

Geerten van de Kaa

Technological innovation

- Innovation funnel





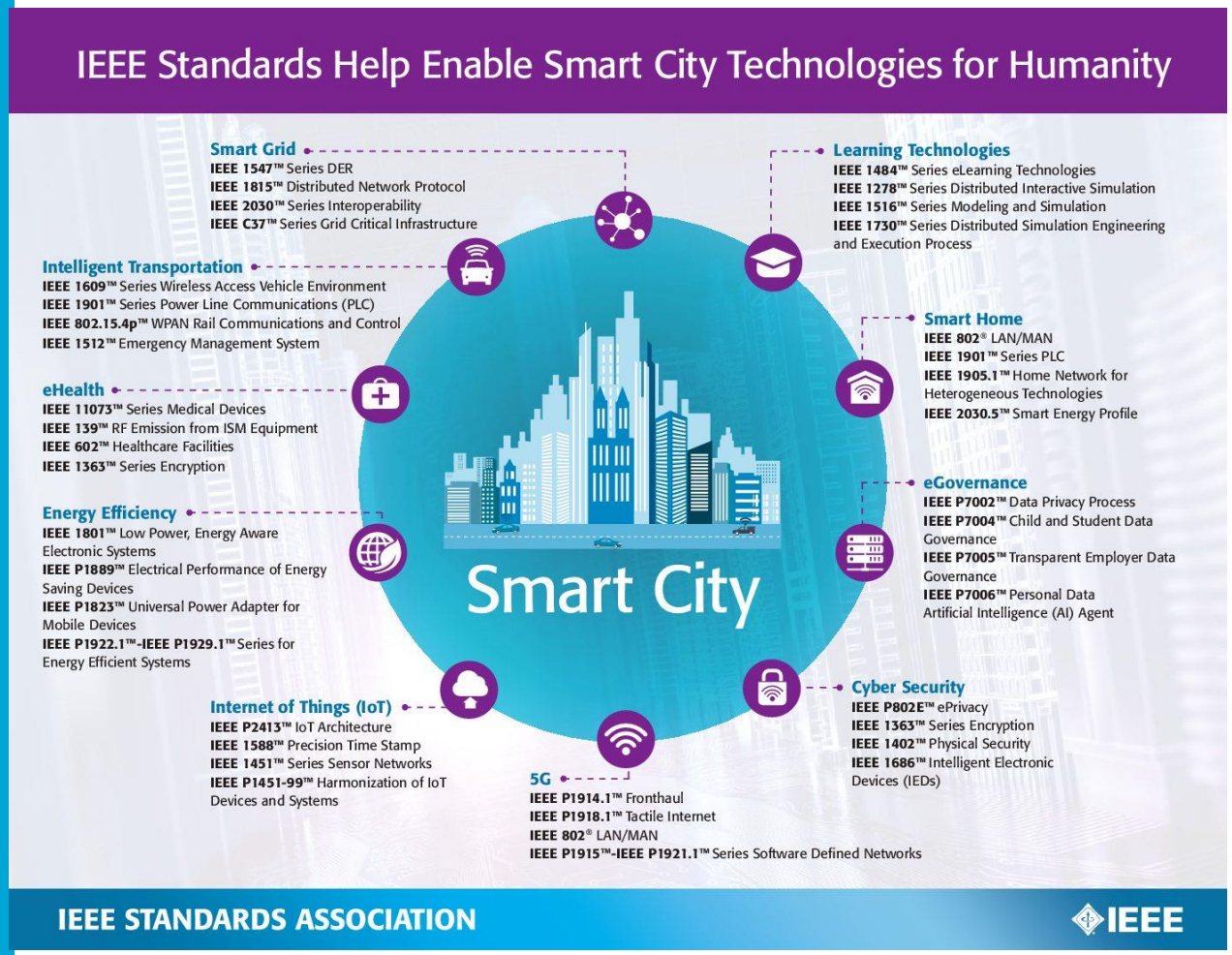
Impact of innovation on society

- GDP
- Solving grand societal challenges


7
AFFORDABLE AND
CLEAN ENERGY

SUSTAINABLE DEVELOPMENT GOALS

11 SUSTAINABLE CITIES AND COMMUNITIES



TU Delft

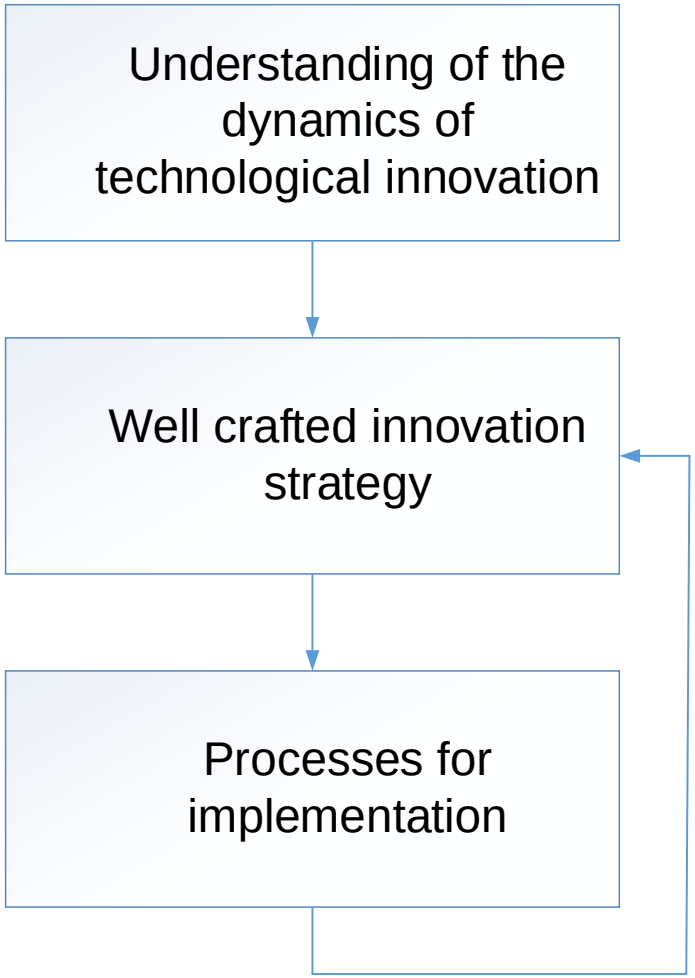
Impact of innovation on society

- Negative externalities

Teaching objectives

- Understanding the theoretical background of technology, strategy and entrepreneurship
- Critically reflect on theory
- Analyze and apply models to real life situations

Course contents



Course format is blended

brightspace

Teaching cases

Teaching components

- Appetizers
- Interactive lectures
- Teaching game
- Teaching cases
- Teaching material
- Quizes

Examination

- Quizes
  - Quizes at the end of the week that will cover that week's study material
  - The quiz will be online at Thursday afternoon and the deadline is Friday evening
  - You get absolutely one attempt to do the quiz, clicking on the link starts the quiz
  - Time limit 30 minutes
  - Average of quizzes count for 30 percent of total grade and should be >=5.75
- Final exam
  - Individual digital exam on book on campus, literature and lectures (70% and should be >= 5.75)

Structure and topics

Lecture 1/2	Types and patterns of technological innovation, standards battles.
	Timing of entry and collaboration strategies
	Factors for technology dominance
Lecture 3/4	Game theory
	Resource based view
	Inclusive/frugal innovation
Lecture 5/6	Entrepreneurship
	Open innovation
	Ambidexterity
	Social network theory

Geerten van de Kaa

Cees van Beers

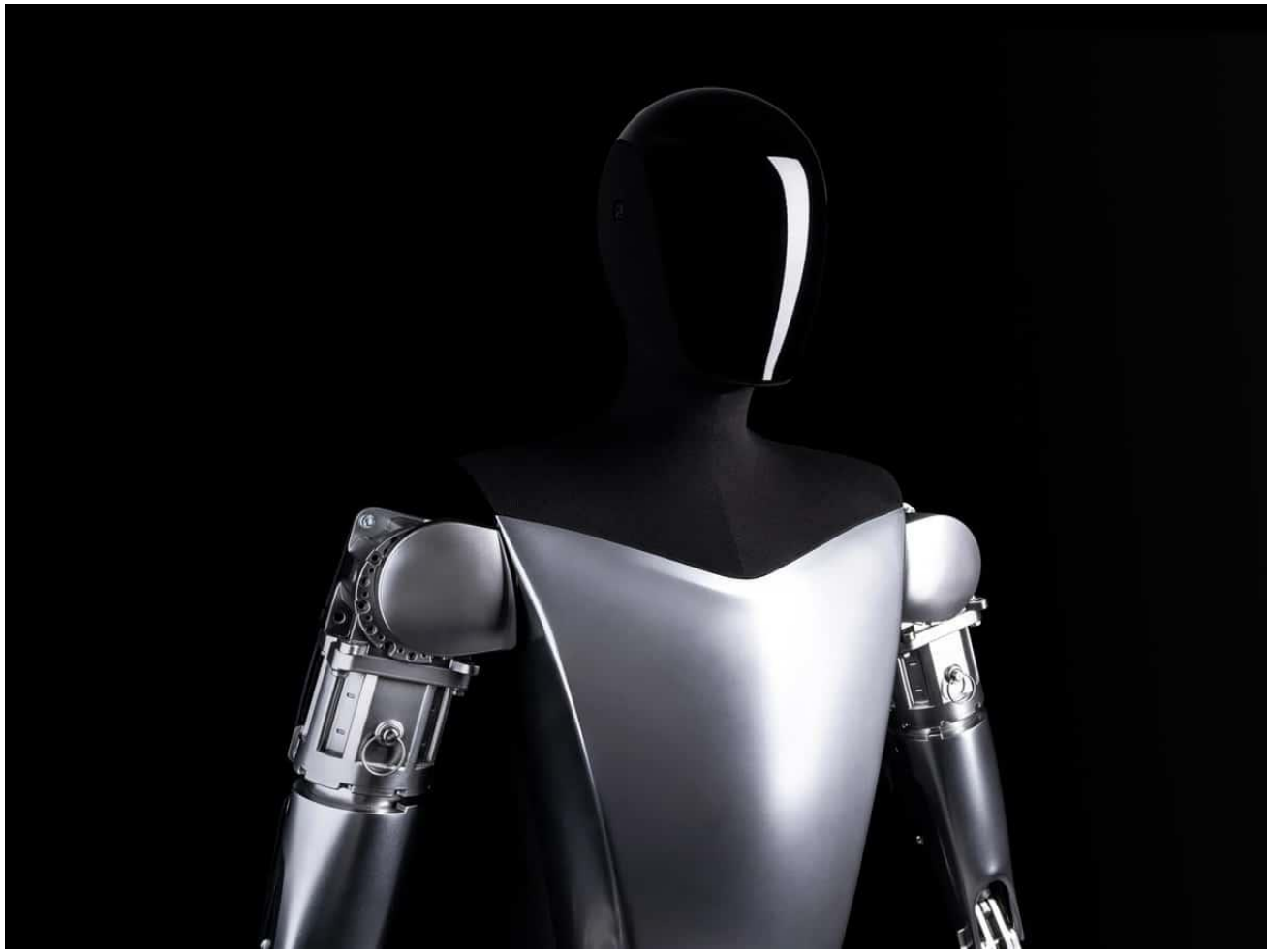
Victor Scholten

Topics lecture 1 and 2

- Types and patterns of technology innovation
- How to achieve dominance with a technology by a firm?
  - Collaboration strategies
  - Timing of entry strategies
- Which factors affect the adoption of technology by firms/consumers?
  - Deployment strategies

Questions?

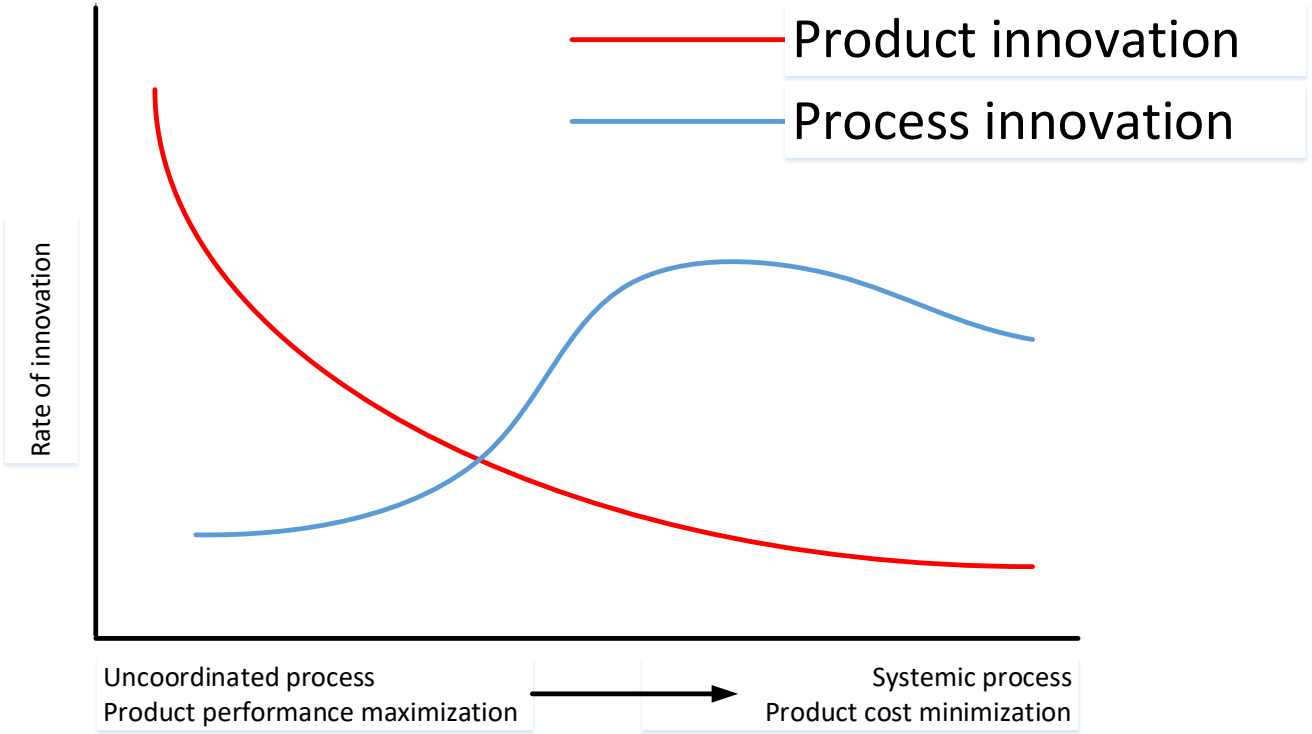
Tesla’s robot



Types and patterns of technological innovation

- Several dimensions are used to categorize innovations.
  - These dimensions help clarify how different innovations offer different opportunities (and pose different demands) on producers, users, and regulators.
- The path a technology follows through time is termed its *technology trajectory*.
  - Many consistent patterns have been observed in technology trajectories, helping us understand how technologies improve and are diffused.
- Technological change tends to be cyclical

Product vs process innovation



- Product innovation can enable process innovations and vice versa
- What is a *product innovation* for one organization might be a *process innovation* for another
  - *moving-band conveyor*

J.M. Utterback, W.J. Abernathy, A dynamic model of process and product innovation, Omega-Int. J. Manage. S., 3 (1975) 639–656.

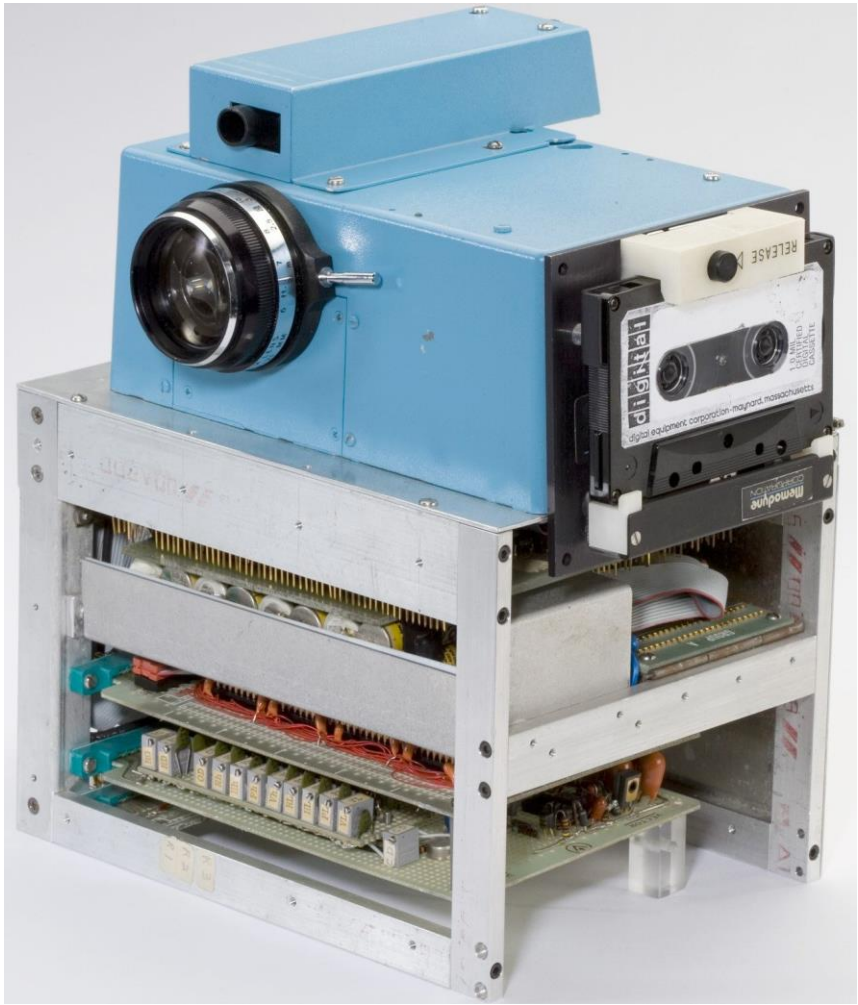
Radical vs incremental innovation

- Radical innovation: Revolutionary changes, departures from existing practice, require new knowledge and are risky for an organization[2]
- Incremental innovation: minor adjustments, simple improvement, no new knowledge required and significantly less risky[2]

[1] Zaltman, G. N., R. B. Duncan and J. Holbek, Innovations and Organizations, John Wiley & Sons, New York, 1973
[2] R.D.D. Dewar, Jane E., The Adoption of Radical and Incremental Innovations: An Empirical Analysis, Management Science, 32 (1986) 1422-1433.

Radical vs incremental innovation

The radicalness of an innovation is relative; it may change over time or with respect to different observers.



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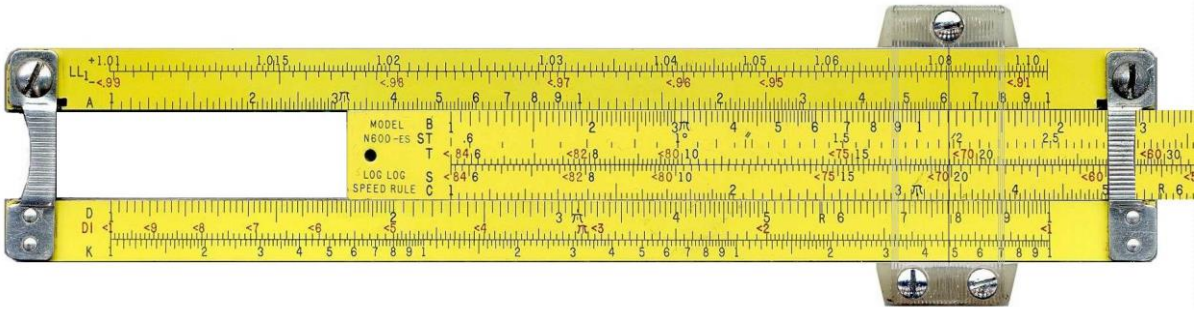
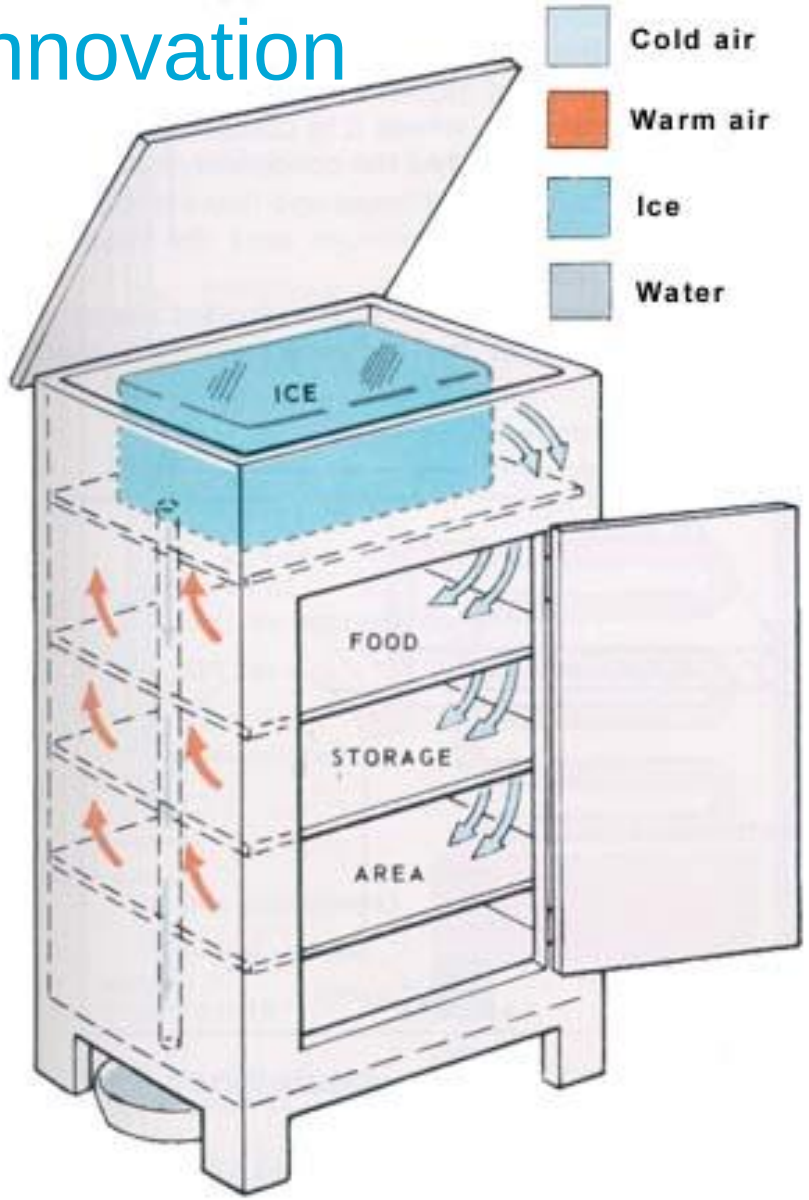
Competence enhancing and destroying innovation

- Competence enhancing innovation: improves or builds upon existing competences of firms
- Competence destroying innovation: renders competences of firms obsolete
- Whether an innovation is competence enhancing or competence destroying depends on the perspective of a particular firm.



Competence enhancing and destroying innovation



Architectural versus Component Innovation

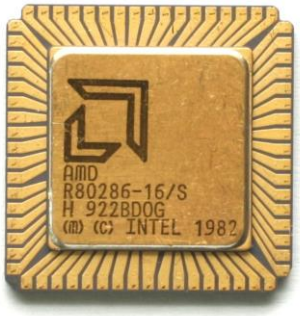
- Most architectural innovations require changes in the underlying components also.
- Architectural innovations are often considered more radical and competence destroying

Sustaining vs Disruptive innovations

- Disruptive innovation: A new product or service that enters at the low end of the market and gradually moves up-market, displacing existing, established products.

Mainframes, mini computers, personal computers

What type of innovations



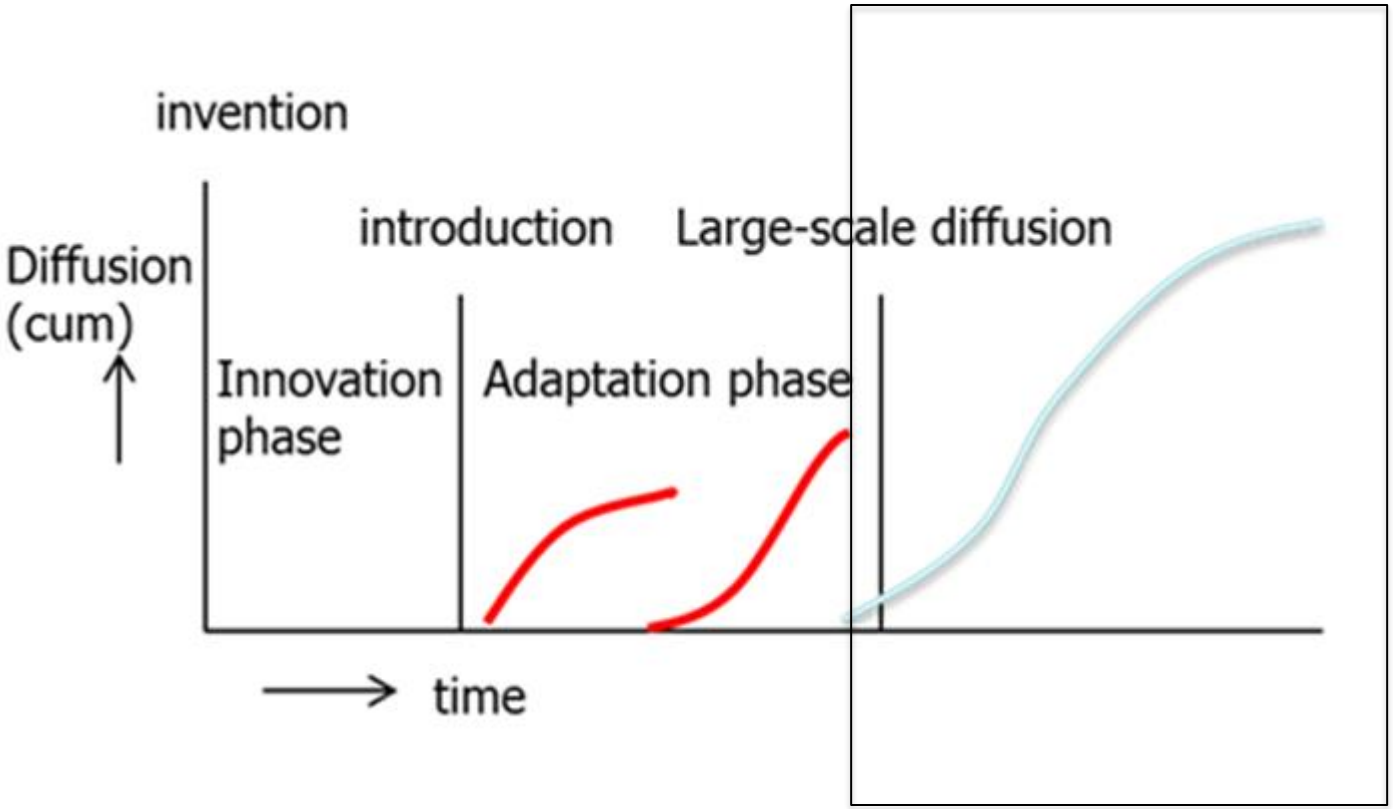
Examples of innovations related to mobile telecommunications?

- Clamshell handset
- Vibrate function
- WAP
- T9 predictive text
- Internal camera
- Dust proof design
- MP3
- Internet
- TV
- Memory capacity
- GSM-GPRS-UMTS
- 4G/5G
- Water proof design
- Health trackers
- Etc.

Mostly product innovations and competence enhancing innovations

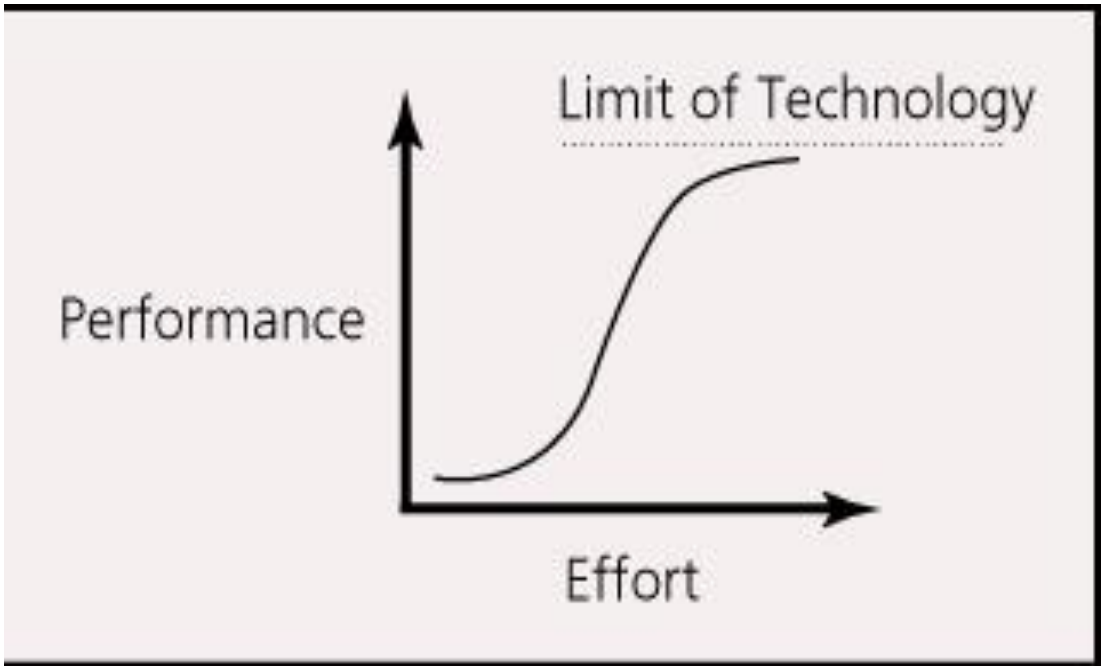
T9 predictive text: component innovation
Different layout: incremental innovation
Iphone: radical innovation?

Technology S-Curves



Technology S-Curves

- Both the rate of a technology's improvement, and its rate of diffusion to the market typically follow an s-shaped curve.
- **S-curves in Technological Improvement**



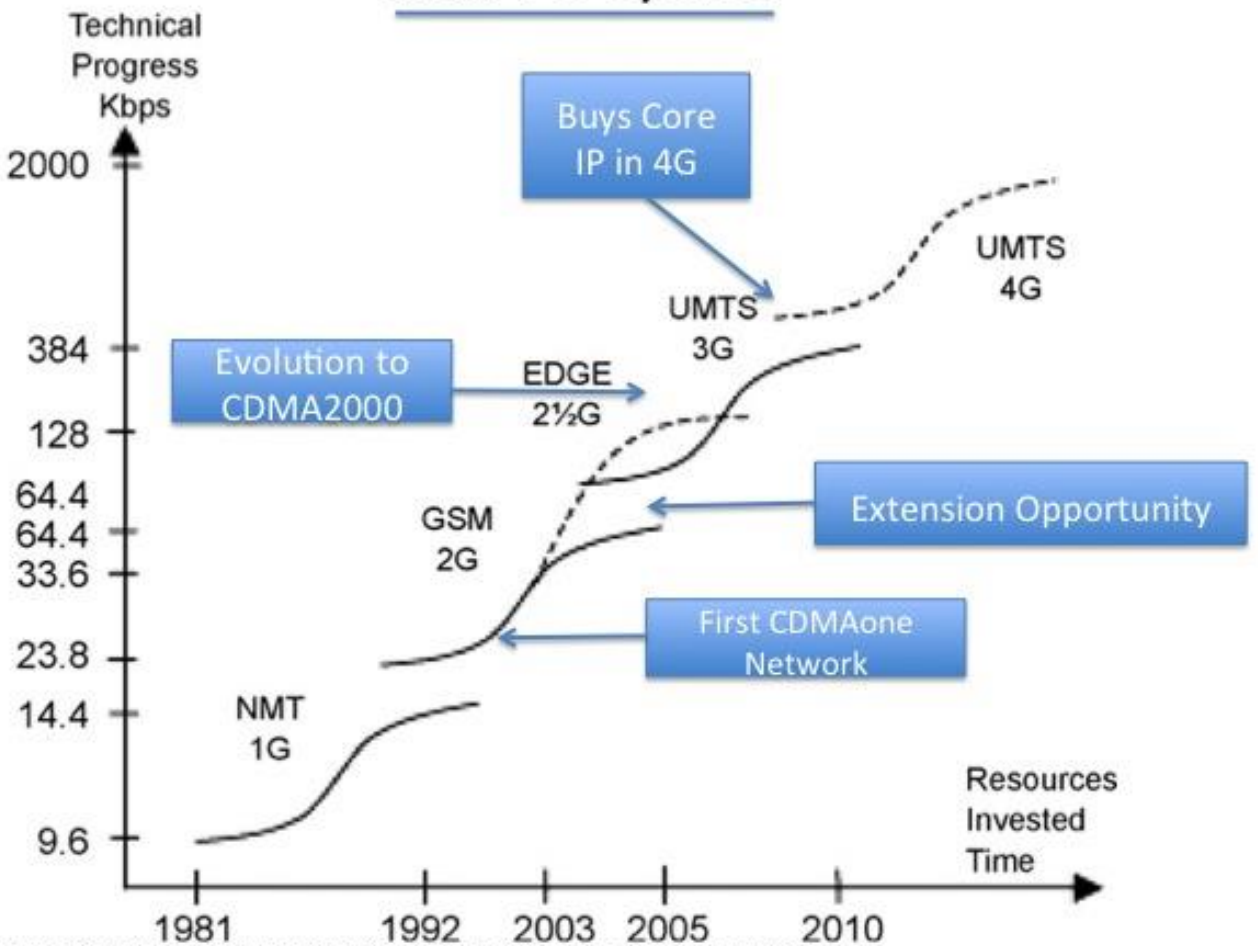
Technology S-Curves

- Technologies do not always get to reach their limits and may be displaced by new, *discontinuous technologies*

- Firms may be reluctant to adopt new technology because performance improvement is initially slow and costly, and they may have significant investment in incumbent technology

Technology S-Curves

At the forefront of innovation through 2G, 3G and 4G cycles

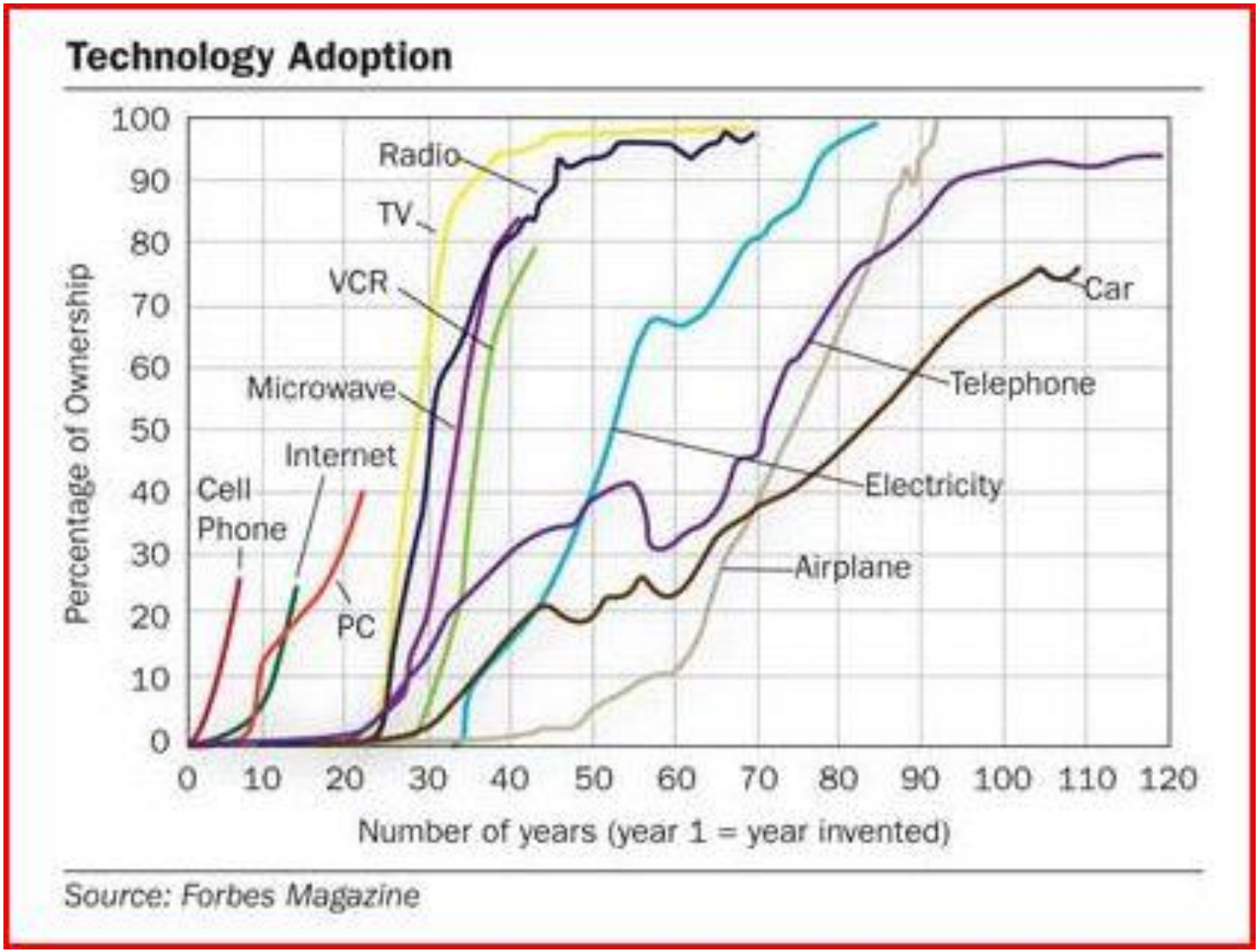


Source: Inter-generational transitions in socio-technical systems: The case of mobile communications

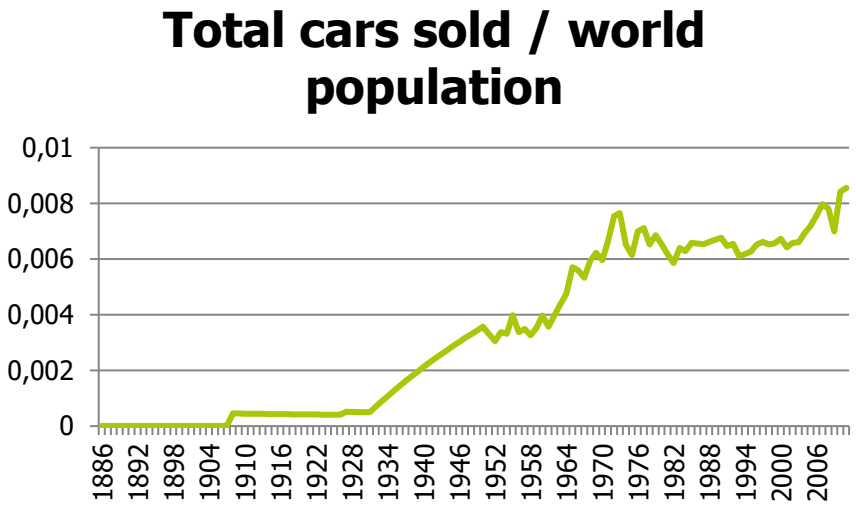
Technology S-Curves

- **S-Curves in Technology Diffusion**
  - S-curves of diffusion are in part a function of s-curves in technology improvement

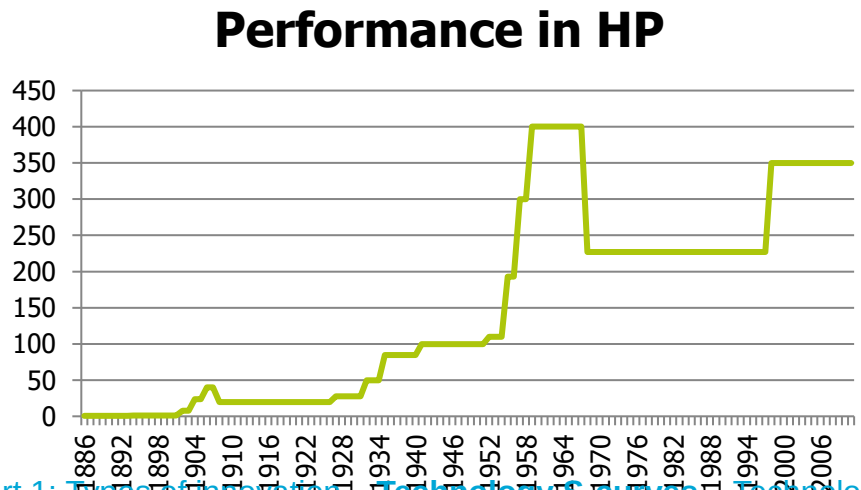
Technology S-Curves



Example: personal transportation (see online video)



Technology s-curves in diffusion

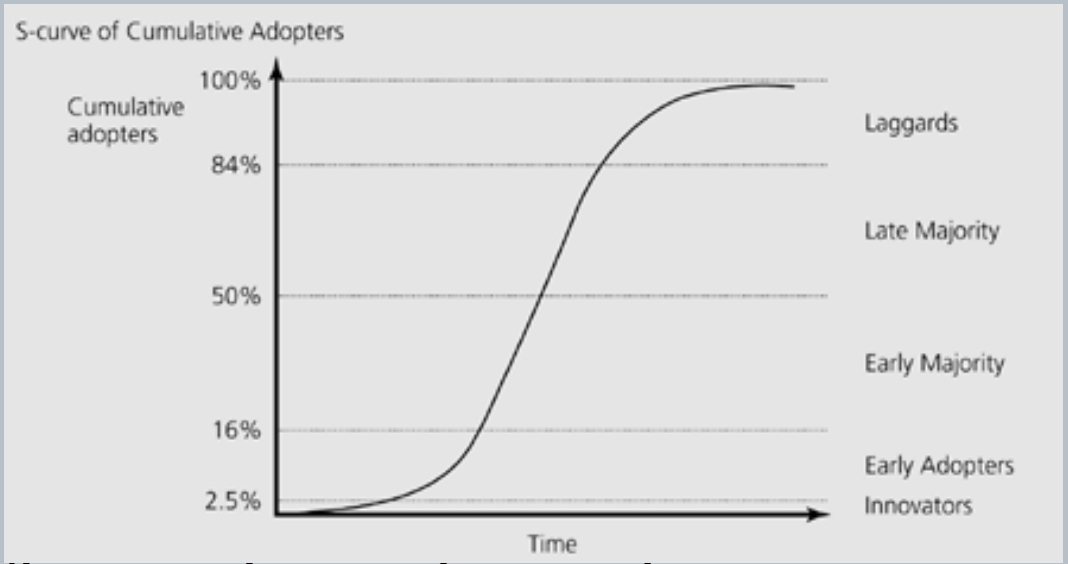


Technology s-curves in performance

Research Brief

Diffusion of Innovation (Rogers 1962)

- **Adopter Categories**
  - **Innovators**
  - **Early Adopters**
  - **Early Majority**
  - **Late Majority**
  - **Laggards**

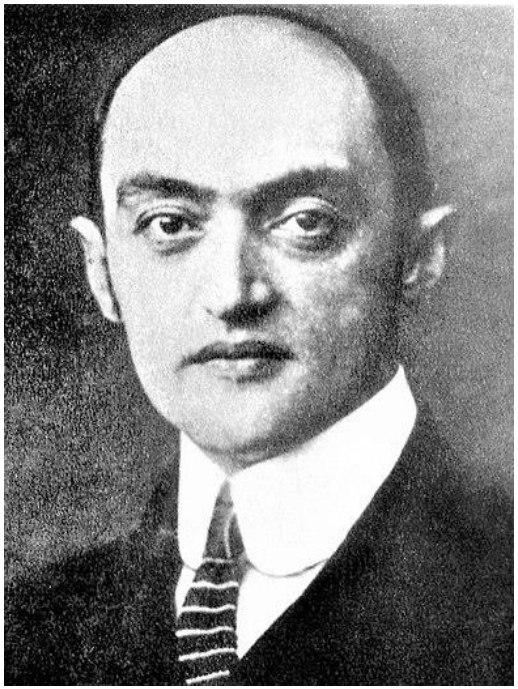


  - **trying to convince the mass of a new idea is useless, convince innovators and early adopters first.**

Technology cycles

Creative destruction

- The dismantling of long-standing practices in order to make way for innovation.



Technological change

- Technological change tends to be cyclical:
  - Each new s-curve ushers in an initial period of turbulence, followed by rapid improvement, then diminishing returns, and ultimately is displaced by a new technological discontinuity.

Technological change