

3D RFID

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Wirama



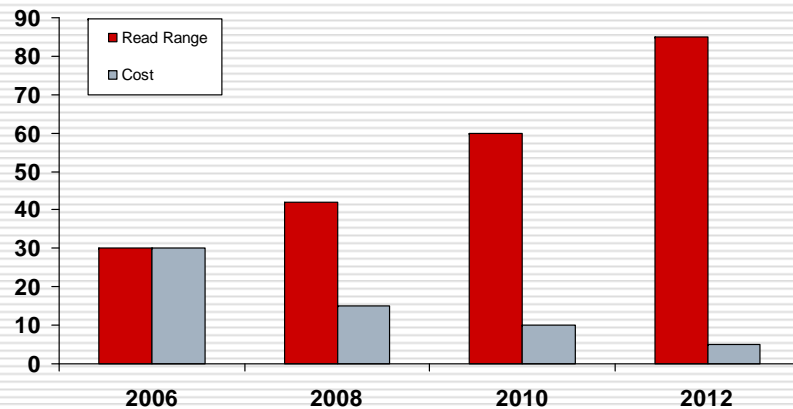
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 - Asset tracking in large yards
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Introduction

- ❑ Incorporated January 2006
- ❑ Team with entrepreneurial experience, engineering savvy, and intellectual horsepower
- ❑ Founders include UC Berkeley and UC Santa Barbara professors – highly cited experts in wireless communication and signal processing
- ❑ Received Series A funding in 2007
- ❑ 5 full/pending patents
- ❑ 4 full-time employees
- ❑ Office in Palo Alto, CA

Introduction



- ❑ Cross reads become more problematic over time
- ❑ Reverse link becomes more challenging
- ❑ Semi-passive tags increase these problems

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Our Goal – Technology

- Transmitter beam forming
 - Increase reliability
- Receiver beam forming
 - Reduce cross reads, increase SNR, cancel interference
- **X,Y,Z locationing for all types of tags**
 - **Gives tag location and directionality, identify zones**
- Multipath/reflection cancellation
 - Improve location in harsh environments.
- Software Defined RFID Reader
 - Easily program Reader for any passive/semi-passive/active tag standard

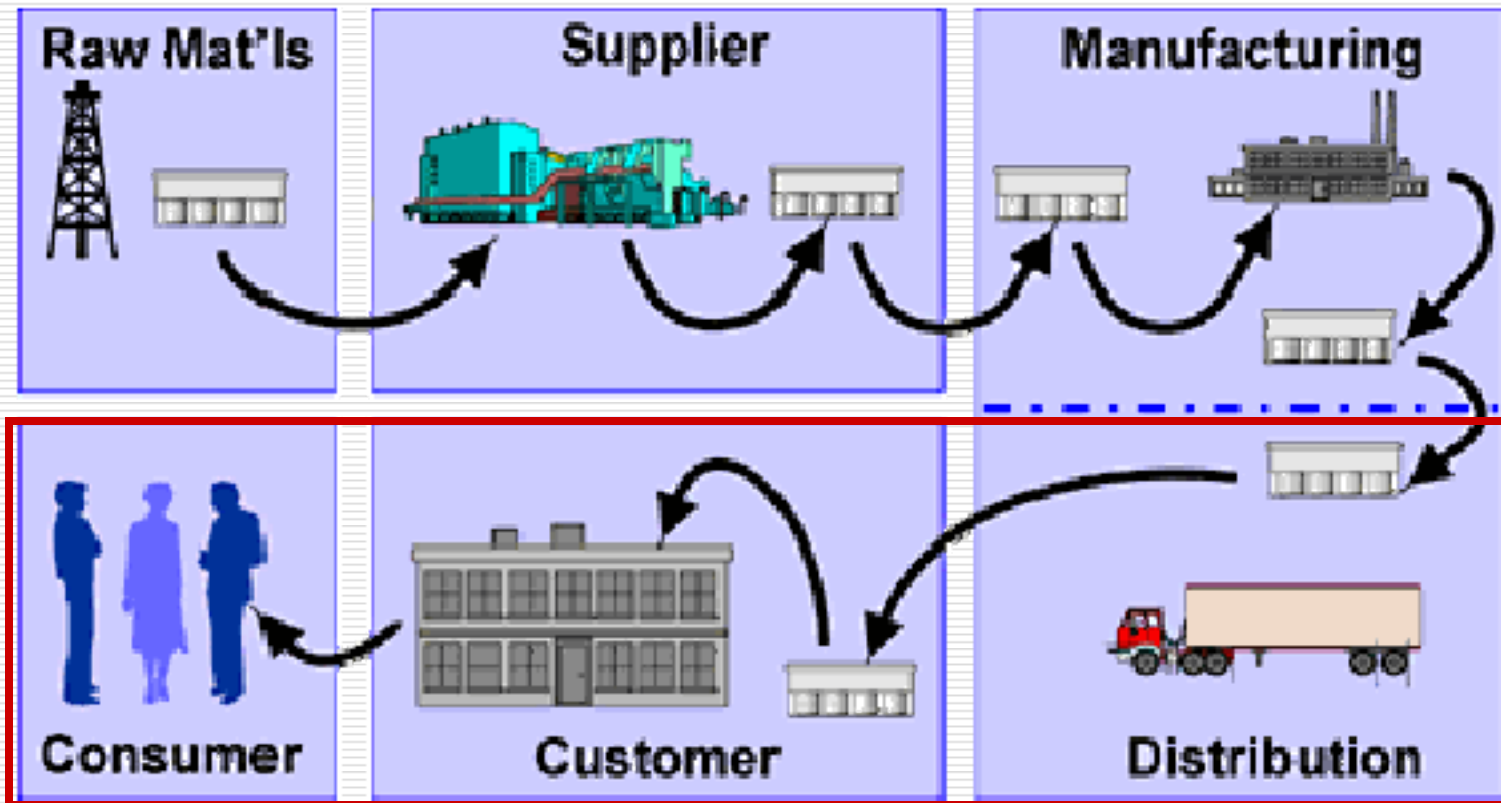
Our Goal – Sample use cases

- Improve existing infrastructures
 - Accurate inventory cycle count
 - High volume dock door processing
 - Direction of arrival
- Enable new ones
 - Locate misplaced items and items of interest
 - Passive and semi-passive RTLS
 - Large yard asset tracing

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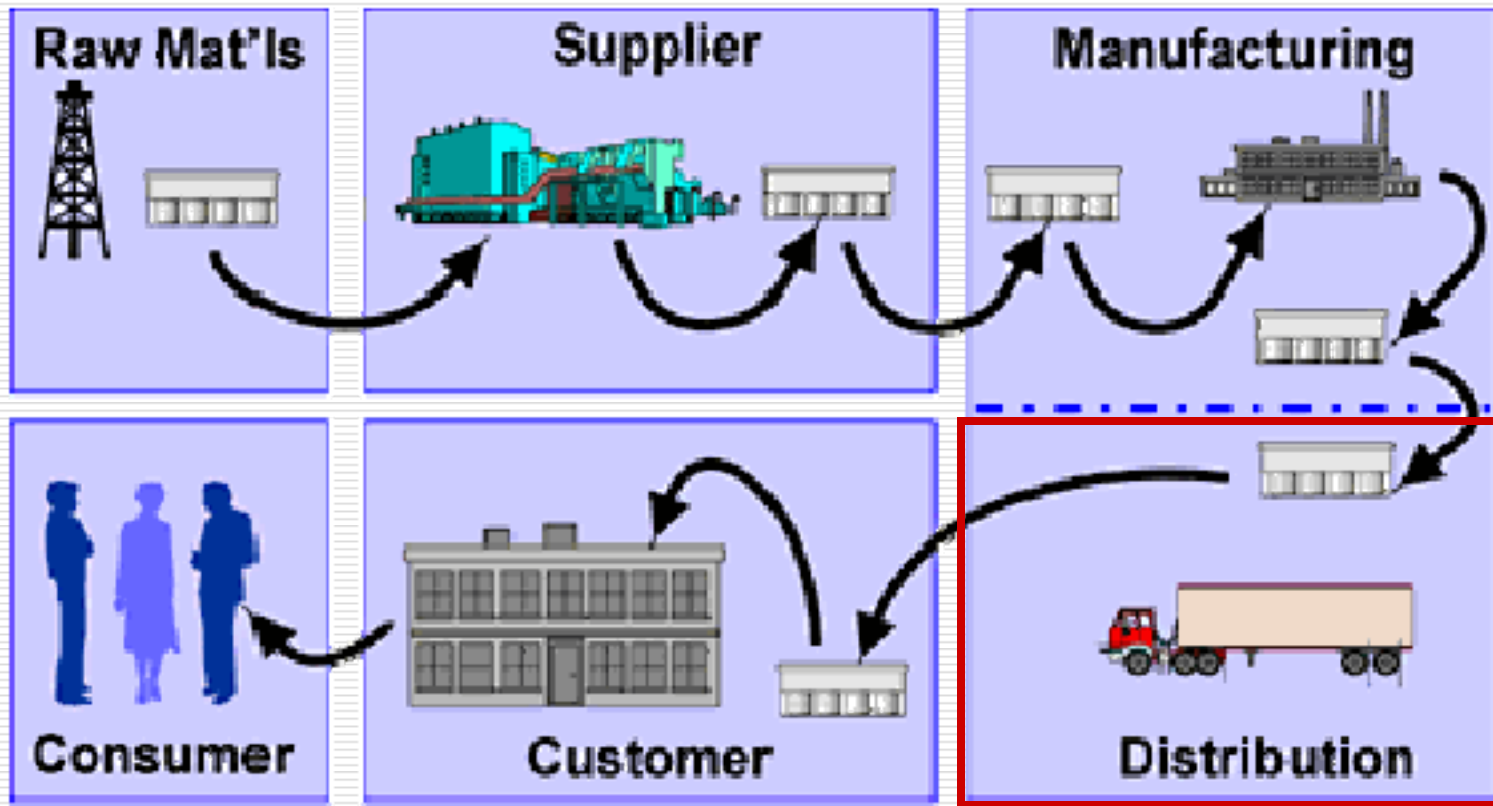
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Supply chain



So many steps...so many inventories...so much time!

Asset tracking in large yards

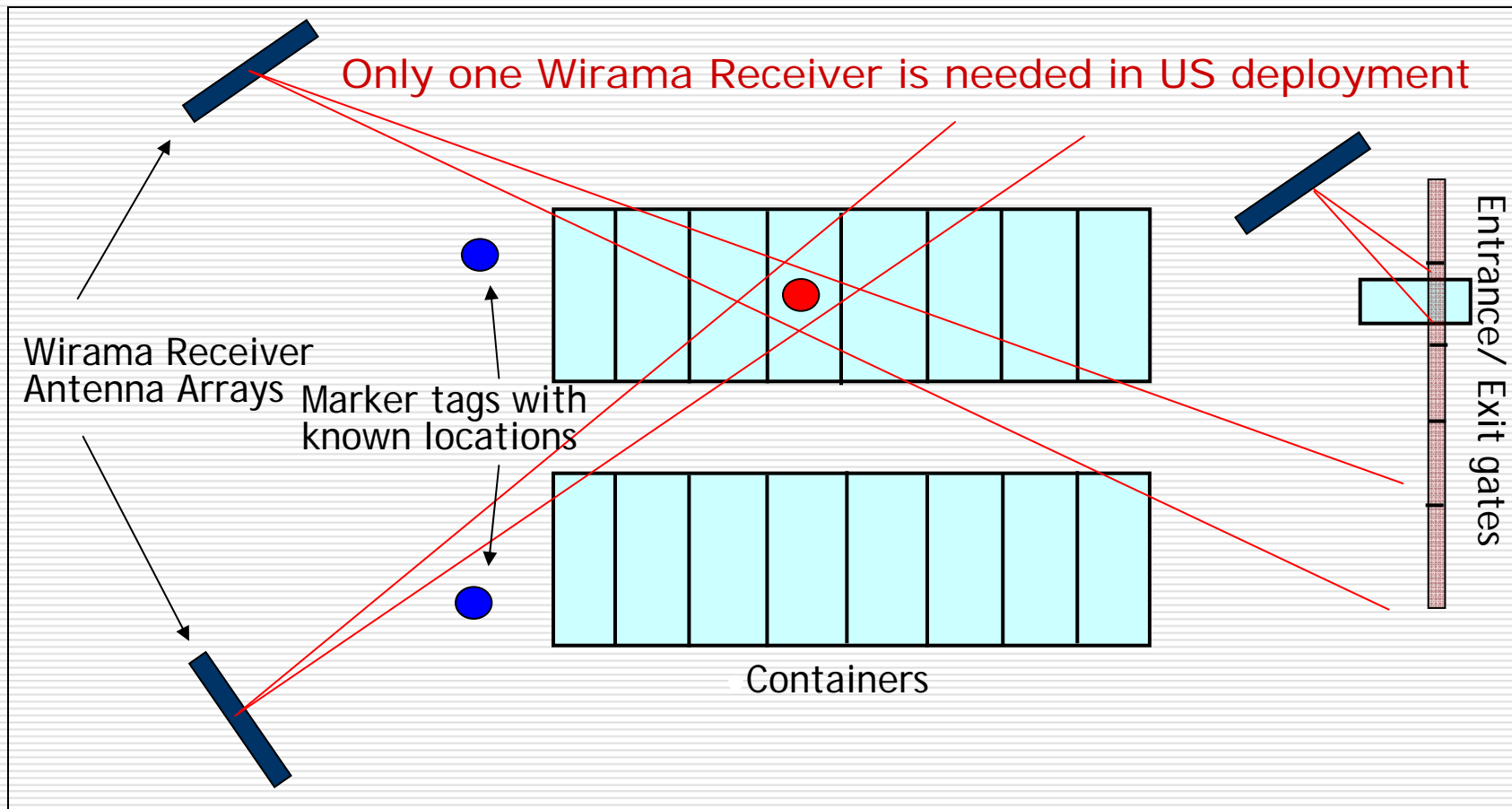


Issues



- K-C: Up to 3 hours to find container of interest
- Lost time in yard check
- Inefficient yard utilization and use of equipment
- Shrinkage through spoilage and theft

Asset tracking in large yards



7/8/2008

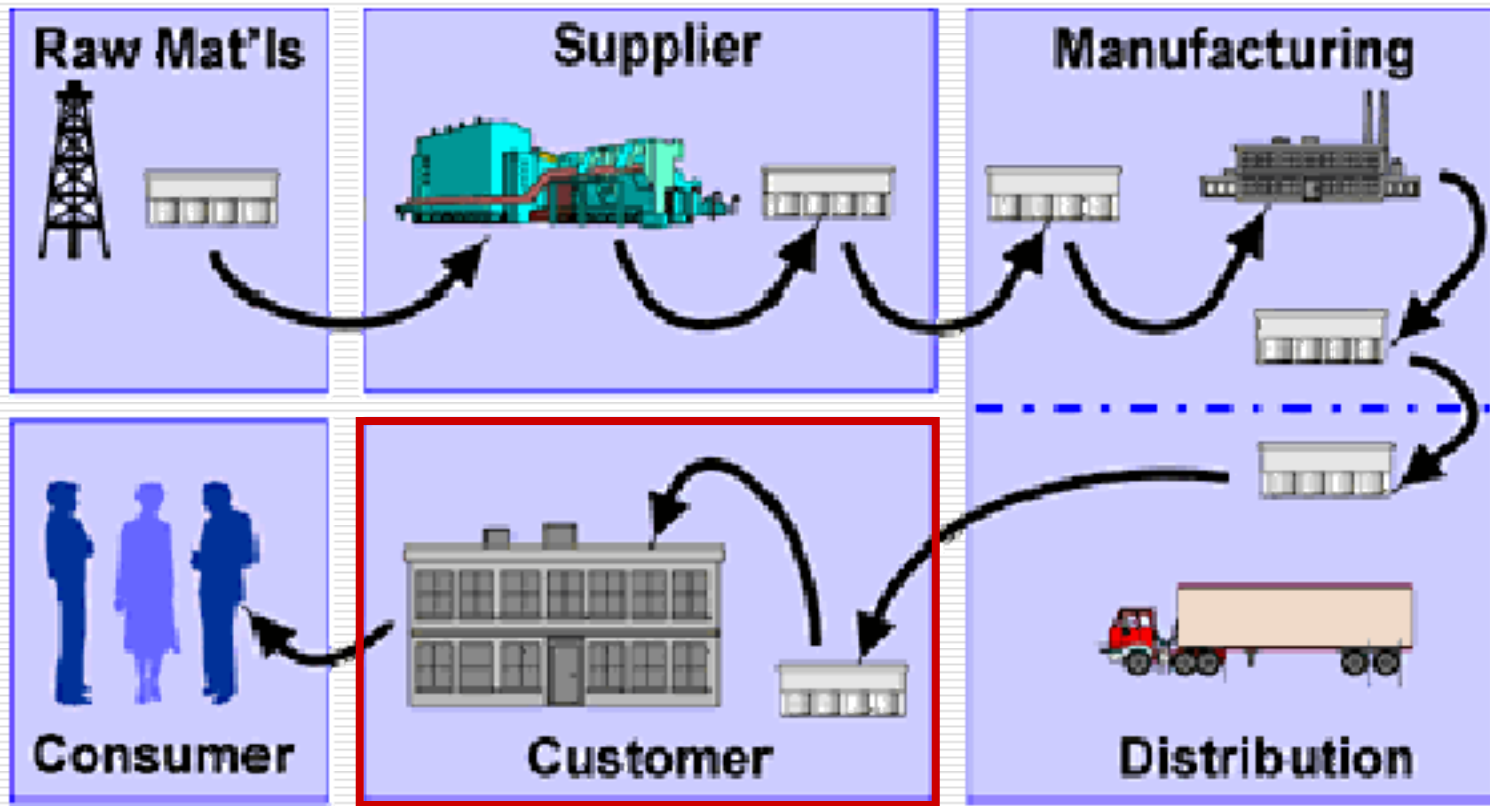
3D RFID



Alternative solutions examples

- Ekahau RSS based active
 - Triangulated received signal strength
 - 3-4 antennas to locate a tag
 - \$40 per tag
- Aeroscout TDOA based active
 - Triangulated time difference of arrival
 - 3-4 antennas to locate a tag
 - \$40 per tag
- Pinc passive/GPS solution
 - Mobile interrogation unit
 - \$3 per tag
- Intellex semi-passive/GPS solution
 - Mobile interrogation unit
 - \$5 per tag

Dock doors

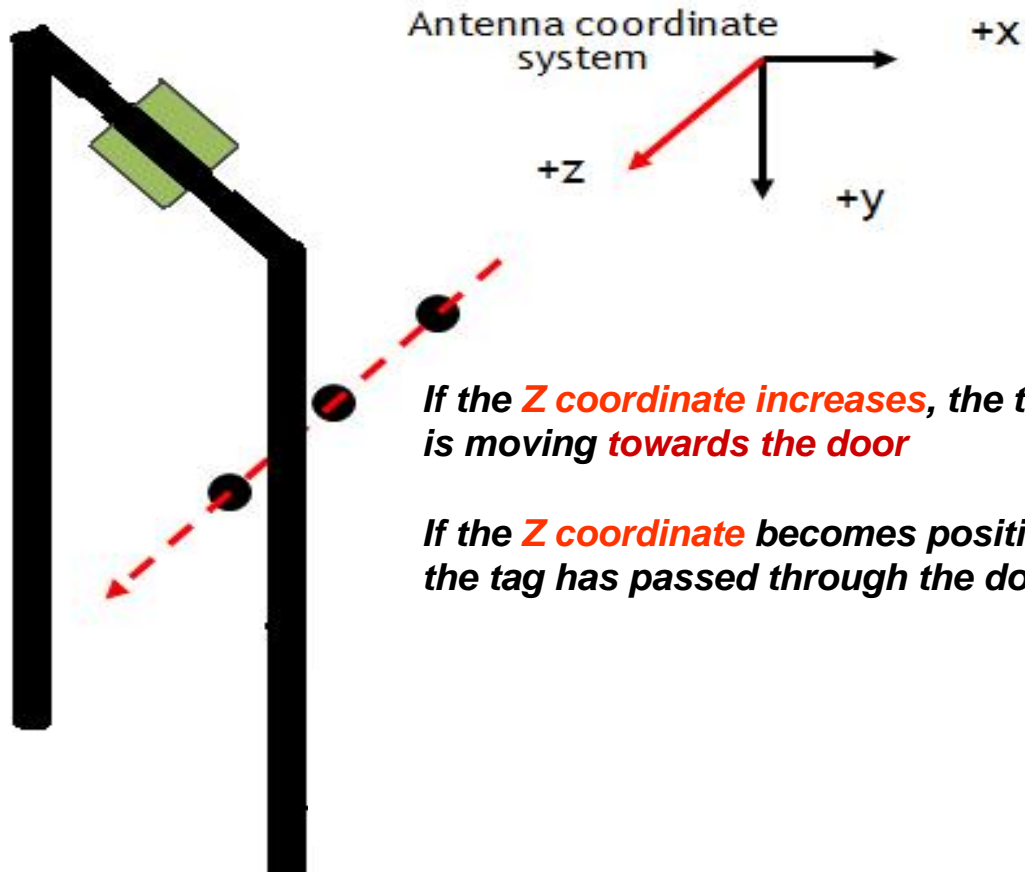


Dock doors issues

- Current problem with the setup
 - Which dock door did the that tagged asset come through?
 - Was it coming in or out?
 - Was it even coming through the door?
- Problem with tags
 - They are becoming too good

Dock door directionality

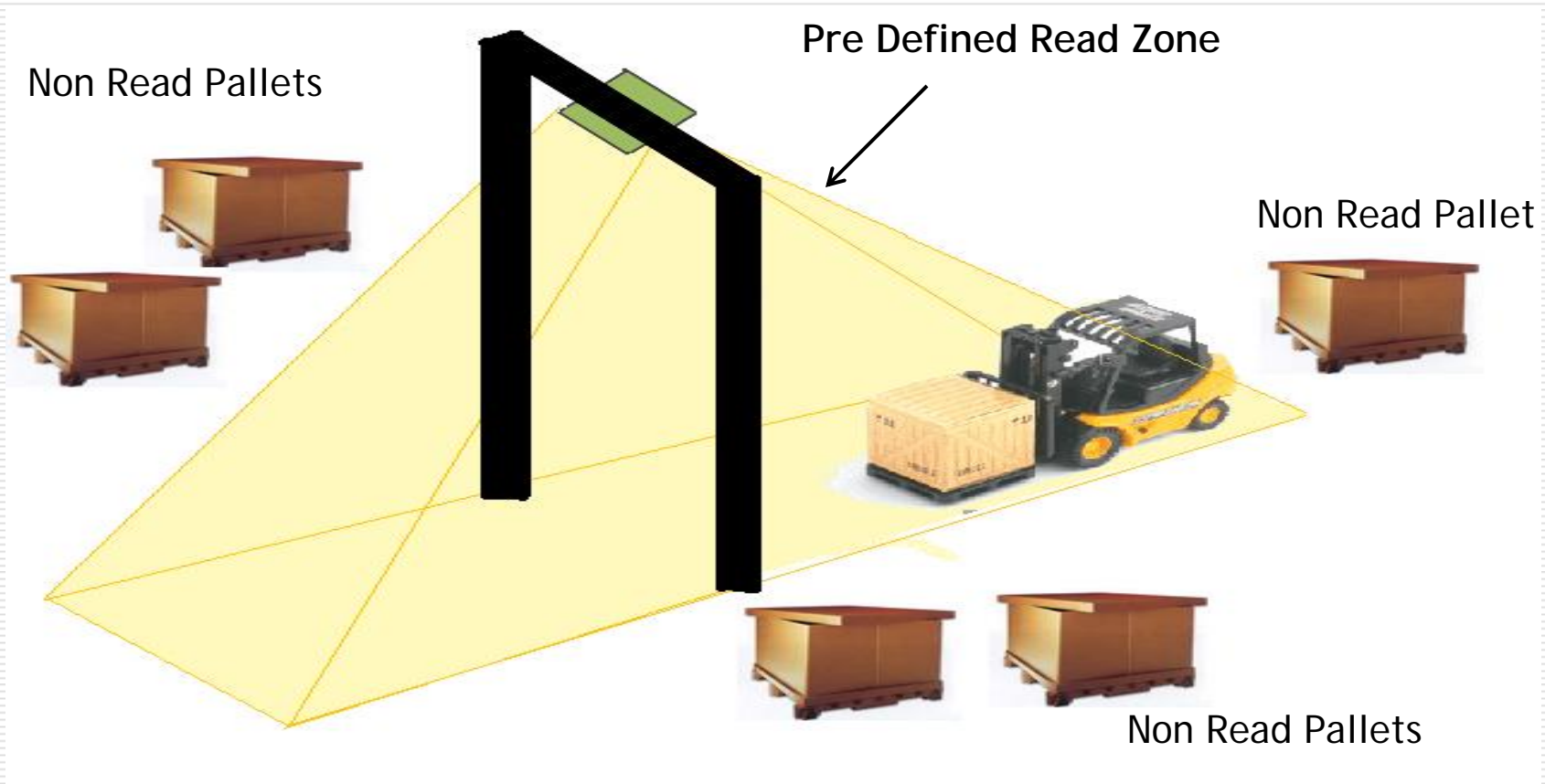
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Locating Reader



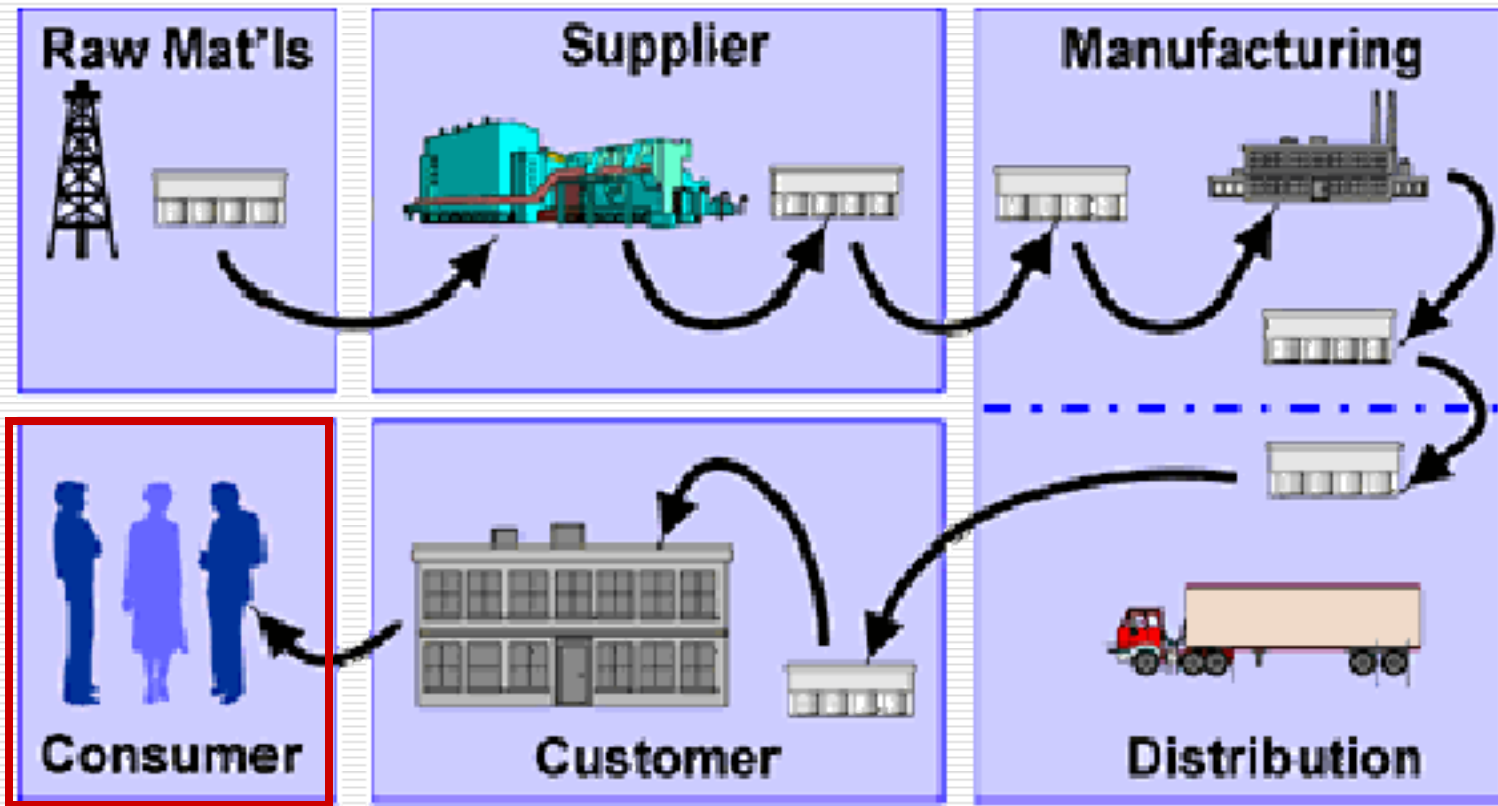
*If the **Z coordinate** increases, the tag is moving **towards the door***

*If the **Z coordinate** becomes positive, the tag has passed through the door*

Eliminate dock door cross reads



Retail



Issues

- ❑ 50% of retail store labor time used searching for items
- ❑ 20% of customers claim they cannot find a desired in stock item
- ❑ 25%+ profit dollars lost to shrinkage
 - Customer theft
 - Employer theft
 - Administrative errors
- ❑ Inefficient restocking process

Location enabled inventory

Ceiling-Mounted Reader

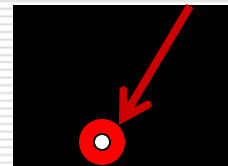
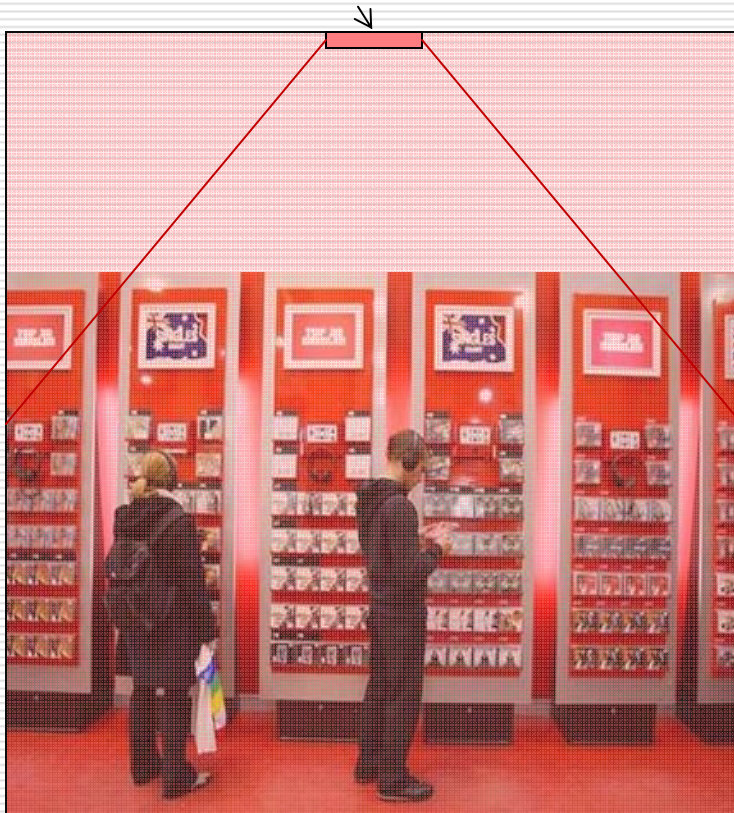


Cart-Mounted Reader

- Accurate inventory cycle count
 - Cross reads elimination
 - Assets tracked to dock door to back room shelves to store shelves
- Improved customer satisfaction

Track movement of valuable items

Wirama Reader



Items moves or disappears

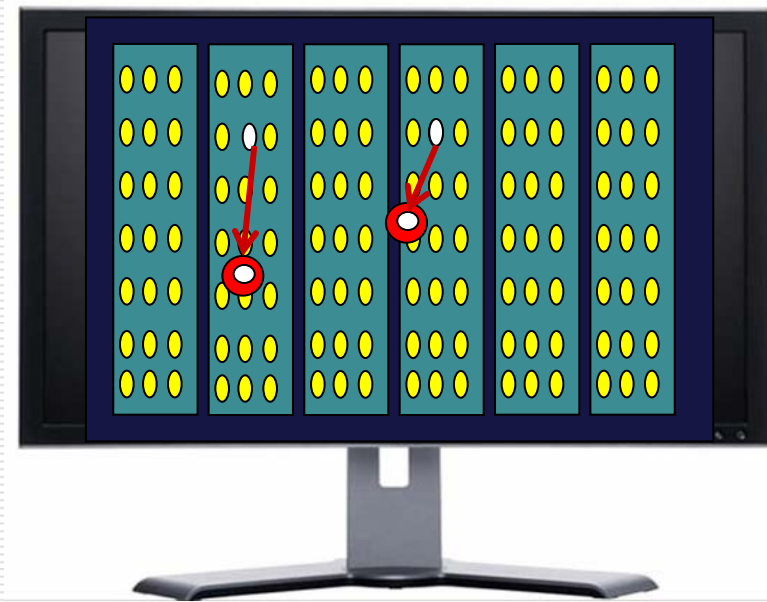


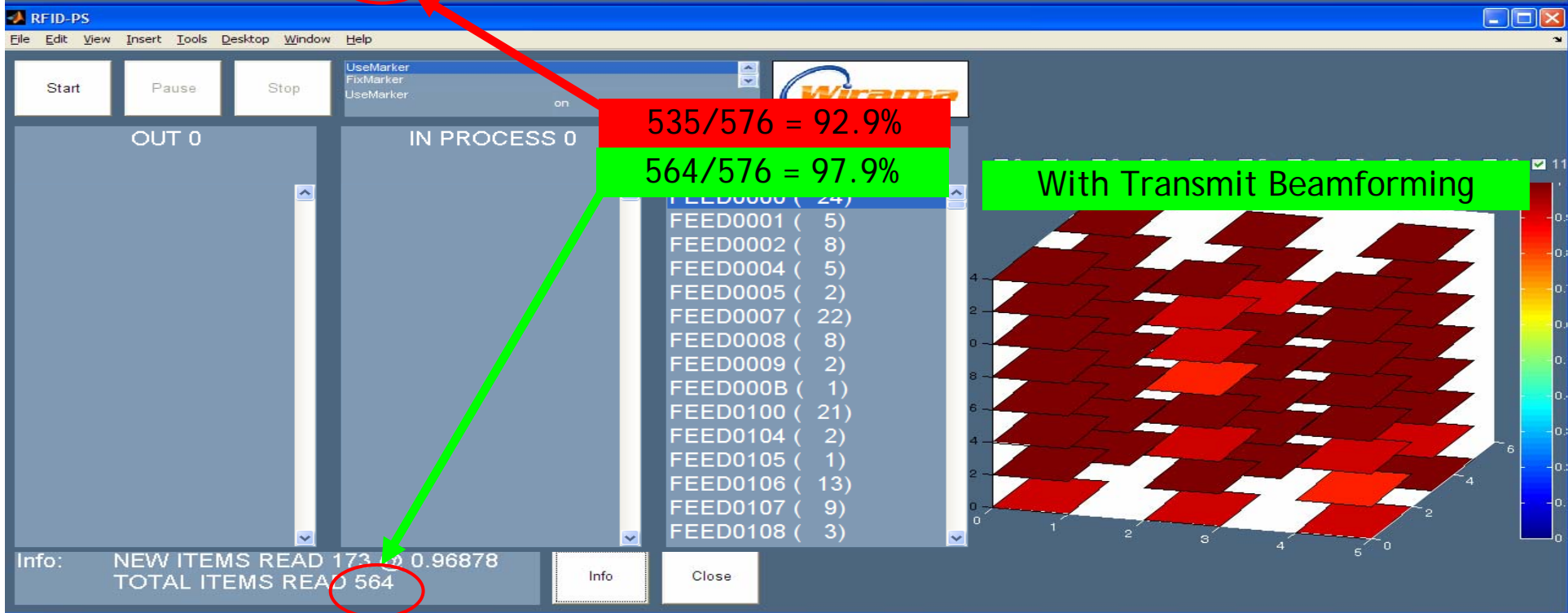
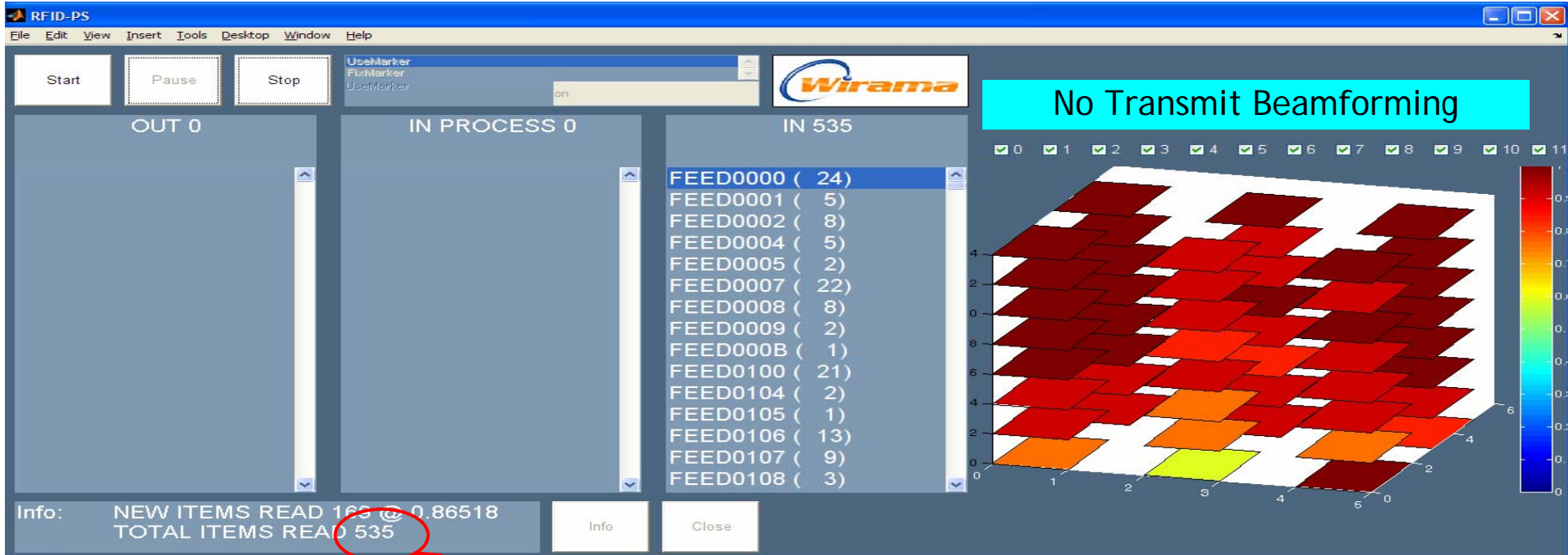
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Current status

- ❑ Beta product available today
- ❑ Integrated phased array antenna
- ❑ Software defined reader with current support of Gen 2 passive and semi-passive tags
- ❑ 30'+ read range with passive 100'+ read range with semi-passive
- ❑ 1000+ tags per second in a dock door setup
- ❑ 6'' accuracy per 10' of distance
- ❑ Tx and Rx beam forming with all the benefits
- ❑ Two configurations: mobile, battery powered; fixed, multi antenna
- ❑ Bluetooth, serial port communication interface





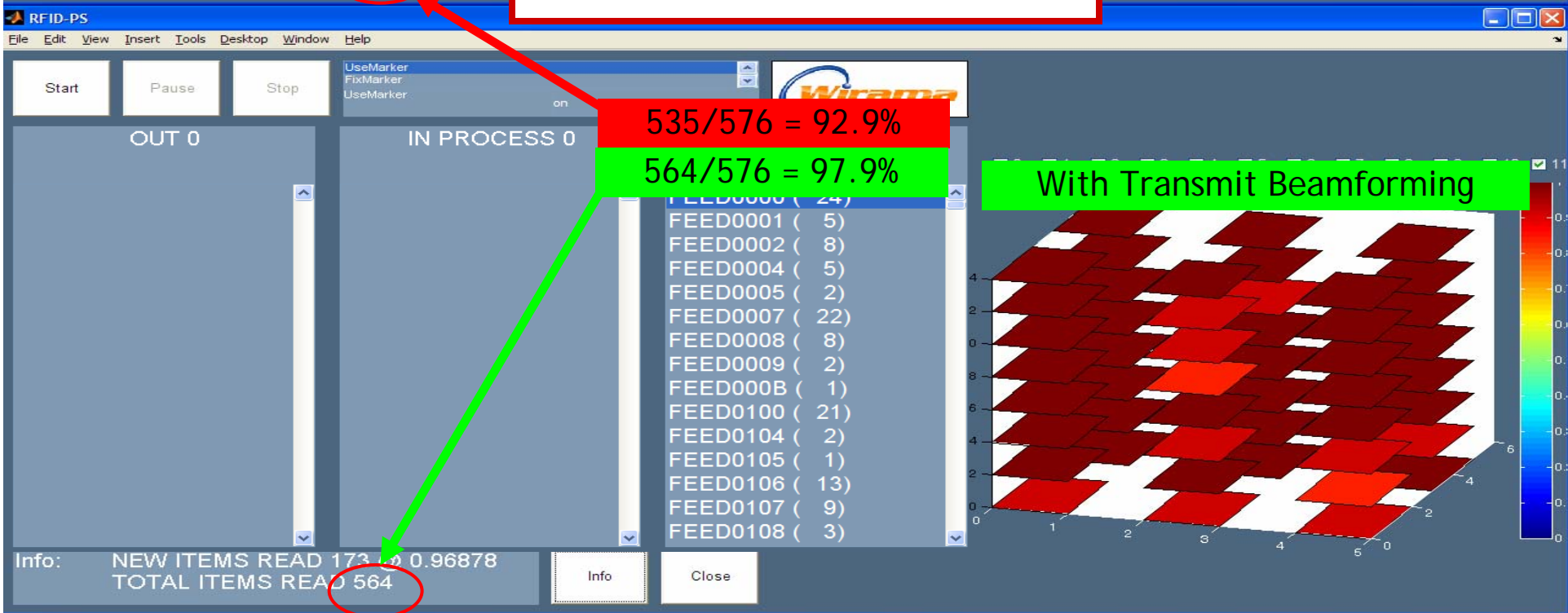
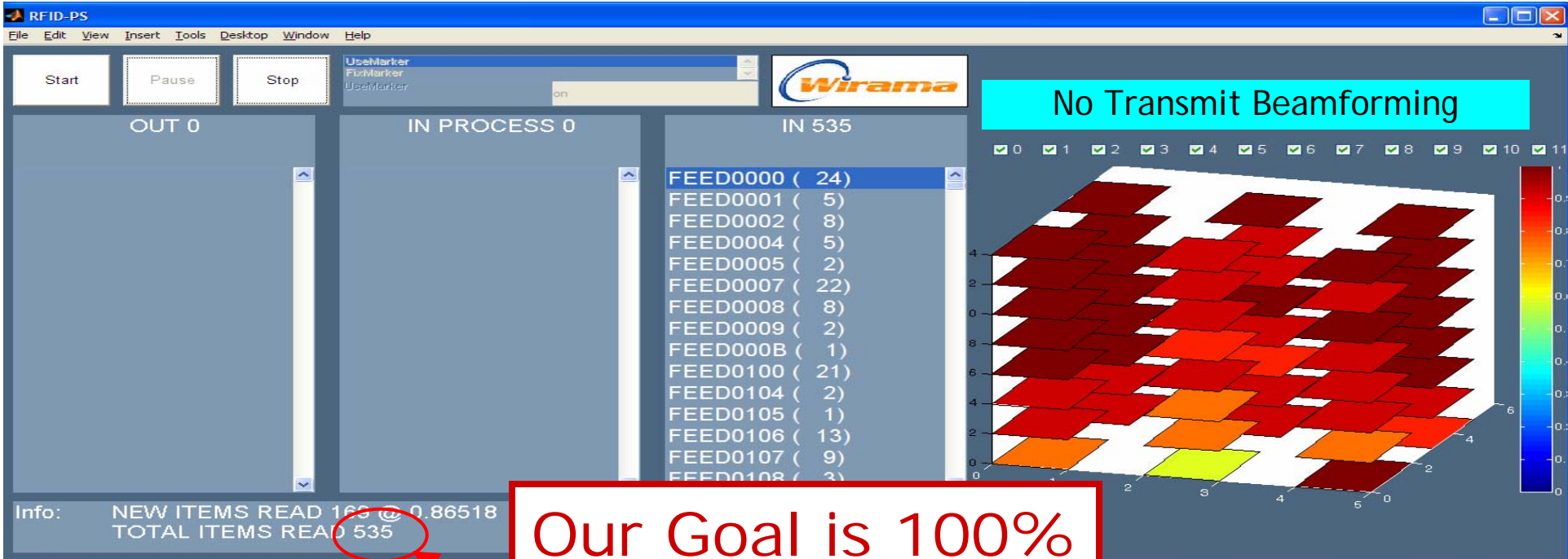


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