University-industry innovation in creating future models of education

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Society, Market Change and Hitachi's Vision

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Macro Trend in Society

- Shifting from a society centered on "concentration, ownership and consumption" to "distribution, sharing and recycling"
- Expansion of free trade zones
- Global market growth led by emerging countries
- Energy shift drive to reorganize industry and market change (Growing presence of the U.S., Sub-Saharan Africa and South Africa, South America, etc.)

Achieving a Sustainable society

- Securing water resources, energy and food
- Replacement of aging infrastructure systems
- Reduction of CO2
- Improving transportation systems
- Responding to lower birthrate and aging
- Promoting material recycling

etc.

What the Hitachi Group aims to become

Hitachi's Vision

Hitachi delivers innovations that answer society's challenges. With our talented team and proven experience in global markets, we can inspire the world.

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Customer-Driven Approach

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Focus on a customer-driven research model for the global growth of Social Innovation Business

1. Uncover and share problems held by customers

Uncovering and sharing the fundamental objectives, potential needs of customers

→ **Ethnographic research**

2. Continuous co-creation with customers

Greater innovation through quick repetition of the uncovering and problem-solving cycle

→ **ExApproach**

3. Develop innovation from a vision of the future

Develop disruptive technology capable of responding to future issues in society as drawn from the vision, to achieve a society where those issues are resolved

→ **Vision design**

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Vision Design

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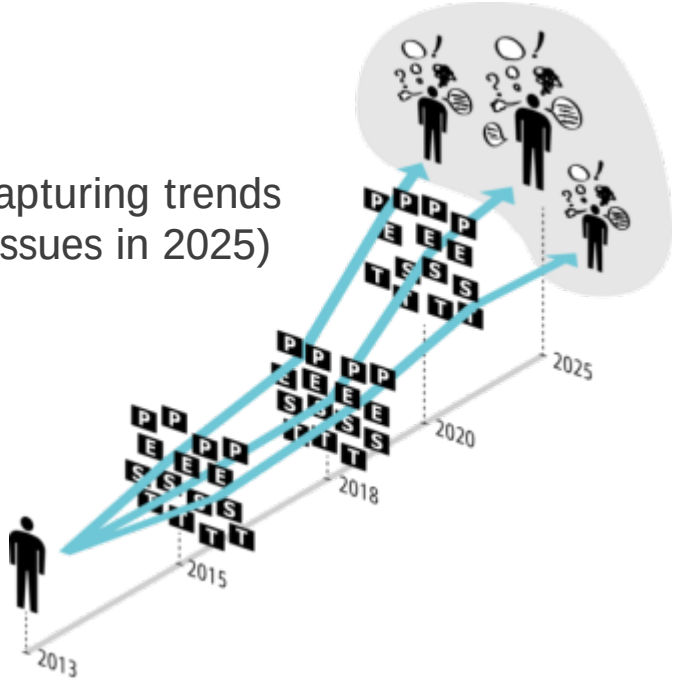
Capture future societal issues, and illustrate them in detail from citizens' perspective as a solved problem in society

「きざし」

Analysis of external factors
"PEST" analysis

P: Politics E: Economy
S: Society T: Technology

Capturing trends
(Issues in 2025)



Designed vision of UK healthcare in 2025 led to collaboration with NHS GM*

Healthcare vision video presented to NHS GM

Diabetes prevention service for the U.K.

Health guidance to insured citizens to prevent diabetes (10% medical expenses in UK)

Insurer | Hospital | Insured

NHS GM

*NHS GM：National Health Service England (Greater Manchester)

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Deep Research (Product-Driven Research) PBT

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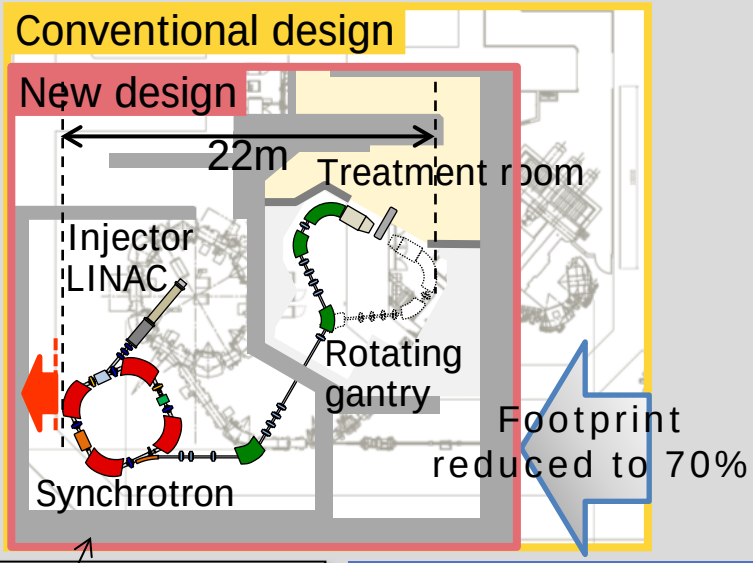
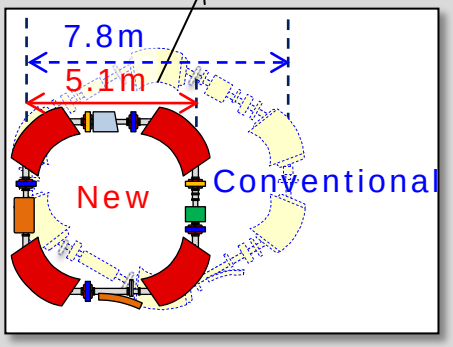
Proton beam therapy system PROBEAT-RT

Compact system 70% previous model





Hokkaido University

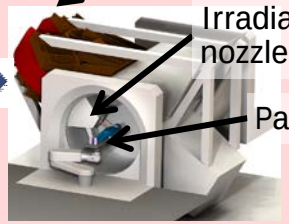
Completion ceremony
(17 March 2014)

Applicable to moving organs

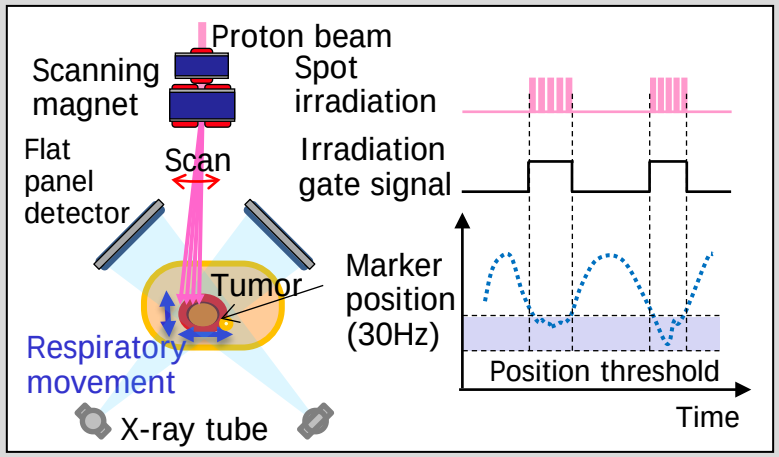
Real-time tumor-tracking radiotherapy (Hokkaido University)

Integrate

Spot-scanning proton beam therapy (Hitachi)



Real-time tumor tracking spot scanning proton beam therapy system



Highly accurate irradiation of a tumor influenced by respiratory movement

*A part of this technology was developed together with Hokkaido University under the Funding Program for World-Leading Innovative R&D on Science and Technology ("FIRST Program") initiated by the Council for Science and Technology Policy. and granted by the Japan Society for the Promotion of Science (JSPS). **This integrated therapy has been submitted for manufacturing & marketing approval under the Japanese Pharmaceutical Law.

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Deep Research (Roadmap-Driven Research)

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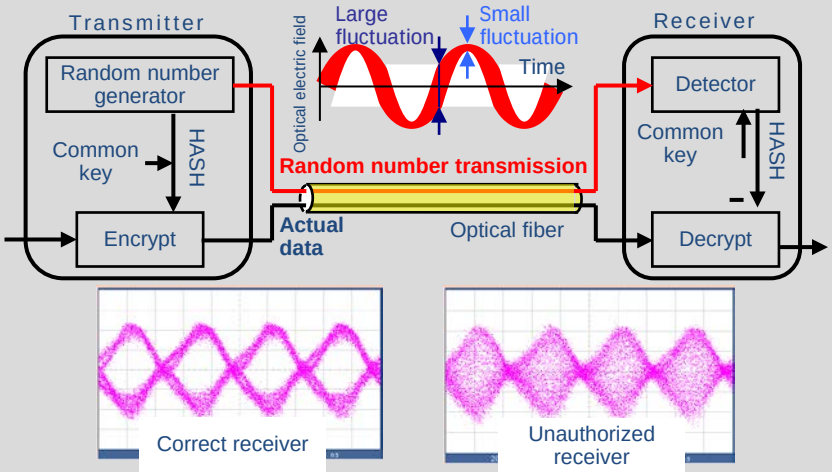
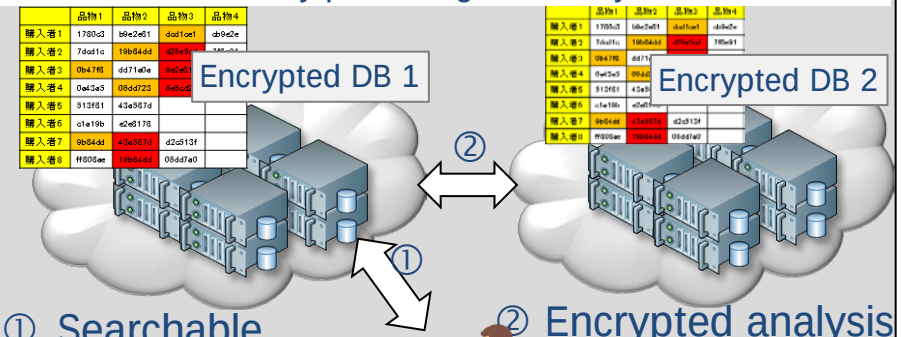
Secret data optical transmission*1

Secret communication technology developed using quantum fluctuation



Encryption for the cloud

Search over encrypted data & Privacy preserving data analysis



① Searchable encryption*2

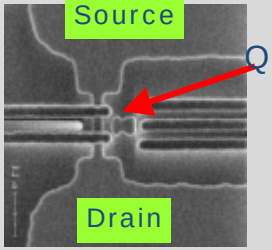
Technology to search data while in the encrypted state

② Encrypted analysis

Data mining over encrypted data

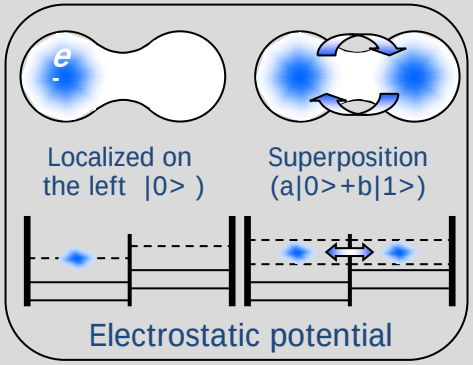
Si-qubit*1

Qubit – an elementary device in quantum computing - realized on silicon



Si-qubit fabricated in a commercial CMOS line*2

Qubit: Quantum bit



Semi-perpetual storage

Fused silica storage with DVD comparable recording density & durability of a few hundred million years

DVD comparable recording density (270MB/inch^2)

Few hundred million year durability (Heat resistance 1,000°C, 2 hrs.)

*1 This work was supported in part by the Project for Developing Innovation Systems of the Ministry of Education, Culture, Sports, Science and Technology (MEXT), Japan.
*2 The searchable encryption method developed is part of research results from the 2010 project commissioned by the Ministry of Internal Affairs and Communications, for "R&D of technology for information security countermeasures in large-scale virtual server environments.

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Summary

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Two types R&Ds are key drivers for social innovation

- Customer driven R&D
  Explore a regional business opportunity
  Discover an essential problem of key customer
- Deep Research (Product & Roadmap driven R&D)
  Develop cutting-edge technology

Training needs

- Ability to identify and define the problem
- Ability to pursue conventional research is still important

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END

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