Quantum Computing Use Cases

24-hour health concierge



Promotion of SDGs with Quantum Technology

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New Energy and Industrial Technology Development Organization (NEDO)

24時間健康コンシェルジュ
24-hour health concierge

NO IMAGE

ユースケース概要 **Use Case Overview**	埋め込み型デバイスによる24時間バイタルデータ収集を通じた健康予測 Health prediction through 24-hour vital data collection by implantable devices.
解決できる課題と効果 **Issues to be addressed and their effects**	高齢者や障碍者の支援技術の高度化とそれを通じた国の医療費削減 Support for the elderly and people with disabilities, and the reduction of medical costs through that support.
量子技術の貢献 **Contributions of quantum technology**	病院を含めた多数の事業者間でのセキュアなデータ共有 Secure data sharing among multiple businesses, including hospitals.

実現予想時期 **Expected realization period**	(Year)～2030
産業分類 **Industry classification**	情報・金融・その他サービス Information・Financial・Other services
関連するQRAMI階層 **Related QRAMI layers**	通信層 Communication layer
関連する量子技術 **Related quantum technologies**	量子通信・セキュリティ 量子コンピュータ Quantum Communication・Security Quantum Computer

新規性 **Novelty**	既存の模倣 Existing imitation
達成難易度 **Difficulty of achievement**	容易 Easy
社会貢献度 **Social contribution level**	特定の業種に貢献 Contributions to specific industries
市場規模 **Market size**	10兆円～ 10T¥～

Detail

24-hour health concierge

Issues to address

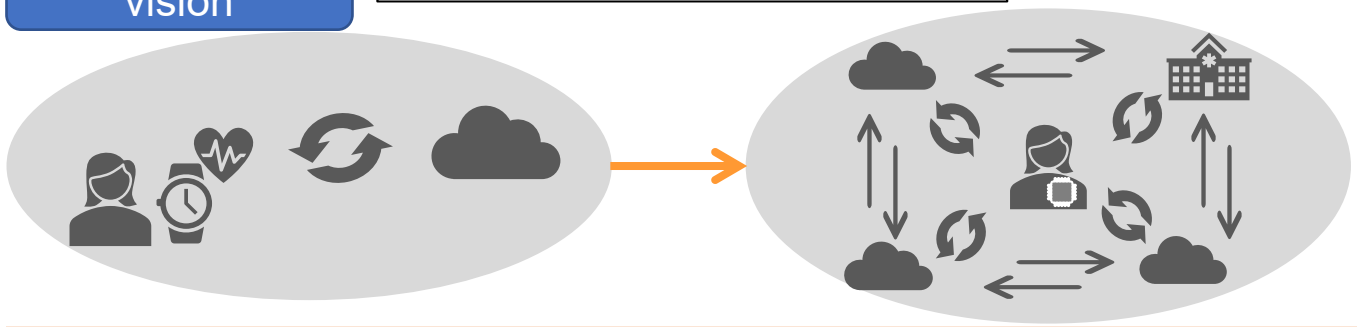
- Creating a society where everyone can live with peace of mind as they age (advancement of assistive technologies for seniors and individuals with disabilities)

Use case overview

- Personalized services utilizing individual healthcare data from embedded devices (seamless data accumulation enabled by embedded devices)
- Services that integrate 24-hour vital data with medical institution records and genomic data to assess and predict health conditions comprehensively

Implementation vision

Achievement target period: 2025–2030



- Due to the miniaturization and sophistication of devices, implantable devices have been developed, enabling the unconscious acquisition of a wide variety of healthcare data.
- Quantum cryptography communication will enable exchanging and utilizing data among a large number of businesses, including hospitals.
- Gate-based quantum computers will enable predicting individual health conditions using a wide variety and large amounts of healthcare data.

Expected benefits

- Health promotion through high-quality healthcare services using data created for each individual
- Reduction of national medical costs through the increase in the number of healthy people

Action plan

QRAMI hierarchy	Action
Business	Concierge services by fitness providers, hospitals, drugstores, etc.; health management services by medical institutions; etc.
Functional	Develop life expectancy prediction system, disease onset risk simulation system, and longevity recommendation system
Information	Collect and manage 24-hour vital data and disease-risk-related data (electronic medical records, genomic data)
Communication	Establish network for communication of confidential data using QKD and PQC
Policy aspect	Promote the adoption of medical IDs and expand certified business operators to handle anonymously processed medical information at many companies

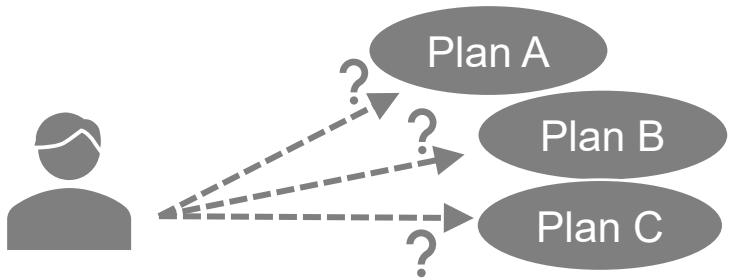
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2023
Record of personal healthcare data

PHR-based health prediction (1-to-1)



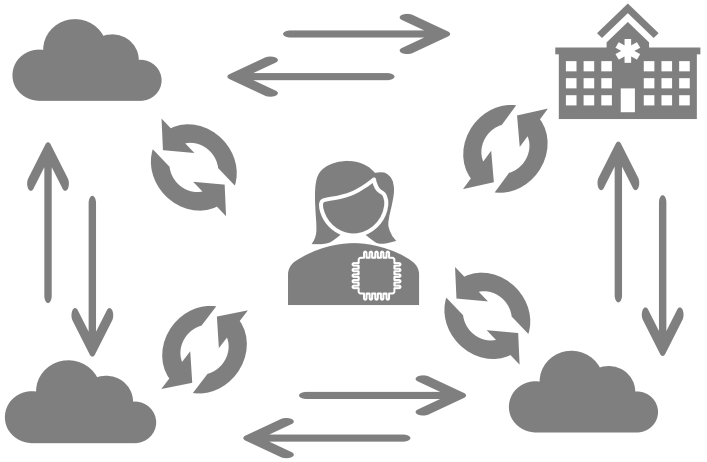
- ✓ Record and store vital data (weight, heart rate) from smart devices
- ✓ Services for determining and predicting health status from vital data



- ✓ The provision of health promotion services is not based on strict personal optimization, but rather on several typified patterns.

Around 2025 to 2030
Individualized services leveraging personal healthcare data

24-hour health concierge (1-to-N)



- ✓ Embedded device accumulates data without user being aware of it.
- ✓ Services that integrate 24-hour vital data with medical records and genomic data to assess and predict health conditions comprehensively
- ✓ Provide health promotion services created for each individual person

Around 2035
Group services leveraging personal healthcare data

Prediction and mass customization based on disease onset risk for entire population (N-to-N)



- ✓ Predict the risk of infectious disease onset in each area based on data accumulated by multiple services and medical institutions
- ✓ Based on the above, take measures in accordance with the risk of disease onset (priority allocation of doctors and hospital beds, etc.)

Roadmap

24-hour health concierge

	2023	2025	2030	2035
	PHR-based health prediction	**24-hour health concierge**		**Prediction and mass customization based on disease onset risk for entire population**
Business	Health prediction services using smart devices	Concierge services by fitness providers, hospitals, drugstores, etc.		Support services for priority allocation of doctors and hospital beds Emergency response support services
Interface	Medical information retrieval API	Medical information retrieval API		Medical information retrieval API Disease risk data retrieval API
Functional	Diet plan presentation (choose from categorized plans) Predicting the risk of arrhythmias	Develop life expectancy prediction system, disease onset risk simulation system, and longevity recommendation system		Medical capacity alerts (optimized allocation of beds, physicians, and medical devices) Secret quantum computing and distributed quantum computing systems
Information	Vital data	**24-hour vital data, disease-risk-related data (electronic medical records, genomic data)**		**Disease onset risk data for entire population**
Communication	4G and 5G communications	**QKD, PQC Communication of confidential data**		Quantum Internet, PQC
Integration	Engine, server, storage	Engine, server, storage		Engine, server, storage
Asset	Sensor devices, inspection devices, smart devices, classic computers	**Implantable devices (smart contacts, chips, etc.), quantum computers**		**Quantum computers, implantable devices, non-invasive quantum sensors (capable of measuring molecular-level protein changes)**
Policy aspect	Only a limited number of certified businesses can handle anonymously processed medical information	**Adoption of medical IDs Expansion of certified businesses, enabling the handling of anonymously processed medical information at many companies**		**Effective results of the forecasting function are recognized and established as evidence for policymaking, etc.**

More use cases are available on our website. We invite you to explore them.
https://www.quantum-computing-use-cases.nedo.go.jp/english/

More Use Cases

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This collection of use cases was obtained as a result of the work commissioned by the New Energy and Industrial Technology Development Organization (NEDO) "Cyber-Physical Development Business of Quantum/Classical Hybrid Technology/Study of Use Case of Quantum Technology" and the “Post-5G Information and Communications System Infrastructure Reinforcement R & D Project (Quantum Industrialization)/Comprehensive Study for Promoting the Industrialization of Quantum Computers ”.