



Defining Today's
Technology Standards;
Empowering Tomorrow's
Solutions.



Make•IT•Wright 20 HACKATHON 23

Training Session #3

Date: February 2nd, 2023

by AIM North America



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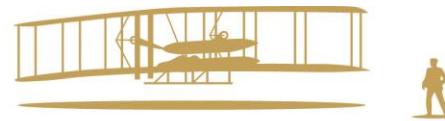
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Speaker



Matt Kijowski



**WRIGHT STATE
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Cyber Systems Program Manager

matthew.kijowski@wright.edu

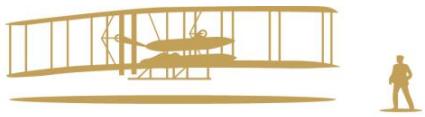


Session 3 Agenda

- 5:00 Welcome
- 5:05 – 5:30 EPCIS Work Bench and Free EPICS Client Repository PLUS Examples
- 5:30 – 5:45 Networking / Dinner
- 5:55 – 6:45 Label Design Training – Roberto & Elizabeth
- 6:45 – 6:55 Break
- 6:55 – 7:25 Decoding the GS1 Digital Link
- 7:25 – 7:45 Walk through an example of beef supply chain
- 7:45 – 8:00 GitHub Repository – challenges
- 8:00 – 8:15 Wrap-Up / Q&A



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WRIGHT STATE
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Intelligent Tracking - Powerful Results





Defining Today's
Technology Standards;
Empowering Tomorrow's
Solutions.



Make•IT•Wright 20 HACKATHON 23

Training Session #2 –EPCIS Work Bench and Free EPICS
Client Repository PLUS Examples

Date: February 2nd, 2023

by AIM North America

Speaker



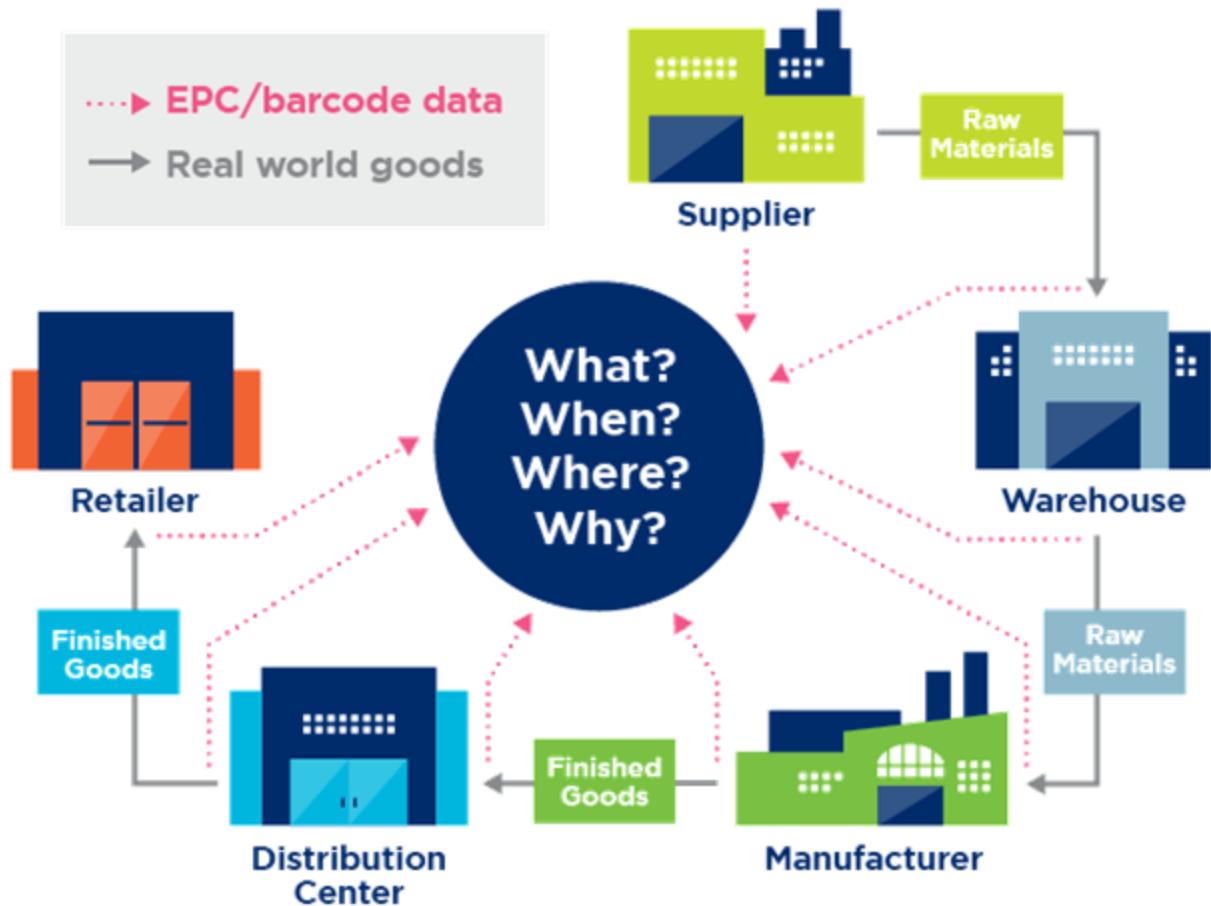
Jeanne Duckett

Food Traceability and Transparency,



jeanne.duckett@averydennison.com

Event-based visibility powered by EPCIS



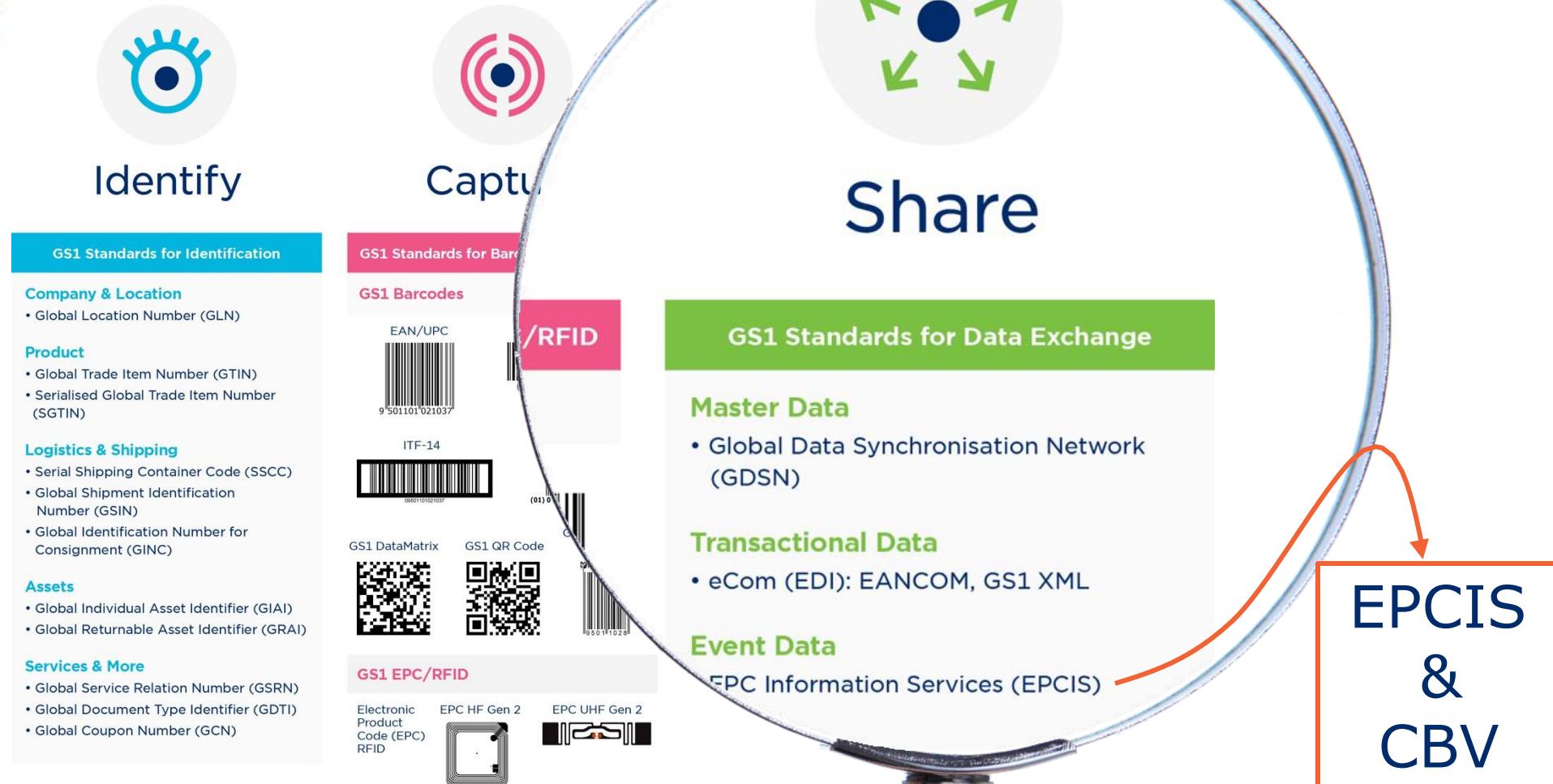
EPCIS and CBV Implementation Guideline

Using EPCIS and CBV standards to gain visibility of business processes

Release 1.2., Ratified, Feb 2017



EPCIS: a GS1 “Share” standard





EPCIS/CBV Introduction

- Goal of EPCIS

- is to enable disparate applications to create and share visibility event data, both within and across enterprises.

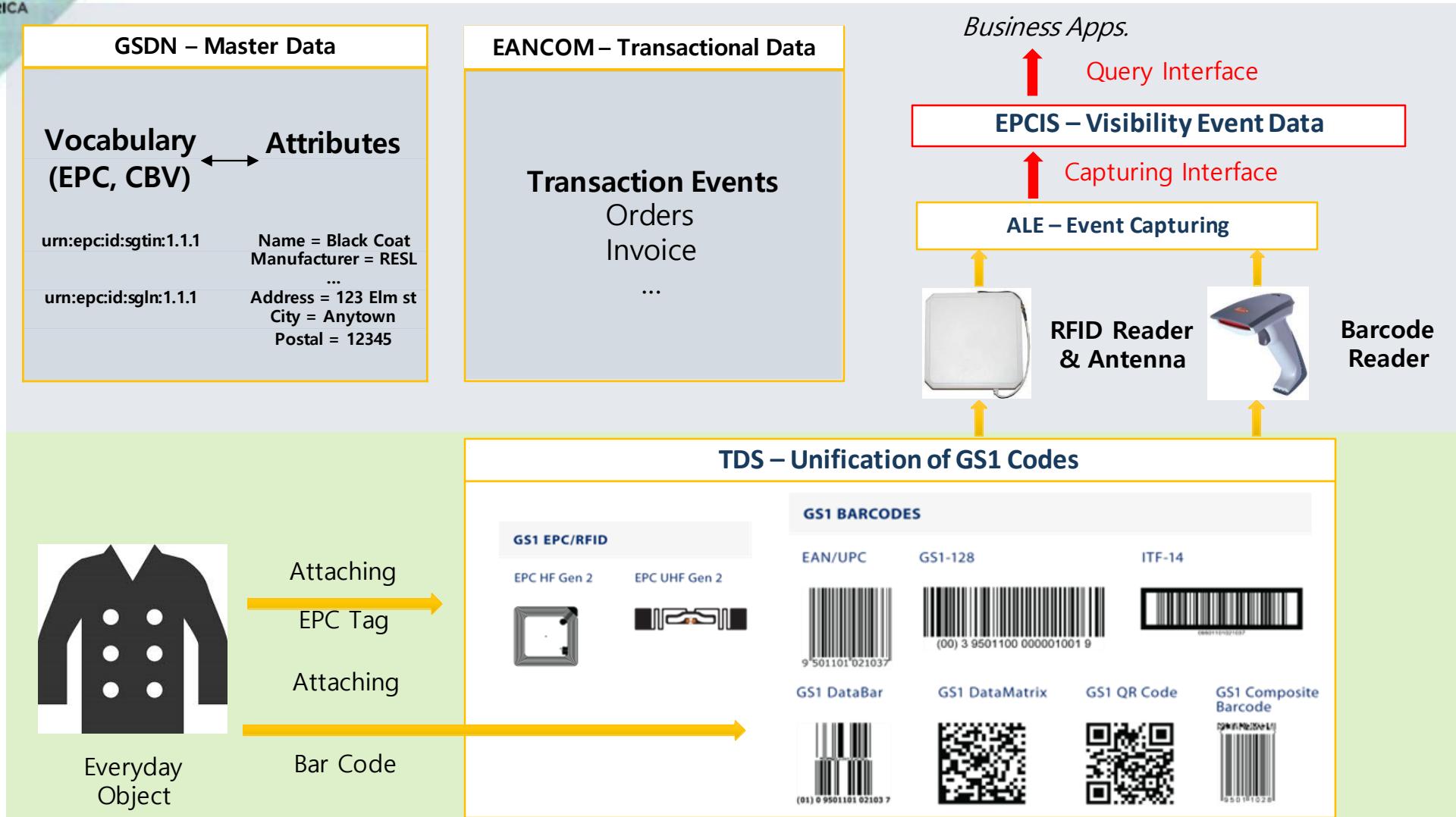
Ultimately, this sharing is aimed at enabling users to gain a shared view of physical or digital **objects** within a relevant business context

- **Physical objects** include trade items (products), logistic units, returnable assets, fixed assets, physical documents, etc. .
- **Digital objects** include digital trade items (music downloads, electronic books, etc.), digital documents (electronic coupons, etc.) etc. .



Master Data
Product & location descriptive attributes

Introduction “Share” Layer of GS1 Standards



EPCIS enables supply chain visibility



- Defines a framework data model, query & capture interfaces
- Helps **share visibility data** across & between enterprises
- Based on capture of business process steps as "**events**"
- GS1 Keys identify the "what" & "where" of visibility events
 - EPCIS 1.2: encoded as EPC URNs
 - **EPCIS 2.0:** encoded as EPC URNs or subset of GS1 Digital Link URIs
- Data-carrier neutral (works well with GS1 barcodes and EPC/RFID)
- Published as ISO/IEC 19987

Core Business Vocabulary (CBV)



- Companion standard to EPCIS
- Defines **cross-sector code lists** to populate EPCIS event data
 - Previously defined as URNs and definitions in a PDF standard
 - Each code list will have a Web URI & online definition in **CBV 2.0**
 - Will be published as a JSON-LD dataset + browsable tool
- Ensures a common understanding of data semantics
- Underpins the **interoperability** of EPCIS implementations
- Published as ISO/IEC 19988

Supply chain visibility with EPCIS

- Tracking

Where are the vaccines we shipped on 6 October?

- Tracing

Which path did this shipment follow on its way to us?

- Chain of Custody

Which parties had contact with these products along the way?

- Inventory Management and Maintenance

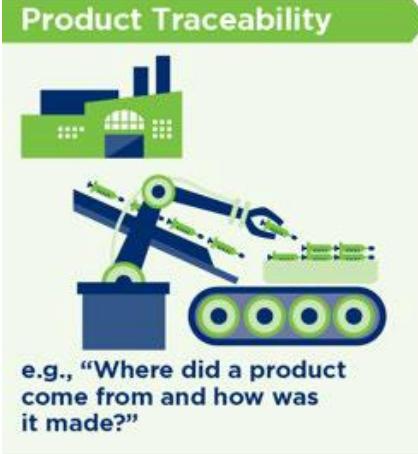
*How much vaccine is **available** in inventory?*

*Which of the vaccines in our inventory **expire** soonest?*

*When are technical components due for **maintenance**?*

- Recall

Recall batch 133xyz packed on line 22A in week 27 . . .





What information is captured in EPCIS events?

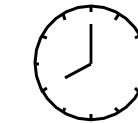
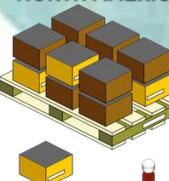
Who, What, When, Where, How



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Dimensions of an EPCIS event

What objects are the subject of events?
SGTIN, SSCC, GIAI, etc.

When did this event take place?
Date, time, time zone

Where did this occur...
...and Where are the objects there?
Physical location (GLN)

Why did this event take place?
Process step, object status, link to transactions, etc.

How (~~warm humid fast etc~~) are these objects?

```

{ "type": "gs1:MeasurementType-Temperature" , "value" : 26.2, "uom": "CEL" },
{ "type": "gs1:MeasurementType-Humidity" , "value" : 12.2 , "uom": "A93"}, 
{ "type": "gs1:MeasurementType-Speed" , "value": 162.0, "uom":"KMH"} ,

```

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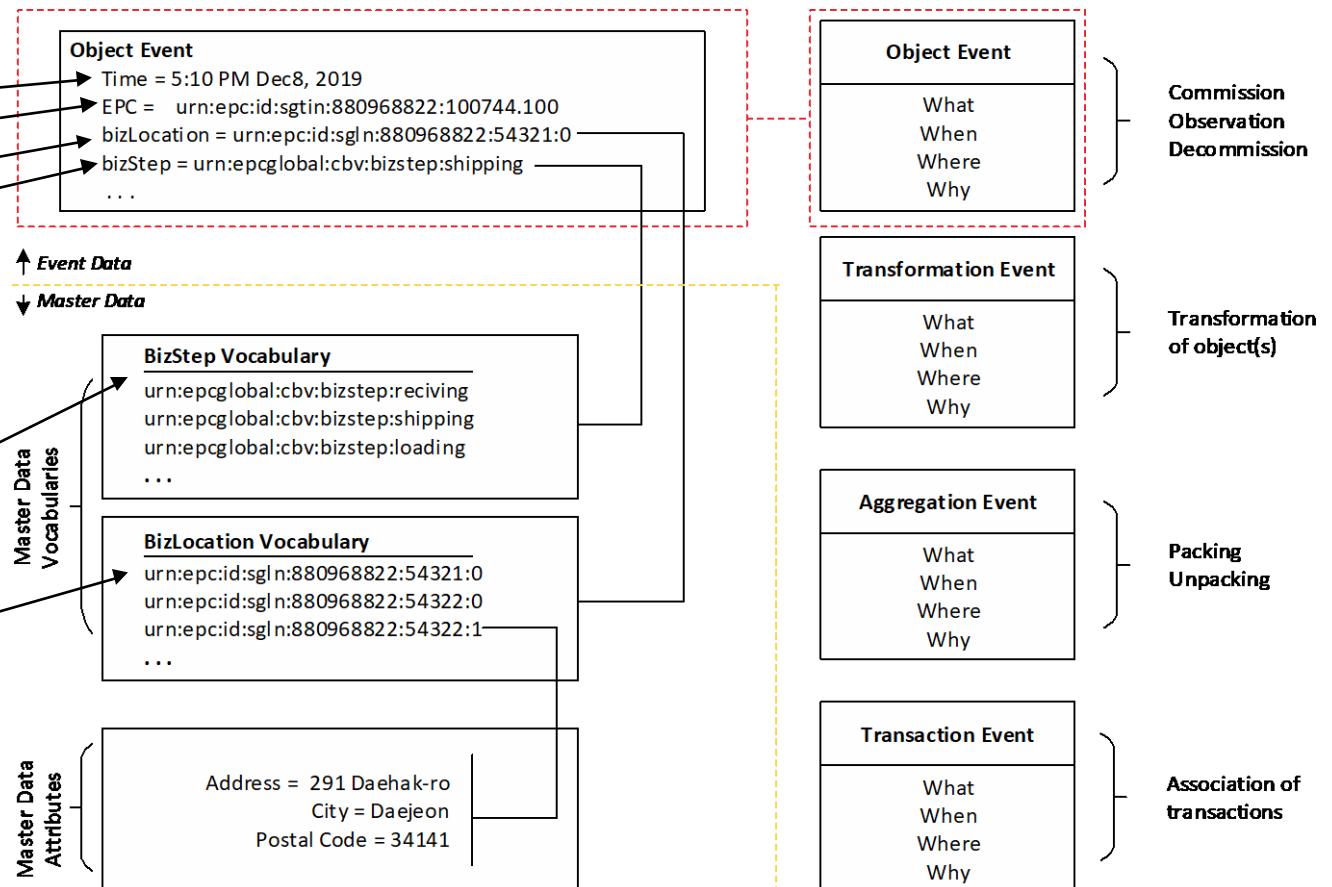
Anatomy of EPCIS events

The four dimension of EPCIS:

- When
- What
- Where
- why

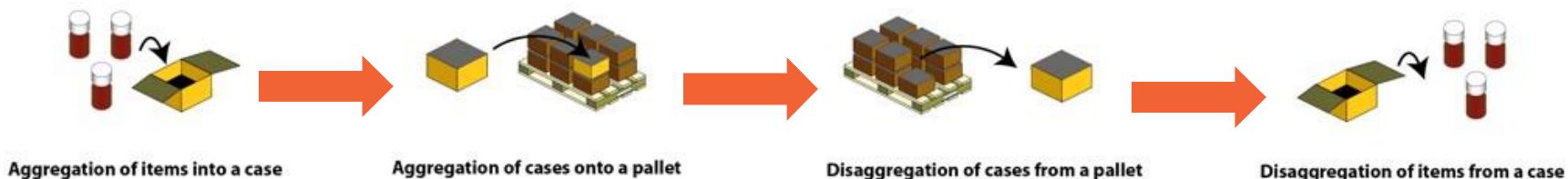
CBV Vocabulary types:

- Standard
- User defined



EPCIS enables tracking of Aggregation changes

- Parent-Child logistical hierarchy
 - Parent: one containing object
 - Children: one or more contained objects
- Captures **packing** and **unpacking** steps



Aggregation of items into a case Aggregation of cases onto a pallet Disaggregation of cases from a pallet Disaggregation of items from a case

- Keep track of logistic / packing hierarchies
- Enables the practice of **inference**



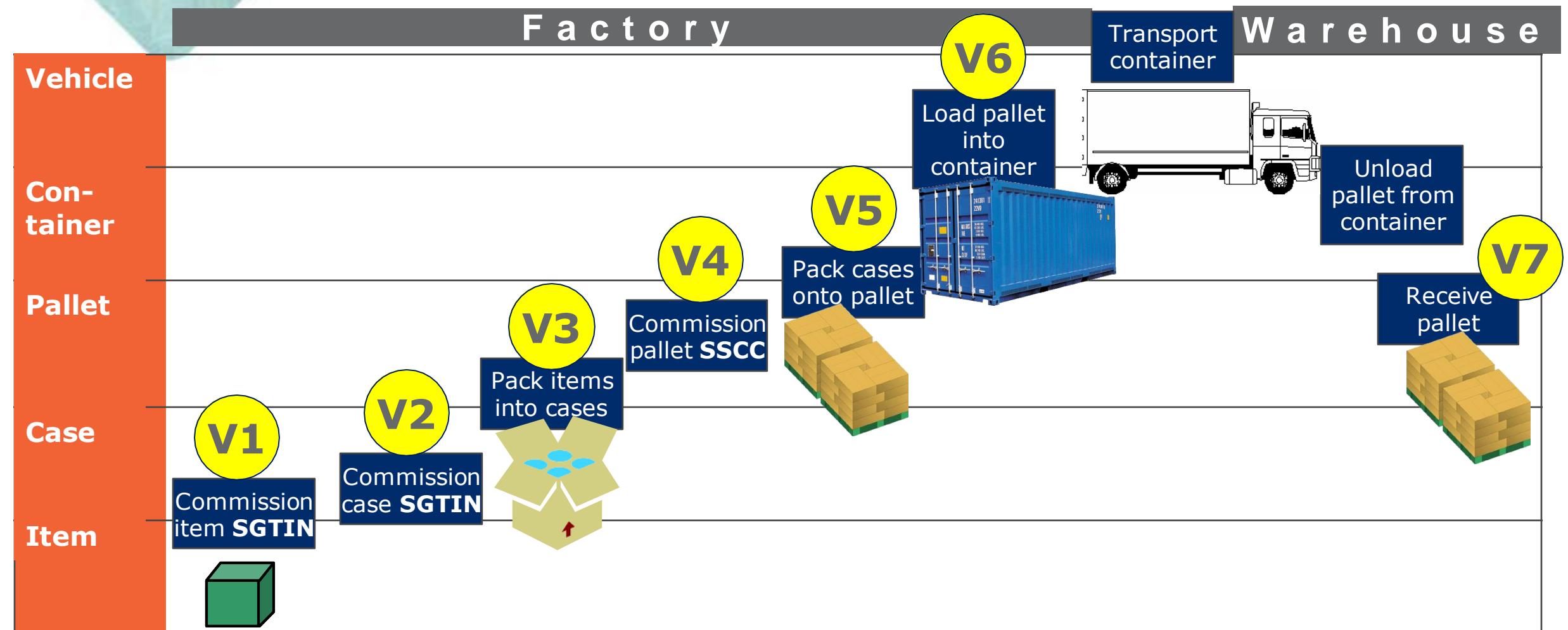


Designing a visibility system using EPCIS

Implementation Guideline http://www.gs1.org/docs/epc/EPCIS_Guideline.pdf

1. Collect visibility goals and requirements
2. Document business process flows
3. Break each process flow into series of discrete steps

Process Flow Example





Designing a visibility system using EPCIS

Implementation Guideline http://www.gs1.org/docs/epc/EPCIS_Guideline.pdf

1. Collect visibility goals and requirements
2. Document business process flows
3. Break each process flow into series of discrete steps
4. Decide which business steps require visibility events
5. **Model completion of each step as a visibility event**
6. **Decide which data to include in the visibility event**

What info does the
business application
need?





Designing a visibility system using EPCIS

Implementation Guideline

http://www.gs1.org/docs/epc/EPCIS_Guideline.pdf

1. Collect visibility goals and requirements
2. Document business process flows
3. Break each process flow into series of discrete steps
4. Decide which business steps require visibility events
5. Model completion of each step as a visibility event
6. Decide which data to include in the visibility event
7. Determine vocabularies to populate each data field
- 8. Document visibility events in a visibility matrix**

What info does
the business
application need?





Visibility Data Matrix

Designing a Visibility System using EPCIS

		Event V1	Event V3	Event V5	Event V6
What	Identifiers	Commission items	Pack items into case	Pack cases onto pallet	Ship pallet
When	Timestamp	24 Sept 2018, 11:27 CEST	24 Sept 2018, 14:09 CEST	25 Sept 2018, 10:24 CEST	25 Sept 2018, 15:19 CEST
Where	Location	packaging line 47	A-frame 21	palletiser 2	dock door 11
Why	Business Step	Commissioning	Packing	Packing	Shipping





Product Traceability



e.g., "Where did a product come from and how was it made?"

Logistics



e.g., "How many of the shipments were punctual?"

Inventory



e.g., "Is there enough of the product in stock?"

Compliance



e.g., "Do the products that I am receiving meet regulatory requirements?"

Product Recall



e.g., "To which customer was a specific product shipped?"

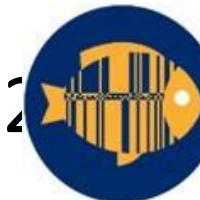


EPCIS in business applications

- Anti-counterfeiting
- Chain of custody/ownership
- Couponing
- Customs clearance
- Recall
- Sales Promotion
- Traceability
- Business Process Optimization
- Exception Management
- Food Freshness
- Asset Management
- Inventory Management
- Process Documentation

- **Rail** rolling stock visibility & MRO
- ~~Fish~~ **Seafood** packaging & distribution momentum in 2021-22
- **Fresh Fruit & Vegetable** traceability
- **Maritime / Port** capacity utilisation management
- **Pharmaceutical** chain-of-custody
- **Pandemic** supply chain security

Inventory management of vaccines & PPE



- EPCIS provides a standardised way of **exchanging visibility event data** including business context
 - Why align with EPCIS?
- EPCIS is an **open standard** supported by an increasing number of implementations and software products
- EPCIS and the Core Business Vocabulary (CBV) are designed to be applicable across **multiple industry sectors**
- EPCIS & CBV are also ISO/IEC standards
 - EPCIS = ISO/IEC 19987
 - CBV = ISO/IEC 19988



- Any questions?





epcisworkbench.gs1.org

The screenshot shows the EPCIS Workbench interface. At the top left is the GS1 logo. To its right is the title "EPCIS Workbench". Below the title are two buttons: "HOME" and "HELP ▾".

Welcome! The EPCIS Workbench helps you work with EPCIS events, queries, and servers.

The EPCIS Workbench is a free, interactive tool for working with the GS1 Electronic Product Code Information Services (EPCIS) standard. You focus on the business content of EPCIS data instead of technical details.

Use the EPCIS Workbench to decode EPCIS event XML into this:

DATASET INFO		4 EVENTS	0 ERRORS	XML
		EVENT 1 ▾	EVENT 2 ▾	
TYPE	Event Type	Object Event ADD	Aggregation Event ADD	
W	Event Time	2013-03-21 11:47:01.000 GMT-05:00		2010-03-22 11:47:02.000 GMT-05:00
H	Record Time			
E	"What" Dimension	GTIN 00614141382668 Serial 101 GTIN 80614141123458 Lot ABC123 (Example case 5) Quantity 6.847 kg	Parent SSCC 006141411234567890 Children GTIN 00614141382668 Serial 101 GTIN 00614141382668 Serial 102	
A	Read Point	GLN 0614141000005 Ext 1234		GLN 0614141000005 Ext 9012
W	Biz Location	GLN 0614141000005 (Acme Corp)		GLN 0614141000005 (Acme Corp)
H	Biz Step	Commissioning (CBV)	Packing (CBV)	In Progress
Y	Disposition	Active		

[REGISTER](#)

Or, log in:

E-mail

jeanne.duckett@averydennison.com

Password

.....

[LOGIN](#)

[Forgot Password?](#)

New features (March 2020)

- ▶ Aligned with EPC Tag Data Standard (TDS) 1.13



epcisworkbench.gs1.org

Get an account and see what the EPCIS Workbench can do for you.
It's free!

Decode

- ▶ Upload a file and decode its contents [SEE A DEMO](#)
- ▶ See all files previously uploaded

Create

- ▶ Create new EPCIS events [SEE A DEMO](#)
- ▶ Edit the content of EPCIS events
- ▶ Capture events to an EPCIS server [SEE A DEMO](#)

Query

- ▶ Create a new EPCIS query
- ▶ Query an EPCIS server



EPCIS Workbench

HOME HELP ▾

Use the EPCIS Workbench to decode EPCIS events...

Here's what raw EPCIS data looks like. Not so easy to read, eh? (click the arrow at the right to continue)

```
DemoExample1.xml - Notepad
File Edit Format View Help
<epcis:EPCISDocument
  xmlns:epcis="urn:epcglobal:epcis:xsd:1"
  xmlns:vwb="http://epcis.vizworkbench.com/ns"
  xmlns:example="http://example.com/epcis/ns/1"
  creationDate="2013-03-15T06:07:08Z"
  schemaVersion="1"> <EPCISBody> <EventList>
    <ObjectEvent> <eventTime>2013-03-21T11:47:01-05:00</eventTime> <eventTimeZoneOffset>-05:00</eventTimeZoneOffset> <epcList>
      <epc>urn:epc:id:sgtin:0614141.038266.101</epc>
      </epcList> <action>ADD</action>
      <bizStep>urn:epcglobal:cbv:bizstep:commissioning</bizStep>
      <disposition>urn:epcglobal:cbv:disp:active</disposition> <readPoint>
        <id>urn:epc:id:sgln:0614141.00000.1234</id>
      </readPoint> <bizLocation>
        <id>urn:epc:id:sgln:0614141.00000.0</id>
      </bizLocation> <extension> <quantityList>
        <quantityElement>
          <epcClass>urn:epc:class:lgtin:0614141.812345.ABC123
        </epcClass> <quantity>6.847</quantity>
        <uom>KGM</uom> </quantityElement> </quantityList>
      </extension> </ObjectEvent> <ObjectEvent>
```

Upload XML File

Each column is one EPCIS event, with the event type and action clearly indicated.

DATASET INFO		4 EVENTS	0 ERRORS	XML
		EVENT 1 ▾	EVENT 2 ▾	
Type	Event Type	Object Event ADD	Aggregation Event ADD	
When	Event Time	2013-03-21 11:47:01.000 GMT-05:00	2010-03-22 11:47:02.000 GMT-05:00	
What	Record Time	GTIN 00614141382668 Serial 101 GTIN 80614141123458 Lot ABC123 (Example case 5) Quantity 6.847 kg	Parent SSCC 006141411234567890 Children GTIN 00614141382668 Serial 101 GTIN 00614141382668 Serial 102	
Where	Read Point	GLN 061414100005 Ext 1234	GLN 061414100005 Ext 9012 GLN 061414100005 (Acme Corp)	
Why	Biz Location	GLN 061414100005 (Acme Corp)	GLN 061414100005 (Acme Corp)	
	Biz Step	Commissioning (CBV)	Packing (CBV)	
	Disposition	Active	In Progress	



Create EPCIS Events

Use the EPCIS Workbench to create or edit EPCIS events...

Start by selecting an event type.

Event Type	<input type="button" value="Choose..."/>	Ordinary Event	<input type="button" value="GENERATE"/>	WAIT! Leave this blank
Event ID	Enter an Event ID (seldom needed - see FAQ)			
W H E N	Event Time	<input type="text" value="2017-03-15 14:30:00"/>	US/Eastern	<input type="button" value="GENERATE"/>
W H A T	Record Time	<input type="text" value=""/>	US/Eastern	
W H E R E	Read Point	<input type="button" value="Choose..."/>		
W H Y	Business Location	<input type="button" value="Choose..."/>		
Disposition	<input type="text" value="Enter a disposition URI"/>			
Biz Transactions	<input type="button" value="ADD ANOTHER"/>			
Extensions	<input type="button" value="ADD ANOTHER"/>			

Please choose an event type, above

Use the EPCIS Workbench to create or edit EPCIS events...

The editor knows how to encode all GS1 identifiers into EPC URIs. Or, you can enter a URI manually.

Event Type	<input type="button" value="Object Event"/>	Ordinary Event	<input type="button" value="GENERATE"/>	WAIT! Leave this blank
Action	<input type="button" value="OBSERVE"/>			
Event ID	Enter an Event ID (seldom needed - see FAQ)			
W H E N	Event Time	<input type="text" value="2017-03-15 14:30:00"/>	US/Eastern	<input type="button" value="GENERATE"/>
W H A T	Record Time	<input type="text" value=""/>	US/Eastern	
W H E R E	EPCs	<input type="button" value="Choose..."/>	<input type="button" value="Delete"/>	
W H Y	Quantities	Identifiers unique to a single object ("instance-level" or "serialized" identifiers)		
Business Step	Read Point	<input type="button" value="GS1 Key"/>	<input type="button" value=""/>	
Disposition	Business Location	<input type="button" value="SGTIN (AI 01 + AI 21)"/>	<input type="button" value=""/>	
Biz Transactions	Business Step	<input type="button" value="SSCC (AI 00)"/>	<input type="button" value=""/>	
Extensions	Disposition	<input type="button" value="GRAI (AI 8003)"/>	<input type="button" value=""/>	
		<input type="button" value="GIAI (AI 8004)"/>	<input type="button" value=""/>	
		<input type="button" value="GSRN (AI 8018)"/>	<input type="button" value=""/>	
		<input type="button" value="GSRNP (AI 8017)"/>	<input type="button" value=""/>	
		<input type="button" value="GDTI (AI 253)"/>	<input type="button" value=""/>	
		<input type="button" value="GCN (AI 255)"/>	<input type="button" value=""/>	
		<input type="button" value="CPI (AI 8010 + AI 8011)"/>	<input type="button" value=""/>	
		<input type="button" value="Other EPC Identifier"/>	<input type="button" value=""/>	
		<input type="button" value="GID"/>	<input type="button" value=""/>	
		<input type="button" value="USDoD"/>	<input type="button" value=""/>	
		<input type="button" value="ADI"/>	<input type="button" value=""/>	
		<input type="button" value="Other"/>	<input type="button" value=""/>	
		<input type="text" value="Enter a URI manually"/>	<input type="button" value=""/>	
		<input type="button" value="ADD ANOTHER"/>	<input type="button" value=""/>	

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Query an EPCIS Server

Sending query "Commision" to an EPCIS query server (as a "Poll" request)

Query Server

AD Test ▾

EXPORT DELETE RENAME EDIT RAW COPY

DATASET INFO

2 EVENTS

0 ERRORS

XML

Name for resulting dataset

EVENT 1 ▾

EVENT 2 ▾

Commision results

SUBMIT

CANCEL

TYPE	Event Type	Object Event ADD	Object Event ADD
WHEN	Event Time	2016-12-01 08:09:23.582 GMT+11:00	2012-04-05 12:35:00.000 GMT+01:00
WHEN	Record Time	2023-01-06 23:01:04.480 GMT	2023-01-23 17:21:48.015 GMT
WHAT	"What" Dimension	GTIN 30048000632679 Lot YFT123 Quantity 5714 kg	GTIN 04098760000015 Lot L1 Quantity 3500 GTIN 04098760000022 Lot L4 Quantity 200



EPCIS Workbench FAQs

Frequently Asked Questions

- ▶ General Questions about the EPCIS Workbench
- ▶ Questions about Account Registration
- ▶ Questions about Event ID
- ▶ Questions about Error Declaration
- ▶ Questions about Displaying Product or Location Names

General Questions about the EPCIS Workbench

What is the EPCIS Workbench?

The EPCIS Workbench is a free, interactive tool for working with the GS1 Electronic Product Code Information Services (EPCIS) standard. The EPCIS Workbench lets you focus on the business content of EPCIS data instead of the technical details.

What is Electronic Product Code Information Services (EPCIS)?

EPCIS is a GS1 Standard for Visibility Data. EPCIS data consists of events, where each event is a record of something that happened in the real world. EPCIS data is used to track and trace products, assets, documents, and other things as they move through a business process, especially a business process that spans multiple physical locations and multiple organizations. An EPCIS event records *what* was involved in a business process step, *when* the step took place, *where* it took place, and additional business context that answers the question *"why."*

How does the EPCIS Workbench help me work with EPCIS?

EPCIS data take the form of an eXtensible Markup Language (XML) document. This format is easy for computers to understand, not so easy for humans. The EPCIS Workbench lets you see the data content of EPCIS data in a format that is more human-friendly.



FreeEPCIS

Welcome to **FRE**EPCIS, the free EPCIS server for development and test.

Setting up your own EPCIS server is as easy as 1, 2, 3:



Step 1: Register for a free account



Step 2: Choose your server name and other settings



Step 3: That's it! You're ready to go.

What's the catch?

Your **FRE**EPCIS server is free because it is limited to hold no more than 25 EPCIS events. But other than that, it is a full implementation of EPCIS 1.2.

Click [here](#) to register for your free account. For more information, see the [FAQ](#).



FreeEpcis

EPCIS events

You currently have 14 EPCIS events captured. Your limit is 25 EPCIS events.

[View all events](#)

Activity

Your most recent capture was on 2023-01-23 12:21:48.

Your most recent query was on 2023-01-23 20:59:00.

[View all activity](#)

Subscriptions

You have no subscriptions registered. To register a subscription, send a [Subscribe](#) request to your query service URL.

Server settings

Your capture and query service URLs are:

	Service URL	Authentication required?
Capture	https://freepcis.gs1.org/server/ADTest/capture	No
Query	https://freepcis.gs1.org/server/ADTest/query	No

[Change your settings](#)



FreeEPCIS FAQ

Frequently-asked questions

Read on for answers to questions about **FREEEPCIS**.

- General questions about **FREEEPCIS**
- Getting started
- Questions about account settings
- Questions about capturing EPCIS events
- Questions about querying for EPCIS events
- Questions about standing queries

General questions about **FREEEPCIS**

What is FREEEPCIS?

FREEEPCIS is a free EPCIS repository for development and test.

What is Electronic Product Code Information Services (EPCIS)?

Electronic Product Code Information Services (EPCIS) is a GS1 Standard for visibility data. EPCIS data consists of events, where each event is a record of something that happened in the real world. EPCIS data is used to track and trace products, assets, documents, and other things as they move through a business process, especially a business process that spans multiple physical locations and multiple organizations. An EPCIS event records what was involved in a business process step, when the step took place, where it took place, and additional business context that answers the question "why."

What is an EPCIS repository?

An EPCIS repository is a service that lets you *capture* EPCIS event data, and then later *query* for events that match specified query criteria. It's basically a database designed especially for EPCIS data, with web service interfaces for capturing and querying data as specified by the EPCIS standard.

Questions & Comments



Contact Us



Jeanne Duckett

Food Traceability and Transparency,



jeanne.duckett@averydennison.com



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Defining Today's
Technology Standards;
Empowering Tomorrow's
Solutions.



Make•IT•Wright 20 HACKATHON 23

Training Session #3 – Label Design Training

Date: February 2nd, 2023

by AIM North America

Speaker



Roberto Posada

 **BarTender®**
BY SEAGULL SCIENTIFIC

Sales Engineer

rposada@seagullscientific.com



Why does labeling matter in the supply chain?

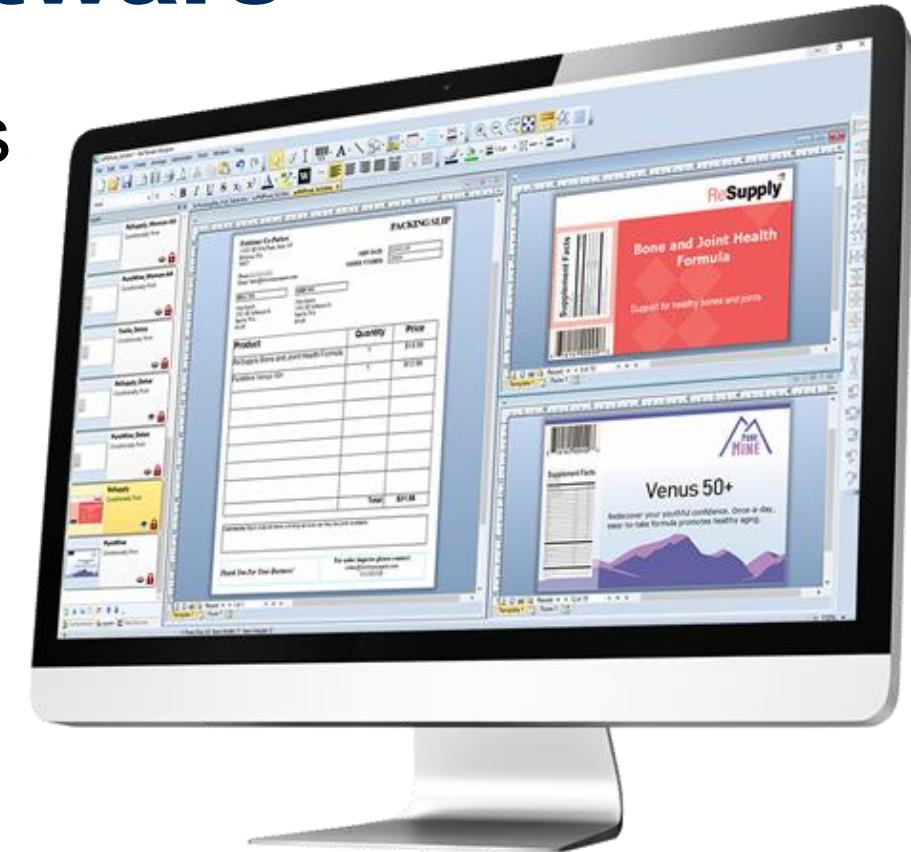
- Reduces overall operational cost.
- Visibility across the whole supply chain.
- Helps keep up with evolving regulations and standards
- Traceability of everything related to the product.
- Accuracy and consistency of products across all regions.





Enterprise Label Software

- Easy to create, manage and print labels
- Out of the Box templates
- Support for regulatory and industry-standard and compliance
- Print from any device
- Automated Printing Platform/REST API
- GS1 Digital Link
- RFID, Including TID support





DEMO

The word "DEMO" is displayed in large, bold, white sans-serif letters. Each letter is set against a different colored square background: the 'D' is purple, the 'E' is pink, the 'M' is blue, and the 'O' is light blue.

Contact Us



Roberto Posada
 **BarTender**[®]
BY SEAGULL SCIENTIFIC

Sales Engineer
rposada@seagullscientific.com



Session 3 Agenda

- 5:00 Welcome
- 5:05 – 5:30 EPCIS Work Bench and Free EPICS Client Repository PLUS Examples
- 5:30 – 5:45 Networking / Dinner
- 5:55 – 6:45 Label Design Training – Roberto & Elizabeth
- 6:45 – 6:55 Break**
- 6:55 – 7:25 Decoding the GS1 Digital Link
- 7:25 – 7:45 Walk through an example of beef supply chain
- 7:45 – 8:00 GitHub Repository – challenges
- 8:00 – 8:15 Wrap-Up / Q&A



Defining Today's
Technology Standards;
Empowering Tomorrow's
Solutions.



Make•IT•Wright 20 HACKATHON 23

Training Session #3 – Decoding the GS1 Digital Link
Date: February 2nd, 2023

by AIM North America

Speaker



Jeanne Duckett

Food Traceability and Transparency,



jeanne.duckett@averydennison.com



Antitrust Caution

GS1 US is committed to complying fully with antitrust laws.

We ask and expect everyone to refrain from discussing prices, margins, discounts, suppliers, the timing of price changes, marketing or product plans, or other competitively sensitive topics.

If anyone has concerns about the propriety of a discussion, please inform a GS1 US® representative as soon as possible.

Please remember to make your own business decisions and that all GS1 Standards are voluntary and not mandatory.

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www.gs1us.org/gs1-us-antitrust-compliance-policy



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GS1 US recommends that any organization developing an implementation designed to be in conformance with the Digital Link Specification should consult with their own counsel to determine the compliance of such an implementation with any relevant intellectual property or other rights of third parties.



GS1 Global Migration to 2D

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Why: Future of On-Pack Coding

- **Problem Statement:** The proliferation of barcodes and other methods of identification on products and things causes **confusion to consumers and trading partners**, who expect a seamless experience of connecting products and things to relevant experiences in the digital world.
- GS1 must make it possible for ***"all products and things to serve as sources of data for the companies that manufacture, transport and sell them."***



Why is a transition needed?

- Consumers expect quick access to product information
- Product packaging contains too many symbols
- Brands and retailers and their customers can more easily access on-pack data to solve new business challenges
- EAN/UPC limits the use cases as it cannot hold additional data
- ***Interoperable 2D symbols can help accomplish all this***

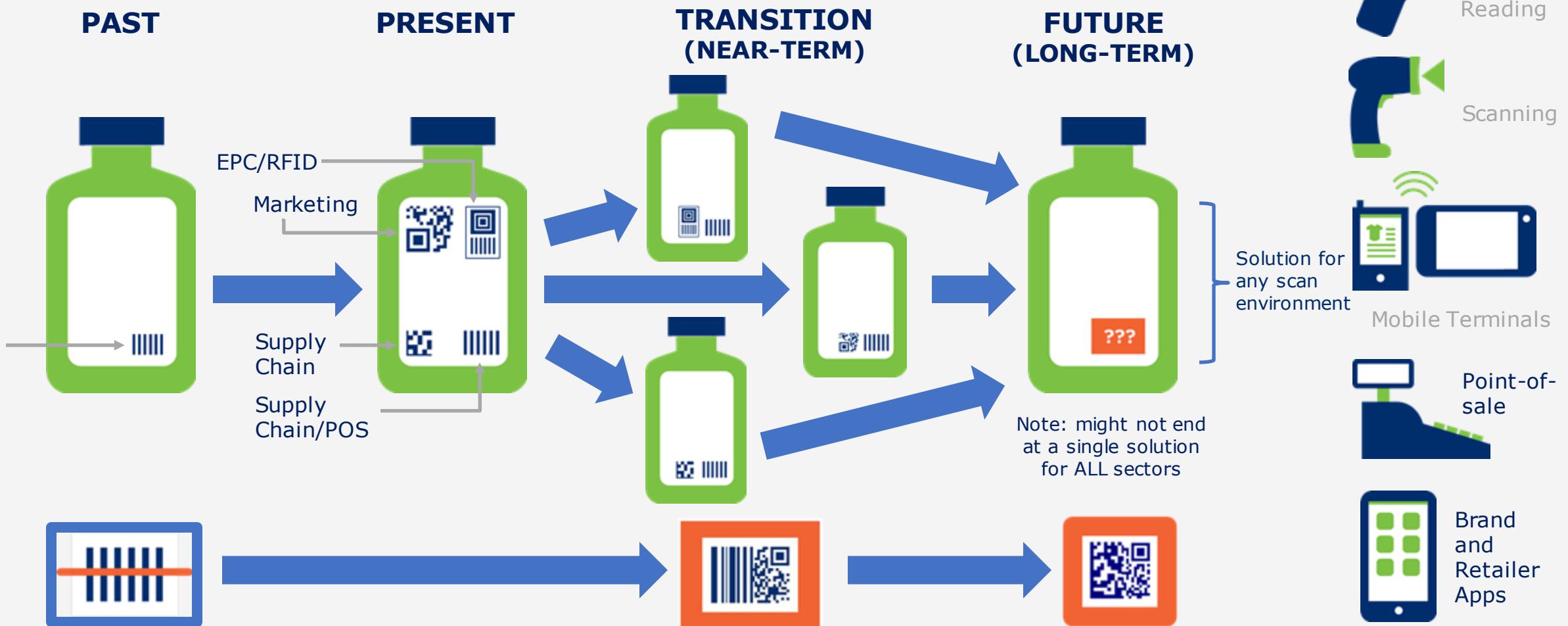




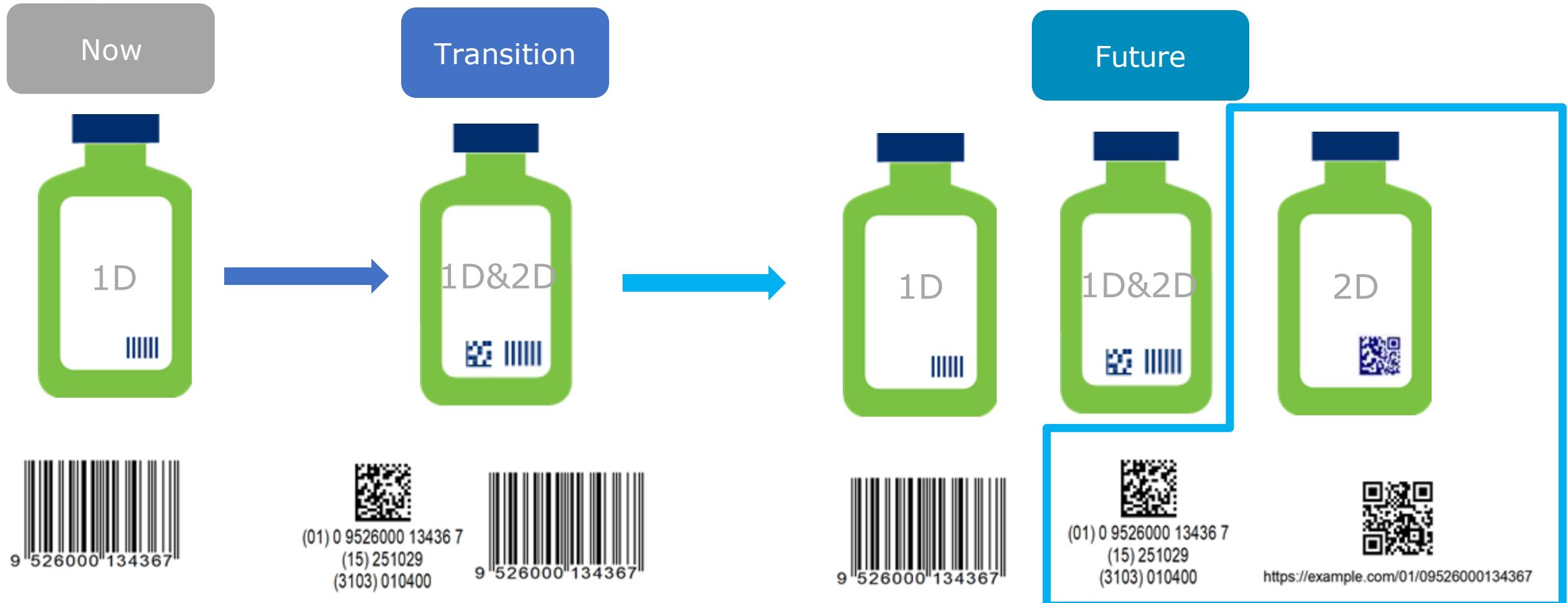
Global Migration to 2D

The purpose of this new programme is to manage the migration to a future in which 2D barcodes are pervasively used to enable prioritised industry use cases in a globally-interoperable way.

A Glimpse of the 2D Interoperable Future

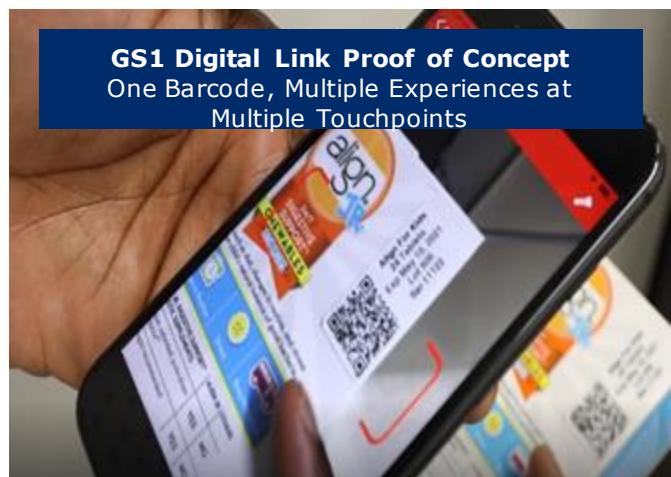
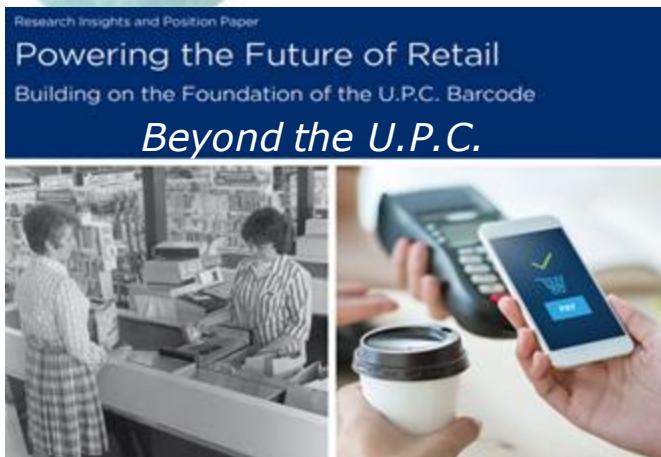


Global Migration to 2D – Fixed Measure example



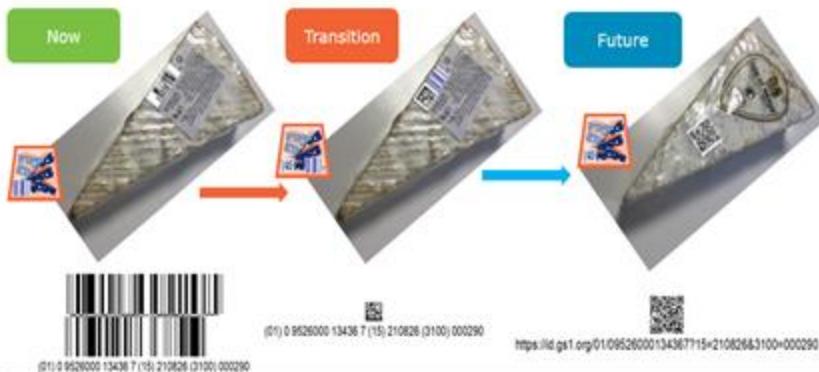


GS1 US Activity w/ 2D Data Carrier Relevance



GS1 US Advanced Data Carrier for POS Getting Started Guide

Future of On-Pack Coding - 2020
Global Migration to 2D – 2021+



Autonomous Retail Whitepaper

Improve inventory visibility and fulfillment with emerging technologies and GS1 Standards | December 2020

Sunrise 2027 and GS1 Digital Link

2D Scan at Point-of-Sale

- Sunrise 2027 is a GS1 US initiative that allows for full use of 2D barcodes at point-of-sale
- Retailers have already begun making needed POS updates: GS1 US will continue to provide education and outreach to support the transition
- Brands utilizing 2D GS1 Digital Link embedded data carriers can remove the U.P.C. after the 2027 Sunrise
 - Multiple barcodes will no longer be needed
 - 2D data carrier of choice utilizing GS1 Digital Link can be scanned
 - At POS
 - By the consumer
 - Within the supply chain
- U.P.C. will continue to scan at POS





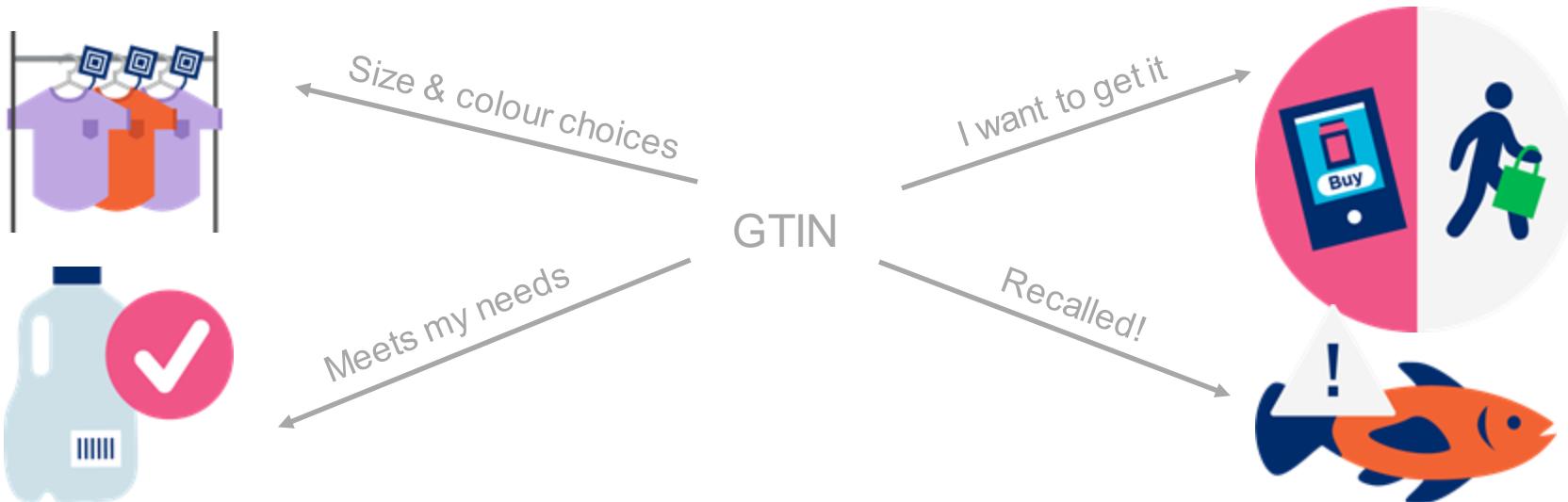
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GS1 Digital Link



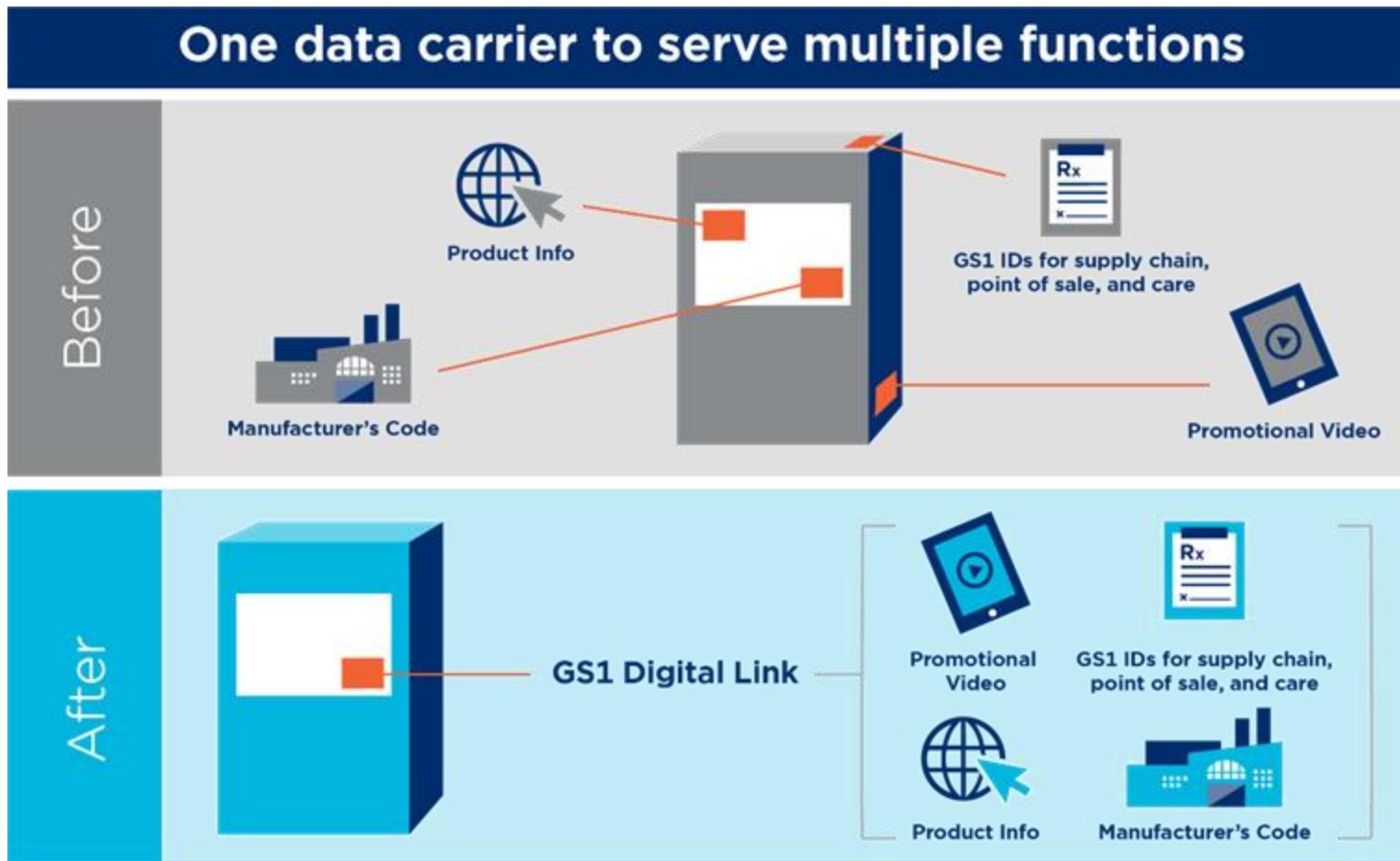
GS1 Digital Link overview

GS1 Digital Link is the forward-looking, extensible component of the GS1 system that takes the existing components of GS1 identification and makes them fully interoperable with how the Web works.



- Please note that AI (8200) is limited to trade item applications while the GS1 Digital Link Standard allows for all keys to be integrated.

One Data Carrier



GS1 Digital Link: Potential Value Summary

GS1 Digital Link has the opportunity to help transform current labeling into an **efficient, empowering platform for retailers & consumers** that can enable limitless linked information, improve data latency, and more.

	Reduces Barcodes on Pack	Links to Additional Information	Extends Uniqueness	Simplifies Data Sharing Ecosystems	Removes Data Latency
TODAY	 Multiple barcodes on label	 Limited product info & use cases	 Identical codes on 1D-labeled products	 Retailers aggregate data	 1 Day refresh rate
FUTURE	 DataMatrix or QR Code Single barcode on label	 Limitless product info & use cases (product origin, ingredients, etc.)	 Unique codes on all products	 Retailer link to data sources	 Real time refresh

What is GS1 Digital Link



Redirects
to a web
address

<https://dalgiardino.com/01/09506000134369/10/123456/21/192837?17=191031>

↑
The protocol
(i.e., secure
HTTP)

↑
A domain
chosen by the
brand or service
provider

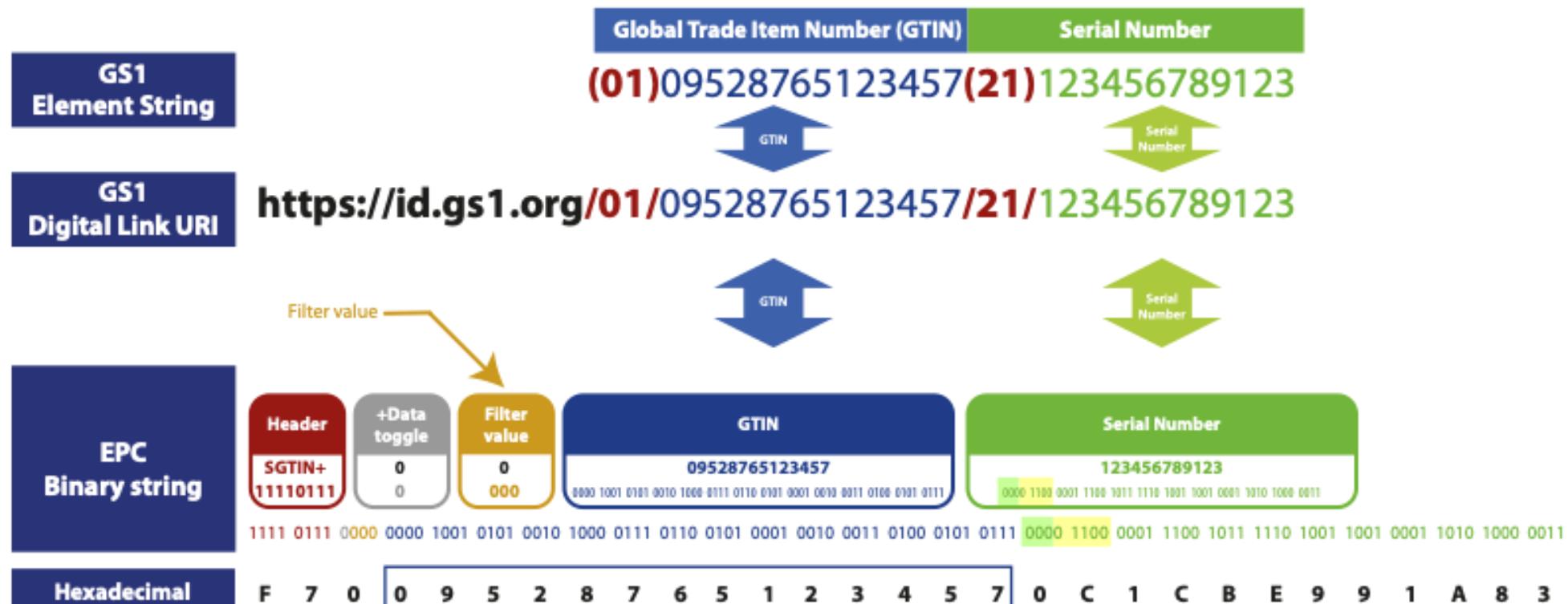
↑
The GTIN identifying
a product

↑
The batch/lot
number

↑
The serial
number
(identifying
an item or
thing)

↑
The
expiration
date

GS1 Digital Link RAIN RFID



GS1 Digital Link overview



Allergen information

As a coeliac, it is very important to Alice that any food she consumes does not contain gluten.

Using an app on her phone, she scans the Data Matrix on a food item she's interested in and is directed to data about the item which confirms that it is gluten free.



Traceability

Bob is wants to check that the food item he's considering buying comes from a sustainable source.

He scans the QR Code on the pack and is redirected to traceability information curated by a solution provider on behalf of the manufacturer.





To Summarize - In the FUTURE:

Every product could be:

1. Self describing
2. Its own media channel, personalised to a consumer
3. Its own authoritative source of information

Every scan could:

1. Tell you when and where it was scanned
2. Whether the scan was by a known customer (and if so who)
3. What else they scanned

One barcode could:

1. Do everything, everywhere
2. Support B2B and B2C functions
3. Remove the need to aggregate multiple sources of data

Contact Us



Jeanne Duckett

Food Traceability and Transparency,



jeanne.duckett@averydennison.com

Questions & Comments





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Training Session #3 – Beef Supply Chain Example

Date: February 2nd, 2023

by AIM North America

Speaker



Scott Austin

Managing Director



scott@zugangtc.com

ANIMAL ID HISTORY

The practice of branding livestock, or marking the animal with a specific symbol to identify ownership, began long before the cowboy made it famous. According to the Washington State Department of Agriculture, branding first began in **2700 B.C.** with the Egyptians. Sep 28, 2017

<https://www.agribef.com › blog › learn-the-hows-and-...> ::

The first systems were all built with the conventional components and attached to a collar around the cow's neck. In the 1980s however special integrated circuits were developed minimising the size of the [transponders](#).

Now in the 1990s, official organisations are testing systems for identification and registration of all animals to control movements from birth to [slaughterhouse](#). This will enable farm livestock to be traced at the outbreak of diseases and residues in [slaughter animals](#) to be followed up. [Injectable transponders](#), electronic eartags and rumenal bolusses are being used. <https://www.sciencedirect.com/science/article/abs/pii/S0168169999000332>



Visual Identification



Electronic Identification



Syringes & Accessories



Tissue Sampling



WHAT IF I FULL LIFECYCLE TRACEABILITY?

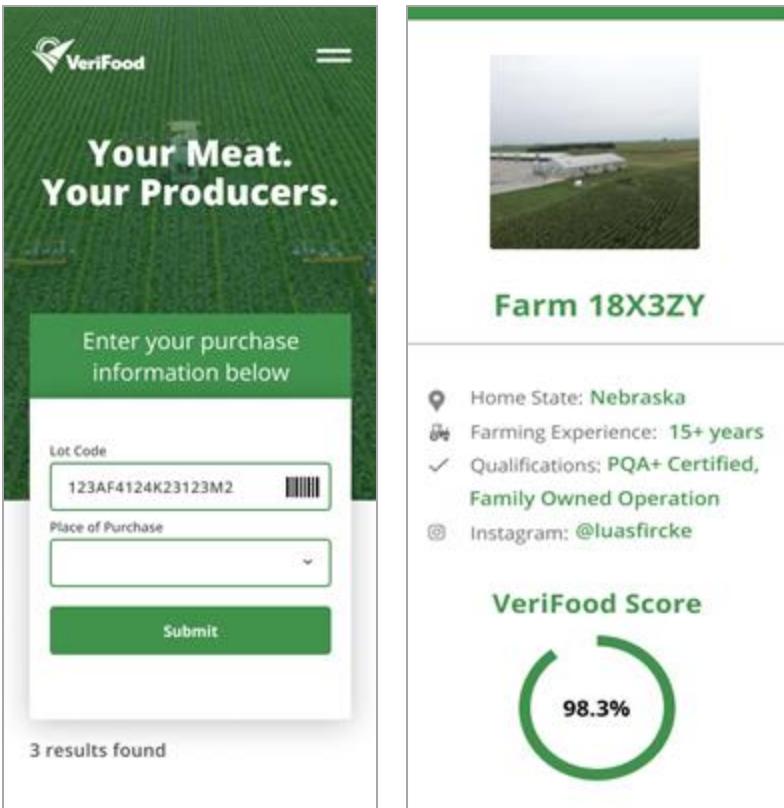
- 1 Enable Trust through producer authenticity and verified data
- 2 Meet Sustainability objectives through traceability
- 3 Food Safety enhanced through traceability



LIFECYCLE DATA SUPPORTS

- **Paper based records hinders advance sustainability goals.**
 - Handwritten records can be difficult and costly to transcribe. Record management involves time and physical resources making the data difficult to retrieve.
- **Data Quality:**
 - On farm instantaneous data gives operational insights as well as ACCURATE and VERIFIED sustainability accounting. e.g. breeding optimization, supplement transparency, antibiotic contamination etc.
- **Employee and Animal Welfare:**
 - Treatments, herd information, and ACCURATE and VERIFIED employee animal interactions.
- **Enhanced Connectivity and Interoperability:**
 - Using existing farm infrastructure or uninhibited wireless connectivity for sensors.
- **RECALL ACCURACY:**
 - In the event of disease outbreak fast and accurate identification

DATA IS KEY



- Each animal history record is authentic and verified to each animal.
- Data is real time and based on physical animals, their location, and inputs.
- **Traceable Verified Metrics:**
 - Blockchain verified
 - Verified sensor data
 - Authenticated employee activities
 - Authenticated animal welfare activities.
- True smart farm to fork experience.

IMPACT OF FOOD WASTE



- Globally, around 14 percent of food produced is lost between harvest and retail, while an estimated 17 percent of total global food production is wasted (11 percent in households, 5 percent in the food service and 2 percent in retail).
- Food that is lost and wasted accounts for 38 percent of total energy usage in the global food system.
- When reductions in food loss occur close to the farm, they are most effective in addressing food insecurity and in alleviating stress on land and water.
- When reductions in food waste occur downstream in the supply chain and at the consumer level they are key to cutting greenhouse gas emissions.
- Packaging now contributes approximately 5.4 percent of global food-system emissions, more than any other supply-chain factor including transportation.

LIVESTOCK SUPPLY CHAIN



Capture Animal on Farm

- Identifier – SGTIN + Animal ID
- Capture Point – Farm GLN
- Step – Commissioning
- [Sustainability Info](#)
- [Product Id/Name \(GTIN\)*](#)
- [Lot#](#)



Animal Leaves on Truck

- Identifier – GTIN + Lot
- Capture Point – FARM GLN
- Step – Shipping
- [Logistics Identifier \(SSCC\)*](#)



Slaughterhouse Holding Pen

- Identifier – GTIN + Lot
- Capture Point – Slaughter GLN
- Step – Receiving
- [Sustainability Info](#)
- [Product Id/Name \(GTIN\)*](#)
- [Lot#](#)



Stun Box

- Identifiers – 1 or more GTIN+Lot
- Capture Point – Slaughter GLN
- Step – Transformation

BEEF SUPPLY CHAIN

				
<p>Carcass Stored in Chiller</p> <ul style="list-style-type: none"> ▪ Identifier – SGTIN ▪ Location – Slaughter GLN ▪ Step – Observe ▪ Sensor Data 	<p>Carcass Moved to Debone</p> <ul style="list-style-type: none"> ▪ Identifier – SGTIN ▪ Location – Slaughter GLN ▪ Step – Transformation ▪ Transformation details (Input/Output) ▪ Master Manufacturing Record/ Batch Production Records ▪ Quality Report ▪ Certifications 	<p>Finished Cuts Packed</p> <ul style="list-style-type: none"> ▪ Identifier – GTIN + Lot ▪ Location – Slaughter GLN ▪ Step – Packing ▪ PO/Invoice/Bill of Lading/Shipment # 	<p>Loading Containers on Truck</p> <ul style="list-style-type: none"> ▪ Identifier – GTIN + Lot ▪ Location – Slaughter GLN ▪ Step – Shipping 	<p>Product arrives at Processor</p> <ul style="list-style-type: none"> ▪ Identifier – GTIN+ Lot ▪ Location – Processor GLN ▪ Step – Receiving

FINISHED PRODUCT SUPPLY CHAIN

				
<p>Containers Moved to Line</p> <ul style="list-style-type: none"> ▪ Identifier – SGTIN ▪ Location – GLN ▪ Step – Transformation ▪ Transformation details (Input/Output) ▪ Master Manufacturing Record/ Batch Production Records ▪ Quality Report ▪ Certifications 	<p>Product Packed</p> <ul style="list-style-type: none"> ▪ Identifier – GTIN + Lot ▪ Location – GLN ▪ Step – Packing ▪ PO/Invoice/Bill of Lading/Shipment # 	<p>Loading Cases on Truck</p> <ul style="list-style-type: none"> ▪ Identifier – GTIN + Lot ▪ Location – Slaughter GLN ▪ Step – Shipping ▪ Logistics Identifier (SSCC)* 	<p>Product arrives at FoodService</p> <ul style="list-style-type: none"> ▪ Identifier – GTIN+Lot ▪ Location – Food Service GLN ▪ Step – Receiving ▪ Logistics Identifier (SSCC)* 	<p>Product Sold at FoodService</p> <ul style="list-style-type: none"> ▪ Identifier – GTIN+Lot ▪ Location – Foodservice GLN ▪ Step – Retail Selling ▪ Latency ▪ FIFE

FOOD SAFETY MEETS TECH ENABLED TRACEABILITY



Food safety

- Can be compromised through many agents and at ALL steps of the supply chain like: **Antibiotics**
- Information needs to be accurate and verified
- If it's not safe, it is not food



Requirements for food control

- Trust in data
- Key data elements (KDE) need to be available at various points in the supply chain to enable **traceability, recalls** and consumer trust
- Quick response time (regulators and public)

- [GFSI Checklist](#)
- [Digital traceability for food safety FAQ](#)



TRACEABILITY:COMPLIANCE OR CABABILITY

We continue to live our purpose

- To nurture bodies, minds, hearts and spirits of our staff, guests, and communities.

Sourcing antibiotic-free cattle, defined as no-antibiotics ever (NAE)

- We will not support a supplier withholding appropriate veterinary care from a sick or injured animal, but once treated with antibiotics, these animals may not enter our supply chain.
- Beef Cattle – Antibiotics Free
- Controlling the antibiotic issue in dairy (DOH)



86

TANGIBLE BENEFITS



Through
standards
achieving
verifiability

Reduce
food waste

Consumer
Trust

Antibiotic
Free

TANGIBLE BENEFITS



Regulatory Compliance

Prop 12
FSMA



Corporate Compliance

Sustainability Objectives
Food Safety Metrics



Operational Efficiency

Documented Food Service use case saved > 80 million annually in inventory takes



Consumer Confidence & brand selection and confidence

Source: <https://www.ecrloss.com/research/sell-more-waste-less>

IMPACT OF FOOD WASTE ON PROFITABILITY

The Food Dollar Series divides the food dollar into a set of input-component values. There are three primary series—the *marketing bill* series, the *industry group* series, and the *primary factor* series. For each primary Food Dollar Series, the combined input-component values are equal to the \$1 output-market value.



<https://www.ers.usda.gov/data-products/food-dollar-series/documentation.aspx>
<https://www.fao.org/documents/card/en/c/30245942-5cd8-42b6-bb1a-98243f108446/>



Waste in the Food Supply Chain



Consumer Food Waste



**TOTAL:
41%**

Contact Us



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Training Session # 3 - GitHub Repository – Challenges

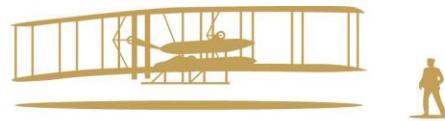
February 2nd, 2023

by AIM North America

Speaker



Matt Kijowski



**WRIGHT STATE
UNIVERSITY**

Cyber Systems Program Manager

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The Basics

1. Idea Submission Guidelines for Hackers - Due by 5pm on Friday Feb 3, 2023
2. All other teams will be assigned a challenge during the opening session on Saturday Feb 4, 2023
3. Please follow these guidelines while making your idea submission:
 - Idea Title: Written on the cover page
 - Problem Statement: What is the specific problem?
 - Approach: How will you solve it? Problem by technology (your solution)?
 - Overview with a diagram: Share your solutions/prototype mock image & business model with a diagram



Organization

- Teams will be balanced
- Mentors will be assigned to teams
- Door prizes throughout weekend



Make-It-Wright Github

The screenshot shows a GitHub repository page. At the top, there's a navigation bar with links for 'Pull requests', 'Issues', 'Codespaces', 'Marketplace', and 'Explore'. Below the navigation bar, the repository name 'wrightedu / Make-IT-Wright-2023' is displayed, followed by a 'Public' badge. Underneath, there are tabs for 'Code', 'Issues', 'Pull requests', 'Actions', 'Projects', 'Wiki' (which is underlined in red), 'Security', 'Insights', and 'Settings'. The main content area is titled 'Home' and shows a message from 'jeanneduckett' edited 2 days ago, mentioning 4 revisions. Below this, a large heading reads 'Welcome to the MakItWright and AIMGlobal wiki!'. A section titled 'Background information' discusses supply chain challenges. At the bottom of the page, there's a footer with various icons and a note about views expressed/presented.

Home

jeanneduckett edited this page 2 days ago · 4 revisions

Welcome to the MakItWright and AIMGlobal wiki!

For starters check out these videos to get a feel for the problem space:

- [McDonald's Track My Macca's](#)
- [Meet the Winners of FDA's Low- or No-Cost Food Traceability Challenge](#)
- [A Dutch chocolate company's fight to end illegal child labor](#)
- [Faces of DSCSA](#)
- [How a Customer Care Meeting Led to DSCSA Compliance](#)

Background information

Supply chains are the backbone of commerce, critical to delivering the right products to the right place at the right time. Globalized supply chain models are focused on cost savings, efficiency, and speed, but the Covid-19 pandemic and recent natural disasters have shown the fragility of this existing paradigm. In times of crisis, supply chains are challenged by rapidly changing demands with little room for flexibility, which has translated to ongoing bottlenecks and delays.



Project Submission Guidelines for Hackers - Due by 1:00pm EST

Sunday Feb 5, 2023

Please follow these guidelines while making your final project submission:

- You may submit your project as many times as you like. Only the final submission will be judged
- All projects must contain the following in their submission
 - Link to the code on Github
 - A presentation (in the form of a YouTube video) of your project
 - Recommended: YouTube – no longer than 3 minutes
 - PPT that is covered in video (no more than 12 slides covering the following)
 - Project Challenge
 - Team Members
 - Elevator Pitch - About Your Proposal
 - Benefit
 - What standards/technology did you Use
 - What would you do to enhance
 - The Right to Win - why your project should be chosen



Requirements – Make Your Project Shine

Each of the 4 challenges have requirements that need to be met

In addition – each challenge has above and beyond attributes to make your team stand out



4 Hackathon Challenges

- [Challenge 1 - App for farmers to meet FSMA 204 Farm CTE&KDE](#)
- [Challenge 2 - FSMA 204 Salad Kit Processing to Packing](#)
- [Challenge 3 - DSCSA Single Purchase Order without aggregation](#)
- [Challenge-4 - DSCSA-Warehouse-Aggregation-from-each-to-pallet](#)



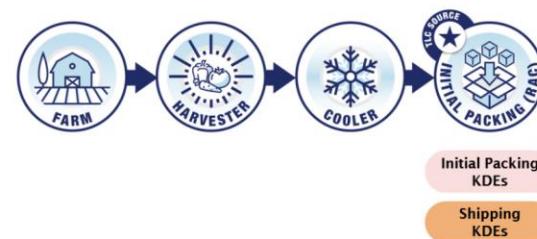
Challenge 1 App for farmers to meet FSMA 204 Farm CTE&KDE

In this challenge the farmer harvests and cools the produce before sending to the Packer. The farmer challenge solution will create three events. Each solution should have a rfid tag or label that is created at one step and capture at another. Sensor data should be automatically captured during one of the events.

Events

- Harvest (or commission the produce)
- Chill produce
- Ship the produce

Supply Chain Example: Cucumbers



KDEs can be "linked" in different ways, including by being listed together in single row of an electronic sortable spreadsheet, stored together as a record in a database, shared to a subsequent recipient as an electronic message, or printed on the same commercial document, such as a Bill of Lading. KDEs may also be linked together using a common identifier on multiple records, such as the traceability lot code.



Challenge 2 App for Processors to Create a Simple Salad and capture the FSMA 204 Events

In this challenge the processor creates a simple salad with 2 ingredients - tomatoes and romaine lettuce. The processor receives the cases of ingredients, transforms the ingredients into packages salads and then packs them into cases. The processor challenge solution will create 3 events. Each solution should have an RFID tag or label that is created at one step and captured at another. Sensor data should be automatically captured during one of the events.

Events

- Receive the ingredients at the processing line
- Transform the ingredients into finished salad assigning the new traceability lot code
- Pack the salads into cases



Challenge 3 DSCSA Single Purchase Order without Aggregation

In this challenge a pharmaceutical company, CloudPharma Inc. will create a single purchase order without aggregation. They are going to ship 100 cases of Example Drug to Real RX Distributors. The solution will create three events. Each solution should have an RFID tag or label that is created at one step and capture at another. Sensor data should be automatically captured during one of the events. Read the backstory [here](#).

Events

- Commission Cases
- Commission SSCC
- Ship product



Challenge 4 DSCSA Warehouse Aggregation from each to pallet

In this challenge a pharmaceutical distribution company, Real Rx Distributors will fulfill a purchase order by aggregating the 10 cases of 2 different products onto the pallet, shipping the pallet and receiving the pallet at Stay Well Hospital. They are going to ship ten cases of Example Drug and ten cases of Miracle Drug. The solution will create three events. Each solution should have an RFID tag or label that is created at one step and capture at another. Temperature must be maintained on Miracle Drug at 32 Degree Fahrenheit. Sensor data should be automatically captured during one of the events.

Events

- Pack Example Drug and Miracle Drug on Pallet
- Shipping Pallet
- Receive Pallet



Making it Shine

- 1) Add interface to print tags / labels to the project
- 2) Add Code to decode barcodes / rfid tags
- 3) Explain how your program could extend to other challenges
- 4) Challenge 2 – Functional Digital Link
- 5) Use your creativity – ping your mentor



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THANK YOU!

