日本側報告資料
June 29, 2010
Pre-meeting for Yaroslavl policy forum

Green and Silver Innovations

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

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
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.
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)

To achieve green innovation

Vision 2050

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

**Automobile energy consumption to 1/10**

<table>
<thead>
<tr>
<th>US/European Cars</th>
<th>Japanese Cars</th>
</tr>
</thead>
</table>

- **Fuel Consumption [L/km]**

- **Vehicle Weight [kg]**

Data Source: Yahoo! Japan Autos

**Japan leads!**

**Technology transfer can reduce emission**

<table>
<thead>
<tr>
<th>Energy Consumption per ton (MJ/t)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Japan</td>
</tr>
<tr>
<td>Sweden</td>
</tr>
<tr>
<td>France</td>
</tr>
<tr>
<td>Belgium</td>
</tr>
<tr>
<td>Denmark</td>
</tr>
<tr>
<td>US</td>
</tr>
</tbody>
</table>

Energy efficiency improvement by 3 times is feasible. Investment for energy efficiency is win-win-win.

Source: Japan Cement Association
**Energy Scenario and CO₂**

**a) 1990**
- 6.0G C-ton
- CO₂ 369 ppm

**b) 2050 BAU case**
- 22.0G C-ton
- CO₂ 600 ppm

**c) Vision 2050**
- 4.5G C-ton
- CO₂ 460 ppm

**d) After 22nd Century**
- CO₂ 280 ppm

Data: from “Vision 2050”

---

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

**Scenario in developed and developing countries**

<table>
<thead>
<tr>
<th>Year</th>
<th>Emission, G C-ton</th>
</tr>
</thead>
<tbody>
<tr>
<td>1997</td>
<td>5.0</td>
</tr>
<tr>
<td>2050</td>
<td>1.7</td>
</tr>
<tr>
<td>1997</td>
<td>2.5</td>
</tr>
<tr>
<td>2050</td>
<td>5.8</td>
</tr>
</tbody>
</table>

Developed Countries: Fossil & Non-fossil

Developing Countries: Fossil & Non-fossil

Compiled data created by The University of Tokyo
Emission control depends on countries!

Energy consumption by final use

Making things

Home

Office

Transportation

Daily life

Energy consumption in houses

Air-conditioner 28%

Water heating 30%

Others 24%

Kitchen 8%

Lighting 10%

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

エネルギー・経済統計要覧2009年版より
Technology innovation can happen!

Air-conditioning energy can be $1/10$ in 2050

Air conditioner

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>12</td>
<td>43</td>
</tr>
</tbody>
</table>

Heat insulation of houses and buildings

<table>
<thead>
<tr>
<th>bonfire</th>
<th>wretched hut</th>
<th>temple</th>
<th>house</th>
<th>eco-house</th>
<th>ideal</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1</td>
<td>5</td>
<td>30</td>
<td>100</td>
<td>$\infty$</td>
</tr>
</tbody>
</table>

Innovation has happened already in Japan!

Water Heater

<table>
<thead>
<tr>
<th>US (majority)</th>
<th>Japan (majority)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tank storage 40%</td>
<td>Heat-to-use 80%</td>
</tr>
<tr>
<td>5</td>
<td>2.5</td>
</tr>
<tr>
<td>Heat-pump (Ecocute)</td>
<td>Fuel cell (Enefarm)</td>
</tr>
<tr>
<td>$50% \times 4 = 200%$</td>
<td>36% elec. + 50% hot water</td>
</tr>
<tr>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>
Action based on existing technologies
Komiyama Eco-house & transportation

<table>
<thead>
<tr>
<th>Technology</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hybrid car</td>
<td>22km/l</td>
</tr>
<tr>
<td>Heat Pump Water Heater</td>
<td>COP=4</td>
</tr>
<tr>
<td>High Insulation</td>
<td>K=1.6 W/m²K</td>
</tr>
<tr>
<td>New air conditioners</td>
<td></td>
</tr>
<tr>
<td>New refrigerator and lightings</td>
<td></td>
</tr>
<tr>
<td>Solar Power Generation</td>
<td>3.6kW</td>
</tr>
</tbody>
</table>

81% Energy Reduction

©Hiroshi Komiyama

Challenge25 Campaign
—Team Komiyama’s proposal—

<table>
<thead>
<tr>
<th>Category</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Daily life</td>
<td>12%</td>
</tr>
<tr>
<td>Making things</td>
<td>3%</td>
</tr>
<tr>
<td>Nuclear energy etc.</td>
<td>5%</td>
</tr>
<tr>
<td>Forest etc.</td>
<td>5%</td>
</tr>
<tr>
<td>CDM</td>
<td>5%</td>
</tr>
</tbody>
</table>

Dependent strongly on countries!
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.
Paradigm in 21st century

Shrinking earth

- Financial crisis
- Pandemic ...

20th Century
Infinite earth

21st Century

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

Aging society

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

Exploding knowledge

1900
- Sunlight
- CO₂
- H₂O
- Chlorophyll
- O₂
- Carbohydrate

2000
- CO₂
- H₂
- O
- Chlorophyll
- H₂O
- Carbohydrate

Photosynthesis

Source: Japan as a forerunner for addressing emerging problems in the world, 2014

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
Japan’s experience with Sumida river

1967

present

東京屋形船案内
http://www.t-yakata.com/tyh_fish.htm

環境省 図で見る環境白書 昭和57年

Japan’s experience with Yokkaichi

1950’s

present

©Yokkaichi City
Japan’s experience with kitakyushu

Emission of Sulfur Oxides from Thermal Power Plants

<table>
<thead>
<tr>
<th>Country</th>
<th>1999</th>
<th>2002</th>
</tr>
</thead>
<tbody>
<tr>
<td>U.S.</td>
<td>4.8</td>
<td>3.7</td>
</tr>
<tr>
<td>U.K.</td>
<td>3.2</td>
<td>2.6</td>
</tr>
<tr>
<td>Germany</td>
<td>1.2</td>
<td>0.7</td>
</tr>
<tr>
<td>France</td>
<td>2.0</td>
<td>7.1</td>
</tr>
<tr>
<td>Italy</td>
<td>2.1</td>
<td>2.7</td>
</tr>
<tr>
<td>Canada</td>
<td>4.0</td>
<td>3.9</td>
</tr>
<tr>
<td>Japan</td>
<td>0.2</td>
<td>0.2</td>
</tr>
</tbody>
</table>

Data Source: Tokyo Electric Power Company, web-site
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

<table>
<thead>
<tr>
<th>Positive evolution</th>
<th>Inertia and negative response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Market transition</td>
<td>Formal institution building; profit-seeking and modern corporations (normalization)</td>
</tr>
<tr>
<td>Globalization</td>
<td>Linkage with global markets; G8 member; transnationalization</td>
</tr>
<tr>
<td>Role of government</td>
<td>From instable to stable</td>
</tr>
<tr>
<td>Global judgments</td>
<td>High evaluation as BRICs; promising markets; important resource base</td>
</tr>
</tbody>
</table>
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

- Low level of machinery export
  - 5% (2008), 6% (2009)
  - Reference: 5% in 1938 in USSR, 7% in 1951 in Japan
- Lack of investment
  - Increase of investment (% in GDP)
  - 16% (2000), 21% (2008)
  - Low compared with China (38%)
  - Modernization in Russia needs more than 25%
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

<table>
<thead>
<tr>
<th>Aging structure of petroleum pipeline (years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 10</td>
</tr>
<tr>
<td>7%</td>
</tr>
</tbody>
</table>

Facilities with more than 20 years are said to be critical. 70% must be replaced.

- 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:
  - Digital AVC
  - Housing Equipment
  - Home Appliances
  - Components and Devices
  - FA Equipment
  - Solar Cells
  - Rechargeable Batteries
  - Commercial-use Refrigeration / Air Conditioning

*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

Energy Creation  Energy Storage  Energy Management  Energy Saving

Eco-car-related  Creating a Community Grid  Smart Meter

Developing Technology  Virtually Zero CO2 Emissions for the Entire Home  Linked to Infrastructure
Virtually Zero CO2 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)

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%)

- Supplied 1st Equipment to the Prime Minister’s Official Residence
- 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

- 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**
  - Incandescent bulb: 54W
  - LED Light: 6.9W

- **Long lifetime**
  - Incandescent bulb: 1,000 hours
  - LED Light: 40,000 hours

- **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)

- **<60W Model>**
  - Incandescent bulb: 54W
  - LED Light: 6.9W

- **Approximately one-eighth in power consumption & electricity expenses**

- **Approximately 40 times**

- **<Image> Tokyo Sky Tree**

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”

- **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
- Carrying out energy-saving diagnoses employing energy-saving technology support teams
  - Carried out diagnoses at 18 plants
  - Proposed 350 ideas to reduce CO2 emissions by 20,000 tons in total
- Bringing innovation to the production process
- Sharing successful examples across the Group

Setting CO2 Emissions as a Key Management Indicator

- Business growth and environmental management living together.
- Incorporating CO2 emissions into key management indicators.

Environmental performance system

- CO2 emissions (23 items)
- Thru Web
- Head Office
- Logistics Office
- Manufacturing business units
- 274 sites

Key management indicators

- Sales, Profit, ROE, etc.
- ‘Business Plan’ & ‘Three Years Plan’
- Management evaluation criteria

Feedback of analysis results

Report to top management
Various report issue
Achievement of CO₂ Reduction in Production Activities

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

Making a Global Contribution to Reducing CO₂

Reduce CO₂ 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 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

Japan National ICT Strategies


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
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
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

Ubiquitous R&D activities

2001 2002 2003 2004 2005 2006 2007 2008 2009 2010

First phase
- MIC committee started the study of "Ubiquitous network"
- Report of "Ubiquitous Networking"
- "Ubiquitous networking forum"
- "network robot forum"

Second phase
- Ubiquitous service platform (CUBIQ)
- Ubiquitous mobile phone by embedded RFID (UMoRE)
- Infrastructure of Common Ubiquitous Service (iCUTE)
- Network robot project (Phase 2)
- Intelligent home appliance project

Fora
- Ubiquitous network project
- RFID project
- Network robot project
- Sensor network project
- Network test bed
- JGN network
- JGN2 network
- JGN2 plus network
Two Directions

ICT as social infrastructure
Peter Drucker

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

Peter Drucker

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

- Environment (Green, Smart Grid)
- Transportation
- City
- Supply Chain (food, retail)
- Water Management
- Resource mngt

ICT as Civil Infrastructure

- Health care / welfare
- Transportation
- Agriculture
- Education
- Energy

ICT
Partner

ICT people

○○ people

ICT as “experience”
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

Service Prototyping Video

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
Ubiquitous networked society is driven by *Data*
Trends

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

- Integration with physical world

Mechanism to collect “personal info.”

- Personalization

3-axis Acceleration Sensor (LIS3L02DQ) + Wireless Sensor Node (ANTH)

Show Us a Better Way

- 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
Open Government Initiative

Data.gov

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

Apps.gov

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....
Breakthrough

Functions

WWW

Stream Data?

Now

Time
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

本日お話すること

• 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
Nanomedicine: Medical Application of Nanotechnology.

Drug delivery

Protein and peptide delivery

Drug delivery

Nano-level Imaging

Early Cancer Detection

Non Invasive Surgical Methods
ゲノム創薬
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、その遺伝子が作りたんぱく質などを創薬の標的にするのが特徴です。

テーラーメード医療
(Tailor-made Medicine, Personalized Medicine)
Tissue Engineering or Regenerative Medicine

再生医療とは
再生医療とは、本人もしくは他者の細胞・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

①細胞の採取（自己又は他人から）

臨床研究
開始済み

②細胞培養技術・組織工学を用いた、セルプロセッシングセンター等における細胞の凍結・加工による製品・製剤化

③再生した細胞や組織の移植・投与

1) 休性幹細胞

stem cell

2) 胚性幹（ES）細胞

embryonic stem cell

3) 人工多能性幹（iPS）細胞

induced pluripotent stem cell

Ministry of Health, Labour and Welfare
allocated ¥16.5bil for R&D in Pharmaceuticals and Medical Devices in 2009
Ministerial Cooperation of Cancer R&D

progress of tissue engineering

basic res, pre-med res, medical res, clinical trial

skin
bone
cartilage
cornea
myocardium
spine/nerve
lever/pancreas

世界の再生医療技術の3分の1を日本発に！
128
Endoscopic Devices

Industrial robots in Medicine

Japan
Five-year Strategy for innovation of breakthrough pharmaceuticals and medical devices by MEXT, MHLW, METI and Cabinet
日本の医療技術協力

Technical Cooperation in Medicine

東京

「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

遠隔医療の実例

旭川医科大学遠隔医療センター

診療支援

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）
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

大都市病院 Center Hospital

- 核診断像
- 操作器
- 映像/音コミュニケーション
- 光サービス

病理医

地方病院 Local Hospital

- 視野鏡
- 微細コントロール
- 担当医

microscope

※0.40×480 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：一枚のフレーム数
※新たに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）を一般ユーザ向け商用提供開始
### Twelve Russian cases treated in Japanese hospitals

<table>
<thead>
<tr>
<th>Year</th>
<th>Month</th>
<th>Disease</th>
<th>Age</th>
<th>Treatment</th>
<th>Hospital</th>
<th>Duration</th>
<th>Reason</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>Jul-Aug</td>
<td>Cardiac</td>
<td>61</td>
<td>Endocarditis</td>
<td>Heart</td>
<td>60 days</td>
<td>For heart surgery</td>
</tr>
<tr>
<td>2007</td>
<td>May-Aug</td>
<td>Cancer</td>
<td>42</td>
<td>Surgery</td>
<td>Cancer</td>
<td>90 days</td>
<td>For cancer treatment</td>
</tr>
<tr>
<td>2007</td>
<td>Jul-Sep</td>
<td>Stroke</td>
<td>53</td>
<td>Rehabilitation</td>
<td>Stroke</td>
<td>90 days</td>
<td>For rehabilitation</td>
</tr>
<tr>
<td>2008</td>
<td>Jan-Mar</td>
<td>Diabetes</td>
<td>56</td>
<td>Medication</td>
<td>Diabetes</td>
<td>2 weeks</td>
<td>For medication management</td>
</tr>
<tr>
<td>2008</td>
<td>Jun-Sep</td>
<td>Spine</td>
<td>16</td>
<td>Surgery</td>
<td>Spine</td>
<td>1 week</td>
<td>For spine surgery</td>
</tr>
<tr>
<td>2008</td>
<td>Jul-Sep</td>
<td>Spine</td>
<td>65</td>
<td>Surgery</td>
<td>Spine</td>
<td>1 week</td>
<td>For spine surgery</td>
</tr>
<tr>
<td>2008</td>
<td>Aug-Sep</td>
<td>Diabetes</td>
<td>44</td>
<td>Medication</td>
<td>Diabetes</td>
<td>60 days</td>
<td>For medication management</td>
</tr>
<tr>
<td>2008</td>
<td>Sep-Oct</td>
<td>Diabetes</td>
<td>57</td>
<td>Surgery</td>
<td>Diabetes</td>
<td>20 days</td>
<td>For diabetes surgery</td>
</tr>
<tr>
<td>2009</td>
<td>Jan-Feb</td>
<td>Stroke</td>
<td>48</td>
<td>Rehabilitation</td>
<td>Stroke</td>
<td>50 days</td>
<td>For rehabilitation</td>
</tr>
<tr>
<td>2009</td>
<td>Apr-May</td>
<td>Diabetes</td>
<td>60</td>
<td>Medication</td>
<td>Diabetes</td>
<td>1 week</td>
<td>For medication management</td>
</tr>
<tr>
<td>2009</td>
<td>Sep-Oct</td>
<td>Diabetes</td>
<td>3</td>
<td>Medication</td>
<td>Diabetes</td>
<td>1 week</td>
<td>For medication management</td>
</tr>
</tbody>
</table>

Note: The table lists the cases of Russian patients treated in Japanese hospitals, including their age, disease, treatment, hospital, duration of treatment, and reason for treatment.
ロシアの医療事情

- 医療機械の不足
  - Lack of Medical Devices
- 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
- 看護の不足
  - 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
- メンタル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
**Article: “Health status in Russia and CIS” by T Hirose, former Prof of NY Med Univ**

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

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.

1. tāgatte, kikai kōe to kyuken kōe ga daini no meru kōe kyoukō seiken ga kouyoku suru. kikai
mo shihōsha no shinservice ni akuseki deki kōe o koushin shi nagor, sono taimi ni
bōza no keikō to rurō no tenkai o tsūmu.
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.

Provide healthcare related services to Asian markets expected to experience aging society.
1926年

1939年
1959年

1989年
連邦崩壊後の混乱・出生率低下

2002年

2008年

国家統計局

黑線・2008年
棒グラフ・2002年