

9TH INTERNATIONAL DSM CONFERENCE

From Product/Service Complexity
Management to Innovation

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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. ...



Product Development



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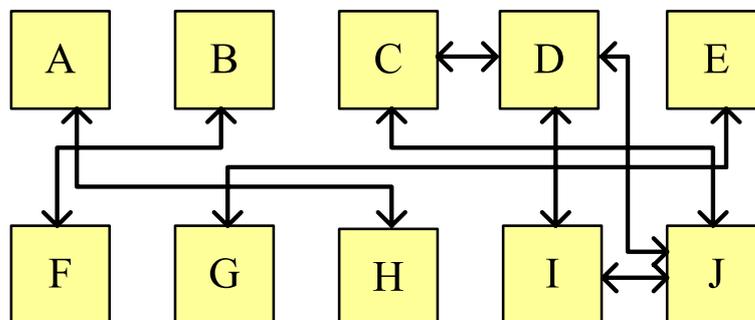


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Modularity: Products and Services

Product with 10 components labeled A through J

Example



Product Development

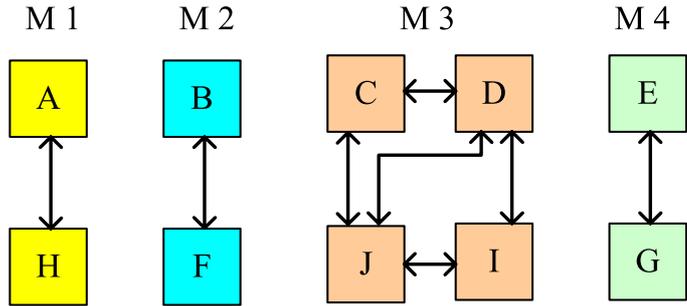
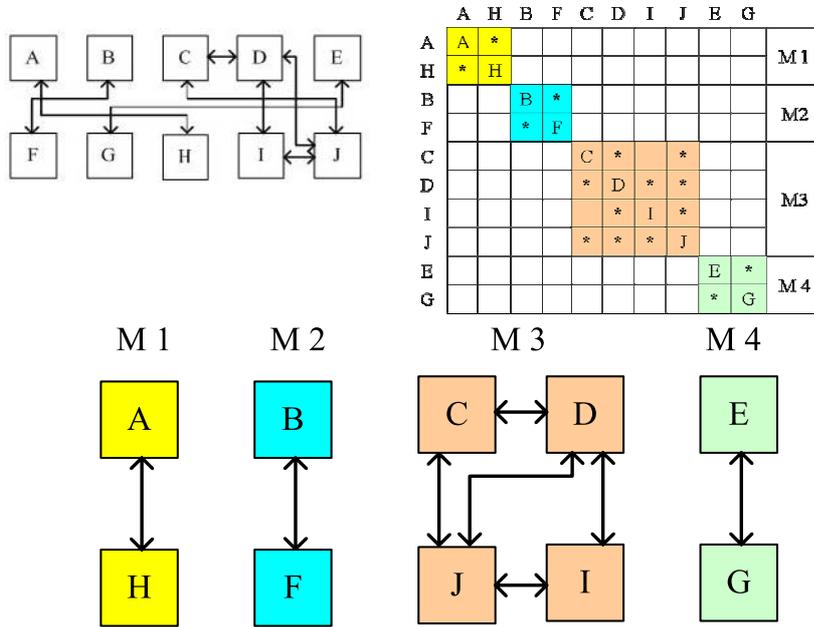


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Module Representation



Product Development

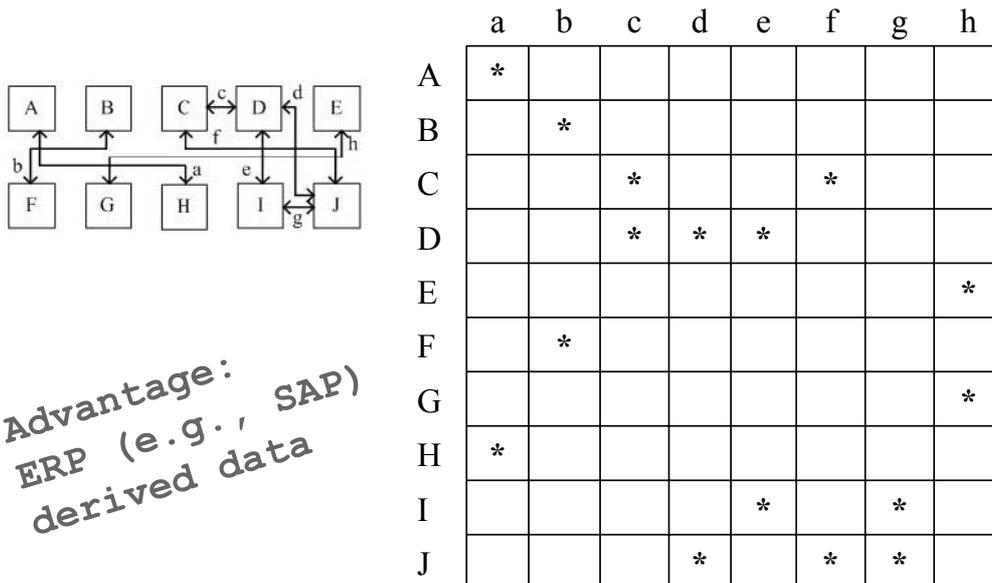


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Interface Structure Matrix



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



Product Development



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DSM vs ISM

DSM Solution

Identical?

ISM Solution

	A	H	B	F	C	D	I	J	E	G	
A	A	*									M1
H	*	H									
B			B	*							M2
F			*	F							
C					C	*		*			M3
D					*	D	*	*			
I						*	I	*			
J					*	*	*	J			
E									E	*	M4
G									*	G	

	a	b	h	c	d	e	f	g	
A	*								M1
H	*								
B		*							M2
F		*							
E			*						M4
G			*						
C				*			*		M3
D				*	*	*			
I						*	*		
J					*	*	*		

Solving DSM and ISM

DSM

- Specialized algorithms published in the literature
- DSM software

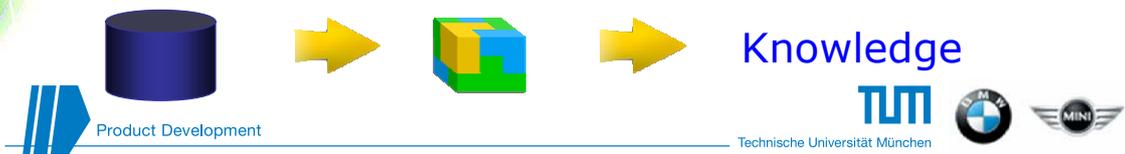
ISM

- General clustering algorithms
- Optimization software
- Data mining algorithms and software

What is Data Mining?

A process

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



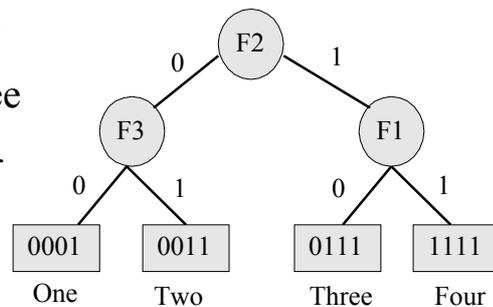
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Decision Tree

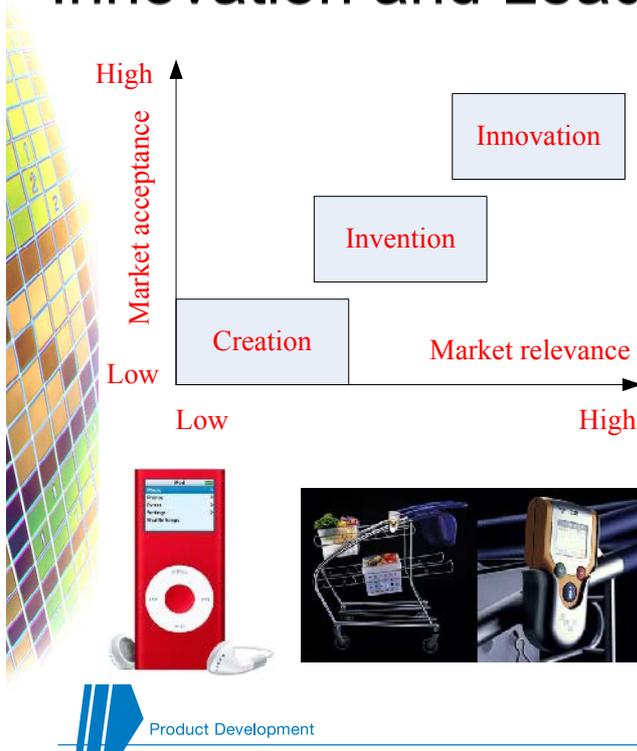
Pattern

F1	F2	F3	F4	D
0	0	0	1	One
0	0	1	1	Two
0	1	1	1	Three
1	1	1	1	Four

F1	F2	F3	F4	D
0	0	0	1	One
0	0	1	1	Two
0	1	1	1	Three
1	1	1	1	Four



Innovation and Leading Innovators

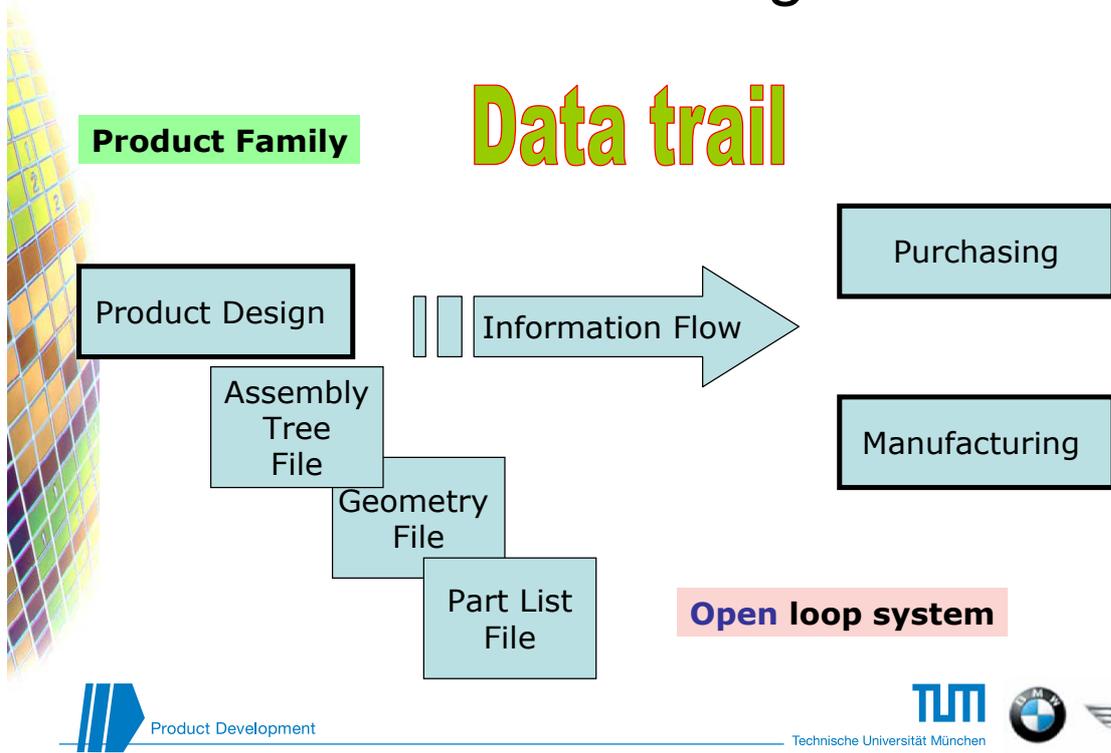


- Apple Computers (Product/Service Design)
- IDEO (Product & Service Design)
- 3M (Product Development)
- Google (Software Innovation)

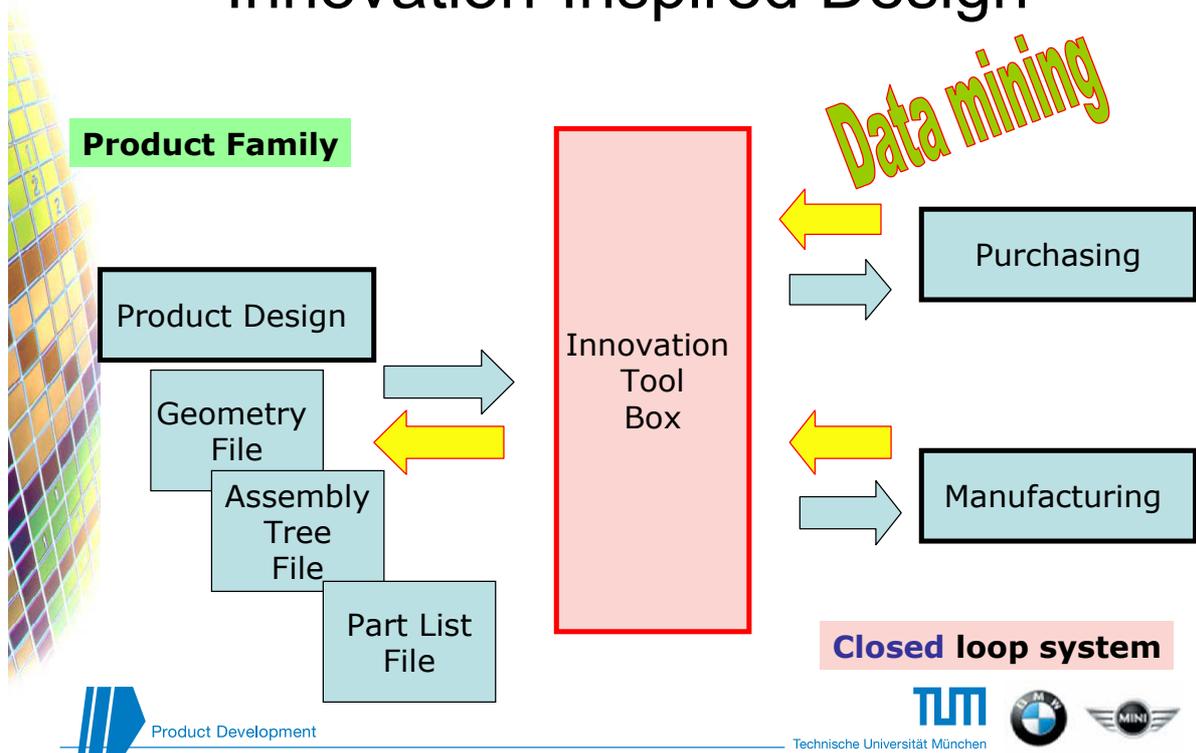
Data-driven Innovation

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

Traditional Design

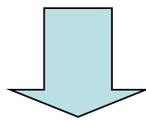


Innovation-Inspired Design



Innovation: Multi-dimensional Origin

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



- Requirements driven

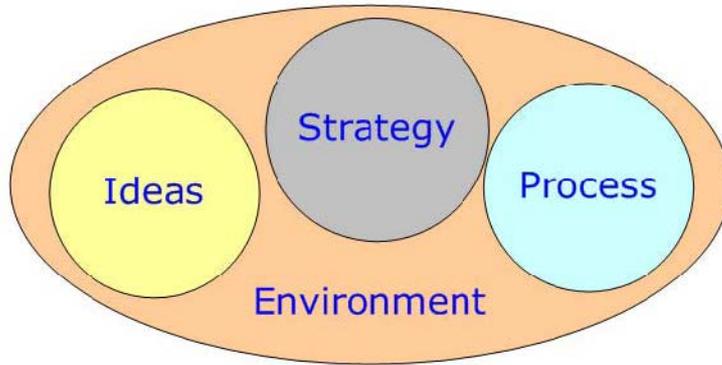


Cyberspace

MySpace

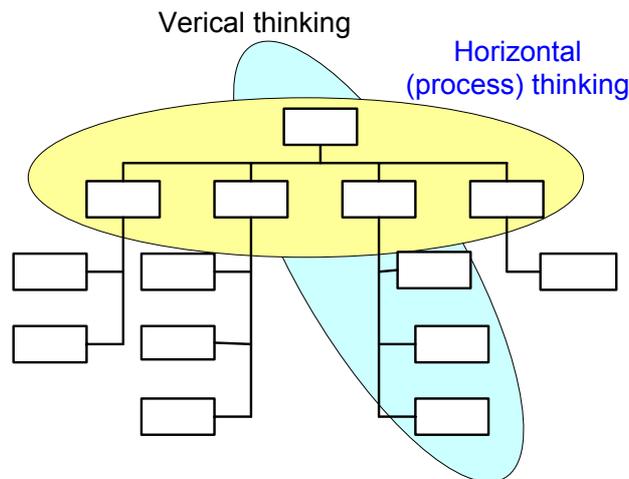


Innovation: What is Needed?



<http://www.getfuturethink.com>

Innovation: Process Thinking



Mass Customization

Honda Element



Exterior Accessories

Choose a category from the tabs below. Installation cost for accessories is not included. Dealer costs may vary.

ACCESSORY	MSRP
Wheels	
<input type="checkbox"/> 16" Alloy Wheels	\$219 DETAILS
<input type="checkbox"/> Wheel Locks	\$54 DETAILS
Cargo Handling	
<input type="checkbox"/> Kayak Attachment	\$160 DETAILS
<input type="checkbox"/> Luggage Basket	\$340 DETAILS
<input type="checkbox"/> Mid-Size Roof Box	\$430 DETAILS
<input type="checkbox"/> Roof Mount Bike Attachment	\$128 DETAILS
<input type="checkbox"/> Roof Rack	\$287 DETAILS
<input type="checkbox"/> Short Roof Box	\$299 DETAILS
<input type="checkbox"/> Ski Attachment	\$139 DETAILS
<input type="checkbox"/> Snowboard Attachment	\$142 DETAILS
<input type="checkbox"/> Surfboard Attachment	\$75 DETAILS
<input type="checkbox"/> Trailer Hitch	\$463 DETAILS
Protection	
<input type="checkbox"/> Door Vises™	\$90 DETAILS
<input type="checkbox"/> Half Nose Mask	\$59 DETAILS
<input type="checkbox"/> Hood Air Deflector	\$149 DETAILS
<input type="checkbox"/> Splash Guards	\$94 DETAILS
Other	
<input type="checkbox"/> Cabana Tent Poles	\$67 DETAILS
<input type="checkbox"/> Fog Lights	\$337 DETAILS
<input type="checkbox"/> Rear Bumper Trim	\$60 DETAILS
<input type="checkbox"/> Rocker Panel Trim	\$330 DETAILS
<input type="checkbox"/> Side Steps	\$480 DETAILS
<input type="checkbox"/> Tailgate Air Deflector	\$340 DETAILS
<input type="checkbox"/> Tailgate Cabana	\$250 DETAILS



VIEW: FRONT REAR

Select an exterior color: Atomic Blue Metallic

Interior Color: Gray With Blue Accent

My 2006 Element
2WD EX-P Automatic Transmission (Standard Features)

Base MSRP*: \$20,925
Destination & Handling: \$550
MSRP including selected accessories: \$21,748

Selected Accessories (Installation costs not included):

Wheel Locks \$54
 16" Alloy Wheels \$219

"Like its driver each Toyota Echo is unique"



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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



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