

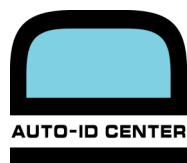
# **APPLICATIONS RESEARCH**

**JUNE 4, 2002**

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**ROBIN KOH**

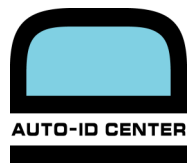
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## CHARACTERISTICS OF THE TECHNOLOGY

	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	

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## 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

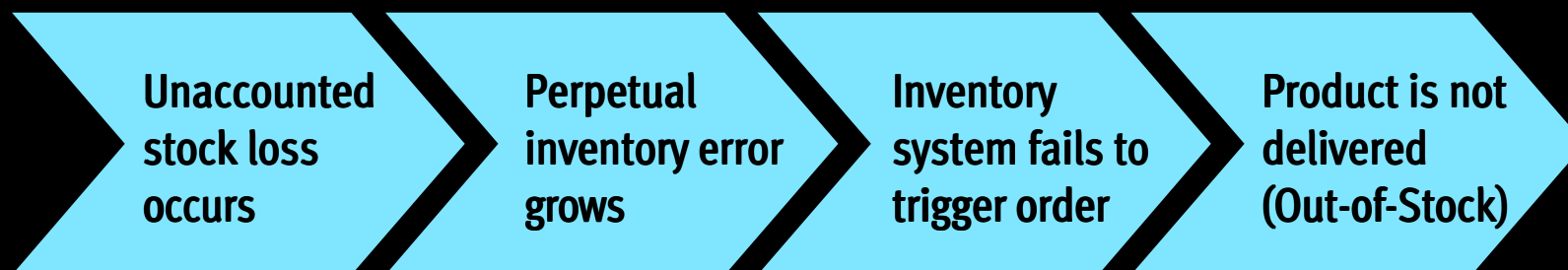
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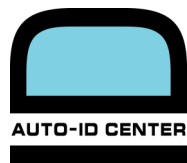
## THE SHRINKAGE ICEBERG



How harmful is this cycle?

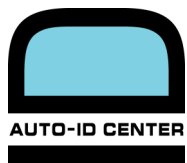
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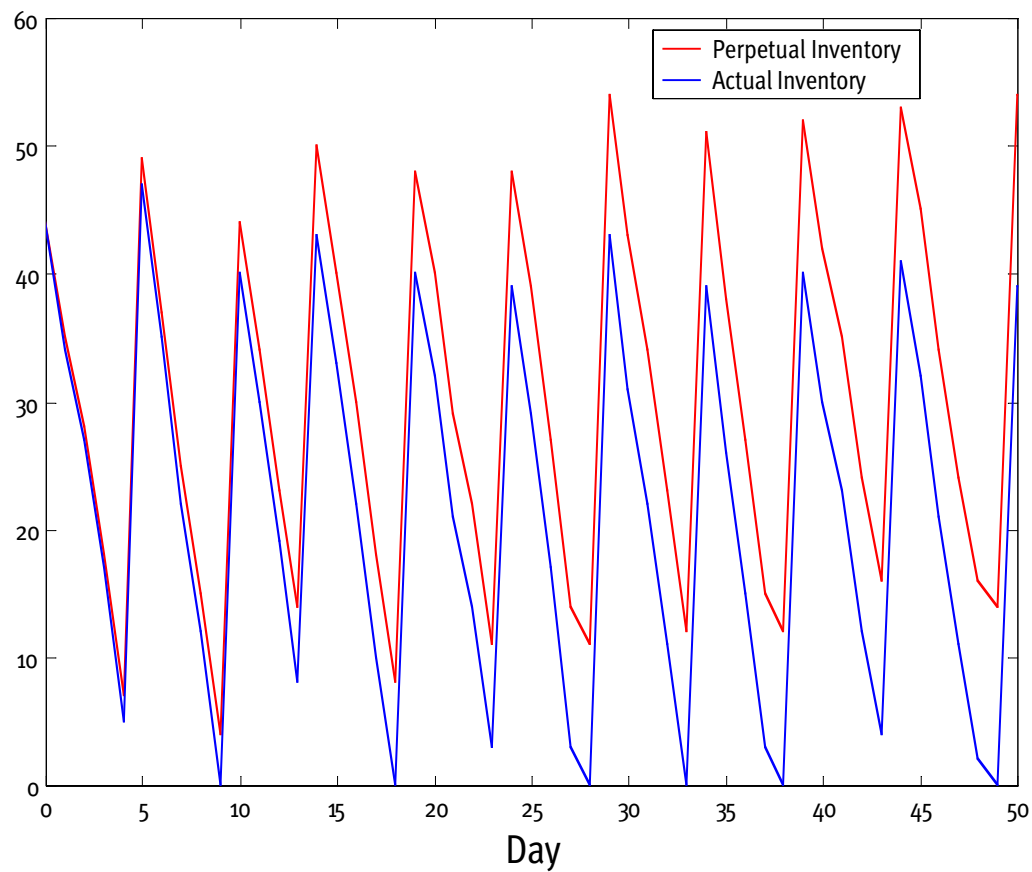


## MODELING THE IMPACT OF SHRINKAGE

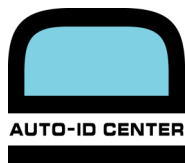
- Simulate a commonly used retail inventory replenishment
  - \_ Automatic replenishment using reorder point (min,max)
  - \_ Random demand and shrinkage
  - \_ Perpetual inventory is left uncorrected
- Model tracks the perpetual and actual inventory and reports the performance



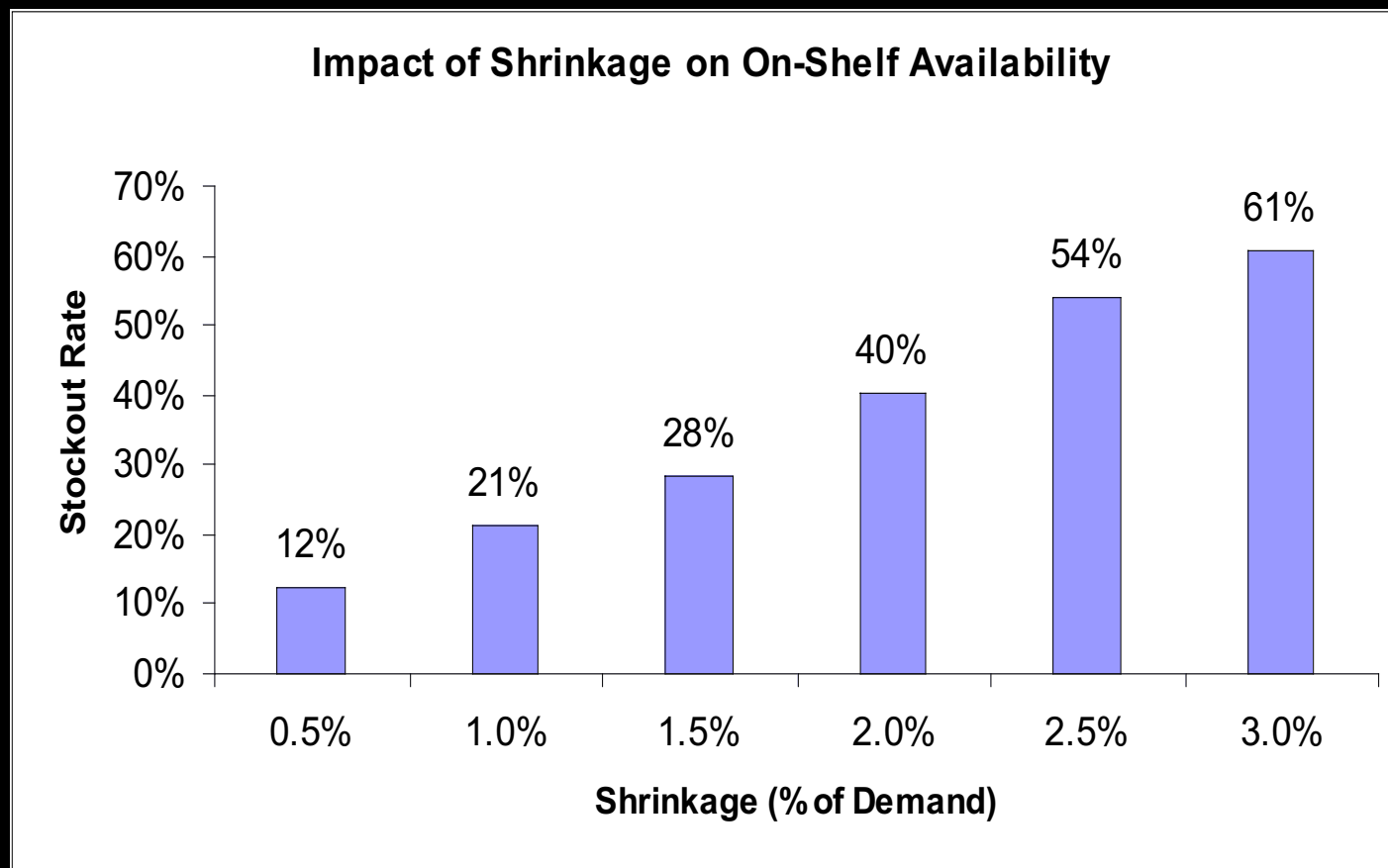
# MODELING THE IMPACT OF SHRINKAGE



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## WHAT OUR MODELING WORK TELLS US

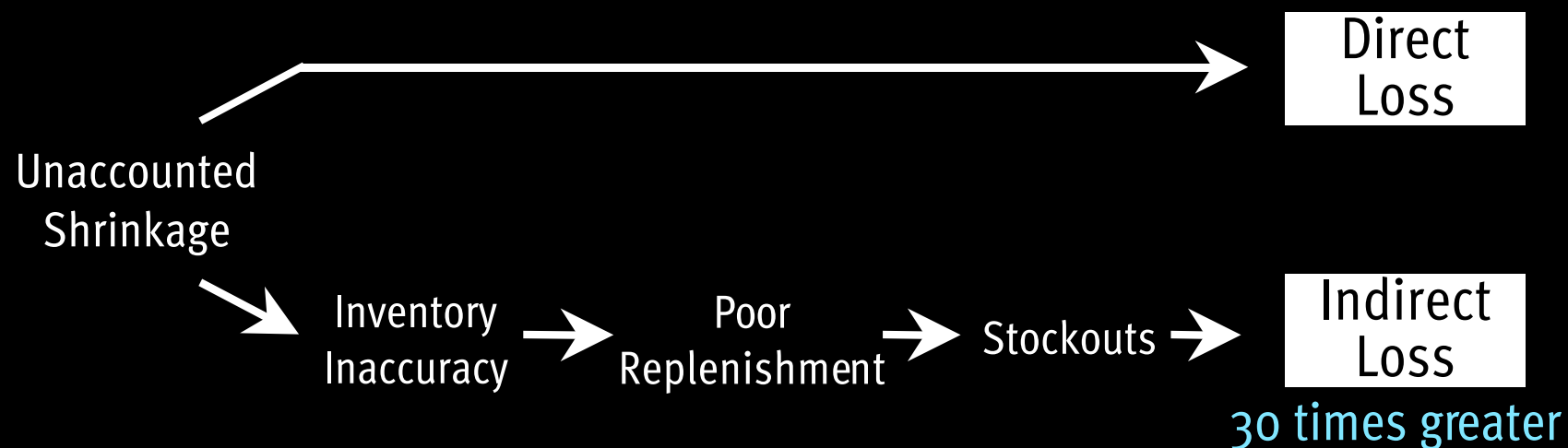


Even a small unaccounted loss can lead to high stockouts

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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 v alue)
  - \_ 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