

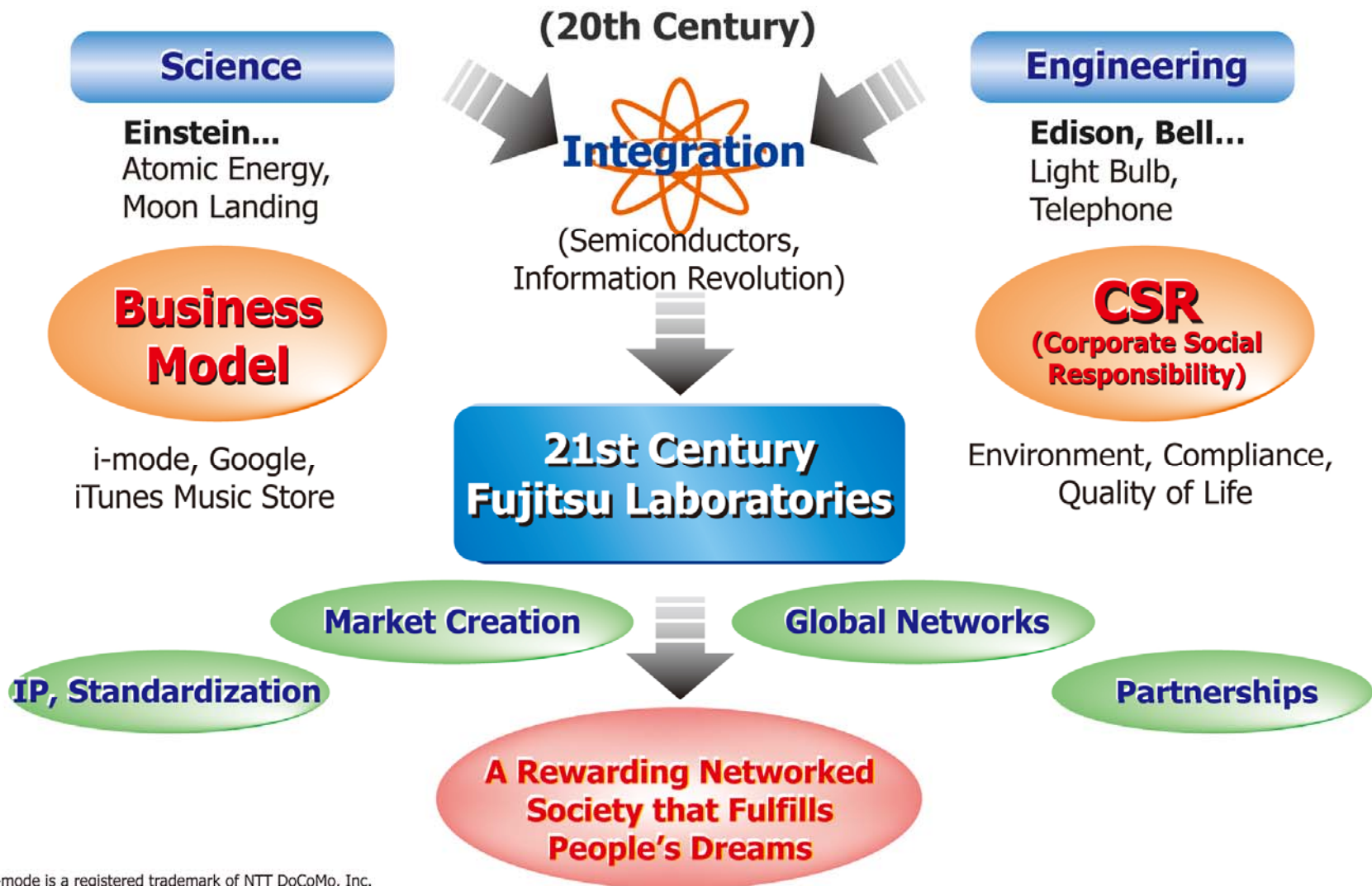
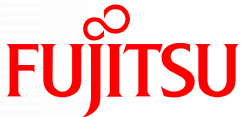
# **Fujitsu Laboratories' R&D Strategies**

**April 17, 2009**

**Kazuo Murano, Ph.D.  
President**

**FUJITSU LABORATORIES LTD.**

# Our Global R&D Laboratory Model for the 21st Century



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# Toward a Prosperous Future that Fulfills the Dreams of People

## 10-year Vision of Fujitsu Laboratories

- **Enabling a human-centric networked society**
  - By linking everything together, we generate value, realizing a human-centric networked society that delivers inspiration, discovery, reliability and growth.



## Inspiration

Fujitsu seeks to bring about a society that delivers unprecedented levels of happiness and inspiration, by mobilizing information and communication technologies to assist people, such as when the elderly or children need help, or when advice or guidance is sought in a work environment.

## Discovery

By drawing together large volumes of real-world data to analyze and visualize complex situations, Fujitsu seeks to provide people with the data that will enable the realization of an environmentally-sustainable society that is comfortable to live in.

## Reliability and Growth

Through eco-friendly and secure information and communications technologies that are all-encompassing and ubiquitously deployed ("available like air"), Fujitsu supports a human-centric networked society that is reliable and has superior growth prospects.

**Services & Solution Platform**

**Networks**

**Ubiquitous Computing**

**Security, Core Technologies, Eco-friendly**

# R&D Roadmap 2009



2009

2013

2019

## IT System/Services

### Services & Solution

Visualization (Human activity, Web information, Business process) → Business restructuring & optimization → Re-engineering of human and system processes → Requirement specification & traceability → Life log: Dynamic information integration & analysis → Integrated optimization of human activity and system functions → Rapid adaptation of requirement and system-environment changes

*Systems that support efficient management*

### Security

Requirement modeling → Development and runtime environment for SaaS/Cloud applications → Automated cooperation of cloud application → Security for information life cycle → Enterprise information leakage prevention → Digital watermarking/ Paper encryption → Palm vein / Fingerprint authentication → Multi-modal authentication → Integrated security infrastructure Based on multilayered authentication

*Security that supports social life*

### Platform

#### Cloud computing

Manageable (Visualization, Operation platform, Virtualization) → Scalable (Data-center optimization, Peta-scale computing) → Green (System, Equipment, Assembly) → Autonomous computing → Utility computing → Optimum control theory of electric power/workload

*Organic computing: Autonomous systems for non-stop IT service*

## Network

#### Next generation network

#### New generation network

Manageable service network → Service delivery platform → Service-oriented Platform

*Networks that connect people, goods and services*

### Photonic

### Wireless

40GbpsWDM → 3.5G (HSDPA·HSUPA·HSPA+) → 3G-LTE (100Mbps) → Super high-speed WMAN → Overlay Network → 100GbpsWDM → 10Tbps class core network → IMT-Advanced (100Mbps-1Gbps)

## Ubiquitous

#### Mobile service platform

#### Intelligent service platform

Touch interface

Tangible interface

Ambient interface

#### Mobile computing

RFID (passive, active)

Position sensing

Motion sensing

Human-centric computing

Recognition of human action and intention

Electronic paper

Life support robot

Service robot

*Natural human-machine interfaces*

## Base technology

### System LSI

Digital AV

Multimode LSI (Digital AV, BB)

Multi-core LSI (car, mobile phone)

### Compound semiconductor

GaN amplifier

CNT applications

Quantum dot laser

#### Nano electronics

Silicon-photonics

Quantum encrypted communication

### Simulation

VPS

"MONOZUKURI" (car, environment, medicine, semiconductor, chemistry, steel)

*Robust infrastructure to support next generation IT systems*

## Green technology

DB of restricted substance contained risk

Analysis of restricted substances, Evaluation of alternatives

Quantification of CO<sub>2</sub> emission

Environmentally-friendly materials

High-efficiency energy conversion, Energy management system

*Environmental preservation*

# Today's Press Release & Exhibits

Press Release

Exhibit

2009

2013

2019

## IT System/Services

### Services & Solution

Visualization (Human activity, Web information) Business restructuring & optimization Re-engineering of human and system processes Life log: Dynamic information integration & analysis

**Secure USB memory with automatic data-erase**

### Security

Requirement n... Encryption employing paper & electronic data

**High-speed palm vein authentication**

### Platform

**VM allocation-design**

**High-speed I/O circuitry for blade server**

**Field data/ID storage technologies**

**Next-generation mobile phone (LTE)**

## Network

### Photonic

### Wireless

40Gbps/wdm 3.5G (HSDPA·HSUPA·HSPA+)

Super high-speed WMAN

## Ubiquitous

**In-vehicle microphone array**

RFID (passive, active) Position sensing Electronic paper Motion sensing Recognition of human action and intention

## Base technology

### System

### Compound semiconductor

### Simulation

## Green technology

**Chip-simulation environment for mobile phones**

LSI (car, mobile phone)

**77GHz-CMOS automotive radar**

VPS "MONOZUKURI" (car, environment, medicine, semiconductor, chemistry, steel) DB of restricted substance contained risk Analysis of restricted substances, Evaluation of alternatives

Quantification of CO<sub>2</sub> emission Environmentally-friendly materials High-efficient energy conversion, Energy management system

Integrated optimization of humanactivity and system functions

Rapid adaptation of requirement and system-environment changes

Integrated security infrastructure d on multilayered authentication

Autonomous computing Utility computing

Optimum control theory of electric power/workload

Service-oriented Platform

Advanced (100Mbps-1Gbps)

Intelligent service platform Ambient interface

Human-centric computing

Life support robot

*Systems that support efficient management*

*Security that supports social life*

*Organic computing: Autonomous systems for non-stop IT service*

*Networks that connect people, goods and services*

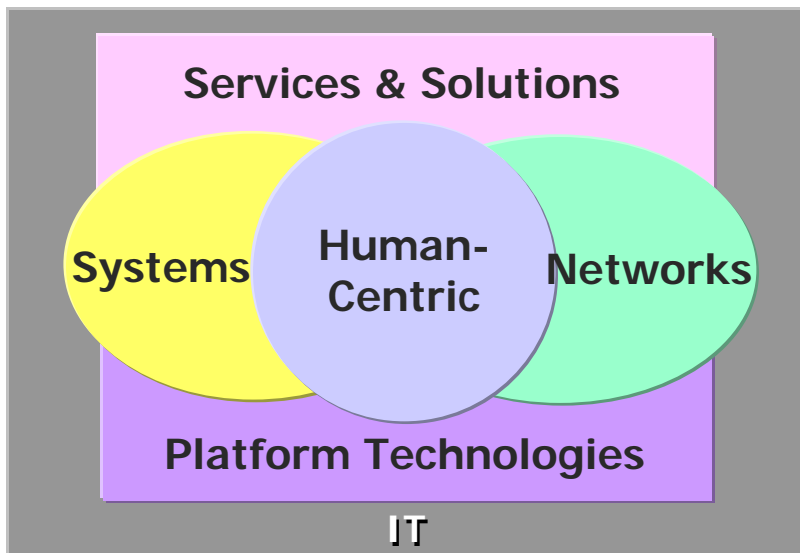
*Natural human-machine interfaces*

*Robust infrastructure to support next generation systems*

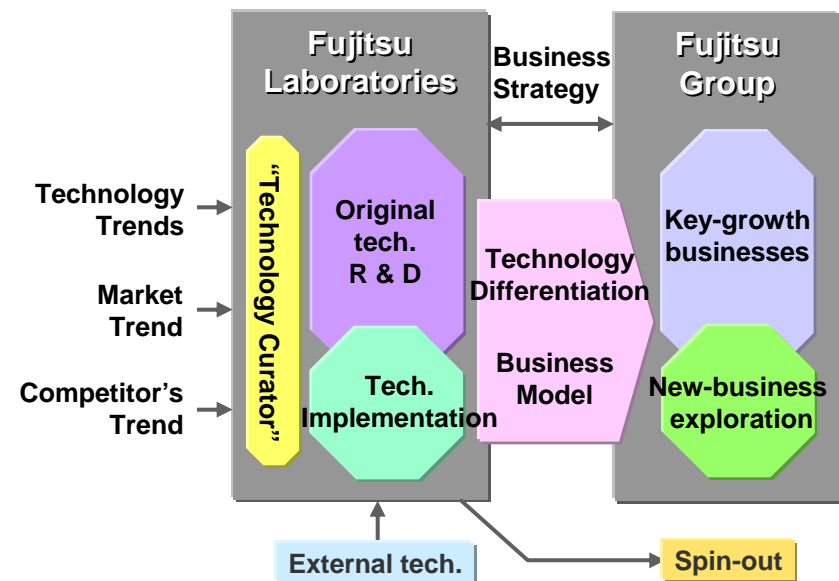
*Environmental preservation*

- Capital: 5 billion yen
- Budget: 35 billion yen
- Employees: 1,300 in Japan  
200 at overseas labs (US, China, Europe)

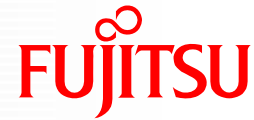
## Research Fields



## Functions & Role



# R&D Policies and Enhancement Measures for Fiscal 2009



Strategically bolstering Fujitsu's business base while looking to the future

## Fujitsu Group

Driving medium- to long-term growth based on superior products and services



## Fujitsu Laboratories

- Research contributing to future technology for core businesses
  - Linking IA servers with FTS, cloud computing, global expansion of LTE, differentiated device technology for systems
- R&D in ground-breaking fields, creation of new businesses
  - Human-centric computing, green technology, electronic paper, ITS
- "Technology Curator" and open innovation

FTS: Fujitsu Technology Solutions, LTE: Long Term Evolution, ITS: Intelligent Transport System



# Research that Contributes to Future Technologies for Core Businesses

## Linking IA Servers with FTS

- From a system-wide perspective, taking a top-down approach to developing technologies, emphasizing simplicity and energy savings
- For high-performance blade servers:
  - Virtualization, simplified operation, high-speed interconnects
- For large-scale data centers:
  - Pursue scale, energy saving, cost economies

## Globally expand LTE Business

- Offer turn-key solutions
- Develop differentiated technology to support Fujitsu LTE
  - Conducted field test before competitors
- Standardization and intellectual property strategy for LTE-Advanced systems

## Cloud Computing

- Develop core technologies to deliver virtual platforms for cloud computing business
- Differentiated technology for cloud computing market
  - Open, user-friendly development and operating environment
  - Scalable operation management technology for data centers

## Platform Technology

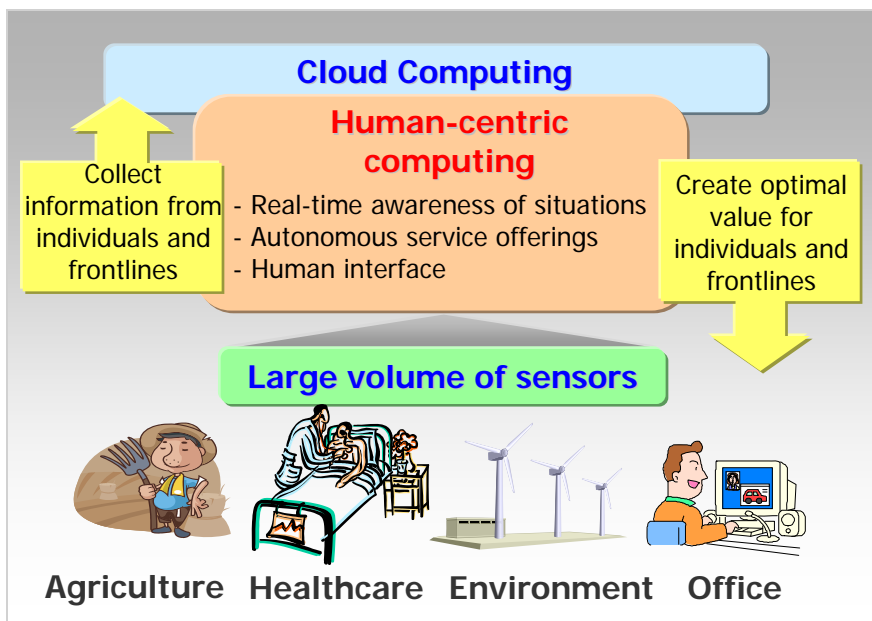
- Offer one-stop differentiated technology for system devices
- Deploy high-performance IP platforms (Build functionality into software, uniform functions, high-speed/low power consumption design)

(\* IP generally refers to intellectual property, but here it is used to refer to circuit blocks, firmware, middleware, etc. that enable system functions)

# Carry Out Groundbreaking R&D, Create New Businesses

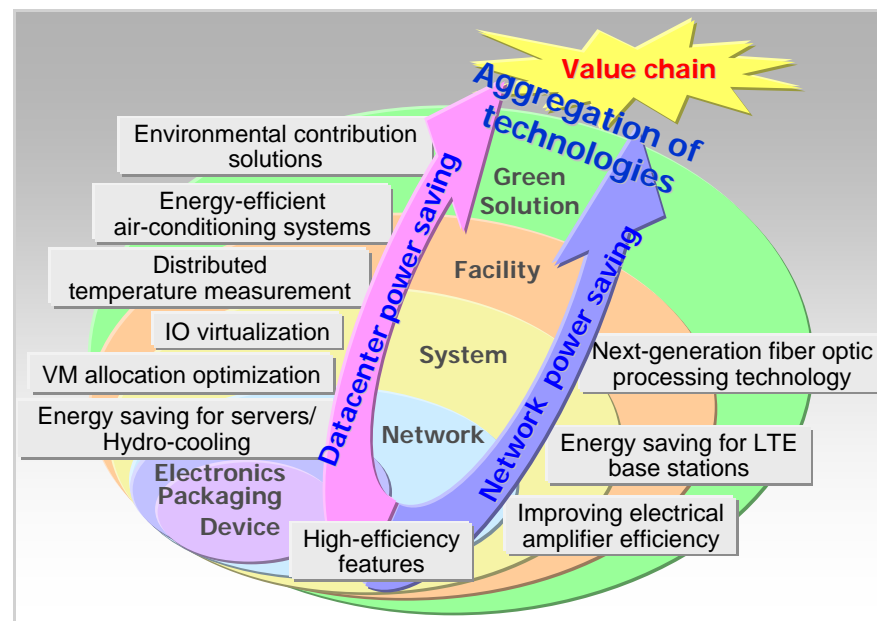
## Human-Centric Computing

- Using sensors to transform real-world information into intelligence, and offering services that respond to people's real situations
- Bring together the sensors, terminals, and services that serve as the basis for frontline-oriented services, and develop the key technologies for building out an ecosystem

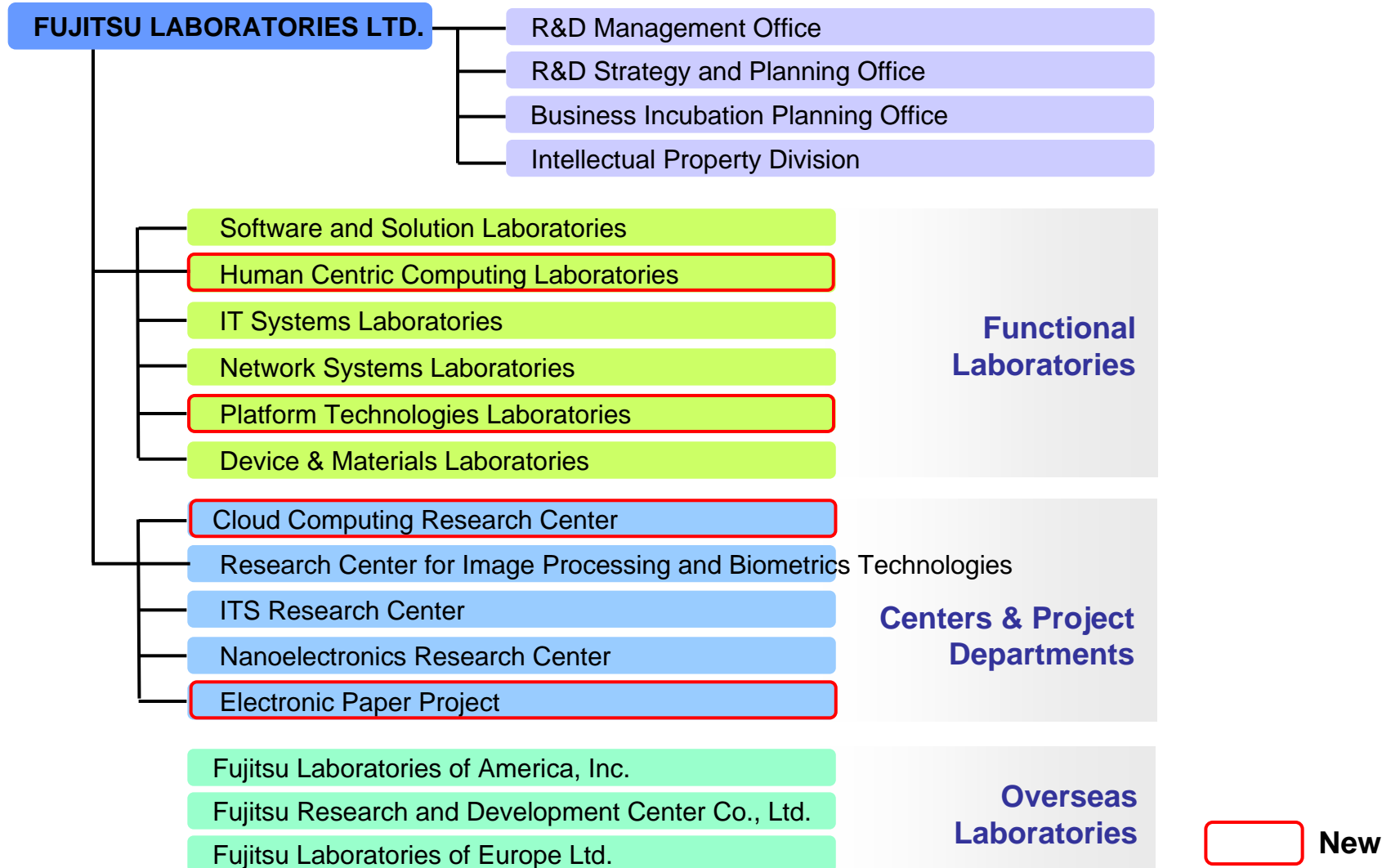
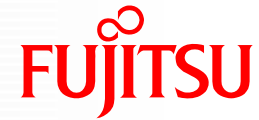


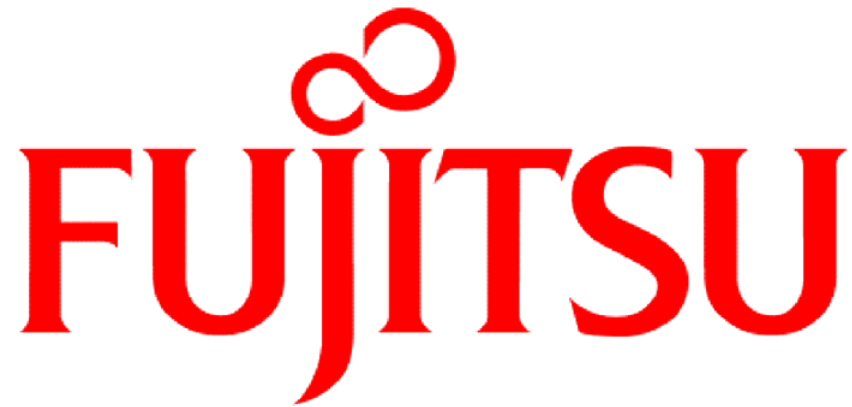
## Green Technology

- Build ecological value chain
- Contribute to Green Policy 2020 as a core technology through Fujitsu Laboratories' aggregate technology
- Create revolutionary advanced terminal technology focusing on energy saving through IT itself and by utilizing IT



# Organization – Fujitsu Laboratories





**FUJITSU**

**THE POSSIBILITIES ARE INFINITE**

# Cautionary Statement

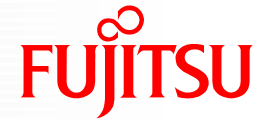
These presentation materials and other information on our meeting may contain forward-looking statements that are based on management's current views and assumptions and involve known and unknown risks and uncertainties that could cause actual results, performance or events to differ materially from those expressed or implied in such statements. Words such as "anticipates," "believes," "expects," "estimates," "intends," "plans," "projects," and similar expressions which indicate future events and trends identify forward-looking statements. Actual results may differ materially from those projected or implied in the forward-looking statements due to, without limitation, the following factors:

- general economic and market conditions in the major geographic markets for Fujitsu's services and products, which are the United States, EU, Japan and elsewhere in Asia, particularly as such conditions may effect customer spending;
- rapid technological change, fluctuations in customer demand and intensifying price competition in the IT, telecommunications, and microelectronics markets in which Fujitsu competes;
- Fujitsu's ability to dispose of non-core businesses and related assets through strategic alliances and sales on commercially reasonable terms, and the effect of realization of losses which may result from such transactions;
- uncertainty as to Fujitsu's access to, or protection for, certain intellectual property rights;
- uncertainty as to the performance of Fujitsu's strategic business partners;
- declines in the market prices of Japanese and foreign equity securities held by Fujitsu which could cause Fujitsu to recognize significant losses in the value of its holdings and require Fujitsu to make significant additional contributions to its pension funds in order to make up shortfalls in minimum reserve requirements resulting from such declines;
- poor operating results, inability to access financing on commercially reasonable terms, insolvency or bankruptcy of Fujitsu's customers, any of which factors could adversely affect or preclude these customers' ability to timely pay accounts receivables owed to Fujitsu; and
- fluctuations in rates of exchange for the yen and other currencies in which Fujitsu makes significant sales or in which Fujitsu's assets and liabilities are denominated, particularly between the yen and the British pound and U.S. dollar, respectively.

# Supplementary Materials

# Medium-Term Environmental Vision

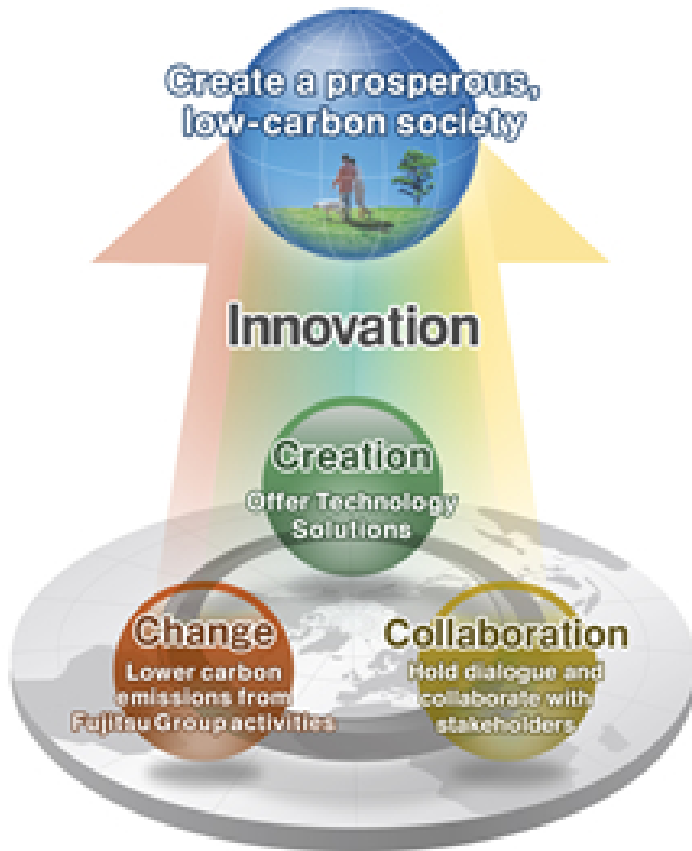
## “Green Policy 2020”



## Green Policy 2020

*The Fujitsu Group will meet the challenge of creating a prosperous low-carbon society.*

### 3 Key Goals



### 1. *Benefit our customers and society*

To reduce CO<sub>2</sub> emission in Japan by 30 million tons annually by 2020. Benefiting the reduction of greenhouse gas emissions (at the latest peak out by 2020 worldwide).

### 2. *Pursue internal reforms*

To pursue world-class overall energy efficiency in all of our business areas (software and services, hardware, electronic devices, others).

### 3. *Preserve biodiversity*

To address every area of the Leadership Declaration of the “Business and Biodiversity Initiative”, with specific initiatives underway before 2020.