Outline

- What is DSM?
- Applications of DSM
- DSM alternatives
- Data mining in DSM
  - Modularity
  - Mass customization
  - Innovation
- Data-driven innovation
- Conclusion
What is DSM About?

1. Simplification
2. Better understanding
3. Improved organization
4. Complexity reduction
5. …

Modularity: Products and Services

Product with 10 components labeled A though J
Module Representation

Interface Structure Matrix

Advantage: ERP (e.g., SAP) derived data
DSM vs ISM

**DSM Solution**

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**ISM Solution**

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**Identical?**

Solving DSM and ISM

**DSM**
- Specialized algorithms published in the literature
- DSM software

**ISM**
- General clustering algorithms
- Optimization software
- Data mining algorithms and software
What is Data Mining?

- Domain understanding
- Data selection
- Preprocessing, e.g., integration of different files
- Data transformation
- Pattern (knowledge) discovery
- Interpretation (e.g., visualization)
- Reporting

Decision Tree

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Pattern

```
0001 One
0011 Two
0111 Three
1111 Four
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Innovation and Leading Innovators

- Apple Computers (Product/Service Design)
- IDEO (Product & Service Design)
- 3M (Product Development)
- Google (Software Innovation)

Data-driven Innovation

- Data reflect product/system behavior
- Data have been used to monitor, process, improve efficiency, detect faults, etc.
- The use of data in innovation has not been pursued
- Innovative ideas may be embedded in the data
Traditional Design

Product Family

Product Design

Assembly Tree File

Geometry File

Part List File

Information Flow

Purchasing

Manufacturing

Open loop system

Innovation-Inspired Design

Product Family

Product Design

Geometry File

Assembly Tree File

Part List File

Innovation Tool Box

Purchasing

Manufacturing

Closed loop system
Innovation: Multi-dimensional Origin

- Customer induced
- Expert induced
- Product life-cycle induced
- Information-world induced
- Requirements driven

Cyberspace

MySpace
Innovation: What is Needed?

Innovation: Process Thinking

http://www.getfuturethink.com
Mass Customization

Honda Element

“Like its driver each Toyota Echo is unique”

Conclusion

- Wide spectrum of DSM applications
- Complexity reduction of products, systems, and services
- Data access and scalability
- Pattern discovery with DSM and data mining
- Coupling DSM with innovation
- No single “one-size fits all” innovation methodology on the horizon
- Diverse products, systems, and services call for different innovation approaches