



APPLICATIONS RESEARCH

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YUN KANG

ROBIN KOH

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CHARACTERISTICS OF THE TECHNOLOGY

	Tag/ Readers	ePC	ONS	PML
• No Line-of-Sight Identification	X			
• Unique Identification		X		
• Real-Time Visibility	X		X	X
• Traceability		X	X	X
• Accuracy	X	X		
• Bi-directional Information Flow	X	X	X	



AREAS OF RESEARCH

- Strategic
- Tactical
- Operational



STRATEGIC RESEARCH

- Evolutionary

- _ Value of Information/Material Flow Synchronization
- _ Implications for Current Inventory Management Algorithms
- _ Supporting Make-To-Stock, Make-To-Order and Engineer-To-Order Environments

- Revolutionary

- _ Distributed Intelligent Products
- _ Distributed Business Processes



TACTICAL RESEARCH

- Support

- _ Activity Based Costing
- _ Collaborative Planning, Forecasting & Replenishment
- _ Continuous Replenishment Program
- _ Shrinkage Containment
- _ Product Shelf-life Management
- _ Maintenance, Repair & Operations
- _ Customer Relationship Management

- Enable

- _ Pay-By-Scan
- _ Extended Products
- _ Diversion Control

- _ Counterfeit Control
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OPERATIONAL RESEARCH

- Purchasing
- Manufacturing
- Warehouse
- Transportation
- Order Management



STRATEGIC RESEARCH

- Evolutionary

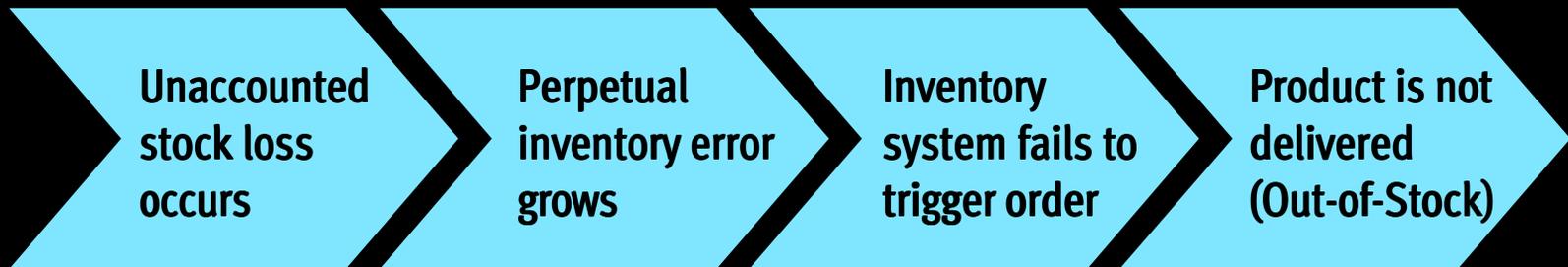
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THE SHRINKAGE ICEBERG



How harmful is this cycle?

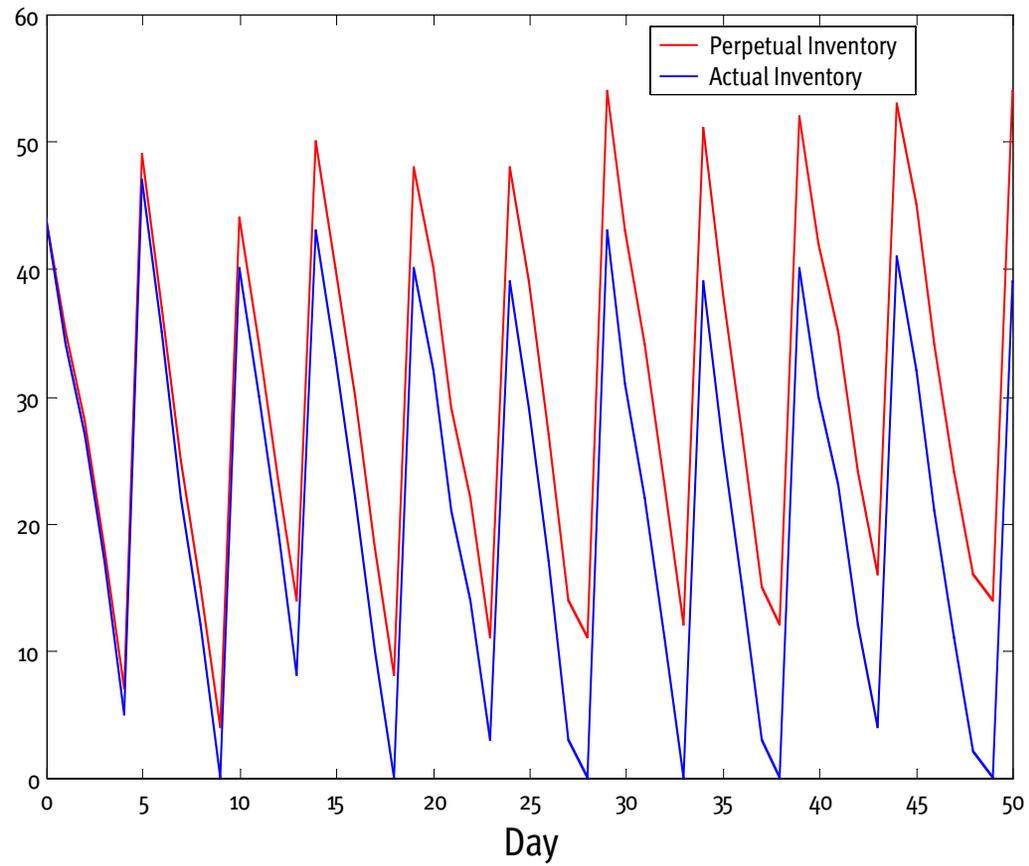


MODELING THE IMPACT OF SHRINKAGE

- Simulate a commonly used retail inventory replenishment
 - _ Automatic replenishment using reorder point (min,max)
 - _ Random demand and shrinkage
 - _ Perpetual inventory is left uncorrected
- Model tracks the perpetual and actual inventory and reports the performance



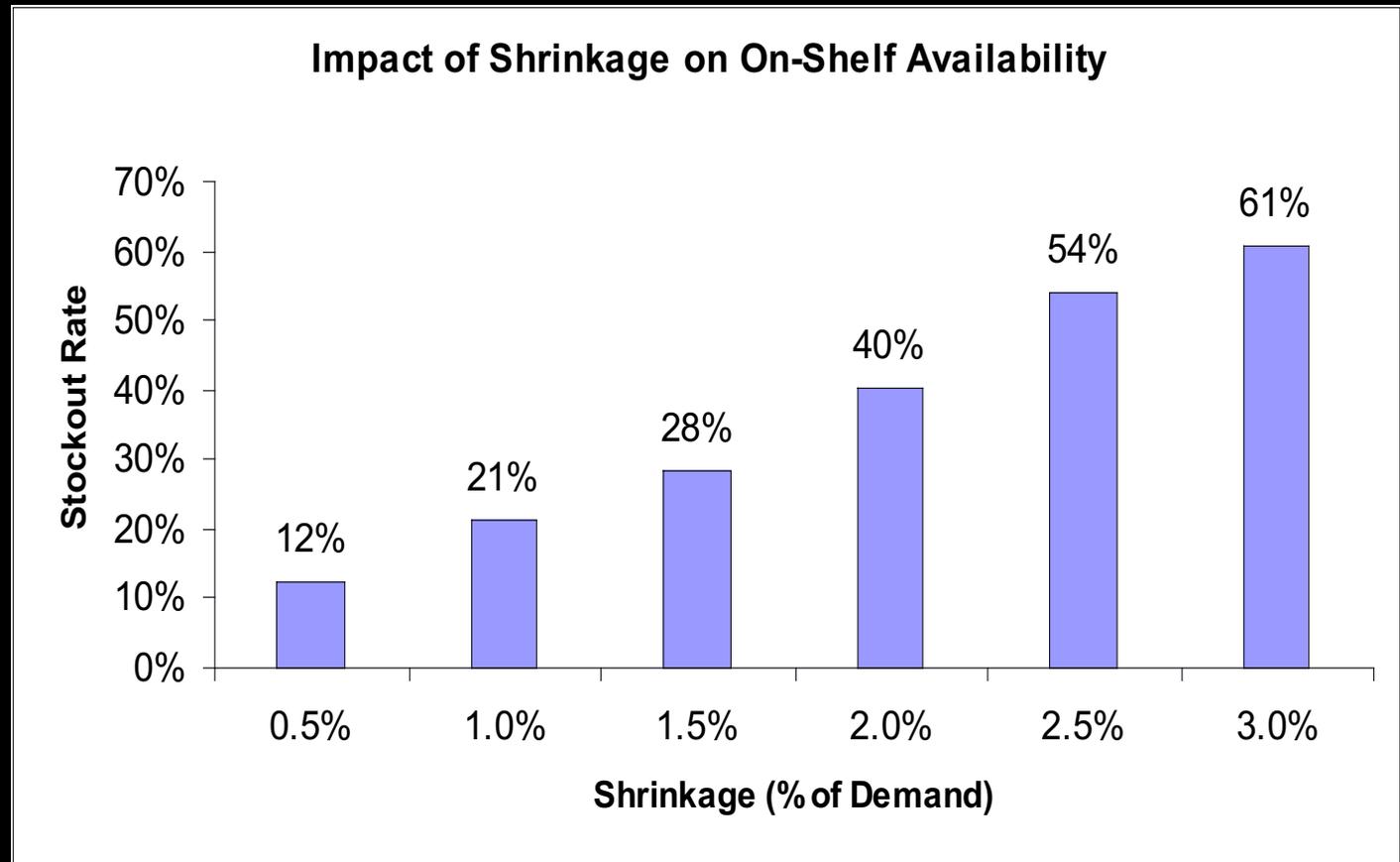
MODELING THE IMPACT OF SHRINKAGE



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WHAT OUR MODELING WORK TELLS US

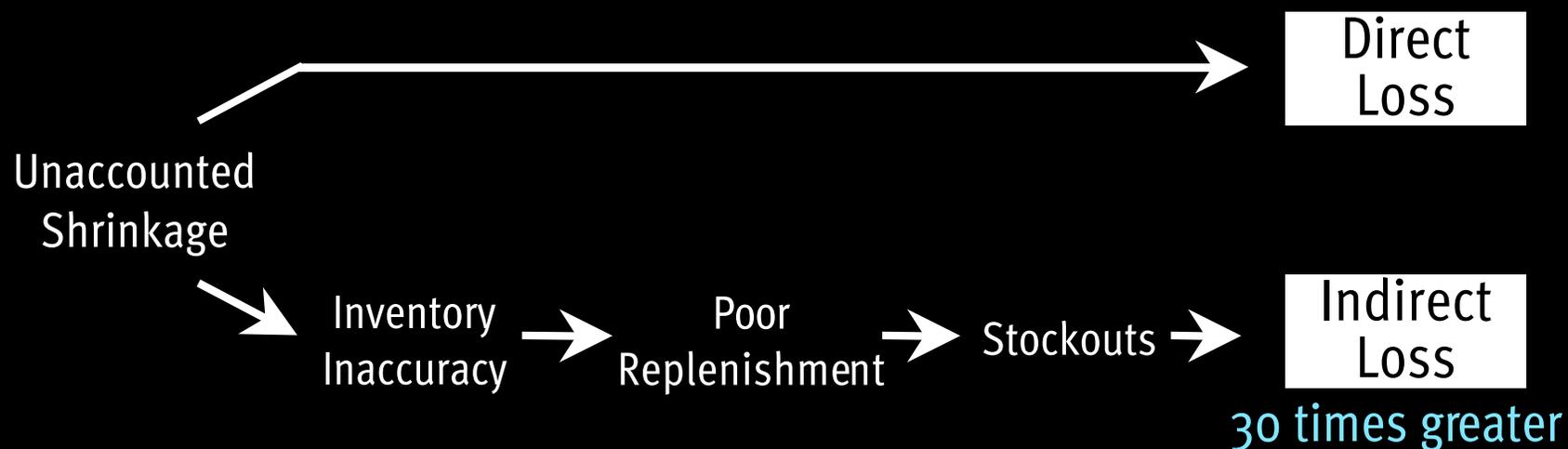


Even a small unaccounted loss can lead to high stockouts

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THE SHRINKAGE ICEBERG



Losses due to inventory errors can be much higher than the direct loss due to shrinkage



INDUSTRY FINDINGS

- ECR Europe (2001)
 - _ Shrinkage at retailer stores is 1.56% of sales (11.5 B in value)
 - _ Most of this loss is unaccounted.
- University of Florida (1996)
 - _ Shrinkage at retailers is 1.69% of sales
- Harvard Business School Retail Inventory Study
 - _ Based on a study with two major North American retailers
 - _ More than 65% of the SKUs had inaccurate perpetual inventory



NEXT STEPS OF RESEARCH

- Validate and enhance the model
 - _ Collaborate with the sponsors
 - _ Study historical data on shrinkage, sales, PI, and PI adjustments
- Determine the potential delta between Auto-ID and existing inventory adjustment policies