

# Fujitsu Laboratories' R&D Strategies

March 31, 2010

Kazuo Murano, Ph.D.
President
FUJITSU LABORATORIES LTD.

shaping tomorrow with you

### 21st Century R&D Laboratory Model FUJITSU



Einstein, Maxwell... E=mc², Quantum Physics



**Engineering** 

Edison, Bell...

Electric Bulb, Telephone

20th Century

Atomic Energy, Moon Landing, Information Revolution Semiconductor

# **Business Model**

i-mode, Google, iTunes Music Store

21st Century Fujitsu Laboratories

#### CSR (Corporate Social Responsibility)

Environment, Compliance, Quality of Life

- i-mode is a registered trademark of NTT DoCoMo, Inc.
- Google is a registered trademark of Google Inc.
- iTunes is a registered trademark of Apple Computer, Inc.

### **Human Centric Networked Society**





By connecting with our surroundings, we create a "human centric" networked society, delivering value through experience, discovery, reliability and growth.

**Manufacturing** 

**Transportation** 

### Paradigm Shift in ICT Systems





**Network** Centric

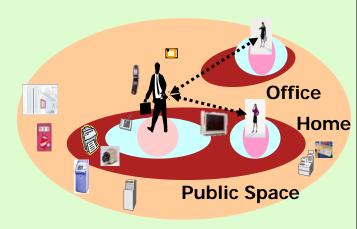
Human







Centric



**Specialist** 

**General User** 

**Trusted Environment** 

**Data Processing**  **Information Gathering** 

Knowledge Base

From "Technology Centric" to "Human Centric"

Through ICT we create greater value by connecting to the real world

### **Enabling** a **Human Centric Networked Society**



ICT platform capable of communicating, storing and processing massive amounts of data



- Advanced Network

Server

**Cloud Fusion** 

Middleware

Supercomputer

**Understanding** conditions around us (real-world discovery)

Multi modal data gathering

#### **Human Centric** Computing

- Real-time situational awareness
- Human behavior analysis

Adaptive service and solution offering

(real-world value creation)

Multitude of Sensors and Mobile Devices



Power Agriculture Management







ITS



Office/Home

Building a society that empowers people through ICT

### **FUJITSU Laboratories Ltd.**



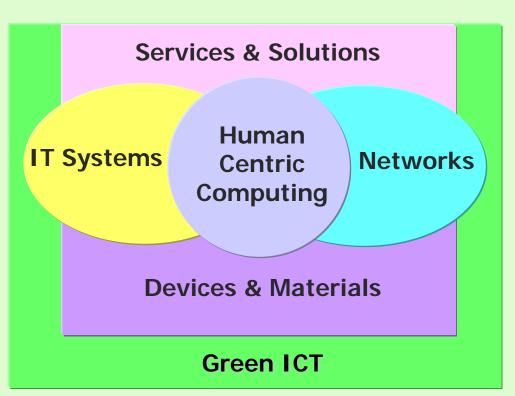
Capital: \$55M (¥5B)

■ Budget: \$380M (¥35B)

**■** Employees: 1,300 in Japan

200 at overseas labs (US, China, Europe)

Research Fields



### FY2009 R&D Results - Core Technology -

#### Research contributions to core technology business

#### IA Server

- ⇒ Improved energy efficiency through dynamic power management and virtualization in PRIMERGY BX900 blade server
- ⇒ Industry leading energy efficient blade server w/10G Ethernet switch Exhibit

#### Cloud/Security

- ⇒ System failure management technology for cloud computing
- ⇒ Inter-cloud technology international standards leadership (board position)
- ⇒ Email attachment traceability technology for data leak prevention **Exhibit**
- ⇒ Paper encryption technology with mobile phone reader **Exhibit**

#### LTE Development

- ⇒ Interference canceller MIMO repeater for wider area coverage
- ⇒ Algorithm to lower interference between base stations, with 20% improvement in throughput rate at cell border

#### Platform Device

⇒ Small size frequency synthesizer for digital TV mobile devices

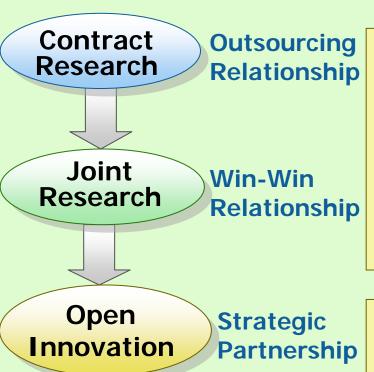
### FY2009 R&D Results - Emerging Technology -

#### R&D contributions in emerging technology areas

- Human Centric Computing
  - ⇒ Socially interactive robot (teddy bear) with human-friendly interface
  - ⇒ Field solutions using mobile devices and sensors **Exhibit**
- Green Technologies
  - ⇒ Gallium nitride HEMT for energy-saving power supply Exhibit
  - ⇒ Evaluating CO2 emissions reduction potential at the R&D stage Exhibit
  - ⇒ Small, sensitive chemical sensors for environmental monitoring Exhibit
- Nanotechnology =>Carbon nanotube and graphene applications Exhibit
- E-paper Technology
  - ⇒ Roll-to-roll mass production technology for e-paper panels
  - ⇒ Patient guidance healthcare solution **Exhibit**
- **ITS** => 40% improvement in car navigation display energy efficiency
- Today's press releases (available in Japanese only)
  - Office energy use measurement & visualization Press Release & Exhibit
  - Automatic video summarization technology
    Press Release & Exhibit

**Exhibit** 

### Open Innovation & Global Reach FUJITSU



#### **Universities**

**EU:** Oxford University,

**University of Technology Munich** 

N.A.: MIT, Stanford University,

**University of Toronto** 

**University of California/Berkeley** 

China: Peking University, Tsinghua University

Japan: Tokyo Institute of Technology,

**University of Tokyo** 

Others: Technion-Israel Institute of Technology etc.

#### **Research Institutes**

EU/N.A.: IMEC (EU), Fraunhofer Institutes, PARC

Asia: A★STAR (Singapore), AIST(Japan),

Suzhou Industrial Park (China),

■QD Laser, Inc. spin out from university and government collaboration:

Commercialized world's first green quantum dot laser

■A★Star Institute of High Performance Computing R&D partnership:

Joint software development on Asia's fastest HPC provided by Fujitsu

Collaboration office at China's Suzhou Industrial Park with Jiangsu Feng Yun Network Service CO., Ltd.:

Started trial collaboration for development of inter-cloud technology

etc.

### FY2010 New R&D Framework



- Areas to Strengthen
  - Strategic R&D to support the future of the Fujitsu Group
  - Alignment of lab R&D strategy to business group needs
  - Resource shift to respond to changes in the business portfolio

#### Framework Change

#### Global Perspective to Optimize the Fujitsu R&D

- ◆ Top-down strategic R&D resource allocation and decision-making
- ◆ Three classifications to clarify each R&D theme

Reinforce

### **Strategic Research Themes**



Core Future Technology R&D

#### Large-boned Themes (Core Strategic)

- Core research projects focused on important themes for the future technology of Fujitsu Group
- Medium- to long-term technology development

Core Business R&D

### **Business Strategic Themes**

- Strategic business projects with commitment from internal business segments for commercialization
- Short- to medium-term technology development

Future Technology R&D

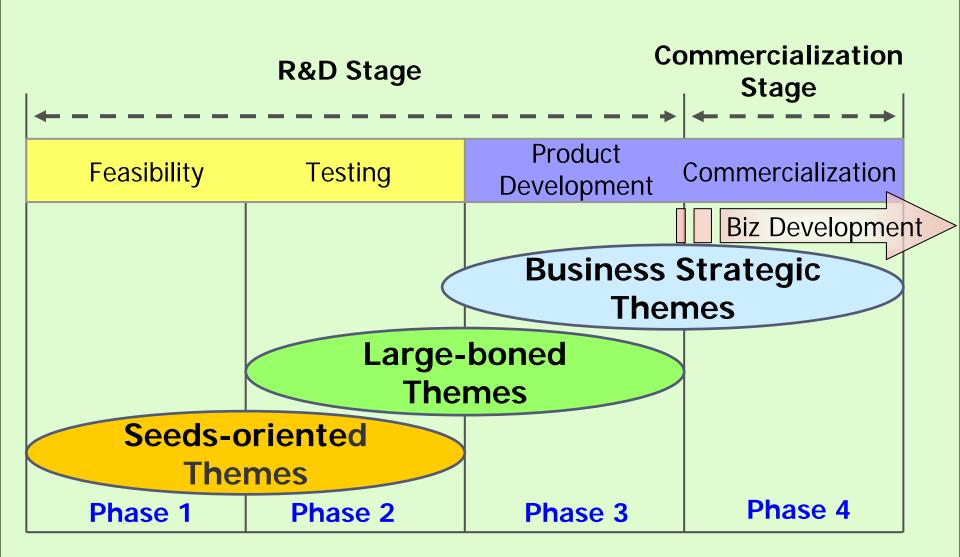
#### **Seeds-oriented Themes**

- New research areas for growth of future emerging technology seeds
- Long-term technology development

#### **R&D Process**



### - Positioning of Research Themes -



### Large-boned Research Themes



### **Enabling a Human Centric Networked Society**

Human Centric Computing

Integration of ubiquitous devices with cloud infrastructure to create new technology solutions and services in healthcare, energy management and other human centered activities

**Intelligent Society** 

Responding to societal needs across industry verticals to create new social infrastructure, solutions, and services business

**Cloud Fusion** 

Unified operation and quality management as well as service distribution and load balancing over multiple clouds and existing systems

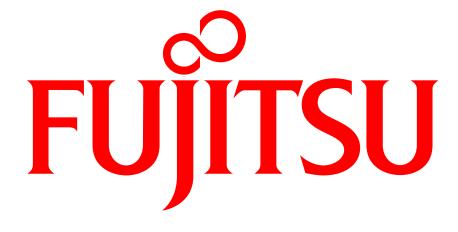
**Next Generation Green Data Center** 

Optimizing new energy saving and cooling technologies, and utilizing optical networks to realize next-generation, low-power, and high cost-performance green data center

### **R&D Roadmap FY2010**



	2010	•	•	•	• 20	15	20	20(FY)
IT System	ns/Service	S						
Services	s & Solutions Human beha	vior visualization		Knowloda	e integration and ana	lveie		
Security	(intra-/interpe	rsonal activities, Pocial model design (social modeling a	and optimizationd simulation)	n A	eeting social needs  utomated interoperab of cloud application	pility as	Continuing optimization of complicated social system as a whole	Services & Solutions Supporting Affluent and Safe Society
	Palm vein/fi	ngerprint Authentic Secure system co (Web appli Cloud Compu	nstruction and co		vailability) niques, cyber security application)	Integrated secur with user environi	ity infrastructure ment authentication	Organic Computing:
Platform		Manageable	(Visualization,	•	orm, Virtualization)	Auto	onomous computing Utility computing	Autonomous systems for
Network	Hur		een (System, E	quipment, Asse	embly) Op	timal power contro an-aware Netwon-aware core netwo	ol and workload balance	IT service Human-aware
	Platform	Energy-saving an			S	Overlay	network	Network Delivering
Photonic Wireless		al coherent optical Self-Organizing I		ADM	Optimizat ROADM with band	ion of network res width virtualization	ource utilization n, universal transceiver	WOSE SUITABLE
Ubiquitou.	Lii	gh-speed wireless  Mobile service		+, LTE)	Intelligent termina	IMT-Advar	nced	Person's Circumstances
Human	Interface	Voice recognition voice interact nvironment sensing	ion	Sys for secur	stem -on-chip re cell phone sensor	Am	bient terminal of intent and emotion	Contents by Recognizing Person's Circumstances  System Delivering Intuitive Service to
Sensin <mark>g</mark>	& Actuation			Ubiquito	us sensor network		Ambient_Computing	People
Base Tec	hnology	Huma LSI (Digital AV, B	n interaction  Multi	core LSI (for c	ars and mobile phone	Recognition of h	uman action and intent	High-performance
Compou	ind————————————————————————————————————	Ultra-low	power LSI tech	nologies	Nanoelectroni	ics	photonics	High-performance Infrastructure to
		ifier and power dev Quantum dot laser	rice CNT app	olications	Q	uantum-encrypted	I communication	Support
Monozu	/ 11//	oduct Simulator			<i>Monozukuri</i> supp			Advanced Utilizations of ICT
_	High-spe	ed, high-density el	ectronics packa	nging	Hyb	orid device integra	tion	
Green Te	<i>chnology</i> Photocat	alysis	Altern	atives reliabilit	ection technologies, y evaluation technolo			Global environmental preservation
High-efficiency energy conversion, Energy management system								



shaping tomorrow with you

## **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.