The Global Language of Business

GS1 Standards Event – A digital experience

RFID: beyond identification

June 25, 9.00am -11.00am EDT

Anti-trust caution

- GS1 operates under the GS1 anti-trust caution. Strict compliance with anti-trust laws is and always has been the policy of GS1.
- The best way to avoid problems is to remember that the purpose of the group is to enhance the ability of all industry members to compete more efficiently.
- This means:
  - **There shall be no discussion of prices, allocation of customers, or products, boycotts, refusals to deal, or market share.**
  - If any participant believes the group is drifting toward impermissible discussion, the topic shall be tabled until the opinion of counsel can be obtained.
- The full anti-trust caution is available via the link below, if you would like to read it in its entirety: http://www.gs1.org/gs1-anti-trust-caution.

Meeting etiquette

Be present
Avoid multitasking

Be considerate
Silence phones
Keep comments concise

Be collaborative
Ask questions
Be open to other views

Be professional
Speak on company's behalf

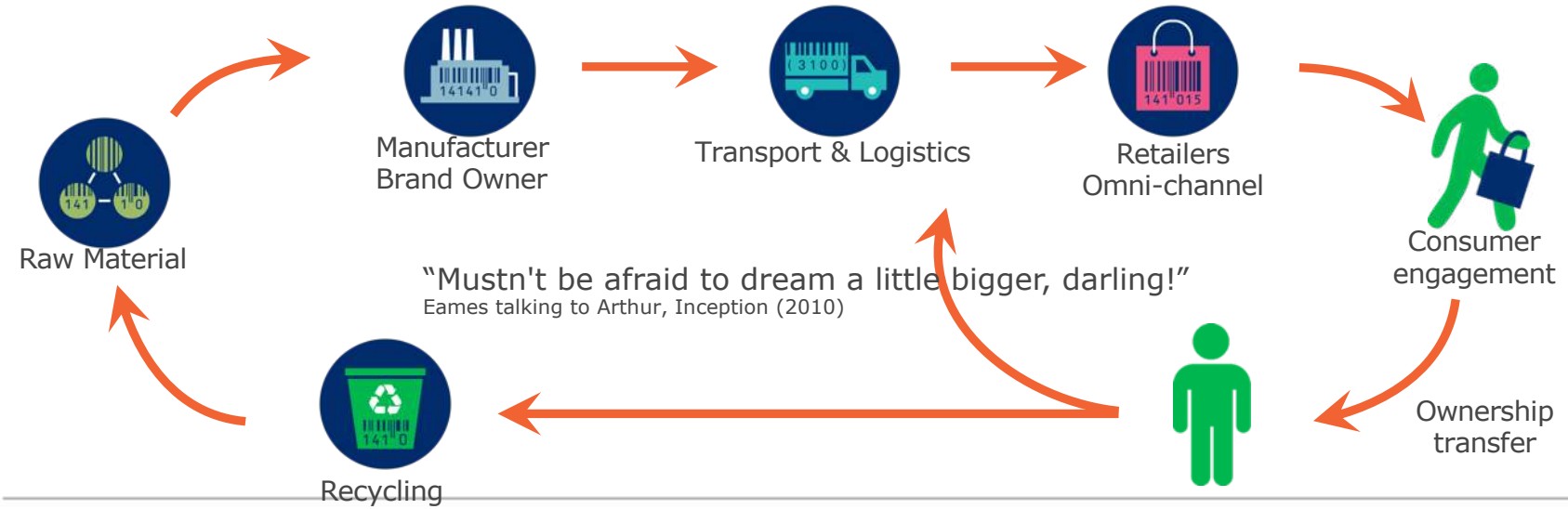
GS1 Standards Event 2020 | Week at a Glance

MONDAY, JUNE 22nd			TUESDAY, JUNE 23rd			WEDNESDAY, JUNE 24th			THURSDAY, JUNE 25th		
8:00 - 8:45			8:00 - 8:45			8:00 - 8:45			8:00 - 8:45		
Keynote: Accelerating into our digital future			Keynote: How organisations (and the people who lead them) can thrive in the age of relentless change			Keynote: Healthcare			Keynote: MIGROS & Google Shopping		
8:45 - 9:00			8:45 - 9:00			8:45 - 9:00			8:45 - 9:00		
Retail Innovation "Flash talk": Computer Vision GS1 in maritime-based supply chains "Flash talk"			Global Data Model business case "Flash talk"			GS1 UK & Healthcare "Flash talk"			Material Master Data in the Rail Industry "Flash talk"		
9:00 - 12:00	9:00 - 12:00	9:00 - 12:00	9:00 - 12:00	9:00 - 12:00	9:00 - 10:00	9:00 - 12:00	9:00 - 11:00	9:00 - 12:00	9:00 - 11:00	9:00 - 12:00	9:00 - 12:00
GSMP Identification SMG meeting *Opted-In only	GDSN User Group meeting	Industry Engagement Steering Committee meeting *Members only	GSMP Image, Digital & Electronic Assets (IDEA) SMG meeting *Opted-In Only	GSMP EPCIS & CBV MSWG meeting *Opted-In Only	The New Global Data Model Standard – Driving global adoption	GSMP Low Level Reader Protocol (LLRP) MSWG meeing *Opted-In only	GSMP Global Product Classification SMG meeting *Opted-In Only 10:00 - 12:00 The Future of On-pack Coding Update	GSMP EPCIS & CBV MSWG meeting, continued *Opted-In Only	RFID beyond identification 11:00 - 12:00 Global Data Model live Q&A	2D at POS Fresh Foods Variable Measure Products *Opted-In only	GSMP Digital Signature MSWG meeting *Opted-In Only
12:00 - 12:30											
Open networking time											

RFID: beyond identification

- RFID? What are we talking about?
- I have a dream!

From raw material to recycling: a wonderful (RFID enabled) journey



RFID: beyond identification

Claude Tételin

Steve Halliday

Jonathan Gregory

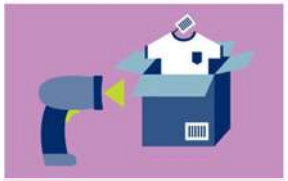
Isabelle Devant

Paul Muller

Craig Alan Repec

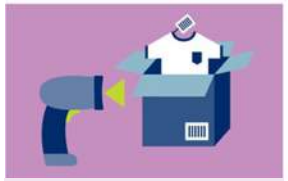
What RFID allows you to do?

First of all: **increase inventory efficiency** (accuracy, speed and granularity)



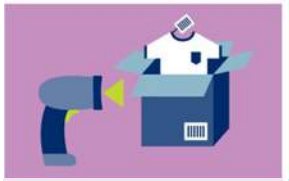
63%
of inventory accuracy with barcodes

95%
of inventory accuracy with EPC/RFID



200
items per hour with barcodes

20000
items per hour with EPC/RFID



GTIN
same article, same GTIN

SGTIN
each article has a different identifier

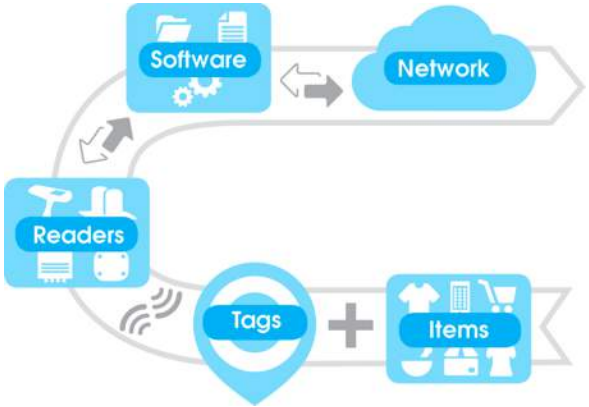
ECR retail report

But not only!

Back to basics: what is RFID?

- RFID is a **data carrier**
- RFID is a **wireless technology** that connects billions of things
- RFID enables consumers and businesses to:

identify, locate, engage, transact and authenticate



Type of RFID	Options	Main applications
Passive	LF HF (including NFC) UHF (RAIN)	Animal ID Payment/access control Retail, logistics,…
Active	Different protocols & frequencies	Geo-fencing

Back to basics: NFC vs. RAIN

RAIN

- Passive Ultra High Frequency UHF (860-930 MHz)
- Air interface: GS1 EPC Gen2 / ISO/IEC 18000-63
- Read range: <15m

- + read rate: up to 100 tags/s
- + no line of sight required

NFC

- Passive High Frequency HF (13,56 MHz)
- Air interface: ISO/IEC 14443 and 15693
- Read range: <10cm

- + reader embedded in smartphones
- + peer to peer mode

Both use passive tags
(no battery required)

Back to basics: RAIN RFID tag

Inlay (dry or wet): the basic form factor of an RFID tag

antenna (metal)

97 x 27 mm

RFID chip

substrate (PET, paper)

Back to basics: RFID and GS1 data format

Example of a care label

GS1 element string (GTIN + serial):
(01) 0 360844 984616 5 (21) 000 000 760 130
Decathlon's GCP

"Pure Identity" EPC URI for use in EPCIS event:
urn:epc:id:sgtin:360844.0984616.760130

EPC Tag URI for tag-encoding software:
urn:epc:tag:sgtin-96:1.360844.0984616.760130

96 bits SGTIN-96 (as encoded in RFID tag)
001100000011100101100000011000110000001111000001100010100000000000000000000010111001100101000010
Hexadecimal = 3039606303C18A00000B9942

RFID tags form factors… for all industries

Confidex

printable metal tag

RAINFC

LabId / EM microelectronic

Avery Dennison

micro-wavable tag

Primo1D

Thread

Healthcare

Retail

Packaging & Logistics

Rail

Manufacturing

Electronics

Food

Aviation

From RAIN Alliance

RFID beyond inventory

Counting/detection is important for inventory but also for:

- Anti-theft system
- Dynamic pricing
- Payment solutions
- Omni-channel
- Product recalls
- Product returns

FedEx

Decathlon PoS

Other ways to benefit from RFID

- Sensors
- Brand protection
  - Authentication
  - Tamper proof
- Localisation
- Embedded tags
  - recycling
  - ownership transfer
  - chain of custody

Smartrac

Huayuan

Steve Halliday
RAIN Alliance

RAIN RFID Alliance

GS1 Standards Event
25 June 2020

Steve Halliday
President
RAIN RFID Alliance

RAIN Alliance

- **RAIN Alliance was founded in 2014 and is a subsidiary of AIM**
  - Increase awareness and understanding of passive UHF RFID (GS1's EPC Gen2 protocol and ISO's 18000-63 standard)
- **Around 160 global members and annual meetings in Americas, Asia and Europe**
  - Alliance members include hardware and software companies, solution providers, academics, and end-users

What is RAIN RFID?

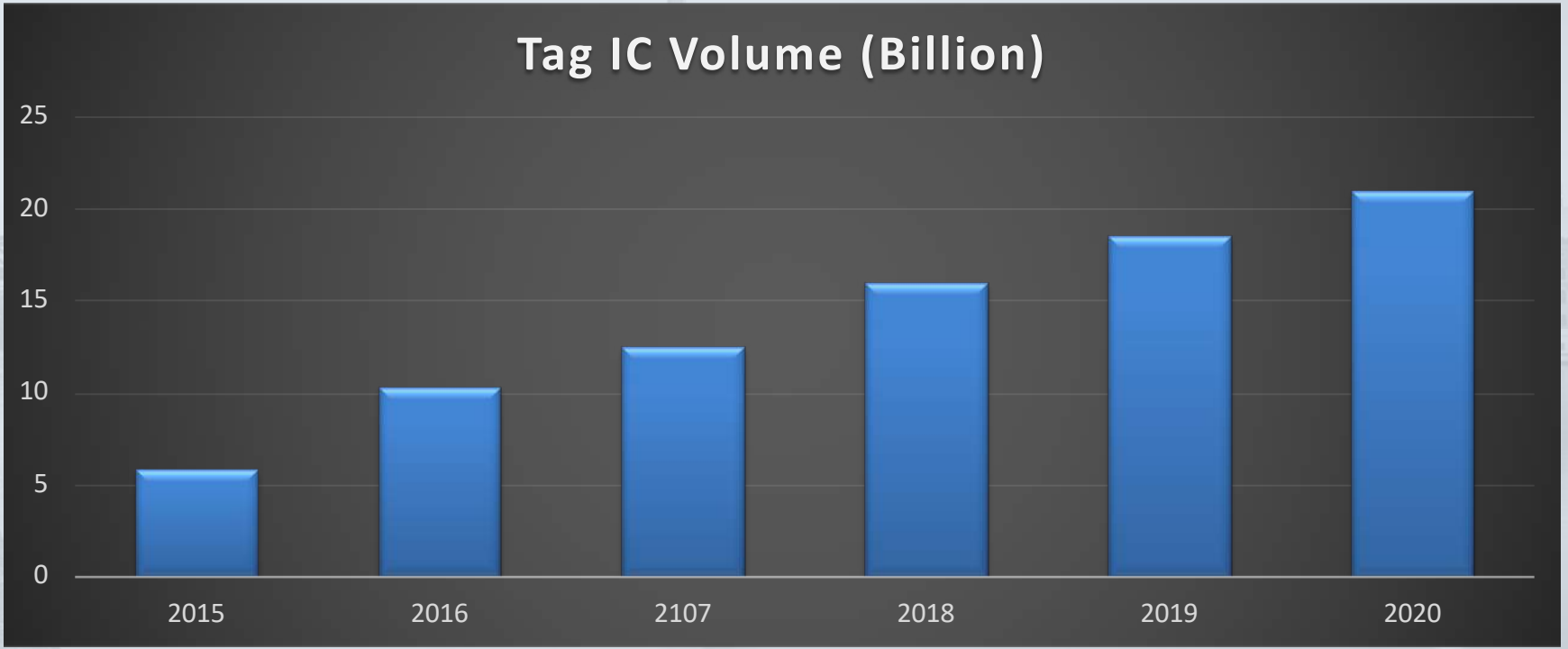
- **RAIN RFID is a wireless technology that connects billions of everyday items to the internet, enabling businesses and consumers to identify, locate, authenticate, and engage each item.**
- **RAIN RFID makes it possible to network *things* without power.**
  - >18 billion things tagged in 2019
  - >20 billion annually by 2020

Why RAIN – the RAIN Brand

- **RFID is a generic acronym to describe different types of wireless technologies – different frequencies, different standards, passive vs. active, etc. *This creates confusion.***
- **RAIN is a brand for a specific passive UHF RFID wireless technology**
  - GS1's UHF Gen2 protocol
  - ISO/IEC's 18000-63 standard
- **The ultimate goal is for *"RAIN"* to be THE UHF RFID brand**
  - To transition companies and consumers to the RAIN brand, ***RAIN RFID*** is currently being used for the technology
  - ***RAIN Alliance*** is the organization
- **Other wireless technology brands, easier for end-users to understand:**
  - **WiFi**, instead of IEEE's 802.11 versions
  - **NFC**, instead of HF RFID or ISO/IEC's 14443
  - **Bluetooth**, instead of IEEE's 802.15.1

WiFi Alliance **Bluetooth SIG** **NFC Forum**

Tag IC Volume



Data Collected by RAIN 2015-2019: Forecast 2020

RAIN RFID Industries Include…

Healthcare

Retail

Packaging & Logistics

Automatic Vehicle Identification (AVI)

Manufacturing

Electronics

Food

Aviation

Why RAIN?

Retail

- 2 to 20% sales boost
- Reduction in out of stocks
- 96% time reduction with smart inventory
- Over 9% decrease in shrinkage
- Over 98% inventory accuracy results

Aviation

- Improve end to end tracking
- Improve asset inventory control and life cycle management
- Higher customer satisfaction – fewer delays, cancelations, mishandled bags
- Rapid return on investment
- Easier bag handling

Healthcare

- Higher inventory accuracy
- Reduced product expiration
- Effective recall management
- Improved patient safety and care
- Automated payments and increased profitability
- Decreased supply chain and equipment costs

Smart Retail - apparel

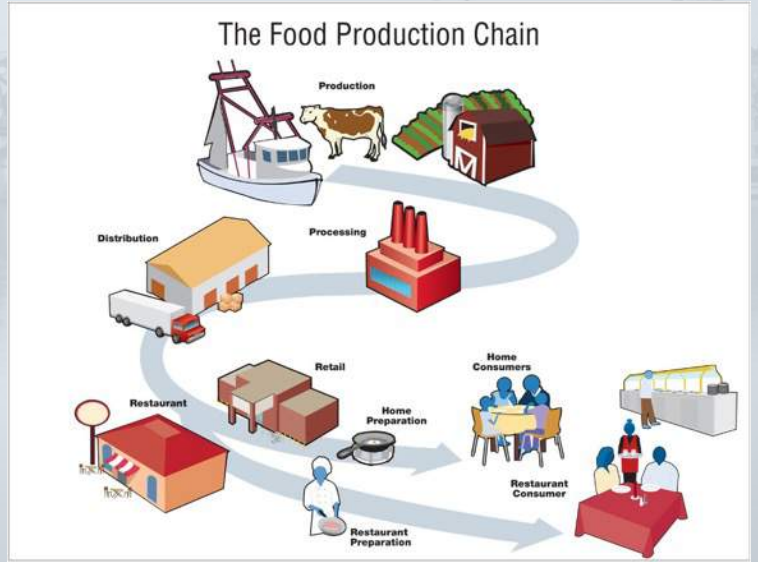
- **Growing at a fantastic rate Over 100 retailers currently using RAIN**
- **Losses - Over 9% decrease in shrinkage**
- **Increases in sales - 2 to 20% sales boost**
- **Reduction in out of stocks**
- **Big savings in inventory management**
  - 96% time reduction with smart inventory
  - Over 98% inventory accuracy results

Frictionless Shopping

- Whole store
- Intelligent vending machine/fridge
- Competition is with alternative technologies (camera, scale, etc.)

Smart Agriculture & Smart Animal Farming

- Farm to Fork initiatives
- Freshness tracking
- Refrigerated transport
- Vending machines



RAIN Tag

Aviation

- Enable hands-free scanning of baggage throughout the handling process
- Track passenger's baggage in real-time - Reduce mishandling of baggage by 25-50%
- Automate freight tracking and increase accuracy
- Ease tracking of airplane safety equipment and reduce errors
- Authenticate and track repair parts for maintenance

Sports

ING NEW YORK CITY MARATHON
PREMIER EVENT OF NEW YORK ROAD RUNNERS

- Improved Runner Tracking
- Social Media Integration
- Real-Time Race Updates

RAIN Tag

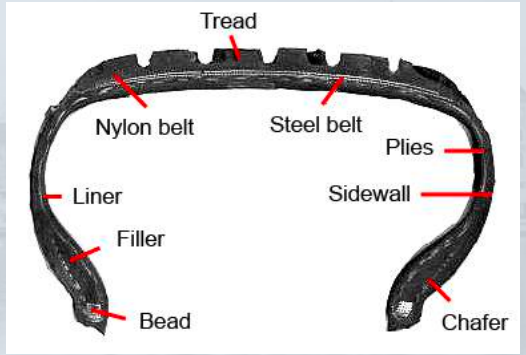
Tire identification and data-sharing

Market need

- **Today: Identify and authenticate every tire to meet government and/or consumer demand**
- **Tomorrow: use RFID as a sensor (pressure, temperature, mechanical stress)**

Issues

- **No RFID-friendly way to embed tag in a tire today**
- **Data-sharing amongst many stakeholders**



GS1 contribution

- **SGTIN for tire identification offers traceability, etc.**
- **EPCIS for data-sharing**
- **Application Identifiers for user-memory data encoding**

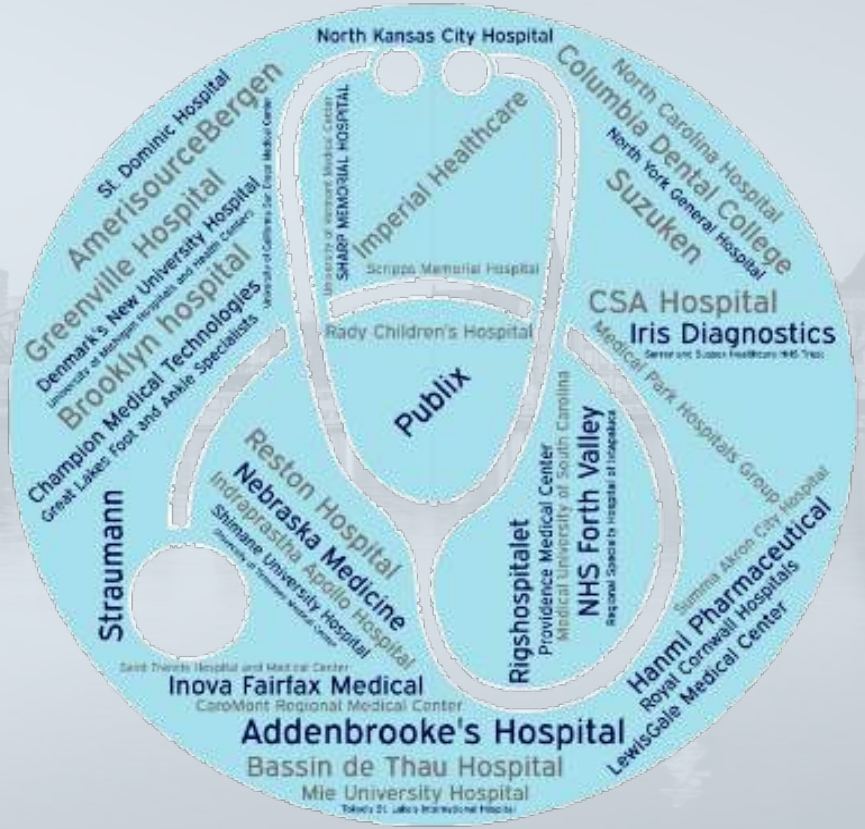
Healthcare

Asset Tracking and Management

Healthcare and Supply Chain Management

Inventory and Supply Management

Patient Care and Experience



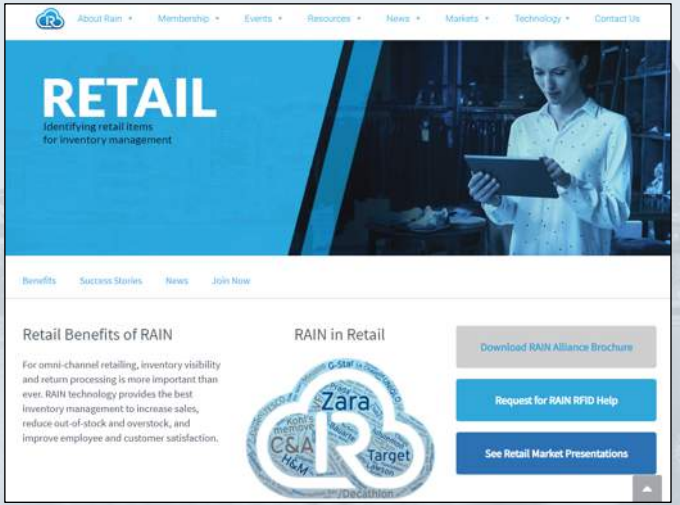
RAIN Workgroups

- **RAIN workgroups create educational material to help accelerate adoption**
  - Aviation
  - Developers
  - Healthcare
  - Intelligent packaging
  - Smart products
  - Technical
- **New workgroups coming**
  - Tyres
  - Sustainability/Recycling
  - Numbering Solutions

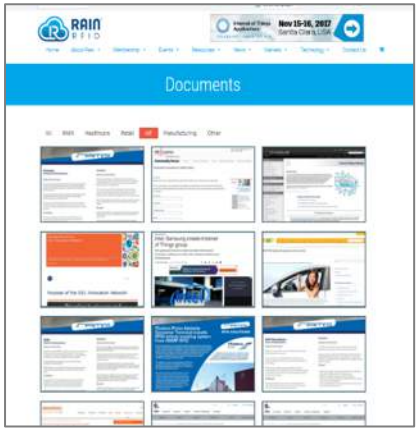
www.RAINRFID.org

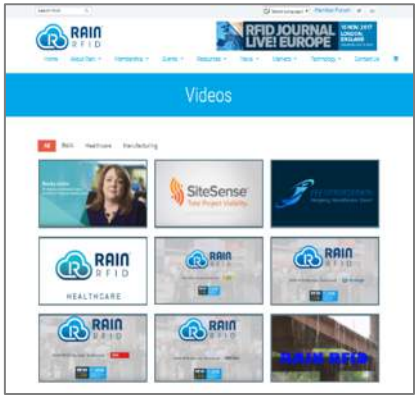
Market Pages

Case Studies, News, Presentations, etc.



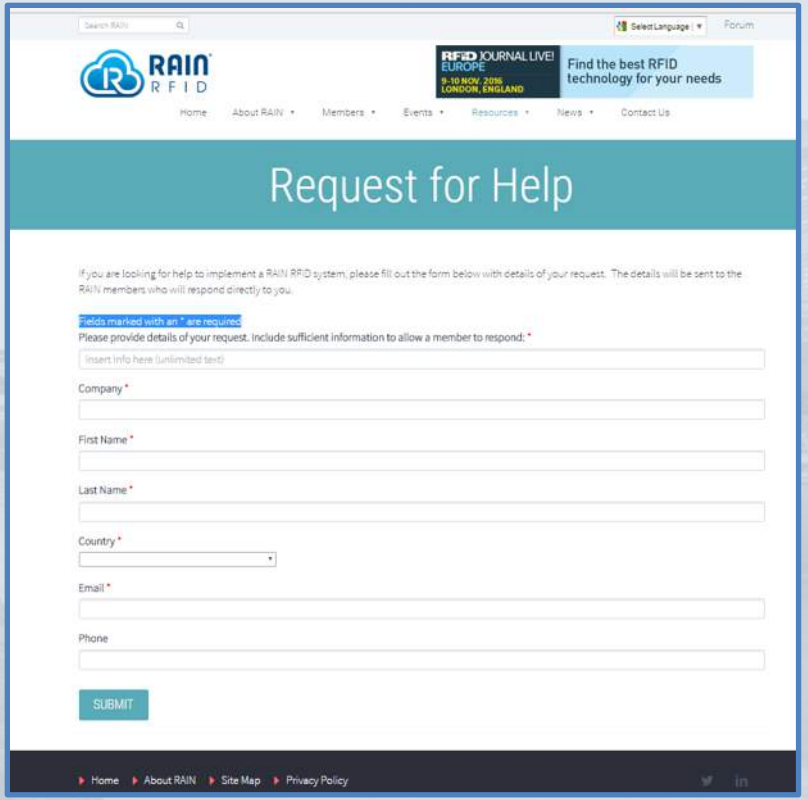
Documents & Videos Organized by Markets





- Current markets – Aviation, Healthcare, IOT, Retail, & Smart Manufacturing
- Lists of >100 retailers and >40 healthcare end-users worldwide

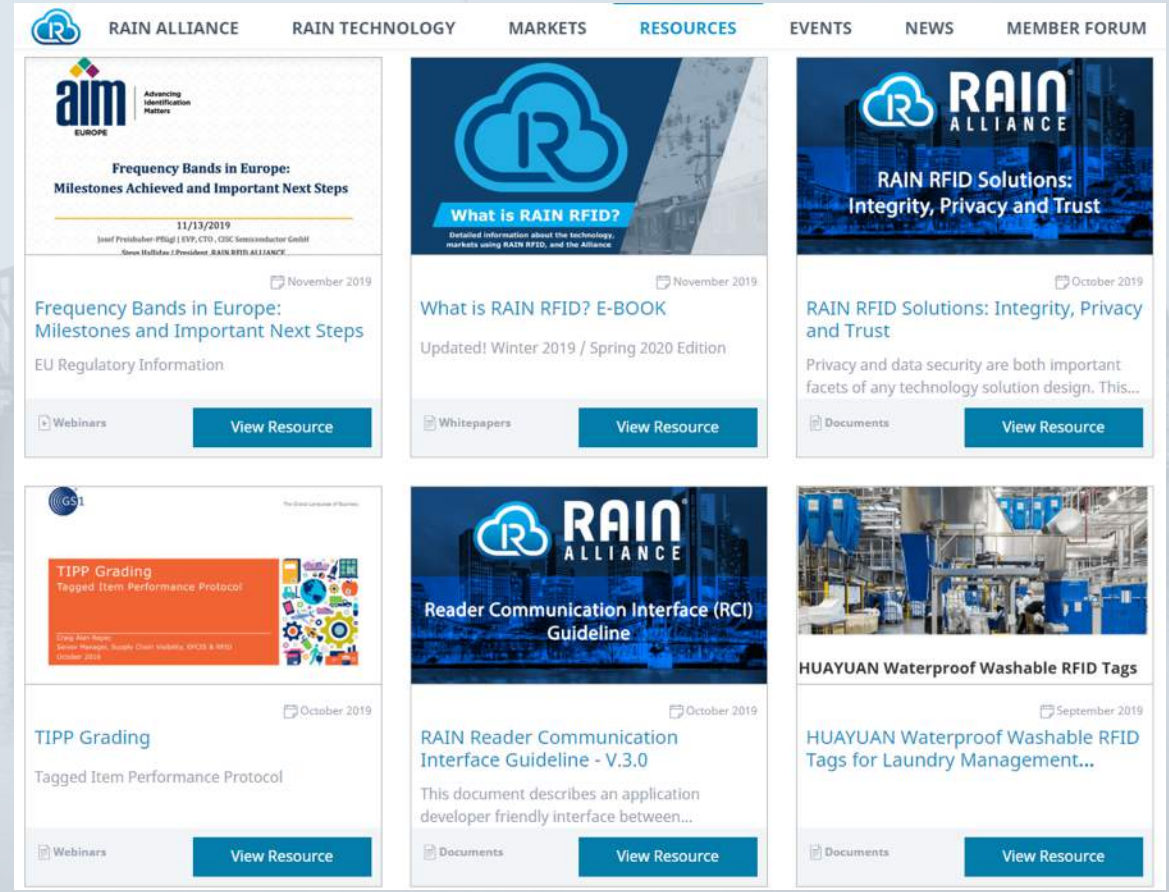
Requests for Help



- Great way to get help on your project
- End users can post on the web site
- Sent to all member companies for their attention

Post your requests for help with your project
http://rainrfid.org/resources/request-for-help/

RAIN Resources

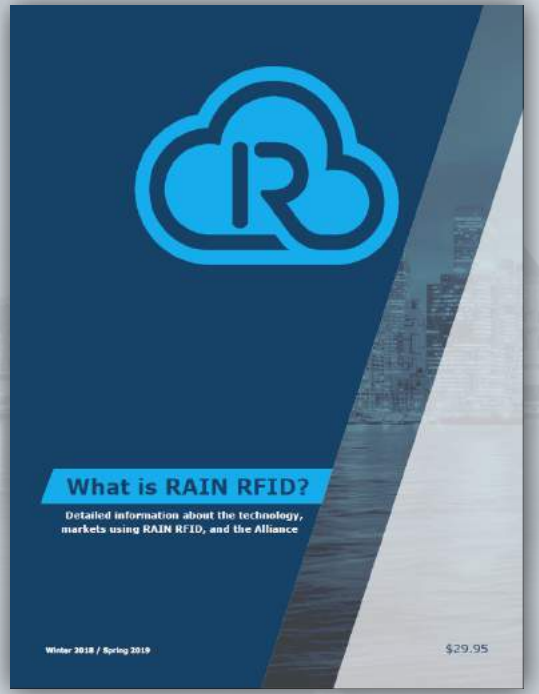


E-Book

What is RAIN RFID?

Detailed information about the technology, markets using RAIN RFID, and the Alliance

- **Details about RAIN RFID**
  - Tags, Readers, Antennas, Software, and Data
- **Standards and Numbering System**
- **Markets | Industries | Applications**
  - Applications and benefits of using RAIN
  - Case studies
- **Request for Help**
  - How end-users can find the RAIN Alliance members they need to work with
- **RAIN Alliance**
  - Workgroups and Meetings
  - List of Members and Categories for the companies



Questions?

Questions?

Questions?

Questions?

Questions?

www.RAINRFID.org

Steve@rainrfid.org

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Jonathan Gregory
GS1 US

The Global Language of Business

Raw Material Attributes

Jonathan Gregory, Director, Community Engagement, GS1 US
June 25th, 2020

How do you specify raw materials?

Leather

- Dyeing Characteristics
- Finish Basic
- Grain Surface Characteristics
- Hand Feel
- Hide Configuration
- Leather Type
- Oil Content (%)
- …

How is this described?

Raw Material Attributes Guideline

- Defines Raw Materials that are components of finished products
- Provides a standard vocabulary for defining material attributes
- Attribute fingerprint: identification of specific materials enables apples-to-apples material comparisons
- https://www.gs1us.org/rawmaterials

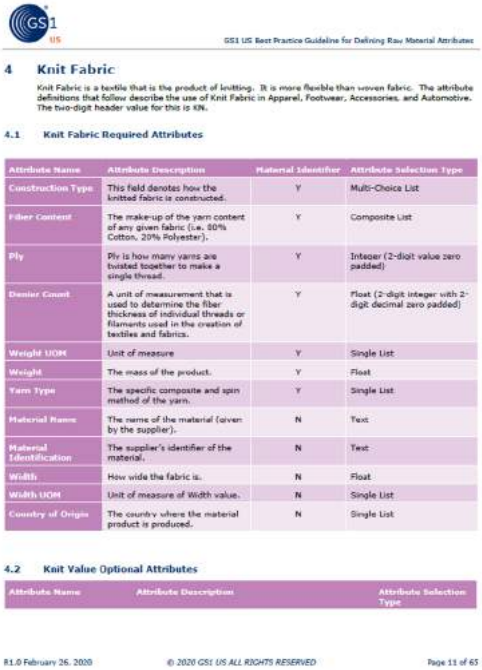
Knit Fabric Identifier Example

Required Field	Example Values	Reference Section	Code Value
Header	R01KN	4	R01KN
Construction Type	Fleece Knit (AH) Herringbone (AK) Mesh (AU)	4.3.1	AHAKAU~
Fiber Content	Alpaca (BD) 20% Azlon (BK) 40% Cotton (BQ) 35% Elastane (BV) 5%	4.3.2	BD20BK40BQ35BV05~
Ply	3	4.3.3	03
Denier Count	4	4.3.4	04.00
Weight UOM	Grams per Square Meter	4.3.5	G/M
Weight	32.1	4.3.6	32.10~
Yarn Type	Filament - Flat	4.3.7	FF

Resulting Code Value: R01KNAHAKAU~BD20BK40BQ35BV05~0304.00G/M32.10~FF

Guideline Value

- Enables like-kind buyer comparisons of raw materials
- Increases buyer decision speed
- Digitized material data enables system-driven sourcing with resulting efficiencies and rules
- 3D Modeling
- Product Circularity



GS1 US Best Practice Guideline for Defining Raw Material Attributes

4 Knit Fabric

Knit Fabric is a textile that is the product of knitting. It is more flexible than woven fabric. The attribute definitions that follow describe the use of Knit Fabric in Apparel, Footwear, Accessories, and Automotive. The two-digit header value for this is KN.

4.1 Knit Fabric Required Attributes

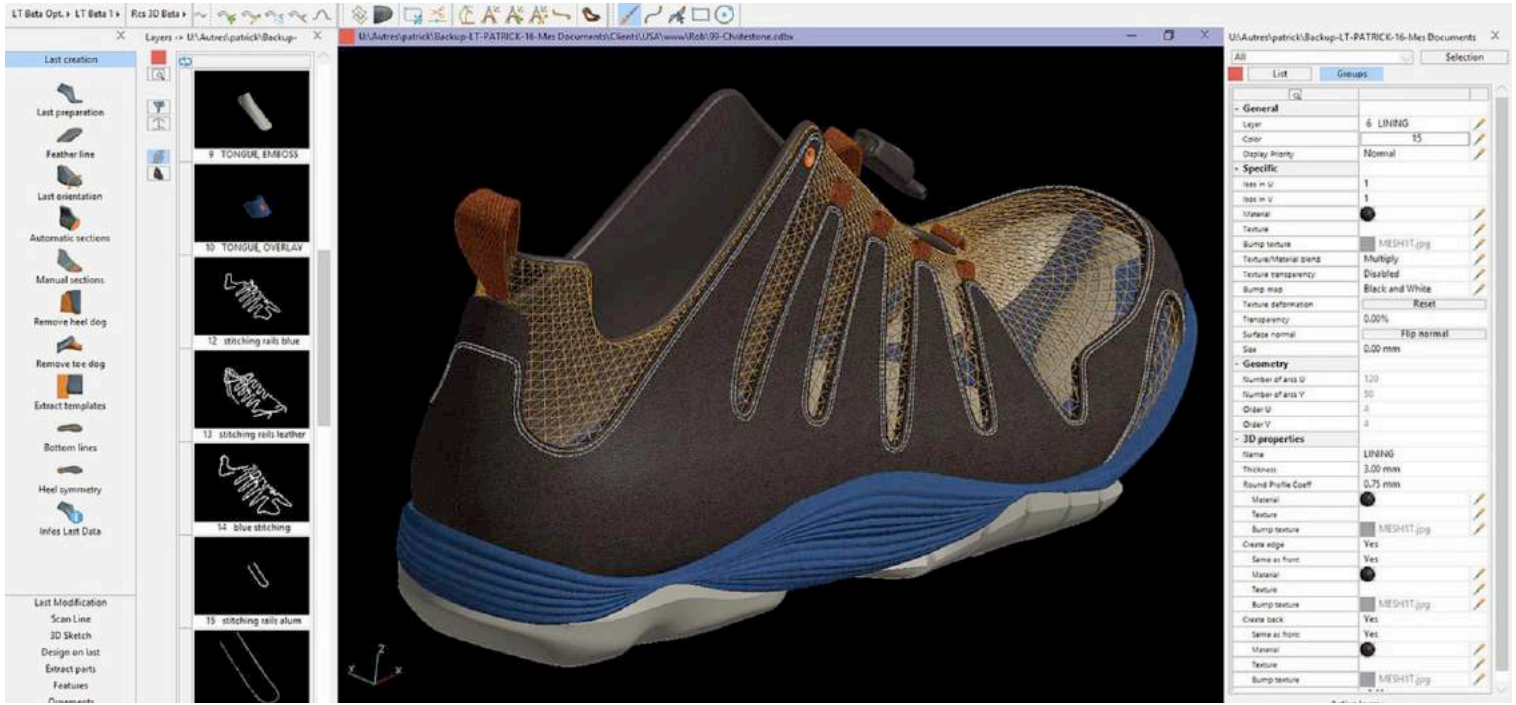
Attribute Name	Attribute Description	Material Identifier	Attribute Selection Type
Construction Type	This field denotes how the knitted fabric is constructed.	Y	Multi-Choice List
Fiber Content	The make-up of the yarn content of any given fabric (i.e., 80% Cotton, 20% Polyester).	Y	Composite List
Ply	Ply is how many yarns are twisted together to make a single thread.	Y	Integer (2-digit value zero padded)
Denier Count	A unit of measurement that is used to determine the fiber thickness of individual threads or filaments used in the creation of textiles and fabrics.	Y	Float (2-digit integer with 2-digit decimal zero padded)
Weight UOM	Unit of measure	Y	Single List
Weight	The mass of the product.	Y	Float
Yarn Type	The specific composite and spin method of the yarn.	Y	Single List
Material Name	The name of the material (given by the supplier).	N	Text
Material Identification	The supplier's identifier of the material.	N	Text
Width	How wide the fabric is.	N	Float
Width UOM	Unit of measure of Width value.	N	Single List
Country of Origin	The country where the material product is produced.	N	Single List

4.2 Knit Value Optional Attributes

Attribute Name	Attribute Description	Attribute Selection Type

R1.0 February 26, 2020 © 2020 GS1 US ALL RIGHTS RESERVED Page 11 of 65

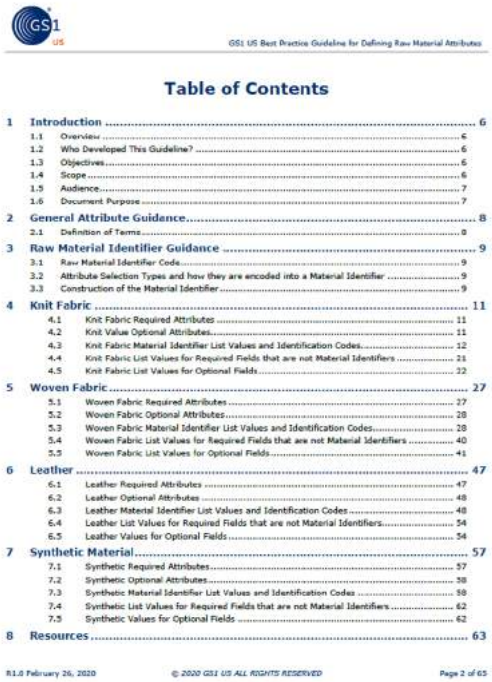
3D Modeling Benefits



3D Modeling and Component Materials

Timeline

- Feb 2020: First Release
  - Knit, Woven, Leather, and Synthetic material
- Fall 2020: Second Release Planned
  - Update initial materials to add recycled content
  - Add labels, thread, footwear components…
- Sept 2020: GS1 US Webinar
  - Highlight Circularity and 3D rendering



GS1 US Best Practice Guideline for Defining Raw Material Attributes

Table of Contents

Questions?

- If interested in more information, including details on the September webinar, please contact jgregory@gs1us.org
- And for the latest guideline, see https://www.gs1us.org/rawmaterials

Isabelle Devant
Primo1D

Primo1D

The E-Thread ™ Company

EMPOWER APPAREL

Primo1D Retail Value Proposition

Supply chain

Omni-channel enabler

POS

Customer Engagement

Business

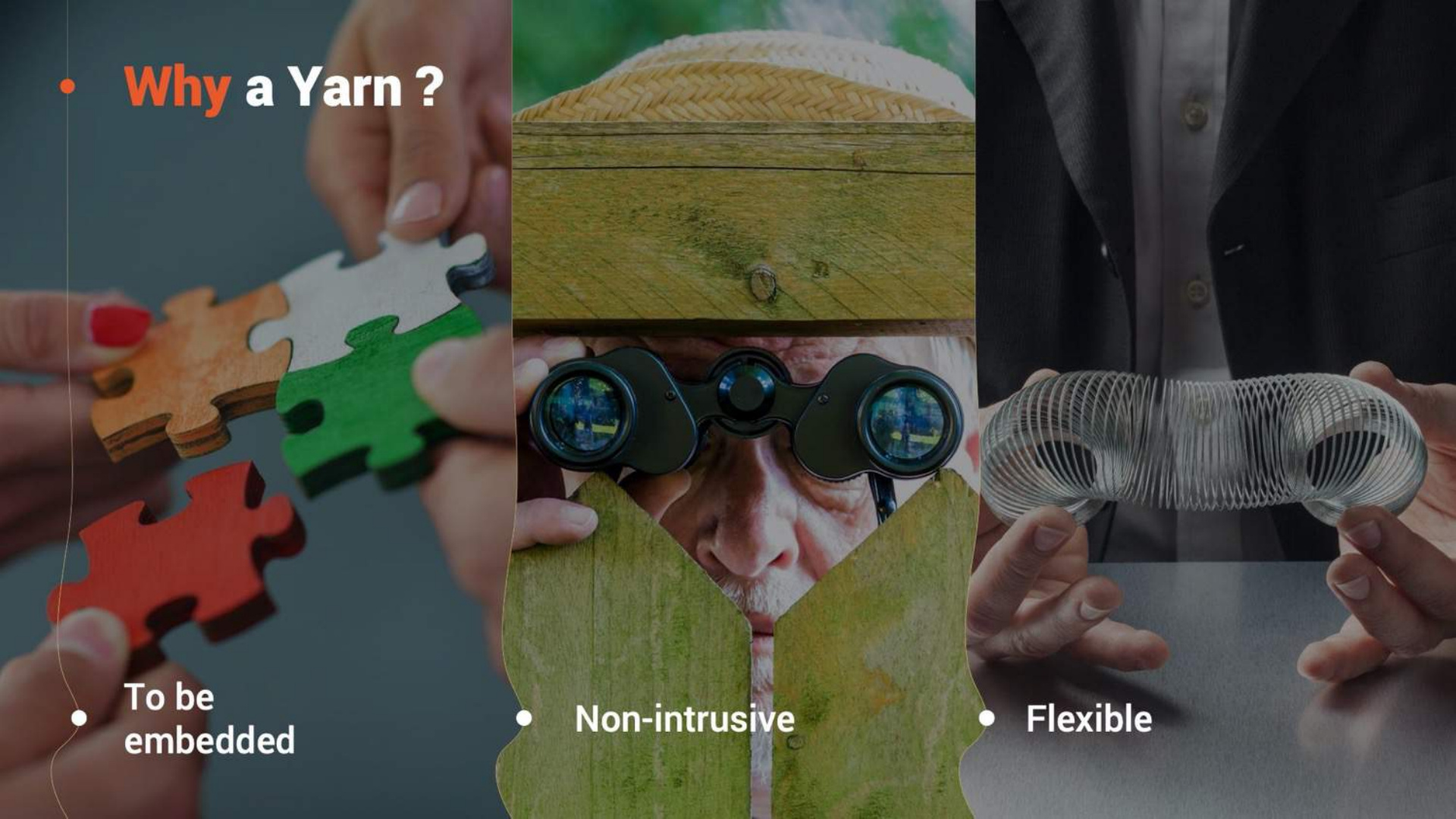
A unique Product Lifecycle Management tool

Primo1D Product

Passive **RAIN RFID** tag into a textile yarn

Easy to integrate into **apparel**

Protected by **18 international patents**



Why a Yarn ?

- To be embedded
- Non-intrusive
- Flexible

How to get a Smart Garment ?

Tag in a **strip**

Integration on **standard machines**, with a specific pressure foot

Smart garment **ready** !

Retail Value Proposition in Supply Chain

Durable track & trace solution

Source tagging

Washable tag

Extended digitalisation

Omnichannel enabler

Inventory accuracy

Prevent OOS

Facilitate reverse logistic

One unique digital ID all along value chain

Primo1D

Retail Value Proposition at POS (and beyond…)

Reliable stock visibility

Physical asset detection, not tag !

Secure all POS operations (fitting room management)

Enhance customer journey

Easy trials

Fast cashing

Privacy management

After sales

Quick and safe product return

Power resale, rental and sharing

Trigger customer engagement

Primo1D

Retail Value Proposition for Business

Not a single usage tag !

Digital ID + embedded EAS solution

Boost operations efficency

Unlock transparency

Full life cycle info

Grey market identification

Support sustainability

Authentication warranties for repair purpose and second hand

A “less is more” tagging solution

Primo1D

Company Profile

Founded August 2013
17 talented people

E-Thread™ technology platform

Scalable industrial model

Primo1D

The E-Thread ™ Company

THANK YOU !

Isabelle DEVANT
isabelle.devant@primo1d.com

Paul Muller
EM Microelectronic

em microelectronic
A COMPANY OF THE SWATCH GROUP

RAINFC Dual-Frequency RFID Solutions

Leveraging GS1 Standards for Full Product Lifecycle Traceability

We are embracing challenges through time

A COMPANY OF THE SWATCH GROUP

SWATCH GROUP

Swatchgroup is:
20 Brands
35,360 Employees
USD 8.5 Billion Net Sales

2019 Figures

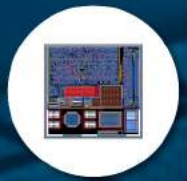
Breguet Depuis 1775 · HARRY WINSTON · BLANCPAIN · Glashütte ORIGINAL · JAQUET DROZ · LÉON HATOT · OMEGA

LONGINES · RADO SWITZERLAND · UNION GLASHÜTTE/SA. · TISSOT · ck Calvin Klein · BALMAN swiss watches · CERTINA

MIDO · HAMILTON · swatch · flik flak

30 Years of RFID

Swatch Group's **EM Microelectronic** serves the RFID market since 1989 with premium ICs, standard and customized, for LF, HF, UHF and multi-frequency/multi-protocol applications



1992

EM4021 First UHF IP-X chip

2000

EM4036 first EM 13.56MHz Vicinity chip

2015

World's first RAINFC dual-frequency chip

em | echo

2018

100M RAINFC tags in the market

1989

EM4001 First EM LF chip

1996

ISO 11784/11785 standard for animal identification, EM4005

2000

EM4095 High Performance LF Reader AFE

2003-2008

World's first mass UHF RFID retail deployment, EM delivers 90% of worlds UHF chips

2017

The new benchmark for RAIN RFID crypto transponders

em | aura-C

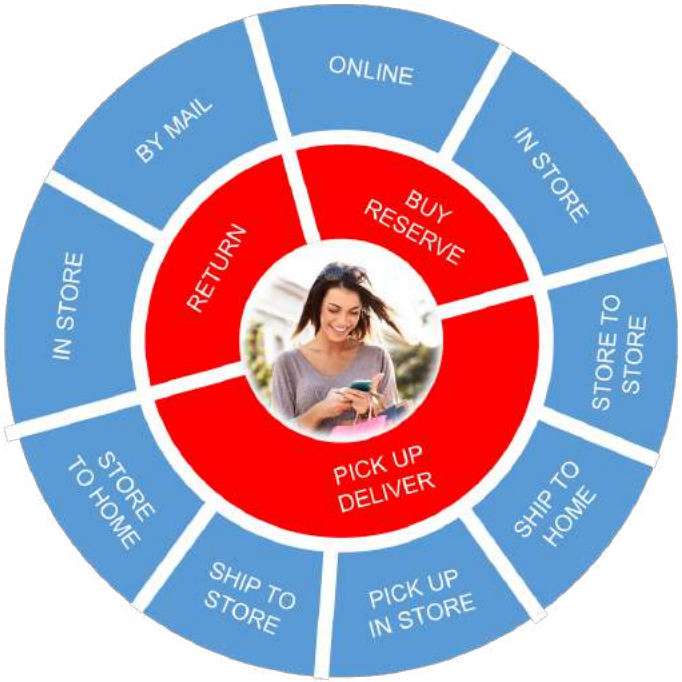
2020

The holistic omnichannel solution powering circular brand-consumer engagement models

em | echo

Retail footprint

Our own omnichannel challenges



- Same experience at all touch points
- Same services everywhere
- Fusion of marketing and sales
- Seamless consumer experience: “white gloves” at home
- Channel management
- Grey market
- Counterfeits

To provide a consistent retail experience when consumer A engages with product Y, A and Y need to be uniquely identified

→ A and Y need Digital Twins

Same Experience Anytime, Anywhere

- Wikipedia:
  A digital twin is a digital replica of a living or non-living physical entity…

- Every physical entity can have different digital twins for different purposes
  - ➢ Drivers license, ID, passport(s)
  - ➢ Social media accounts
  - ➢ Credit card & online shopping accounts/identities
  - ➢ Design drawings, business plans,…
  - ➢ ERP item inventory data in retail and smart industries

- A number of technologies create the link between the entity and its digital twin
  - ➢ Barcodes, 2D codes, magstripes, low frequency RFID, NFC, RAIN RFID/EPC Gen2 tags

RAIN RFID (Radio Frequency Identification)

- Advantages
  - Fully passive tags, energy harvested from reader signal
  - Transmits data by backscattering the reader signal
  - No battery → virtually unlimited lifetime, no maintenance
  - Inventories 100s of items at once
  - Reads >10m
- Prime technology for inventory and supply chain management applications
- Technology
  - GS1 EPC Gen2v2 Air Interface Protocol
  - Operates in the UHF 860-960MHz Spectrum
  - Supports GS1 global trade item codes (GTIN) or proprietary closed-loop code schemes

Retail

Electronic Vehicle Identification

Logistics

Baggage Tags

Near Field Communication (NFC)

- Advantages
  - Fully passive tags, energy harvested from reader signal
  - No battery → virtually unlimited lifetime, no maintenance
  - 1-to-1 communication between consumer and item
  - Directional short-distance read (< 8cm) → no risk of stray reading
  - Supports secure communication out of the box

- Prime technology for contactless payment, eID, ticketing, consumer engagement, brand protection

- Technology
  - GS1 Digital Link Standard with underlying NFC Forum Tag Standard
  - Operates in the HF 13.56MHz spectrum
  - Natively supported by any smartphone thanks to standardized NFC Data Exchange Format (NDEF) messages

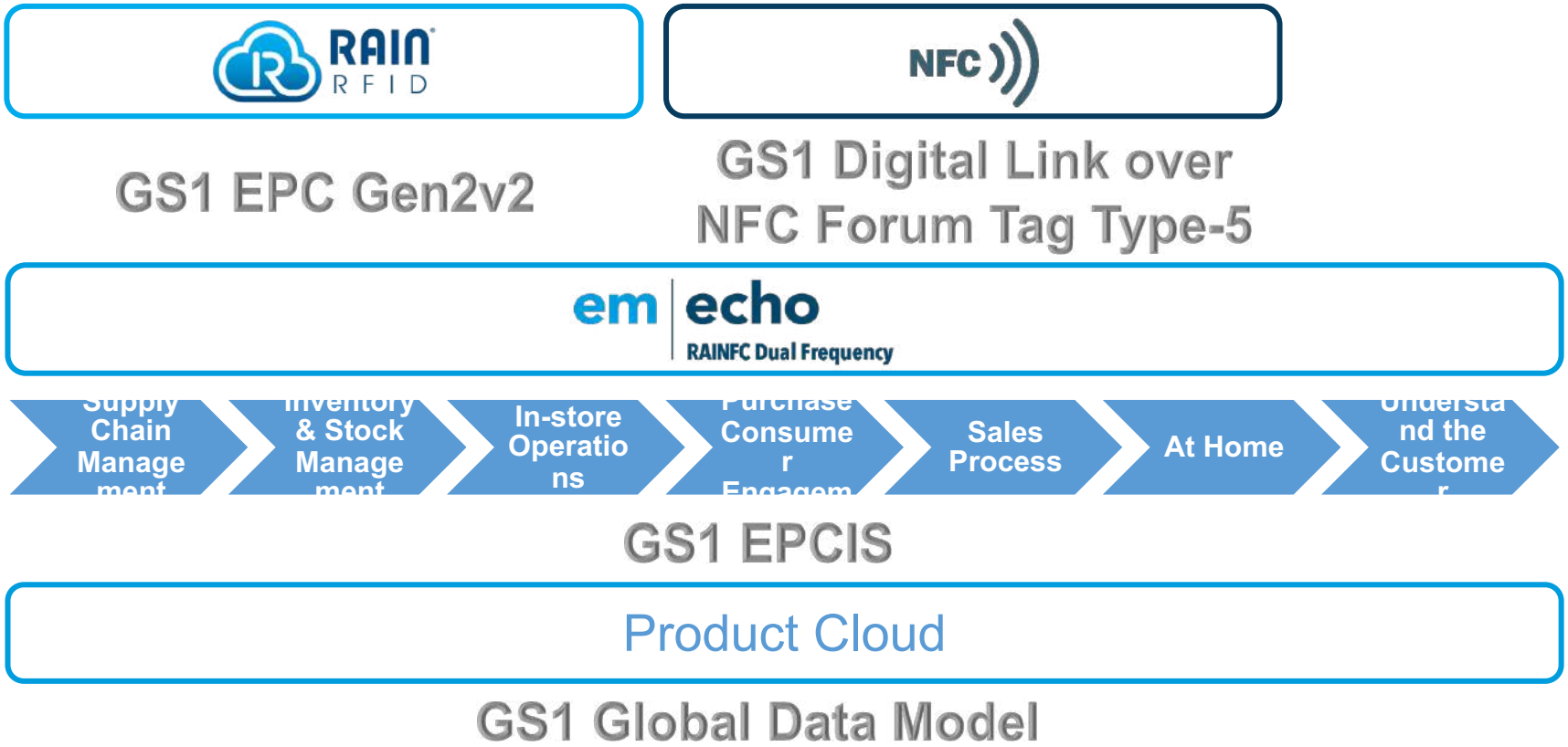
Contactless Payment

Electronic Passport

Consumer Engagement & Brand Protection

Ticketing

RAIN RFID and NFC are complementary



How Does RAINFC Technology Work – RAIN RFID Use Cases

1. Production Site
   a. Goods Dispatch

2. DC / Warehouse
   a. Goods Receiving
   b. Picked and Packed Items
   c. Goods Dispatch

3. Store
   a. Goods Receiving
   b. Inventory Counting
   c. Loss Prevention & Automated Checkout

Supply Chain Management → Inventory & Stock Management → In-store Operations

How Does RAINFC Technology Work – NFC Use Cases

1. In Store
   a. Product information, story telling, product associations
   b. Virtual sales assistant
   c. Enables store analytics on layout, consumer engagement patterns, etc.

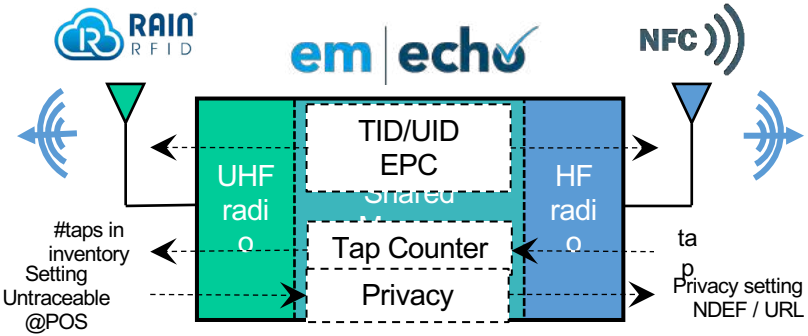
2. In Store
   a. Virtual sales assistant with up-sell and cross-sell
   b. Smartphone-enabled self-checkout (“Tap & Go”)

3. At Home
   a. Assembly instructions & videos
   b. Ordering spare parts
   c. Omni-channel sales platform for online orders

Pre-Purchase Consumer Engagement | Sales Process | At Home

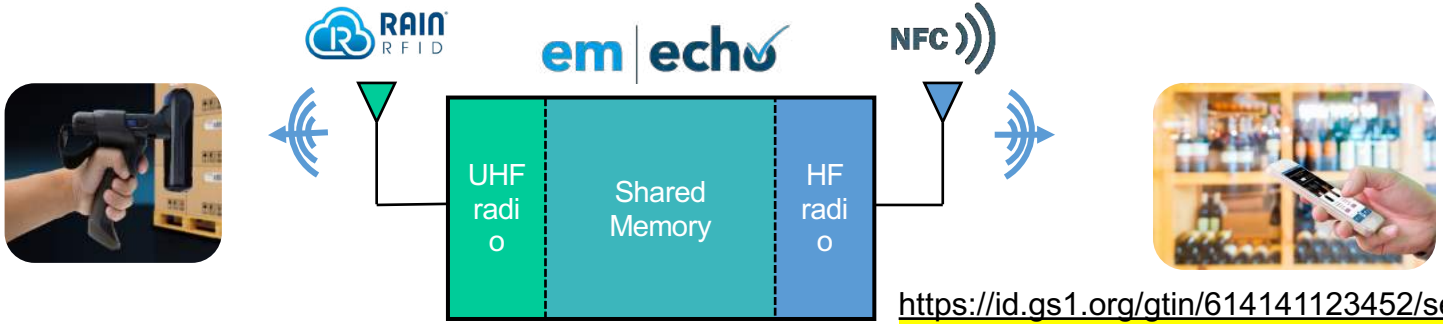



Unique RAINFC Shared Memory Concept



- Shared EPC code
  - Consistent identification of each item through either interface
  - NFC read-out using GS1 Digital Link Standard https://id.gs1.org/gtin/614141123452/ser/12345/
- Consumer engagement “tap” counter read by RAIN RFID inventory management
  - Enables advanced store and consumer behavior analytics
- EPC Gen2v2 privacy settings included in NFC NDEF message
  - Providing differentiated pre-purchase / post-purchase consumer engagement content

em echo Additional Benefits



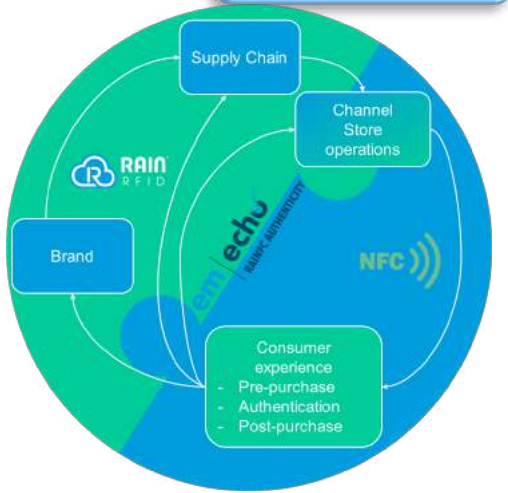
https://id.gs1.org/gtin/614141123452/ser/12345/?uid=[uid]?token=[0001]?signature=[93F5D1]

- Full tag personalization using standard RAIN RFID printers/encoders
  - The most cost-effective way to deploy NFC technology into EPC use cases
- A highly optimized AES-128 hardware cryptographic engine
  - Best-in-class secure web-authentication capability for brand protection applications
- Smartphone-based NFC read range beyond 2” on standard retail labels
  - Superior user experience (UX) vs other NFC products in the market thanks to NFC Type-5

Control logistics flow through sales channels

Prevent grey market

In-store mobile shopping assistant



Warranty registration

Enable omnichannel shopping

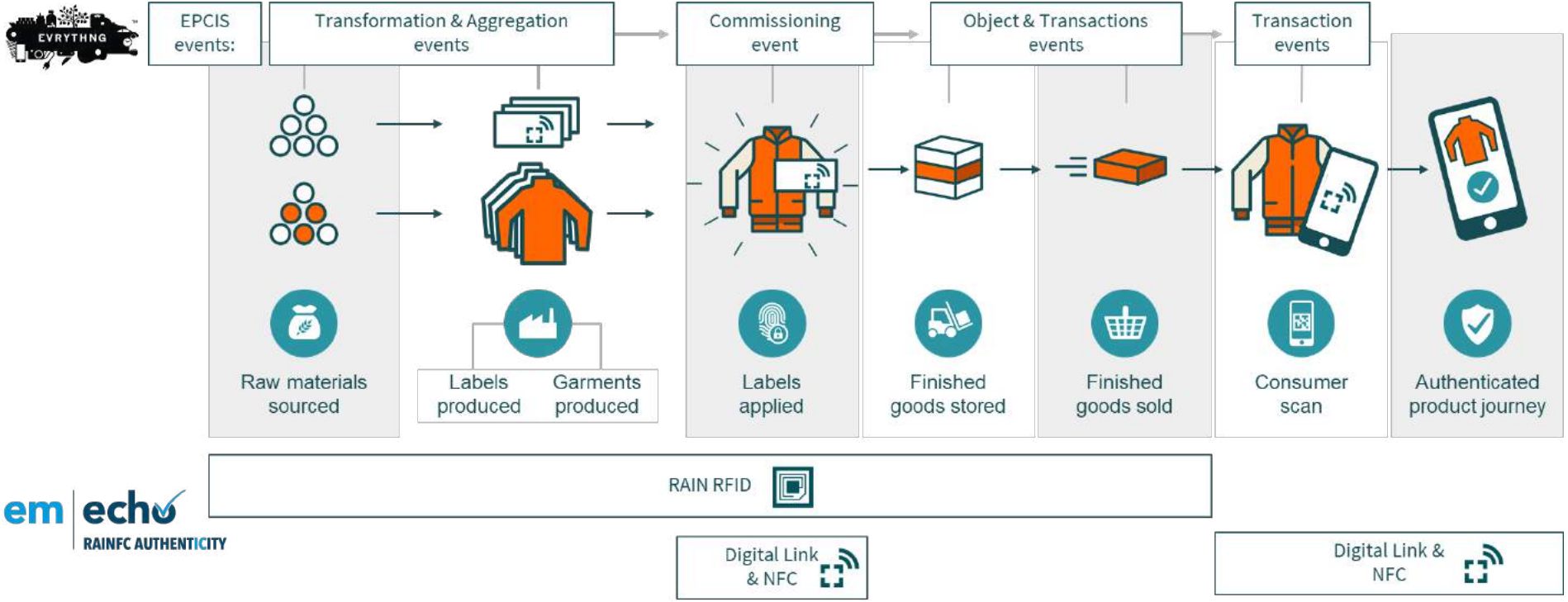
Order accessories, service, appointments

Cross-sell, upsell

Product and channel authentication

Product information and story-telling

NFC meets RAIN RFID, EPCIS & Digital Link



em echo
RAINFC AUTHENTICITY

em echo RAINFC Dual-Frequency Technology

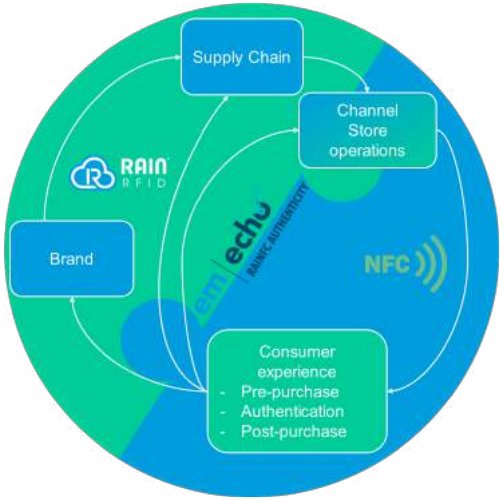
RAINFC AUTHENTICITY

- Powers holistic omni-channel sales models through product and channel authentication
- Is the perfect physical world counterpart to digital identities for Digital Twin applications
- Provides for smartphone-based secure mutual authentication
- Works hand-in-hand with distributed ledger blockchain technology
- Enables end-to-end product lifecycle management for the circular economy


em microelectronic
A COMPANY OF THE SWATCH GROUP
empowering connected things
paul.muller@emmicroelectronic.com
ultra-low power.
time accuracy.

Synergy: a few things you can't do with RAIN RFID or NFC alone

- Channel management in an omnichannel world
- Use NFC to verify not only the product is authentic, but also the channel is legit
- Manage warranty, returns, repairs, disposal, recycling
- Support conscious consumerism by providing supply chain information to the consumer



vs. 2-tag / 2-chip solutions

- Single-chip
- Shared memory → enable synergy
- Cost-effective
  - Optimized IC platform
  - 1 step assembly
  - 1 step tag encoding
- Fully backwards-compatible with existing RAIN RFID infrastructure
- Improved EPC privacy feature

drop-in upgrade

- Use the existing RAIN RFID infrastructure: readers, encoders, printers, middleware…

  … while accessing additional budgets:
  - Consumer engagement
  - Marketing
  - Anti-counterfeit
  - Environmental compliance

- No need to train the personnel
- Target only the relevant subset of the tag population
- Pilot, deploy or roll back anytime within your normal operational setup

Craig Alan Repec
GS1 Global Office

EPCIS & EPC/RFID:
Tools to enable supply chain visibility

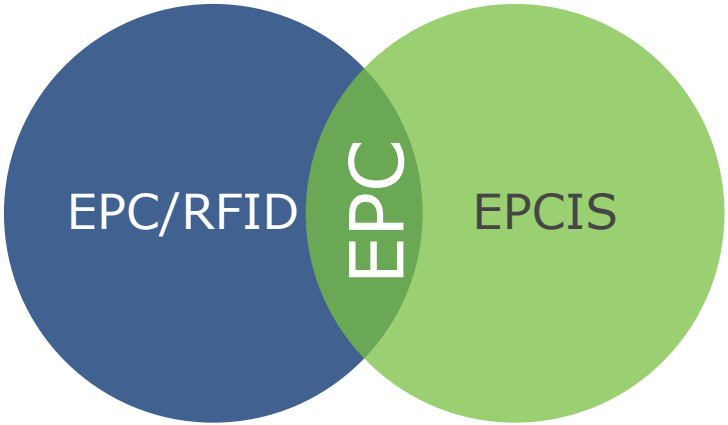
Craig Alan Repec

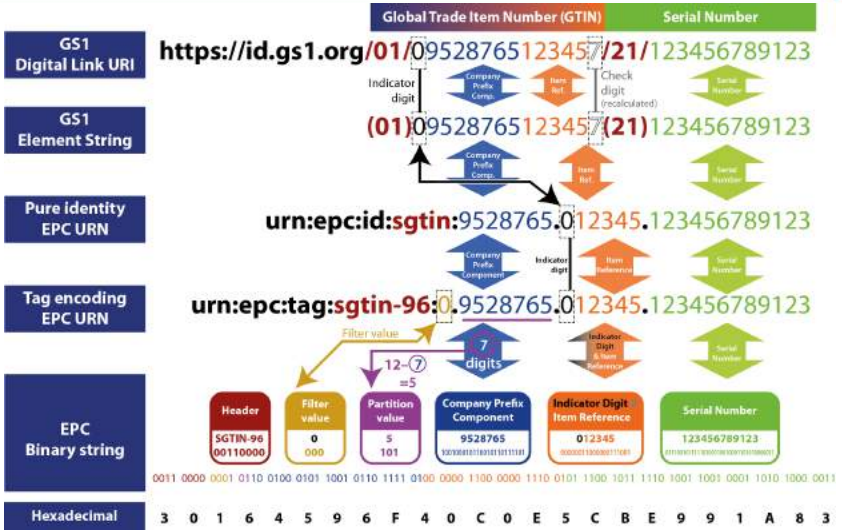
Senior Manager, Supply Chain Visibility, EPCIS & RFID

GS1

25 June 2020

Electronic Product Code (EPC)
EPC/RFID and EPCIS share the same roots





GS1's EPC Tag Data Standard (**TDS**) defines the EPC binary (RFID) and EPC Pure Identity URN (EPCIS) formats and encoding/decoding rules

GS1's Tag Data Translation (**TDT**) standard provides machine readable versions of encoding/decoding rules, defines algorithm for automated translation between various formats

EPCIS: a GS1 “Share” standard

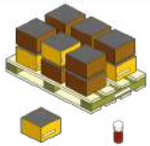
EPCIS, a GS1 and ISO “share” standard

- Open technical standard enables visibility solutions & services
- Defines a framework data model, query & capture interfaces
- Helps share visibility data across & between enterprises
- Business process steps captured as **visibility “events”**
- GS1 Keys identify the “what” & “where” of visibility events…
  - encoded as **data-carrier neutral** Electronic Product Codes (EPCs)
  - Normatively specified in GS1’s EPC Tag Data Standard (TDS)
- Published as **ISO/IEC 19987**

Core Business Vocabulary (CBV)

- Companion standard to EPCIS
- Defines specific data values to populate EPCIS data model
- Ensures a **common understanding of data semantics**
- Anchors EPCIS events to business process context
- Underpins the interoperability of EPCIS implementations
- published as **ISO/IEC 19988**

Dimensions of an EPCIS event



What objects are the subject of event?

Product / Logistic unit / Asset (e.g., SGTIN, SSCC, GIAI, etc.)

When did this event take place?

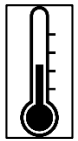
Date, time, time zone

Where did this occur and where are the objects thereafter?

Physical location (SGLN)

Why did this event take place, and in which business context?

e.g., shipped, in transit, link to transactions, chain of custody info, etc.



How *(e.g., warm, acidic, radioactive, etc.)* are monitored objects?

***Sensor**-monitored condition of objects (**new in EPCIS 2.0**)*

EPCIS enables supply chain visibility

- **Tracking**
  Where are the products we shipped?
- **Tracing**
  Where did this batch of products come from?
- **Chain of Custody (CoC) / Chain of Ownership (CoO)**
  Which parties had custody or ownership of these products?
- **Inventory Management / Inventory Maintenance**
  How many units are in stock? When does my available inventory expire?
- **Recall**
  Find all units produced and packed on line 42 on 24 June 2020...

EPCIS implementations include…

- Fish packaging & distribution
- Fresh Produce packaging & distribution
- RTI asset tracking
- **Rail rolling stock visibility**
- **Rail maintenance, repair & overhaul (MRO)**
- Pharmaceutical chain-of-custody
- Hospital patient admission / procedures / discharge
- Maritime / Port capacity utilisation visibility
- Fighting Illicit Trade (FIT)

EPCIS **Workbench**

Interactive tool which can be used to…

- Decode and validate the contents of an EPCIS data file
- Create new EPCIS events or edit an existing file
- Send EPCIS events to an EPCIS repository for capture
- Query an EPCIS repository for events
- No coding experience necessary!

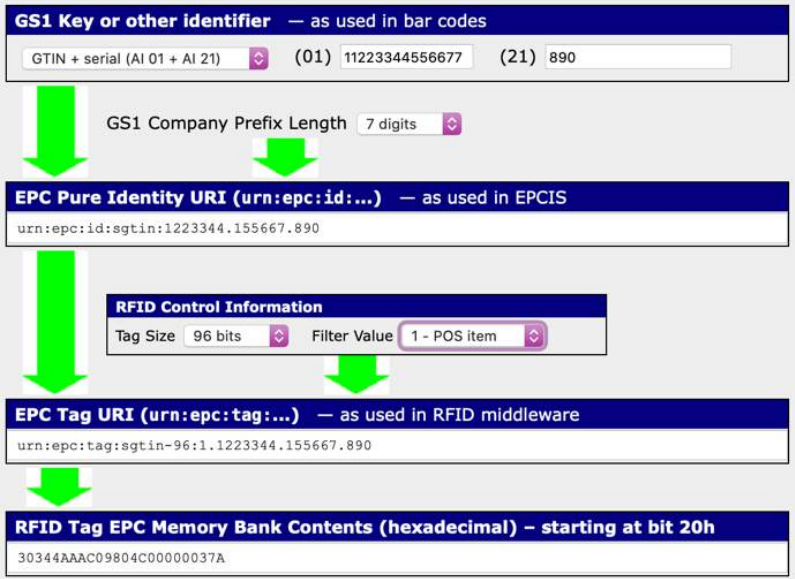
https://epcisworkbench.gs1.org/ui/home

EPC **Encoder/Decoder** suite

Translation between GS1 Keys/AIs and **EPC encodings**

https://www.gs1.org/services/epc-encoderdecoder

- EPC Encoder/Decoder
- User Memory Encoder
- User Memory Decoder
- TID Decoder



EPCIS & RFID: GS1 standards & guidelines

- **EPCIS** & **CBV** standards (normative technical specifications)
  www.gs1.org/epcis
- EPC Tag Data Standard (**TDS**)
  Defines EPC pure identity (EPCIS) & EPC binary (RFID) encoding schemes
  https://www.gs1.org/standards/epc-rfid/tds
- EPCIS & CBV **Implementation Guideline** (cross-sector)
  www.gs1.org/docs/epc/EPCIS_Guideline.pdf
- **Rail** Rolling Stock Visibility & MRO application standards
  https://www.gs1.org/industries/technical-industries/rail/rail-standards

Serialisation & event-based visibility can fundamentally improve supply chain precision... **EPCIS** will help enable this!

EPCIS & CBV 2.0 - Community Review of drafts **Please get involved!**

- New features and enhancements geared to lower adoption hurdles for new generations of developers, including support for:
  - JSON/JSON-LD syntax
  - REST API binding
  - Sensor data
  - GS1 Web Vocabulary

www.gs1.org/standards/development-work-groups#EPCISCBV

- **Community review begins in July!**
- **Prototype testing** will commence in summer

Claude Tételin
Wrap-up
GS1 Global Office

You want to know more?

Ask GS1 Global Office

send an email to

Helpdesk
or
claude.tetelin@gs1.org

Join the RFID MO Interest Group

switch on
your RFID skills

Educate

Share

Serve

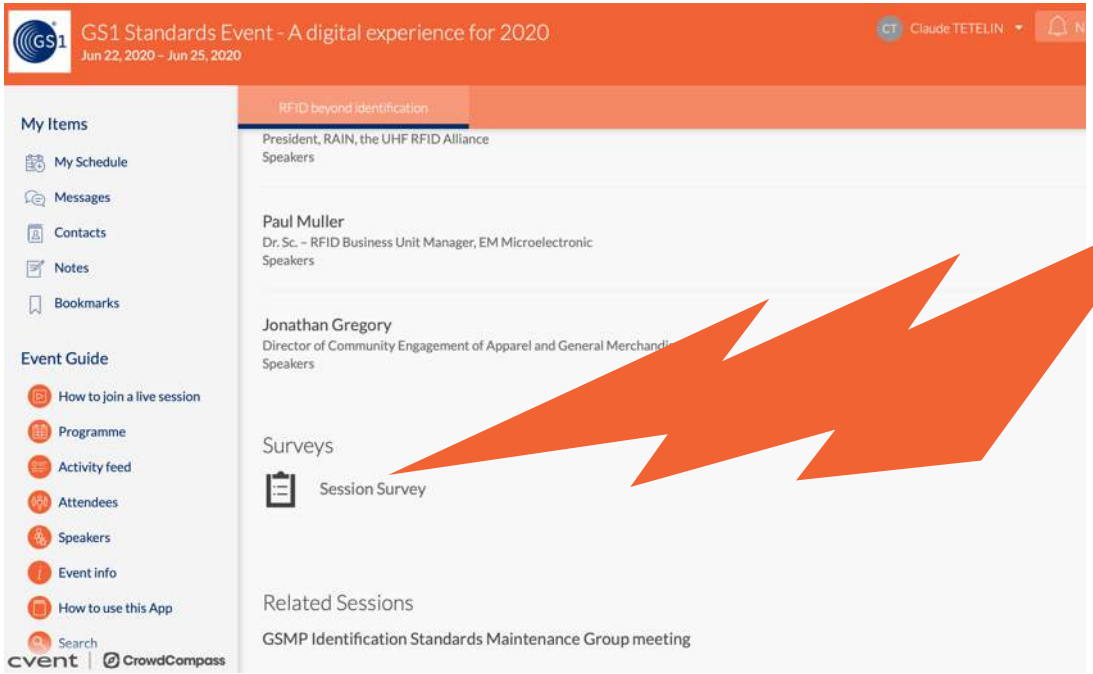
Collaborate

Apply for an RFID training

Coming soon!

2 trainings
“use-cases based”

- RFID for beginners
- Advanced features



Thank you!

and do not forget to rate the session

Any questions?