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## 日本側報告資料

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**June 29, 2010**  
Pre-meeting for Yaroslavl policy forum

## **Green and Silver Innovations**

**Hiroshi Komiya**

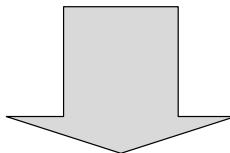
**Chairman of the Institute,  
Mitsubishi Research Institute, Inc., Japan  
President emeritus, University of Tokyo**

1

## **Innovation Models in Japan**

- Closed to outside (~1868)**  
⇒ highly cultural but not-industrial development
- Catch-up Model (~1980)**  
⇒ introduction and improvement of foreign technologies
- Basic research in enterprises (1980~)**  
⇒ central research laboratories in enterprises

Globalization and  
IT revolution



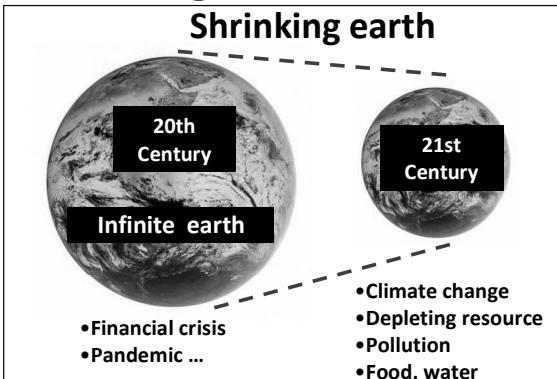
Sophisticated but  
compartmentalized  
knowledge & technology

**New National Innovation System**

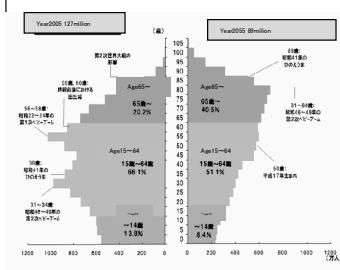
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## Paradigm in 21<sup>st</sup> century

### Shrinking earth



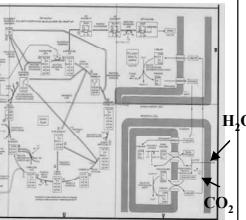
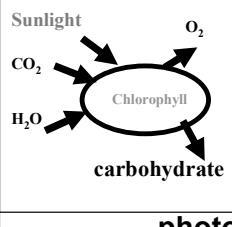
### Aging society



- Longevity
- Small birth rate
- Saturating demand
- Pension
- Medicine
- Care
- Work sharing
- Barrier free ...

### Exploding knowledge

1900



Source: Japan as a forerunner for addressing emerging problems in the world P134

National census 2005, Ministry of Internal Affairs and Communications

3

**Year 2050 will be crucial for humanity.**

**Considering the time for change,  
2050 will come soon.**

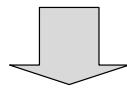
**Innovation is the key.**

**We need a concurrent approach  
to accelerate the process.**

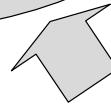
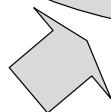
4

## New Innovation Model in Japan

Issues surfacing domestically as  
'Forerunner of emerging issues'



Innovation and Human  
Resources



Technology in making-things  
(Original know-how)

Education and Mentality  
(Cultural value / emotion)

5

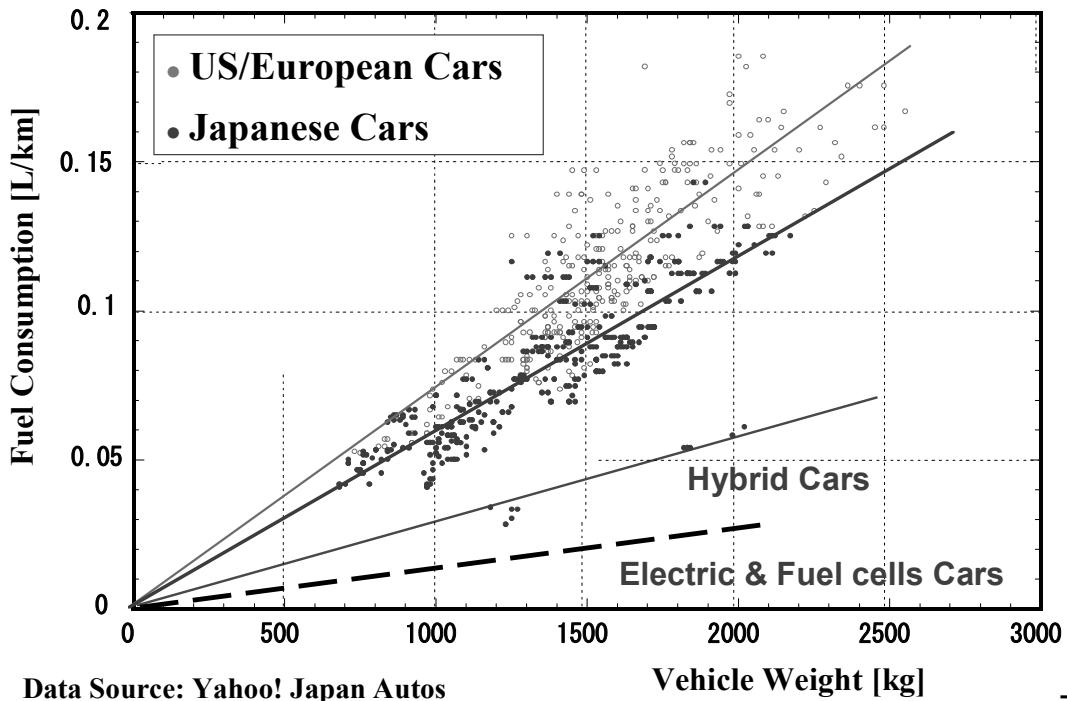
### To achieve green innovation

### Vision 2050

- Improve energy efficiency by three times
- Double the use of renewable energy
- Establish recycling system of materials

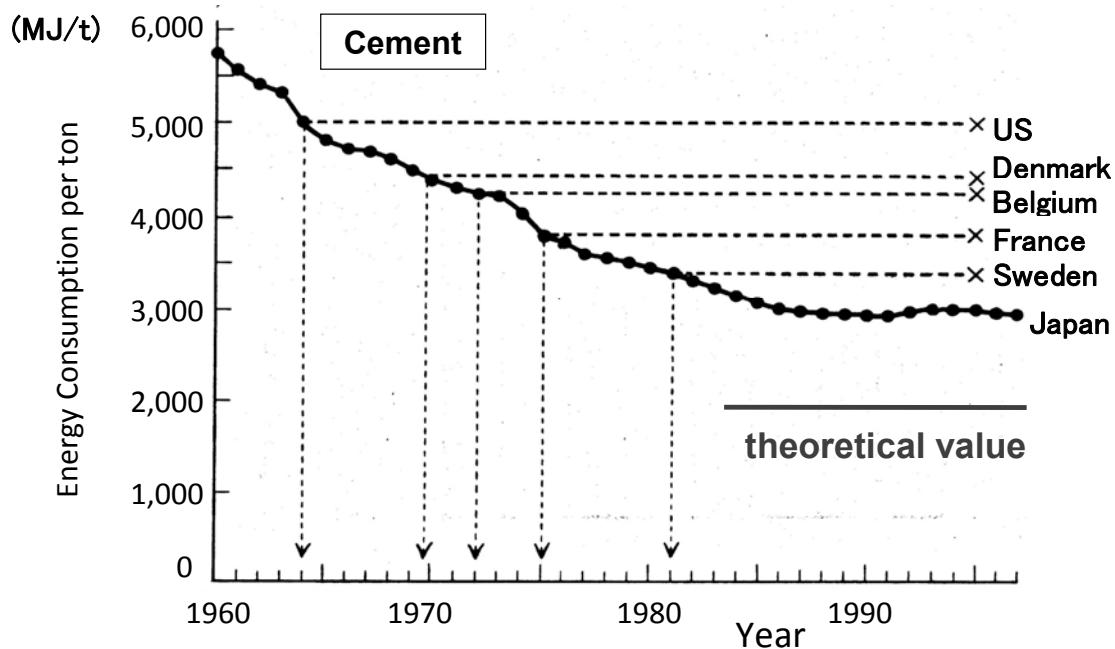
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*Japan leads!*  
**Automobile energy consumption to 1/10**



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*Japan leads !*  
**Technology transfer can reduce emission**



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## Year 2050 will be crucial for humankind!

### Energy Scenario and CO<sub>2</sub>

#### a) 1990



Fossil resources

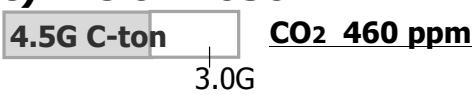
Non- Fossil resources

#### b) 2050 BAU case



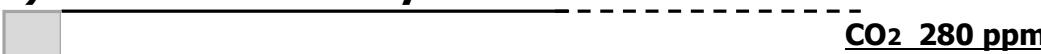
CO<sub>2</sub> 600 ppm

#### c) Vision 2050



CO<sub>2</sub> 460 ppm

#### d) After 22<sup>nd</sup> Century



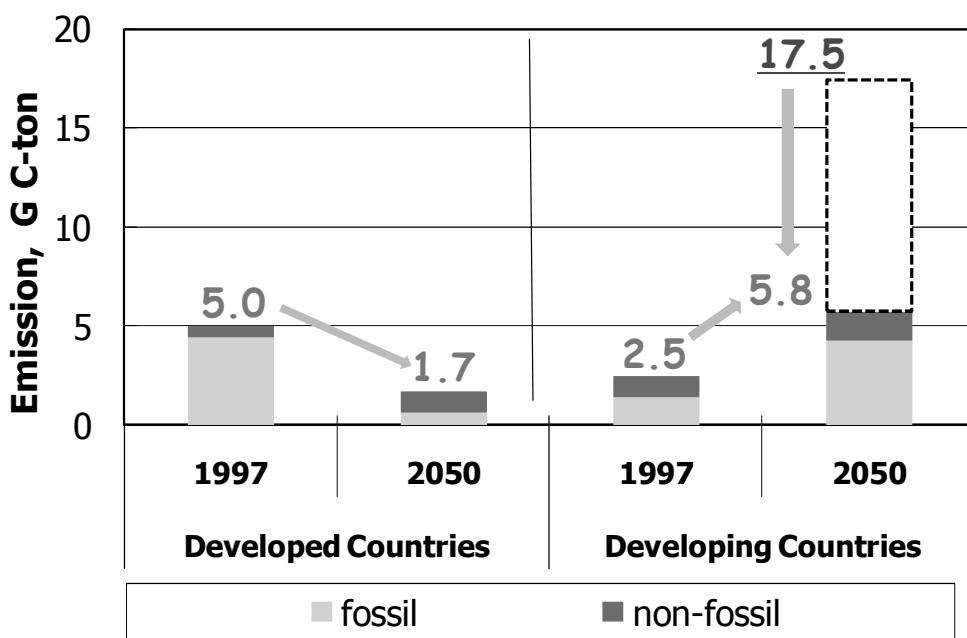
CO<sub>2</sub> 280 ppm

Data: from "Vision 2050"

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## *Growth is rights but efficiency is duties !*

### Scenario in developed and developing countries

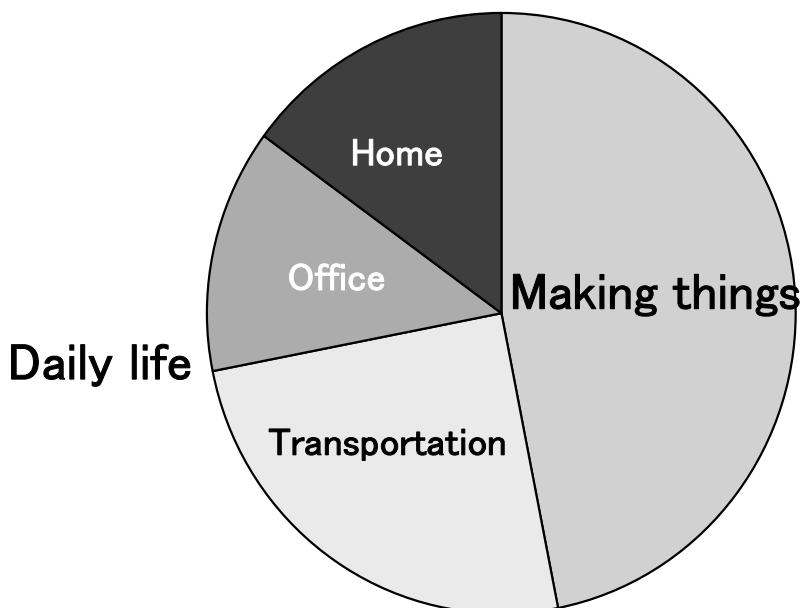


Compiled data created by The University of Tokyo

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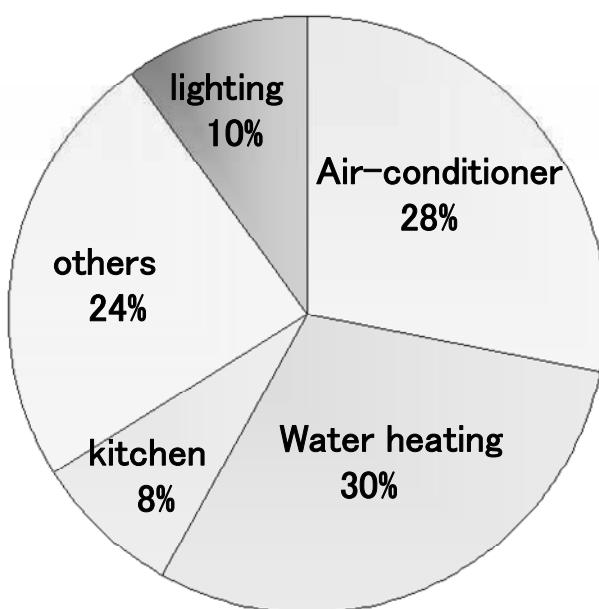
*Emission control depends on countries!*

## Energy consumption by final use



©Hiroshi Komiya 11

## Energy consumption in houses



50%: air-conditioner 20%: lighting in offices

*Technology innovation can happen !*

Air-conditioning energy can be 1/10 in 2050

### Air conditioner

before 1990	1997	2004	2006	2007	VISION 2050	theory
3	4	5	6	7	12	43

### Heat insulation of houses and buildings

bonfire	wretched hut	temple	house	eco-house	ideal
0	1	5	30	100	$\infty$

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*Innovation has happened already in Japan !*

### Water Heater

US (majority)

Tank storage 40%

5

Japan (majority)

Heat-to-use 80%

2.5

Heat-pump (Ecocute)

$50\% \times 4 = 200\%$

1

Fuel cell (Enefarm)

36% elec. + 50% hot water

0

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*Action based on existing technologies*  
**Komiyama Eco-house & transportation**



Hybrid car: 22km/l

Heat Pump Water Heater: COP=4

High Insulation:  $K=1.6 \text{ W/m}^2\text{K}$

New air conditioners

New refrigerator and lightings

Solar Power Generation: 3.6kW

**81 % Energy Reduction**

©Hiroshi Komiyama

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**Challenge25 Campaign**  
**—Team Komiyama's proposal—**

**Daily life** 12%

**Making things** 3%

**Nuclear energy etc.** 5%

**Forest etc.** 5%

**CDM** 5%

**Dependent strongly on countries!**

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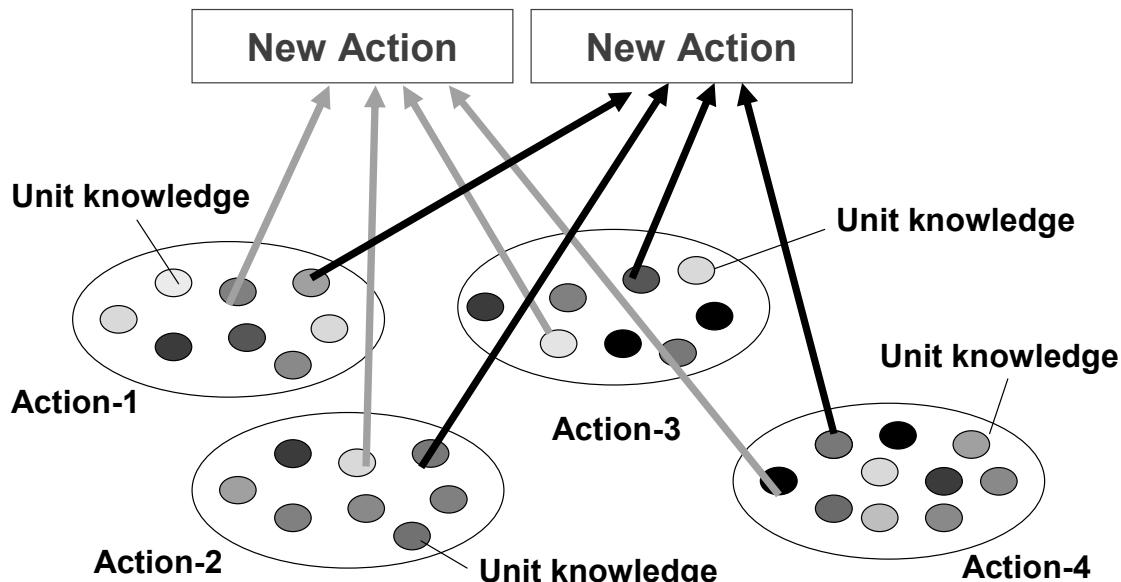
**2050 will come soon and so  
we don't have much time any more.**

**6 billion people must take actions.**

**We need structuring of actions  
to shorten the lead time.**

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### **Concurrent Approach by Structuring of Actions**



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## Paradigm in 21<sup>st</sup> century

**Shrinking earth**

- Climate change
- Depleting resource
- Pollution
- Food, water

**Aging society**

**Exploding knowledge**

1900      2000

**photosynthesis**

Source: Japan as a forerunner for addressing emerging problems in the world P134

National census 2005, Ministry of Internal Affairs and Communications

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## Green & silver & golden growth

**Shrinking earth**

- Eco house
- Eco appliance
- Eco car
- Solar panel
- Wind mill

**Aging society**

- Barrier free building
- Health monitoring
- Safe mobility
- Senses supporting

**Exploding knowledge**

- Structuring knowledge
- Structured knowledge-base
- Education
- Lifelong learning
- Value creation

©Hiroshi Komiyama      20

## **Japan's experience with Sumida river**

**1967**



**present**



東京屋形船案内  
[http://www.t-yakata.com/tyh\\_dkship.htm](http://www.t-yakata.com/tyh_dkship.htm)

環境省 図で見る環境白書 昭和57年  
<http://www.env.go.jp/policy/hakusyo/zu/eav11/eav110000000000.html>

**21**

## **Japan's experience with Yokkaichi**

**1950's**



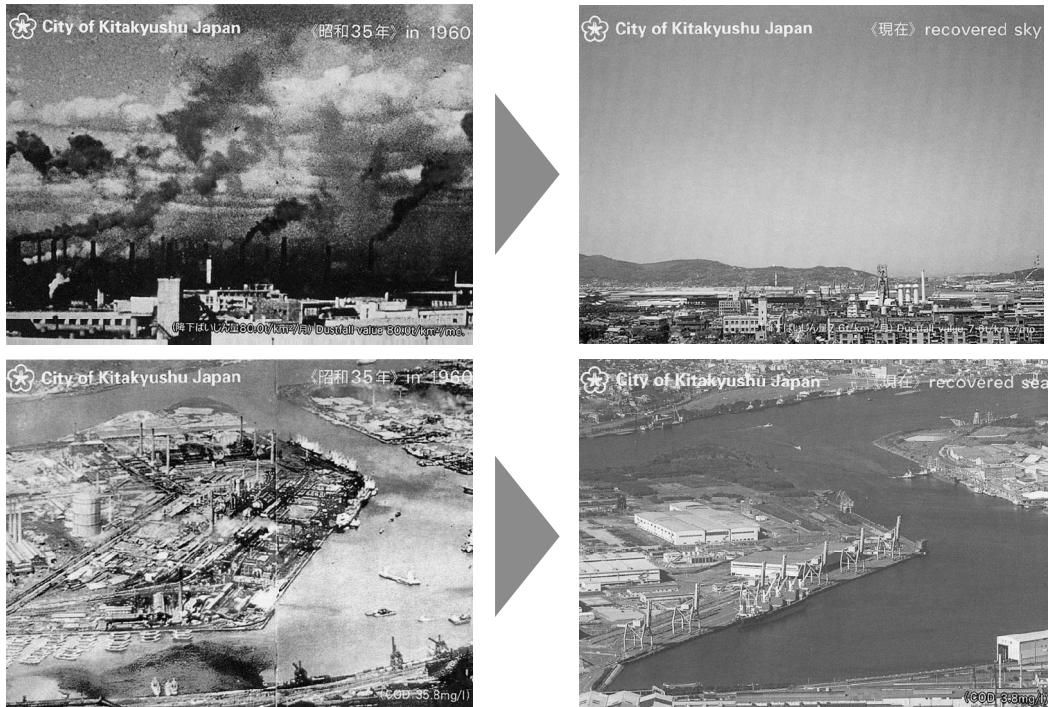
**present**



©Yokkaichi City  
<http://www.city.yokkaichi.mie.jp/kankyo/kogai.htm>

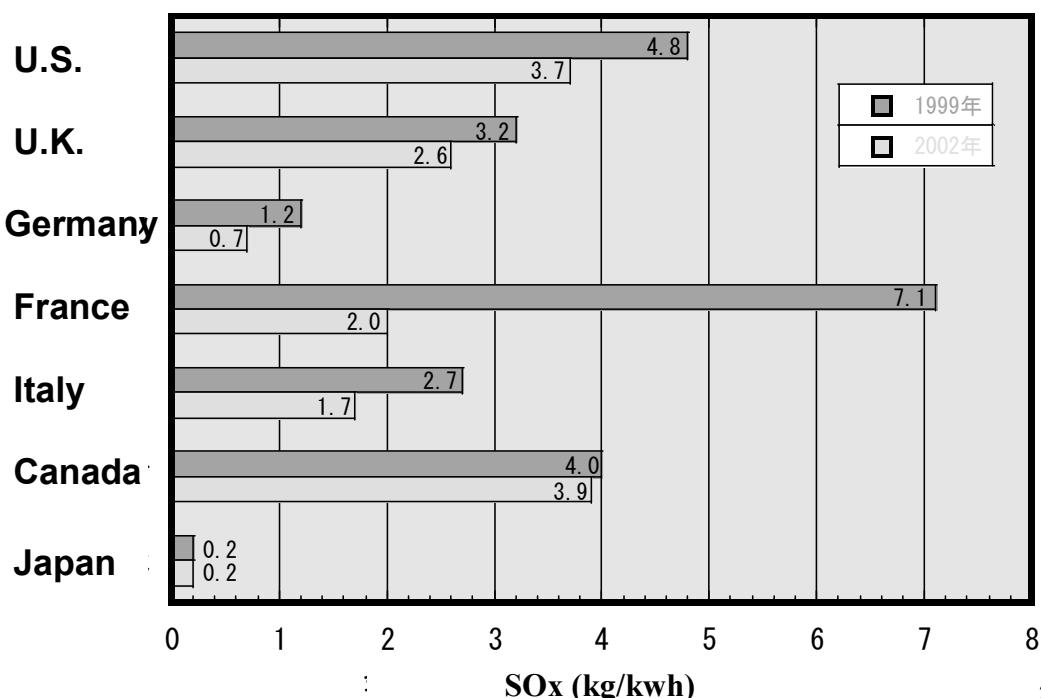
**22**

## Japan's experience with kitakyusyu



Source: Japan as a forerunner for addressing emerging problems in the world P27 23

## Japan's experience Emission of Sulfur Oxides from Thermal Power Plants



Data Source: Tokyo Electric Power Company, web-site

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**2050 will come soon.**

**Globalized economy is  
opaque, heterogeneous and short-sighted.**

**If we fail to manage it,  
this ‘hard-to-control’ system will explode.**

**We need to keep that in mind in innovation.**

**Thank you !**

Memo on postwar industrial growth of Japan

Motoshige Itoh

University of Tokyo,  
and  
National Institute for Research Advancement

Rapid growth period: 1960-73

- Domestic demand oriented growth
- Rapid process of liberalization
- Infant industry protection

From heavy industries to machinery industries

- Increasing energy costs and restructuring of the industries
- Appreciating yen

Structural Change after Plaza accord

- Yen-dollar exchange rate rose 100 % during three years
- Shifts of production location to Asian countries
- Increasing imports of manufactured goods

Lost 10 years

- Deflationary gap for almost 20 years
- Oversupply in various sectors
- Aging of population

Growth strategy

- Opening of the market
- Global strategy of various industries
- Industrial policies in the new age

# **Comments on “Modernization and innovation in Russia”**

**Preliminary Meeting for Global Policy Forum in  
Yaroslavl 2010  
"The Role of the State in Technical Modernization"**

**Satoshi Mizobata  
KIER, Kyoto University  
29 June 2010**

## **Background of modernization: results of transformation**

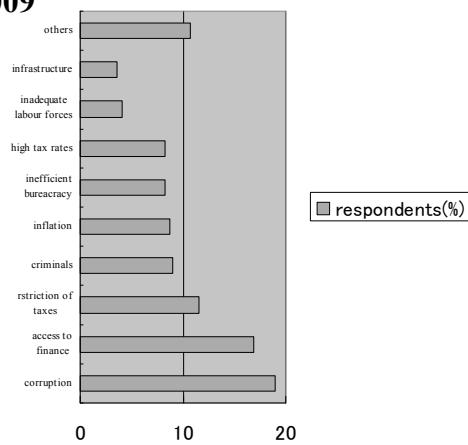
	Positive evolution	Inertia and negative response
Market transition	Formal institution building; profit-seeking and modern corporations (normalization)	Informality; segmented markets; rent-seeking and weak enforcement (abnormal market)
Globalization	Linkage with global markets; G8 member; transnationalization	Parallel economy; capital flight; economic fragility
Role of government	From instable to stable	Excessive intervention
Global judgments	High evaluation as BRICs; promising markets; important resource base	Transparency international (146 <sup>th</sup> ); World economic forum (63 <sup>rd</sup> )

# Necessity and urgency of modernization in Russia

- Results of high economic growth in 2000s: economic structure and federal budgets biased to energy and raw materials – fragile to global prices
- Siberian curse; resource curse; historical curse
- Extrication from the global crisis: judgment of the crisis- short-term temporary or long-term structural
- Sustainability and survival of the Russian economy by diversification and modernization: modernization committee; window of chance; economic revolution
- Consistency of speech and action: Skolkovo project; PPP and others

## Restrictions for modernization

Business environments in Russia,  
2009



### Lack of investment

Increase of investment (% in GDP)  
16% (2000), 21% (2008)

Low compared with China (38%)  
Modernization in Russia needs  
more than 25%.

### Low level of machinery export

5% (2008), 6% (2009)  
Reference: 5% in 1938 in USSR,  
7% in 1951 in Japan

## Tasks for modernization

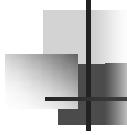
- Institutions: liberalization and stability; development of democratic institutions
- Corporate governance: weak domestic financial institutions; corporate motivation with short-term goals (buy or develop)
- Human resource: lack of skilled labour force; lack of corporate training and education  
Skill seems to be neglected under modernization debates.
- Capital formation: lack of infrastructure; aging facilities
- Global linkage: WTO membership; global network  
Economic integration into the global markets is necessary.

## Aging facilities

Aging structure of petroleum pipeline (years)

Less than 10	10-20	20-30	More than 30	Facilities with more than 20 years are said to be critical. 70% must be replaced.
7%	25%	34%	34%	

- Fixed capital has been worn out in the transformation period.
- Production equipments (more than 20 years): 51.5% (2004)



## Model of Russian modernization

- Is Organic modernization without pains and revolution possible? What is a breakthrough?
- Initial conditions determines the model.
  - (1) Energy and resource sectors are indispensable for modernization. However, advantageous prices discourage modernization, and rich resource has paralyzed ecological management. “Danger past, God forgotten”.
  - (2) Modernization from the above is indispensable in Russia. However, harmonization of public and private is difficult.
- Targets of modernization are important: domestic market vs. global market; position between China and developed countries; competitors; fields of innovation (Russian companies do not prefer risks)

## Panasonic Initiatives to Realize a Low-carbon Society

June 29, 2010  
Panasonic Corporation  
Masashi Makino

### Overview of the Panasonic Group

- Founding: July 1918
- Sales: ¥7 trillion 418 billion
- Number of Employees: 384,586
- Business Fields:

\*Sales: FY2010, ending March 31, 2010  
\*Number of employees: As of March 31, 2010



## Vision Looking to the 100th Anniversary (2018) of Our Founding

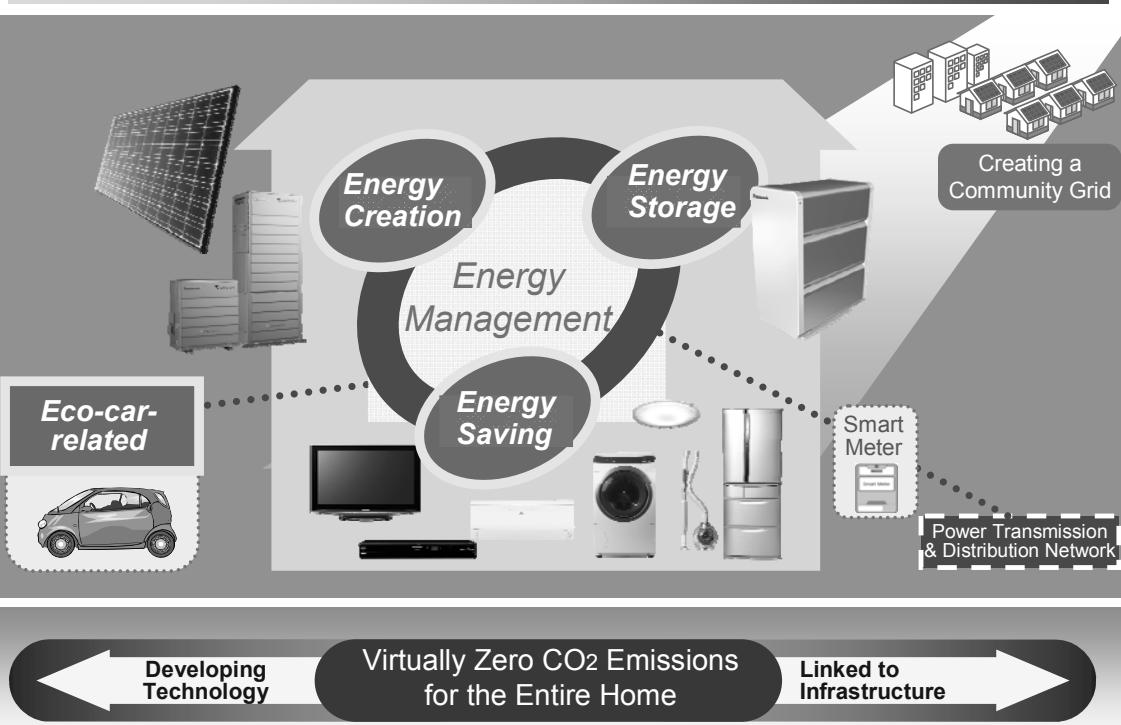
### No.1 Green Innovation Company in the Electronics Industry

Make the “environment” central to all of our business activities and bring forth innovation

**Green Life  
Innovation**

**Green Business  
Innovation**

### Comprehensive Energy Solutions



## Virtually Zero CO<sub>2</sub> Emissions for the Entire Home

Propose ideas for lifestyles 3 to 5 years in the future,  
using the 'eco ideas' House



(On the premises of  
Panasonic Center Tokyo)

CO<sub>2</sub> Emissions  
in the Entire Home

Energy  
Saving

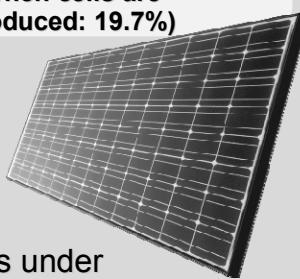
=  
Energy  
Creation  
Energy  
Storage

## Energy Creation

### Solar Cells

#### World Top-level Conversion Efficiency

(Level when cells are  
mass-produced: 19.7%)



- Promoting sales under both Panasonic and SANYO brands
- Developing next-generation solar cells
- Investment of approximately ¥100 billion

Target FY2016 World Top 3 Maker

### Home-use Fuel Cells

#### World Top-level Effective Utilization Ratio of Energy

(Product specification: 93%)

2005 Supplied 1<sup>st</sup> Equipment to the Prime Minister's Official Residence

2009 Launched by Gas Companies



- Significant cost reduction
- Global expansion

Target FY2019 ¥200 billion

# Energy Storage

Expand our top-market-share lithium-ion rechargeable battery business into growth markets



Home-use Storage Batteries



- Realize Higher Capacity
- Increase Cost Competitiveness

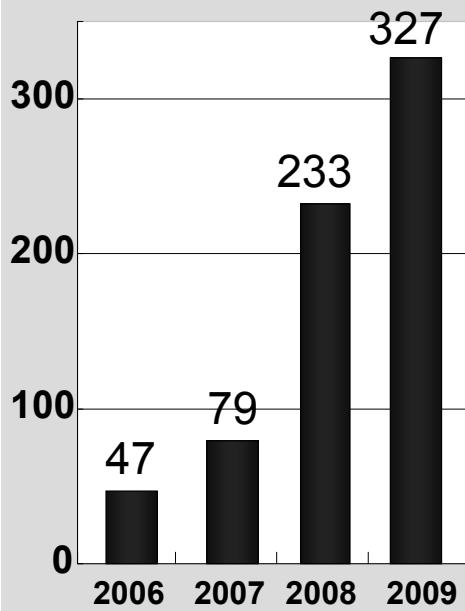
Power Source for Vehicles



Kasai Plant in Hyogo Prefecture  
(SANYO Electric)

# Energy Saving in Products

<Number of Models That Are No.1 in Energy Efficiency>



Evolution of Energy-saving Functions



Panasonic-unique Sensor Technology

Programming Technology to Realize Optimum Operation

## Representative Energy-saving Technology

### 1. LED Light

LED Light "EVERLEDS"



Energy-saving & Cost-saving

<60W Model>

Incandescent bulb 54W  
LED Light 6.9W

Approx. one-eighth in power consumption & electricity expenses

Long lifetime

Incandescent bulb 1,000 hours  
LED Light 40,000 hours

40 times

Compact body

Almost same size as incandescent bulb



2 colors

[Bulb color]



[Sunlight color]



Quick to operate

Fully operating right after switched on  
(Taking several minutes for incandescent bulbs before full operation)

<Image> Tokyo Sky Tree

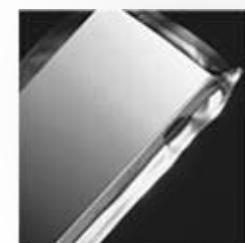


## Representative Energy-saving Technology

### 2. Vacuum Insulation Panel

- Same insulation performance as 80mm-thick urethane with only 4mm-thick
- Leading to drastic reduction in power consumption by using in thin parts

Vacuum Insulation Panel "U-Vacua"



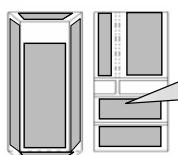
Magnified core material image

Glass fiber in core materials

Examples of application to products



■ Refrigerator

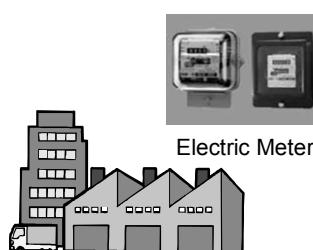


Cutting power consumption by 40% (compared to a previous model)

Improving insulation performance by applying to front doors which are difficult to be made thin

# Energy Saving in Our Production Activities

- Visualizing the amount of energy consumption



Measurement and control for each piece of equipment and each production line



- Carrying out energy-saving diagnoses employing energy-saving technology support teams

- Carried out diagnoses at 18 plants
- Proposed 350 ideas to reduce CO<sub>2</sub> emissions by 20,000 tons in total



- Bringing innovation to the production process

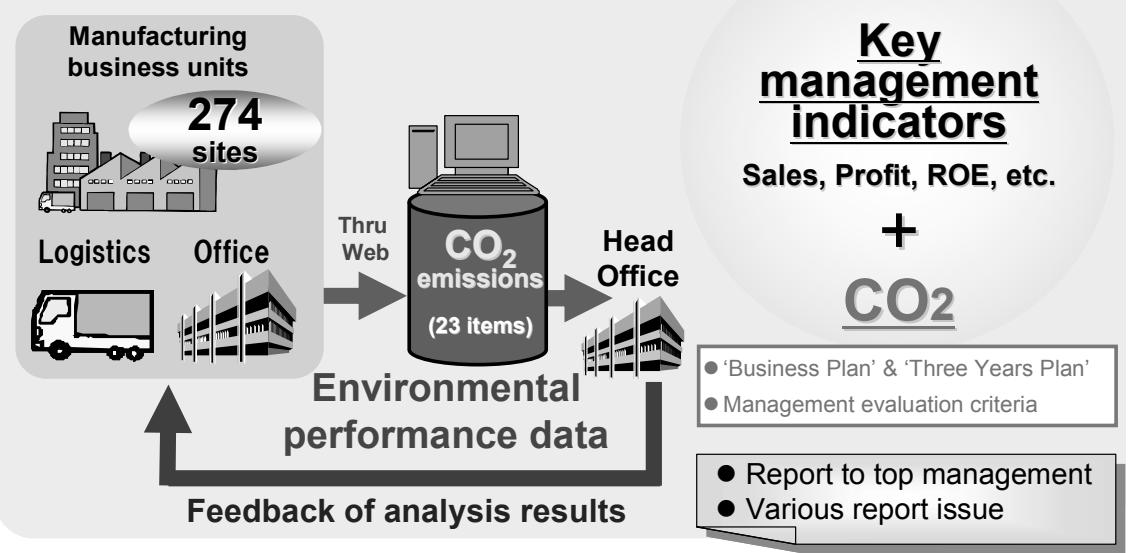


- Sharing successful examples across the Group

## Setting CO<sub>2</sub> Emissions as a Key Management Indicator

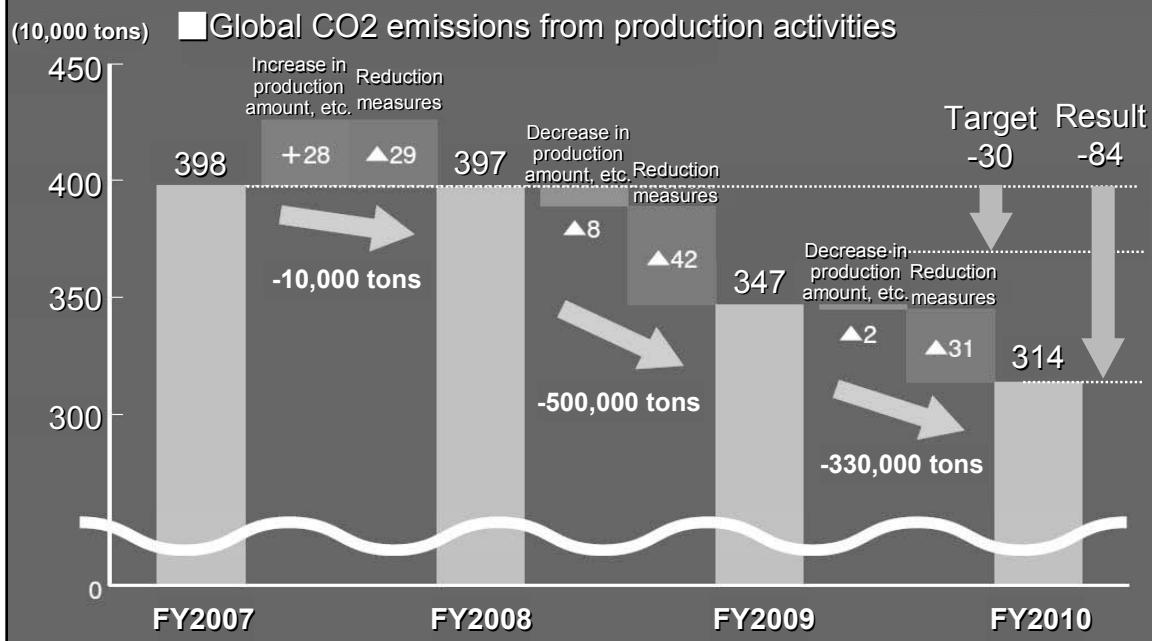
- Business growth and environmental management living together.
- Incorporating CO<sub>2</sub> emissions into key management indicators.

### Environmental performance system



## Achievement of CO<sub>2</sub> Reduction in Production Activities

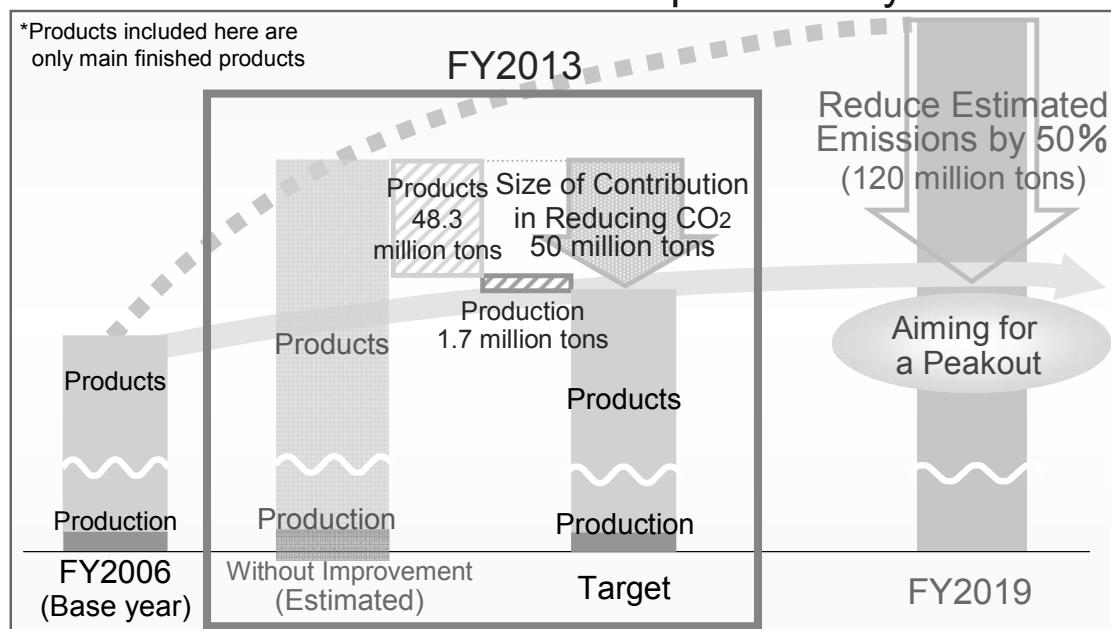
Reduced by 840,000 tons against the target of 300,000 tons



## Making a Global Contribution to Reducing CO<sub>2</sub>

Reduce CO<sub>2</sub> throughout our entire operations and make sure total emissions peak out by 2018

\*Products included here are only main finished products





**The Panasonic Group strives to be  
a Green Innovation Company  
with a global perspective**

# Ubiquitous ICT Societies: A Glimpse of Where We Are Going

Hiroyuki Morikawa

The University of Tokyo

2010.06.29

1

## Japan National ICT Strategies

2001 ~

**e-Japan Strategy**  
(January 2001)  
Establish Broadband infrastructure

- ① Infrastructure
  - Internet-accessible environment by 2005
    - High-speed access covering 30 million households
    - Ultra high-speed access covering 10 million households
  - ② E-commerce
  - ③ E-government
  - ④ Human resource development

**e-Japan Strategy II**  
(July 2003)  
Application and Effective Use of IT

Promote effective utilization of IT in 7 leading areas

- ① Medical services
- ② Food
- ③ Lifestyle
- ④ SME financing
- ⑤ Knowledge
- ⑥ Employment and labor
- ⑦ Public service

**New IT Reform Strategy**  
(January 2006)  
IT Structural Reform Capabilities

**A-Japan Strategy 2015**  
(July 2009)

- ① Medical services
- ② Environment
- ③ Safety and Security (anti-disaster etc)
- ④ ITS
- ⑤ E-government
- ⑥ IT-oriented corporate management
- ⑦ Prosperous lifestyle(telework etc)
- ⑧ Universal designs (subtitled television etc)
- ⑨ Infrastructure
- ⑩ A secure IT society
- ⑪ Highly competent human resources
- ⑫ Development of human resource base
- ⑬ R&D
- ⑭ International competitiveness
- ⑮ International contribution

More focus on application and utilization

Solving social problems through utilizing ICT

Becoming the world's leading IT-oriented nation by 2005

Becoming a society where anyone can appreciate the benefits of IT at anytime from anywhere by 2010

Hiroyuki Morikawa | The University of Tokyo

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## MIC R&D Strategy Program II (June 2008)

**Mid- to long-term priority researches** in ICT are selected and grouped into 3 research areas from the perspective of **strengthening global competitiveness** and **building a safe/secure society**.

### New-generation network technology

- Network technologies that enable Japan to maintain / strengthen international competitiveness in core technologies, including photonic network, mobile, and device technologies
- The most advanced basic technologies that enable Japan to play a leading role in global ICT development

### ICT Security and Safety Technology

- Technologies that ensure the security / safety of ICT networks that are the foundation of social and economic activities
- Technologies that ensure security in a broad sense to realize a safe / secure social environment through ICT

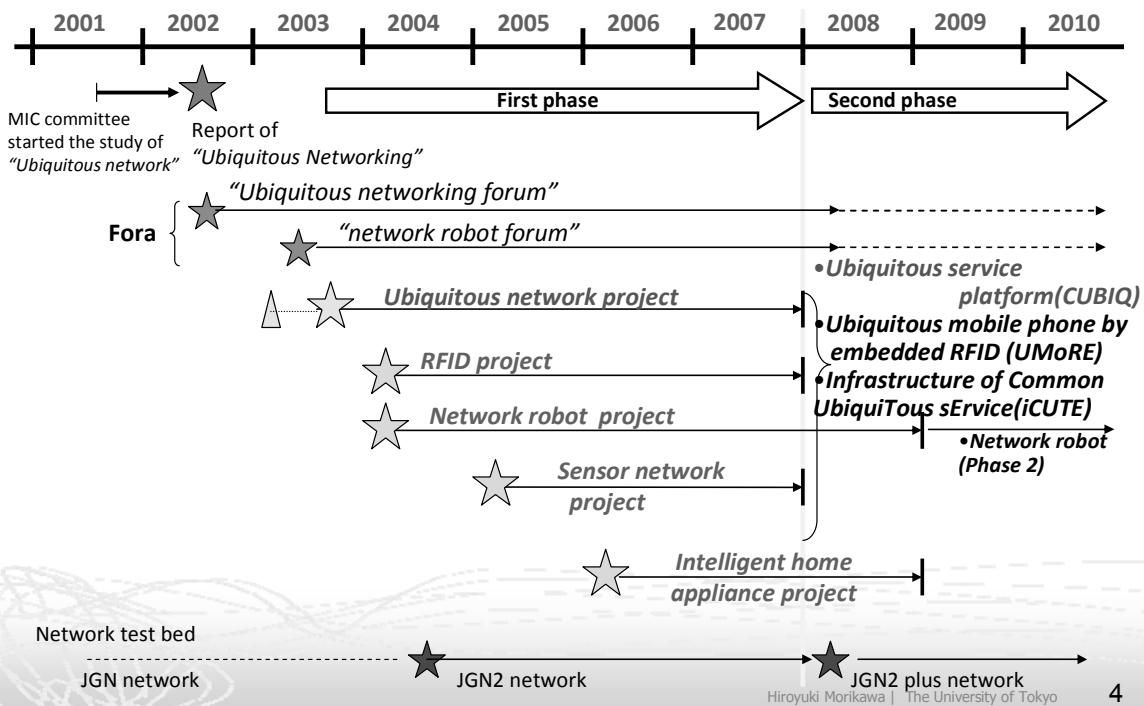
### Universal communications technology

- Content creation technologies that can promote the intellectual creativity of individuals
- Communication technologies that can transcend the barriers of language, culture, and physical capabilities

Hiroyuki Morikawa | The University of Tokyo

3

## Ubiquitous R&D activities



4

## Two Directions

Hiroyuki Morikawa | The University of Tokyo

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## ICT as social infrastructure

Hiroyuki Morikawa | The University of Tokyo

6

## Peter Drucker

The emergence of steam engine leads to the railroad,  
railroad gives way to the emergence of  
bank, post, and newspaper.

Hiroyuki Morikawa | The University of Tokyo

7

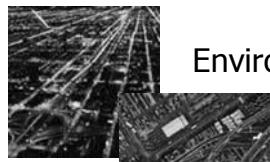
## Peter Drucker

The invention of ICT leads to the broadband,  
broadband gives way to the emergence of  
○○, ○○, and ○○.

Hiroyuki Morikawa | The University of Tokyo

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## ICT-driven Society



Environment (Green, Smart Grid)



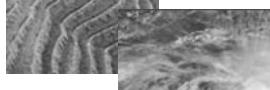
Transportation



City



Supply Chain (food, retail)



Water Management



Resource mgmt

Hiroyuki Morikawa | The University of Tokyo

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## ICT as Civil Infrastructure

Health care / welfare

Transportation

Agriculture

Education

.. .

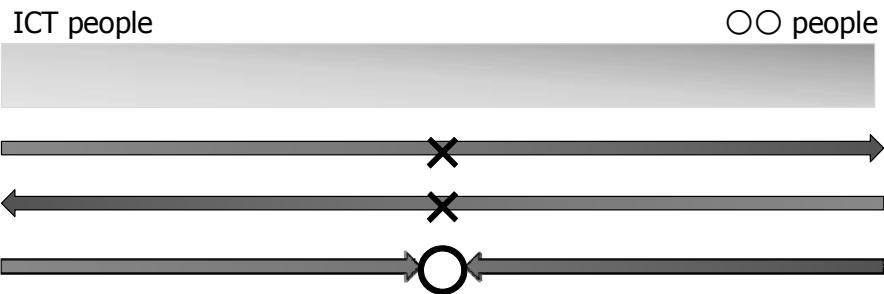
Energy

ICT

Hiroyuki Morikawa | The University of Tokyo

10

## Partner



Hirouki Morikawa | The University of Tokyo

11

ICT as “experience”

Hirouki Morikawa | The University of Tokyo

12

## The Beginning of Telegraph

"We call the electric telegraph the most perfect invention of modern times ... as anything more perfect than this is scarcely conceivable, and we really begin to wonder what will be left for the next generation, upon which to expend the restless energies of the human mind."

-- an Australian Newspaper 1853

Hiroyuki Morikawa | The University of Tokyo

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## Service Prototyping Video

Small Stories in 2008 (2003)



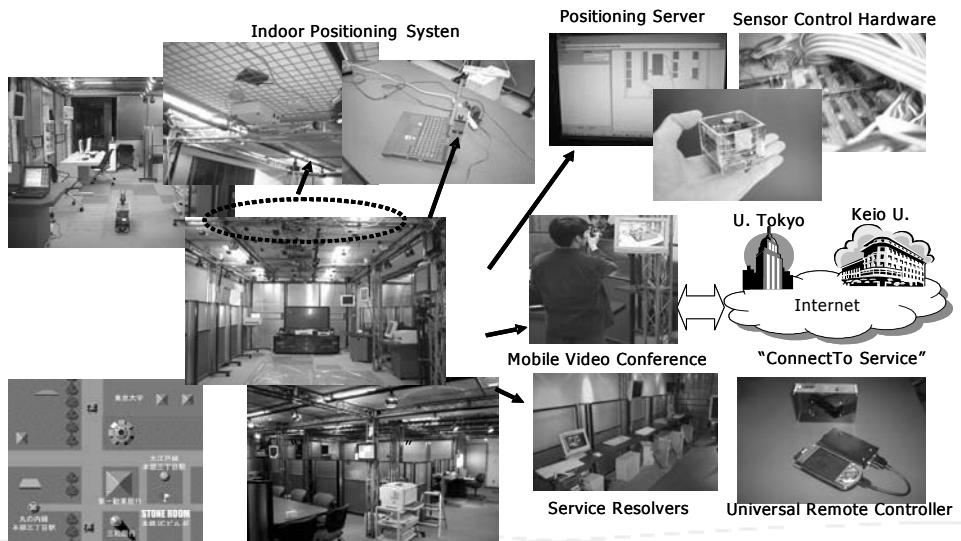
Aura (2006)



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## STONE Room 2000-2004



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## Akihabara Ubiquitous Network Room

- Research Theme
  - » Context extraction mechanism from sensor rich space
  - » From context information to personalized service
  - » Low-power wireless service/device discovery
  - » Demonstration in Akihabara area
- Technology
  - » Signal processing and learning mechanism for context extraction, context modeling and description
  - » Sensor data mining, sensor web service
  - » Low power tiny sensor node (wakeup on wireless, OS, CPU...)
- Application
  - » Earthquake monitoring, structural monitoring, disaster contingency planning, risk management, elder care, profiling business, ADL (activities of daily living) modeling



Morikawa-Laboratory



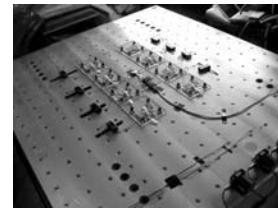
16



## Trends

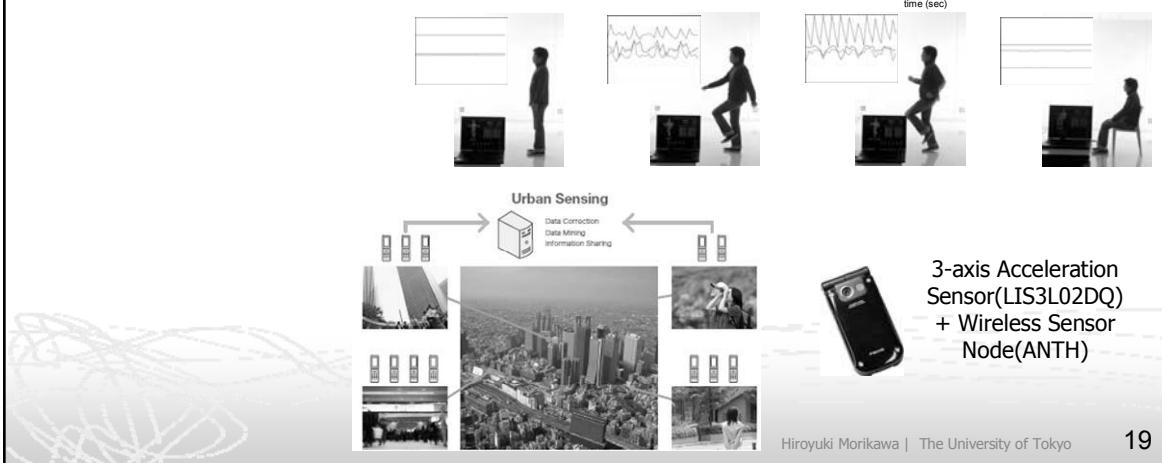
Mechanism to collect “content (incl. environmental info)”

» Integration with physical world



Mechanism to collect “personal info.”

» Personalization



## Show Us a Better Way

### Show Us a Better Way

Tell us what you'd build with public information and we could help fund your idea!

What would you create with public information?

You've been frustrated that you can't find out something that ought to be easy to find? Ever been baffled by league tables or "performance indicators"? Do you think that better use of public information could improve health, education, justice or society at large?

The UK Government wants to hear your ideas for new products that could improve the way people use information in their everyday lives. The [Office of Information Technology](#) is running a competition on the Government's behalf, and we have a £20,000 prize fund to develop the best ideas to the next level. You can see the type of thing we are looking for [here](#). If you can build it - even better - we have an additional £20,000 cash to give you.

To show they are serious, the Government is making available snapshots of some or [otherwise invisible](#) public information especially for people to use in this competition. Rest assured, this competition does *not* include personal information about people.

We're confident that you'll have more and better ideas than we ever will. You don't have to have any technical knowledge, nor any money, just a good idea, and 5 minutes spare to enter the competition.

Go on, Show Us A Better Way.

[Submit Your Idea](#)

[Home](#)  
[All your ideas](#)  
[About This Competition](#)  
[Examples](#)  
[Frequently Asked Questions](#)  
[Information sources](#)  
[House Rules](#)  
[Contact Us](#)

[About This Site](#)

The Power of Information Taskforce is helping government become more transparent and effective through better use of published information.

This competition is asking for your ideas for better ways to publish the vast swathes of non-personal information that the government holds which creates on your behalf.

Public data is your data. Tell us what you'd build with it and you might just help develop your idea to the next level.

- The UK Government's Power of Information Taskforce are running a mashup competition with a £20,000 prize fund and gigabytes of brand new data and APIs.
- BBC weather forecast, public transport data, school information in England and Wales, Royal Mail postcode address, NHS health care services, neighborhood statistics (2001 census, crime and safety, economic deprivation, education skills and training),
- Crime mapping
- Fix the street

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## Open Government Initiative

### Data.gov



### Apps.gov

A screenshot of the Apps.gov homepage. At the top, it says "GSA Apps.Gov A Service Provided by GSA". Below that is a navigation bar with Home, Business Apps, Productivity Apps, Cloud IT Services, and Social Media Apps. The main content area has a "Coming soon to Apps.gov" section featuring a globe and several laptops. To the right, there's a section titled "What type of solution do you need?" with four categories: "Business Apps", "Cloud IT", "Productivity Apps", and "Social Media". Each category has a small icon and a brief description.

- Upload of federal government
- CIO of Obama administration:  
Vivek Kundra

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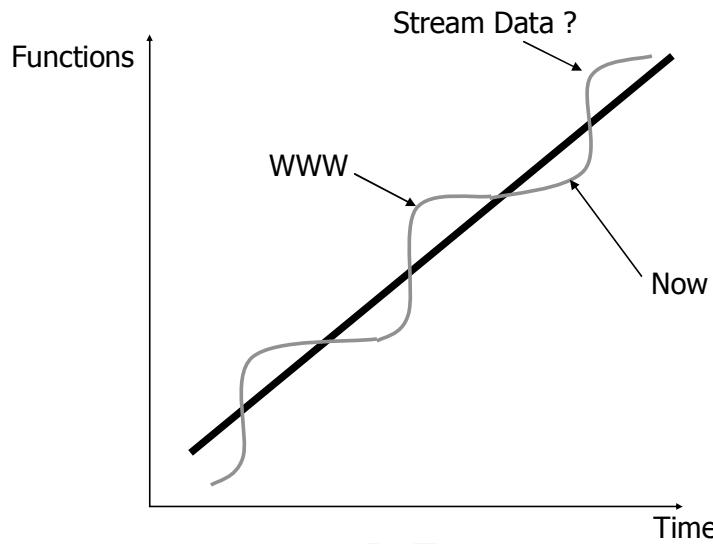
## Stream Data

- Time-series data
  - » Transportation, stock quote, RFID, IC card, e-cash, position, camera, meteorological/earthquake/structure monitoring, car, power, water, oil, radio, power consumption...
- Distribution management, inventory management, traffic control, stock market, smart grid, anomaly detection, hazard warning, traffic prediction, weather forecast, behavior assistance, productivity improvement, resource management, water management, space/city planning, cognitive radio, green network....

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## Breakthrough



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Preparatory Meeting for the International Conference in  
Yaroslavl 2010

“Role of the Government in Technical Modernization”

## Session 2. The Challenges of Modernization in Various Fields: Medical Technology in Japan

29 June 2010

Vice-President, International University  
of Health and Welfare, Japan

Soichiro IWAO, MD, MPH, PhD



### 本日お話しすること

### Today's Topic

- 日本の医療ハイテク技術
    - ゲノム創薬とテーラーメイド医療
    - 再生医療
    - インテリジェント手術
  - 日本の医療技術協力
    - 遠隔医療
    - メディカルツーリズム
  - ロシアの医療事情
  - おわりに-新成長戦略  
(20100618閣議決定)
- Advanced Medical Technologies in Japan Now**  
**Genome Medicine / Tailor-made Medicine**  
**Tissue Engineering**  
**Intelligent Medicine**

**Technical Cooperation in Medicine**  
**Telemedicine**  
**Medical Tourism**

**Health Status in Russia**  
**Japan's New Growth Strategy**



## 超微細技術を用いた医療(ナノメディシン)の推進

**Nanomedicine : Medical Application of Nanotechnology.**

超微細技術(ナノテクノロジー)の医学への応用による非侵襲・低侵襲を目指した医療技術の研究・開発を推進し、患者にとってより安全・安心な医療技術の提供の実現を図る。

**ナノメートル単位(10億分の1メートル)**

**超微細技術を用いた医療技術開発**

5~10年後の実用化を目指して研究推進

- 1) **Protein and peptide delivery** 応用  
・たんぱく質の構造を基にした創薬技術の開発
- 2) 微小医療機器及びその操作技術への応用  
(例)・極小医療機器、カテーテル等の技術開発
- 3) **Drug delivery** 応用  
(例)・未だ利用できなかった高分子粒子を開発
- 4) その他 独創的な医療技術の開発への応用  
(例)・既存の医療機器に様々な特性・機能を付与する等生体親和性の高い素材の開発等

1~3については、国として着実な推進を図るために、テーマの指定を行い、テーマ毎にナショナルセンターを中心としたプロジェクトチームを形成する。  
また、4については、公募とする。

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## Nanomedicine Research ナノメディシン研究

事業概要 平成21年度概算要求額 1,898百万円 (平成20年度予算 1,937百万円)

ナノスケールの超微細技術(ナノテクノロジー)を医学へ応用することにより、非侵襲・低侵襲を目指した医療機器等の研究・開発を産学官の連携をもって推進し、患者にとってより安全・安心な医療技術の提供の実現を目指す。  
IEDOとのマッチングファ

**Development of Minimum / Non Invasive Medicine**

**Nano-level Imaging**

**[1] 超微細画像技術(ナノレベル・イメージング)の医療への応用に関する研究**

- 種々のγ線放出核を用いた早期疾患診断プローブ開発とコンピュンタカメラによる複数核種同時イメージング(下図)
- 細胞レベルにおける細胞の局所場に於ける動態、とくに効率的な医薬品他

**[3] 疾患の超早期診断・治療システムの開発に関する研究**

OPETを用いた多施設共同臨床試験によるアルツハイマー病の超早期診断法の確立と普及

- がんを安全・高感度で鮮明に画像化できるナノサイズシガーポールデンドリマー型新規MRI造影剤の開発研究(右図)

**Early Cancer Detection**

**Non Invasive Surgical Methods**

**[2] 低侵襲・非侵襲医療機器の開発に関する研究**

○胎児手術の技術的限界を克服しうる子宮内手術システムの開発: 超高精度3D/4D超音波誘導下での超高感度胎児内視鏡手術

**若手育成型研究**

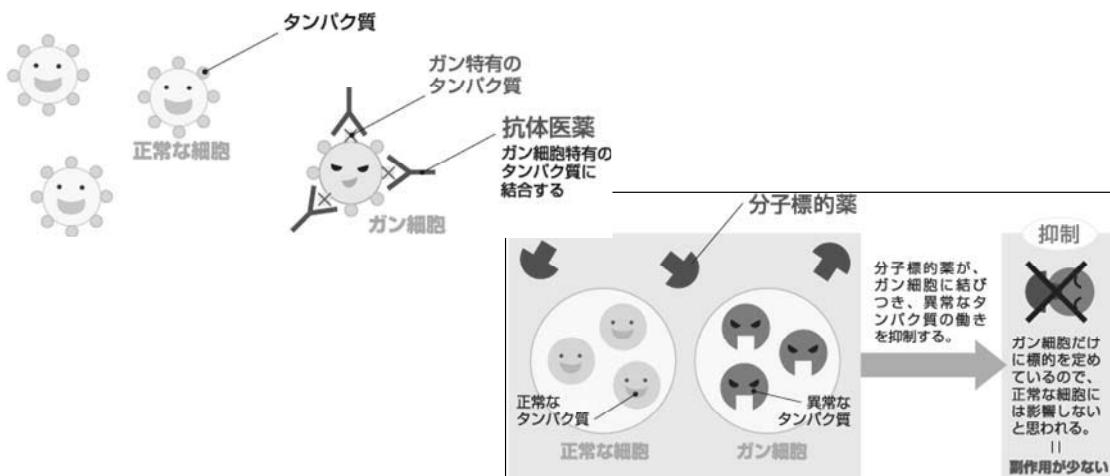
○ナノテクノロジーを用いたDDSによる耳鳴の克服他

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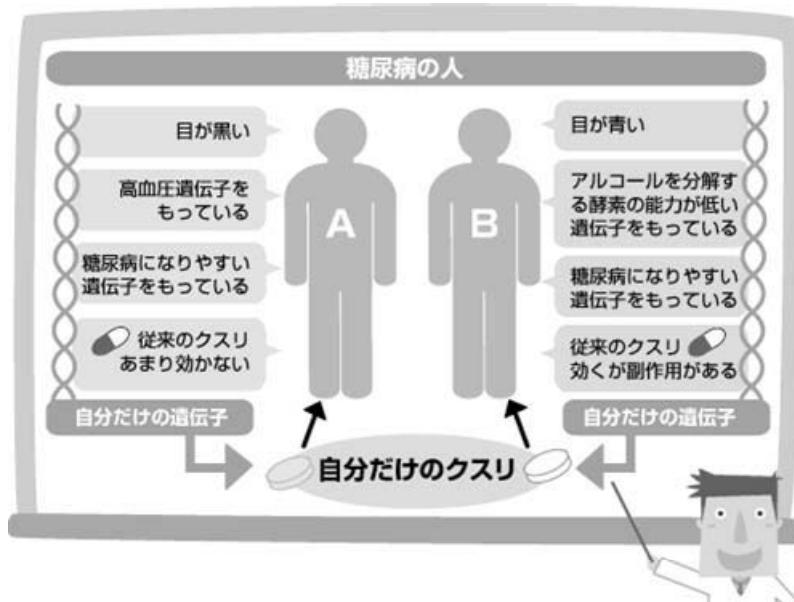
## ゲノム創薬

(Genome Medicine)

コンピューター解析等によって得られたヒトゲノム情報をもとに、病気や病態に効果を示す新しい医薬品を論理的に研究開発しようとする新しい創薬手法のこと。疾患や体質の原因となる遺伝子を突き止め、その遺伝子が作るたんぱく質などを創薬の標的にするのが特徴です。



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## テーラーメード医療

(Tailor-made Medicine, Personalized Medicine)



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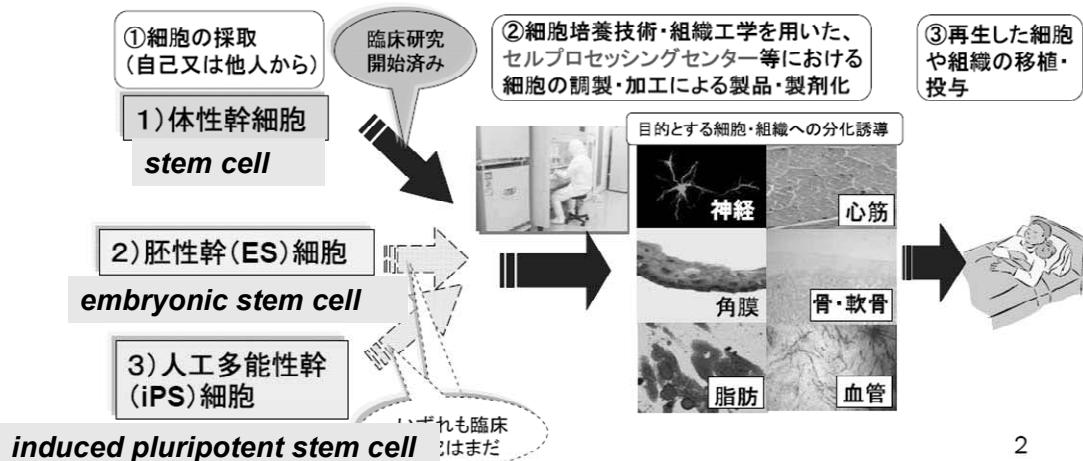
## Tissue Engineering or Regenerative Medicine

## 再生医療とは

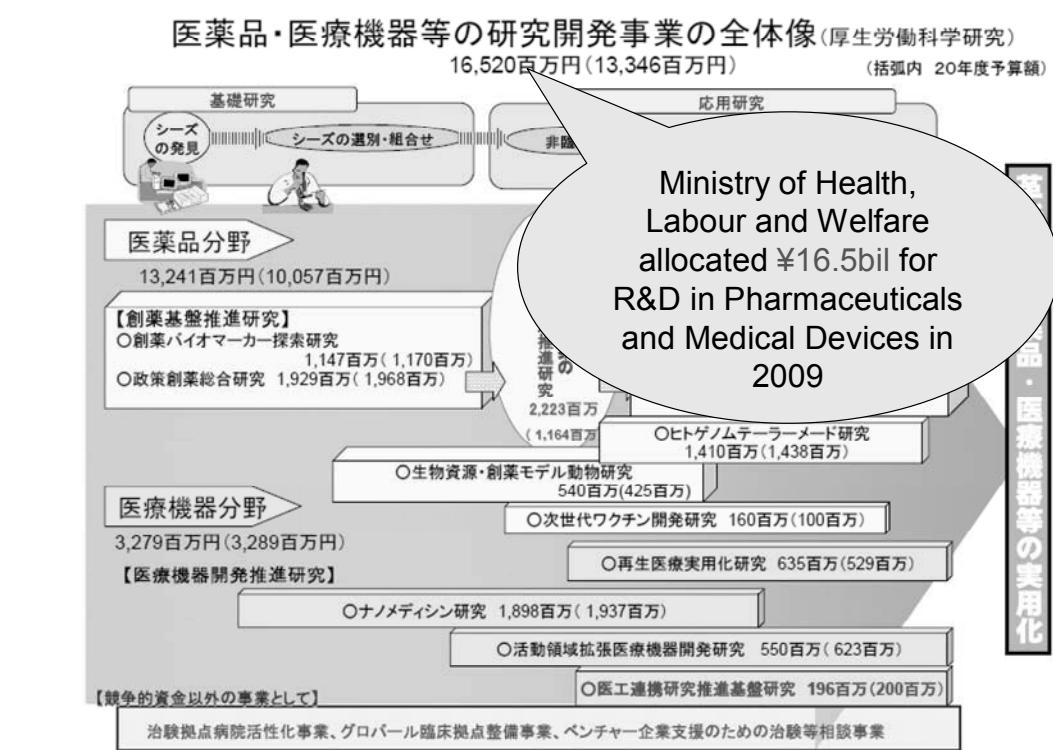
再生医療とは、本人もしくは他人の細胞・組織を培養等加工し、障害のある臓器の代わりに用いることにより、失われた組織や臓器を修復・再生する医療。

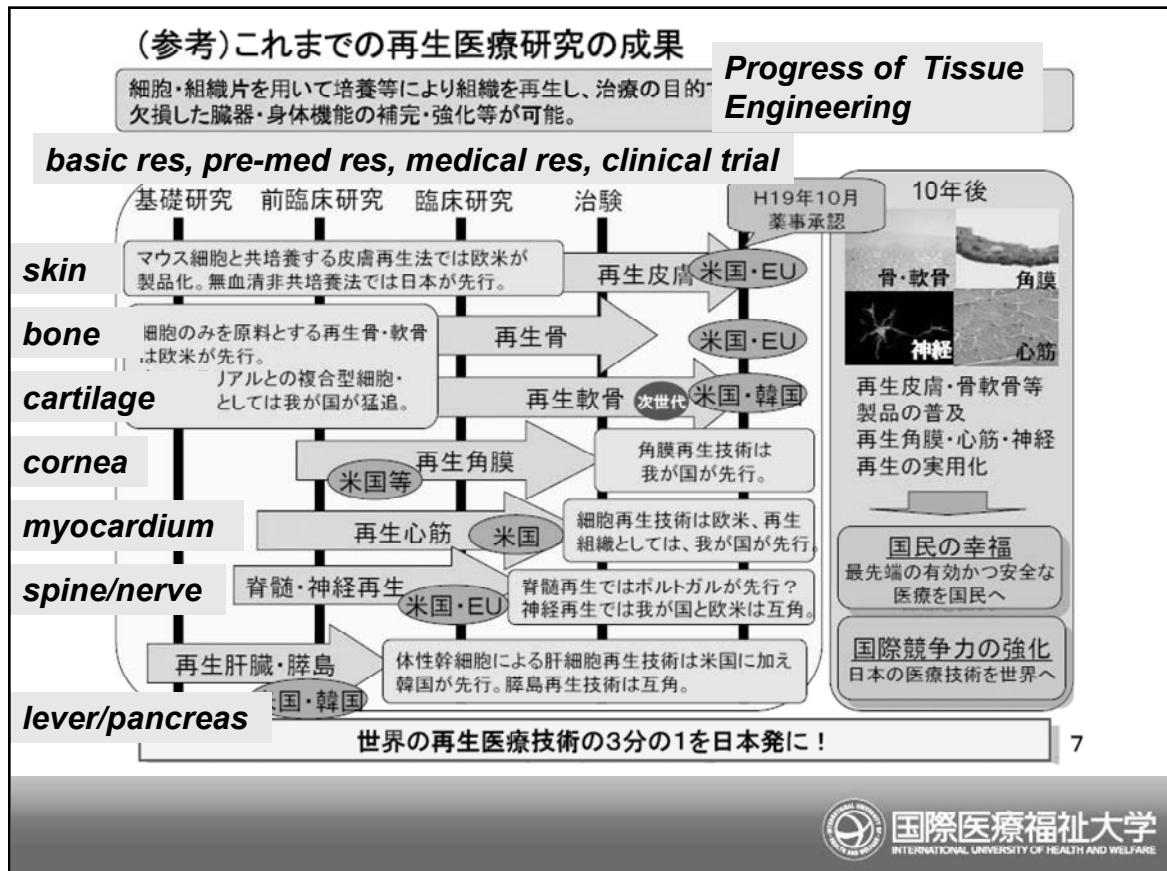
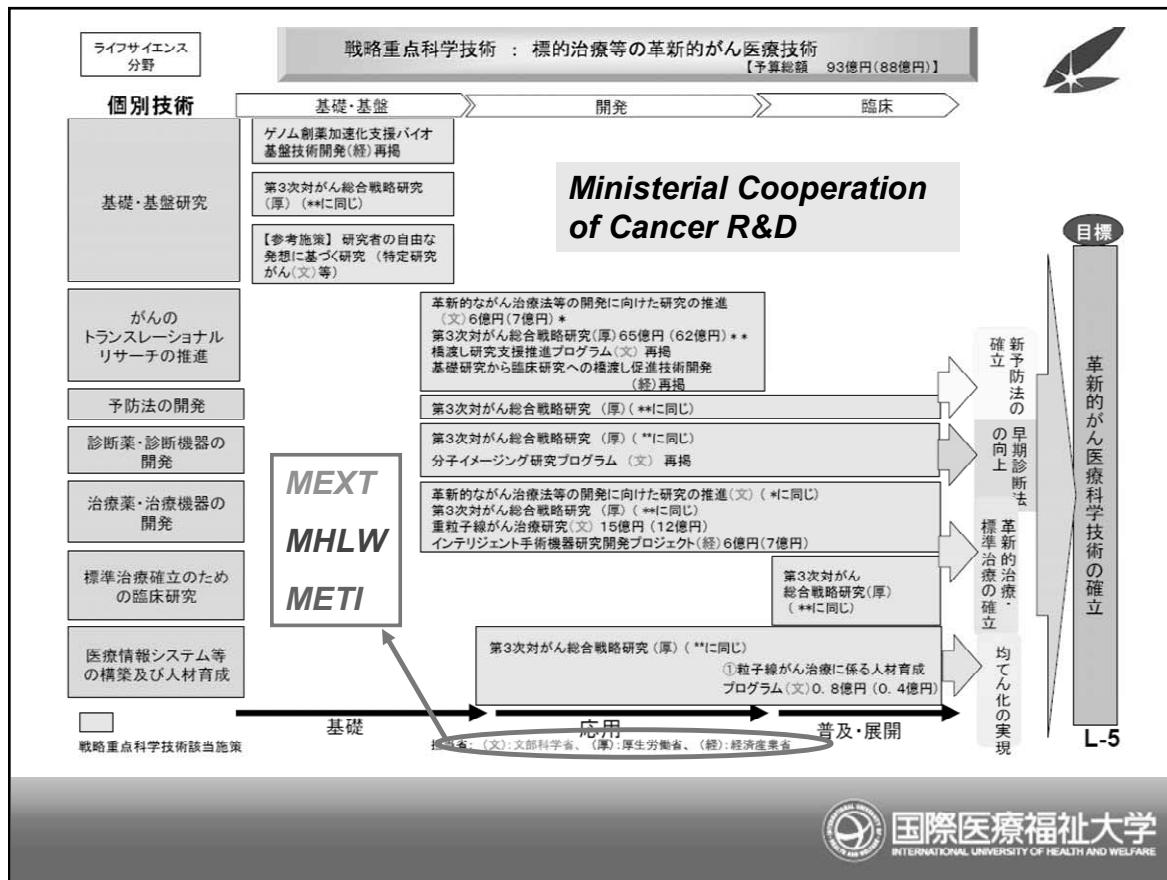
(例 ①心臓や脳などの疾患治療: 心筋、神経細胞、②培養角膜による視力の回復など)

### 各種幹細胞由来製品による再生医療の基本プロセス

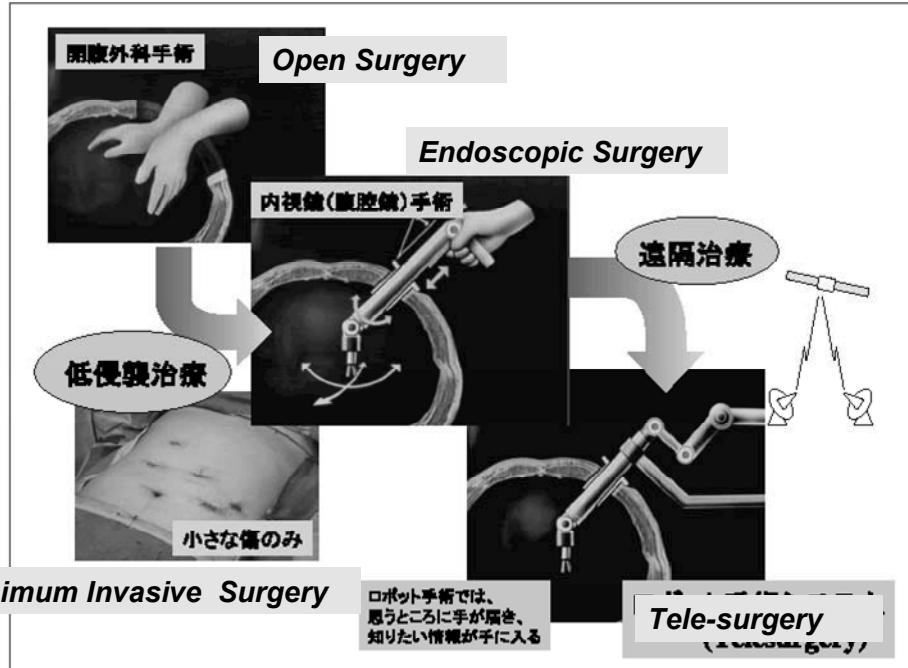


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図表1 外科手術における2段階の進展



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### 内視鏡手術の現状

#### 患者側

- 病巣部周辺をピンポイントで治療できる
- 切開範囲を小さく抑えることができる
- 身体への負担を少なくできる
- 入院期間が少なくてすむ

#### 医療従事者側

- 微細な作業、高度な技術が求められる
- 手術中の視野が制限される
- 術前・術中の情報を常に頭の中で統合させながら機器を操作するため熟練が必要

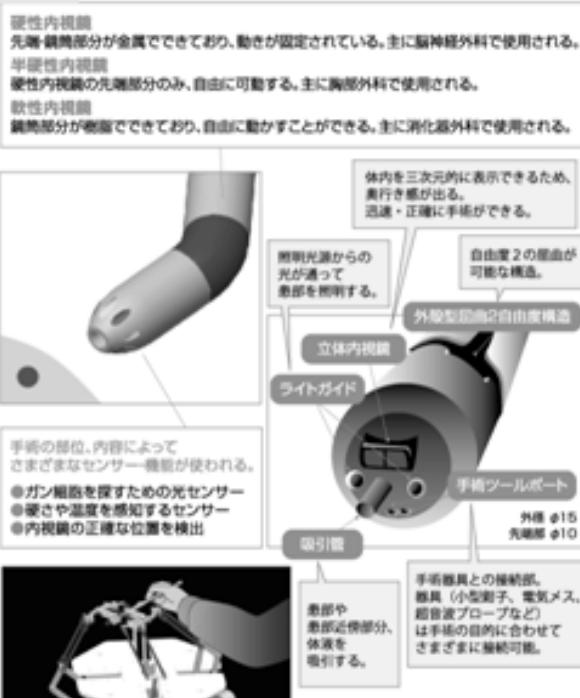


患者の負担を軽減しつつ、医療スタッフを支援する  
インテリジェント手術機器が重要に

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## Endoscopic Devices

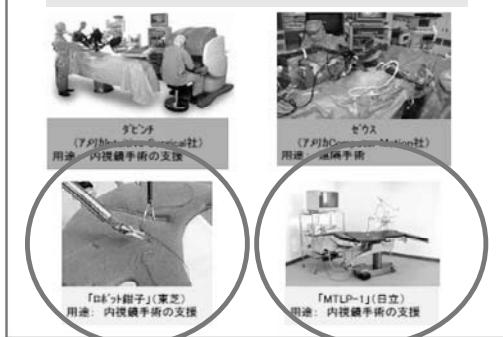
インテリジェント手術で使用される内視鏡の例



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## 非産業用ロボット 医療・福祉分野

### Industrial robot in Medicine



### II. 福祉ロボット



Japan

米国

欧州



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国際医療福祉大学  
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**革新的医薬品・医療機器創出のための5か年戦略の概要**

**世界最高水準の医薬品・医療機器を国民に提供**

**医薬品・医療機器産業を日本の成長牽引役に**

平成19年4月  
平成20年5月(改定)  
平成21年2月(改定)  
内閣府・文部科学省  
◎厚生労働省・経済産業省

日本先行開発・日本参加の世界同時開発を目指した施策群

<b>①研究資金の集中投入</b> <ul style="list-style-type: none"> <li>・医薬品・医療機器関連予算の重点化・拡充</li> <li>・産官学による重点開発領域等の調整組織の設置</li> <li>・研究開発税制の充実・強化</li> <li>・先端医療開発特区における研究資金の合理的・効率的な運用の方策の検討</li> <li>・先端医療開発特区に関連する研究重点化・集中配分等</li> </ul>	<b>③臨床研究・治験環境の整備</b> <ul style="list-style-type: none"> <li>・国際共同治験の推進</li> <li>・国立高度専門医療センターを中心に産官学密接に連携!</li> </ul>	<b>④迅速化・質の向上</b> <ul style="list-style-type: none"> <li>・の上市までの期間を2.5年間短縮(ラグ・ラグの解消)</li> <li>・審査人員を倍増・質の向上(3年間で236人増員)</li> <li>・審査の在り方や基準の明確化、GMP適用改善</li> <li>・相談にタイムリーに対応できる体制</li> <li>・局との間での共同治験協議</li> <li>・承認までの期間を19ヶ月(ラグ・ラグの解消)</li> <li>・審査人員の増員・質の向上(69人増員)</li> <li>・新規医療機器・改良医療機器・後発医療機器の3トラック審査体制を導入し承認審査の合理化を促進</li> <li>・医療機器の相談業務の質・量の向上</li> <li>・医療機器GCPの運用改善</li> </ul>
<b>Five-year Strategy for innovation of breakthrough pharmaceuticals and medical devices by MEXT, MHLW, METI and Cabinet</b>		

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## 日本の医療技術協力 *Technical Cooperation in Medicine*



報道資料

実はここにも  
総務省

*Press release by the Ministry of Internal Affairs and Communications*

平成20年7月31日

2010.07.31

### 「遠隔医療の推進方策に関する懇談会」

*the Interim Report from the Panel on Telemedicine Promotion Measures*

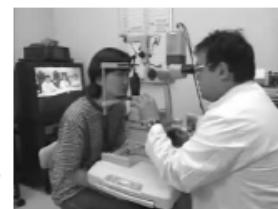
[http://www.soumu.go.jp/joho\\_tsusin/  
policyreports/chousa/telemedicine/in  
dex.html](http://www.soumu.go.jp/joho_tsusin/policyreports/chousa/telemedicine/index.html)



# 遠隔医療の実例



検査画像を共に観察しながら診断の支援



診療支援

旭川医科大学遠隔医療センター

静内町立病院



訪問した看護師からの報告と患者の様子に基づき療養指導の支援



在宅療養支援

岡山県新見市 太田病院

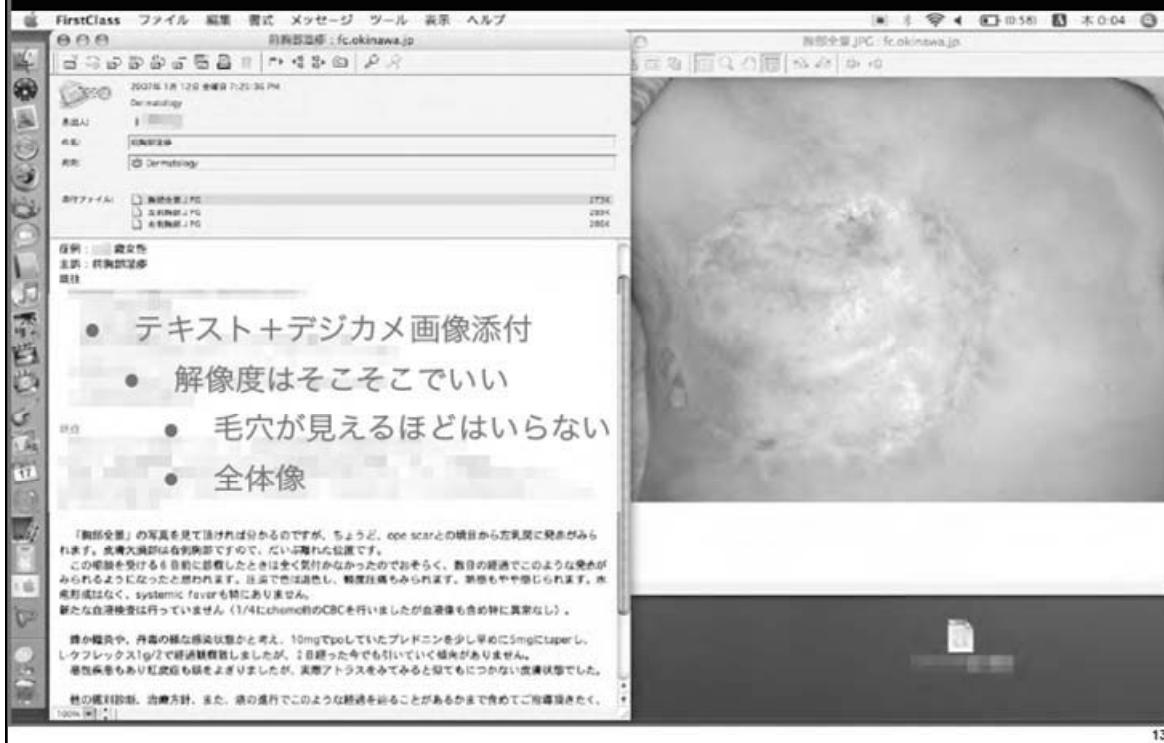
新見市内患者宅

(実証実験として研究助成に負うところが大きい。運営経費基盤の確立が課題)



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# 皮膚科:200件/5年

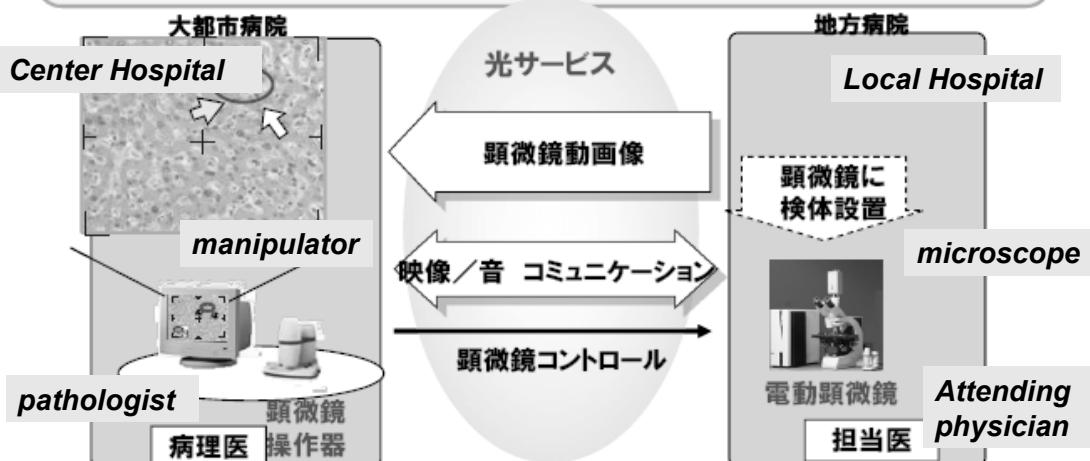


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## 2. 病院間(B2B)での取り組み事例 (テレパソロジー)

*Tele-pathology*

- ✓ 都心部に偏る病理医と地方の医療機関をつなぐ
- ✓ リアルタイム動画による双方向映像コミュニケーションを活用
- ✓ 術中の迅速診断を可能にし、患者の負担を軽減

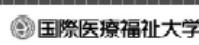


■ 640×480 pixel、最大30 fpsの映像を提供 (一般的なテレビの倍の画素数)

※fps:一秒間のフレーム数

■ 新たな高精細画像サービス(ハイビジョンクラス1920×1080 pixel、最大30 fps)を一般ユーザー向け商用提供開始

*NTT Communications*


 INTERNATIONAL UNIVERSITY OF  
HEALTH AND WELFARE  
Presents  
**【国際医療福祉大学大学院主催シンポジウム】**  
**メディカル・ツーリズムの  
国際的動向と日本の課題**

**International Symposium on Medical Tourism hosted by IUHW**

**2010.0322**

しかし、その一方で、この「メディカル・ツー」であるドイツ・バイエルン州の事情について  
――JULY――に關しては、医療だけが一人歩き お譲りいただき、日本医療福祉大学 Horst  
アーヴィング教授がお見え、「ヨーロッパ・カントリーズの医療と医療政策」を講演されました。

**15:35～16:05 「日本の医療とロシア人患者－ファシリテーターの役割と課題－」**

ビー・ジェイ・エル株式会社 代表取締役 山田紀子

日 時●2010年3月22日(月曜日、祝日)  
 13:00～17:30(受付開始12:30)  
 場 所●国際医療福祉大学大学院  
 東京青山キャンパス5Fホール  
 東京都港区南青山1-3-3 青山1丁目タワー5階  
 参加費●無料 日英同時通訳付き  
 定 員●150名(定員になり次第締め切らせていただきます)


**国際医療福祉大学**  
 INTERNATIONAL UNIVERSITY OF HEALTH AND WELFARE

**弊社の役割と実績**

**患者さんの例**

**Twelve Russian cases treated in Japanese hospitals**

■ 循環器疾患、糖尿病、消化器疾患、関節痛、脳腫瘍についての問い合わせが多い

治療年月	目的	年齢性別	来日経緯	滞在日数	治療後(現状)
2006年7月～8月	循環器血管バイパス術	61歳女性	ロシアの医師からの紹介	約60日	
2007年5月	甲状腺がん治療後検査	42歳女性	サハリン州政府からの紹介	約1週間	半年～1年毎に来日検査
2007年6月～8月	脳腫瘍摘出術、放射線治療	40歳男性	ロシアの医師からの紹介	約90日	
2007年7月～9月	同上	53歳男性	同上	約90日	半年～1年毎に来日検査、治療
2008年1月	循環器血管造影検査、不整脈検査	56歳男性	同上	約2週間	薬を定期的に購入
2008年6月	整形外科(ひざ関節)検査	16歳男性	同上	約1週間	
2008年7月	骨髄検査	65歳男性	同上	約1週間	
2008年8月～9月	脳腫瘍免疫療法	44歳女性	ロシア大使館からの紹介	約60日	ロシアへ帰国後死亡
2008年9月	循環器ステント留置術	57歳男性	患者さんからの紹介	約20日	
2009年1月	頸下腺がん手術後放射線治療	48歳男性	同上	約50日	半年毎に来日検査
2009年4月	婦人科検診	69歳女性	同上	約1週間	1年毎に来日検査予定
2009年10月	新生児眼科検診	3か月男児	大使館関係者からの紹介	約1週間	10か月後に再検査

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## ロシアの医療事情

## Issues & Challenges of Russian Medicine

### ➤ 医療機械の不足

*Lack of Medical Devices* い

### ➤ 高度医療センターが大都市にしかない

*Advanced medical centers only located in large cities*

### ➤ 医療制度の問題

*Improvement of infrastructures in medical & healthcare system* 待

保険制度の機能不全

### ➤ ロシアの医療そのものを国民が信頼していない

*Reliability*

### ➤ 健康に関する基本的な知識の不足

*Lack of healthcare knowledge*

### 日本の医療に対するイメージ

- ◆ 最新の検査・治療ができる
- ◆ 医療費は高くない
- ◆ 対応が丁寧、信頼できる

### (参考) ロシア人の一般的な特徴

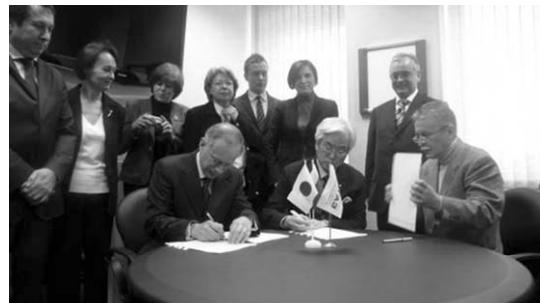
- メンタリティが日本人と似ている
- 意外と真面目で我慢強い
- 体力の回復が早い
- ブランド志向が強い



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寄稿

## ロシアおよび旧ソ連圏の医療の現状

日本医療経営学会理事長／元ニューヨーク医大臨床外科教授 廣瀬輝夫

## はじめに

ロシアでは、1917年にレーニンにより結成された共産主義がロシア王政に代わって、22年に周辺の十数小国を併合してソ連邦が設立された。89年にベルリンの壁が取り払われて、91年にソ連邦が解体されるまでの69年間にわたり共産党の支配下に置かれていたため、中央集権政策により公的医療制度が施行されたが医療の貧困化が起こった。筆者が95年の夏にロシアを訪問したときに、その回復には15年間を要すると報告したが、その13年後の2008年秋に再訪問した際もYeltsin, PutinとMedve-



〈写真1〉モスクワ大学心臓血管外科のVictor V. Sokolov教授(左)と著者



〈写真2〉モスクワ大学医学部付属第二病院

不十分であり、さらに近代設備もほとんどなかった。320万床に及ぶ医療施設と外来では診療が施行されてはいたが、軽症の疾病もすべて入院治療を行っていたので、強制労働と生活困難を避けるために国民の3%が常に入院していた。

心疾患の治療を必要としたときには心臓移植や冠動脈バイパス手術は不可能であったため、米国のBayler大学のDeBakey教授の手術チームを招へいして万一の場合に備えたほどであった。

今回、まずモスクワ大学のSklifos-

**Article: "Health status in Russia and CIS" by T Hirose, former Prof of NY Med Univ**

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	Russia(2007)	Japan(2006)
Population	140mil	128mil
GDP(US\$)	2tril	5tril
GDP/capita(US\$)	14,000	32,600
Child birth rate/TFR	11.03/1.4	8.7/1.37
Mortality rate	16.06	9.1
Infant mortality rate	10.81	2.6
Life expectancy	61.8(M)、74.2(F)	79.3(M)、86.1(F)
Ageing population(%)	14.1	20.2
Population increase(%)	-0.47	-0.06
Medical expenditure(US\$)	40bil	33bil
Med exp/GDP(%)	2.2	8.8
Med exp per capita(US\$)	250	2,593
Hospitals	6,800	8,862(Hospital)、12,399(Clinics)
Clinics/1000person	18.3	8.5(87,133clinics w/o beds )
Beds/10000person	1.52 million,107	1.62 million, 126.8
Doctors/10000person	707 thousands,49.8	278 thousands, 20.6
Nurses/10000person	1.54 million,109	1.25 million, 98

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## 「新成長戦略」について Japan's New Growth Strategy



平成22年6月18日  
閣議決定

**Prime Minister Kan said, "I said in my policy speech "a strong economy," "robust public finances," and "a strong social security system," but without a strong economy, neither public finances nor social security system can be viable.**



### (2) ライフ・イノベーションによる健康大国戦略

#### 【2020年までの目標】

『医療・介護・健康関連サービスの需要に見合った産業育成と雇用の創出、新規市場約50兆円、新規雇用284万人』

(医療・介護・健康関連産業を成長牽引産業へ)

我が国は、国民皆保険制度の下、低コストで質の高い医療サービスを国民に提供してきた結果、世界一の健康長寿国となった。世界のフロンティアを進む日本の高齢化は、ライフ・イノベーション（医療・介護分野革新）を力強く推進することにより新たなサービス成長産業と新・ものづくり産業を育てるチャンスでもある。

したがって、高い成長と雇用創出が見込める医療・介護・健康関連産業を成長牽引産業へ

#### Targets to achieve by 2020 : Healthcare

Create healthcare, nursing and medical market of 50 trillion yen and 2.8M jobs by leveraging technologies to create internal and external demand.

もが必要なサービスにアクセスできる体制を維持しながら、そのために必要な制度・ルールの変更等を進める。



(日本発の革新的な医薬品、医療・介護技術の研究開発推進)

安全性が高く優れた日本発の革新的な医薬品、医療・介護技術の研究開発を推進する。産官学が一体となった取組や、創薬ベンチャーの育成を推進し、新薬、再生医療等の先端医療技術、情報通信技術を駆使した遠隔医療システム、ものづくり技術を活用した高齢者用パーソナルモビ

Initiate R&D of innovative medical and nursing technologies such as regenerative medicine, telemedicine system, nursing robots etc.

Strengthen infrastructure supporting aging society such as medical, nursing and housing to eliminate anxieties for the future to promote consumption by elders

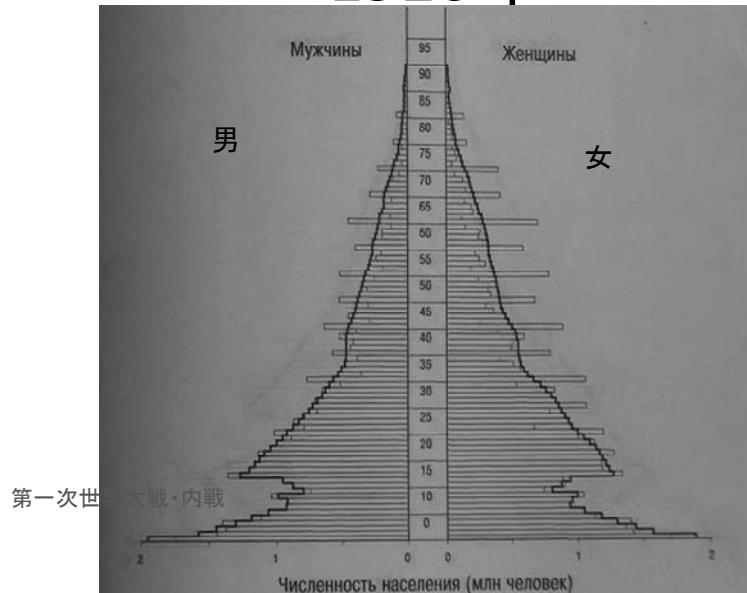
(アジア等海外市場への展開促進)

医療・介護・健康関連産業は、今後、高齢社会を迎えるアジア諸国等においても高い成長が見込まれる。医薬品等の海外販売やアジアの富裕層等を対象とした健診、治療等の医療及び関連サービスを観光とも連携して促進していく。また、成長するアジア市場との連携（共同の臨床研

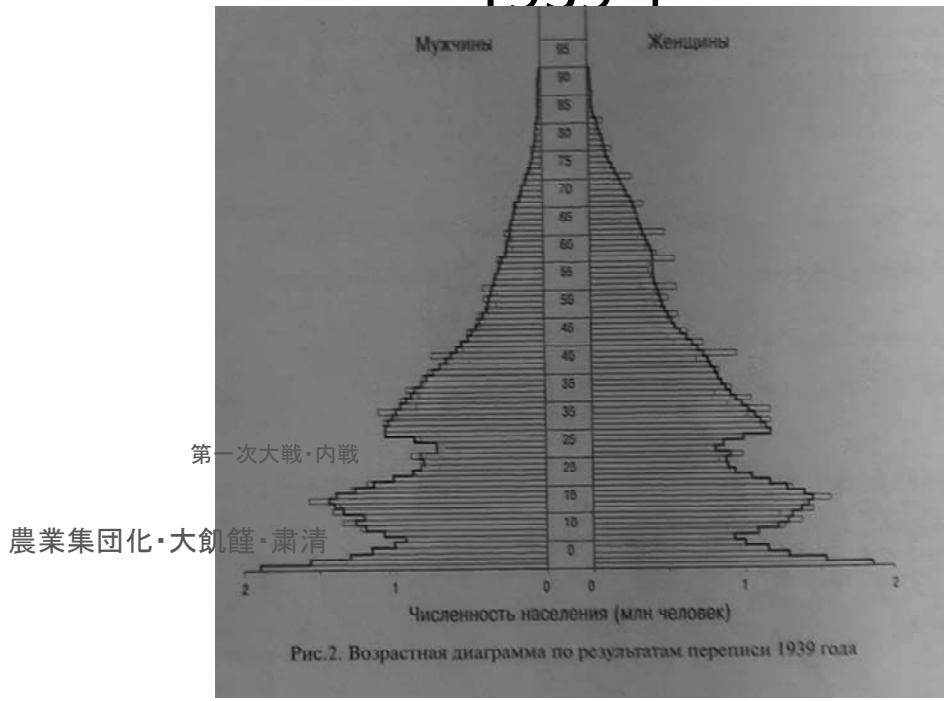
Provide healthcare related services to Asian markets expected to experience aging society.



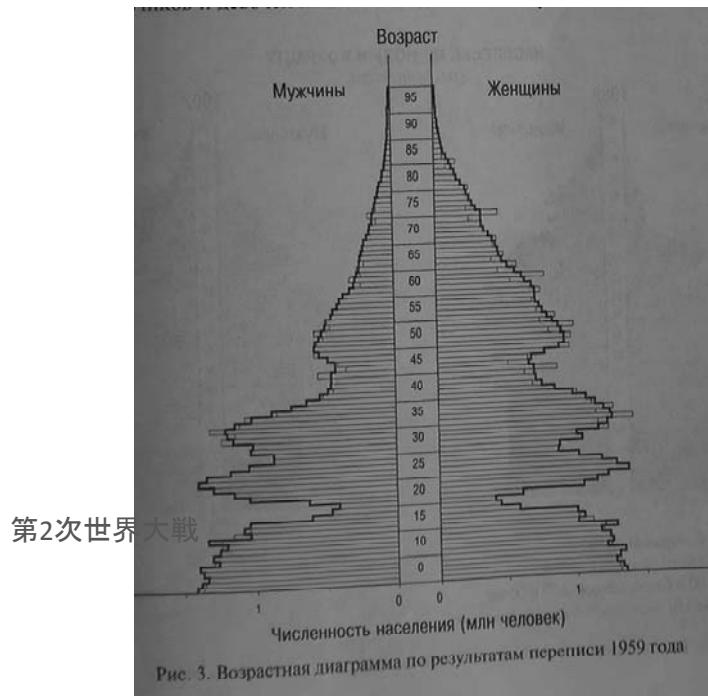
1926年



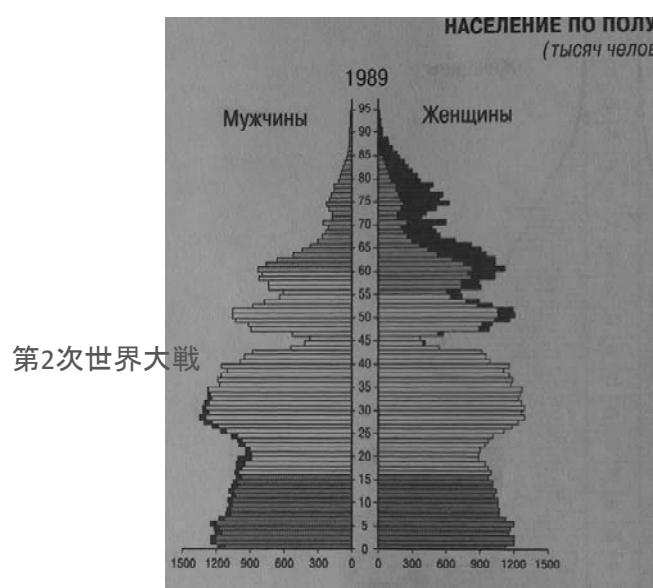
1939年



# 1959年



# 1989年



# 2002年



# 2008年

国家統計局

