Fujitsu Laboratories’ R&D Strategy

October 13, 2011
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President
Fujitsu Laboratories Ltd.
Challenges in Enabling Sustainable Growth
- Increasingly complex societal issues -

New unconventional innovation is required
What is happening in Japan?

Great East Japan Earthquake & Tsunami

Nuclear power generation

Typhoons

Building a society that is resilient to disasters
Paradigm Shift in ICT

From “Technology-Centric” to “Human-Centric”
Enabling an Intelligent Society

Creating New Value

Creating New Value

Intelligent Society
Cloud Computing
Sensor Technologies
Ubiquitous Devices
Mobile Communications

For Everyone
Network-Centric

For Specialists
Computer-Centric

Computers

1990
2000
2010
2020

Scope of ICT Usage

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Enabling a Human-Centric Intelligent Society

Delivering new services and solutions

Human-Centric Computing

Understanding environments surrounding people

Supercomputers

Advanced Networks

Servers & Middleware

Cloud Fusion

Developing Green Datacenters

Next-Generation

Green Datacenters

Multitude of Sensors & Mobile Devices

Agriculture

Energy

Healthcare

ITS

Workplaces/Households

ITS: Intelligent Transport Systems

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R&D Scheme of the Fujitsu Group

Creating value and pioneering new markets Contributing to Fujitsu’s core businesses

Spin-out Ventures

Fujitsu Group

R&D Budget (FY2010)
Fujitsu: Approx. ¥225 billion
Allocated to Fujitsu Laboratories: Approx. ¥35 billion

FY2010: April 1, 2010 – March 31, 2011

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Strategic Research Themes
- Sustainable contribution to strengthening Fujitsu’s business -

Clarifying the positioning of research themes to support the future of the Fujitsu Group
Aligning businesses and research, strategic allocation of research resources
Key R&D Initiatives for FY2011

■ Forward-looking Strategic R&D
  • Alignment of R&D strategy with business segment groups’ business strategies
    → “Company-wide Technology Strategy Task Force”
  • Shifting resources in response to business portfolio changes
    → “Core Strategic Themes”

■ Expansion of Core Strategic Themes
  • In FY2011, expand from developing basic technologies to concept verification and testing phases
  • Establishing “Manufacturing Innovation” as a new core strategic theme

■ Pioneering World-Class Research (Unexplored Areas)
  • By pioneering distinctive technological innovations and new businesses through the continuous accumulation of basic technologies, Fujitsu aims to leverage unique ideas to produce world-class research results

■ Developing New Global Businesses

FY2011 Core Strategic Themes

**HCIS**  
Human-Centric Intelligent Society

- **Human-Centric Computing**  
  User-friendly timely services tailored for individuals: “right now, right here, just for you”

- **Intelligent Society**  
  Overall optimization of social infrastructures, integrating individuals and systems

- **Cloud Fusion**  
  Environments for flexible fusion of multiple clouds

- **Green Datacenters**  
  Green platforms for smart services

- **Manufacturing Innovation**  
  Enhancing competitive strengths of Fujitsu’s products

# R&D Roadmap FY2011

**Human-Centric Computing**

- **2011**: User-friendly timely services tailored for individuals: “right now, right here, just for you”
  - Fusion of cloud devices & cloud computing
  - Mobile Service Platforms
  - Cloud Devices that Integrate with Human Behavior
  - Interfaces Based on the 5 Senses & Operation Natural to Humans
  - Context Computing

**Intelligent Society**

- Overall optimization of social infrastructures, integrating individuals and systems
  - Expansion from industry-specific to cross-industry solutions
  - Solution for Social Problems
  - Complex and Multi-sequence Analysis
  - Uncertainty-based Knowledge Processing
  - Social Modeling Analysis
  - Dynamic Optimization Model Changes
  - Deriving Social Innovation Hypotheses
  - Social Services Modeling
  - Methods to Derive Social Value

**Cloud Fusion**

- Strengthening business through cloud computing
  - New market creation with vertical integration of hybrid clouds
  - Green infrastructures for social activities
  - Mass. Data Accumulation & Allocation
  - Multi-data Processing Fusion & Optimization
  - Integrated Dashboard for Heterogeneous Clouds
  - Visualization of Infrastructure & Apps., Relationship Mgmt.
  - Link Virtualization-based Optimal Transmission Control

**Green Datacenters**

- Total optimization including facilities
  - Eco-friendliness by maximizing use of renewable energy & recycled exhaust heat
  - Fabric Computing
  - Optical Backplanes
  - Scale-Out Storage
  - Container Datacenters Employing Fresh-air Cooling Systems

**Environmental Considerations**

- Various methods to reduce environmental impact

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Open Innovation & Global R&D Collaborations

Outsourcing Relationship  Win-Win Relationship  Strategic Partnership

- Japan - Tsukuba Innovation Arena (TIA): Development of ultra-low-power devices
- Japan - QD Laser, Inc.: Began shipping quantum dot lasers for communications
- Singapore - A*STAR: Development of artificial antibodies for diagnosing cancer and contagious diseases
- Germany – Technical University Munich (TUM): Development of DNA-based bio-sensor technology
- Australian National University (ANU): Development of supercomputer simulation software
## FY2010 R&D Achievements: Core Strategic Themes

<table>
<thead>
<tr>
<th>Field</th>
<th>R&amp;D Theme</th>
<th>Announcement/Exhibit</th>
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</table>
| **Human-Centric Computing** | 1. Automatic Execution/Closing of Applications & Data in Accordance with Time/Place/Occasion: Easy and Secure Use of Smartphones  
2. High-speed Display for Tablets and Smartphones: Compresses Thin Clients’ Screen Data Transfer Volume to 1/10 | Exhibit                                                                             |
| **Intelligent Society** | 3. Automatic Extraction of Social Event-related Wording from Social Media  
Press Release (Japanese only): September 14, 2011 |
| **Cloud Fusion**        | 5. Efficient Processing of Large-Volume Range Queries with Distributed Key-Value Stores  
6. Technologies for New Countermeasures to Prevent Information Leakage for the Cloud-computing Era | Exhibit  
Press Release & Exhibit: October 13, 2011 |
| **Green Datacenters**   | 7. World’s First Real-Time Power-Saving Simulations with Comprehensive Datacenter Models  
8. Prototype of World’s First Next-generation Server that Simultaneously Delivers High Performance and Flexibility  
9. Optimal Control of Server Cooling Fans to Promote Energy-Efficiency  
Exhibit  
Exhibit  
Exhibit |
Enabling a Human-Centric Intelligent Society

- Multitude of Sensors & Mobile Devices
- Agriculture
- Energy
- Healthcare
- ITS
- Workplaces/ Households

Intelligent Society

Delivering new services and solutions

Human-Centric Computing

Understanding environments surrounding people

Next-Generation Green Datacenters

Supercomputers

Advanced Networks

Servers & Middleware

Cloud Fusion

Developing Green Datacenters

ITS: Intelligent Transport Systems
Enabling a Human-Centric Intelligent Society

Cloud Fusion

1. Automatic application distribution & execution
2. Accelerated thin client display
3. Automatic extraction of social event-related wording from social media
4. Supporting business decision-making
5. Distributed-key value stores
6. Data leakage countermeasures for the cloud era

Next-generation Green Datacenters

7. Energy-efficient simulations
8. Next-generation server prototype
9. Optimal control of cooling fans
10. Optical interconnect silicon photonics

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### FY2010 R&D Achievements: Core Technologies

<table>
<thead>
<tr>
<th>Core Technology: Category</th>
<th>R&amp;D Theme</th>
<th>Announcement/Exhibit</th>
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<tbody>
<tr>
<td>Media Processing</td>
<td>Useful Information Provided Just by Speaking into Your Smartphone</td>
<td>Press Release &amp; Exhibit: October 13, 2011</td>
</tr>
</tbody>
</table>
| Security                 | World’s First Palm Vein and Fingerprint Hybrid Biometric Authentication System  
                          | - Enables personal authentication from a group of 5 million individuals within 2 seconds | Exhibit                          |
| Photonic Networks        | High-efficiency Optical Communication for Terabit-Ether Era                | Exhibit                              |
| Advanced Devices         | World’s First 40 Gbps Optical Fiber Transmission Using Directly-Modulated Laser Without Need for Cooling | Exhibit                              |
| Environment & Energy     | Energy Harvesting from Surrounding Environment: Electricity-generating Flexible Sheet | Exhibit                              |
| HPC (Packaging Analysis Technology) | Highly-reliable Water Cooling Material Technology Supporting Fast and Energy-efficient Computing for the K Computer | Exhibit                              |
| HPC (Engineering Innovation) | Successful Verification Calculation of Highly-parallel Calculation based Large-scale Quantum Conductivity | Exhibit                              |
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• 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.