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Digital Trail of Your Assets

REMOVE WEAK LINKS IN DATA ACQUISITION

IDENTITY
VISIBILITY
USABILITY

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Email Us : support@trakaid.com

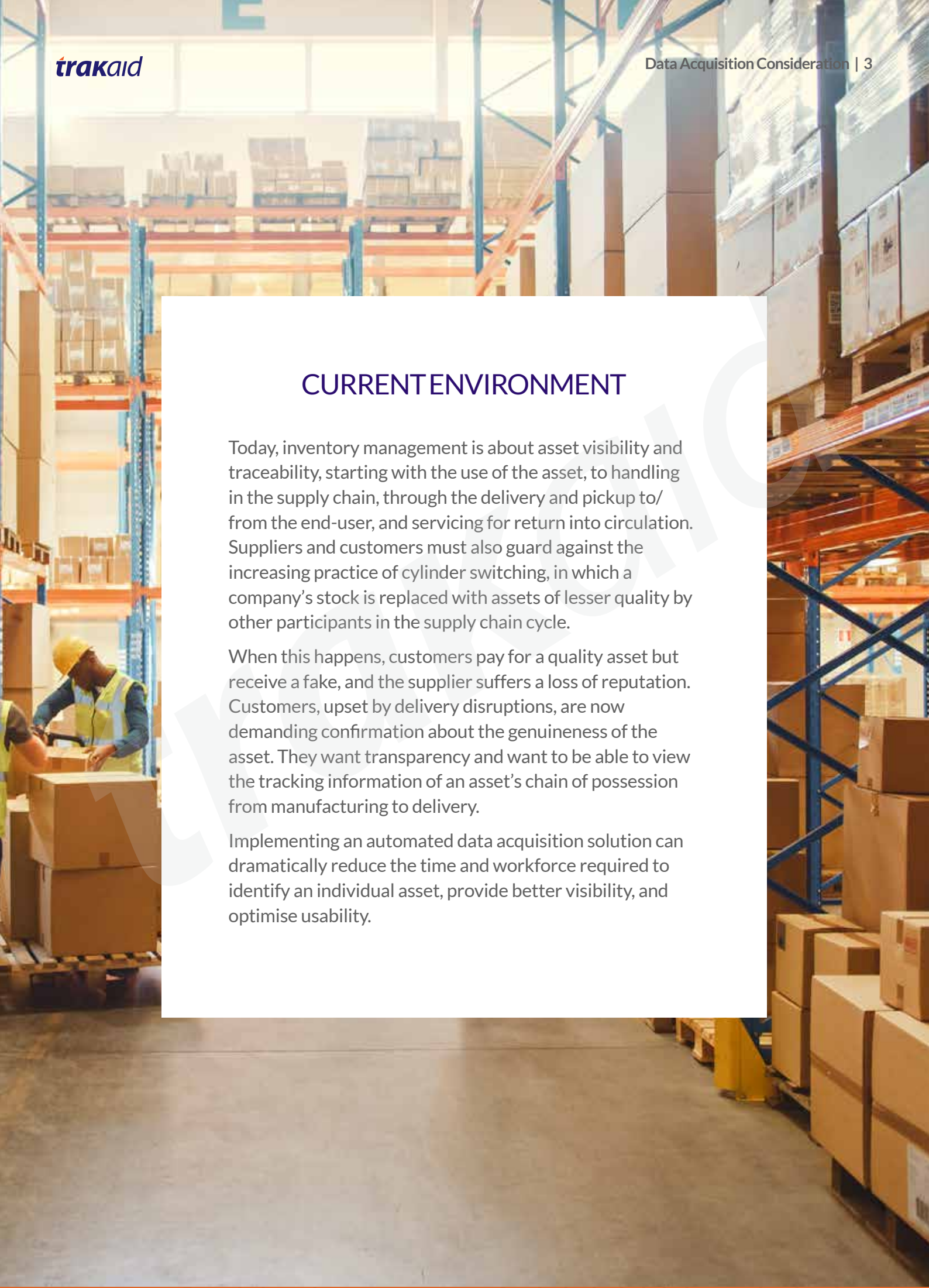
CONSIDERATIONS FOR THE USE OF DATA ACQUISITION TECHNOLOGY IN A HARSH INDUSTRIAL ENVIRONMENT

Background

Digital data acquisition is essential for tracking, monitoring and managing each asset and inventory in returnable asset transactions. However, for many companies, the container cost exceeds the commodity it contains. With extensive asset inventories to be maintained, the potential losses can amount to millions of dollars.

Manual data entry, which is performed first with pen and paper, and then with manual data entry into an electronic database, introduces approximately 20 per cent of errors in the correct representation of any asset ID. Team members have to return to the asset's site to correct the mistake, possibly multiple times during each transaction in which the asset is in use. For example, filling gas, or other commodities in the returnable asset, are issued and delivered to the end-user and returned to the supplier.

Errors in record-keeping contribute to low productivity through repetition of the same task. They also contribute to a consistent shortage of assets at any given time due to the inability to trace and recall misplaced or idle assets in customer locations. But, most importantly, they undermine customer trust in the supplier's ability to deliver a reliable product promptly.



CURRENT ENVIRONMENT

Today, inventory management is about asset visibility and traceability, starting with the use of the asset, to handling in the supply chain, through the delivery and pickup to/from the end-user, and servicing for return into circulation. Suppliers and customers must also guard against the increasing practice of cylinder switching, in which a company's stock is replaced with assets of lesser quality by other participants in the supply chain cycle.

When this happens, customers pay for a quality asset but receive a fake, and the supplier suffers a loss of reputation. Customers, upset by delivery disruptions, are now demanding confirmation about the genuineness of the asset. They want transparency and want to be able to view the tracking information of an asset's chain of possession from manufacturing to delivery.

Implementing an automated data acquisition solution can dramatically reduce the time and workforce required to identify an individual asset, provide better visibility, and optimise usability.

Data Acquisition Technology

Current auto-identification data acquisition technologies include 1D \ 2D barcodes, QR code, and Radio Frequency Identification (RFID). They each use an encoded label and a scanning device to decode the data and transfer it to a central database.

Barcode labels work for indoor use; plastic/paper are inexpensive and easy to produce. Metal bar codes are more expensive but can withstand the demands of a harsh industrial environment, resistance to heat, cold, moisture, UV light and rough handling. Barcode labels can be scanned with smartphone cameras or handheld barcode scanners to acquire data. The technology is easy to use, highly portable and affordable.

However, barcode labels are easy to duplicate and challenging to read as they are easily scratched or torn, soiled with dust or oil, and occasionally separated from the asset. Also, barcode \ QR code technology is only capable of reading one label at a time and requires a line of sight between the scanner and the label. The procedure can become challenging with the massive number of assets.

Implementing automated data capture can eliminate these challenges. Document asset status quickly without error at each location in the transfer of a movable asset – at the fill station, during delivery, and during pickup - requires data acquisition. As a result, customers receive a more reliable product, and suppliers can access more information about their inventory status.

Companies are turning to RFID technology to tighten up and verify the repeated procedures and transactions that are the mainstay of their business. This option implements additional features that secure, enhance, speed up, and automate the process of data acquisition. For example, each RFID tag has a unique number that is challenging to alter or replicate and read without a direct line of sight between the scanner and the tag. These two features allow for rapid and accurate data acquisition and automation.

RFID tags are custom-made according to user requirements. For example, gas cylinder tags are encased in a small, curved plastic box that can withstand harsh treatment in industrial environments. In addition, they are attached to the cylinder with permanent bonding. However, RFID technology is vulnerable in locations subject to frequent radio interference.

Both RFID tags and barcodes carry product information, and both work very well. However, the two technologies have advantages and disadvantages, as listed in the following chart:

What Is RFID?

Radio Frequency Identification (RFID) is a standards-based technology that uses radio signals to read identification codes - Electronic Product Codes (EPC) and unique Tag Identification Codes (TID). RFID technology increases data acquisition efficiency and integrity, lowers the total cost of operation (TCO) and brings in an excellent return on investment (ROI).

It does not require a line of sight to read or write tag data, even in harsh industrial environments. The RFID scanner can read the tag whether a few inches/cm or hundreds of feet (or metres) from the asset.

How Does RFID Technology Work?

RFID employs a reader as a radio signal initiator and a receiver that listens to signals sent from passive RFID tags. The unique identification code is embedded digitally on a microchip, read, and registered by initiating the scan on the reader. The customer can read multiple RFID chips quickly and easily.

RFID Tag

RFID tags have no moving parts, are small, and have a multi-year life span. An RFID microchip is embedded in a high-impact resistant case based on end-use. The tag is then attached to the asset with a permanent bonding agent.

The RFID tag provides a robust, local, secure read-write data cache to record the most recent asset information. The combination of the Unique Identifier Code on the microchip, the serial number on the cylinder, and added user information make it possible to track and document the life span of any one single asset.

RFID Reader

An RFID reader is a radio signal initiator and receiver that listens to the modulated signals sent back from the RFID tags. Today, fixed readers such as those used in RFID signal scanning are used to automate supply chains and the transfer of movables.

Where Are RFID Tags Read?

Primarily, read RFID tags for each transaction - production floors, shipping docks and supply chain. Scanning and re-scanning tags by multiple users create a history of transferring assets from one location to another.

What Happens to the Read Data?

Users may identify the asset by scanning the RFID tag with the scanner attached to the smartphone, then save the data, process the same on the android smartphone or integrated device, and upload it to the central database over the internet.

How Is Data Filtered?

On starting a scan, an RFID reader or software may read a unique tag multiple times. Data filtering creates one record. In addition, the system validates the status of each unique asset tag.

What Systems Is the Data Passed on to, and How is the Data Used?

Upload data from the handheld device to a central database over the internet. The application will automatically update the status of the individual asset and the total inventory. It will also close jobs associated with the conclusion of an asset transaction. View in real-time the visibility and usability of the asset.

Automate Data Acquisition with the IoT (Internet of Things)

IoT devices like sensors, controllers and RFID technology are used to scan and automate process data acquisition using asset identity without human intervention and direct line of sight. More companies are deploying IoT solutions and RFID tags to track their assets from end to end, from manufacturing, movement in the supply chain, and logistics to delivery, after-sales service and repair.

Using IoT technology allows a company to participate in the digital economy. IoT is easy to use with quick ROI. Secure IoT technology can validate large quantities of data, embrace the data revolution, automate manual processes, diagnose production bottlenecks and enhance customer service.

COMPARISON OF RFID TAGS AND BARCODE LABELS IN THE CYLINDER INDUSTRY

Consideration and Comparison

BENEFITS & FEATURES	BARCODE	UHF RFID
COUNTERFEITING 	Yes: Barcodes are simple and easy to duplicate.	No: The digital Unique Identity Code (UIC) is embedded on a microchip and is challenging to replicate.
Accuracy 	Good	Good
 Ease of Use	Simple: Peel and attach	Simple to moderate: bonded to the asset
 COST \ TCO	Plastic labels cost the US $0.06. More durable labels for use on metals cost the US $0.80. High TCO as there are recurring costs to identify and replace damaged labels.	Plastic tags cost the US $0.15. Durable tags cost the US $1 for use in harsh, hazardous environments and on-metal. Low TCO. Bonded tags last for years.
 Return on Investment (ROI)	Low: Counterfeited labels are difficult to identify. Brand identity is compromised.	High: ID information is challenging to replicate. Iron-clad protection for brand identity
 HARSH ENVIRONMENT	No: Labels are environmentally sensitive. They may become illegible due to scratching, dust, or oil.	Yes: Tag encasements are highly resistant to damage in harsh environments. and rough handling
 LIFE SPAN	Limited: Paper and plastic barcode labels are adequate for indoor use but degrade quickly with handling. Metallic barcode labels have a longer lifespan but can become difficult to read in the presence of dust and oil.	Long-Lasting: Use a robust protective case to embed RFID tags with no moving parts.
 PHYSICAL SIZE	Size-sensitive: The aspect ratio of a barcode's length vs. width is critical to its operation	Less size-sensitive: The aspect ratio of a tag's length vs. width is flexible and not a significant factor in an operational capacity.
 TRACEABILITY	More suitable for an entire class of products than for identifying a single asset.	Suitable for the identification of a single asset. ID information for each asset plus user recorded data provides comprehensive and accurate total inventory information.
 Line of Sight	The scanner must "see" the barcode label to read it	The scanner must "see" the barcode label to read it

 Manual Orientation	Manual orientation required to match the reader to the barcode position	No orientation required
 Scan Range	Inches	Inches or feet
 Speed	Slow: Read label one at a time.	Fast: Scan more tags in a shorter period.
 SCANNING	No: The need to be near the barcode label and the fact that they have to be read one at a time creates obstacles to automation.	Yes: Made for automation.
 Use with IoT	No: It needs a line of sight.	Yes: Automated data acquisition with the use of IoT readers and sensors
 SECURITY	Low: No - Barcodes can be easily reproduced or counterfeited.	High: RIFD has the capacity for data encryption and password protection.
 DYNAMIC DATA UPDATES	No: Barcode technology does not allow for the addition of product details.	Yes: update onboard user memory with additional product information, such as product calibration and maintenance history. Quick updates are made automatically without human intervention
 PRODUCT CODES	No: Major markets such as Retail have created standards that are excellent at coding product types. Information beyond these basic parameters is not feasible as the barcode size becomes too large.	Yes: Retains digital data in memory. In addition, microchips provide the ability to encode product parameters.
 Geo Location	Yes: a GPS-enabled scanning device captures GPS coordinates on every scan.	Yes: a GPS-enabled scanning device captures GPS coordinates on every scan.
 Proof of Receipt	Yes: Scanners are enabled with touch screens and electronic signature software.	Yes: Scanners are enabled with touch screens and electronic signature software.