Applying “Manufacturing Innovation” to Software Development: Application Operation/ Maintenance Innovation

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Fujitsu Limited
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1. Four Innovation Initiatives

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

3. What is Application Operation/Maintenance Innovation?

4. Conclusion
1. Four Innovation Initiatives
Japan IT Services Business and Fujitsu’s Position

- 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**

<table>
<thead>
<tr>
<th>Year</th>
<th>Support &amp; Training</th>
<th>IT Outsourcing</th>
<th>Project-based</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007</td>
<td>1,142</td>
<td>2,007</td>
<td>1,917</td>
<td>5,066</td>
</tr>
<tr>
<td>2008</td>
<td>1,134</td>
<td>2,606</td>
<td></td>
<td>3,740</td>
</tr>
<tr>
<td>2009</td>
<td>1,134</td>
<td>2,236</td>
<td></td>
<td>3,370</td>
</tr>
<tr>
<td>2010</td>
<td>1,134</td>
<td>2,236</td>
<td></td>
<td>3,370</td>
</tr>
<tr>
<td>2011</td>
<td>1,134</td>
<td>2,606</td>
<td></td>
<td>3,740</td>
</tr>
<tr>
<td>2012</td>
<td>1,134</td>
<td>2,606</td>
<td></td>
<td>3,740</td>
</tr>
</tbody>
</table>

CAGR 3.4%


**Ranking of IT Services Vendors in Japan by FY2007 Sales**

<table>
<thead>
<tr>
<th>Rank</th>
<th>Vendor</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Fujitsu</td>
</tr>
<tr>
<td>2</td>
<td>NEC</td>
</tr>
<tr>
<td>3</td>
<td>Hitachi</td>
</tr>
<tr>
<td>4</td>
<td>IBM</td>
</tr>
<tr>
<td>5</td>
<td>NTT Data</td>
</tr>
</tbody>
</table>

Source: IDC Japan, "2008 IT Services Market Vendor Competition Analysis for FY2008" (Doc#J8460106), 8/2008
Reduction of loss-generating projects through improved risk management

<table>
<thead>
<tr>
<th>Losses from loss-generating SI projects in Japan</th>
<th>FY04</th>
<th>FY05</th>
<th>FY06</th>
<th>FY07</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>-40.0</td>
<td>-17.0</td>
<td>-10.0</td>
<td>-8.0</td>
</tr>
</tbody>
</table>

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)**

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

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

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

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

**Today’s focus**

*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
  - 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.

⇨ 5,000 Fujitsu Group staff have completed training
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
Cannot change a system while it is running
duplicate version of the system currently running
fix

Similar System
Running System

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

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

Strengthening internal controls/audit systems (comply with JSOX, etc.)
System continuity and operational stability
Clarifying quantitative and qualitative benchmarks for return on IT investment

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

- 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

<table>
<thead>
<tr>
<th></th>
<th>New IT Investment Spending</th>
<th>Operation/Maintenance Spending</th>
</tr>
</thead>
<tbody>
<tr>
<td>FY 2006 Actual</td>
<td>31.5%</td>
<td>68.5%</td>
</tr>
<tr>
<td>FY 2007 Plan</td>
<td>33.0%</td>
<td>67.0%</td>
</tr>
<tr>
<td>FY 2008 Projection</td>
<td>33.4%</td>
<td>66.6%</td>
</tr>
</tbody>
</table>

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.

3. What is Application Operation/ Maintenance Innovation?
Supporting the business of customers by continuously performing the CAPDo cycle and “making 3 realms visible”

**Application Operation/Maintenance Innovation: CAPDo Cycle**

- **3:7 Model**
  - New (Strategic) IT Investment (ave. 33%)
  - Operation/maintenance of existing system

- **5:5 Model**
  - New (Strategic) IT Investment (ave. 45-50%)
  - 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

CAPDo: Check, Action, Plan, Do
Objective evaluate IT investments in light of management strategy and business trends; prioritize investments that contribute the most to business objectives.

Making Investments Visible

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

- 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

Differences of opinion with management:

- Management’s evaluation of systems from a business perspective

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
(2) Making the Frontlines Visible

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

**Issue**

**Executive**

- The return on IT deployments was not as high as expected

**Managers**

- Too much time spent handling exceptions and inquiries

**Making the Frontlines Visible**

**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

**Identify Root Causes**

- 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
(2) Making the Frontlines Visible

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

### Identify Fundamental Causes

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

### Business Fieldwork

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  - Too much paperwork: a paperwork-based culture
  - Administration depends on specific person's skills
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### Managers

- Too much time spent handling exceptions and inquiries

### Executive

- The return on IT deployments was not as high as expected

- "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**
  - Enhance IT resources
  - Add system functionality

- **IT**
  - Reform administrative procedures
  - Deploy digital authorization

- **Processes**
  - 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
(3) Making Application Software Assets Visible

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

**Current Issues**

- 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
- Analysis of Duplication
- Make duplications visible

**Asset Characteristic Analysis**
- Make the degree of complexity visible

**Proposals for Improvement**
- Get rid of unnecessary assets
- Set appropriate quality targets
- Review development (maintenance) terms/standards

**Ideal Image**

- 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
Fujitsu has developed new technology to improve application quality.

“Impact Scale” makes the complexity of application structures visible.

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

- Degree of importance of 200 projects shown on one easy-to-understand chart
  ⇒ Objective evaluation and explanation is convincing to each division

Operation/Maintenance Innovation

- 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

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

Operation/Maintenance Innovation

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

Make the Frontline Visible

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

<table>
<thead>
<tr>
<th>12月</th>
<th>1月</th>
<th>2月</th>
<th>3月</th>
</tr>
</thead>
<tbody>
<tr>
<td>921件</td>
<td>913件</td>
<td>655件</td>
<td>522件</td>
</tr>
</tbody>
</table>

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

• Reduction in system operation/maintenance costs
• Maintenance personnel shifted to planning
• Improvement in operation quality

<table>
<thead>
<tr>
<th>Planning Personnel</th>
<th>Before Outsourcing</th>
<th>After Outsourcing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Op/Maint. Personnel</td>
<td>96 (all customers staff)</td>
<td>40 (Fujitsu)</td>
</tr>
<tr>
<td>40 (customer)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
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**
Continuous support for optimal IT investment using a portfolio approach across the lifecycle, from planning through operation.

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

**APM Outsourcing Services**
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**
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.*
Based on SE projects for customers, since fiscal 2003 Fujitsu has established centers for each industry and in each region:

- Shanghai APM Center
- Kyushu APM Center
- Chugoku APM Center
- Chubu APM Center
- Tohoku APM Center
- Shikoku APM Center
- Kansai APM Center
- Kanto APM Center
- Gyosu APM Center
- Industry-based APM Centers:
  - Insurance
  - Lease
  - Newspaper
  - Department Stores
  - Gas
  - Manufacturing
  - SAP-AMO
- Internal System APM Center
4. Conclusion
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

5:5 Model

- Increase in new (strategic) IT investment
- Streamline operation/maintenance of existing system
- Support in planning and defining requirements (design/manufacturing innovation)
- Outsource operation to Fujitsu

- Application operation/maintenance innovation
- Outsource operation to Fujitsu

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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;
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