Applying "Manufacturing Innovation" to Software Development: Application Operation/Maintenance Innovation

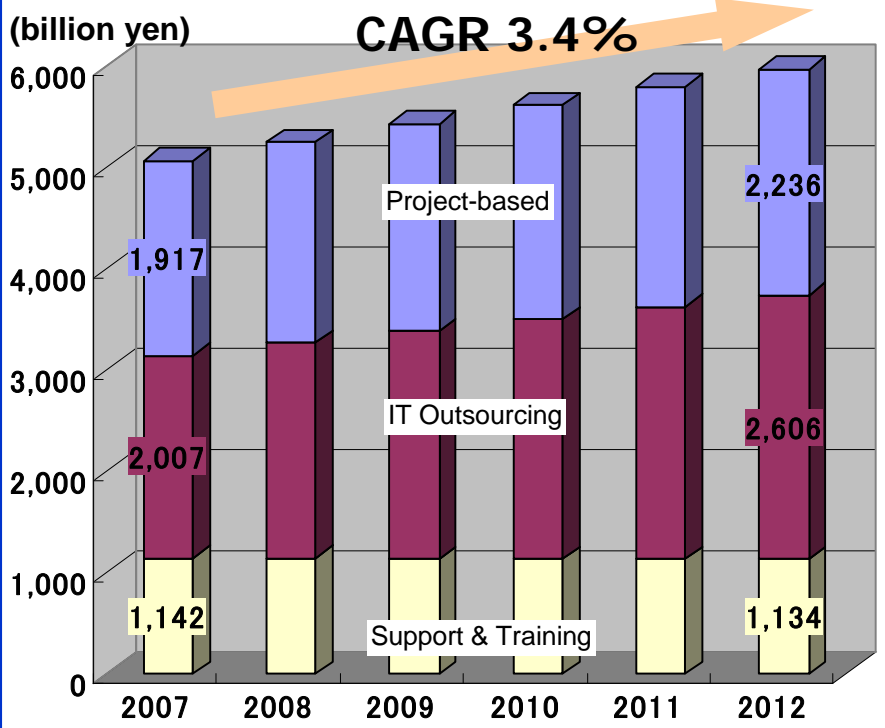October 7, 2008
Fujitsu Limited
Kazuhiro Uematsu
Managing Director and President,
Assurance Unit

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1. Four Innovation Initiatives

Japan IT Services Business and Fujitsu's Position

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- ■**Fujitsu Group ranks #1 in IT services sales in Japan**
- ■**Japanese market forecast to grow by average of 3.4% in next five years**

Size of Services Market in Japan

CAGR 3.4%

(billion yen)

	2007	2012
Project-based	1,917	2,236
IT Outsourcing	2,007	2,606
Support & Training	1,142	1,134

Years: 2007, 2008, 2009, 2010, 2011, 2012

Source: IDC Japan, "Japan IT Services Market 2007 Industry-based Analysis and 2008-2012 Projections" (Doc#J8460103), 4/2008

Ranking of IT Services Vendors in Japan by FY2007 Sales

	Vendor
1	FUJITSU
2	NEC
3	Hitachi
4	IBM
5	NTT Data

Source: IDC Japan, "2008 IT Services Market Vendor Competition Analysis for FY2008" (Doc#J8460106), 8/2008

Fujitsu SI Business: On Recovery Path

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■ **Reduction of loss-generating projects through improved risk management**

(Billion Yen)

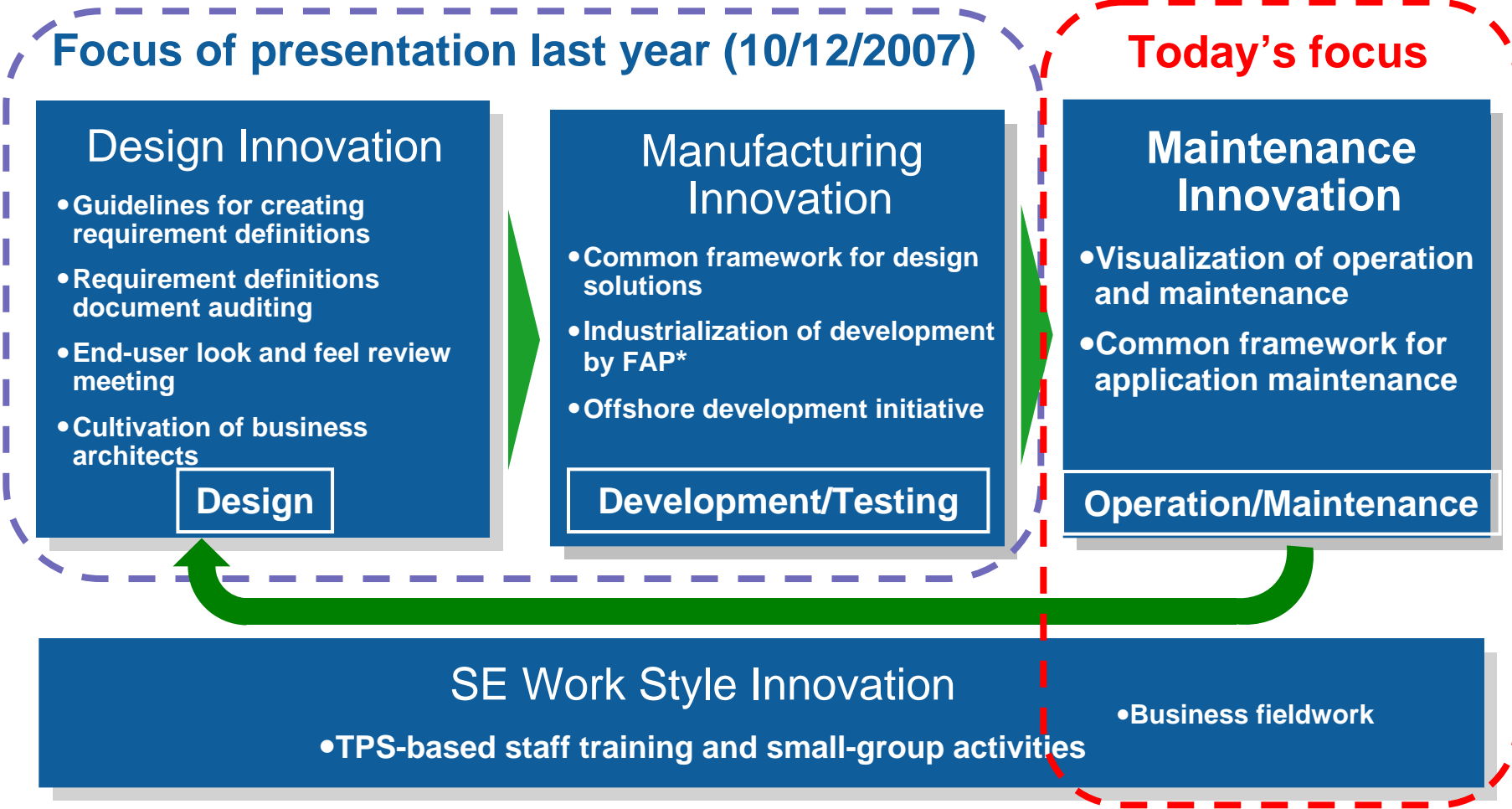| Losses from loss-generating SI projects in Japan	FY04	FY05	FY06	FY07
	-40.0	**-17.0**	**-10.0**	**-8.0**

■ **Reduce number of loss-generating projects**

 ⇨ **Appropriate deployment of SEs has improved management ability and profitability**

● **Reduction in loss-generating projects has led to improved profitability**

● **Implementing innovations in all phases of design, deployment and operation for further improvement in QCD**

Four Innovation Initiatives

- **Eliminating structural problems that cannot be solved with traditional development technology**

Focus of presentation last year (10/12/2007)

Today's focus

Design Innovation

- **Guidelines for creating requirement definitions**
- **Requirement definitions document auditing**
- **End-user look and feel review meeting**
- **Cultivation of business architects**

Design

Manufacturing Innovation

- **Common framework for design solutions**
- **Industrialization of development by FAP***
- **Offshore development initiative**

Development/Testing

Maintenance Innovation

- **Visualization of operation and maintenance**
- **Common framework for application maintenance**

Operation/Maintenance

SE Work Style Innovation
- **TPS-based staff training and small-group activities**

- **Business fieldwork**

*FAP: Fujitsu Applications, Ltd.

Design Innovation

■ **Improving design quality and preventing delays by requiring third-party review*** **(* For projects worth over 300 million yen)**

- ● **Devise written guidelines for determining requirements**
  - • **Consistently disseminate and inculcate guidelines**
    - ⇨ **5,000 Fujitsu Group staff have completed training**

- ● **Requirement definitions auditing**
  - • **Through systematization, make process more thorough and expand promotion efforts to industry business groups (BGs)**
  - • **Improve accuracy of bids by checking RFP content**

- ● **External third-party design assessment**
  - • **Improve quality through third-party assessment and frontline self-assessment**

■ **Train staff to support above-upstream process**
  - ● **Aiming to train 300 people in 3-year period starting in 2006; approximately 100 completed training by end of FY2007.**

Manufacturing Innovation

■ **Ensure efficiency and quality by "industrialization" of application development**

● **Improve development quality**
  - **Deploy third-party audit system* to inculcate process-oriented development**

   ***Third-party audit system: Fujitsu Advanced Quality Ltd. (FJAQ) established to implement system**

● **Promote industrialization of application development process**
  - **Expand FAP model based on industrialization of application development (improve productivity, accumulate production know-how by repetitive development)**
  - **Establish process definitions and process management to support completion of each developer's processes**
  - **Strive to expand adoption of Function Scale (FS)* size measurement scale**

      ***Function Scale: Fujitsu's proprietary size estimation method. Used at the beginning of a design**

   process, it minimizes individual differences in development work.

■ **Increase off-shore development**

● **Expand industrialization model**
● **Expand development scope of off-shoring counterparts (Expand from programming focus to detailed design and consolidated testing)**
● **Expand scope of development work performed**

2. Current Status and Priorities for Application Operation/ Maintenance Business

Changes Impacting Management

■ **Agile management needed to deal with changes in business environment**

Early announcement of financial results; Quarterly release of results

Internal control (JSOX)

International financial reporting standards (IFRS); International audit standards

Corporate Management

Business continuity

BC (Business Continuity)
DR (Disaster Recovery)
・・・

Environmental protection/ regulation

Basic environmental laws, green purchasing laws, RoHS compliance・・・

Security
Laws protecting personal information; ISMS/ISO-27001; government uniform standards・・・

What is Application Operation/Maintenance?

■ **Maintaining the value of the information systems that support our customers' businesses**
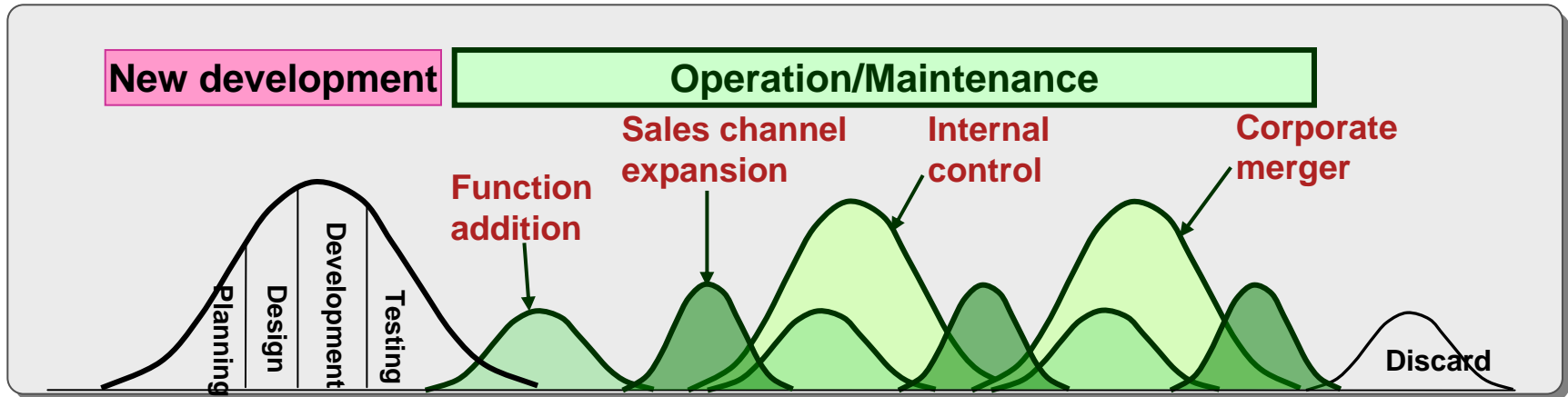
- **Information systems must be continuously responsive to changes in the business environment (internal control systems, corporate merger, sales channel expansion, etc.).**

- **It is important to carry out continuous review (make IT investments) to maintain the value of information systems.**
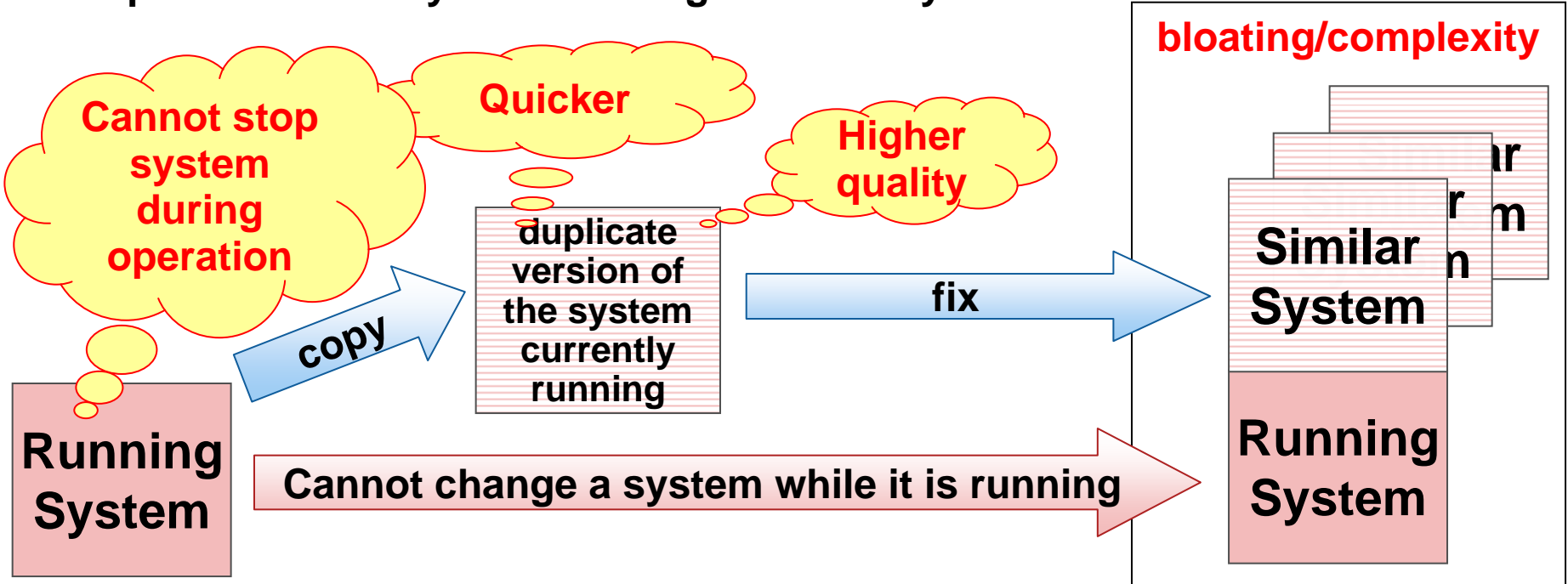
Application Operation/Maintenance Is Important

Example of Increasing the Size of Application Operation/Maintenance Work

Need to continuously operate/maintain IT systems

Each time a similar system or function is added,
the system becomes more bloated and complex
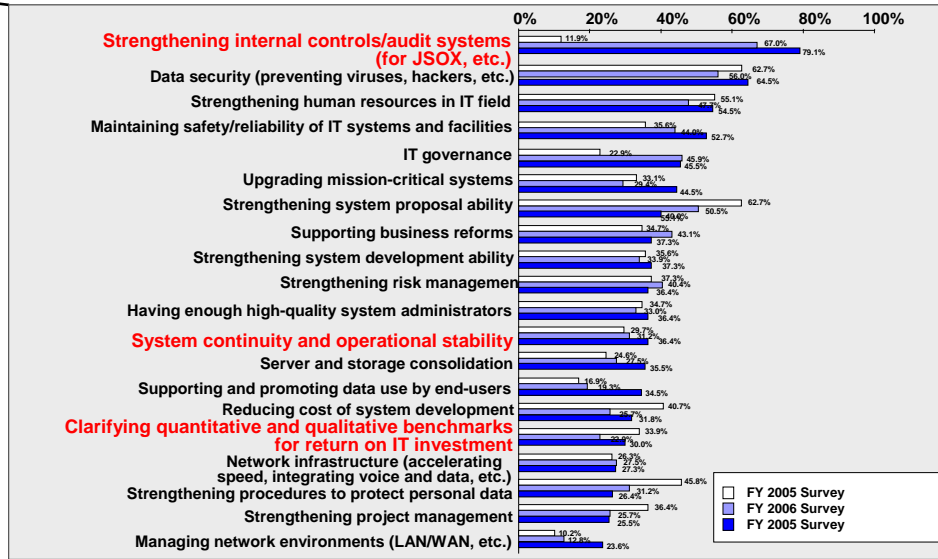
Example of bloated system: Adding a similar system

Cannot stop system during operation

Quicker

Higher quality

bloating/complexity

Running System

copy

duplicate version of the system currently running

fix

Similar System

Similar System

Cannot change a system while it is running

Running System

Issues Facing Customers (from LS Research* FY2007 IT White Paper)

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■ **Managing operation/maintenance is a problem for an increasing number of customers**

Strengthening internal controls/audit systems (comply with JSOX, etc.)
- 11.9%
- 67.0%
- 79.1%

System continuity and operational stability
- 29.7%
- 31.2%
- 36.4%

Clarifying quantitative and qualitative benchmarks for return on IT investment
- 33.9%
- 22.9%
- 30.0%

☐ FY 2005 Survey
☐ FY 2006 Survey
■ FY 2007 Survey
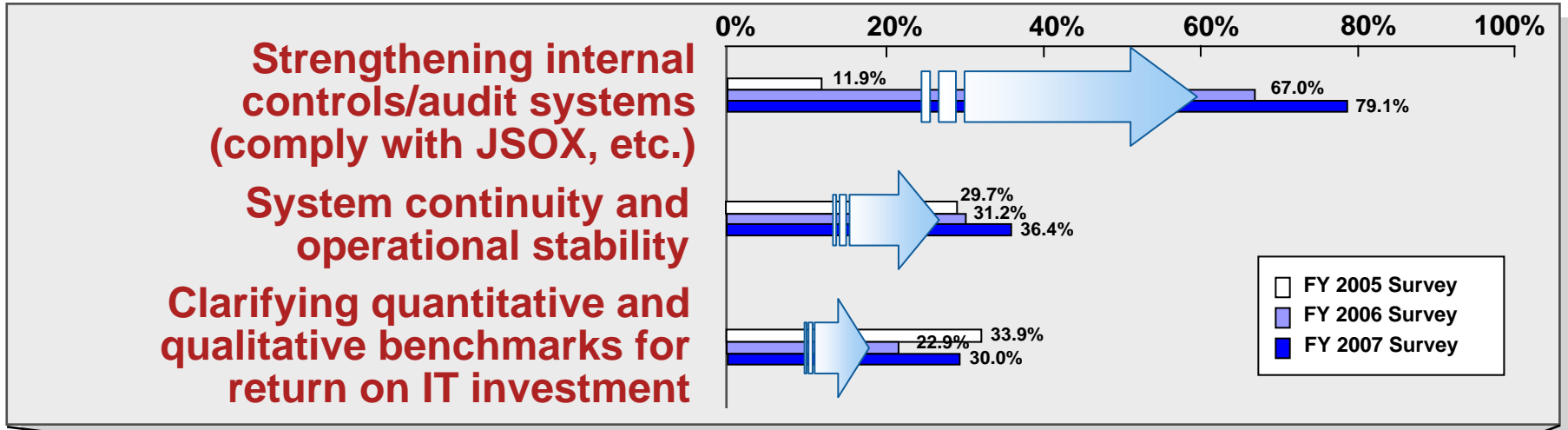
Important Issues for IT Systems Departments

Top 20 responses in FY2007, with each customer listing up to 10 issues

Issue	FY2005	FY2006	FY2007
Strengthening internal controls/audit systems (for JSOX, etc.)	11.9%	67.0%	79.1%
Data security (preventing viruses, hackers, etc.)		62.7%	64.5%
		56.0%	
Strengthening human resources in IT field		55.1%	54.5%
Maintaining safety/reliability of IT systems and facilities	35.6%	44.0%	52.7%
IT governance	22.9%	45.9%	45.5%
Upgrading mission-critical systems	33.1%		44.5%
Strengthening system proposal ability		50.5%	62.7%
		54.0%	
Supporting business reforms	34.7%	43.1%	37.3%
Strengthening system development ability	35.6%	37.3%	
Strengthening risk management	37.3%	40.7%	36.4%
Having enough high-quality system administrators	34.7%	33.0%	36.46.4%
System continuity and operational stability	29.7%	31.2%	36.4%
Server and storage consolidation	24.6%	37.6%	35.5%
Supporting and promoting data use by end-users	16.9%	18.3%	34.5%
Reducing cost of system development	25.7%	31.8%	40.7%
Clarifying quantitative and qualitative benchmarks for return on IT investment	33.9%	30.0%	22.9%
Network infrastructure (accelerating speed, integrating voice and data, etc.)	26.3%	27.3%	45.8%
Strengthening procedures to protect personal data	31.2%	26.4%	36.4%
Strengthening project management	25.7%	27.3%	25.5%
Managing network environments (LAN/WAN, etc.)	10.2%	12.8%	23.6%

☐ FY 2005 Survey
☐ FY 2006 Survey
■ FY 2005 Survey

•**Leading-edge Systems (LS) Research Committee:**
A research committee focusing on advanced IT usage; part of the Fujitsu Family Association, Fujitsu's user group.

Customer IT Spending

■**Operation/maintenance accounts for nearly 70% of IT spending, squeezing new IT investment**

**Recent Trends in Spending on New IT Investment
Versus Operation/Maintenance**

	0%	20%	40%	60%	80%	100%

	New IT Investment	Operation/Maintenance
FY 2006 Actual	31.5%	68.5%
FY 2007 Plan	33.0%	67.0%
FY 2008 Projection	33.4%	66.6%

□ **New IT Investment Spending**   □ **Operation/Maintenance Spending**
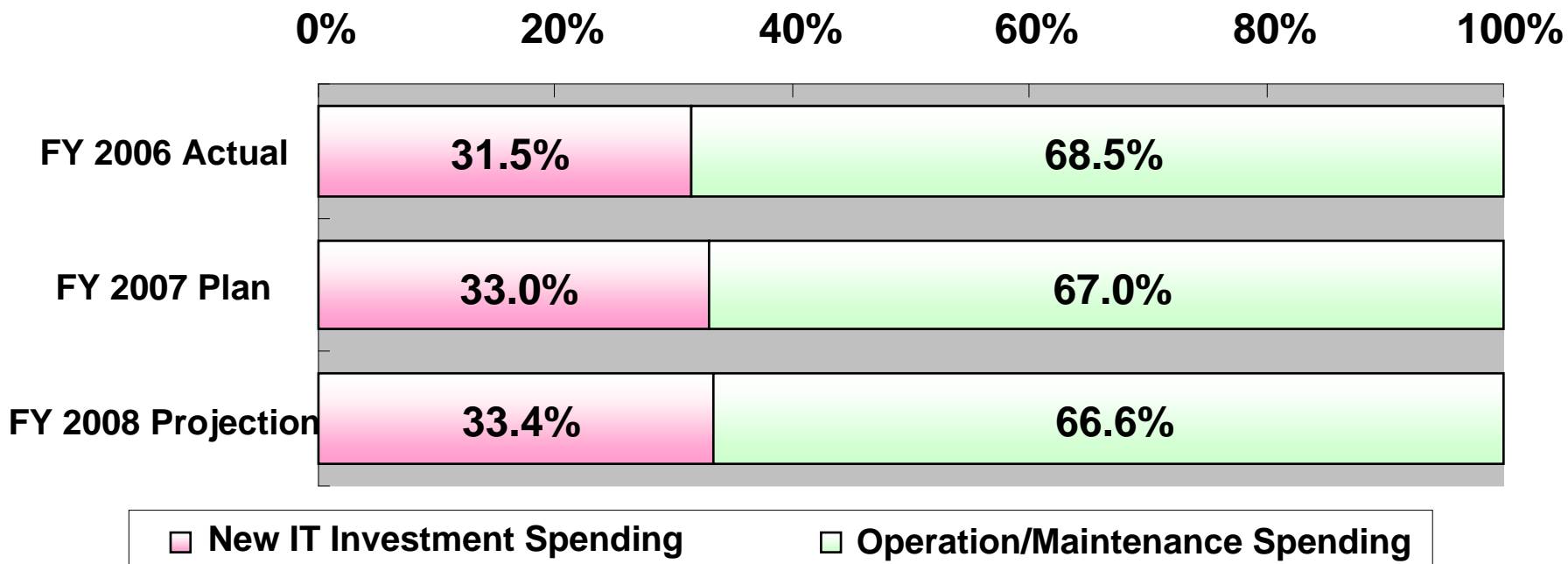
Source: LS Research White Paper (FY2007)

■ **IDC Japan research found spending on new development/ systems at 22% of budget, and 78% on operation/maintenance, etc.**

IDC Japan, "2008 Japan CIO Survey: Usage of IT Services," 6/2008 (Doc#J8460105)

3. What is Application Operation/Maintenance Innovation?

Application Operation/Maintenance Innovation: CAPDo Cycle

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■ **Supporting the business of customers by continuously performing the <u>CAPDo</u> cycle and <u>"making 3 realms visible"</u>**

(Current allocation)
3:7 Model

| New (Strategic) IT Investment (ave. 33%) |
| Operation/ maintenance of existing system |

Making 3 Realms Visible

(1) Making IT spending visible

(2) Making the frontlines visible

(3) Making application software assets visible

Propose/Implement Improvements

(1) Make IT investments to support management strategy

(2) Improve people/processes/IT

(3) Improve quality of application operation/maintenance

(Ideal allocation)
5:5 Model

| New (Strategic) IT Investment (ave. 45-50%) |
| Operation/ maintenance of existing system |

CAPDo : Check,
　　　　　　Action,
　　　　　　Plan,
　　　　　　Do

(1) Making IT Spending Visible

■ **Objectively evaluate IT investments in light of management strategy and business trends; prioritize investments that contribute the most to business objectives**

Prioritizing investments is difficult

- Many projects, good and bad
- No standard for evaluation
- Most influential division gets priority

4 Patents Pending
Laid-open patent no. 2006-099386
Laid-open patent no. 2007-240701
Laid-open patent no. 2007-065937
Laid-open patent no. 2007-065936

Making Investments Visible

100

high

Contribution to business

Reconsider method of implementation

Priority

Project B

Project E

Project C

Project A

Project D

Reconsider need

Reconsider timing

low

low

Technological feasibility

high

100

Direction

Evaluation of system C

Risk

Evaluation of system B

Differences of opinion with management

Differences of opinion with management

Effect

Management's evaluation of systems from a business perspective

Improve planning by making the strengths and weaknesses of each project visible

Dramatically reduce the amount of time spent evaluating projects

Within a limited IT budget, implement the most effective IT investments
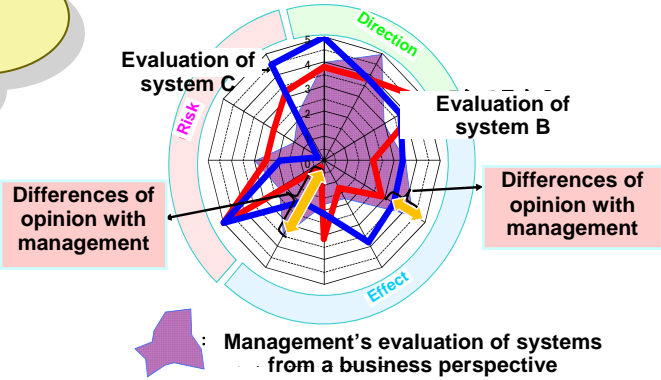
(2) Making the Frontlines Visible

■ **Make work and operation/maintenance visible, improve people/processes/IT**

Issue	Making the Frontlines Visible	Identify Root Causes

Executive

The return on IT deployments was not as high as expected

Too much time spent handling exceptions and inquiries

Managers

Business Fieldwork

Research focused on human activity
- Time spent away from desk/walking around
- Too much paperwork: a paperwork-based culture
- Administration depends on a specific person's skills

Trend Analysis

Analyze inquiries to determine root causes
- Many inquiries from specific groups
- System malfunctions on the 10th of each month

- Changes to administrative processes require supervisor approval, disrupting flow of work
- Sequence of administrative processes is out of synch with work processes
- Some work is not part of administrative routines
- Work is not explained to newly transferred employees
- Some processes consume a huge amount of system resources at specific times

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■**Make work and operation/maintenance visible, improve people/processes/IT**

**Propose and Implement Improvements
(Field Innovation)**

People

- Training for newly transferred employees
- Optimize layout of office for efficient movement

Business

IT

Processes

- Enhance IT resources
- Add system functionality

- Reform administrative procedures
- Deploy digital authorization

(2) Making the Frontlines Visible: Business/Fieldwork Examples

■ **In collaboration with PARC (Palo Alto Research Center) and Fujitsu Laboratories, Fujitsu has developed and systematized "Business Fieldwork" frontline observation methods.**

  ■ **Fieldworkers observe their subjects up close and record how they work in various circumstances**

  ■ **They uncover the roots of the customer's issues from the results of frontline observation**

Office Work (1)

Office Work (2)

Sales

Factory

Warehouse

Call Center
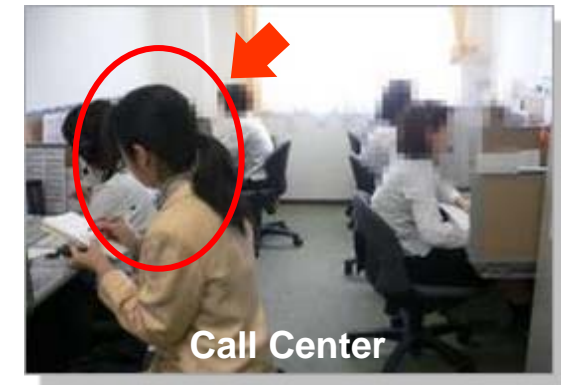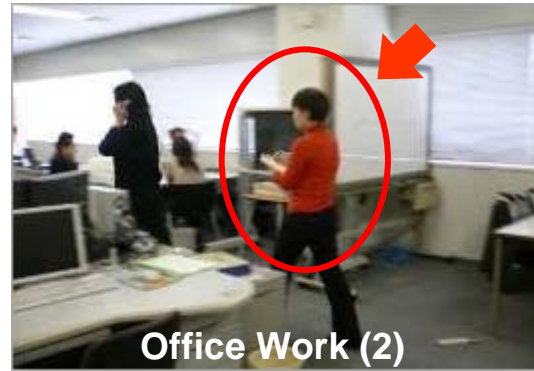
(3) Making Application Software Assets Visible

■ **Make issues with application assets visible to improve the quality of applications**

Making Application Software Assets Visible

Current Issues

Work A
Work C
Work C
Work D
Work B
Work A

Quality Deterioration

From years of adding functions, applications have become bloated and complex

Because unnecessary assets are included, maintenance is difficult

It is easy for complex assets to malfunction, but it is not clear which assets are complex

Analysis of Performing Assets
Make performing assets visible

☐ Overall ☐ Performing assets

Work A Work B Work C

Analysis of Duplication
Make duplications visible

← duplication →

Asset Characteristic Analysis
Make the degree of complexity visible

good
bad quality
keep
D A
E B
C
Reset standard
high Malfunction frequency low

Proposals for Improvement

Get rid of unnecessary assets

Set appropriate quality targets

Review development (maintenance) terms/standards

Ideal Image

Work B Work C
Work A

Quality Stability

Maintain quality by preserving assets in optimal condition

Improve maintenance efficiency by getting rid of unnecessary assets

Implement an appropriate test to quantitatively identify degree of complexity

(3) Making Application Software Assets Visible: Impact Scale

■ **Fujitsu has developed new technology to improve application quality**

⇨ **"Impact Scale"** makes the complexity of application structures visible

Simple Structure

Complex Structure

2 Patents Pending
Laid-open patent no. 2007-156820
Application no. 2007-999091

degree of complexity can vary greatly

Program

Data

→ **Run program**

····· **Reference data**

— **Refresh data**

Previously, degree of complexity of application structure was not quantitatively visible

Through appropriate testing of the complexity of application structures during maintenance, the quality of applications will improve

Company A Case Study: Making IT Spending Visible

Concerns of the Customer's IT Systems Management Department

Overhaul request for a huge system
- Difficult to grasp content of projects
- Difficult to grasp return on IT investment

Difficult to evaluate each project
(over 200 projects/year, only 20 people)
- Insufficient consideration of company-wide optimization
- Priority of tailored functions results in difficult-to-use system
- Tendency to prioritize project of department with most clout

Making IT Spending Visible

Operation/Maintenance Innovation

Degree of importance of 200 projects shown on one easy-to-understand chart
⇒Objective evaluation and explanation is convincing to each division
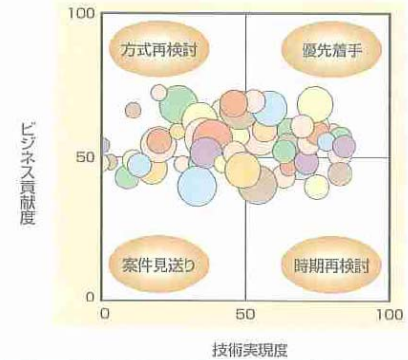
- **Dramatic reduction in time spent evaluating projects**
  (from approx. 13 weeks to approx. 7 weeks)
- **System configuration process improved from department-level optimization to overall optimization**
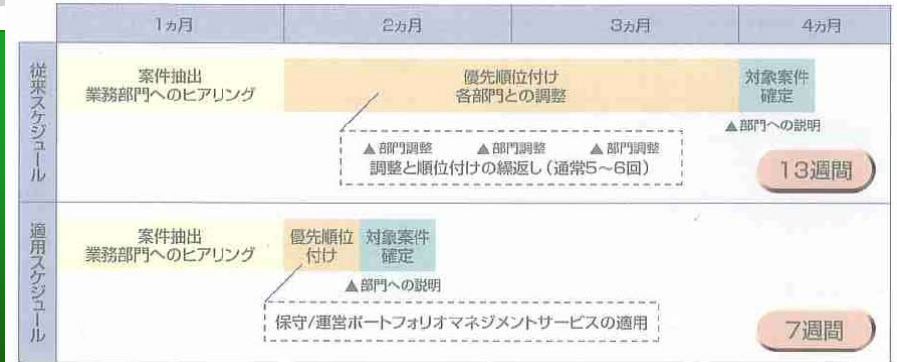
Projects with a large business impact are ready early

Company B Case Study: Making the Frontlines Visible

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Issues of the Frontlines of Operation/Maintenance

Because operation rules have not been written down:
- do not know what anyone is doing
- do not know division of responsibilities

➡ **Do not know status of operation/maintenance**

Because help desk is overwhelmed with inquiries, no time to work on improvements

➡ **Unable to propose work process improvements**

Make the Frontline Visible

Operation/Maintenance Innovation

While observing actual conditions on the frontline, make operation/ maintenance work visible and standardize processes

Through trend analysis, root of problems is resolved, reducing inquiries by 43%

| 921件 | 913件 | 655件 | 522件 |
| 12月 | 1月 | 2月 | 3月 |
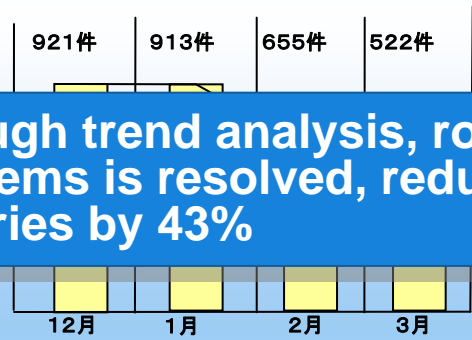
- **Reduction in system operation/maintenance costs**
- **Maintenance personnel shifted to planning**
- **Improvement in operation quality**

	Before Outsourcing	After Outsourcing
Planning Personnel	96 (all customers staff)	40 (customer)
Op/Maint. Personnel		40 (Fujitsu)

➡ **Customer's operation/maintenance costs reduced by 20%, resources shifted to planning and new IT investments.**

Services for Application Operation/Maintenance

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Operation/Maintenance Cycle

Planning, analysis → **Project management** → **Transition management** (design, development, test) → **Release management**
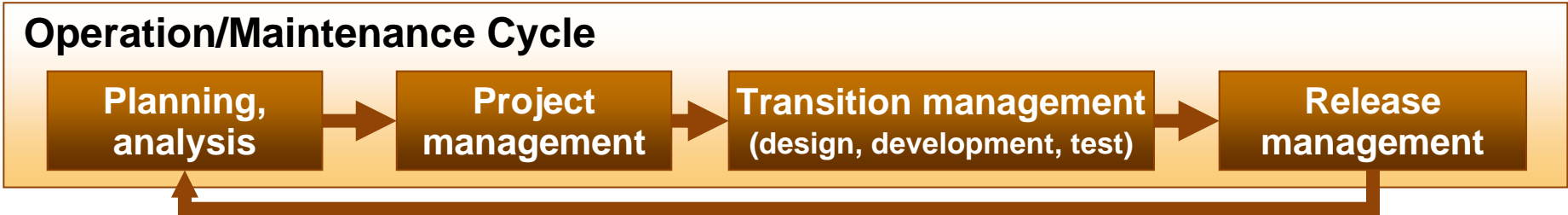
Based on ITIL[*] and our track record on the frontlines of application operation/maintenance, Fujitsu now offers Application Portfolio Management (APM) Services

Portfolio Management Services	**Making IT Spending Visible**

Continuous support for optimal IT investment using a portfolio approach across the lifecycle, from planning through operation.

Asset Analysis Services	**Making Application Software Assets Visible**

Analyzing and clarifying the status of current application assets, including active/non-active assets, duplications, program characteristics, and impact scale.

APM Outsourcing Services	**Making the Frontlines Visible**

Before implementing application maintenance, Fujitsu prepares by researching and analyzing the current maintenance status. Then an agreement is reached on services and service levels.

Application Maintenance Services	**Making the Frontlines Visible**

Fujitsu implements operation/maintenance work on the customer's administrative applications, providing continuous improvement proposals throughout the lifecycle.

*ITIL(IT Infrastructure Library): Best practices in IT services management from UK Office of Government Commerce.

Expanded Industry Coverage and Geographic Reach of APM Centers

FUJITSU

- **Based on SE projects for customers, since fiscal 2003 Fujitsu has established centers for each industry and in each region**

Tohoku APM Center

Industry-based APM Centers

Insurance

Lease

Newspaper

Department Stores

Gas

Manufacturing

SAP-AMO

Shanghai APM Center

Kyushu APM Center

Chugoku APM Center

Chubu APM Center

Shikoku APM Center

Kansai APM Center

Kanto APM Center

Internal System APM Center

- : Industry
- : Region
- : Internal
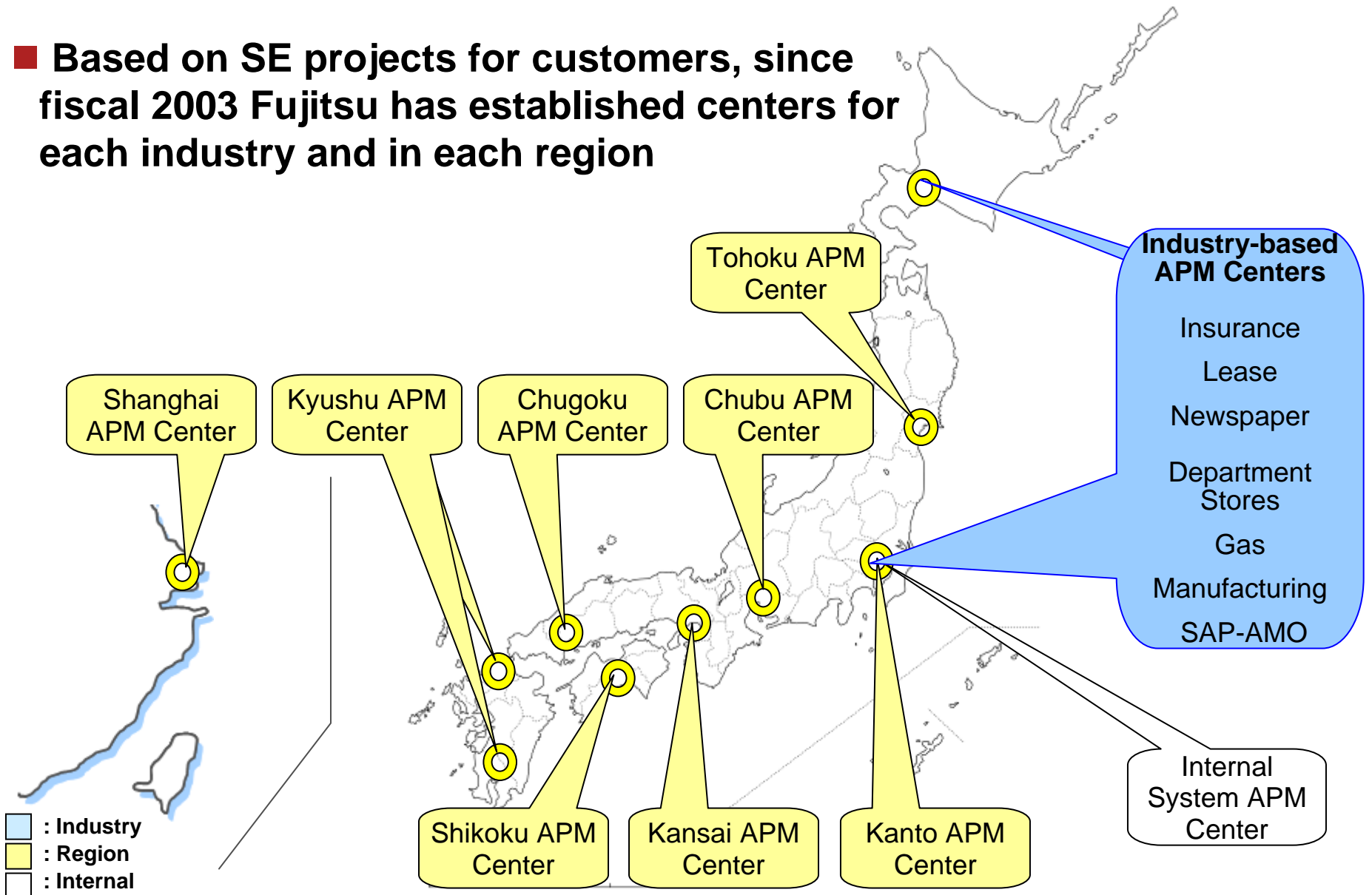
4. Conclusion
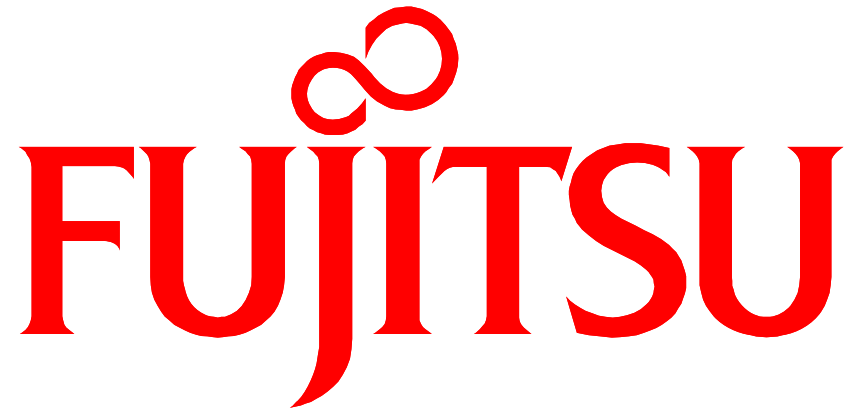
Impact of Application Operation/Maintenance Innovation

■ **Strategic IT investment for the expansion of customers' businesses**

- Operational quality improvements through better visibility and improvements in people/processes/IT
- Human resources can be shifted to strategic planning to strengthen competitiveness
- Acceleration in business speed through expansion of strategic IT investments

3:7 Model (current status)

New (strategic) IT investment

Operation/ maintenance of existing system

Application operation /maintenance innovation

5:5 Model

Increase in new (strategic) IT investment

Streamline operation/ maintenance of existing system

Support in planning and defining requirements (design/manufactur-ing innovation)

Outsource operation to Fujitsu

Cautionary Statement