Applying “Manufacturing Innovation” to Software Development

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Fujitsu Limited

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Fujitsu Applications, Limited
1. Current Status of Fujitsu’s SI Business and IT System Challenges
2. Four Innovation Initiatives
3. What is Design Innovation?
4. What is Manufacturing Innovation?
5. Conclusion
1. Current Status of Fujitsu’s SI Business and IT System Challenges
SI Market Size and Fujitsu’s Position

- Fujitsu Group ranks #1 in SI sales in Japan
- Average Japanese market growth through 2011 forecasted at 3.3%

Size of SI Market in Japan*

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<table>
<thead>
<tr>
<th>Year</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sales</td>
<td>1,000</td>
<td>1,500</td>
<td>2,000</td>
<td>2,500</td>
<td>3,000</td>
<td>3,500</td>
</tr>
</tbody>
</table>

CAGR 3.3%*
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Ranking of SI Vendors in Japan by 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>Hitachi</td>
</tr>
<tr>
<td>3</td>
<td>NEC</td>
</tr>
<tr>
<td>4</td>
<td>NTT Data</td>
</tr>
<tr>
<td>5</td>
<td>IBM</td>
</tr>
</tbody>
</table>

*“Project-base” data as defined by IDC


Fujitsu SI Business: On Recovery Path

- Reduced losses through risk management
  FY ’04: 40 bn yen loss ⇒ FY ’06: under 10 bn yen loss

- Improving margins through better project management

<table>
<thead>
<tr>
<th>Solutions/SI operating profit margins (Rough est., excludes FC*)</th>
<th>FY ’04</th>
<th>FY ’05</th>
<th>FY ’06</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2%</td>
<td>4%</td>
<td>5%</td>
</tr>
</tbody>
</table>

- Promoting split contracts (under 100 man-months)

<table>
<thead>
<tr>
<th>Sales Ratio</th>
<th>FY ’04</th>
<th>FY ’05</th>
<th>FY ’06</th>
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<tbody>
<tr>
<td></td>
<td>43%</td>
<td>44%</td>
<td>47%</td>
</tr>
</tbody>
</table>

- Achieve business recovery through improved management
- Further promote QCD** improvement in mfg. innovation

*FC: Fujitsu Consulting  **QCD: Quality, Cost, Delivery
IT System Challenge: Customers Not Satisfied with Results of IT Investment

Growth in Fujitsu users’ software expenditures expected to taper off

<table>
<thead>
<tr>
<th>Year</th>
<th>Software-related Expenditures</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006 (Act.)</td>
<td>100.0%</td>
</tr>
<tr>
<td>2007 (Plan)</td>
<td>101.3%</td>
</tr>
<tr>
<td>2008 (Est.)</td>
<td>104.9%</td>
</tr>
</tbody>
</table>


70% of user co. CIOs not satisfied with IT investment

- 10% Not satisfied
- 30% As expected
- 56% Somewhat dissatisfied
- 10% Above expectations
- 4% Don’t know


● IT investments are not contributing to expansion of new markets and business opportunities (60%) – Responses from sales planning divisions of user companies (Source: JUAS** Corporate IT Trend Survey, 2007)

● Top reasons for dissatisfaction with IT vendor were insufficient new offering capability (61%), and insufficient technology (55%) – Responses from sales planning divisions of user companies (**Source: JUAS Corporate IT Trend Survey)

* LS Research: Fujitsu Family User Group LS Research Commission  ** JUAS: Japan Users Association of Information Systems
Structural Problems with System Integration and Countermeasures

- Difficulty in determining user requirements
  - Senior management, end-users, and information system specialists all have different viewpoints
  - During system integration, system requirements are not transparent ("black box")
    - Prevent wasted expenses caused by postponing the determination of requirements
    - Train employees to talk with customers from a business perspective

- System vendors’ lack of manufacturing innovation capability
  - Appropriateness of estimates unclear
  - Poor approach to development
    - Reform subcontracting structure, an area where there is little know-how development currently
    - Implement a disciplined work style where manufacturing responsibility is clear
2. Four Innovation Initiatives
Four Innovation Initiatives

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

Focus of Today’s Presentation

- Design Innovation
  - Guidelines for creating requirement definitions
  - Requirement definition 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 (*)
  - Common framework for application maintenance

SE Work Style Innovation

- TPS-based staff training and quality control within small group activity

*: Establishment of service and work scheme in support of system operation and maintenance (announced May 14, 2007)
**: Fujitsu Applications, Ltd.
Postponement of final specification during design process results in revision during test stage (wasted costs), adding cost without creating value.

System Development Cost Structure: 1:6:1:2 Rule

- Design
  - 20 people x 3 months

- Development
  - 60 people x 6 months

- Testing
  - 20 people X 3 months

Increased testing:
- 20 people x 3 months

Time delay:
- 60 people x 1 month

Wasted Costs from Upstream Revision
3. What is Design Innovation?
What is Design Innovation?

- Improving design quality and preventing delays by requiring third-party review (SI assurance)
  - Devise written guidelines for determining requirements
    - Based on IPA-SEC (*) index, create guidelines for proper upstream processes
    - Disseminate and inculcate importance and description of determining requirements to in-house SEs (4,000 people completed training in most recent year)
  - Three viewpoints: Availability of Documents, Consistency, Affordability
  - Requirement Definition Auditing
    - Evaluate quality of requirements document from third-party perspective and suggest improvements to project

- Training staff to support above-upstream process

*IPA-SEC: Information-Technology Promotion Agency, Japan - Software Engineering Center*
## Requiring Third-party Review Process

- Making audit of requirement definition document obligatory for SI proposals exceeding a certain scale

<table>
<thead>
<tr>
<th></th>
<th>Requirement Definition Process</th>
<th>External Design Process</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Customer</strong></td>
<td>Requirement definition document</td>
<td>Specification of final requirements</td>
</tr>
<tr>
<td><strong>Fujitsu</strong></td>
<td>Requirement definition document audit</td>
<td>External design document</td>
</tr>
<tr>
<td></td>
<td>Suggestions</td>
<td>External design diagnostic service</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Feedback</td>
</tr>
</tbody>
</table>

*Specification of final requirements*
Above-upstream Process Defined by IPA-SEC

Above-upstream Process

- Requirement definition
- System specifications
- Software specifications
- System test
- Software test
- Programming
- Operating test
- Assessment
- Results of investment?
- Were requirements correct?
- According to specs?
- According to specs?
- Were requirements correct?
- Results of investment?
- Direction for systematization
- Systematization plan

From "Ensuring Required Quality, with the Planning Involvement of Senior Management" (SEC-BOOKS)
Training Employees to Support Above-upstream Process

What is a Business Architect (BA)?

- Offers high added value by identifying and analyzing the customer’s needs and defining operating requirements that reflect their essence
- Commenced training program in 2006; expecting to train 300 people in 3 years (six-week group training)

Role of Business Architect

<table>
<thead>
<tr>
<th>Process</th>
<th>IT planning</th>
<th>Request for Proposal</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Business requirement definitions</td>
</tr>
<tr>
<td>Viewpoint</td>
<td></td>
<td>End-user viewpoint</td>
</tr>
<tr>
<td>Senior managers’ viewpoint</td>
<td></td>
<td></td>
</tr>
<tr>
<td>People in charge</td>
<td>Customer and consultant (Why)</td>
<td>Customer and business architect (What)</td>
</tr>
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Above-upstream Process
4. What is Manufacturing Innovation?
What is Manufacturing Innovation? (1/3)

- Industrialize development of business specification layer which is tailored to meet each customer’s order

<table>
<thead>
<tr>
<th>Design</th>
<th>Development</th>
<th>Testing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Finalize requirements with design innovation</td>
<td></td>
<td>Confirm that requirements are sufficient</td>
</tr>
<tr>
<td>Design document (input)</td>
<td><em><em>Industrialize application development (FAP</em>)</em>*</td>
<td>Software for customers (output)</td>
</tr>
</tbody>
</table>

**Business Specifications**

- Standardize with development solutions

**Business Operations**

**Infrastructure**

- Infrastructure industrialization (server, OS, middleware)

* FAP: Fujitsu Applications, Limited
What Is Manufacturing Innovation? (2/3)

Ensure efficiency and quality by industrializing application development

- Common framework initiatives (use of development solutions)
  - Automate programming through the standardization of application architecture and development processes as well as design documents
    - For Java (EZDeveloper, Topjax, QuiQpro)
    - For .NET (QuiQpro, WebAS, eProad)

- Initiatives to industrialize application development process
  - FAP will implement application development industrialization and internal manufacturing initiatives
  - Autonomous improvement activities will take root based on “Four Rules” and “Six Mechanisms”
Offshore development initiatives

- In order to compensate for shortage of engineers in Japan, procurement will be made offshore based on the FAP model, and human resources, including those of partners, will be concentrated in design activities.

- Accumulate and utilize production know-how by repetitive development based on improved design precision and use of common framework for design and production.

- Use China as principal base for off-shoring from Japan. (India to be mainly used by Fujitsu overseas subsidiaries in the short term, and by Japan in the medium to long term)
5. Conclusion
Realization of IT Systems Capable of Solving the Customers’ Management Problems

Industrialization ensures rigorous cost reduction and excellent quality

Wasted costs from upstream delays

Development period shorter

Customer needs included in requirements

<table>
<thead>
<tr>
<th>Normal project</th>
<th>Postponed project</th>
<th>Post-reform project</th>
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Stronger risk management and other measures have helped Fujitsu’s SI business recover.

Our customers, however, are not satisfied with the results of their current IT investments.

By implementing manufacturing innovation, we are reducing dead-weight costs from delays that do not create any value. This will assist the customers in saving cost, time, and human resources.

Also, by strengthening our relations with customers, we can create IT systems capable of solving the customers’ management issues, and improve the profitability of Fujitsu’s SI business.

*Putting customers’ dreams into words, and translating those words into reality.*
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•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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