# Information Economy, Business and Society

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Master Iren
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DATA

RESEARCH & DISCOVERY — AUTHORING & RESEARCH OUTPUT — PEER REVIEW — PUBLISH & DISTRIBUTE — POST-PUBLICATION

## RESEARCH & DISCOVERY

### RESEARCHER/SCIENTIST
**ACTIONS**
- Secure grants/funding
- Conduct research/ experiments
- Collaborate
- Manage & analyze data
- Exchange ideas
- Analyze data from tools (e.g., altmetrics)

**INVESTMENTS**
- Self-fund travel to conferences
- Invest time in collaboration
- Invest in research materials
- Invest in memberships

**REWARDS**
- Enhanced reputation
- Career advancement / tenure
- Improved peer network
- Potential new funding

**WHAT KEEPS ME UP AT NIGHT**
- Lack of funding opportunities
- Not complying with OA mandates
- Bias towards English language
- Lack of funding for developing countries
- How to collaborate with Chinese peers
- No incentives for investment in reproducibility
- Flawed rankings
- Administrative and teaching loads
- Success measured by publishing in high impact journals

### INSTITUTION
**ACTIONS**
- Manage research budgets
- Secure grants for research
- Provide library support
- Host research results/data
- Report and track funds
- Balance support for established/ junior researchers
- Analyze data from tools (e.g., altmetrics)

**INVESTMENTS**
- Invest in collaboration platforms
- Invest in research databases/ platforms
- Invest in benchmarking tools
- Invest in text/data mining tools
- Fund labs/salaries

**REWARDS**
- Solve global issues
- Create jobs
- Attract talent
- Attract more students
- Attract more research funding
- Keep government and administration happy
- Raise reputation

**WHAT KEEPS ME UP AT NIGHT**
- Lack of funding opportunities
- Not complying with OA mandates
- Bias towards English language
- Recognizing competition from Chinese peers
- Flawed rankings
- Complying with grant guidelines
- Pressure of university rankings
- Political and fiscal pressures on government funding

### FUNDER/GOVT AGENCY
**ACTIONS**
- Solicit/review proposals
- Fund research / award grants
- Set research policies
- Vet researchers
- Raise funds
- Balance support for established/junior researchers
- Analyze data from tools (e.g., altmetrics)

**INVESTMENTS**
- Pay and develop staff
- Host trainings
- Fund research grants
- Allocate block grants to institutions
- Set policy agenda

**REWARDS**
- Fulfill mission and related goals
- Keep government and administration happy
- Secure additional funding to provide more grants

**WHAT KEEPS ME UP AT NIGHT**
- Creating funding opportunities
- Ensuring that funding supports our goals
- Bias towards English language
- Recognizing competition from Chinese peers
- Flawed rankings
- Securing funding for rare diseases
- Political and fiscal pressures on government funding

### PUBLISHER
**ACTIONS**
- Provide curated resources
- Provide research and collaboration platforms
- Support for scientific networks
- Provide guidance for researchers
- Balance support for established/ junior researchers
- Analyze data from tools (e.g., altmetrics)

**INVESTMENTS**
- Investment in staff, technology and infrastructure
- Invest in research collaboration
- Invest in development of societies
- Invest in text/data mining tools

**REWARDS**
- Drive revenue
- Foster new products
- Attract new customers
- Raise reputation
- Build networks
- Support new discoveries
- Engage stakeholders
- Support society members

**WHAT KEEPS ME UP AT NIGHT**
- Lack of funding opportunities
- Threats from non-traditional publishing sources
- Recognizing competition from Chinese peers
- Anti-publisher sentiments
- Non-compliance with OA mandates

**TOOLS AND SERVICES**
Examples of organizations that serve research & discovery are: reference manager and collaboration software (Mendeley, F1000Workspace, papers, ReadCube, Zotero); electronic lab notebooks (LabArchives, OneNote); grant writing software (GrantHub, Oracle PeopleSoft); collaboration networks (ResearchGate, Academia.edu); digital identifiers (ORCID, Ringgold, ISNI); discovery tools (Google Scholar/Google, ProQuest Summon, OCLC WorldCat, Dimensions, Symplectic Discovery, VIVO); A&I services (Scopus, ScienceOpen); data collection of posters/conferences (Morressier); and identifying experts in a specific field (Expert Lookup); non-publishing learned societies providing research collaboration, conferences, education, etc.

## AUTHORING & RESEARCH OUTPUT

### RESEARCHER/SCIENTIST
**ACTIONS**
- Research publishers
- Submit and revise manuscript/ patent/standard
- Suggest peer reviewers
- Collaborate w/w to write up results
- Seek pre-submission guidance

**INVESTMENTS**
- Invest time/resources in research output
- Invest in professional development

**REWARDS**
- Enhanced reputation
- Career advancement/tenure
- Improved peer network
- Advance science/knowledge

**WHAT KEEPS ME UP AT NIGHT**
- Limited career opportunities
- Predatory journals

### INSTITUTION
**ACTIONS**
- Self-publish research
- Host supplemental data
- Support peer review & editorial services
- Provide access to content
- Provide tools like Symplectic and Pure

**INVESTMENTS**
- Pay salaries
- Invest in collaboration tools
- Invest in research databases/platforms
- Invest in benchmarking tools
- Invest staff time for OA
- Invest in text/data mining tools

**REWARDS**
- Solve global issues
- Attract talent
- Attract more students
- Attract more research funding
- Raise reputation
- Advance science/ knowledge

**WHAT KEEPS ME UP AT NIGHT**
- Pressure on researchers/ talent
- Understanding open science practices
- Support for non-native English speakers
- Pressure on library budgets

### FUNDER/GOVT AGENCY
**ACTIONS**
- Provide submission platform
- Provide block grants for OA
- Track compliance with funder mandates
- Fund further research
- Publicize funded research
- Set funding policies

**INVESTMENTS**
- Invest in submission platforms
- Raise and track funding

**REWARDS**
- Provide access to articles / data sets
- Enable sharing of research
- Recognition for advancement of science

**WHAT KEEPS ME UP AT NIGHT**
- Pressure to ensure open science
- Understanding open science practices
- Pressure of faulty research on our reputation

### PUBLISHER
**ACTIONS**
- Provide submission/product platforms
- Provide authoring/ collaboration tools
- Structure OA agreements
- Provide pre-submission guidance

**INVESTMENTS**
- Invest in research/ collaboration platforms
- Invest staff time in pre-submission activities
- Invest in reviewer networks
- Invest staff time for OA

**REWARDS**
- Increase engagement with authors
- Foster new products
- Attract new customers
- Expand society membership
- Raise reputation
- Develop scientific networks
- Drive revenue
- Advance science/knowledge

**WHAT KEEPS ME UP AT NIGHT**
- Pressure on publishing ecosystem
- Understanding open science practices
- Support for non-native English speakers
- Competition for top talent

**TOOLS AND SERVICES**
Examples of organizations that serve authoring & research output are editing services (Editage, Scribbr); authoring, reference manager and collaboration software (Mendeley, F1000Workspace, overleaf, ReadCube papers, Authorea, Overleaf); research and data organization (Labguru, figshare); licensing services for securing third-party rights to content used in research output (copyright.com, RightsLink, PLS)

## POST-PUBLICATION

### RESEARCHER/SCIENTIST
**ACTIONS**
- Post article
- Share content
- Market content
- Track impact
- Track altmetrics

**INVESTMENTS**
- Time/effort

**REWARDS**
- Advance science / solve global issues
- Enhanced reputation
- Career advancement/tenure

**WHAT KEEPS ME UP AT NIGHT**
- Ensuring post-publication compliance

### INSTITUTION
**ACTIONS**
- Make articles accessible
- Archive articles/data
- Mine data sets
- Track usage statistics
- Ensure details are registered in CRIS

**INVESTMENTS**
- Subscription costs
- Library system technology costs
- Archiving costs
- Staffing costs
- Licensing costs

**REWARDS**
- Advance science / solve global issues
- Attract talent
- Attract more students
- Attract more research funding
- Raise reputation

**WHAT KEEPS ME UP AT NIGHT**
- Ensuring post-publication compliance

### FUNDER/GOVT AGENCY
**ACTIONS**
- Measure impact of article
- Seek additional funding opportunities
- Check for compliance

**INVESTMENTS**
- Time/effort
- Staffing costs

**REWARDS**
- Advance science / solve global issues
- Attract more funding
- Raise reputation

**WHAT KEEPS ME UP AT NIGHT**
- Incomplete impact data

### PUBLISHER
**ACTIONS**
- Archive articles and data
- Measure impact factor
- Track usage statistics
- Track altmetrics

**INVESTMENTS**
- Marketing costs
- New product development costs
- Operational costs for tracking
- Archiving costs
- Staffing costs

**REWARDS**
- Drive revenue
- Advance science / solve global issues
- Attract new customers
- Expand society membership
- Raise reputation
- Identify future authors

**WHAT KEEPS ME UP AT NIGHT**
- Sharing sites (Sci-Hub, ResearchGate) threaten revenue and value
- Pressure from CC-BY and other licensing mandates threatens licensing revenue

**TOOLS AND SERVICES**
Examples of organizations that serve post-publication are: altmetrics (Altmetric, Plum Analytics); reputation management (Kudos, ImpactStory); text & data mining tools, document delivery (RightFind, Reprints Desk); A&I services (Scopus, ScienceOpen); software (Esploro); plagiarism technology (Similarity Check, Turnitin); archiving networks (ResearchGate, Academia. edu); archiving software (LOCKSS, CLOCKSS); licensing services copyright.com, RightsLink, PLS, Creative Commons), CRIS or Research Information Systems (Symplectic, Pure).

## PUBLISH & DISTRIBUTE

### RESEARCHER/SCIENTIST
**ACTIONS**
- Revise content
- Review proofs
- Publish content
- Publish supplementary data
- Promote research

**INVESTMENTS**
- Subscribe to marketing tools (e.g., Kudos)
- Time invested for author profiles, ORCID records, etc.

**REWARDS**
- Advance career/tenure
- Enhance reputation in institution
- Enhance reputation outside institution

**WHAT KEEPS ME UP AT NIGHT**
- Worry about impact of my research
- Pressure of "publish or perish"

### INSTITUTION
**ACTIONS**
- Provide platforms to self-publish
- Host research-related data
- Catalog, tag, and archive research
- Assign DOIs for data
- Incentivize publication of negative results

**INVESTMENTS**
- Invest in websites/platforms/ repositories and appropriate processes
- Invest in integrated library system technology
- Subscribe to marketing tools (e.g., Kudos)
- Invest staff time in managing APCs and embargoes

**REWARDS**
- Achieve institutional mission
- Attract talent
- Attract more students
- Attract more research funding
- Raise reputation

**WHAT KEEPS ME UP AT NIGHT**
- Flat or diminishing library budgets
- How to support/fund publication/sharing of research data.
- The demands of negotiating OA
- Pressure from entities like Sci-Hub

### FUNDER/GOVT AGENCY
**ACTIONS**
- Track research output
- Track compliance
- Provide platforms to self-publish research results
- Support sharing (data, code, MSS, etc.)
- Incentivize publication of negative results

**INVESTMENTS**
- Invest in platforms that enable self-publishing
- Invest in websites/ platforms/repositories and appropriate processes

**REWARDS**
- Achieve mission
- Raise reputation

**WHAT KEEPS ME UP AT NIGHT**
- Change in ecosystem due to OA
- How to support/fund publication/sharing
- Pressure on our mission due to disruption of ecosystem

### PUBLISHER
**ACTIONS**
- Edit content
- Design and package
- Assign metadata / enable discoverability
- Publish
- Curate volumes/issues
- Distribute/host content directly
- Set up third-party distribution
- Deposit in repositories, archive content / manage data
- Manage permissions for reuse
- Liaise with society partners
- Market/preview content
- Incentivize publication of negative results
- Mine data sets

**INVESTMENTS**
- Invest in editorial and/or production platforms
- Invest in web sites/platforms/repositories and appropriate processes
- Pay distribution fees to aggregators
- Pay annual dues to standards organizations
- Pay typesetters and metadata taggers
- Invest in staff
- Pay other third-party fees

**REWARDS**
- Achieve revenue targets
- Gain new insights and products
- Attract new customers
- Raise reputation
- Enhanced growth in society membership

**WHAT KEEPS ME UP AT NIGHT**
- Funder pressure to publish in OA
- How to support/fund publication/ sharing
- Sharing sites (SciHub, ResearchGate) will reduce revenue
- The demands of negotiating OA
- Pressure to meet Horizon 2020/2021 demands

**TOOLS AND SERVICES**
Examples of organizations that serve publish & distribute are digital content development and hosting services (HighWire, Ingenta, Atypon, Silverchair, Hindawi, RedLink, ReadCube, Esploro, Zotero); open access publishing platforms (F1000Research, eLife); DOI registration (Crossref, DataCite); plagiarism technology (Similarity Check, Turnitin); aggregators (ProQuest, Ebsco, Gale, CHORUS); permissions software (RightsLink); open access/institutional repositories (figshare, Dryad, DIGITALCSIC, e-EOI); discovery tools (Google Scholar/Google, ProQuest Summon, OCLC WorldCat); author marketing tools (Kudos); article level metrics (Altmetric); open access directories (DOAJ, Sherpa/Romeo); integrated library system technology (OCLC, Innovative, OCLC); sharing "guidelines" (Creative Commons, CCC).

## PEER REVIEW

### RESEARCHER/SCIENTIST
**ACTIONS**
- Research editorial requirements
- Submit and revise manuscripts
- Suggest peer reviewers
- Seek OA funding once accepted
- Provide peer review
- Participate in / create new societies/networks

**INVESTMENTS**
- Invest time in submitting/revising manuscripts
- Fund APCs and/or seek funding after acceptance

**REWARDS**
- Enhanced reputation
- Career advancement / tenure
- Improved peer network
- Advance knowledge in field
- Compensation for peer review (when available)

**WHAT KEEPS ME UP AT NIGHT**
- Lack of peer review transparency
- Flaws in peer review process
- Requests to peer review
- No formal recognition for peer review
- Pressure on APC funding for research

### INSTITUTION
**ACTIONS**
- Self-publish research results
- Host repositories
- Enable staff to access peer review services
- Provide peer review
- Host preprint servers

**INVESTMENTS**
- Pay editorial staff
- Pay staff to manage APCs
- Pay OA charges upon acceptance
- Invest in repositories
- Pay staff to handle repositories

**REWARDS**
- Enhanced reputation
- Career advancement / tenure
- Improved peer network
- Advance knowledge in field
- Fulfill mission for advancing science

**WHAT KEEPS ME UP AT NIGHT**
- Funder restrictions supporting OA

### FUNDER/GOVT AGENCY
**ACTIONS**
- Provide submission platform
- Approve and fund APCs or OA charges
- Track compliance
- Approve and fund OA charges once accepted
- Host preprint servers

**INVESTMENTS**
- Invest time in tracking compliance
- Track grants and funding
- Invest in altmetrics

**REWARDS**
- Provide access to articles / data sets
- Enable sharing of research
- Recognition for advancement of science

**WHAT KEEPS ME UP AT NIGHT**
- Funder restrictions supporting OA
- Flaws in peer review process
- Pressure on APC block grants

### PUBLISHER
**ACTIONS**
- Manage peer review process
- Assess quality of science
- Establish fit with publishing program
- Accept manuscripts
- Host preprint servers

**INVESTMENTS**
- Invest in submission/ production platforms
- Invest APC e-commerce platforms
- Pay reviewer/editorial board honoraria (where available)
- Invest in peer review network
- Invest in development of altmetrics

**REWARDS**
- Expand scientific networks and brand recognition
- Identify research that fits editorial goals
- Uncover new talent
- Expand society membership
- Achieve high-quality research evaluation

**WHAT KEEPS ME UP AT NIGHT**
- Slow peer review practices of publishers
- Underfunded OA publishing infrastructure of publishers

**TOOLS AND SERVICES**
Examples of organizations that serve peer review are: workflow software (ScholarOne, BenchPress, Editorial Manager); preprint servers (arXiv, bioRxiv, Authorea); peer review tools (F1000 Reviewer Center, StatReviewer, Publons); Open Access payment workflows and management tools (RightsLink, proprietary systems, Axaet); identifying experts in a specific field (Expert Lookup); repositories and tools for discovery, annotation, analytics, etc. (DSpace)
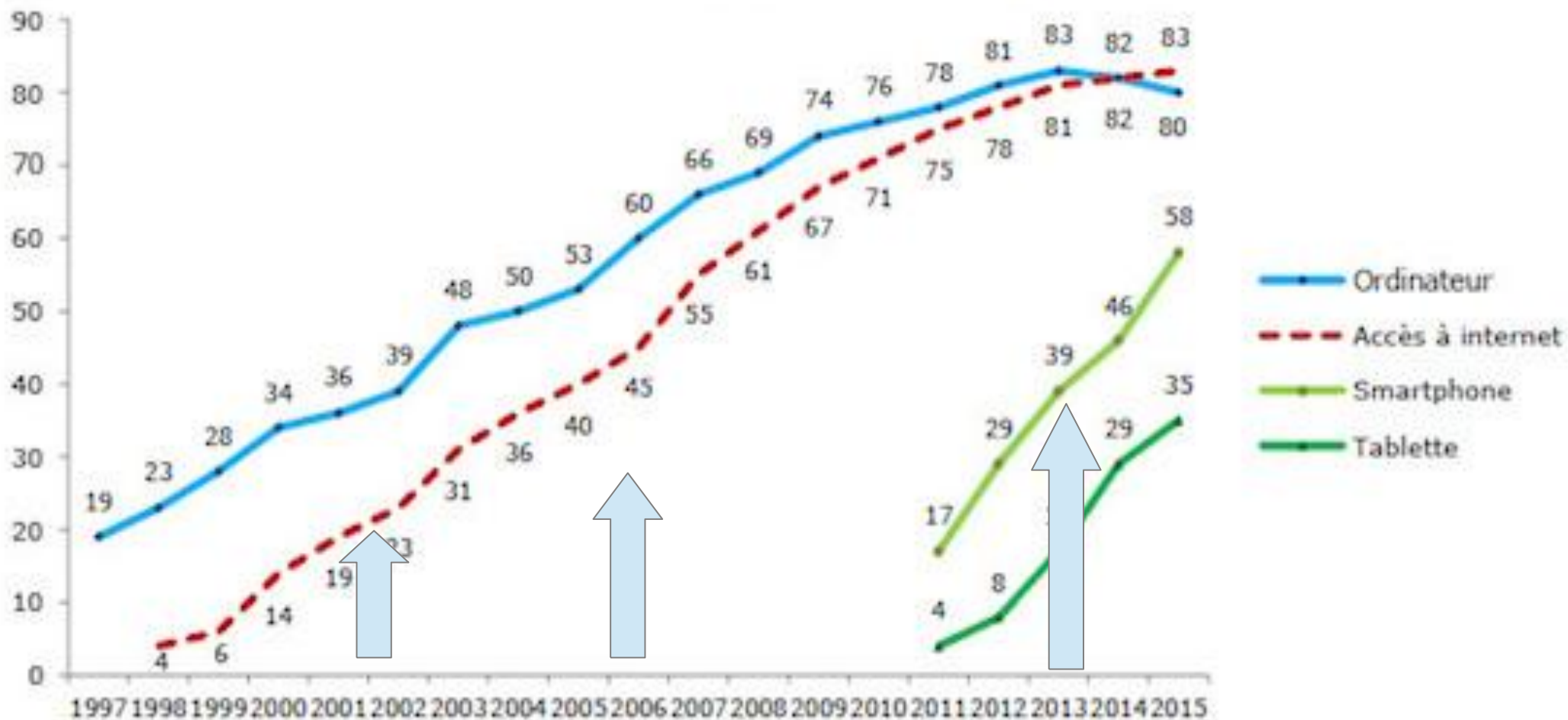
# A short story of digital transformation
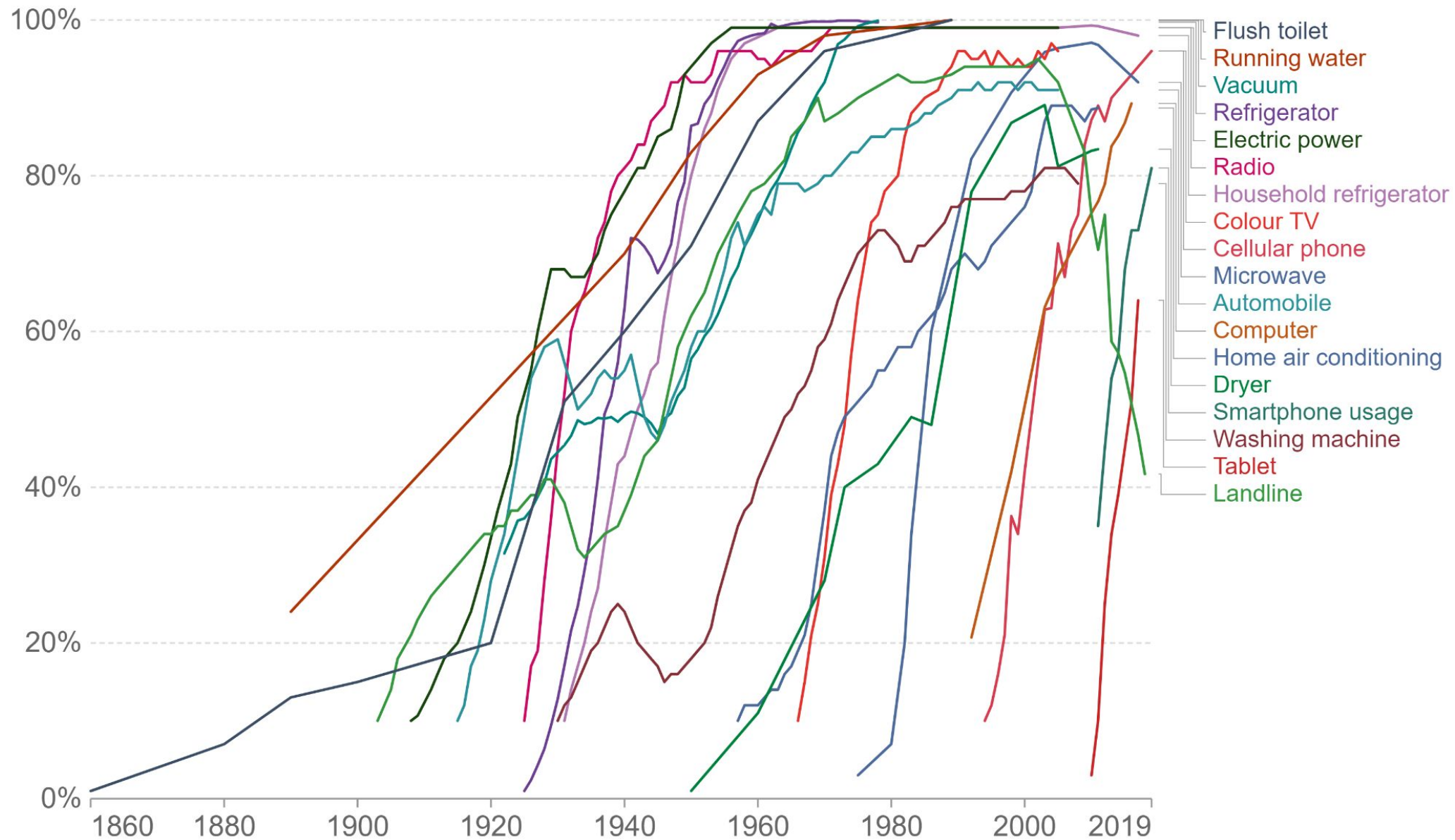
*A personal history :*

- *my first writing machine*
- *some sinclar experiment*
- *my first 13kg PC*
- *…*
-

# Le consommateur appareillé



Taux d'équipement et taux d'accès à internet
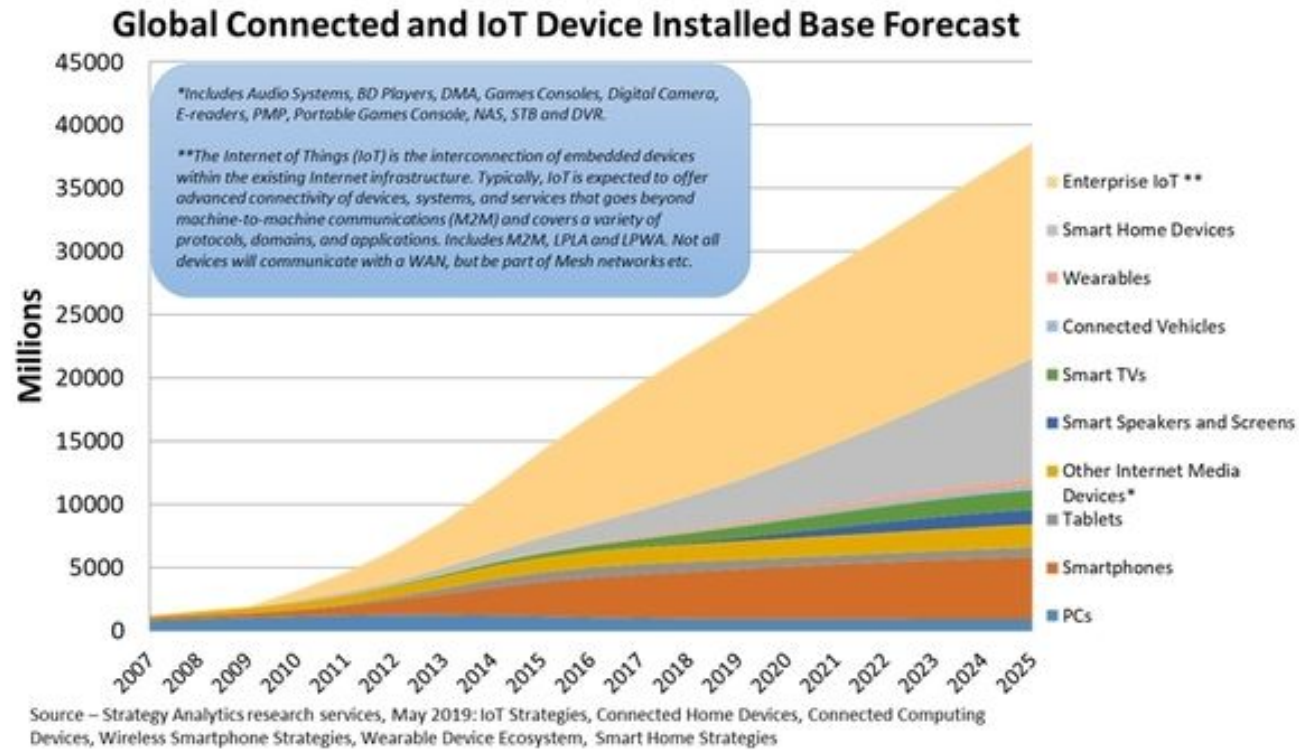Champ : ensemble de la population de 12 ans et plus, en %

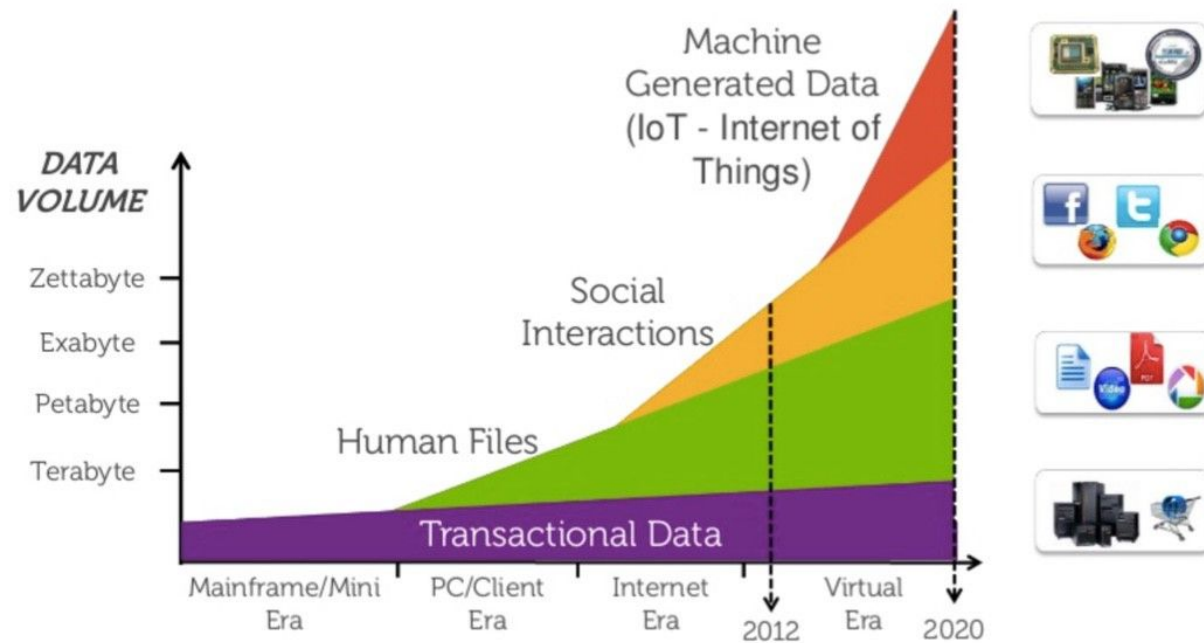# Share of US households using specific technologies, 1860 to 2019

Legend (top to bottom):
- Flush toilet
- Running water
- Vacuum
- Refrigerator
- Electric power
- Radio
- Household refrigerator
- Colour TV
- Cellular phone
- Microwave
- Automobile
- Computer
- Home air conditioning
- Dryer
- Smartphone usage
- Washing machine
- Tablet
- Landline

# Data explosion



## Global Connected and IoT Device Installed Base Forecast

*Includes Audio Systems, BD Players, DMA, Games Consoles, Digital Camera, E-readers, PMP, Portable Games Console, NAS, STB and DVR.

**The Internet of Things (IoT) is the interconnection of embedded devices within the existing Internet infrastructure. Typically, IoT is expected to offer advanced connectivity of devices, systems, and services that goes beyond machine-to-machine communications (M2M) and covers a variety of protocols, domains, and applications. Includes M2M, LPLA and LPWA. Not all devices will communicate with a WAN, but be part of Mesh networks etc.

Source – Strategy Analytics research services, May 2019: IoT Strategies, Connected Home Devices, Connected Computing Devices, Wireless Smartphone Strategies, Wearable Device Ecosystem, Smart Home Strategies

## The Explosion of Data

# Nuages
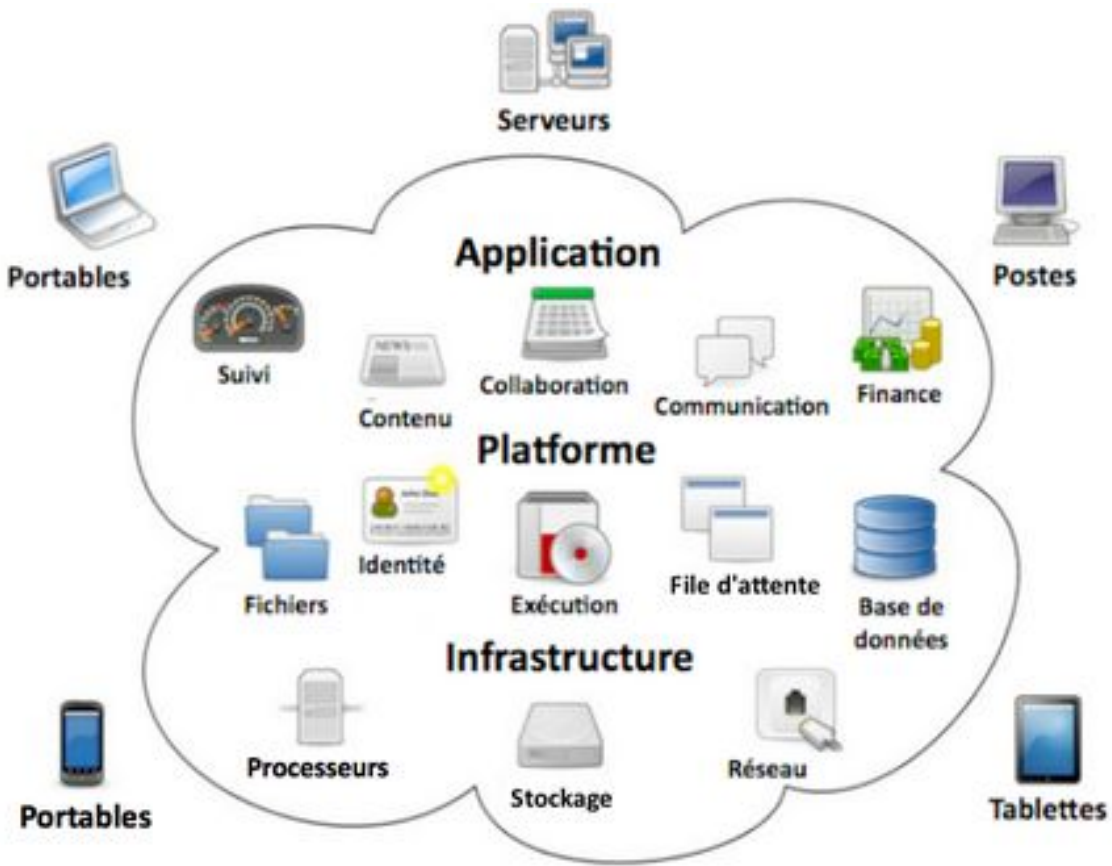


le Nuage



**Amazon Leads the Race to the Cloud**
Worldwide market share of leading cloud infrastructure service providers in Q2 2019*

| | |
|---|---|
| amazon | 33% |
| Microsoft | 16% |
| Google | 8% |
| IBM | 6% |
| Alibaba.com | 5% |
| salesforce | 3% |
| ORACLE | 2% |
| Tencent 腾讯 | 2% |
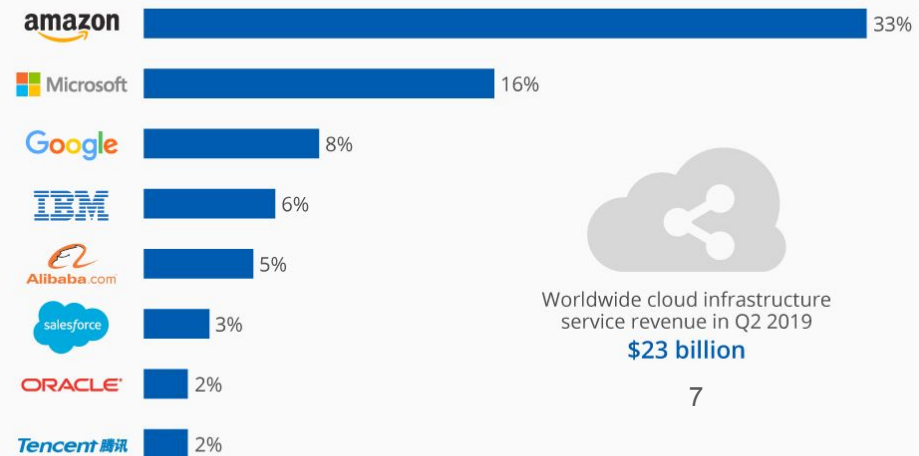
Worldwide cloud infrastructure service revenue in Q2 2019
**$23 billion**

7

\* includes platform as a service (PaaS) and infrastructure as a service (IaaS)
as well as hosted private cloud services

@StatistaCharts   Source: Synergy Research Group

statista

# A data system

l'automobile est un gros smartphone...
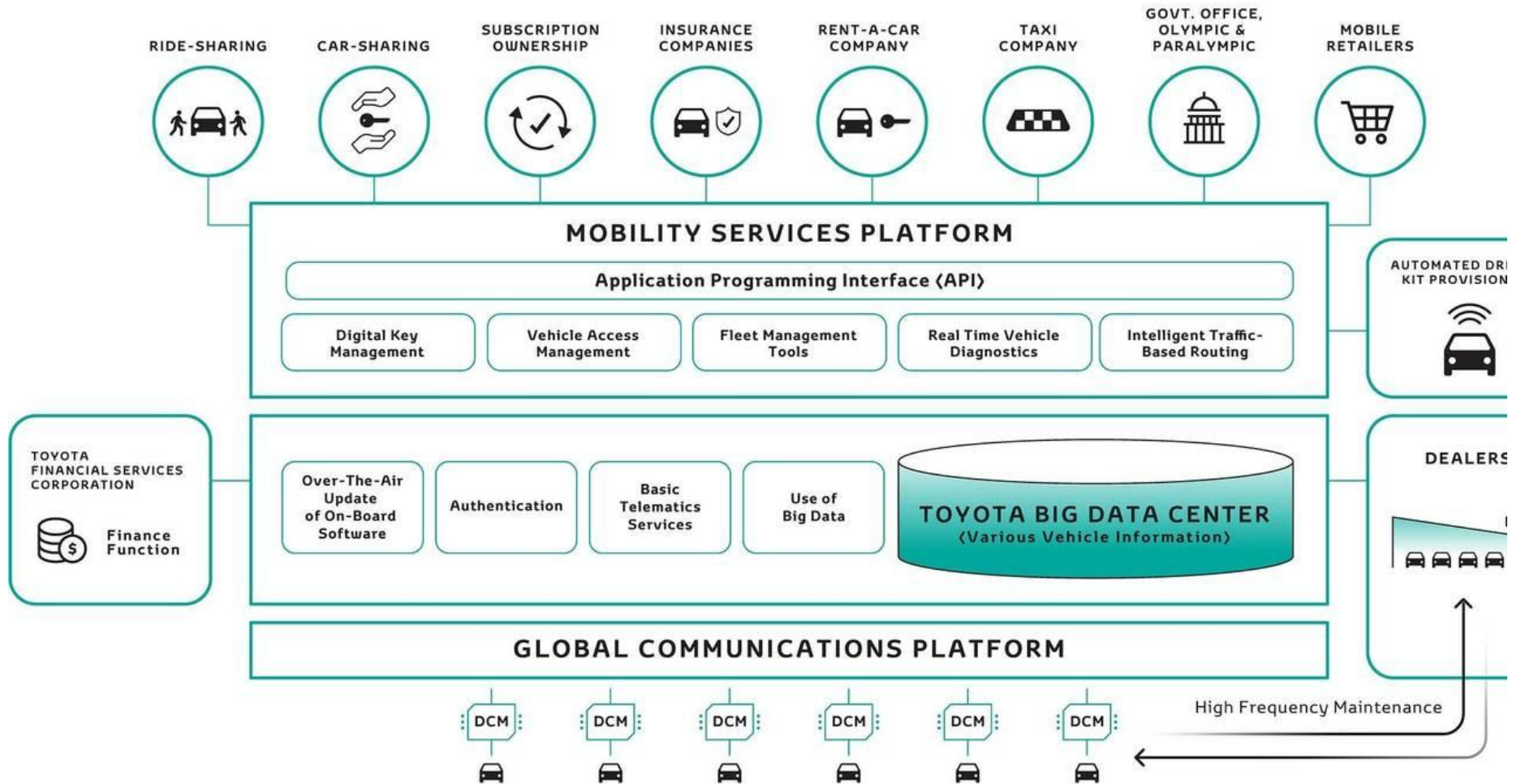
# Industrie 4.0 is designating the 4th industrial revolution

Development stages of industrial manufacturing



**First industrial revolution** — 1.0

**Second industrial revolution** — 2.0

**Third industrial revolution** — 3.0

**Fourth industrial revolution?** — 4.0

**1784**

**Mechanical weaving loom**

Introduction of mechanical production assets based on water and steam power

**1923**

**Introduction of a "moving" assembly line at Ford Motors**

Introduction of mass production based on division of labor and electrical energy

**1969**

**First programmable logic controller (PLC)**

Introduction of electronics and IT for higher auto-matization of production

**2014**

**Real time, self optimizing connected systems**

# Modèle de Bass



© Statista 2016

Parameters:

Estimate Std. Error t value Pr(>|t|)

M 5.695e+02 5.297e+01 10.752 1.17e-10

***

P 8.744e-03 9.511e-04 9.193 2.47e-09 ***

Q 1.098e-01 1.459e-02 7.529 9.07e-08 ***

—

Signif. codes: 0 '***' 0.001 '**' 0.01

'*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 2.384 on 24

degrees of freedom

Estimation et prédiction du nombre cumulé de membres LInked in

- Membres cumulés (réel)
- Cumul



Evolution estimée de nouveaux membres Linked In

- imitateurs
- adopteurs
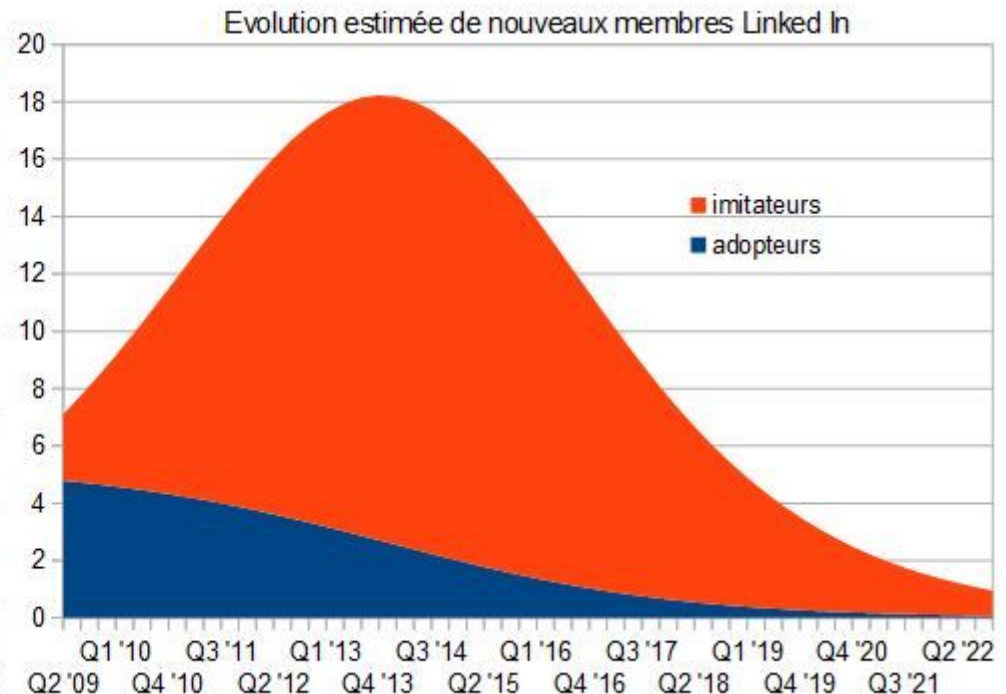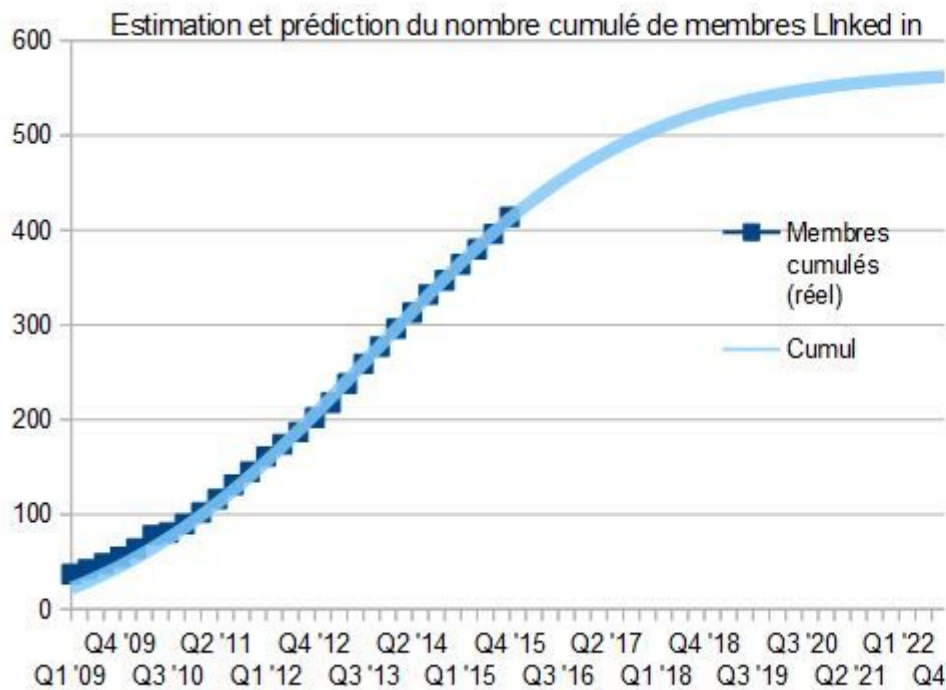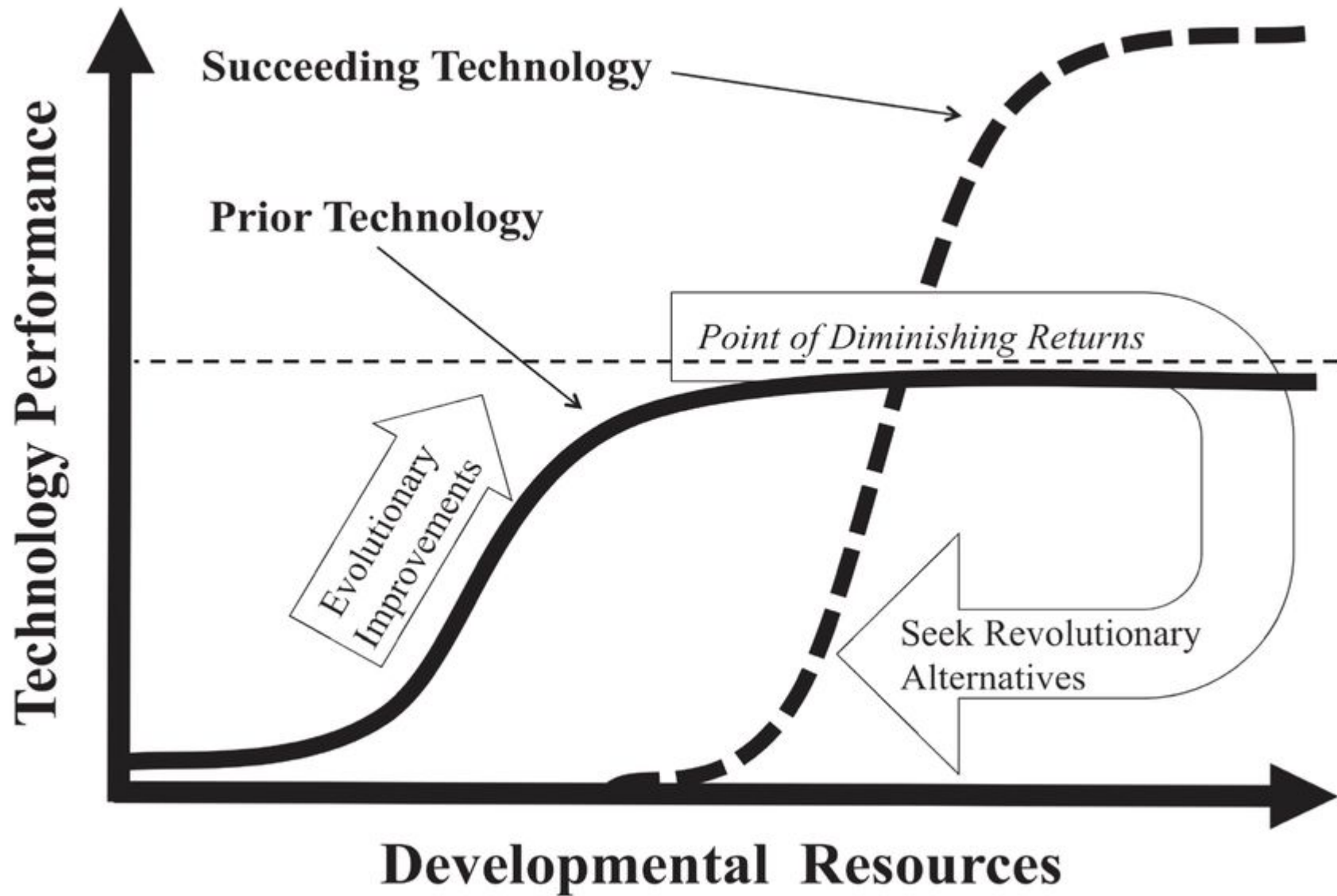
# Loi de Moore



Moore's Law: The number of transistors on microchips doubles every two years

Moore's law describes the empirical regularity that the number of transistors on integrated circuits doubles approximately every two years. This advancement is important for other aspects of technological progress in computing – such as processing speed or the price of computers.

Our World in Data
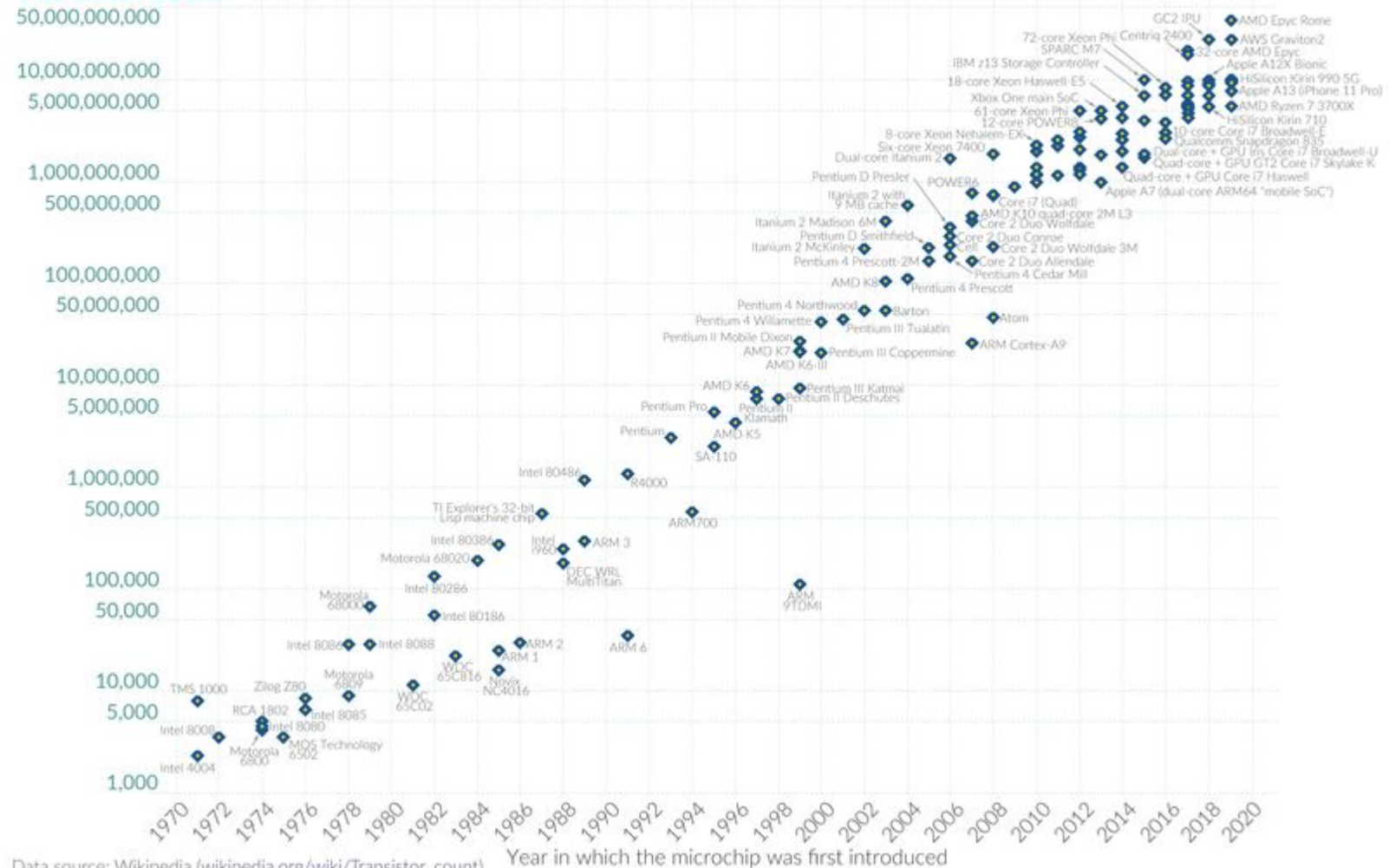
# Économie d'échelle, de champs et d'expérience

Cost per Unit Of Output

X

Economies of Scale

Learning Effect

Z

Y

LAC 1

LAC 2

Q          Q1

Output

Value

Learning

Scope

Scale

Variety
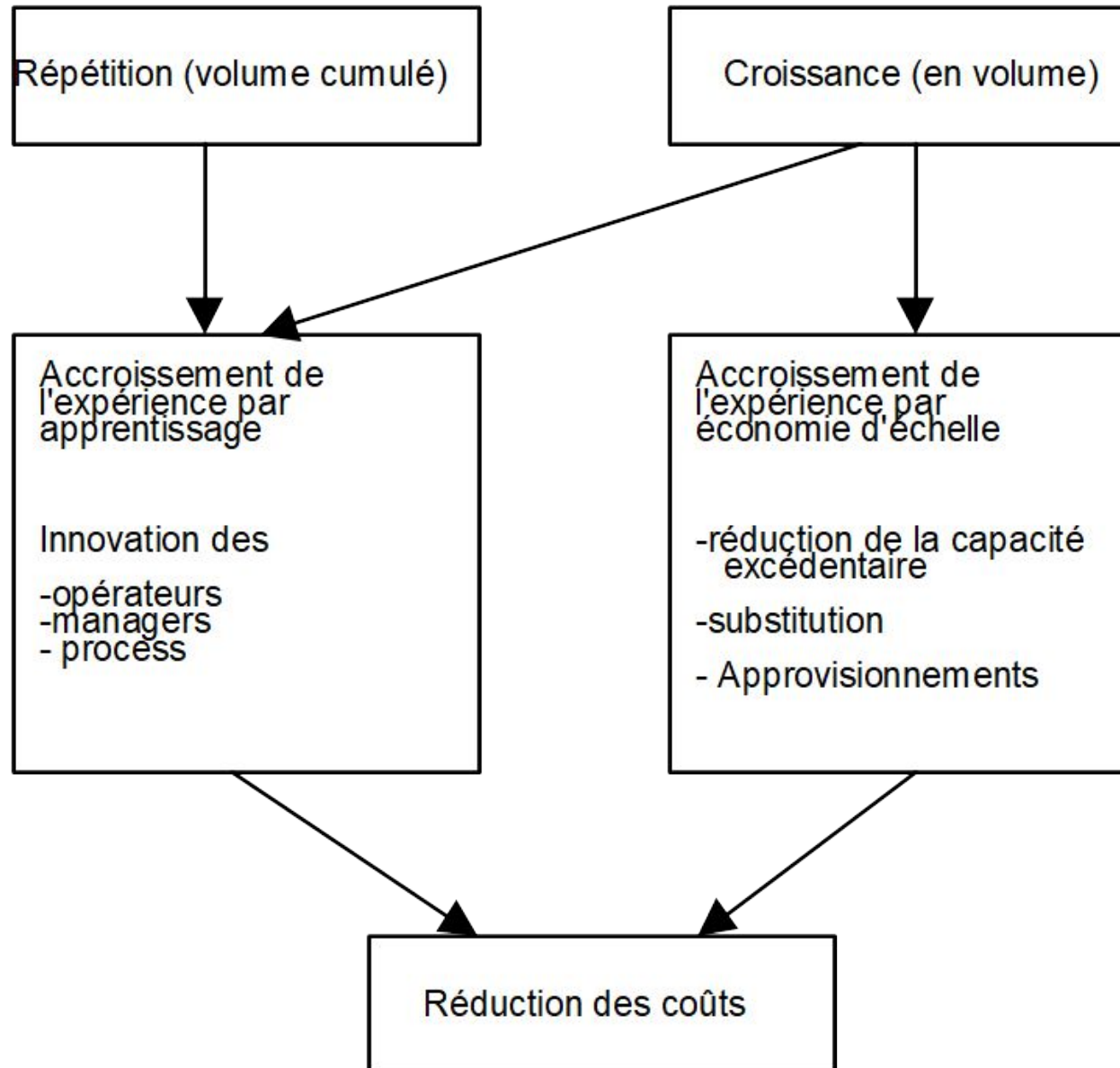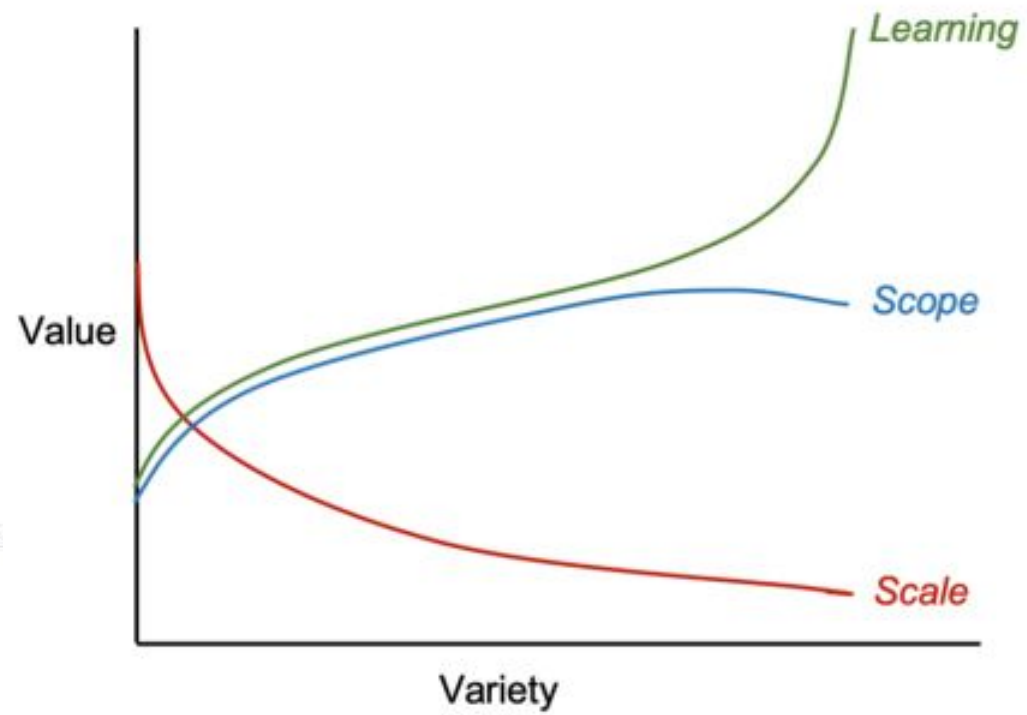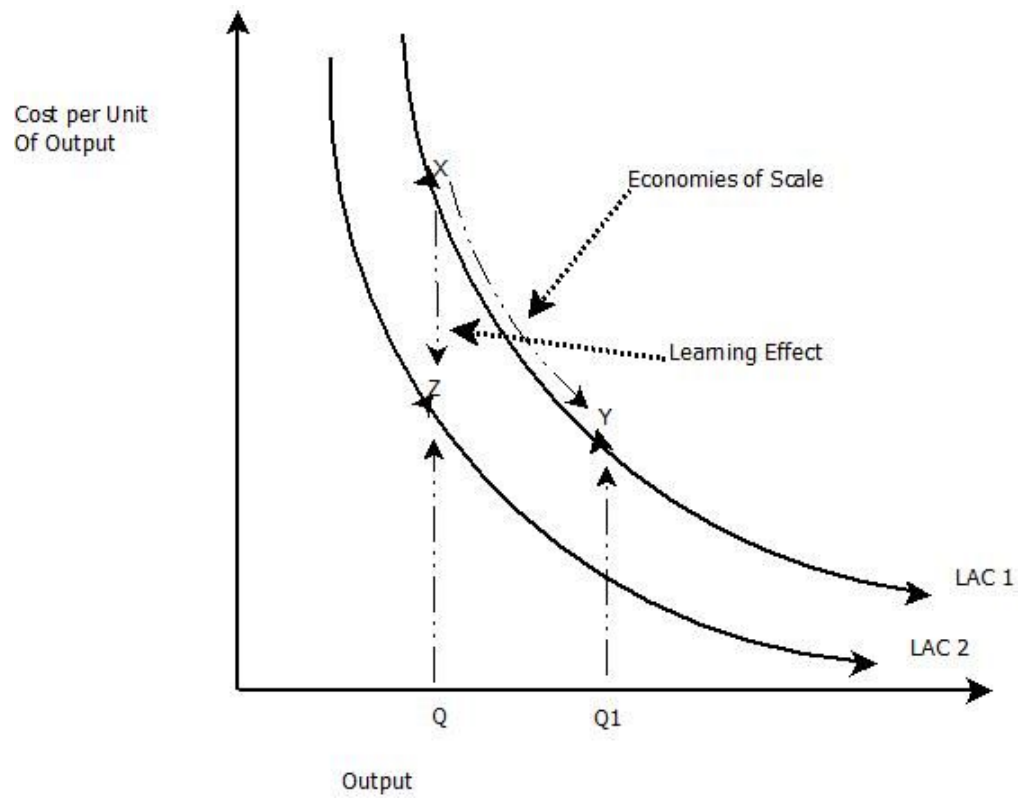
# Network and standard externality
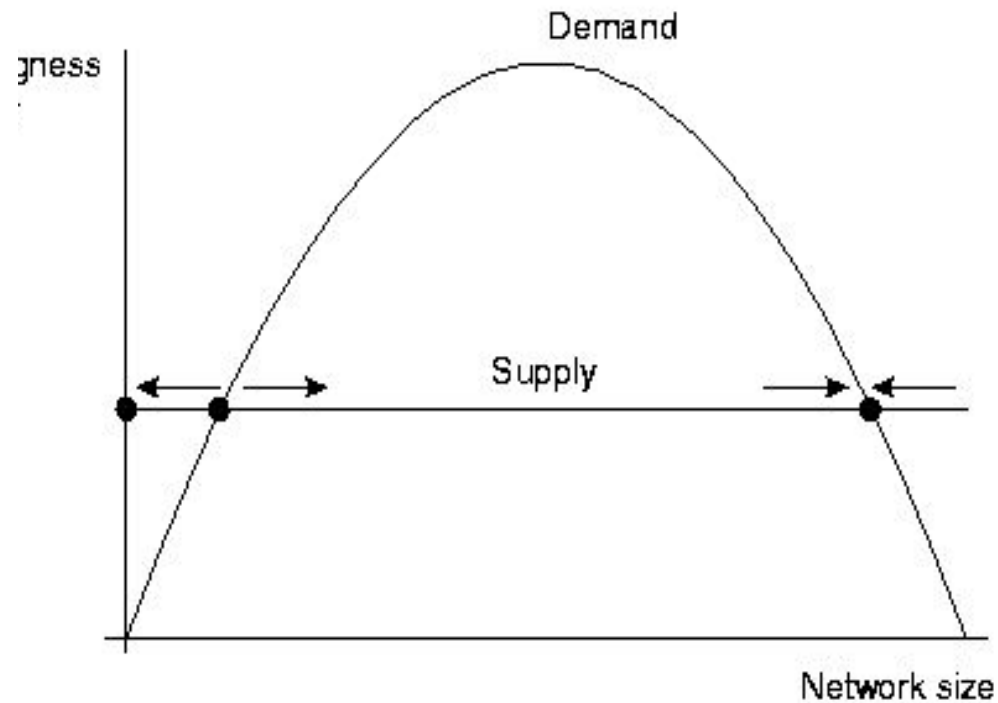


Size of the market is the value



Switching cost lock markets

# Increasing Marginal Cost



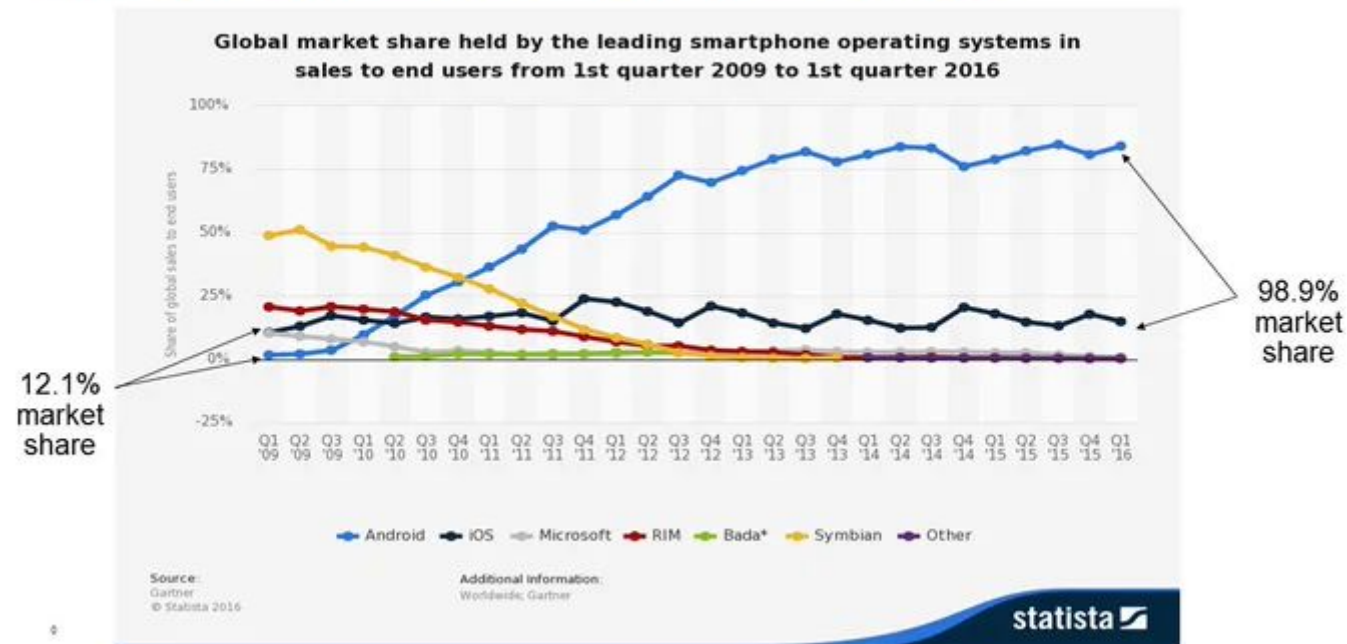Average Cost
Marginal Cost

# Zero Marginal Cost
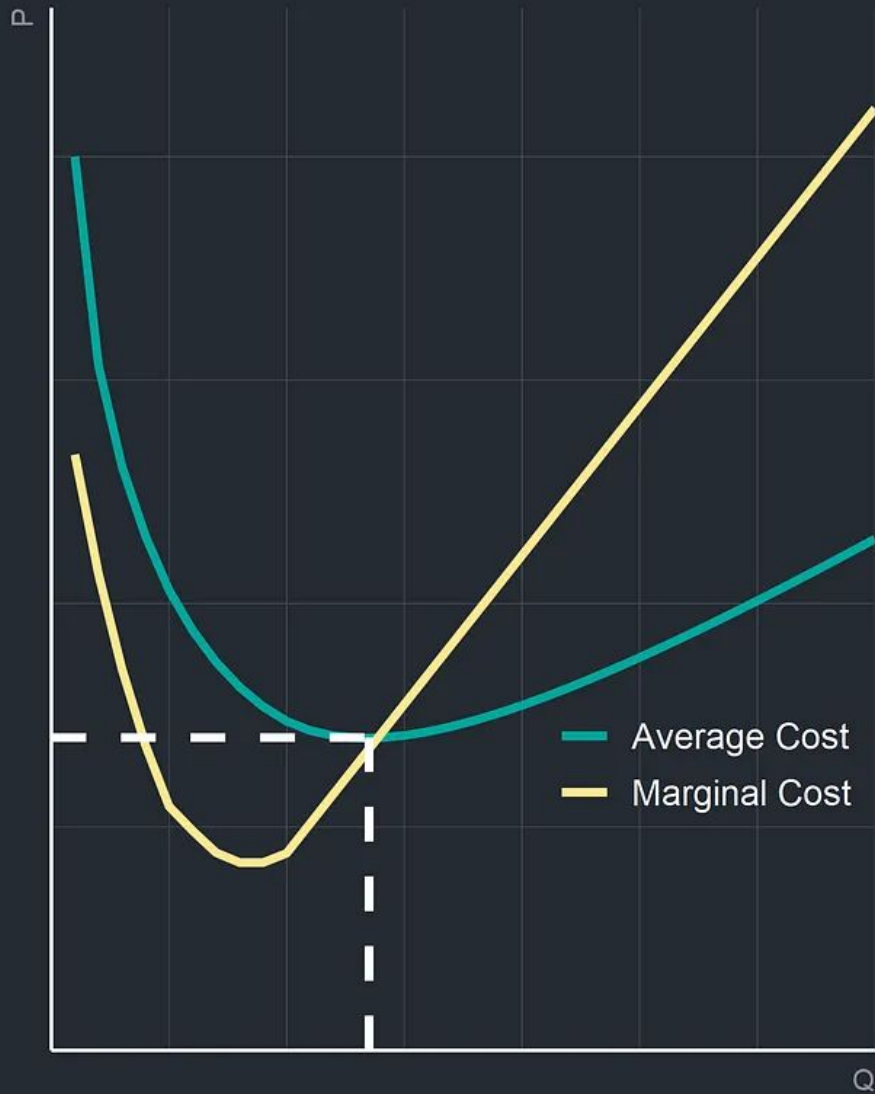


Average Cost
Marginal Cost
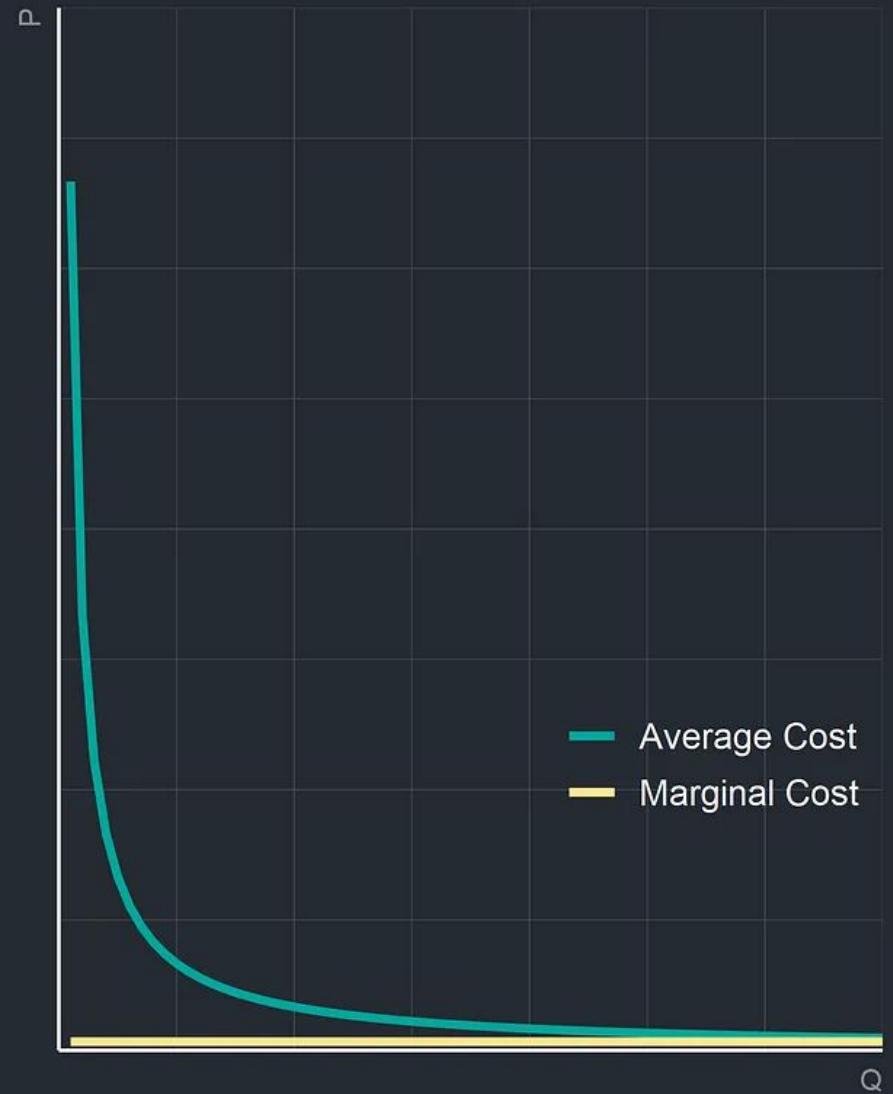
# Deux conséquences



## Platform Business is Winner Takes All/Most

Global market share held by the leading smartphone operating systems in sales to end users from 1st quarter 2009 to 1st quarter 2016

12.1% market share

98.9% market share

Android — iOS — Microsoft — RIM — Bada* — Symbian — Other

Source:
Gartner
© Statista 2016

Additional information:
Worldwide; Gartner

statista



## One Product, Many Versions

Recognizing that its voice recognition software can be used in many ways, Kurzweil Applied Intelligence offers a broad array of versions at very different prices.

| Version | Price | Vocabulary |
|---|---|---|
| VoicePad Pro | $79 | 20,000-word general |
| Personal | $295 | 30,000-word general |
| Professional | $595 | 50,000-word general |
| Office Talk | $795 | business |
| Law Talk | $1,195 | legal |
| Voice Med | $6,000 | medical |
| Voice Ortho | $8,000 | special-purpose medical |