EPC Adoption Roadmap
Getting additional value from your EPC adoption

1. Introduction
We have introduced you to a few of the potential advantages of using a combination of GS1 EPC standards and RFID technology. We would like to finish this roadmap by introducing you to some more of those possibilities.

The nature of goods and materials that pass through supply chains every day varies greatly. Even with the advances in RFID, their suitability for use with the technology varies. Below we have listed use cases that can work for most goods and materials.

There isn’t room in a document of this nature to explain more than the basics of each case study but if you would like more detailed information then please contact GS1 UK and we will be glad to assist you.

But before we look at more possibilities, let’s quickly recap the basic elements and characteristics of EPC event data.

Getting visibility of what is passing through the supply chain requires knowing:

- What something was
- Where it was
- When it was there
- Why it was there

This forms the "event" data and if the RFID tags are being read automatically, then it also forms a "real time" record of what has physically happened.

2. Integrating EPC event data

2.1. Goods inbound
If your inbound goods are tagged then you can automate their identification and receiving. But if your supplier has also notified you via an EPCIS exchange that your goods have physically left their premises then you know that they are in transit. This benefits long and multi-staged journeys - as is the case for many items sold in the Americas or Europe but sourced from Asia – enabling the receipt of intermediate notifications when goods arrive at port of departure, are loaded on to vessel, arrive at port of entry and so on.

Such visibility increases confidence levels that supply will arrive as planned or give an early warning that something has gone wrong. Higher confidence in supply can lower buffer inventory. Whilst knowing that something has gone wrong before a scheduled delivery enables pro-active actions to minimise the impact. This is particularly important for extended supply chains and to reduce any bullwhip effect. Less buffer inventory means less capital tied up and more optimum use of facilities, as well as reduced risk of obsolescence.

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2.2. Warehouse management

If your products are tagged then there are ways to determine automatically and accurately determine exactly where they are put away. This has the knock one effect of a more accurate pick. Discovering a product is not in its correct location is especially bad when it is required at that moment. Misplaced product not only can’t be sold but stays on your books until found and something can be done with it. And, for some products that could mean becoming obsolescent and being written off. This applies at virtually all stages in the supply chain from manufacturing to picking from a back room of a store.

Tagged goods can also be detected being placed in the wrong outbound staging lane or being loaded into the wrong truck or container. This can substantially reduce items being shipped incorrectly.

2.3. Inventory management

Increasing the accuracy of put away and pick, increases accuracy of your overall inventory picture, which can reduce the frequency of cycle counting.

Having an accurate picture of what inventory you have means that replenishment orders are not adding to materials that aren’t being consumed or finished goods that aren’t being sold. That results in less obsolescence and so less write offs or discounted sales.

Using RFID to accurately record the physical receipt and shipment of goods improves the synchronisation of your logical and physical inventory picture. Meaning the liabilities and assets shown in your books, match the assets that are physically under your control.

Having a more accurate picture of inventory increases your trust in stock levels which often results in a lower holding stock. It also enhances FIFO (First In First Out) inventory management capabilities which for time sensitive items can also reduce obsolescence.

For managing inventory on the shop floor, some tagged goods present opportunities to increase inventory accuracy and dramatically reduce the time and effort to know what inventory is on the floor. Apparel in particular can show dramatic returns in this respect with process efficiency gains of up to 600% and inventory accuracy rates of up to 99.50% by count and SKU.

The time taken for inventory counts (cycle and full physical) can be radically reduced where the count can be done using RFID.

2.4. Planning optimisation

Improving visibility of inbound materials and finished goods allows more time for planning logistics operations, such as staffing levels and shift patterns. In the long term, improved data also helps to optimise the planning, receiving, storage and dispatch of facilities and capacity. This in turn maximises the effectiveness of the overall manufacturing, logistics and distribution network.

That same improved inbound visibility can equally be applied to improve production and capacity planning in a manufacturing environment. Where production requiring specific materials has been planned, early warning that the materials will not arrive in time enables pro-active production re-planning and can avoid loss of production capacity and idle lines.

2.5. Work in Progress (WIP)

Having accurate visibility of line side materials means a more effective Kanban replenishment process and less risk of lines stopping for lack of materials. Being able to find and pick replenishment materials accurately also improves the overall process.

If you are assembling serialised finished goods the tagged components can prevent incorrect configuration and auto detect component use and serial number details.
In retail operations, visibility of product movements from back room to store can confirm goods are available on the floor for shelf replenishment and help highlight any process deficiencies.

2.6. Demand forecasting

All product producers have to forecast demand in order to ensure the right product is available at the right time in the right place for their customers. If your customer is part of your distribution channel then they have to do the same – forecast what they think their customers’ demand will be. The more layers in the distribution channel, the more overall variance in the forecast and this usually results in high levels of inventory through the channel.

If your customer shares details of their customers’ consumption then you can have much better visibility of true demand. True demand is that generated by the ultimate end user/consumer of the product. Combining EPC RFID and EPCIS makes it easy to share this information back up through the supply chain so that all of your trading partners are working off true demand.

Visibility of true demand increases the portion of forecasting based on historic demand data, providing better base data for modelling new product demand. By reducing the variability between forecast and actual demand, buffer stocks can also be reduced, which then lowers overall inventory levels.

2.7. Key Performance Indicators (KPI’s)

KPI’s are often related to physical events, obvious examples being the completion of goods on a manufacturing line or the passing of goods through a point of sale. Many of these events, in the supply chain, currently rely on human action to signal an occurrence, which can be misleading.

When goods are received in a typical warehouse, receipt is not tied to their physical receipt but to someone scanning a barcode on the product or pallet. But that scan could take place minutes or even hours later. A KPI that relied on such scans, such as a service level agreement from receipt to put away, is then open to manipulation.

But if that receipt was automatically triggered by reading the tag as the pallet moved across the receiving dock door, then the time of receipt record is more likely to be accurate and less open to manipulation. Visibility that is linked to physical events means that your KPI’s can be based upon real physical data.

2.8. Asset management

By “assets” in this context we mean the physical items used in your operation but not processed as part of it. Returnable Transport Items (totes), tools, computers, tills and office furniture are all examples of such assets. It is important to track these assets both from an accounting and operational perspective. By tagging assets, they can be identified very quickly and their movement within your operation can be detected automatically.

For asset, such as totes, that leave your control, you can detect when they leave and when they arrive back. It is even possible to record on an asset how many times it has been through a specific cycle such as cleaning or refurbishment. GS1 has two identification standards which relate to these types of assets:

- The Global Individual Asset Identifier (GIAI) – used to identify long-lived, high value, and sensitive assets, such as office equipment, furniture, computers, manufacturing equipment, distribution centre devices, and firearms.
- The Global Returnable Asset Identifier (GRAI) – used to identify a reusable package or transport equipment, such as pallets, barrels, gas cylinders, rail cars, and trailers. The equipment leaves the asset owner and the GRAI is used to track it as it is used.

Being able to identify assets without having to find a barcode and orient the asset for scanning can considerably reduce the time and effort of reconciling a physical inventory.
2.9. Out of Stock (OOS)
In this context "out of stock" specifically refers to a product not being available on shelf in store, a very serious situation for any retailer as the consequences range from a disappointed to a lost customer. Not having a product on shelf during a promotion period is especially serious in this respect. However, in many cases this is avoidable, as an out of stock does not necessarily mean that there is no more of the product on site. It could be in the back store. EPC/RFID can help reduce this problem in two ways:
- If you know the product shelf inventory at a point in time, the consumption of that product (at POS) and how much of the product has been moved to the floor then you can detect when the product is likely to go out of stock and take pro-active action to prevent it happening
- If products are tagged and put away is automatically detected, then you will:
  - Accurately know how much of that product you have in the back room
  - And where it is

2.10. Product recall
If product is serialised using a sequential method then it can be recalled within a specific serial number range. This avoids the need to recall on a blanket basis and to clear all products off the shelves. It also enables a selected recall of product already in the hands of the consumer.

2.11. Cold chain
Cold chain items must be stored at or below specific temperatures for the integrity and safety of the item to be maintained. While these items can safely spend short period out of the cold environment, care must be taken to ensure that they do not fall below threshold temperature. Should an item be detected leaving the cold store and remain out beyond a threshold period, then this can be brought to the attention of the right person to ensure rapid return to cold storage or removal from saleable inventory.

2.12. Point of Sale (POS)
If a product is radio friendly then the POS process can be dramatically transformed. Checking out 10 apparel items can take some time with as the barcodes must be found and lined up with the scanner. With EPC/RFID the items can be placed in a checkout surface and all "scanned" in a few seconds. This reduces process time, increases checkout accuracy (and thus inventory accuracy) and improves customer satisfaction.

2.13. Product pedigree
For products such as pharmaceuticals it is important to know the "pedigree" of the product; who made it, where has it been and under whose control has it been? The GS1 EPC standards include a standard for recording such a pedigree on the RFID tag.

2.14. Electronic Article Surveillance (EAS)
If the tag is used for EAS then it is possible to identify whether or not that specific physical item has been sold in that store. This prevents instances where the person with the item claims to have purchased it at another store. It is not necessary to buy and apply a separate tag for EAS purposes.
2.15. **Product returns**

If the returned product is serialised then the exact date of purchase can be established by looking at sales records even if the customer does not produce a sales receipt. It is also possible to establish that the specific product being returned was or was not sold by the retailer.

2.16. **Track and trace**

For items being delivered to your customer the increased visibility that EPC/RFID can provide for you can in turn enable you to provide better visibility to your customer should you wish to do so.

3. **EPC adoption expansion**

There are more potential gains to be made from expanding the application of your EPC Adoption beyond just the tagging of products that you are supplying to your customer. Let’s look at a few examples

3.1. **Customer advantage**

Customers don’t like waiting while they shop but in some scenario’s that’s exactly what they are often asked to do. Retail footwear departments are an excellent example – sample designs, sizes and colours are displayed on the shop floor to get customer interest. But once that customer has expressed interest, it’s necessary to get details of their foot size and the colour they prefer, then go and look to see if that combination is in stock in a store area off the shop floor.

But if those shoes are tagged then the perpetual inventory of that shoe store will be known as everything that enters and leaves the store is tracked. So a sales associate can tell immediately if the required item is in stock without going to look in the shoe store. If it is in stock then the sales associate can find the item quickly using a handheld RFID reader. This is a good example of the customer benefitting from the application of EPC and RFID technology.

3.2. **Vendor Managed Inventory (VMI)**

If your supplier is operating VMI on at your location then should the products be tagged, their arrival at your location can be notified to you via EPCIS. Even though you don’t own or control the VMI, you still have visibility of it so know what materials or finished products are available to you on site from your VMI suppliers.

3.3. **Collaborative Planning, Forecasting and Replenishment (CPFR)**

CPFR is a set of processes that enable manufacturers, suppliers and their customers to jointly “change the relationship paradigm and create significantly more accurate information that can drive the value chain to greater sales and profits”.

Two key aspects of CPFR are:

- giving suppliers insight into their customer’s sales forecast
- giving those customers better visibility of the replenishment pipeline.

Their customers rely partly on visibility of what is happening in their processes to be able to provide a more accurate forecast. And those suppliers rely upon visibility of what is happening in their processes and movement of the products to their customers to be able to share accurate information on the replenishment pipeline. The combination of EPC and RFID can improve both.

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2 You can find out more about CPFR at http://www.vics.org/guidelines/cpfr_roadmap_case_studies/
3.4. **Upstream suppliers**
As we have seen with the various examples above and in other chapters, the benefits that can be derived from your EPC Roadmap implementation need not be confined to just your company operations. Your suppliers can benefit from knowing what you have received, where you physically received it and precisely when that happened.

You could go further and let them have visibility of when you consume the materials or products that they have supplied to assist them in their own forecasting, material and production planning.

3.5. **Internal EPC adoption expansion**
If you have implemented your EPC Adoption Roadmap only for a portion of your products/operations, then once your implementation is stable, you may want to look at expanding your implementation to other product categories. And this may not be as capital intensive as your original implementation.

As an example, if you have already set up RFID infrastructure at your store receiving dock for the initial implementation, that infrastructure can be used for any product that is being received, without the need to install further infrastructure. The same applies to the systems and controls that you have set up for your initial implementation. This can often mean that the viability of expending your implementation is less difficult to achieve than the original implementation.

4. **Decision making**
Good supply chain and retail operations management depends upon making good decisions. Making good decisions is dependent upon having good data on which to base those decisions. And finally, you must have processes and analytics that enable you to mine that data and transform it into business intelligence. Ultimately, the quality of your decisions is directly related to the quality of the basic elementary data of what has happened or is still happening in your supply chain.

The combination of EPC and RFID technology makes it viable to collect data where it was not viable to do so before, but it also provides more accurate and granular data too. It’s this combination that can transform the quality of the data upon which you make your decisions.

5. **Further learning**
See what other learning’s there are in EPC/RFID and what opportunities your organisation can take advantage of with your EPC/RFID implementation. The EPC Adoption Roadmap provides a full set of supplemental materials that you can reference during your implementation.

6. **Milestone**
Congratulations!

You have finally completed your EPC Adoption Roadmap by learning about additional benefits that may be available to you from your implementation.