

Information and Society-E2

-Overview of Information Society-

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Lecture Plan

- Lecture 01 Introduction
- Lecture 02 Overview of Information Society
- Lecture 03 Information Policy
- Lecture 04 Information Ethics

[Assignment 1: 10pt]

- Lecture 05 Information Education
- Lecture 06 Information Education

[Assignment 2: 10pt] [Essay 1: 25pt]

- Lecture 07 Information Law
- Lecture 08 Information Law

[Assignment 3: 10pt]

- Lecture 09 Information Economy
- Lecture 10 Information Economy
- Lecture 11 Information Economy

[Assignment 4: 10pt] [Essay 2: 25pt]

- Lecture 12 Information Archiving
- Lecture 13 Social Media Analysis, Cloud Computing
- Lecture 14 Crowdsourcing and Human Computation

[Assignment 5: 10pt]



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HISTORY OF INFORMATION TRANSMISSION AND STORING

Transmission and Storing of Information in Ancient Times

Information transmission in ancient time

- Communicating by voice and gesture
- Simple drawing (e.g., Lascaux cave paintings)

Spoken information: “storage” and “transmission” over time

- Spoken information passed through generations

Invention of writing

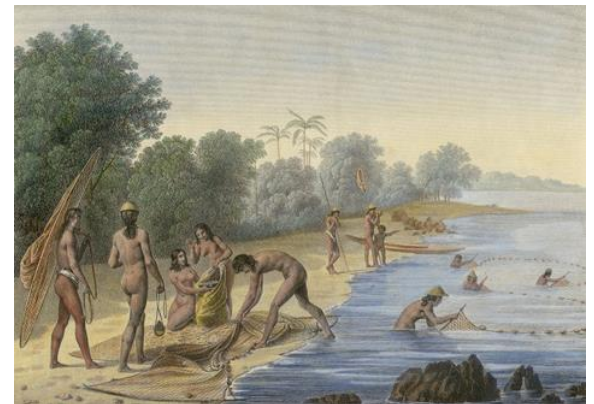
- From pictures or symbols to emoticons and then to written characters
- Early alphabet from Egyptian hieroglyphs (1800 BC)



History of Transmission and Storing of Information: Society Relying on Spoken Communication

- Information was **transmitted orally** and “**stored**” **mainly in personal memory**. **Physical presence of a person** was needed to pass information. Information was then **not fixed** but subject to forgetting or alteration
 - **Elderly as sources of information and wisdom**
- Reality and life were very **local** for most people
 - **Relatively little information was transferred through time & space**. As a result, people knew very little about other places and societies.
 - Information from outside was carried mainly by merchants, travelers, troubadours, etc.

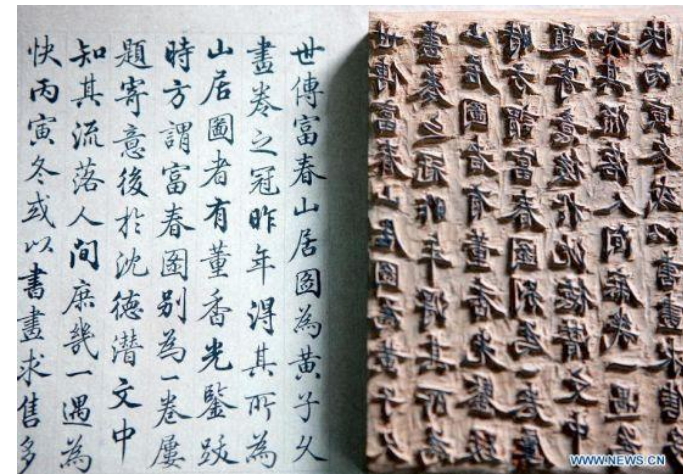
Human memory as a major “means” of storing & carrying information



How did humanity manage to improve
the transmission of
information across space and time?

History of Transmission and Storing of Information: “Print Society”

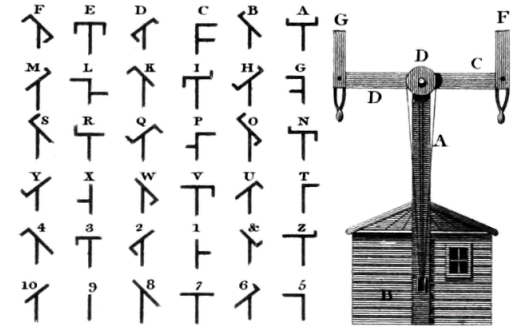
- [Invention of papyrus \(paper\)](#) (Egypt circa 2900 BC)
 - [Hand writing](#)
- [Printing: Woodblock print](#) has been known in China long time ago (from around 9th century) and in Europe the printing press has been invented in 1450s (Gutenberg)
- [Few people could read then](#)
 - Mainly some clergy or nobles
- [Yet printing technology spread widely and quickly](#)
 - First printed books: Bible, Decameron, Don Quixote, etc.
- [Printing](#) allowed [storing information](#) and [decreasing reliance on memory](#), and [transmitting information](#) to large number of people
 1. No need for a physical presence of people
 2. Text is fixed: unchanged through time and space
- Printing increased the [speed of innovation](#) through [incremental knowledge building](#)
 - [Self-learning](#) became a possibility



History of Transmission and Storing of Information: Use of Other Means

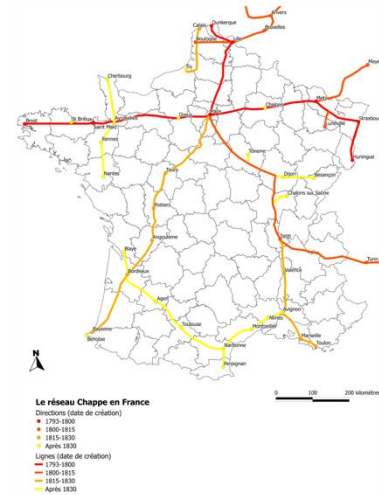
Using animals for communication

- Pigeons, horses, etc.



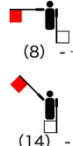
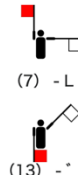
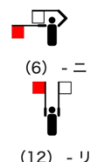
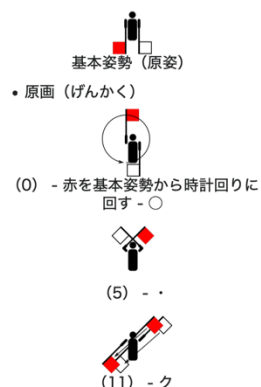
Semaphore Line

- Invention by Claude Chappe (1793)
- Placed several kilometers apart each, representing information as the combination of arms
- Transmission within 20 minutes was achieved between Toulon & Paris (800km)



History of Transmission and Storing of Information: Japanese Flag Semaphore

右手に赤旗、左手に白旗を持つ。



あ: (9) -> (3)

Japanese flag signals with the associated kana

	-	k	s	t	n	h	m	y	r	w
a	 あア	 かカ	 さサ	 たタ	 なナ	 はハ	 まマ	 やヤ	 らラ	 わワ
i	 いイ	 きキ	 しシ	 ちチ	 にニ	 ひヒ	 みミ	*	 りリ	 ゐヰ
u	 うウ	 くク	 すス	 つツ	 ぬヌ	 ふフ	 むム	 ゆユ	 るル	*
e	 えエ	 けケ	 セセ	 てテ	 ねネ	 へヘ	 めメ	*	 れレ	 ゑエ
o	 おオ	 こコ	 そソ	 とト	 のノ	 ほホ	 もモ	 よヨ	 ろロ	 をヲ

'n
 んン

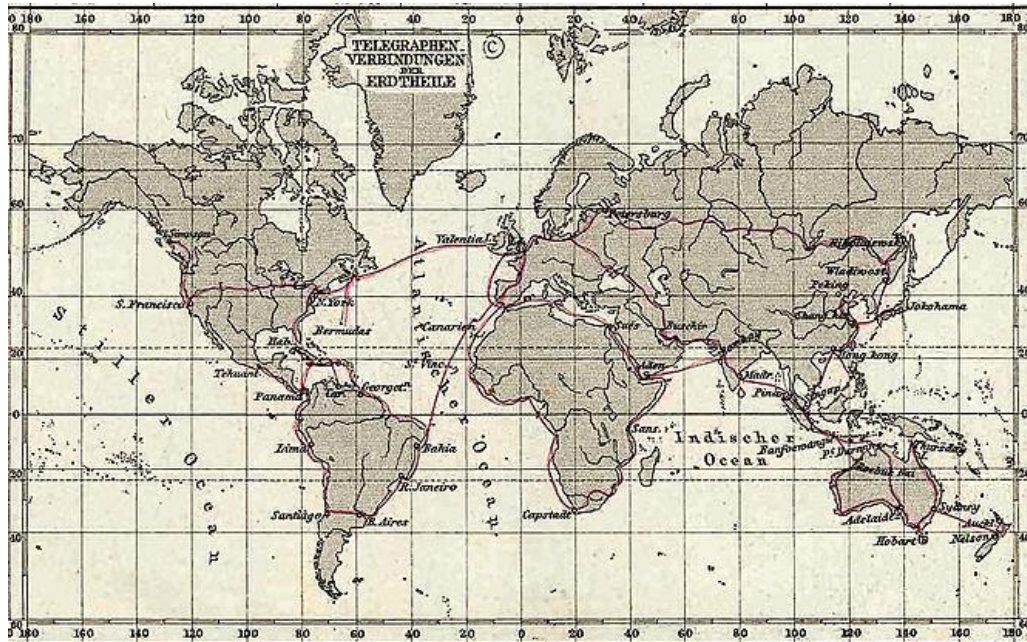
[1]

History of Transmission and Storing of Information: Electrical Telegraphy

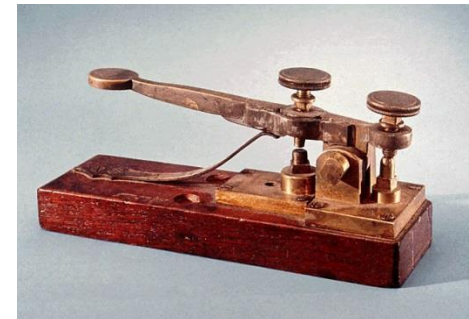
- Further reductions of **time-space limitation** in information propagation
 - Text could be easily transmitted
- Telegraph: 1-to-1 written information transmission

Number of days for a letter from London to reach:

12	New York in USA
13	Alexandria in Egypt
19	Constantinople in Ottoman Turkey
33	Bombay in India
44	Calcutta in Bengal
45	Singapore
57	Shanghai in China
73	Sydney in Australia



Major telegraph lines across the Earth in 1891



History of Transmission and Storing of Information

Telegraph

- Invention by Morse (1837)

Telephone

- Invention by Bell (1876)

Phonograph

- Invention by Edison (1877)

Wireless transmission, radio

- Invention by Marconi and Popov (1895)

TV

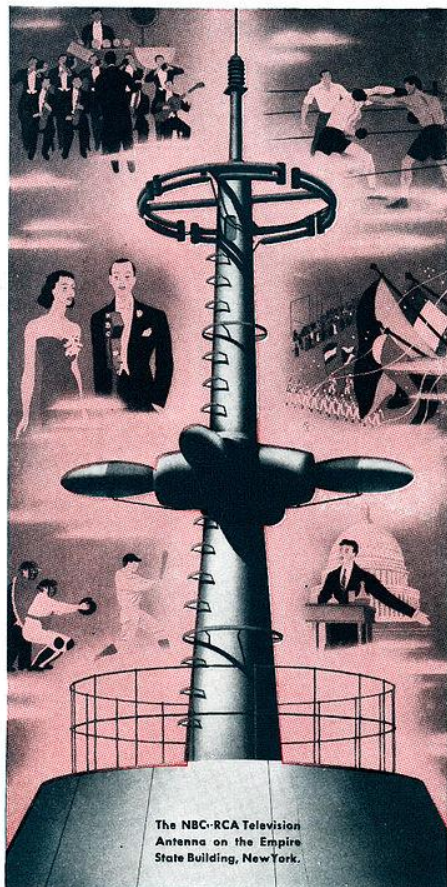
- First broadcast of black-and-white TV (U.S., 1941)
- First broadcast of color TV (United States, 1954)

History of Transmission and Storing of Information: Telegraph, TV, Radio

- Further reductions of **time-space limitation** in information propagation
 - Spoken and written word could be easily transmitted
- Telegraph: 1-to-1 written text information transmission
- Radio: 1-to-many audio information transmission
- TV: 1-to-many visual and audio information transmission
- Video, audio cassette recorders reduced **time limitation**



The Radio Corporation of America Tells **What TELEVISION will mean to you!**



On April 30th RCA television was introduced in the New York metropolitan area. Television programs, broadcast from the lofty NBC mast at the top of the Empire State Building, cover an area approximately fifty miles in all directions from that building. Programs from NBC television studios are sent out initially for an hour at a time, twice a week. In addition, there will be pick-ups of news events, sporting events, interviews with visiting celebrities and other programs of wide interest.

How Television will be received!

To provide for the reception of television programs, RCA Laboratories have developed several receiving sets which are now ready for sale. These instruments, built by RCA Victor, include three models for reception of television pictures and sound, as well as regular radio programs. There is also an attachment for present radio sets. This latter provides for seeing television pictures, while the sound is heard through the radio itself. The pictures seen on these various models will differ only in size.

Television—A new opportunity for dealers and service men

RCA believes that as television grows it will offer dealers and service men an ever expanding opportunity for profits. Those, who are in a position to cash in on its present development, will find that television goes hand in hand with the radio business of today.

In Radio and Television—It's RCA All the Way

Ad at the beginning of experimental
television broadcasting in New York
City by RCA in 1939

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



Radio Corporation of America
RADIO CITY, NEW YORK

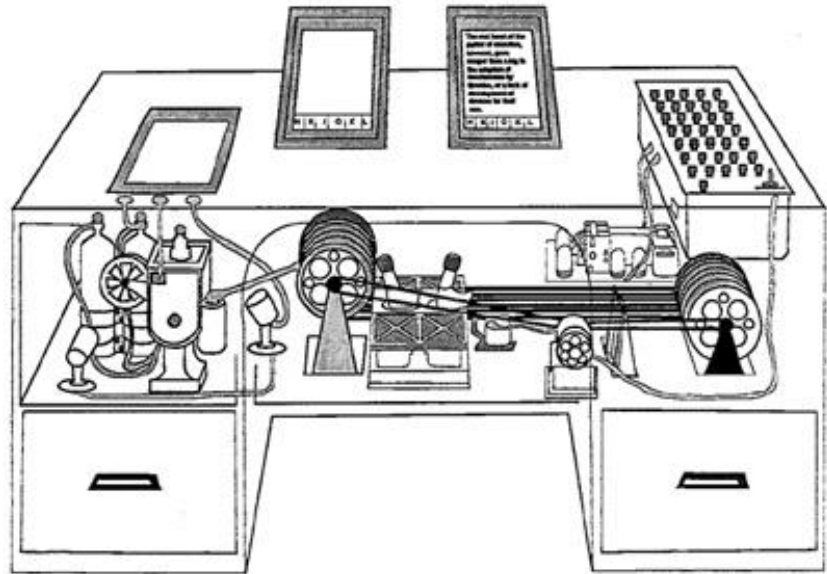
RCA MFG. CO., INC. • RADIOMARINE CORP. OF AMERICA • NATIONAL BROADCASTING CO. • R. C. A. COMMUNICATIONS, INC. • RCA INSTITUTES, INC.

Towards Computers and WWW: Memex (MEMory EXtender)

- “As We May Think” - pioneering article by [Vannevar Bush](#) in 1945
 - “Mechanically linked” machine to help scholars find information in growing number of data
 - First proposal of associative non-linearly connected information

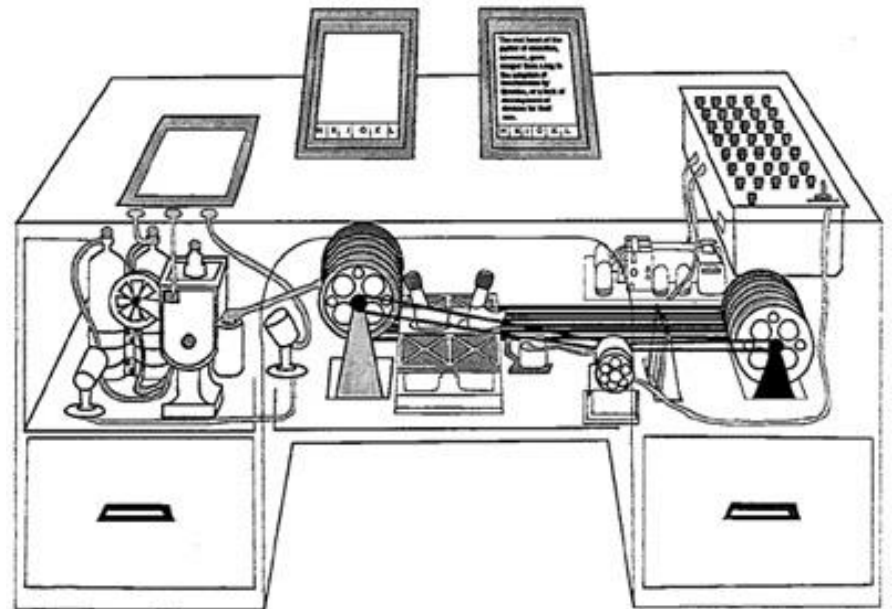


Memex - device in which individuals would compress and store all of their books, records, and communications, "mechanized so that it may be consulted with exceeding speed and flexibility"



Towards Computers and WWW: Memex (MEMory EXtender)

- Individuals **store** all personal books, records, communications
- Items **retrieved** rapidly through indexing, keywords, cross references,...
- Can **annotate** text with margin notes, comments...
- Can **construct** a trail through the material and save it
- Acts as an **external memory**



Memex Demo (by Trevor Flowers 2014)



<https://trevor.smith.name/project/memex/>

Microfilm Technology



ICT, INFORMATION POLICY

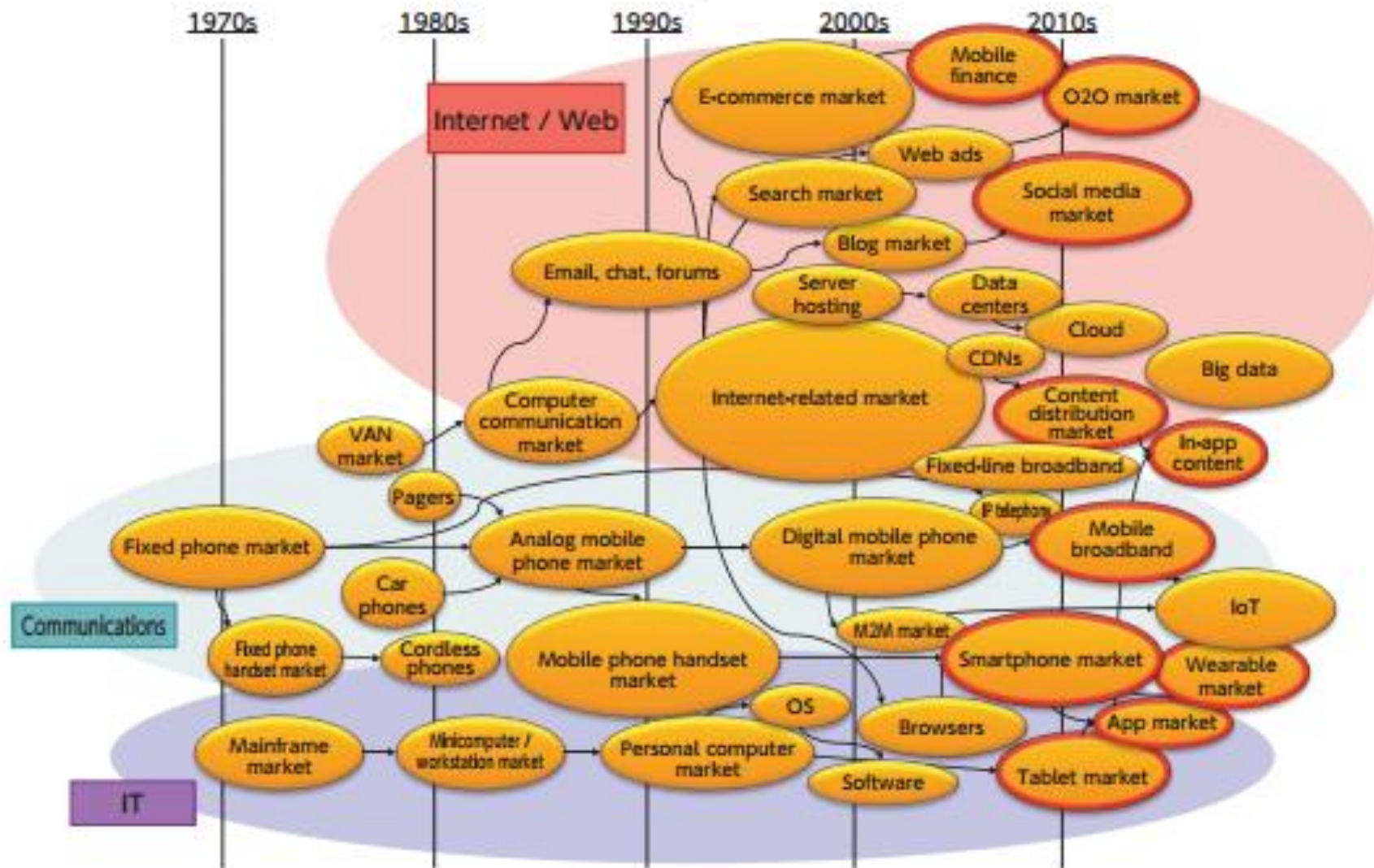
Information Role in Modern Economy

- **Information** – one of the most important resources affecting the efficiency of any economy, industry, household, etc.
 - In **industrial economy**, **land**, **capital** and **machines** were most important
 - In evolving knowledge economy the key are **skilled** and **well-trained people** (human capital), **ideas**, **knowledge** and **information/communication tools**

Information and Communications Technology (ICT)

- **ICT** - anything that processes or renders data, information or perceived knowledge
 - e.g., telephony, broadcasting media, audio and video processing and transmission, network technologies
- **ICT** consists of technical means for managing and processing information and for fostering communication

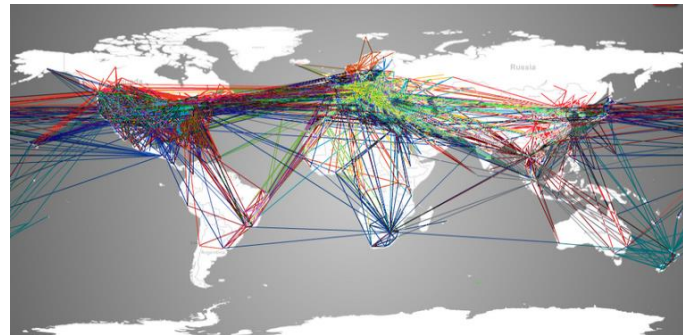
Figure 1-2-4-1 Development of ICT services



(Source) "Study Report on a Structural Analysis of the ICT Industry in the IoT Era and Verification of ICT's Multifaceted Contributions to Economic Growth," MIC (2016)

Importance of Robust ICT Infrastructure

- Highways, roads and railroads were aiding the development of traditional economy
 - Transportation network was one of backbones of the economy
- Broadband information infrastructure for “new economy” development
- Government policies have important role here to play
 - Initial government financial support to a country's ICT strategy is crucial since economic benefits and demand for some of the new services are often unclear for industry players
 - Of course, ICT needs to be well planned according to government's vision to avoid “dark fiber”



Benefits of ICT Infrastructure

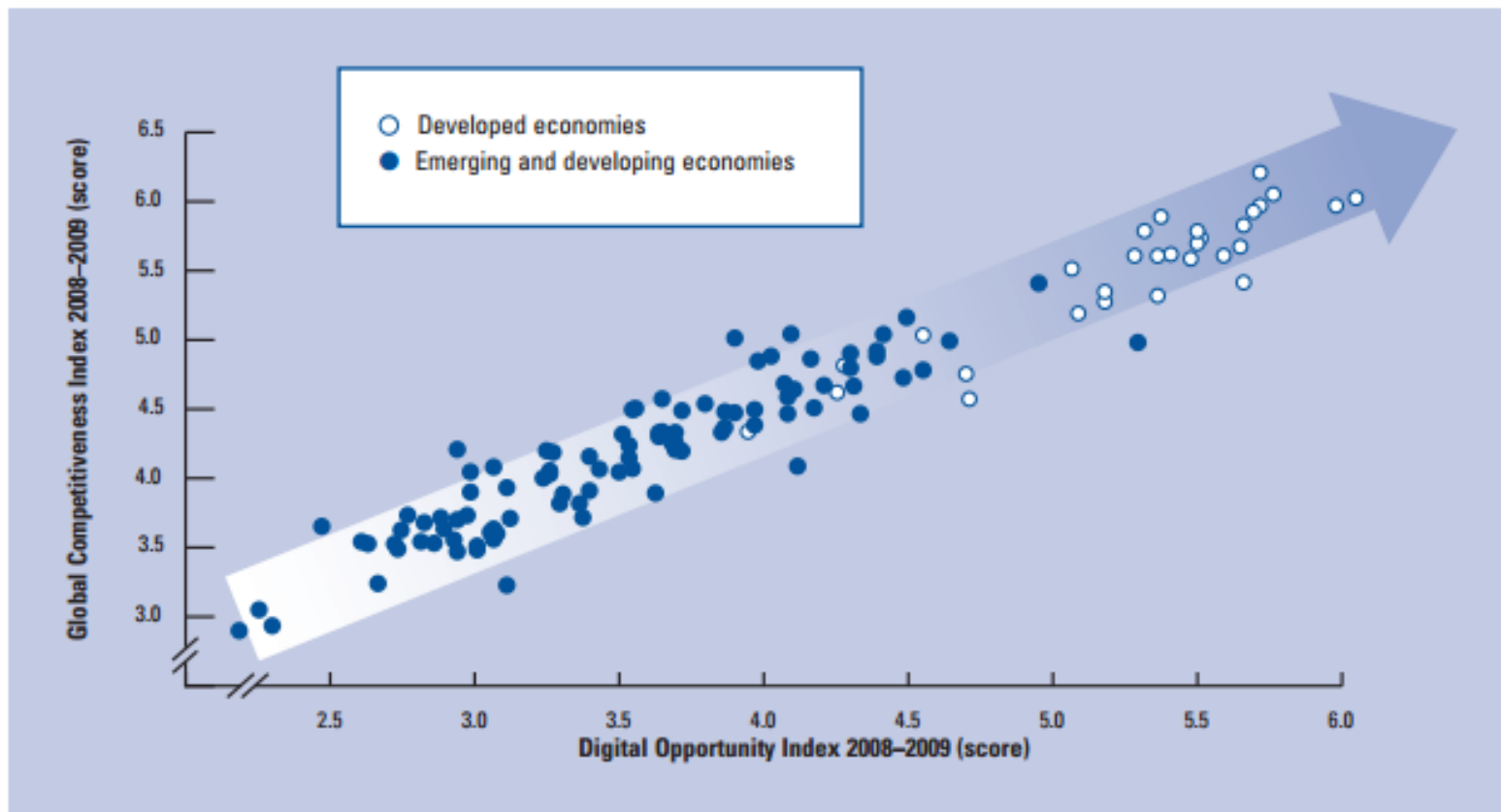
- **Technological progress** allowed over **10% of world's population come out of poverty since 1990** – likely, the **biggest driving force behind economic growth**
 - Development of ICT infrastructure in particular has attracted considerable **amounts of investment**, and generated significant **fiscal revenues** and **employment opportunities** in developing countries
- Wireless communications networks are the **world's largest platform** to **deliver useful information** as well as a wide range of **public** and **social** services, including to those in rural and poor areas
 - E.g. farmers in remote villages of Kenya using mobile phones to access the most current crop prices



Benefits of ICT Infrastructure

- ICT has strong **spillover effects** on long-run productive activities in many sectors
 - In the last 10 years, **high-speed communications networks and the innovative applications** they carry made ICT as an **enabler** and **promoter** of **innovation** and **fundamental economic transformation**
 - Companies that use ICT intensively are more **productive**, **grow faster**, **invest more**, and are **more profitable**
 - Individuals, thanks to the access to the global knowledge, can unleash their **creative potential**
 - **Governments** become **more efficient** and **transparent** thanks to online information and services
 - ICT presents us with **democratic possibilities** allowing **free contact** and **exchange of ideas**
 - **Examples:** SNSs, Citizens' Assembly, etc.

Correlation between ICT Readiness and Competitiveness



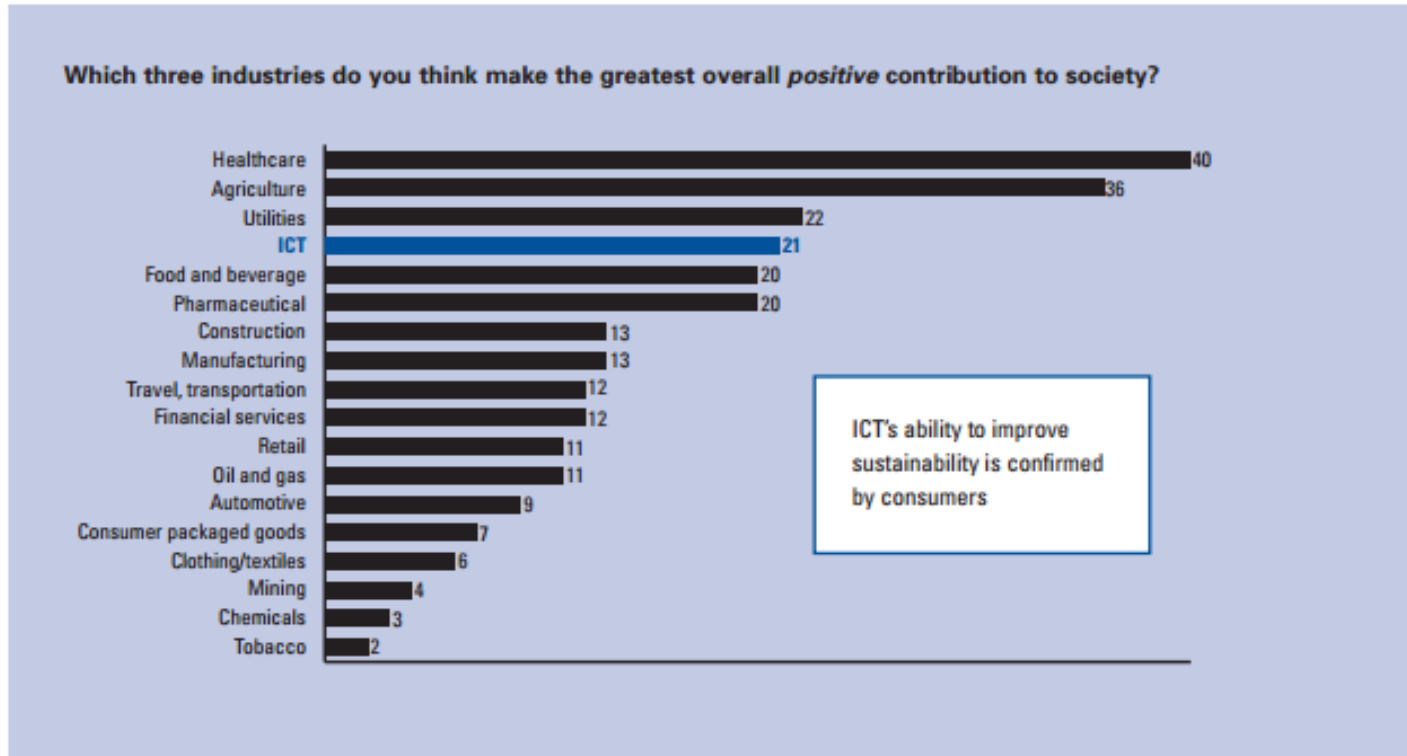
Source: World Economic Forum, Competitiveness Index 2008–2009; McKinsey, Digital Opportunity Index 2008–2009.

Note: The Global Competitiveness Index is a composite index of indicators relating to institutions, infrastructure, macroeconomic environment, health, education, market efficiency, technological readiness, business sophistication, and innovation. The Digital Opportunity Index is a composite index of indicators relating to coverage/access, tariffs, equipment penetration, and broadband adoption.

Investing in ICT can help countries increase their annual GDP growth by 0.6–0.7% on average, on an annual basis, for each increase of 10 percent in household Internet penetration

ICT Contribution to Society

Figure 2: Perceived ICT contribution to society (percent of respondents)

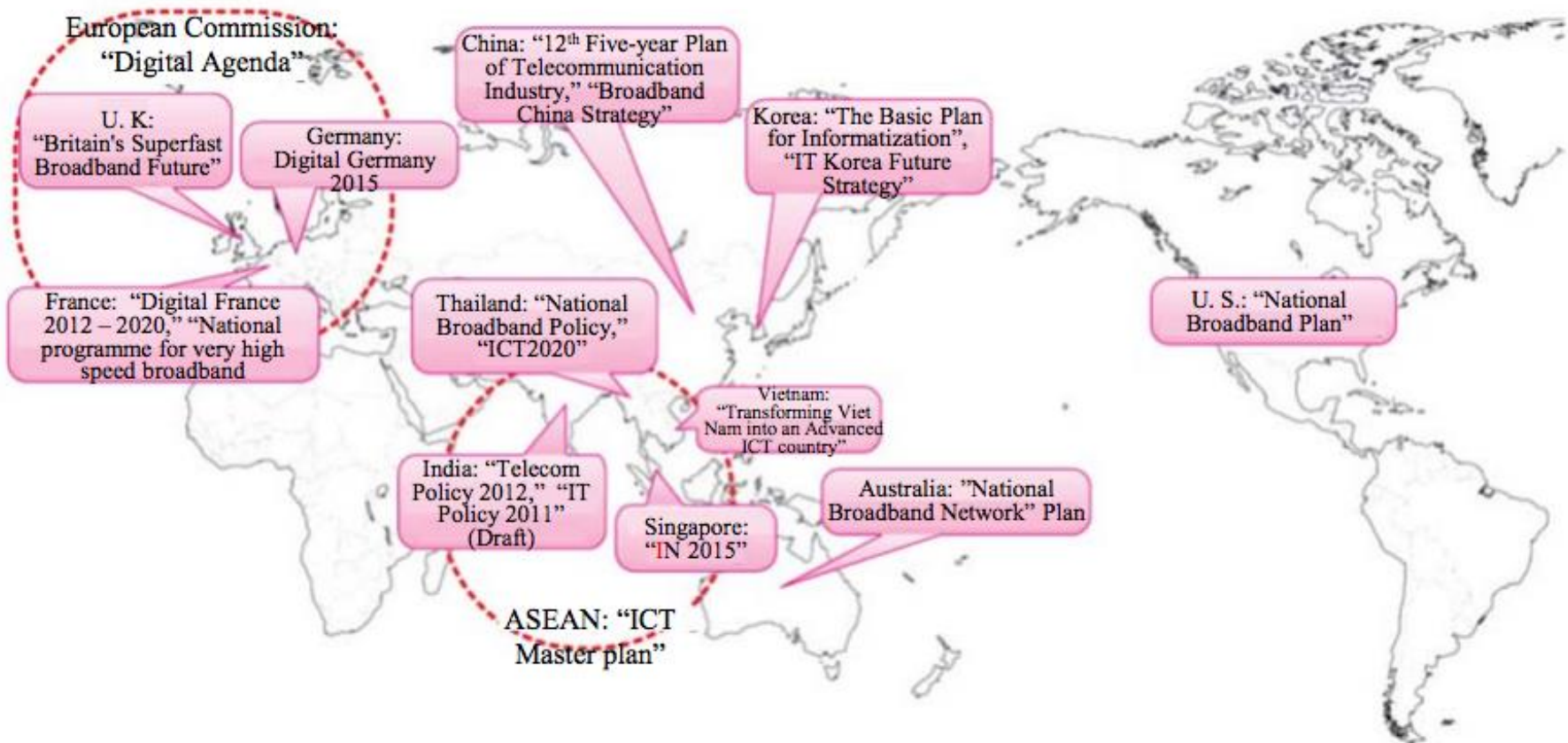


Source: September 2008 McKinsey survey of 4,787 consumers around the world.

The main role of the government should be to help **craft** and **support a vision** for the **ICT sector** that can bring the **interests of the different parties together** and put them to work towards a common goal.

Examples of ICT strategy in the World

- ASEAN countries, as well as the advanced countries, have set-up strategic programs focusing on the enhancement of broadband infrastructure and utilization of ICT.



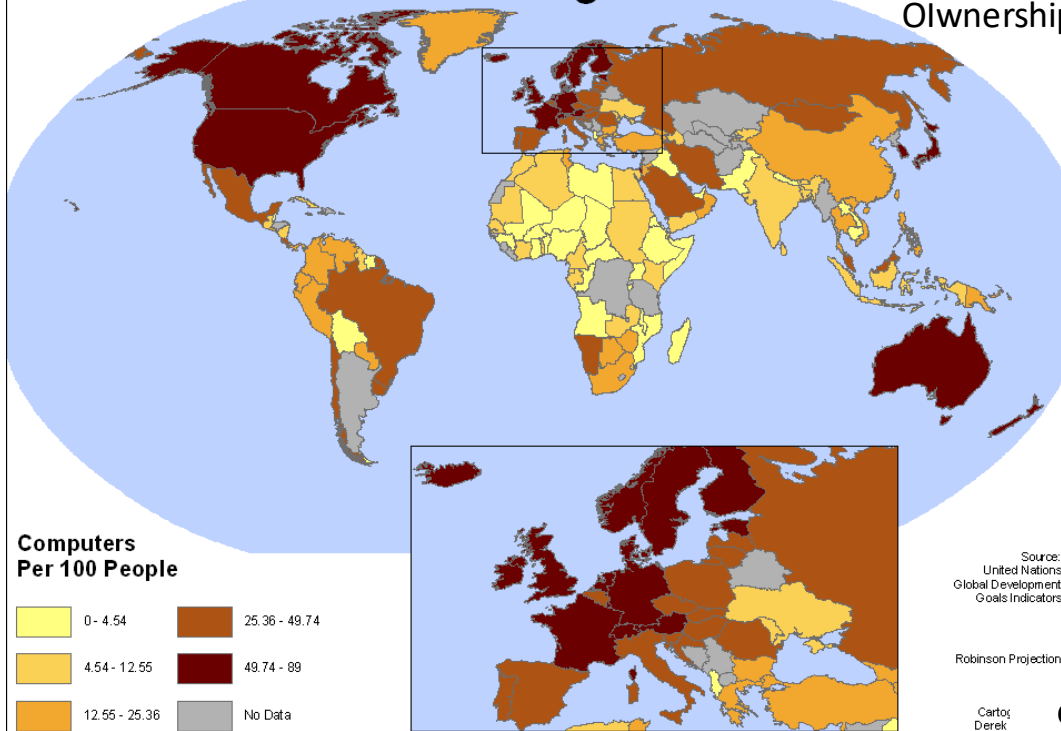
Digital Divide

(情報格差またはデジタル・ディバイド)

- The **Digital Divide** refers to the **use**, or the **knowledge of, information and communication technologies (ICT)**
 - It is gap between people who can **use information and communications technology (ICT)** such as Internet and computers, and those who cannot
 - Global scale - **the divide between developing and developed countries**
- Access is a necessary condition for overcoming the digital divide
 - Those without basic information infrastructure are **denied access to information regarding social, economic, cultural and political activities and ability to act on it** (e.g. job opportunities advertised online)

The Global Digital Divide

Computer
Ownership



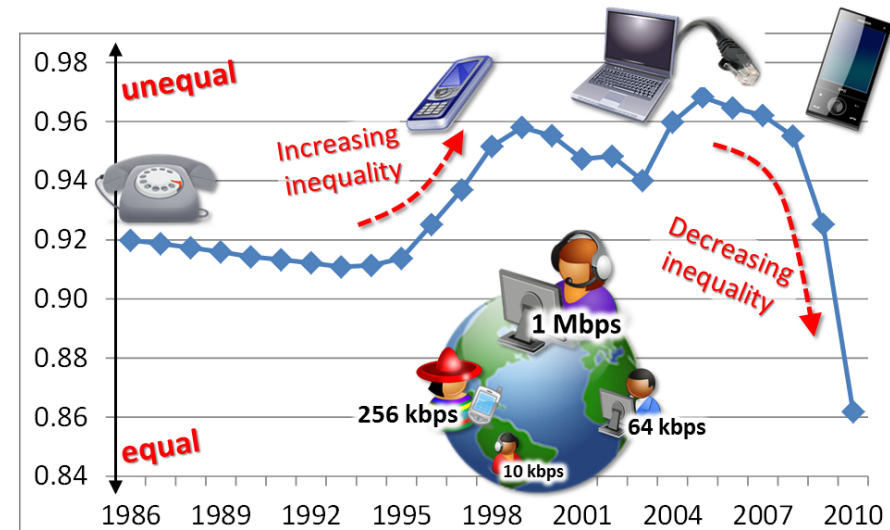
“A digital divide is an economic inequality between groups, broadly construed, in terms of access to, use of, or knowledge of information and communication technologies (ICT).”

Digital Divide

$$G = \frac{\sum_{i=1}^n \sum_{j=1}^n |x_i - x_j|}{2 \sum_{i=1}^n \sum_{j=1}^n x_j} = \frac{\sum_{i=1}^n \sum_{j=1}^n |x_i - x_j|}{2n \sum_{i=1}^n x_i}$$

measure of statistical dispersion

Gini coefficients for telecommunication capacity (in kbps) per individual worldwide (incl. inhabitants from 208 countries)



Source: Hilbert, M. (2013). Technological information inequality as an incessantly moving target: The redistribution of information and communication capacities between 1986 and 2010. *Journal of the Association for Information Science and Technology*. doi: 10.1002/asi.23020

Digital Divide: Reasons

- Poorer, less educated and older often have limited or no access to ICT technologies
 - Other factors: **education, income, age, skills, awareness, race, ethnic origin, location, and gender, political/cultural access** and **psychological attitudes**
- Income has major effect - ICT as a necessity good vs. ICT as a luxury good
 - Prices constantly fall but still too expensive
 - ICT estimated cost: US\$10 per person per month (US\$120 over year)
 - Over 40% of the world population lives on less than US\$ 2 per day so spending $120/730 = 16\%$ is still quite much
- **Lack of knowledge** is another key barrier

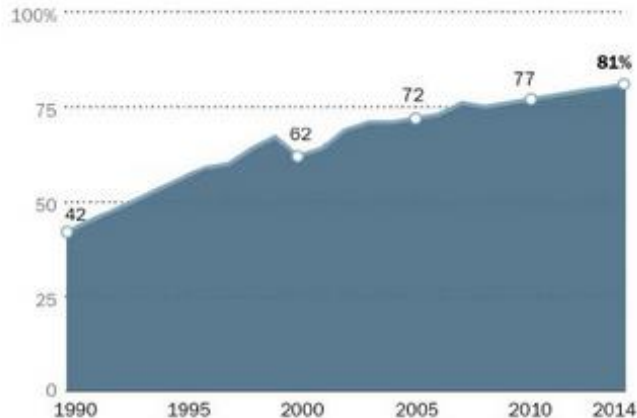
Reshaping of Digital Divide

- Digital divide is also unfolding between **high-speed** and **low-speed access**
- The gap has also moved beyond having the resources and access to connect to ICTs to **interpreting** and **understanding information** presented once connected
- As UNESCO states:
 - “closing the **digital divide** will not suffice to close the **knowledge divide**, for access to useful, relevant knowledge is more than simply a matter of infrastructure—it depends on training, cognitive skills and regulatory frameworks geared towards access to contents.”

Usage in USA

Computer use, 1990-2014

% of American adults who use computers, over time

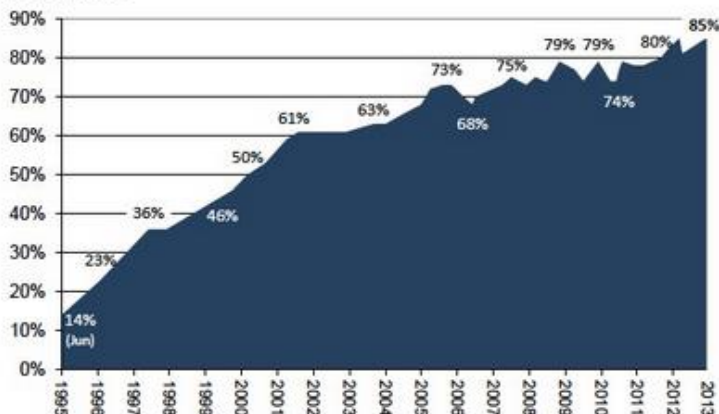


Source: Pew Research Center Surveys, 1990-2014

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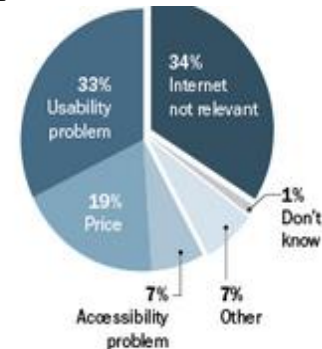
Internet adoption, 1995-2013

% of American adults (ages 18+) who use the internet, over time. As of May 2013, 85% of adults use the internet.



Source: Pew Research Surveys, 1995-May 2013.

More: <http://pewinternet.org/Trend-Data/Internet-Adoption.aspx>



The main reason offline adults don't use the internet

Among all American adults ages 18 and older who do not use the internet or email (n=357)

Just not interested	21%
Don't have a computer	13
Too difficult/frustrating	10
Don't know how/Don't have skills	8
Too old to learn	8
Don't have access	7
Too expensive	6
Don't need it / Don't want it	6
Think it's a waste of time	4
Physically unable (e.g. poor eyesight or disabled)	4
Too busy/Just don't have the time	3
Worried about privacy / viruses / spam / spyware / hackers	3
Other (SPECIFY)	7

Summary of reasons

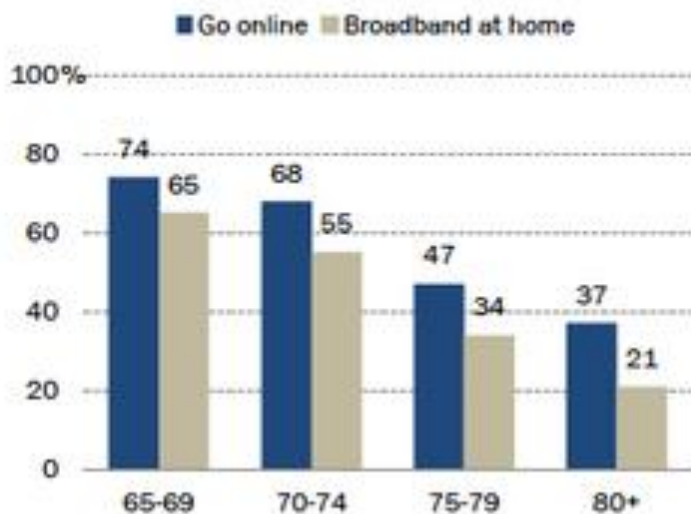
Relevance (not interested + waste of time + too busy + don't need/want)	34%
Usability (difficult/frustrating + too old + don't know how + physically unable + worried about virus/spam/hackers/etc.	32
Price (too expensive + don't have computer)	19
Lack of availability / Access	7

Source: Pew Research Center's Internet & American Life Project Spring Tracking Survey, April 17 – May 19, 2013. N=2,252 adults ages 18+. Interviews were conducted in English and Spanish and on landline and cell phones. The margin of error for results based on all adults is +/- 2.3 percentage points.

Seniors and Technology

Among seniors, internet and broadband use drop off around age 75

% within each age group who ...



Pew Research Center's Internet Project July 18-September 30, 2013 tracking survey.

PEW RESEARCH CENTER

One-quarter of seniors use online social networks

% of seniors who ...

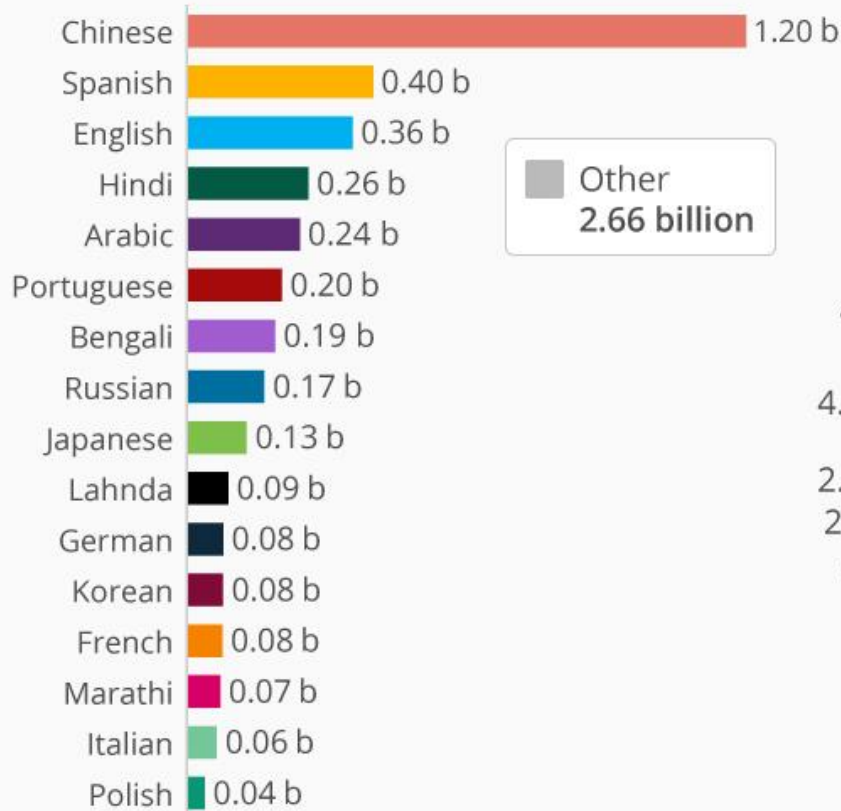


Pew Research Center's Internet Project July 18-September 30, 2013 tracking survey.

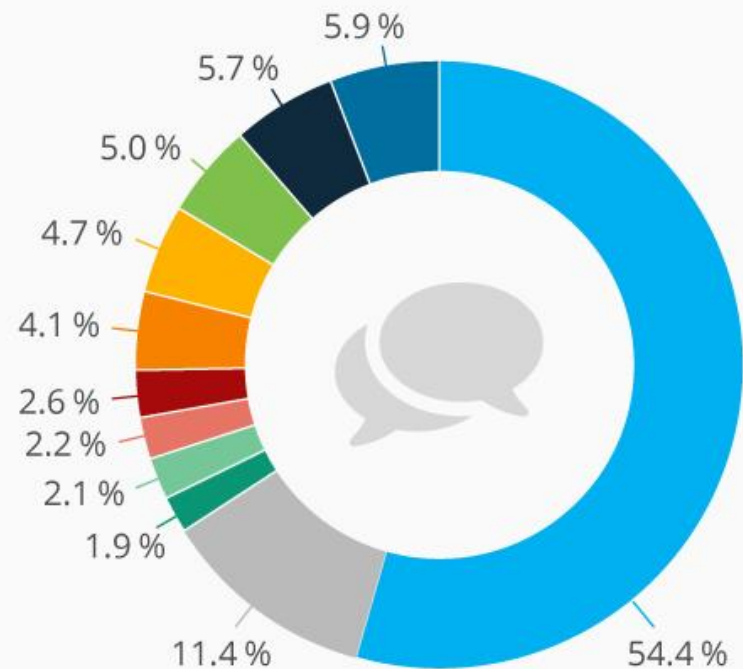
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Internet Languages

Number of first-language speakers (estimates in billions)



Percentage of websites using various content languages*

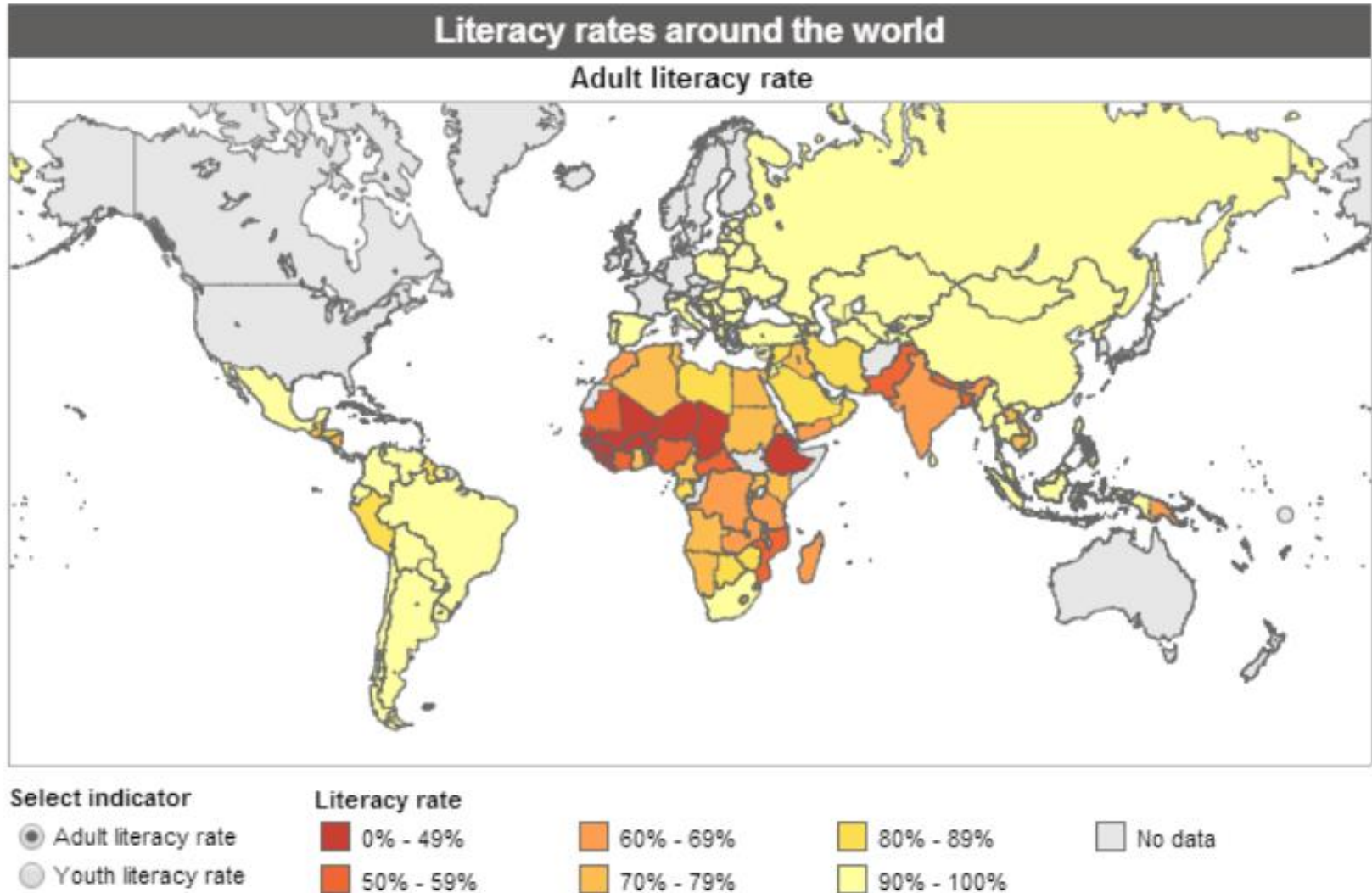


* top 10 million websites

Sources: w3techs.com, Ethnologue

Mashable statista

Literacy Rate



Japan's Information Society

January 2001: e-Japan Strategy

- High-speed network infrastructure, e-commerce, e-government, human resource development

July 2003: e-Japan Strategy II

- Healthcare, food, lifestyle, small business finance, knowledge, employment/labor, administrative services

January 2006: New IT Reform Strategy (u-Japan)

- Healthcare, environment, safety and security, ITS, e-government, IT management, abundant lifestyle, universal design society, infrastructure, reliable IT society, advanced IT talents, human infrastructure creation, research and development, international competitiveness, international contribution

July 2009: i-Japan Strategy 2015

- e-Government/e-Local Government, healthcare, education/ human resources, industry/ regional revitalization, digital infrastructure

History of Japan's ICT Policy: e-Japan

- Slow start:
 - In 1999, Japanese Internet penetration rate was 13.4%
 - In 2001 only 737,000 broadband subscribers
- 2001: Establishing *Advanced Information and Telecommunications Society Promotion Headquarters*
 - E-Japan strategies with specific targets: upgrading Japan's Internet Network to meet global standards and making super-high speed access (30-100 Mbps) available cheaply to everyone
- Many infrastructure building targets were quickly achieved (35mln households with DSL in 2003) so the interest started later shifting to the promotion of ICT usage

History of Japan's ICT Policy: Towards Ubiquitous Networked Society

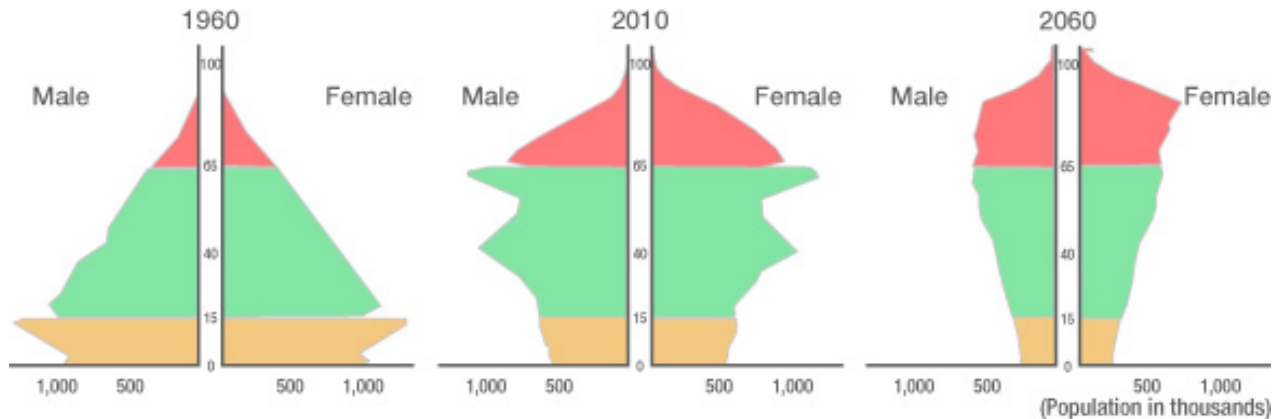
- In 2004 before the end of the **e-Japan**, Ministry of Internal Affairs and Communications drafted **u-Japan policy**
 - Ubiquitous networked society by 2010 that will permit **ICT access at any time, anywhere, with anything and by anyone**
 - Goal is to **lead the world as the most advanced ICT nation** and **disseminate ICT contribution** to the world. Principle of private-sector driven development
 - Basic elements of the policy: **a.) development of ubiquitous networks** that can be used seamlessly for both wireless and fixed networks, **b.) advanced usage of ICT to assist in resolving social issues** (*high unemployment, stagnation, declining birthrate and aging population*), **c.) improvement of environment for ICT usage** in a **safe and secure manner**
 - 2011 chosen as the year of completely digital networks (e.g., changeover to digital terrestrial television broadcasts)

Potential of ICT to Resolve Social Problems in Japan

- “Our country faces a **mountain of social issues** to be resolved, including safe and secure countermeasures and revitalizing the economy amid the **declining population growth** and **aging of society**.”
(Ministry of International Affairs and Communications)
- “As the ‘**magic bullet**’ to solve these issues, great expectations have been placed on **Information and Communications Technology**.”
(Ministry of International Affairs and Communications)

Declining Birthrate and Aging Population in Japan

Japan's Changing Population Pyramid (population by age)



Sources: (For 1960 and 2010) Statistics Bureau (Ministry of Internal Affairs and Communications), *Population Census of Japan*; (for 2060 projection) National Institute of Population and Social Security Research, *Population Projections for Japan* (January 2012), based on medium-variant fertility and mortality assumptions.

Stage 1	Stage 2	Stage 3	Stage 4
Expansive.	Expansive.	Stationary.	Contractive.
Concave sides.	Straight sides.	Convex sides.	Convex sides.
High birth rate.	Still high birth rate.	Declining birth rate.	Very low birth rate.
High death rate.	Falling death rate.	Low death rate.	Low death rate.
Short life expectancy.	Slightly longer life expectancy.	Long life expectancy.	Longer life expectancy.
Rapid fall in each upward age group due to high DR.	Fall in DR so more people living into middle age.	An increasing proportion of the population is in the 65+ age group.	Higher dependency ratio.
Niger	Haiti	Morocco	Australia
Economic development increases >>>>			

ICT and Social Isolation

- Increasingly prevalent “isolation” is a growing social issue in Japan, bringing new risks to the society
 - The segments of the population susceptible to isolation are single-person households, elderly people living alone, and single-parent households
- The formation of networks through ICT is expected to play a key role in building a society which excludes no-one from the network of mutual support, “universally inclusive social framework”
 - Revitalization of ties through Internet

Challenges Related to Internet Utilization

- The number of single-person households, seniors living alone, and single-parent households is forecast to rise
- **Low-income, single-parent, and single-person household segments**
 - High cost of Internet-capable devices
- **Sought remedy:** further **lowering of Internet connection fees** and a **subsidy program** for purchase of computers or other Internet-capable devices
- **Elderly**
 - Difficulty in keeping up with new technologies, products and services
 - Inability to use Internet-capable devices
 - Inability to adapt to the **general shift of services to Internet**
- **Sought remedy:** development of **user-friendly devices** and establishment of **local help desks**

Questions and/or comments?

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