Activity Based Performance Measurement

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Agenda

- **Overview of ABPM**
- **Findings from RFID field site**
- **Role of information flows in generating RFID benefits**

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Overview of ABPM

Goal of ABPM and potential applications

■ **Objective—To develop tools for *measuring performance at activity level* and tying activity level metrics to business unit/firm financial performance**

■ **Potential applications**

- **Measuring value created by new technology…or any intervention**
- **Measuring absolute value of activities for compensation, incentives, etc.**

Two insights that guide ABPM

- **Costs are easy, benefits are hard**
  - Costs come from an activity's *parts*
  - Benefits come from how an activity *affects other activities*
- ***Common patterns*** **can be found in the kinds of benefits that similar activities generate**
  - These commonalities allow us to gain leverage on the problem

ABPM project's status

- **Our vision**
  - **Develop general ABPM model**
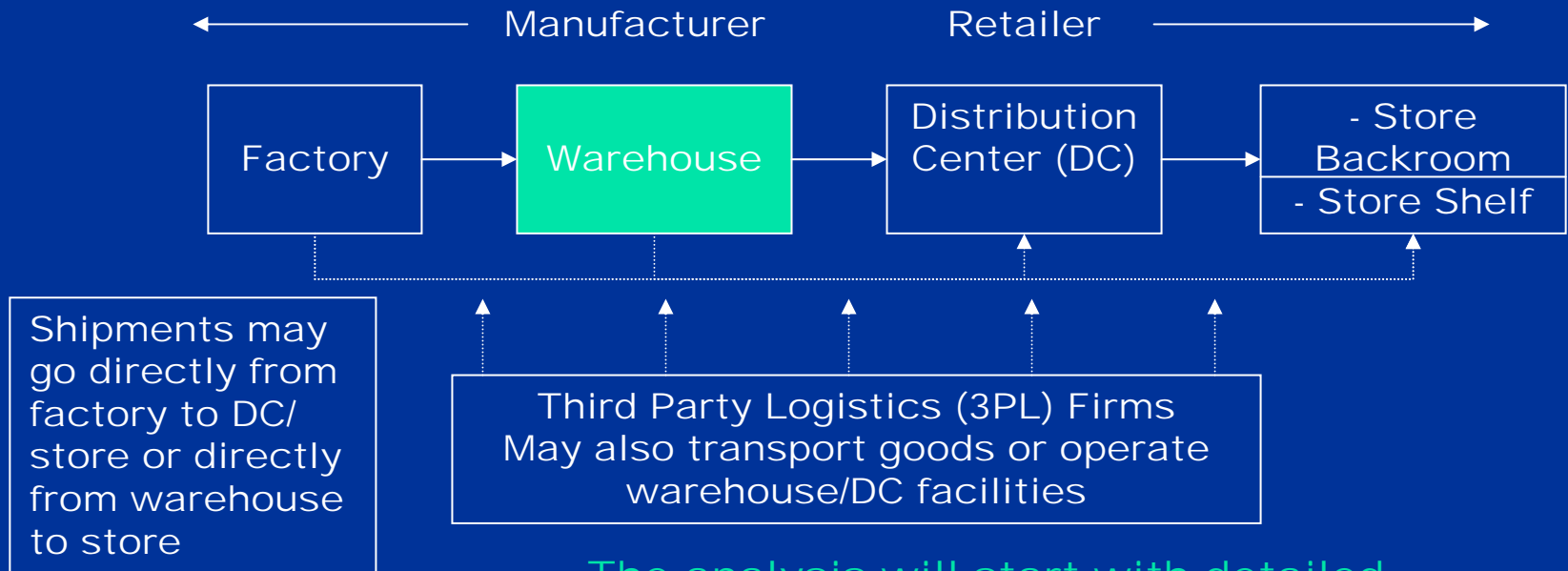 - **Test model at several field sites as proof of concept and catalog benefits associated with activities in MIT Process Handbook http://ccs.mit.edu/ph/**
- **Status**
  - **2 current field sites (RFID, smart device)**
  - **2 sites recently launched (SMEs, KM)**

RFID findings
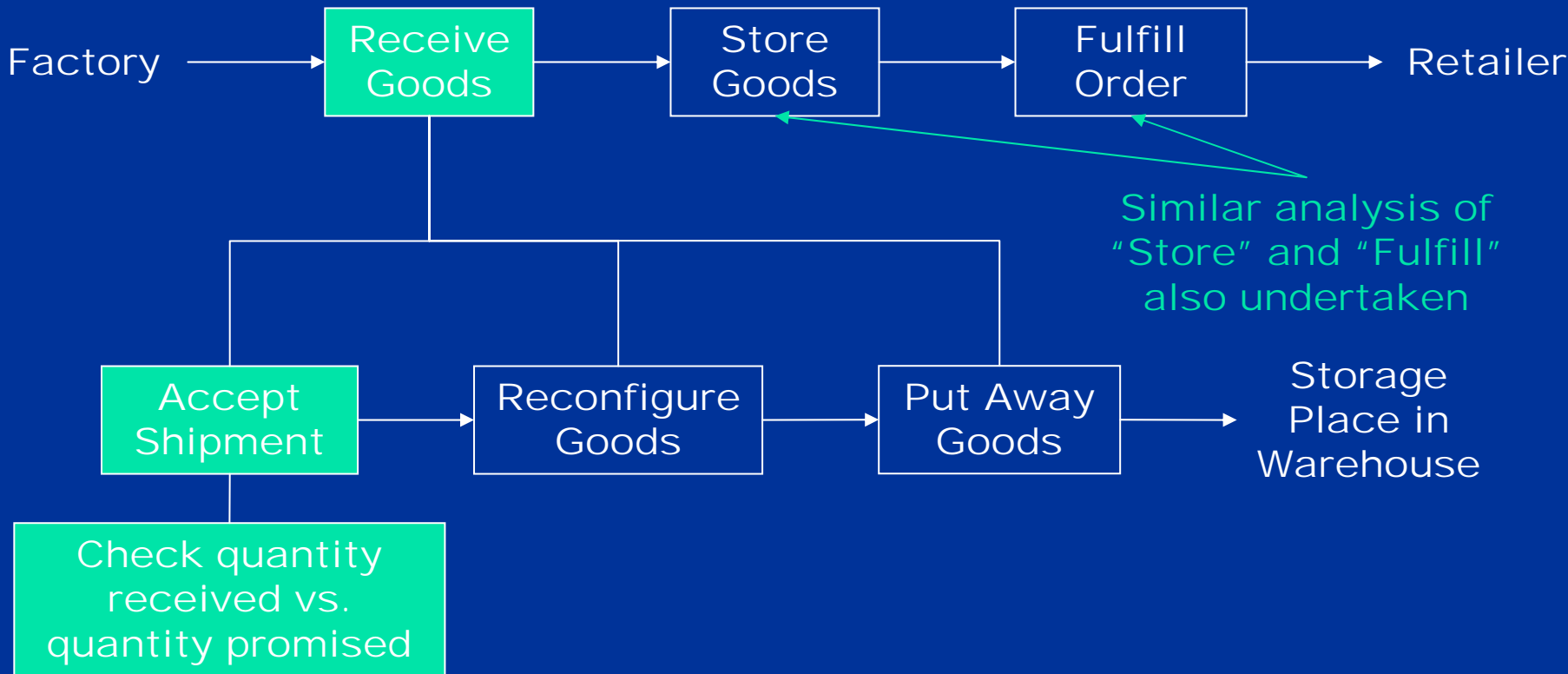
RFID field site and method

- **Large consumer goods supplier, planning *case* (vs. pallet or item) level tagging**

- **Three phase measurement approach**
  - **Identify processes affected by RFID**
  - **Map processes with and without RFID**
  - **Compare before and after**
    - **Cost reduction**
    - **Sales increase**

High level map of retail supply chain

Manufacturer ⟷ Retailer

| Factory | → | **Warehouse** | → | Distribution Center (DC) | → | - Store Backroom
- Store Shelf |

Shipments may go directly from factory to DC/store or directly from warehouse to store

Third Party Logistics (3PL) Firms
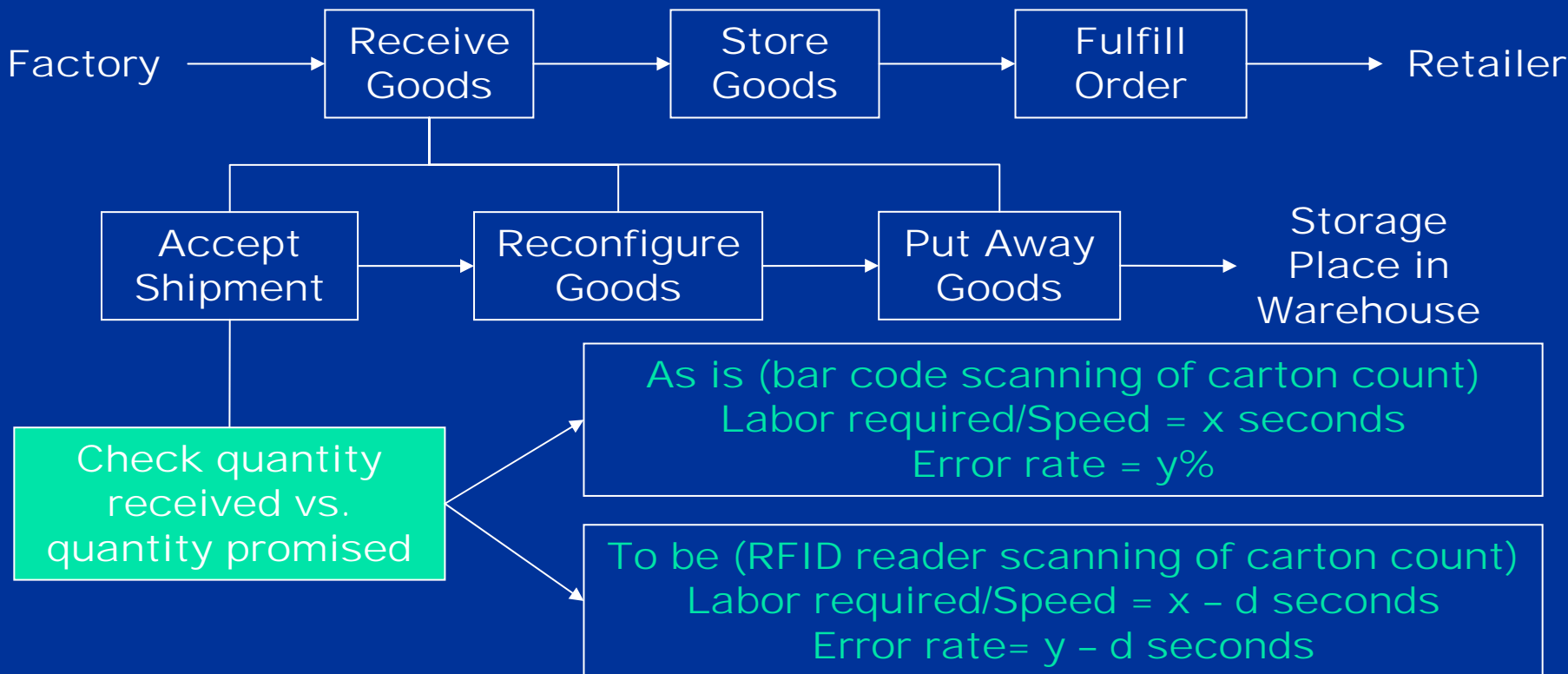**May also transport goods or operate warehouse/DC facilities**

The analysis will start with detailed consideration of potential benefits inside the manufacturer's warehouse....
and then address the retailer DC and store

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Process reshaped by RFID in warehouse—Receiving

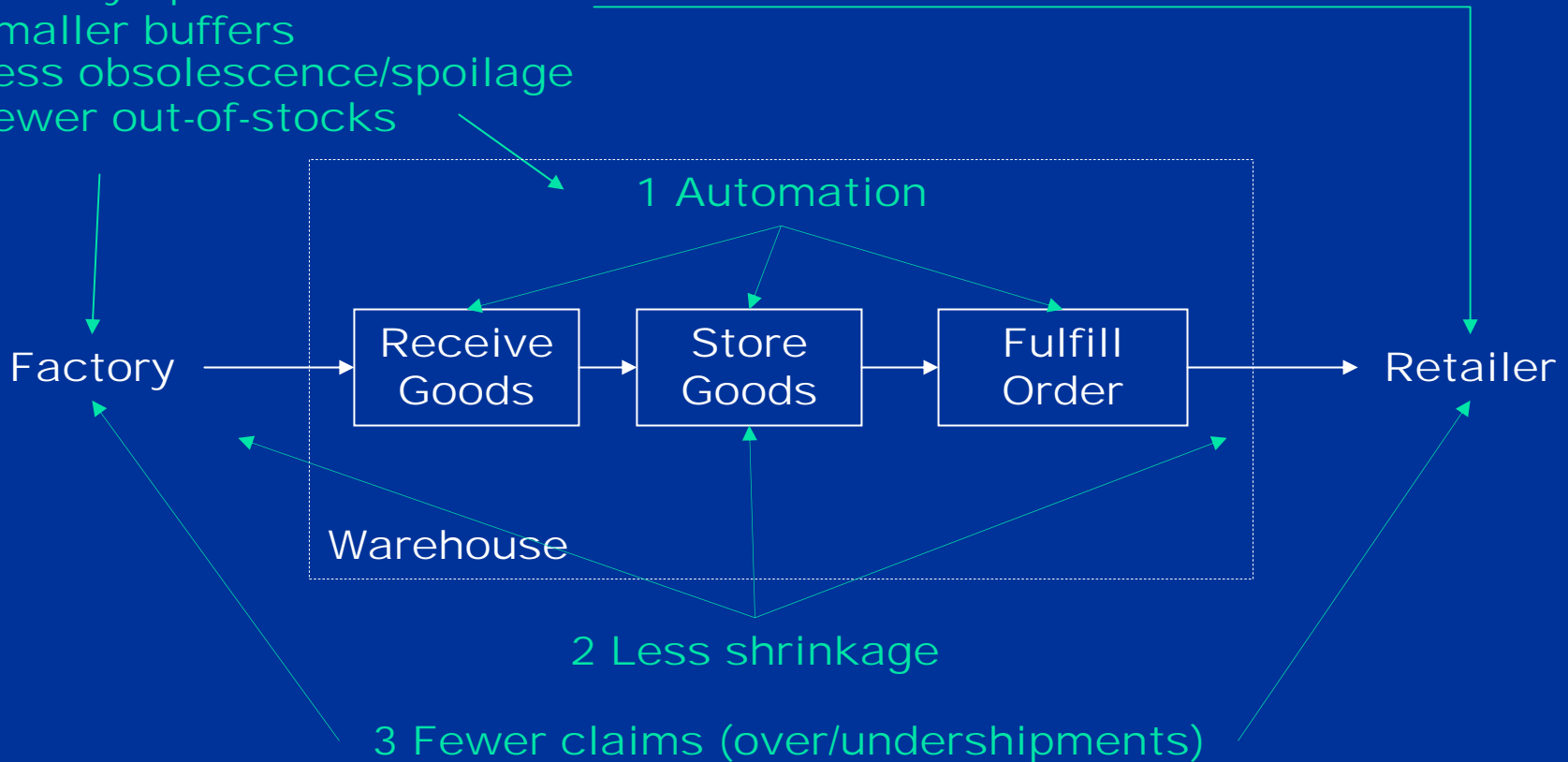Factory → Receive Goods → Store Goods → Fulfill Order → Retailer

Similar analysis of "Store" and "Fulfill" also undertaken

Accept Shipment → Reconfigure Goods → Put Away Goods → Storage Place in Warehouse

Check quantity received vs. quantity promised

Comparison of As Is vs. RFID enabled To Be—Receiving

Factory → **Receive Goods** → **Store Goods** → **Fulfill Order** → Retailer

Accept Shipment → **Reconfigure Goods** → **Put Away Goods** → **Storage Place in Warehouse**

Check quantity received vs. quantity promised

As is (bar code scanning of carton count)
Labor required/Speed = x seconds
Error rate = y%

To be (RFID reader scanning of carton count)
Labor required/Speed = x – d seconds
Error rate= y – d seconds

Six types of benefits of RFID

Inventory optimization
4 Smaller buffers
5 Less obsolescence/spoilage
6 Fewer out-of-stocks

1 Automation

Factory

Receive Goods **Store Goods** **Fulfill Order**

Retailer

Warehouse

2 Less shrinkage

3 Fewer claims (over/undershipments)

Process mapping beyond the warehouse

- **Additional analysis shows underlying similarity between processes in manufacturer's warehouse and**
  - **Store distribution center**
  - **Store backroom**
  - **Store shelf**

- **All are special cases of more general process, *Hold inventory***

"Hold inventory" and its family tree

Hold inventory

- Receive → Store → Provide

Hold inventory at manufacturer's warehouse

- Receive → Store → Fulfill order

Hold inventory at DC

- Receive → Store → Fulfill store order

Hold inventory in backroom

- Receive → Store → Restock shelf

etc. for shelf

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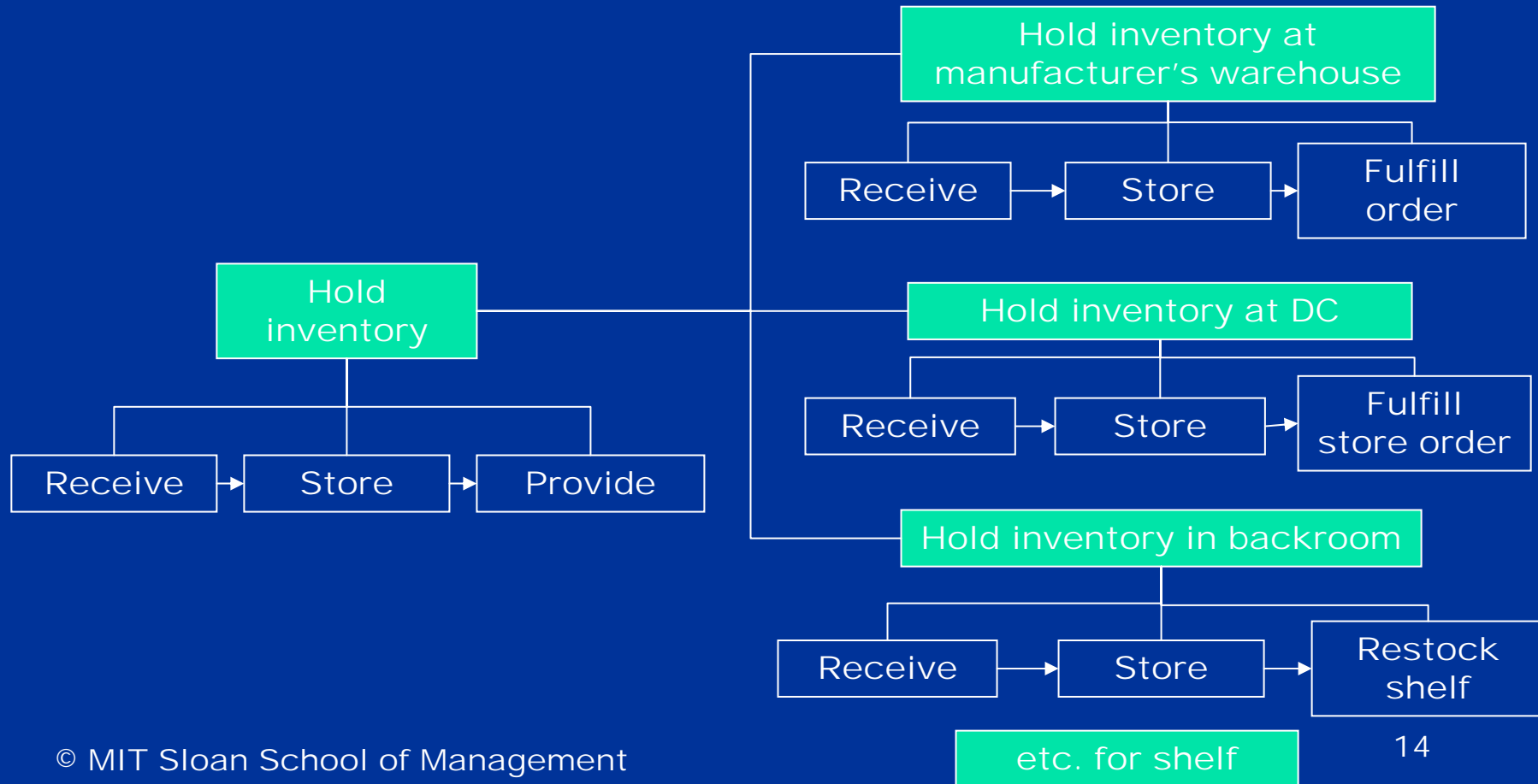
Estimated benefits/costs of RFID

- **Generic consumer goods firm $5 B sales**

- **NPV of benefits = ~$65 M**
  - **$10 M automation**
  - **$40 M other cost reduction (shrinkage, claims, spoilage/ obsolescence, inventory)**
  - **$15 M increased sales**
- **NPV of required investment = ~$15 M**

Extending ABPM to the retailer

- **Currently working with large retailer to quantify RFID benefits in DC and store**
- **Process modeling approach and benefits framework developed in manufacturer's warehouse proving applicable**
- **In depth research at retailer will surface larger supply chain issues**
  - **Alignment/misalignment of incentives**
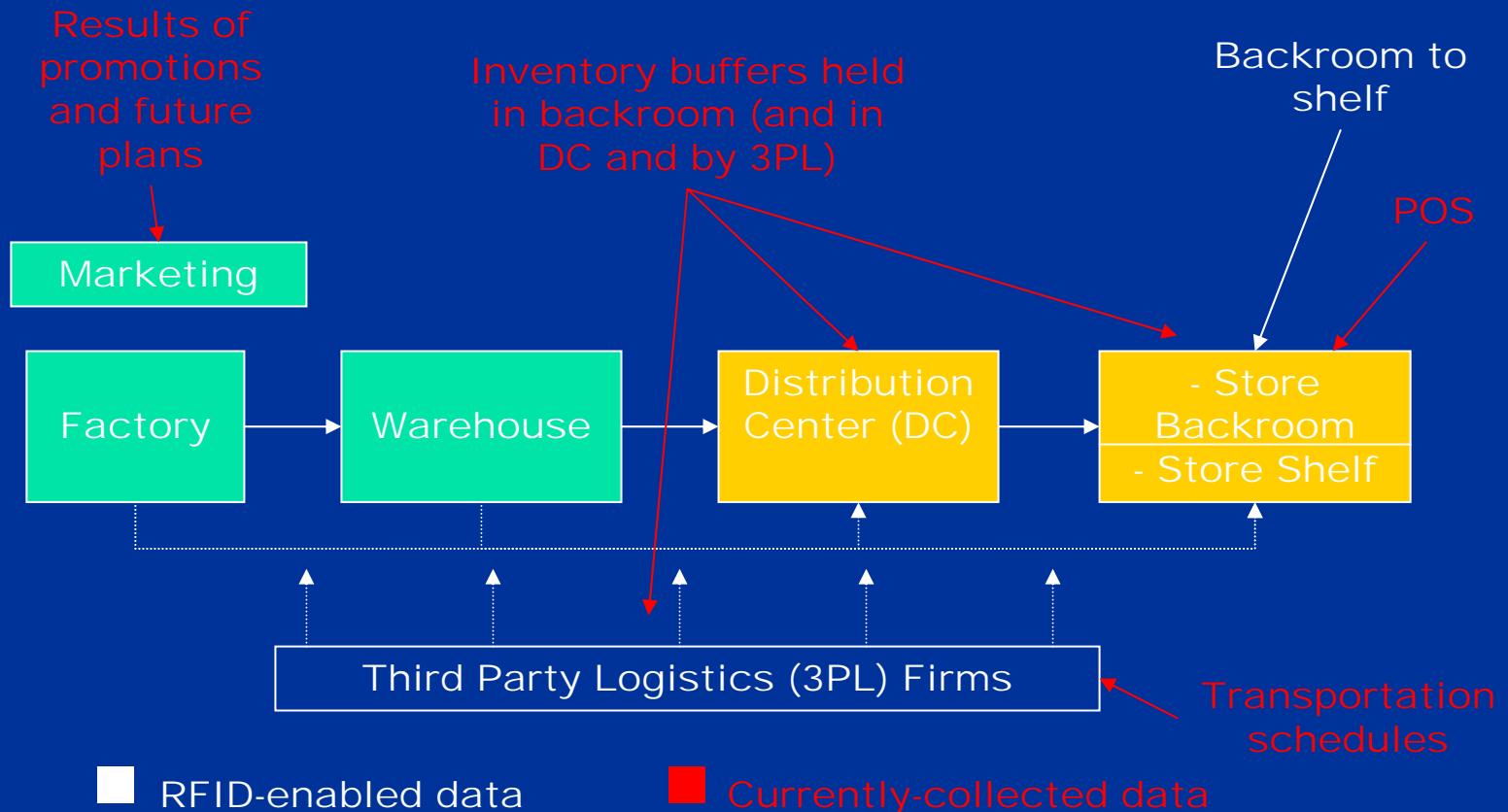 - **Re-engineering/data links needed**

Information flows and RFID benefits

Role of data in achieving RFID benefits

- **Achieving RFID benefits involves**
  - **Generating new kinds of data**
  - **Using data now being collected in new ways**
- **Importance of linking with current data streams varies by benefit type**
  - **Automation, claims, shrinkage simpler**
  - **Other benefits require extensive data sharing across supply chain**

Data flows needed to reduce out-of-stocks

Reducing out of stocks can generate large potential benefits for suppliers, but will require new kinds of data sharing

Results of promotions and future plans

Inventory buffers held in backroom (and in DC and by 3PL)

Backroom to shelf

POS

Marketing

Factory → **Warehouse** → **Distribution Center (DC)** → **- Store Backroom / - Store Shelf**

Third Party Logistics (3PL) Firms

Transportation schedules

■ **RFID-enabled data**   ■ **Currently-collected data**

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Potential roles for PH/ABPM in spurring RFID benefits

- **PH-based mapping can identify**
  - **Which data sources needed to achieve each kind of RFID-enabled benefit**
  - **Where issues will arise around**
    - —**Sharing of proprietary information**
    - —**Data compatibility**
- **ABPM can focus effort by identifying location and magnitude of benefits**