Japan in the Digital Disruption

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Director, JFIT: Japan Forum for Innovation and Technology
April 13, 2018 EJEA and ISDP Conference Stockholm

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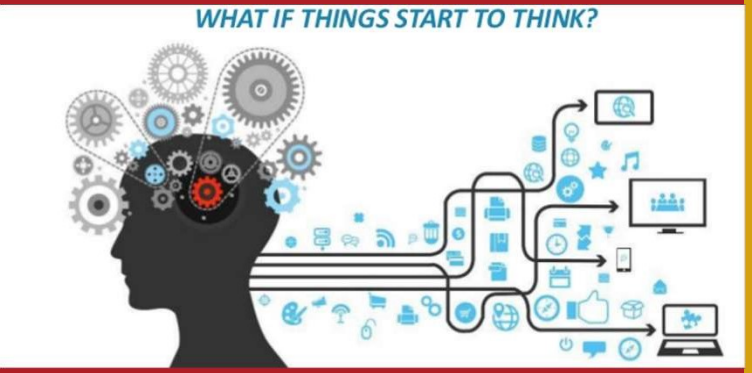
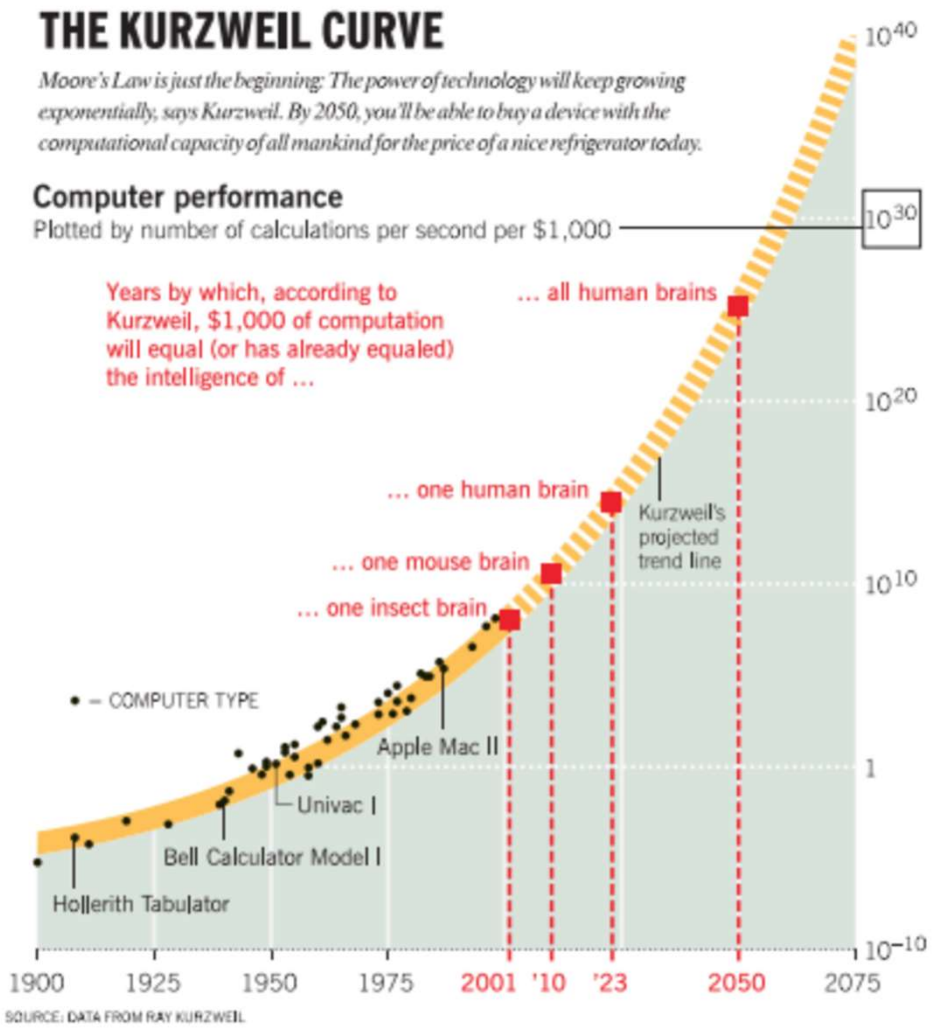


Japan in the Digital Disruption:

How Government, Business and People Embrace Artificial Intelligence, the Internet-of-Things, and the "Connected Society"

Brief self-introduction

- Grew up in Germany (Duisburg, Münster)
- Translator's Diploma Japanese, University of Bonn 1985
- M.A. Japanese Studies/Economics, Bonn, 1987
- Japan Foundation Ph.D. Scholarship, 1987-1988
- Ph.D. Japanese Studies, Economics, Marburg, 1989
- Professor of Japanese Business, UC San Diego, School of Global Policy and Strategy, 1994-current
- Visiting Professorships
  - Hitotsubashi University, Tokyo, 1991
  - UC Berkeley, 1990, 1992-1994
  - Harvard Business School, 1999-2000
  - Stanford University, Hoover Institute, 2003
- Total of 9+ years of study and research and study in Japan
- Launched a Japan center at UC San Diego in 2015
  - JFIT: Japan Forum for Innovation and Technology
  - New research initiative on "Japan in the Digital Disruption: AI and the Future of Society"



According to some people in Silicon Valley, in 7 years ….

- Growth is exponential
- Everything will be exponentially better
- Everything will be connected, automated, autonomous, shared, smart, instantaneous
- It's going to be terrific!

- *But:* Do we really want this? Are we really only 5 years away?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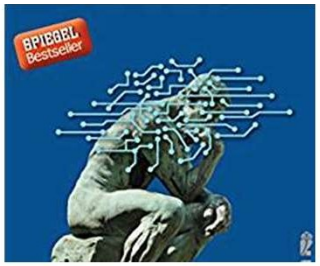
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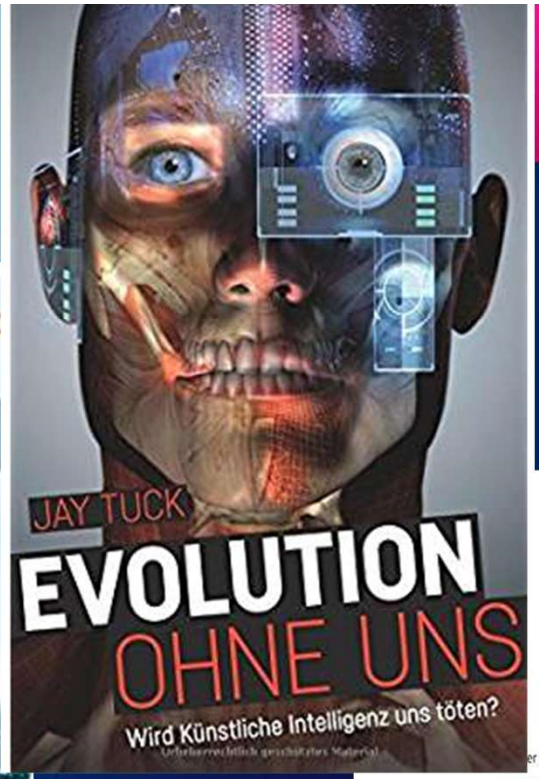
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[Was bedeutet das alles?]
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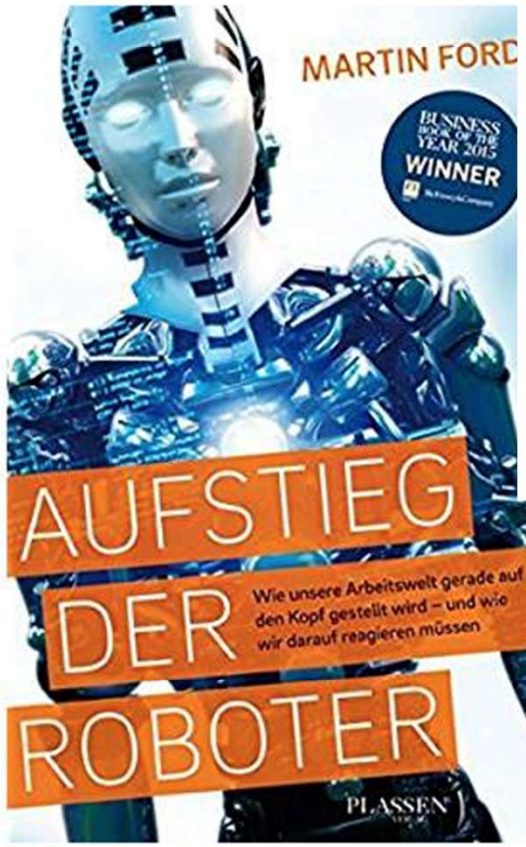
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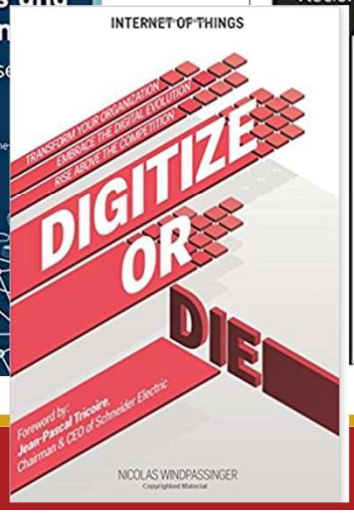
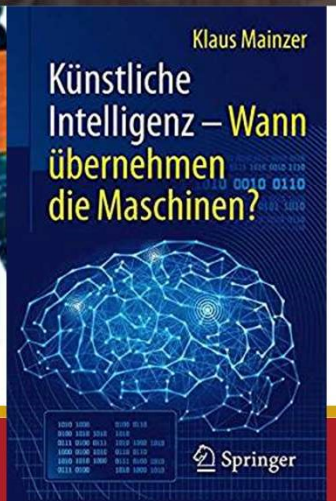

INTERNET OF THINGS
DIGITIZE OR DIE
NICOLAS WINDPASSINGER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ソニー、東芝は大復活する!
米中の戦略・日本の対抗策
人工知能(AI)や次世代自動車をめぐる世界覇権競争の最新動向
ITナビゲーター
2018年版
ブロックチェーンの未来
BLOCKCHAIN
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IoT/AI×障害者が日本の未来を創る!
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Smart Inclusion for the future of Japan
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Google米国本社副社長・村上憲郎氏 推薦
IoT、AIと障害者の密接な関係性をここまで明確に示した書は初めてだろう。
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AI経営で会社は甦る
冨山和彦
経営共創基盤(IGPI)代表取締役CEO
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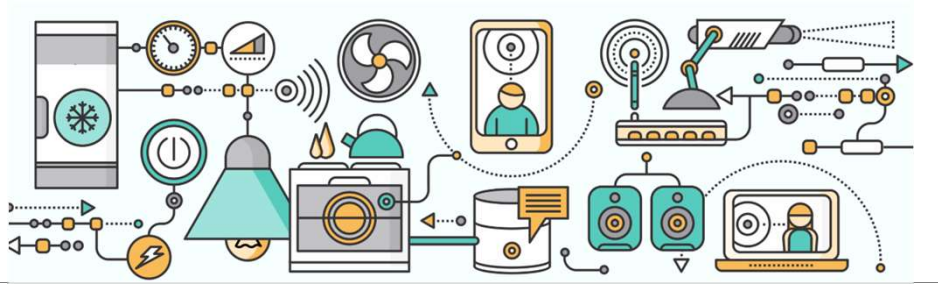
マイナス金利で急速に収益悪化!生き残りの条件は?
FinTech
フィンテック
この1冊ですべてがわかる!

Today's Agenda:

- What is the current situation in Japan regarding the technological disruption?
- Government: fancy reports on "Society 5.0", connected society, IOT, etc.
  - *Takeaway: Much of this is motivated by attempts to appease public concerns.*
- Business: positioning to provide the infrastructure hardware (sensors, storage, self-driving cars) and software (smart cities, trains, energy)
  - *Takeaway: This plays straight into Japan's long-standing strengths.*
- People: exceedingly worried about privacy, data protection, and the loss of the "human touch", coupled with curiosity to "learn"
  - *Takeaway: This is not new; perhaps the biggest challenge for the government is how to change the deep-seated "safety first" 安全第一mentality and if Japan wants to be a player.*
- Open up the discussion!

A few definitions



- AI: artificial intelligence and machine learning
  - when a device can perceive its environment and take actions toward its goals
  - Colloquially, when a machine mimics "cognitive" functions such as "learning" and "problem solving"
- IOT: internet-of-things
  - network of devices, vehicles, appliances etc. embedded with and connected through sensors, actuators, and a new level of wi-fi connectivity
  - each part is uniquely identifiable, inter-operates within the Internet infrastructure
  - objects can to be sensed and controlled remotely
  - result: improved efficiency, accuracy and economic benefit allows reduced human intervention
  - grows into a cyber-physical system: smart home, smart grid, smart city (transportation)
- Industry 4.0: production system based on IOT - all parts and all machines are connected
- Society 5.0 / connected society / sharing society
  - the next stage after the current “information society, where humans become part of the IOT

Elon Musk on AI

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AI 'more dangerous than nukes': Elon Musk still firm on regulatory oversight

The man building a spaceship to send people to Mars has used his South by Southwest appearance to reaffirm his belief that the danger of artificial intelligence is much greater than the danger of nuclear warheads.

By Asha McLean | March 12, 2018 -- 18:50 GMT (11:50 PDT) | Topic: Innovation

"The danger of AI is much greater than the danger of nuclear warheads, by a lot and nobody would suggest that we allow anyone to just build nuclear warheads if they want -- that would be insane.

"This is a case where you have a very serious danger to the public, therefore there needs to be a public body that has insight and then oversight to confirm that everyone is developing AI safely -- this is extremely important," he said.

Let's all move to Mars?

They are two of the most consequential and intriguing men in Silicon Valley who don't live there. Hassabis, a co-founder of the mysterious London laboratory DeepMind, had come to Musk's SpaceX rocket factory, outside Los Angeles, a few years ago. They were in the canteen, talking, as a massive rocket part traversed overhead. Musk explained that his ultimate goal at SpaceX was the most important project in the world: interplanetary colonization.

Hassabis replied that, in fact, *he* was working on the most important project in the world: developing artificial super-intelligence. Musk countered that this was one reason we needed to colonize Mars—so that we'll have a bolt-hole if A.I. goes rogue and turns on humanity. Amused, Hassabis said that A.I. would simply follow humans to Mars.

From: Vanity Fair, March 26, 2017, *ELON MUSK'S BILLION-DOLLAR CRUSADE TO STOP THE A.I. APOCALYPSE*
https://www.vanityfair.com/news/2017/03/elon-musk-billion-dollar-crusade-to-stop-ai-space-x

And what are the core issues?

- Trust
- Privacy / security
- Ethics
- Power and control

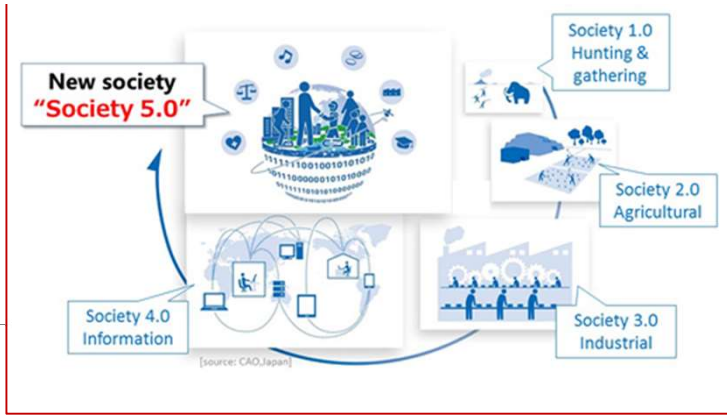
- JFIT project: How are countries answering these questions?
- Today: How is Japan embracing the new technologies?

Japan: General impressions = positive!

- Government: A vision for the future
- Business: A way to grow and compete
- People: A way to overcome social problems

- Negative views mostly expressed as
  - Potential losses in employment
  - Privacy and data protection
  - ….and in the form of very cute robots

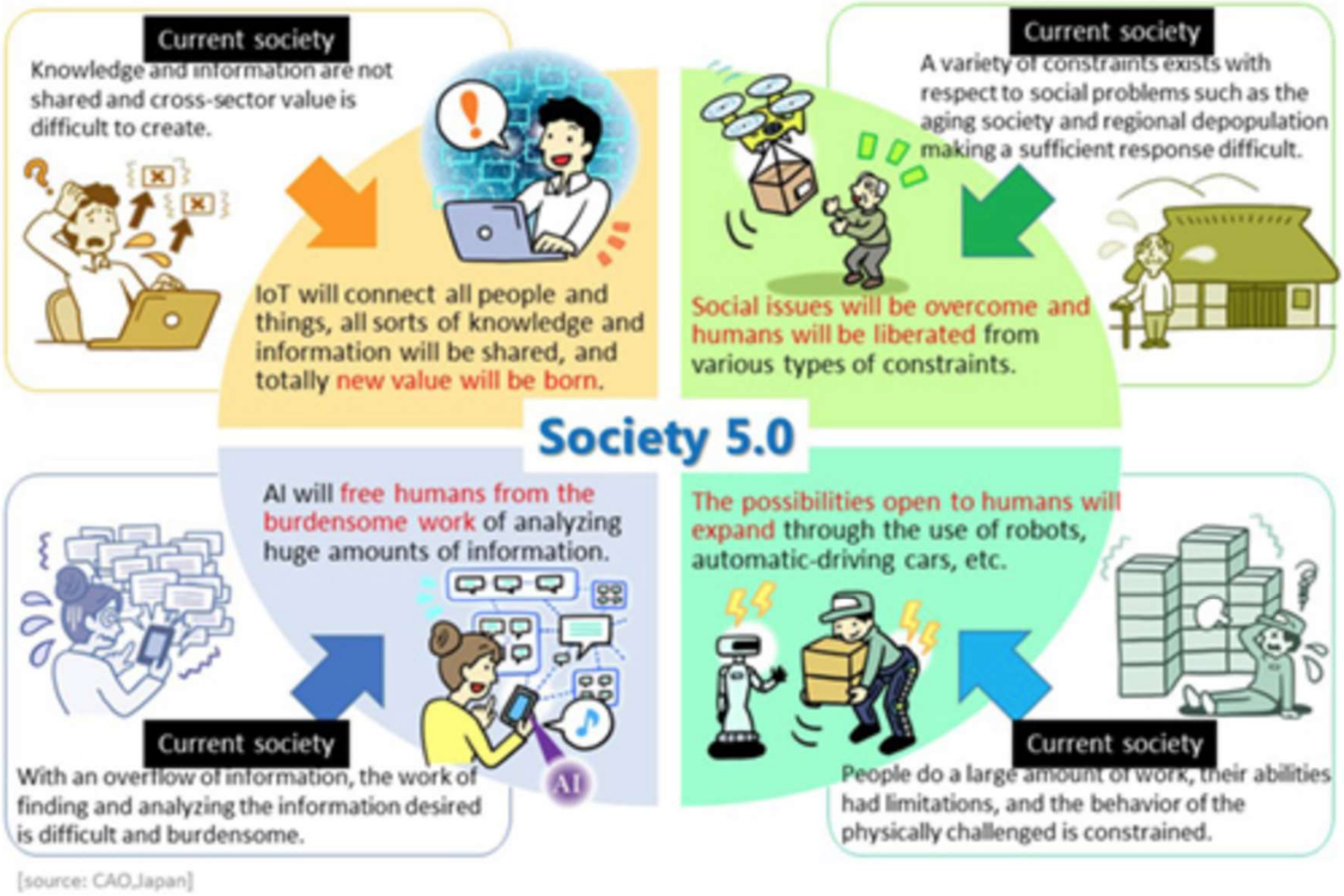
Government: The Rosy Picture?



- Optimistic about improving quality of life for Japanese citizens
  - AI/IoT/Big Data as a means to solve societal problems
    - Aging society, falling population, immigration, increased demand for nursing etc.
    - "Co-creating the future" with robots, smart devices, digital health
- Little in-depth discussion of the concerns
    - Privacy, cybersecurity, displacement, etc.
    - But: many in Japan still uncomfortable with basic internet connections, cloud, even USB sticks
- Tokyo Olympics 2020 seen as a major goal line
    - Not just showcasing Japanese culture, sportsmanship, etc. but also innovations and changes
    - Hope to alter global perception of Japan as a stagnant economy and society

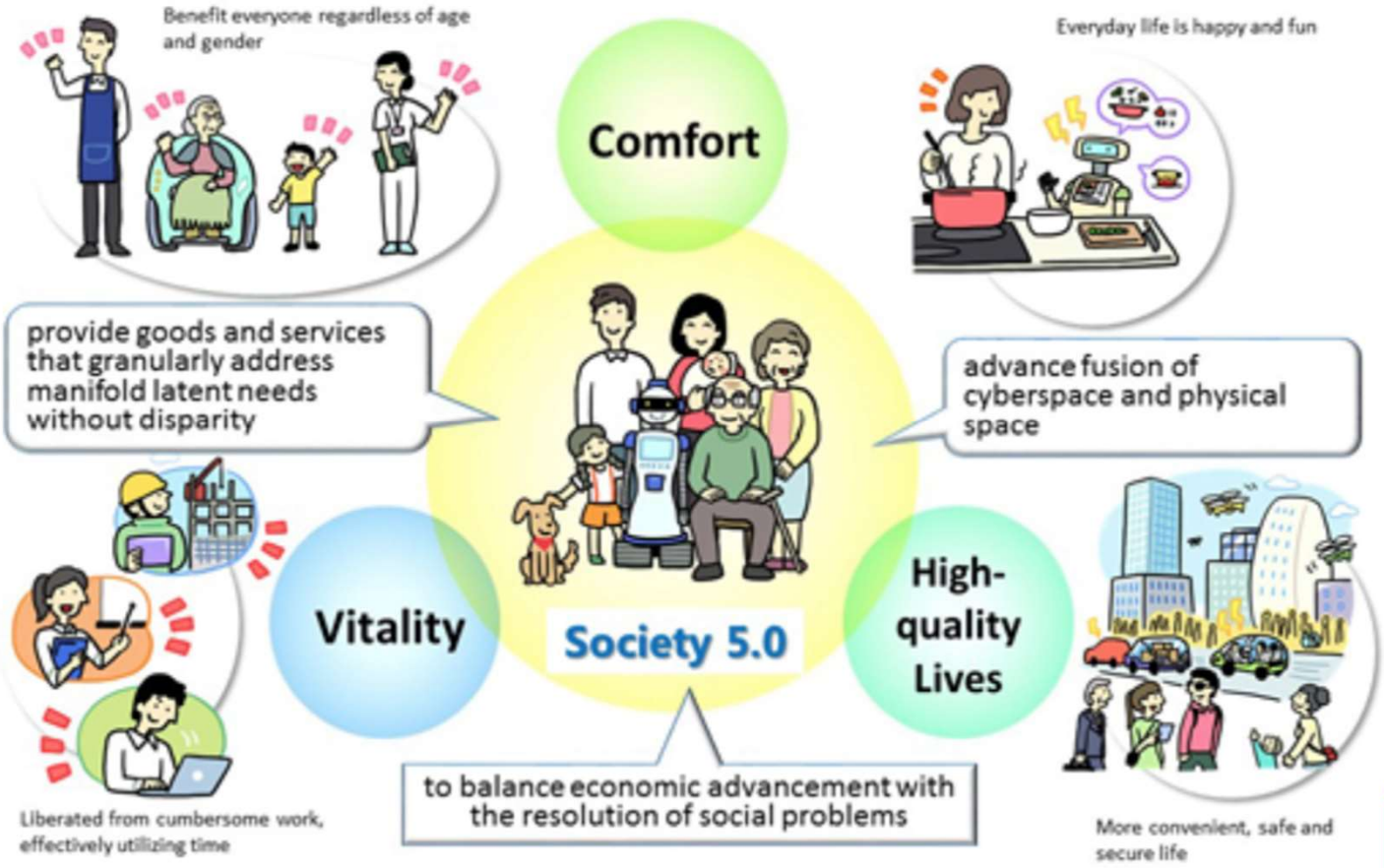
Prime Minister Abe coined the phrase “Society 5.0”….

…. a construction of reality….



[source: CAO,Japan]

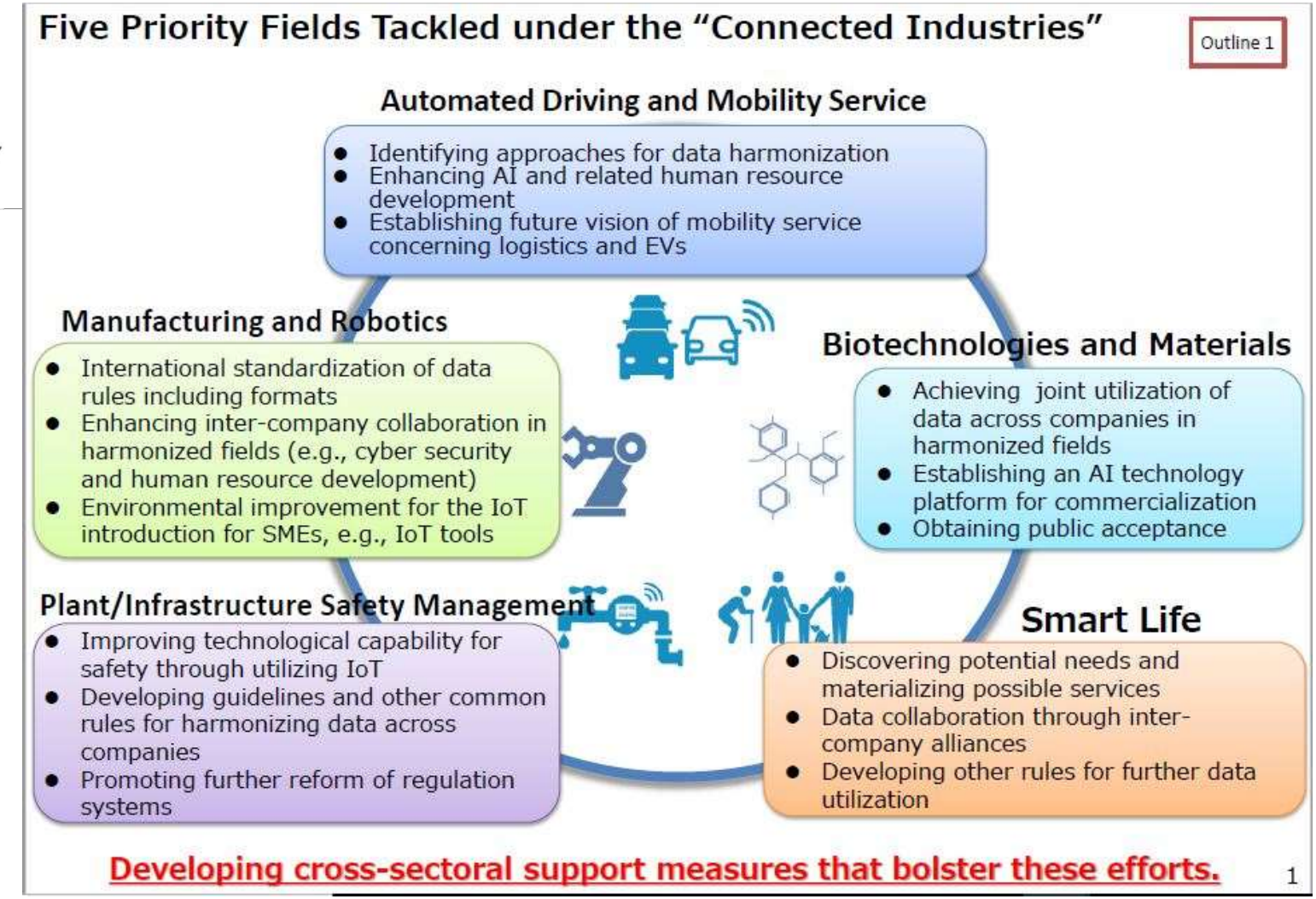
… where “Everyday life is happy and fun!”



経済産業省
Ministry of Economy, Trade and Industry

Five Priority Fields Tackled under the "Connected Industries"

Outline 1



Developing cross-sectoral support measures that bolster these efforts.

1

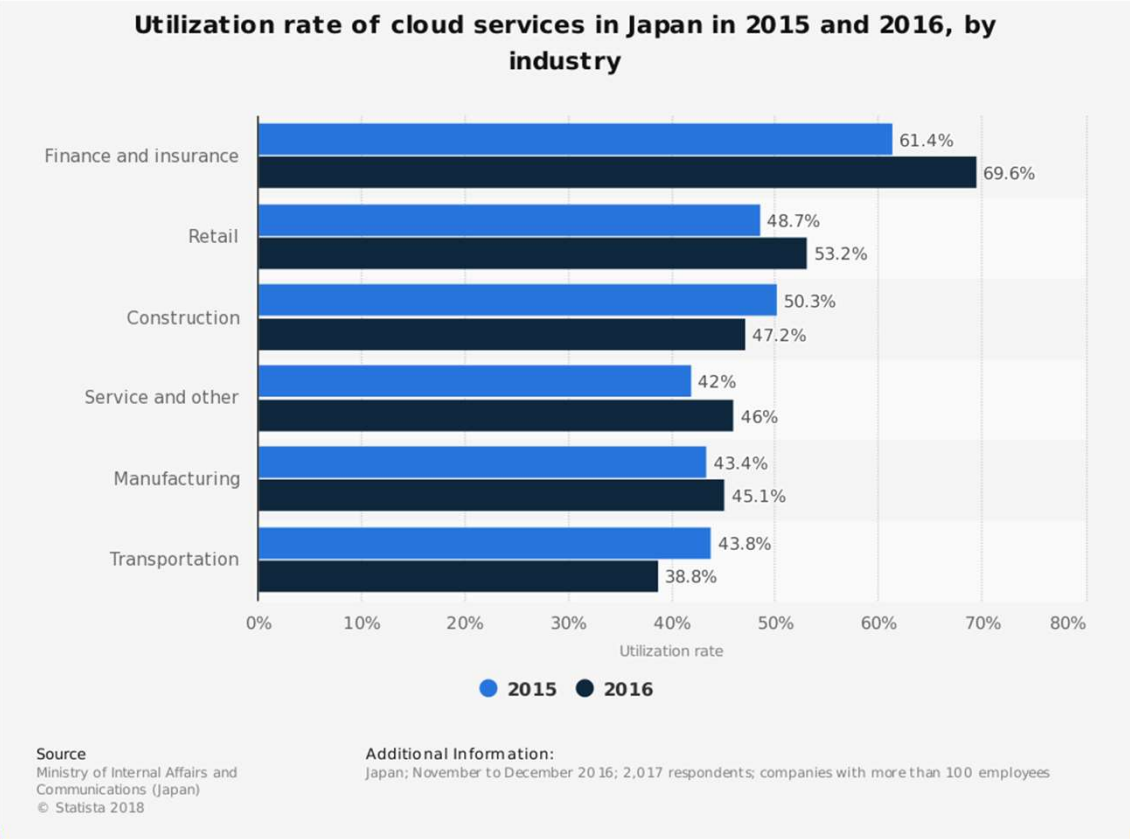
総務省
MIC Ministry of Internal Affairs and Communications

- primary goal: to facilitate the **shift in the Japanese economy from an automated mass production economy** to an **"autonomous" economy** with increased innovation, productivity and efficiency
- foresees a **"data marketplace":** deregulation will allow firms to purchase information from other firms, individuals, and IoT devices
- promotes the **liberalization of data,** four main categories
  - **"open data"** or publicly available government data
  - the digitization of **"know-how"** in essentially all fields (e.g. agriculture, infrastructure, business, etc.); in combining open data with tacit knowledge will boost efficiency and global competitiveness
  - **"M2M"** (machine-to-machine) data: data communication will increase productivity
  - **"personal data"**: individuals should be given the discretion to disseminate their own information to companies as they see fit. As long as the identities of the individuals involved remain concealed, the positive benefits to society of being able to access such information for businesses outweigh the risks.
- liberalizing these four types of data will lead to the **"fourth industrial revolution"**
  - autonomous production will Japanese firms a competitive edge and offer positive externalities for society, such as aging society and work-life-balance.

Why so rosy?

- There is serious concern that Japan will fall behind, in particular against China
  - Most articles on the topic feature Americans, not Japanese movers
  - Japanese companies still slow in IT adoption
- The general public is very worried
  - Concerned about change, security, trust, and privacy
  - If J-government were to say negative things, they would reject change
  - In order not to stop progress, J-govt emphasizes the opportunities
    - "Our METI guidelines are deliberately vague as we strike a balance between ambiguity and concreteness."
  - Japanese elections: elderly voters

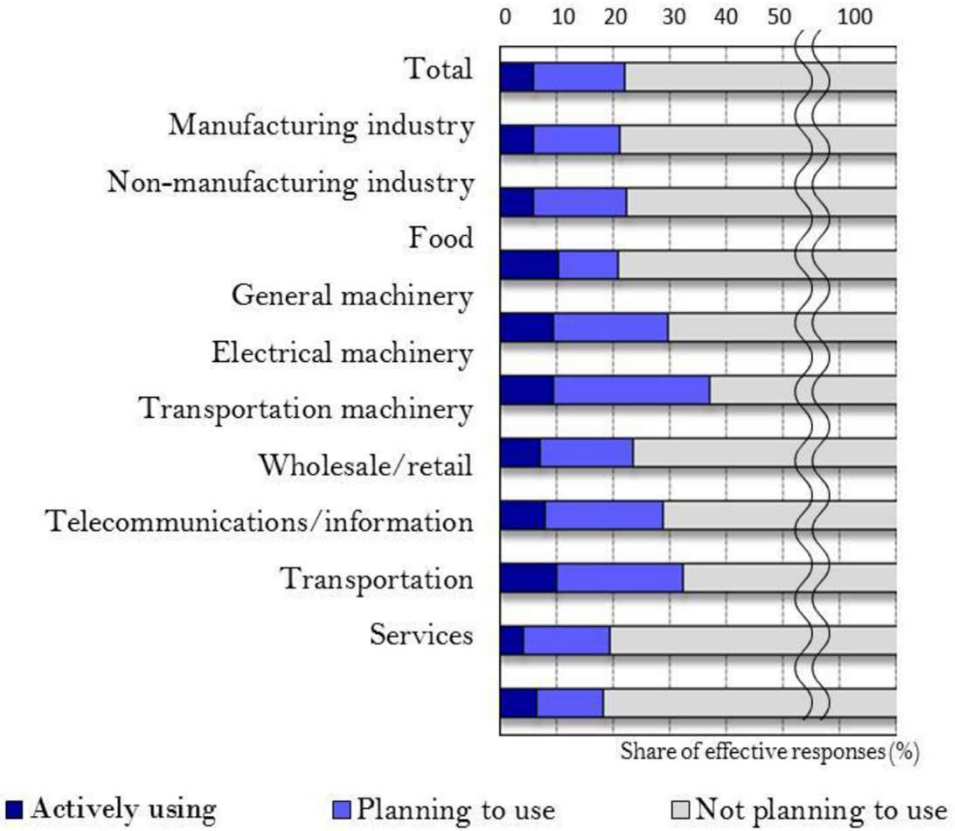
In reality, many challenges



- Japanese business is greatly behind IT adoption
  - Cloud and data storage (USB, passwords, utility v. security)
  - Big data use for advertising, banking, etc.
  - Social media in marketing
  - Banks and “fintech” (Venmo, Wechat)

In 2016, over 90% of U.S. businesses used some kind of cloud access, compared to 25% in Japan.

Usage of IOT and Big Data, by Industry (2015)



Says Keidanren:
"After time and realizing the benefits, we believe companies will come around and embrace them wholeheartedly".

But: How much time is "after time"?

- "The worry is that we are not smart about being slow; it's a default, not a strategy".

Notes:
Respondents = 1,208 large manufacturing companies
Source: Investment Trend of Electric machine: Investment for Growth to the Strong Fields, Sept. 2015, Development Bank of Japan.

People generally very nervous about "sharing"

- Rejection of the use of Big Data, even for research
  - Recent scandal: Hitachi and JR East anonymous train use data collection
  - New government rules on how personal data can be used
- Limited literacy of IOT/Big Data matters among senior managers
  - most U.S. executives are more open to adoption than staff; Japan is the opposite
    - ❖ CEOs in Japan are unfamiliar with big data/IOT; often afraid
    - ❖ insufficient training in quantitative methods (OTJ, rotations, generalists)
    - ❖ no delegation to CTOs or CIOs (few such positions)
    - ❖ Limited M&A of startup technologies : new technologies not integrated
      - ➢ "It's quite stunning: the staff at NEC cannot use their own technologies because senior management is too afraid to use it. They just sell it to others."
      - ➢ "A large bank boasts to do "big data" now; it's the hot topic. But I was shocked when I saw it: It was barely above the normal functions of excel sheet macros."

A few observations….

- A search for “AI”, “Society 5.0”, etc. in *Sentaku* 選択, a leading intellectual magazine, revealed 2 articles in total, both about the U.S.
- A lot of these words are used in *katakana*, the alphabet used for concepts that are alien
  - With 2 exceptions
    - AI = robots
    - Private data

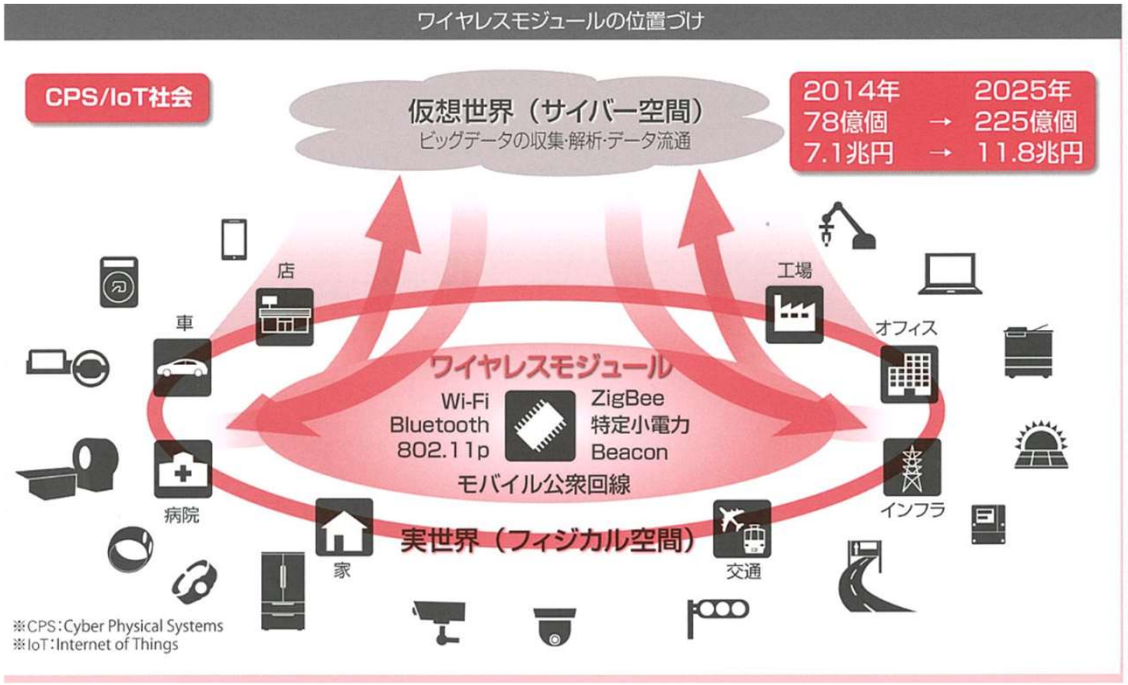
English	Japanese
AI	人工知能
Big Data	ビッグデータ
Personal Data	パーソナルデータ
Private Data	個人情報
Internet of Things (IoT)	IOT (モノのインターネット)
Cyber Security	サイバーセキュリティ

Business: In what industries will Japanese companies be real players?

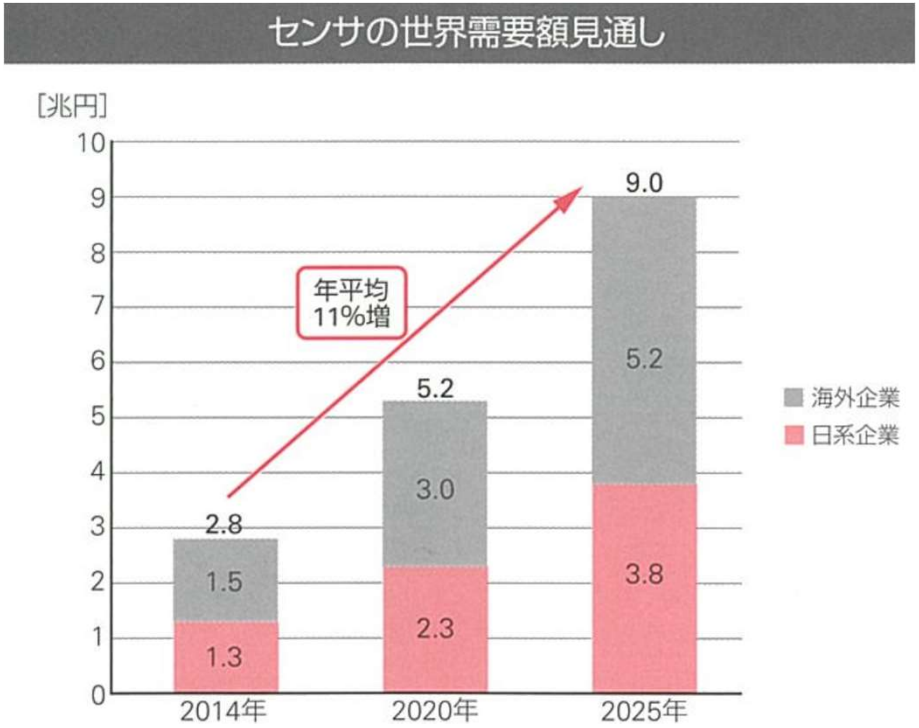
- Sensors
- Storage/batteries
  - Advanced materials, e-vehicle batteries
- Automobiles and new, related technologies
  - Maps, self-driving
  - AI drivers
- Smart cities
  - Trains, maglev vehicles, energy
- i.e., manufacturing-based
- "The good news is that the Japanese public trusts manufacturing".

We will need a new infrastructure!

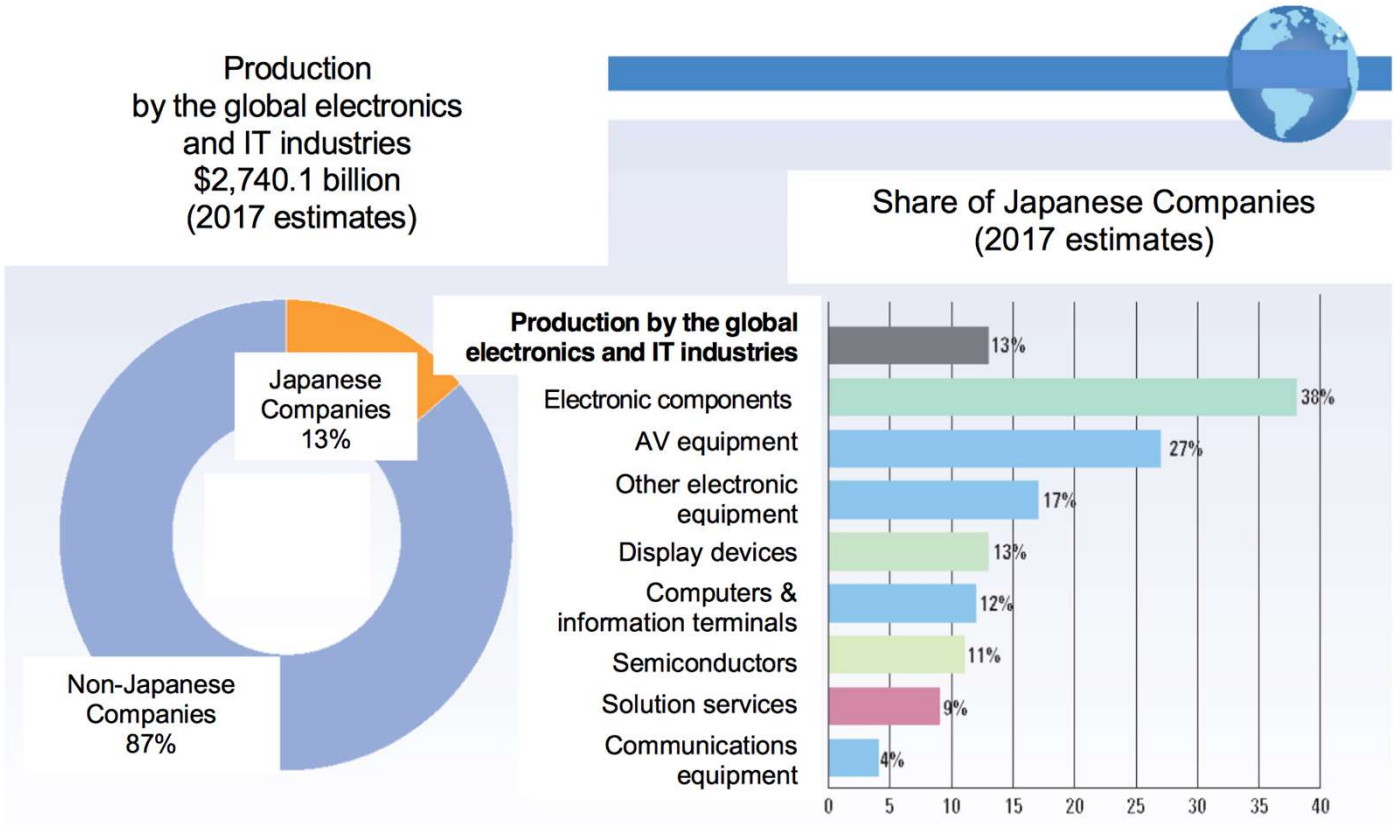
- Wi-fi etc. Connectivity



- Sensors

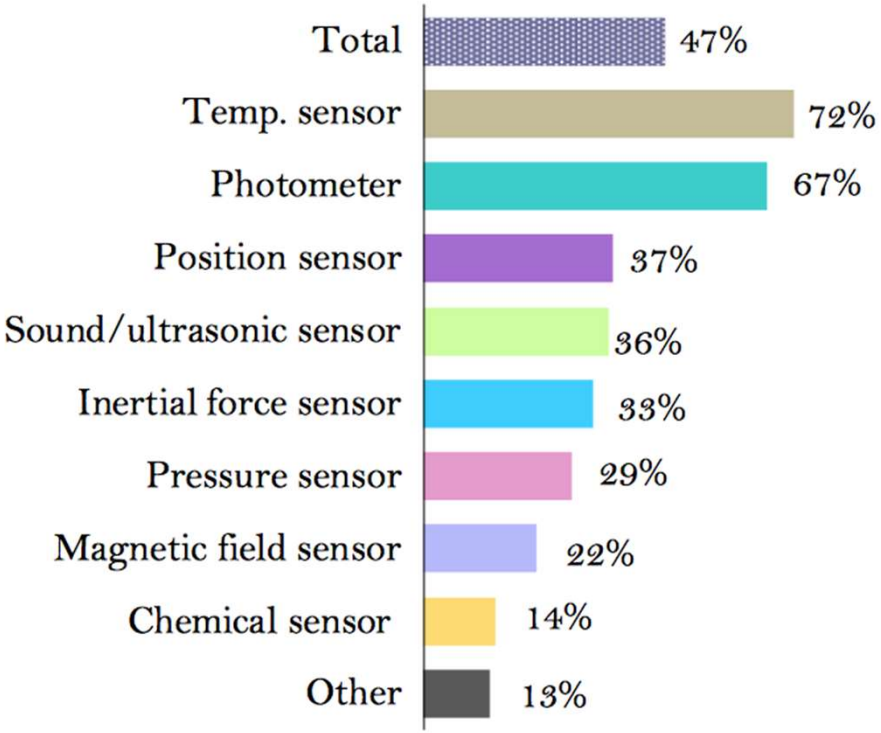


Japanese companies have a 40% global market share in electronic components



https://www.jeita.or.jp/english/topics/2017/1219_en.pdf

Sensors are the next big thing!: Japan's global market share in 2017 = 50%



The big players are:
Keyence
Omron
Panasonic
Mitsubishi Electric
Denso
Canon
Murata
Asahi Kasei
Alps Electric
Rohm
Sony
Optex
… and many more

Source: 2015 DBJ study, cited in http://www.mext.go.jp/component/english/__icsFiles/afieldfile/2017/04/14/1384513_009.pdf
MEXT, "Realizing a Super Smart Society" 2015

Toyota is becoming an Über-Uber….

- 80% of taxi fleet in Tokyo is Toyotas: all connected
- Used taxis are sold to the regions, and Asia: all connected
- New issues looks like a cute London-style taxi; don't be fooled:
  - It knows where people are going
  - who these people are
  - what they want and buy
  - the secrets they share in whatever language
  - and, it is building a map that far surpasses our imaginations

JPN TAXIの本質はクラウドとAI（人工知能）だ。
"JPN Taxi is true cloud-based AI in action."

東京のタクシーは約3万台。その8割はトヨタである。そして東京で使った中古が地方へ、地方で使った中古がアジアへと流れていく

Other big industry players

- Recruit: at the forefront of shifting to IOT/big data
- NTT Data: global IT powerhouse
- Softbank: telecommunications + VC fund
- B2B data interaction: forefront of ”Industry 4.0”
  - More advanced in Japan due to nature of supplier relations / *keiretsu*
  - Providers include Omron, Mitsubishi Denki, Komatsu, Hitachi
- Society celebrates these: if it is manufacturing, it can be trusted

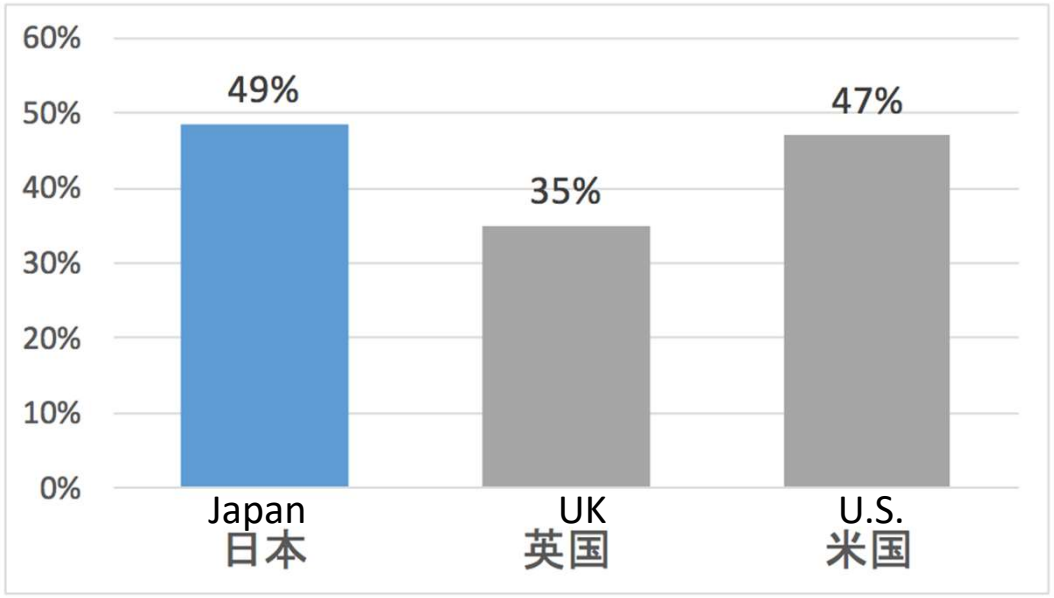
Robots

- Asimo: Honda, Honda 2000
- Pepper: Softbank
- Aibo: Sony

aibo is ready to
fill your heart
with joy.

Robots…

49% of jobs likely to be replaced by robots by 2030



Robots are the solution to Japan's looming labor shortage!

Source: Nomura Research Institute, 2015, 日本の労働人口の 49%が人工知能やロボット等で代替可能に：601 種の職業後とに、コンピューター技術による代替確率を試算

The acceptance of robots is quite high:

Q: “Do you think mankind could coexist with an Astroboy/Doraemon-like robot?”

	回答数	0% 20% 40% 60% 80% 100%
はい	327	65.4%
いいえ	173	34.6%
有効回答数：	500	

Conclusions

- Like everywhere, Japan's embrace is mixed
  - Excitement about new possibilities
  - Serious concerns about privacy, cyber-security, and "sharing" in the general society.
- Japan leapfrogging "Society 4.0" (USB sticks, servers, data centers)?
  - Government picture book visions of the future of society are a way of appeasing societal concerns.
  - How fast should we go? How much time is ok before Japan falls seriously behind?
- Business: positioning to be a big player in infrastructure hardware and software
  - The global market is already heavily relying on Japanese components at the heart of the IOT/AI switch.
  - Quietly, some large companies are rolling out programs in Japan that are at the forefront of the disruption.
- Education and a shift to new patterns of innovation will be critical
  - Old: trial & error, past experience, tacit knowledge = cornerstones of Japan's system of innovation
  - New: identify underlying principles, test hypotheses, use sophisticated instruments, quantitative methods

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