

The background of the entire image is a stylized, low-poly wireframe representation of a mountain range. The mountains are composed of numerous triangular facets, creating a geometric, crystalline appearance. The color palette is a range of blues, from a deep navy blue at the bottom to a lighter, hazy blue at the top, suggesting a clear sky or a digital environment. The overall aesthetic is modern and technological.

# **RFID**

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# JOURNAL

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## DIGITAL SUMMIT

**MAY 10 - 13, 2021**

# BEYOND INVENTORY MANAGEMENT: RFID IN VISUAL MERCHANDISING



**Antonio Rizzi, Prof., Eng., Ph.D**

Full Professor

Industrial Logistics and Supply Chain Management

University of Parma

RFID Lab, Head and Founder

RFID lab

# BACKGROUND

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2008

April– **Board of Advisors fashion** was set  
Charter members: 13 major brands in fashion industry



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2008 - 2011

## Research Projects:

- ✓ The impact of RFID in the fashion supply chain
  - ✓ Business case
  - ✓ Technology Tests
- ✓ RFID for anti counterfeiting
- ✓ RFID for Electronic Article Surveillance

2009 - 2013

## Pilot activities:

- ✓ RFID fashion store (<http://www.rfidlab.unipr.it/eventi/fashion/2009/>)
- ✓ RFID fashion pilot ([www.rfp.unipr.it](http://www.rfp.unipr.it))



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# Research - projects



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**RFID Boosts Store Turnover by Nearly 10 Percent in Italian Pilot**

A study conducted by the University of Parma's RFID Lab, working with a retailer, apparel suppliers and logistics providers in Italy, reveals significant benefits throughout the supply chain.

**By Mark Roberti**

[Tags: Apparel, Inventory / Warehouse Management, Labeling, Logistics, Manufacturing, Packaging, Retail, Supply Chain, Transport](#)

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The software provides employees with a dashboard showing, in real time, which styles, colors and sizes need to be replenished when some of those items are stocked in the back room but there are none on the sales floor. The system determined what needed to be replenished, by combining [RFID](#) data from the inventory counts with sales data acquired from the [RFID reader](#) at the checkout counter. Store associates were trained to print a list of items to be replenished each morning. The system then tracked when the list was printed, along with the time that those items were moved from the back room to the sale floor.

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2013 - now

## RFID deployments

consultancy and support, PM, KPIs, BI & data analysis



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2013 - now

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## RFID barometer in retail

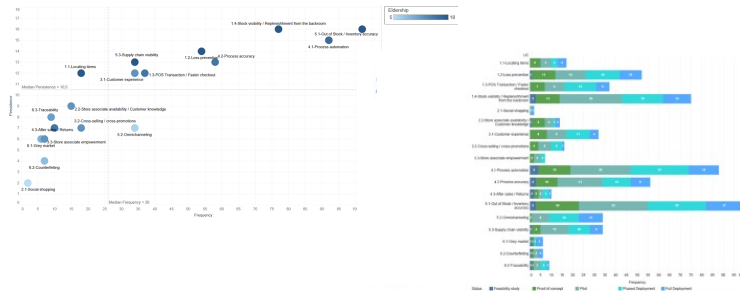


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# RFID barometer in apparel retail

- RFID adoption in fashion and apparel retail
  - Who is adopting, when, how, why?
  - 100+ companies; 18 use cases
  - 24k+ stores; 1B+ tags
  - Use cases framework
  - Evolving use cases
- 
- | Year | Use Case                      |
|------|-------------------------------|
| 2005 | RFID for inventory management |
| 2006 | RFID for inventory management |
| 2007 | RFID for inventory management |
| 2008 | RFID for inventory management |
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| 2013 | RFID for inventory management |
| 2014 | RFID for inventory management |
| 2015 | RFID for inventory management |
- Rizzi, A., Romagnoli, G., & Thiesse, F., 2015  
*International Journal of RF Technologies: Research and Applications*



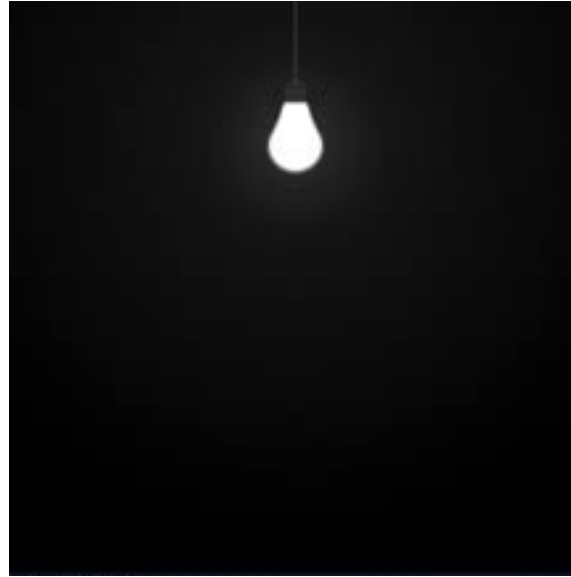
Rizzi, A., Romagnoli, G., & Thiesse, F., 2016. A new framework for RFID use cases in fashion and apparel retailing, *International Journal of RF Technologies: Research and Applications*, 7(2-3), 105-129. DOI: [10.3233/RFT-150075](https://doi.org/10.3233/RFT-150075)

Cilloni, G., Leporati, R., Rizzi, A., Romagnoli, G., 2019. State of the art of item-level RFID deployments in fashion and apparel retail., paper in press

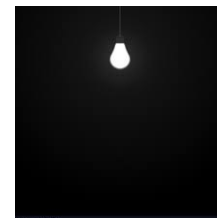
RFID in the store

# **DIFFERENT LEVELS OF VISIBILITY**

# Traditional retail stores – lack of visibility



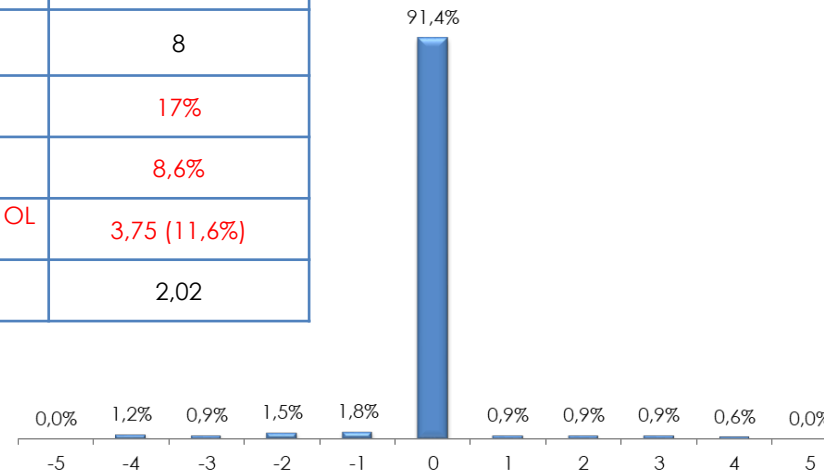
# Lack of visibility – rooth causes



## Inbound inaccuracy

- from the DC
- from other stores
- From third parties

n° BOLs checked	46
n° order lines checked	1480
Average n° OL per BOL	32,2
n° BOLs with errors	8
% BOLs with errors	17%
% OL with errors	8,6%
Average number of wrong OL per BOL	3,75 (11,6%)
Average error (items)	2,02



**Bertolini, M., Bottani, E., Ferretti, G., Rizzi, A., & Volpi, A., 2012.**

Experimental evaluation of business impacts of RFID in apparel and retail supply chain, *International Journal of RF Technologies: Research and Applications*, 3(4), 257-282



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# Lack of visibility – rooth causes



## Inbound inaccuracy

- from the DC
- from other stores
- From third parties

## Outbound inaccuracy

- End of season returns management
- Ship from store



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# Lack of visibility – rooth causes



## Inbound inaccuracy

- from the DC
- from other stores
- From third parties

## Outbound inaccuracy

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- Ship from store

## Internal and external shrinkage



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# Lack of visibility – rooth causes



## Crime Comparisons

### Retail Crime in the U.S., UK and Europe 2019

Three hundred and twenty-eight retailers; eight countries; combined total of 48,000 stores, crime events during 2018-19

- 1.44% of sales is lost for shrinkage

Table 1

Shrinkage and retail crime costs in U.S. & Europe

	shrink as percentage of sales	total shrinkage \$billions	costs of crime \$bn (shrink-minus-error)
U.S.	1.48%	\$43.316	\$34.783
UK	1.42%	\$6.770	\$5.267
Germany	1.12%	\$6.579	\$5.066
France	1.47%	\$6.769	\$5.117
Netherlands	1.40%	\$1.535	\$1.131
Spain	1.51%	\$5.380	\$3.707
Italy	1.67%	\$6.335	\$4.954
Sweden	1.44%	\$0.934	\$0.648
Average/Total	1.44%	\$77.618	\$60.673

# Lack of visibility – rooth causes



## Crime Comparisons

### Retail Crime in the U.S., UK and Europe 2019

Three hundred and twenty-eight retailers; eight countries; combined total of 48,000 stores, crime events during 2018-19

- 1.44% of sales is lost for shrinkage/crime
- 1/3 external, 1/3 internal, 1/3 errors

Figure 2



# Lack of visibility – rooth causes



## Crime Comparisons

### Retail Crime in the U.S., UK and Europe 2019

Three hundred and twenty-eight retailers; eight countries; combined total of 48,000 stores, crime events during 2018-19

- 1.44% of sales is lost for shrinkage/crime
- 1/3 external, 1/3 internal, 1/3 errors
- Apparel is in the hit parade!

#### Most Stolen Merchandise Hit Parade 2019

FOOD & GENERAL MERCHANDISE	Packed meat, such as steak, lamb and bacon Cheese Razor blades alcoholic products Coffee Cosmetics, makeup and lipsticks, Branded under-arm deodorants Perfume and fragrance
APPAREL	<a href="#">Sport fashion</a> <a href="#">Clothing accessories</a> <a href="#">Baby clothes</a> <a href="#">Jeans and casual apparel</a>
ELECTRONICS	Small electrical goods and accessories Batteries Boxed sets DVD and games.

# Lack of visibility – rooth causes



## Inbound inaccuracy

- from the DC
- from other stores
- From third parties

Returns management from customers

Manual adjustments

## Outbound inaccuracy

- End of season returns management
- Ship from store

Checkout errors

Internal and external shrinkage

Damaged spoiled



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# RFID - turn the light on!



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# RFID in the store - three levels of visibility

what is in the store?

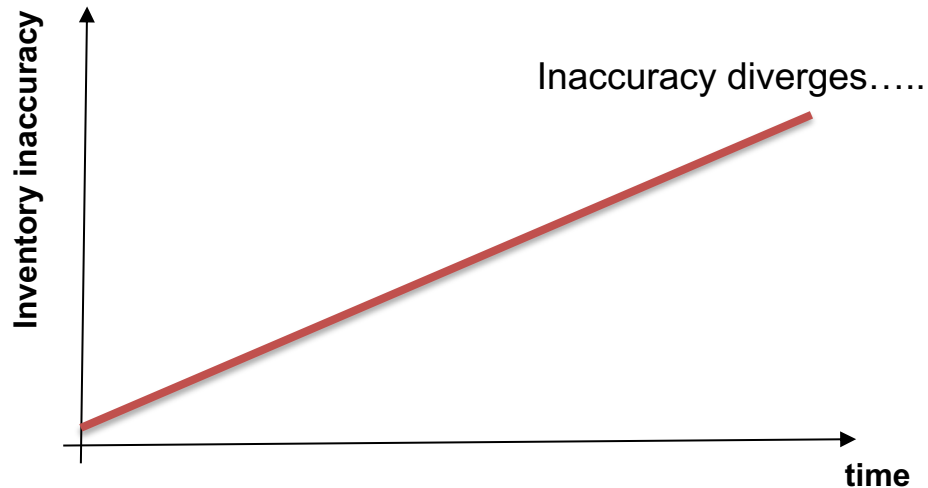
- Inventory accuracy

**Hardgrave, B., 2009**, "ITEM-LEVEL RFID FOR APPAREL FOOTWEAR: THE JCPENNEY RFID INITIATIVE", University of Arkansas White Paper

**Waller, M.A., Nachtmann, H., and Hunter, J., 2006**, "Measuring the Impact of Inaccurate Inventory Information on a Retail Outlet," The International Journal of Logistics Management, 17 (3), 355-376

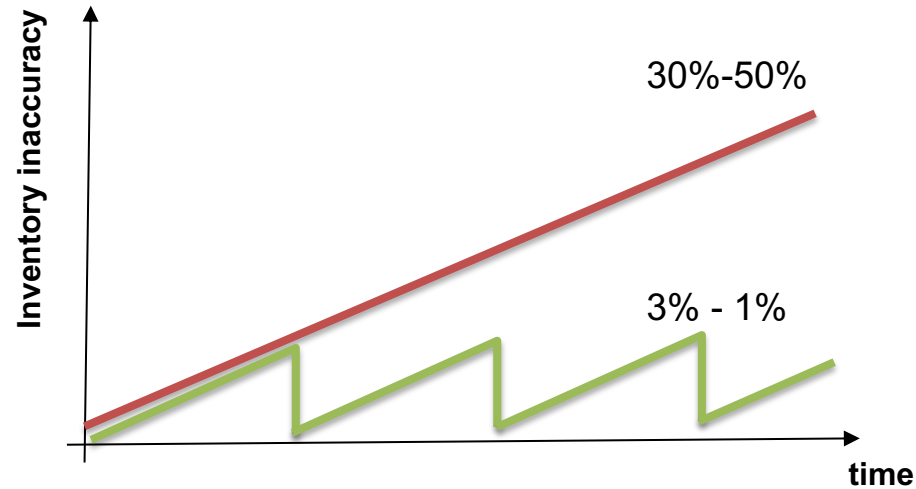


# Inventory inaccuracy



	Accurate PI=OH	Overstated PI>OH	OOS $PI<0; OH=0$	Understated PI<OH
Time 0	90,87%	7,25%	1,14%	1,88%
1 week later	89,61%	8,26%	1,27%	2,13%
1 month later	76,06%	10,76%	1,76%	13,18%
3.100 SKUs; 18.000 Items 10 RFID counts; 20 min each (3h20min) on average				

# Inventory inaccuracy





# RFID in the store - three levels of visibility

what is in the store?

- Inventory accuracy

What is the backroom or in the store area?

- Replenishment from the backroom

**Bottani, E., Ferretti, G., Montanari, R., & Rizzi, A., 2009.** The impact of RFID technology and EPC system on logistics processes of the fashion industry supply chain. *International Journal of RF Technologies: Research and Applications*, 1(4), 225-252.

**Bertolini, M., Bottani, E., Ferretti, G., Rizzi, A., & Volpi, A., 2012.** Experimental evaluation of business impacts of RFID in apparel and retail supply chain, *International Journal of RF Technologies: Research and Applications*, 3(4), 257-282





# Replenishment from the backroom

## Customers buy what they see

- Fashion outlets: Up to 96%
- High luxury retail: 84% sales are triggered by model/colour displayed in the store; only 16% from the backroom



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# RFID in the store - three levels of visibility

what is in the store?

- Inventory accuracy

What is the backroom or in the store area?

- Replenishment from the backroom

What is in which area

- RFID visual merchandising



**Rizzi, A., Volpi, A., 2018.** RFID-enabled visual merchandising in apparel retail. *International Journal of RF Technologies: Research and Applications*, 8(4), 213-231

# Visual merchandising – what it is and why it is important?

- purchase decision making is impulsive, often created by strategic visual presentations and merchandise assortments on the store area
- retailers strive for presenting an attractive sales environment that on the one hand, impacts emotions and keeps customers in the store as much as possible and foster impulse buying
- Displaying the right product in the right area is the key to attract customer, keep them in the store, and increase conversion

# Visual merchandising – why RFID?

- RFID makes it possible to get consistent information on product displays to correlate to sales
- The key point for VM is visibility; RFID is just an enabler

# Visual merchandising – issues at stake

% SPACE – COST TO DISPLAY	
% SALES	Money makers MANTAIN
	The indifferent OPTIMIZE
	The indifferent EXPLORE OPPORTUNITIES
	Money losers REPLACE



# Conclusions



- It is not RFID, its visibility!
- RFID is the visibility enabler that drives sales and reduces costs

what is in the store?

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# THANK YOU

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