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The Event Data Sharing Standard: EPCIS

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The COVID-19 pandemic is certainly causing turmoil in the retail industry. However, for some companies, the crisis has created a sense of urgency for adopting innovative strategies, including those involving blockchain. A recent study called the Chain Integration Project (CHIP), completed earlier this year, represented a small but important step to determine how blockchain could help solve persistent supply chain challenges such as data sharing accuracy and efficiency that are likely to continue long term.

Seeking to specifically explore a way to reduce costly claims and chargebacks and simplify trading partner collaboration, the Auburn University RFID Lab, in collaboration with GS1 US and several leading retail companies, launched the groundbreaking proof of concept. CHIP demonstrated the capability to use blockchain in combination with radio frequency identification (RFID) to gather serialized product information. Three brands, Nike, PVH Corp. and Herman Kay, as well as two retailers, Kohl's and Macy's, contributed live data to the project.

Moreover, it demonstrated that a GS1 data-sharing standard called EPCIS (Electronic Product Code Information Services) enabled more flexible, event-based data sharing between these partners, as it records the what, when, where and why associated with supply chain events. It enables businesses to capture and share supply chain information about the movement and status of goods, both within their enterprise and with their business partners.

EPCIS is the standardized data model that can help supply chain partners form a solid foundation in preparation for blockchain and other digital transformation efforts. The following is an examination of the four components of EPCIS, and how CHIP helped demonstrate its critical role in helping companies achieve supply chain visibility.

THE "WHAT"

During the CHIP proof of concept, all items being shipped from brand to retailer were identified with Serialized Global Trade Item Numbers (SGTINs). The serialization element of this identification key allows brands to individually identify different units of the same product. These standards are used in combination with item-level RFID tags and carton-level identifiers reference by the participants' data management systems.

These building blocks of unique identification are part of an important first step in the serialization process. Working together, these data sources provide more granular information than the basic identifiers found in most barcodes. They also ensure item-level singularity, allowing users to identify and trace specific items or cases throughout the supply chain. In the CHIP proof of concept, most participating brands were paired with a retailer partner, except for one case where a brand operated vertically. Each posted data to be retained in a blockchain ledger using EPCIS. The ledger contained a record of different test products' journeys.

> In general, by recording and transmitting the business context of supply chain events, EPCIS is what enables users to gain a shared view of physical or digital objects within a relevant business context.

For example, a brand and retailer tested the shipment of men's parkas from source to store. As the product progressed through the supply chain, it triggered a new event at each touch point. All events involving the parkas were recorded on the blockchain and available to both trading partners. With unique identification already established, the product data was able to be shared automatically without manual look-ups and time-consuming follow-up procedures.

THE "WHEN"

The RFID Lab researchers noted that during the process of confirming the movement of products between the brand-retailer pairs, date standardization via EPCIS was a tremendous help to clarify when transactions specifically occurred. For example, in an internationally connected industry like retail, the date stamp "6/7/2019" could be confusing. Trading partners could be left wondering if this is June 7, 2019, or following the European date format, it could be July 6, 2019. Additionally, EPCIS enables electronic proof of delivery (EPoD) in a way that is easy to track and report.

Given the permanence of data recording on a blockchain, the quality and the consistency of data details like this is of the utmost importance at the onset of a proof of concept, pilot, or other implementation. Introducing more automation via blockchain can't guarantee data accuracy. A blockchain solution will only process bad data faster, and forever, on an immutable ledger without a foundation based on quality data.

THE "WHERE"

EPCIS records an event in the physical world and helps make the location of each transaction more visible. Leveraging the Global Location Numbers (GLNs) of manufacturing plants, distribution centers, and stores, the location history can be recorded on a blockchain with specificity. These transaction records are particularly useful during a product recall or withdrawal, as end-to-end traceability requires full knowledge of all of the locations where affected or unsafe products have passed through.

In the CHIP proof of concept, the participants identified the locations including relevant manufacturing sites, distribution centers, and stores. This gave the participants visibility into which products had arrived at different locations across the supply chain. EPCIS data gave the participants a read on the different supply chain nodes where product data was collected—a key part of supply chain visibility which is the optimal foundation for blockchain.

THE "WHY"

EPCIS also provides a read on the business process steps that occur, such as receiving or shipping. It provides the state of the item (e.g., saleable, expired, in transit, etc.) and may be used to capture sensor data such as temperature, which is key for cold chain applications in the food or healthcare industries. EPCIS is a useful tool for product recalls, as it can track the movement of goods across the supply chain and into consumers' hands.

In general, by recording and transmitting the business context of supply chain events, EPCIS is what enables users to gain a shared view of physical or digital objects within a relevant business context. This information enhances business analytics by applying visibility data to supply chain network planning, asset utilization analysis and other operations.

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An Example of EPCIS from the CHIP Proof of Concept

XML example

```
<EPCISBody>
 <EventList>
  <TransactionEvent>
   <eventTime>2019-06-14T19:54:13.183-04:00Z</eventTime>
   <recordTime>2019-07-01T12:09:58.150-04:00Z</recordTime>
   <eventTimeZoneOffset>-04:00</eventTimeZoneOffset>
   <parentID>urn:epc:id:sscc:0099617.0378886433</parentID>
  <epcList>
    <epc>urn:epc:id:sgtin:0011531.020393.20998782988</epc>
  </epcList>
  <action>OBSERVE</action>
  <bizStep>urn:epcglobal:cbv:bizstep:receiving</bizStep>
  <disposition>urn:epcglobal:cbv:disp:in_progress</disposition>
  <readPoint>
    <id>urn:epc:id:sgln:5012345.67890.1</id>
  </readPoint>
  <bizLocation>
   <id>urn:epc:id:sgln:5012345.67890.2</id>
  </bizLocation>
  </TransactionEvent>
 </EventList>
```

JSON example*

```
{"eventtype": "ObjectEvent", "eventTime": "2019-06-
14T19:54:13.183-04:00Z", "recordTime": "2019-07-
01T12:09:58.150-04:00Z", "eventTimeZoneOffset": "-
04:00", "parentID":
"urn:epc:id:sscc:0099617.0378886433", "epc":
"urn:epc:id:sgtin:0011531.020393.20998782988", "hex":
"301400B42C13EA44E3A0000C", "action": "OBSERVE",
"bizStep": "urn:epcglobal:cbv:bizstep:receiving",
"disposition": "urn:epcglobal:cbv:disp:in_progress",
"readPoint": "urn:epc:id:sgln: 5012345.67890.1",
"bizLocation": "urn:epc:id:sgln: 5012345.67890.2"}
```

*although the current EPCIS standard only supports XML format, it was necessary to transform each transaction into a more "blockchain friendly" JSON format. GS1 is expected to publish formal guidance for EPCIS and JSON in 2020.

In conclusion, familiarity with EPCIS was imperative to this blockchain proof of concept as it helped establish a common language among the participants. As the core data sharing standard for supply chain visibility, EPCIS is foundational to blockchain experimentation and implementation, and should be prioritized for any retail companies exploring blockchain for greater efficiency.

ABOUT THE AUTHOR

Susan Pichoff leads the GS1 US Apparel and General Merchandise Initiative—an industry group that works to solve supply chain challenges such as data accuracy, inventory visibility and efficiency through GS1 Standards. She is a seasoned veteran of retail operations, having spent 20+ years at Macy's Systems & Technology, managing product databases, merchandise suppliers, and software suppliers to build systems that improved the customer experience.

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