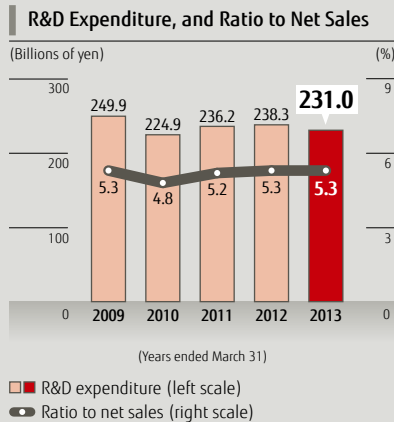## Our Mission in R&D

As our fundamental R&D policy, we pursue initiatives to create new value for our customers and to achieve our Corporate Vision of contributing to the creation of a networked society that is fulfilling and secure, bringing about a prosperous and dream-inspiring future. In order to achieve these initiatives, our R&D of advanced technologies includes technologies for next-generation services, computer servers, and networks, as well as various electronic devices and advanced materials which serve as building blocks for our products and services.

- Create and accumulate advanced technologies
- Extend our value chain globally
- Foster the creation of new businesses
- Fulfill our social responsibilities

R&D Expenditure, and Ratio to Net Sales

(Billions of yen)   (%)

Year	R&D expenditure	Ratio to net sales
2009	249.9	5.3
2010	224.9	4.8
2011	236.2	5.2
2012	238.3	5.3
2013	231.0	5.3

(Years ended March 31)

- R&D expenditure (left scale)
- Ratio to net sales (right scale)

Fiscal 2012 R&D Expenditure by Segment

	Segment	%
1	Technology Solutions	48.1%
2	Ubiquitous Solutions	16.5%
3	Device Solutions	18.8%
4	Other Operations/ Elimination and Corporate	16.5%

Total **231.0** (billion yen)
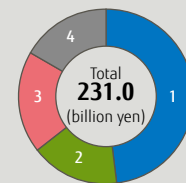
Major Advanced R&D Achievements for Fiscal 2012 (April 2012–March 2013)

1 Technology for Automatically Offering Analysis Scenarios for Easily Using Big Data

As industries seek to promote the effective use of big data, they must increasingly face the challenge of nurturing and retaining personnel who have business knowledge about work processes and specific industries, as well as data analysis knowledge.

In response, Fujitsu developed a function that automatically recommends analysis templates so that data analysis tasks can be performed even without expert knowledge. The analysis templates are prepared by experts and show users what kinds of data can be used in combination, and how to best interpret and utilize the analysis results. The new technology is able to amass such analysis scenarios and recommend them to suit the content and attributes of the data to be analyzed.

This will make it possible for users to easily carry out analysis and prediction work by reapplying the advanced knowledge and expertise of data analysis experts. Going forward, Fujitsu will work to upgrade and expand its analysis templates and other resources. At the same time, Fujitsu plans to progressively roll out this technology onboard the FUJITSU Software Interstage Business Analytics Modeling Server, a middleware product for building analytics solutions.
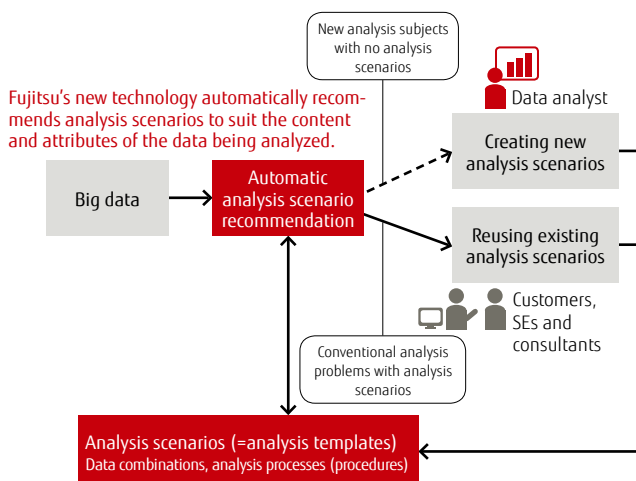
2 Parallel Distributed Data Processing Technology for Big Data and Efficient Processing

One way of processing big data is incremental processing, which involves processing new data consecutively as it arrives and reflecting it in analysis results. However, this method poses a problem: when data arrives extremely rapidly, the storage system must process a huge volume of read-write operations, so that the analysis processing cannot keep pace with the incoming data.

To address this problem, Fujitsu developed a new incremental data processing technology that drastically reduces the number of read-write operations performed by the storage system. The new technology records the data access history during analysis. Based on this information, certain data that have a strong tendency to be accessed continuously are grouped and reallocated in one place to speed analysis processing.

Fujitsu's new technology automatically recommends analysis scenarios to suit the content and attributes of the data being analyzed.

- New analysis subjects with no analysis scenarios
- Data analyst
- Creating new analysis scenarios
- Big data
- Automatic analysis scenario recommendation
- Reusing existing analysis scenarios
- Customers, SEs and consultants
- Conventional analysis problems with analysis scenarios
- Analysis scenarios (=analysis templates) Data combinations, analysis processes (procedures)

Explanations for underlined words can be found in the glossary on page 147-148.

As a result, analysis processing that previously took several hours can now be performed in several minutes. For example, in the field of e-commerce, sophisticated analyses of recent product browsing information and purchase history can be reflected instantly in purchasing recommendations, leading to improved sales.

3 Stream Aggregation Technology for Big Data to Rapidly Aggregate Data Regardless of Aggregation Time

When aggregating and updating steady streams of big data, longer aggregation times result in larger data volumes to be processed. This means computation times lengthen, which makes it difficult to update the aggregation results frequently.

Fujitsu has therefore developed a stream aggregation technology to update aggregation results without re-reading data or re-doing any computations. This is achieved by rapidly extracting only the necessary items from input data and retaining the extracted data in memory in its computed form.

Fujitsu hopes to apply this newly developed technology to fields where real-time processing of data collected over extended periods is essential. For example, the technology could put aggregated rainfall totals over extended periods and regions to good use in identifying disaster warning areas following concentrated downpours.

4 Launched Joint R&D for the World's Top-Level, 400 Gbps-class Optical Transmissions Technology

Currently, 100 Gbps-class optical transmissions methods are starting to see practical application. Going forward, projected increases in data communication volume will create the need for even faster optical communications networks.

Together with NTT Corporation and NEC Corporation, Fujitsu has commenced R&D on 400 Gbps-class optical transmissions technology, which is essential to building an ultra-high speed, energy efficient communications network. The three companies are working under the support of Japan's Ministry of Internal Affairs and Communications' "Research and Development Project for the Ultra-high Speed and Green Photonic Networks." The R&D project will be undertaken by the same team that successfully applied the 100 Gbps-class technology in practical use. Through this project, we aim to develop the world's top level optical communications network capable of transmission speeds of 24 Tbps-class per optical fiber. We aim to establish the necessary elemental technologies for this goal by 2014.

5 Platform Technology for Secure Application Execution on Smartphones for Business Use

Currently, there is great interest in using smartphones to access corporate data systems for business. A problem arises, however, in ensuring the security of internal data within companies.

To address this issue, Fujitsu has developed a platform technology for securely executing applications on smartphones—applications that enable a company's internal business services to be accessed securely via smartphones, without compromising their user-friendliness. This technology ensures that business

applications and data do not remain on smartphones. This is done by encrypting the applications and data, making them available from the cloud only as necessary and deleting them after use. In addition, the technology restricts access to unnecessary sites, and secures communications channels that have little risk of being wiretapped from outside the company.

As a result, the newly developed technology protects data automatically while enabling users to securely utilize business services according to the situation. For example, business people can use the technology to conduct banking negotiations and insurance sales, which involve personal information, outside the office. The technology can also be used in the healthcare field by allowing electronic medical records to be viewed from inside ambulances. In these and other ways, this technology will enable professionals to use their smartphones for work in a variety of settings.
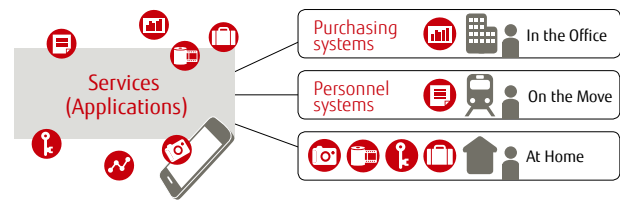
6 Technology for Acquiring Data by Simply Taking a Video of TV or PC Screens

Fujitsu has developed an image-based communications technology where communications data invisible to the human eye is embedded in TV images and PC screens and communicated by having the recipient take a video of the image, using a camera installed in mobile phones and other devices. In applying this technology, Fujitsu has developed a technology for transferring files from a PC to a mobile phone by simply taking a video of a PC screen.
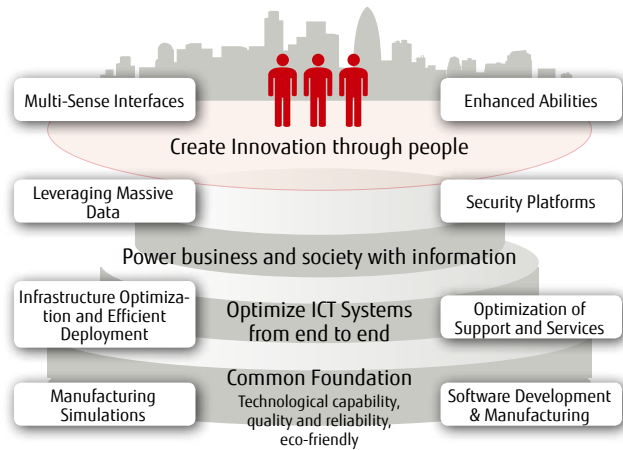
This newly developed technology enables users, for example, to obtain information embedded in TV commercials, such as coupons and site URLs, by simply taking a video of their TV screens using their mobile phones. In addition, the technology can be applied to a variety of other services. For example, a user could download presentation materials by taking a video of a screen on which the presentation materials are projected during a meeting.
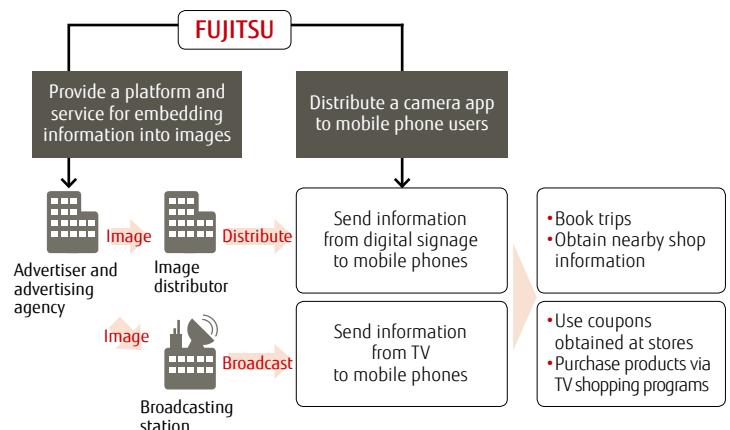
Realizing a Human Centric Intelligent Society

To realize a Human Centric Intelligent Society, where we create new value in the real world through Human Centric ICT, Fujitsu is implementing the following three actions: 1) Create Innovation through people, 2) Power business and society with information, and 3) Optimize ICT systems from end to end. At the same time, Fujitsu is conducting R&D activities focused on cutting-edge technologies that support a common infrastructure.

Multi-Sense Interfaces / Enhanced Abilities

Create Innovation through people

Leveraging Massive Data / Security Platforms

Power business and society with information

Infrastructure Optimization and Efficient Deployment / **Optimize ICT Systems from end to end** / Optimization of Support and Services

Manufacturing Simulations / **Common Foundation** Technological capability, quality and reliability, eco-friendly / Software Development & Manufacturing

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Awards and Prizes

Awarded the Medal with Purple Ribbon in Spring 2012 Medals of Honor

Of the Spring 2012 Medals of Honor awarded by the Japanese government, the Fujitsu Group's Satoshi Takechi received a Medal with Purple Ribbon. This medal was conferred in recognition of Mr. Takechi's development of the world's first practical ArF excimer laser photoresist material (photo-sensitive resin) for photoengraving (lithography technology). It also recognizes his contributions to the advancement of large-scale integrated circuits (LSIs) and improvement of information and communications technology. The photoresist material developed by Mr. Takechi is widely used in the production of leading-edge LSIs.

Awarded Commendation for Science and Technology by the Minister of Education, Culture, Sports, Science, and Technology with Prizes for Science and Technology and the Contribution Prize in the 45th Ichimura Industrial Award of Japan

Five members of the Fujitsu Group were honored by Japan's Minister of Education, Culture, Sports, Science, and Technology, who awarded them with Commendations for Science and Technology by the Minister of Education, Culture, Sports, Science, and Technology with Prizes for Science and Technology (Development Category) in fiscal 2013, for the "development of digital video coding LSI and transmission system". The technology recognized by this award is provided as a solution called

Broadsight. Additionally, three of the above-mentioned recipients were also presented with the Contribution Prize in the 45th Ichimura Industrial Award of Japan, hosted by the New Technology Development Foundation, for the "development of digital video transmission system".

Received Minister of Internal Affairs and Communications Award (CEATEC AWARD) at CEATEC JAPAN 2012 and Innovation Awards, "As Selected by U.S. Journalists" in Two Categories

Fujitsu received the CEATEC AWARD 2012 Minister of Internal Affairs and Communications Award at CEATEC JAPAN 2012, held from October 2-6, 2012. Fujitsu also received the Innovation Awards, "As Selected by U.S. Journalists" 2012* in two categories.

- CEATEC AWARD 2012
  Minister of Internal Affairs and Communications Award: "Akisai Food and Agriculture Cloud Service"

- Innovation Awards, "As Selected by U.S. Journalists" 2012
  Health and Household: Phone scam detector
  User Interface (Judging committee Special Prize): Visually-aided PC control

* Innovation Awards, "As Selected by U.S. Journalists": IT journalists from the U.S. selected and awarded outstanding technologies, products, and services from among the exhibits at CEATEC JAPAN 2012.

Advanced R&D Strategic Direction in Fiscal 2013 (April 2013 – March 2014)

Fujitsu has classified its framework for advanced research into the three categories below, with a view to achieving group-wide optimization from a global standpoint. Through this framework Fujitsu will carry out strategic R&D for the future of the Fujitsu Group, align business segment strategies with research strategies, and enhance resource shifts in response to changes in Fujitsu's business portfolio. Fujitsu will employ a top-down approach to setting research themes, and will conduct strategic research investment.

1. **Core Strategic Themes: Technologies essential to the medium- to long-term future of the Fujitsu Group**

2. **Business Strategic Themes: Short- to medium-term technologies that business segments have committed to commercializing**

3. **Seeds-oriented Themes: Budding technologies not specific to current businesses, and medium- to long-term technologies targeting unknown domains**

Fujitsu has now revised the Core Strategic Themes. The following four themes were established as new Core Strategic Domains.

(1) Ubiquitous Innovation
Contribute to development of front-end technologies and services important for interfaces between people and ICT, sensing, and massive data collection

(2) Social Innovation
Help to address societal issues and expand industry tie-ins and other societal business based on integrated simulation platforms that include human behavioral models

(3) ICT Innovation
Develop integrated ICT platforms and network-wide distributed virtual processing platforms that enable workload optimization to flexibly accommodate customer value targets

(4) Manufacturing Innovation
Contribute to the Fujitsu Group's product portfolio through hardware/software technologies for groundbreaking product creation, leveraging related technologies, and by advancement/accumulation of technologies for manufacturing innovation