MMIS
(Manufacturing Management Information System)

Department of Industrial Engineering
Sharif University of Technology

Session# 6

Course Description

- Instructor
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- Class time
  - Saturday 15:30~18:00

- Course evaluation
  - Mid-term (30%)
  - Final exam (40%)
  - Quiz (10%)
  - Exercise (20%)
Course Description (Continued ...)

- Mid-term session:
  - N/A
- Final session:
  - N/A
- Reference:
  - Steve Bell; “Lean Enterprise Systems: Using IT for Continuous Improvement”, 2005, Wiley

Reference:
- William S. Davis, David C. Yen, “The information system consultant’s handbook: system analysis and design”, 2010, Taylor and Francis
- Gabriele Piccoli; “Information systems for managers: texts & cases”, 2007, John Wiley & Sons Inc
Lean Paradigm

Lean & IT

<table>
<thead>
<tr>
<th>Attribute</th>
<th>LEAN</th>
<th>Traditional IT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Change Management</td>
<td>Organic, incremental and continuous</td>
<td>Engineered and planned large events</td>
</tr>
<tr>
<td>Organization</td>
<td>Cross-functional teams</td>
<td>Central command and control</td>
</tr>
<tr>
<td>Measures</td>
<td>Top-down and bottom-up performance measures linking improvement initiatives to strategic goals</td>
<td>Cost containment and uptime</td>
</tr>
<tr>
<td>Knowledge Management</td>
<td>Generalization</td>
<td>Specialization</td>
</tr>
<tr>
<td>Education</td>
<td>Process focus</td>
<td>Task focus</td>
</tr>
<tr>
<td>Definition of Success</td>
<td>Speed and Agility</td>
<td>Stability</td>
</tr>
</tbody>
</table>
Lean Evaluation

- There are three stages most organizations will encounter on their journey to Lean:
  - Lean Operations—the elimination of waste and continuous improvement of production and service operations. “Lean Manufacturing”.
  - Lean Enterprise—the elimination of waste and continuous improvement throughout the internal value stream of transactions and activities encompassing engineering, marketing, purchasing, planning, production, quality, distribution, service, finance, human resource, and administration.
  - Lean Network—the elimination of waste and continuous improvement throughout the dynamic, global, electronic, demand-driven “supply chain.”
Lean Evaluation

- The Lean Development life cycle
  - There is a natural life cycle to every product, process, and system, and the evolutionary development of Lean Manufacturing within an organization is no exception.

- Four phases that a company may experience if it does not properly integrate information systems into its Lean program:
  - Beginning the Journey,
  - Widespread Adoption,
  - Plateau, and
  - War of Attrition.
Lean Evaluation

- The Lean Development life cycle

Lean Evaluation

- The Lean Development life cycle
  - To achieve sustained Lean Manufacturing performance over the long run, it is important to emphasize a holistic systems perspective from the boardroom to the shop floor.

  - This takes us to the Lean Enterprise.

- Similar to the enthusiastic adoption of Lean Manufacturing in the West, during the 1990s there was an emphasis on Business Process Reengineering (BPR) popularized by Michael Hammer and James Champy.
**Lean Evaluation**

- **The Lean Development life cycle**
- BPR strives for new levels of productivity, breaking the rigid and hierarchical management and work methods of the past, by emphasizing the following points:
  - Process orientation
  - Rule breaking
  - Hybrid centralized-decentralized operations
  - Workers making decisions
  - Work is performed where it makes the most sense.
  - Checks and controls are reduced.
  - Jobs change from simple tasks to multidimensional work.
  - Individual roles change from controlled to empowered.
  - Job preparation changes from training to education.
  - Focus of performance measures and compensation shifts from activity to results.
  - Values change from protective to productive.
Lean Evaluation

- The Lean Development life cycle
  - “Material and information flow are two sides of the same coin.

- Lean and BPR similarly focus on the elimination of waste by improving the overall value stream.

- To improve we must understand the existing business processes, which are often guided by the functional and departmental silos and local optima institutionalized within the culture, compensation policies, procedures, and information systems of an organization.

- By helping systems and people communicate more effectively, Enterprise Integration smoothes the flow of information as the value stream crosses system boundaries.

Lean Evaluation

- The Lean Development life cycle
Lean Evaluation

- The Lean Development life cycle
Lean Evaluation

- The Lean Development life cycle

![Diagram of the Lean Development life cycle]

Lean Evaluation

- The Lean Development life cycle

![Diagram of the Lean Evaluation process]
Lean Evaluation

<table>
<thead>
<tr>
<th>Order Receipt and Processing</th>
<th>Distance (feet)</th>
<th>Time (min)</th>
<th>Operation</th>
<th>Transport</th>
<th>Wait</th>
<th>Inspection</th>
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<td>NVA</td>
<td>NVA</td>
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<td>Carry from fax machine to desk</td>
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<td>1</td>
<td>NVA</td>
<td>NVA</td>
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<tr>
<td>Wait until convenient to process order in batch</td>
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<td>NVA</td>
<td>NVA</td>
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<td>Enter order, verify pricing and credit</td>
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<td>VA</td>
<td>VA</td>
<td>VA</td>
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<tr>
<td>Send copy to legal department for review</td>
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<td>NNVA</td>
<td>NNVA</td>
<td>NNVA</td>
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<td></td>
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<tr>
<td>Legal department review (4 hours)</td>
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<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Order release to scheduler</td>
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<td>VA</td>
<td>VA</td>
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<td><strong>10</strong></td>
<td><strong>6</strong></td>
<td><strong>60</strong></td>
<td><strong>240</strong></td>
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<table>
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<tr>
<th>Total</th>
<th>%</th>
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<tr>
<td>VA</td>
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<td>NVA</td>
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<tr>
<td>NNVA</td>
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Lean Evaluation

- **The Lean Development life cycle**
  - **Lean network**
    - The Lean Network is commonly called the Supply Chain; however, there are two connotations:
      - The Lean Network isn’t about “supply,” it’s demand driven.
    - This new business model isn’t a chain, it’s a network. A chain is linear, sequential, and slow.
    - Lean Network relationships are fluid, organic, and multi-nodal.
Lean Evaluation

- **The Lean Development life cycle**
  - **Lean network**
  - Although many early EDI initiatives may have been focused on waste elimination from a segment of the supply chain, they often resulted in waste transference to the smaller trading partners.

- The same is true in many cases with SCM today, where smaller suppliers build ahead inventory for Just-In-Time (JIT) customers, holding large stocks just waiting for a kanban signal.

- The same may also be true of many Vendor-Managed Inventory (VMI) relationships.

Information Technology

- **The contribution of communications**
  - The firm must be connected electronically with customers and suppliers.

- One rapidly growing technique for this type of interconnection is EDI.
  - Detroit auto manufacturers were among the first companies to encourage suppliers to accept orders electronically.

- Because each firm has its own formats for each of the paper documents used prior to EDI, there are problems of compatibility.

  - The American National Standards Institute (ANSI) has developed a standard known as ANSI X.12 to specify common document formats for the transactions involved in ordering, receiving, and paying for merchandise.
Information Technology

The contribution of communications

- Manufacturing Series (MAN)
  - 196 Contractor Cost Data Reporting
  - 830 Planning Schedule with Release Capability
  - 844 Product Transfer Account Adjustment
  - 846 Inventory Inquiry/Advice
  - 849 Response to Product Transfer Account Adjustment
  - 852 Product Activity Data
  - 861 Receiving Advice/Acceptance Certificate
  - 866 Production Sequence
  - 867 Product Transfer and Resale Report
  - 869 Order Status Inquiry
  - 870 Order Status Report
  - 894 Delivery/Return Base Record
  - 895 Delivery/Return Acknowledgment or Adjustment
Lean Evaluation

- **The Lean Development life cycle**
  - Lean network
    - In contrast, the Lean Network looks beyond local improvement, aspiring to eliminate waste and enable smooth flow of material and information across the entire supply chain for everyone’s benefit.

- After all, a customer usually pays for waste in its supply chain, directly or indirectly.
- If a supplier is forced to carry the burden of excess inventory, this makes the relationship less profitable, resulting in small compromises that add up to diminished innovation, quality, service, and longevity.

Lean Evaluation

- **The Lean Development life cycle**
- **Lean network**
  - Many enterprises have been building the foundation for the Lean Network for years.

- They have invested massive resources in improving their information technology infrastructure, often in conjunction with BPR, to replace fragmented transactional systems with a centralized system of record.

- It is the ERP system that automates, records, and integrates the core financial and operational events within a single transaction database model.

- Customer Relationship Management (CRM) and Product Lifecycle Management (PLM) systems have also received considerable investment, integrating marketing, sales, design, engineering, and customer service processes with the ERP core.
Lean Evaluation

* The Lean Development life cycle