



GS1 2D Pilot Toolkit

Updated February 2023



How to use this Pilot Toolkit slide deck

1. **Executive Summary** (jump to [slide 2](#))

Start here for a brief introduction to the sections in the Pilot Toolkit.

2. **Full Pilot Toolkit** (jump to [slide 12](#))

Start at the beginning if you are new to 2D and want a complete overview of each element to start your 2D journey. This guides you through the Why, What, Who, How and Reporting and Learning sections.

3. **Ready to Plan Your Pilot** (jump to the HOW Section at [slide 52](#))

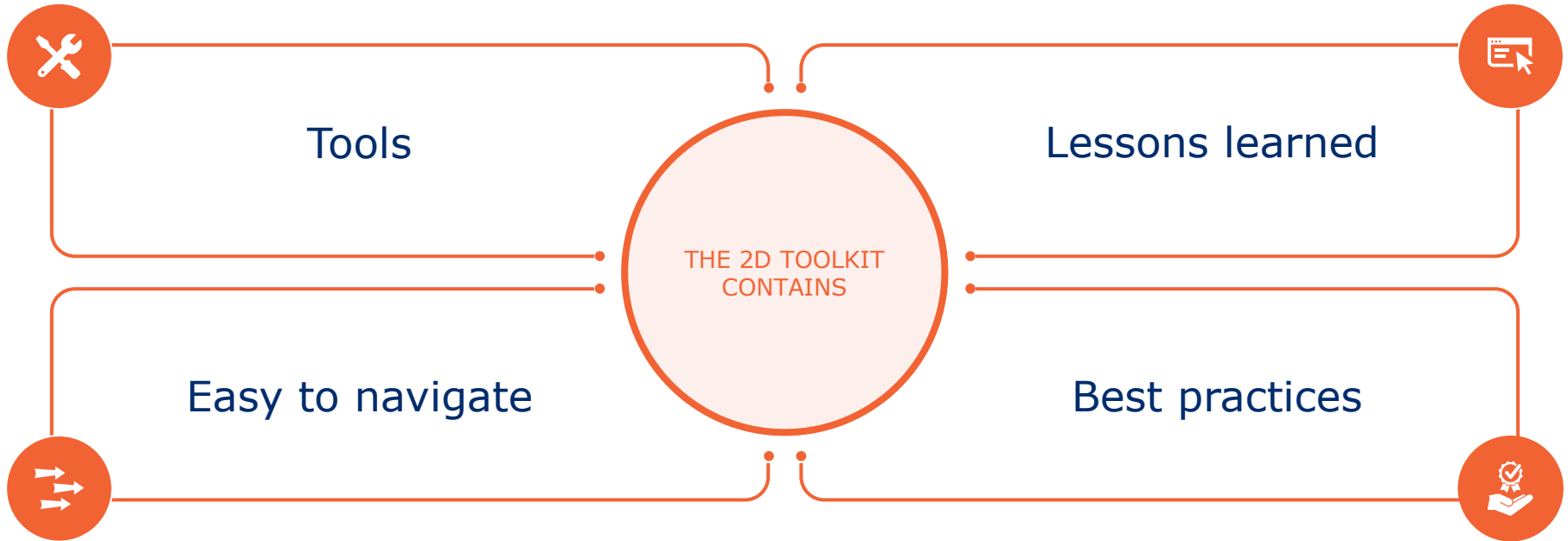
If you already have a good understanding of 2D basics and would like to start thinking about how to organise and plan a pilot, start with the How section. You can always open and close the Why, What and Who sections for additional background and information.

In Slide Show mode, the navigation buttons below allow you to jump around the toolkit sections



WHAT IS THE 2D PILOT TOOLKIT?

A set of practical and relevant building blocks to enable both manufacturers or brand owners and retailers to jump start their 2D pilots





WHY

What business use cases can be unlocked using 2D barcodes



WHAT

What is the scope of the pilot and what variables to consider when setting up a pilot



WHO

Which supply chain partners and solution providers will you engage to create success



HOW

How to set up and implement a 2D pilot; looking at different pilot building blocks, learnings and pitfalls



REPORTING & LEARNINGS

How to track your pilot, capture learnings and report back to the GS1 community



GENERAL

WHY

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Piloting 2D barcodes



WHY

KEY DRIVERS



Consumer Engagement



Safety



Sustainability



Inventory Management



Traceability



Improved Packaging



GENERAL

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Decide the scope for your 2D pilot



WHAT

SCOPE



Geography & Product



Barcode & Data



Value Chain



Pilot Implementation



GENERAL

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Identify Stakeholders for Pilot



WHO

STAKEHOLDERS

Internal



Manufacturers/ Brand Owners



Retailers



Solution Providers



Local GS1 Office



GENERAL

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Set Up Pilot



HOW

Pilot Steps



GENERAL

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REPORTING




SHARE

Tools available for sharing your 2D pilot with the GS1 community:

Report & Learn

Additional Template for Detailed Storytelling



2D Barcodes case study template
[Author] | [Company] | [Country] | [Date]

TITLE
[Include name of company, country]

SUB-TITLE
[Introductory sentence highlighting the success or main challenge]

Challenge
[Describe the challenge that motivated starting a 2D pilot]

Solution
[Describe the solution]

Benefits
[Outline the benefits realised by using 2D barcodes]

Report & Learn

2D Pilot Report for repository

Business Use Case Definition

Description of business challenge and desired outcome:

Key Drivers: (check all that apply)

Pilot Scale & Product Details:

Participants:

Data encoded:

2D Barcode Selected:

Contact:

Organisation Details

On Schedule ■ Minor risk/<10% behind schedule ■ Significant risk/>10% behind schedule ■ Complete ■

Stage	Date/Status	Pilot Scale			Updated
Planning		Test Lab	In Store	Multi-location	
Pilot Duration					
Review/Report					

Key Stakeholders	Company	Name	Key Learnings		
GS1 Lead					
Retailer Lead					
Brand/ Manufacturer/ Supplier Lead					
Solution Provider Lead					
Other Participants			KPIs	Baseline	New

GENERAL

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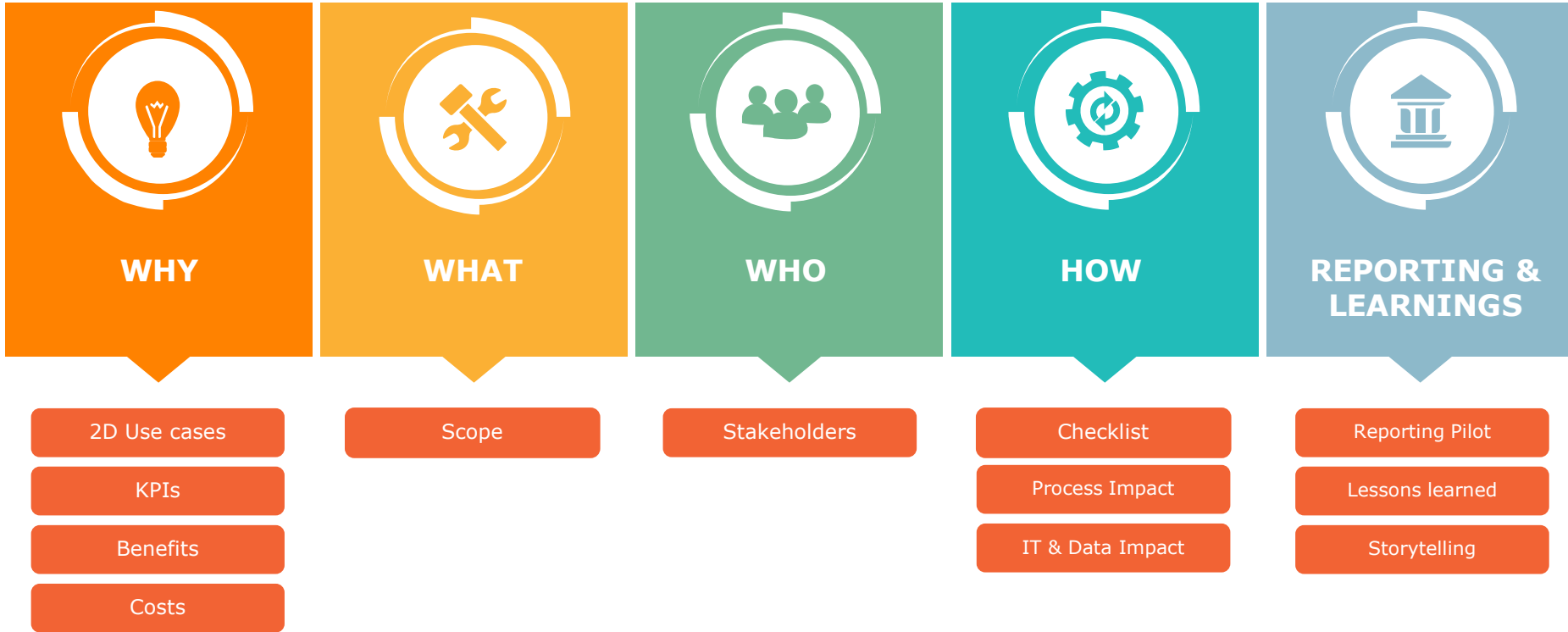
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Summary



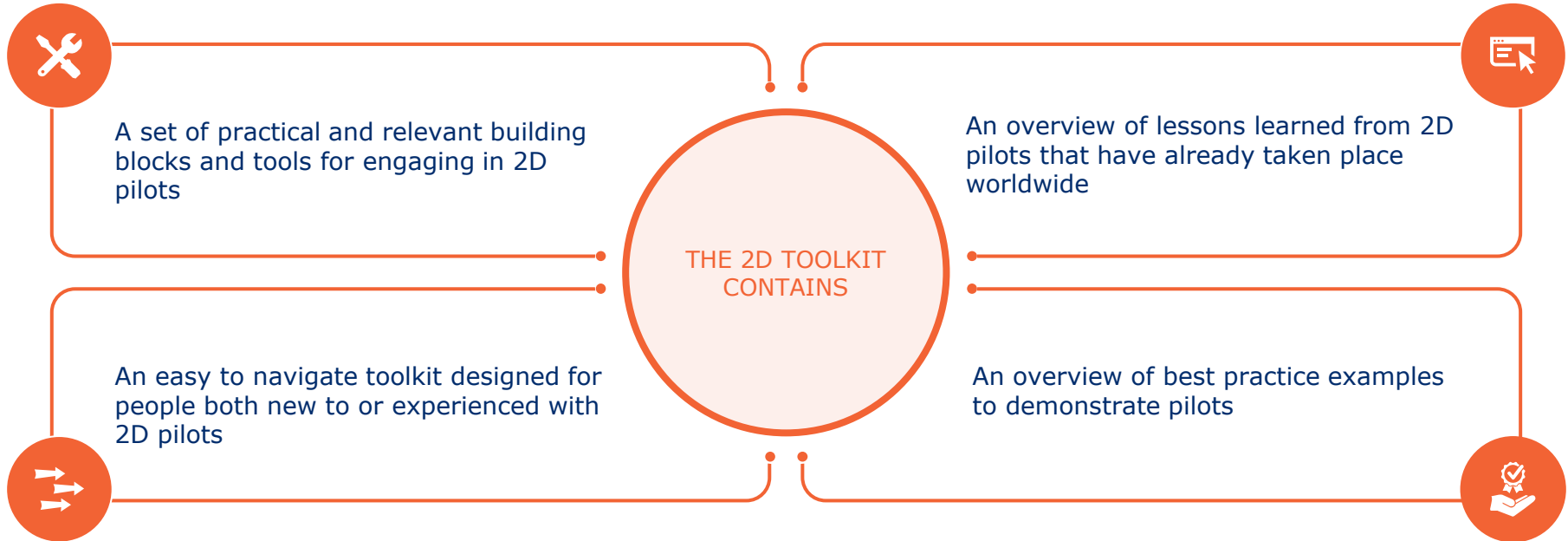
2D PILOT TOOLKIT





WHAT IS THE 2D PILOT TOOLKIT?

A set of practical and relevant building blocks to enable both manufacturers or brand owners and retailers to jump start their 2D pilots



GENERAL

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Manual

How does the toolkit work?

- To use the toolkit: first enter presentation mode and then use the buttons in the tool to navigate to the desired modules.
- If you are thinking about starting a 2D pilot or have made first steps, then this toolkit will help YOU.



WHY

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Where to start?

On the next page you will find the outlay of the toolkit, with interactive links to the different chapters.

While you can move to any chapter at any time, we recommend going through this toolkit sequentially on first use.

TOOLKIT CHAPTERS





WHY

What business use cases can be unlocked using 2D barcodes



WHAT

What is the scope of the pilot and what variables to consider when setting up a pilot



WHO

Which supply chain partners and solution providers will you engage to create success



HOW

How to set up and implement a 2D pilot; looking at different pilot building blocks, learnings and pitfalls



REPORTING & LEARNINGS

How to track your pilot, capture learnings and report back to the GS1 community

Where to start?

Collaboration with all key internal and external stakeholders is foundational to pilot success. GS1 can support your pilot from the start.



Where GS1 can support

- Neutral partner in the process
- Help with guidance on data and 2D barcode choices
- Provide guidance on the use of globally-interoperable GS1 Standards
- Leverage standards and solutions that are already implemented
- Connect to other companies that are piloting or have piloted
- Assistance in connecting to scanner or POS providers



GENERAL

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Understanding the **WHY**



What business use cases can be unlocked using 2D barcodes

Start by identifying the Key Drivers



WHY

There are many reasons to pilot with 2D. You can find the six key drivers here.

While you may select a primary driver for your pilot, look for additional benefits that can be realized through 2D barcodes.



Key learning:

Start with a brainstorming exercise on potential use cases to define the most beneficial value drivers to begin your 2D journey

KEY DRIVERS



Consumer Engagement

- Access to Brand authorized information
- Price and promotions
- Nutritional information and recipes
- Opportunities to engage with the brand



Sustainability

- Recycling information
- Enables Circular Economy
- Waste Prevention
- Farm to Fork
- Repair information



Traceability

- Product authentication
- Ingredient sourcing info
- Supply chain visibility
- Consumer trust
- Food safety



Safety

- Brand Integrity
- Prevent sale of expired or recalled product
- Fight counterfeiting



Inventory Management

- Maintain FIFO (first in, first out)
- Inventory accuracy
- Availability and location insight
- Avoid waste, ensure freshness
- Efficient store processes
- Improved analytics & insights



Improved Packaging

- Marketing goals on-pack
- Regulatory compliance
- Enhanced consumer experience

Align on your Prioritised Use Cases and review other Examples



WHY

One code, many use cases

Click on a best practice example to find out more details and get inspired.

2D PILOT EXAMPLES



- Inventory management
- Sustainability
- Safety



Case study



Video



- Consumer engagement
- Sustainability
- Safety
- Inventory management
- Improved packaging



Case study



Video



- Inventory management
- Sustainability
- Safety



Video

Consider Consumer Engagement Goals



WHY

If your primary use cases for 2D are operational, consider how you can improve consumer KPIs by also using that same 2D barcode to engage directly with consumers.

Do you already have a QR code for your product?

Adding the GTIN inside of your existing QR code can unlock additional use cases AND enable that same code to go “beep” at POS.



Check out [key learnings here](#)

CONSUMER ENGAGEMENT EXAMPLES



Consumer engagement use case examples:

1. Product as a channel

- In-store navigation
- In-store conversion
- Use at home
- Share product experience

2. Marketing campaigns

- Promotions
- Social media activation
- Customize products
- Storytelling

3. Contextualized content and services

- Product info
- Agility to incorporate multiple messaging into one 2D code
- AR: virtual try-on
- Loyalty services

4. Operational excellence

- 1st party data collection
- Traceability for recalls
- Brand protection
- Quick payments

Consider and define your KPI Framework



WHY

Your prioritised use cases and drivers can influence several KPIs. Here are examples that can be impacted by implementing 2D barcodes:

- **Operations KPIs**
- Consumer facing KPIs



OPERATIONS KPIs



Operational Efficiency

- Sell-through rate
- Perfect order rate
- Throughput
- Shipment cost reduction



Inventory Management

- Inventory accuracy
- Number of scanning errors
- Days Sales in Inventory (DSI)
- Accuracy of forecast
- Time to receive
- Lead time
- Safety stock levels



Resource Utilization

- Utilisation rate
- Cost of waste
- Lost sales ratio
- Dead stock/spoilage
- FTE productivity
- Line utilisation



Traceability & Safety

- Percentage of products end-to-end tracked
- Number of suppliers that implement sustainability management systems
- Number of reported recall incidents
- Number of expired products prevented from being sold
- Time to recall



Sustainability

- Percentage of circular inflow/outflow
- Supply chain waste
- Recycling rates

Consider and define your KPI Framework



WHY

Your prioritised use cases and drivers can influence several KPIs. Here are examples that can be impacted by implementing 2D barcodes:

- Operations KPIs
- **Consumer facing KPIs**



CONSUMER FACING KPIs



Consumer Engagement

- Conversion rate
- Net Promoter Score
- Engagement rate
- Brand perception
- Number of impressions
- Number of people who scan QR code
- Improved insights and analytics



Revenue

- Sales growth
- Sales by new consumers
- Customer retention rate
- Average sales volume per consumers
- Consumer Return Rate



Marketing Campaigns

- Return on Marketing Investment
- Click-through-rate
- Website traffic growth
- Sales margin
- Discount as a percentage of price
- Number of actions
- Revenue and cost per scan



Transparency

- Decrease in unauthorized product sales
- Ratio of transparent products
- Ratio of validated authentic products

Establish your Benefit Logic



ABOUT

The benefit logic establishes logical links between business goals, KPIs, value drivers and components of the solution.



STEPS

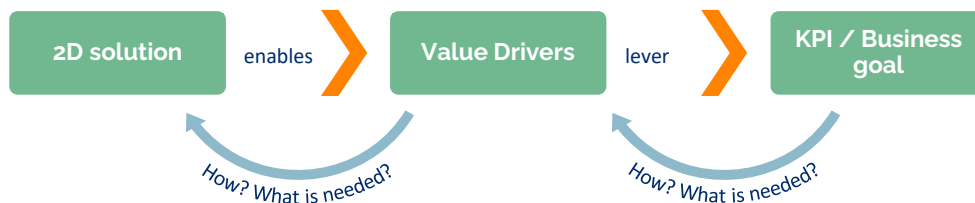
1. Listing and mapping
 - Solutions
 - Value drivers
 - Results
2. Connecting elements if they are in dependency



WHY BENEFIT LOGIC

- The benefit logic defines the benefit areas to reach the ambition and KPIs set by the stakeholders.
- It also provides a framework for linking defined solutions to the benefit areas. By doing this, it automatically creates priorities of activities and states which activities to focus.
- Different stakeholders might have different priorities and the benefit logic is helpful in identifying those differences.
- Note that for every category the benefits can differ in size and set priorities in implementation accordingly.

EXAMPLE



Benefit Logic Level 1

 SOLUTION

2D BARCODE 

 VALUE DRIVERS

 KPIs

 BUSINESS GOALS



Customer Engagement

Revenue increase

Profitability



Sustainability

Sustainability goals rate

Sustainability



Traceability

Cost decrease

Consumer NPS



Safety

Regulatory compliance rate

Regulatory compliance



Inventory Management

Working capital decrease



Improved Packaging

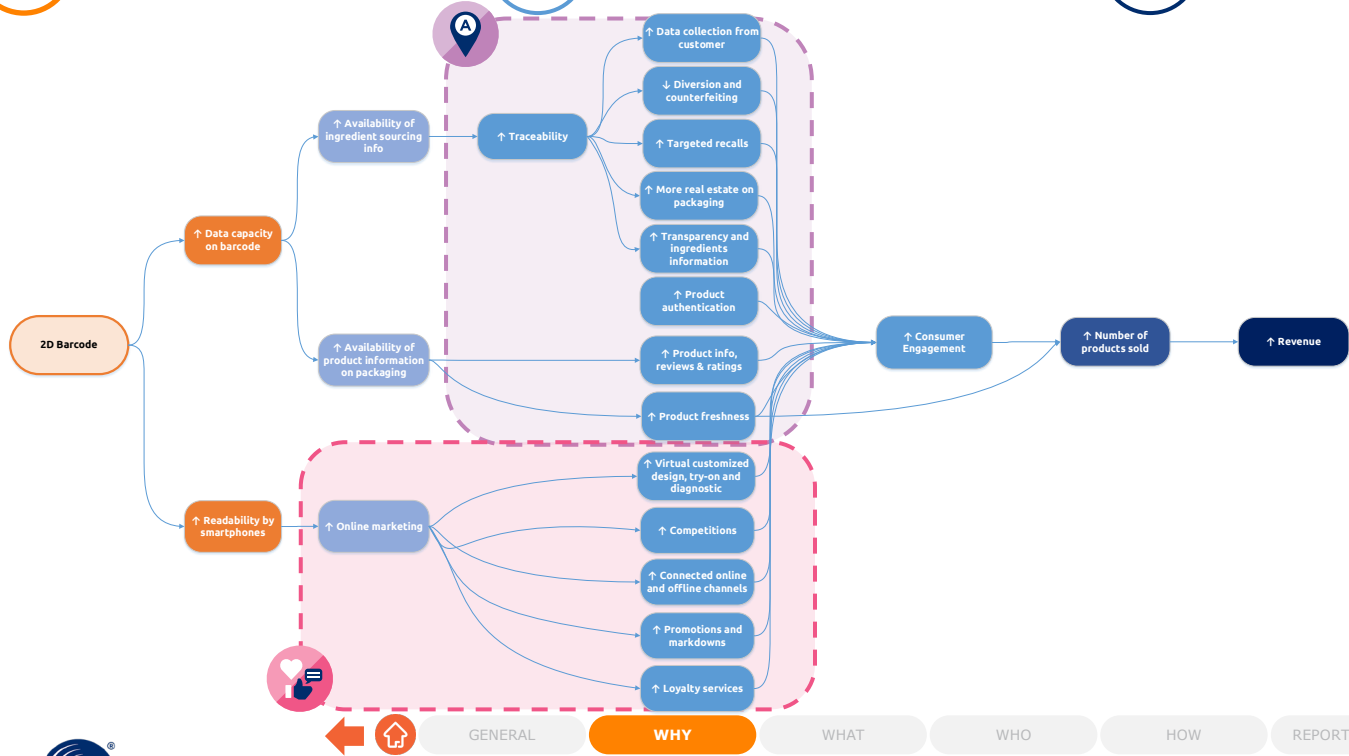
Engagement rate



Benefits

A number of possible consumer benefits leading to increased revenue

For manufacturers or brand owners



KPIS

Consumer Engagement & Transparency

- Average sales volume per consumers
- Consumer Return Rate
- Conversion rate
- Net Promoter Score
- Engagement rate
- Brand perception
- Number of people who scan QR code
- Click-through-rate
- Website traffic growth
- Sales margin
- Discount as a percentage of price
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- Ratio of transparent products
- Ratio of validated authentic products



Benefits

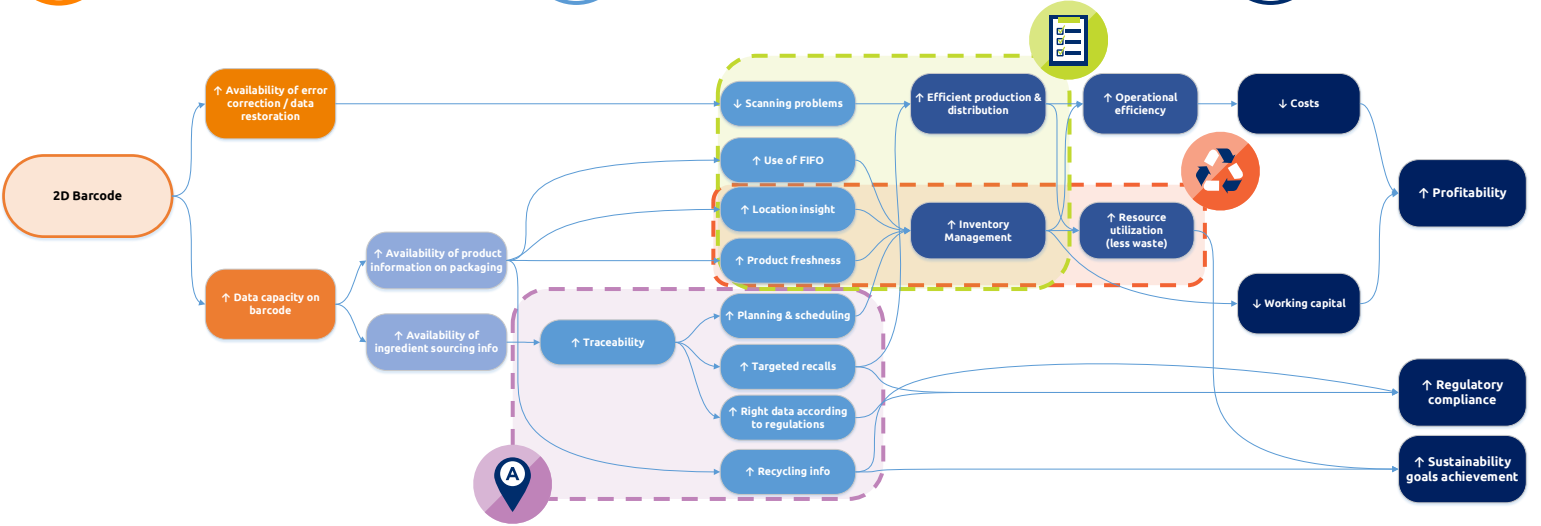
Possible operational benefits leading to a reduction in cost and working capital

For manufacturers or brand owners



KPIS

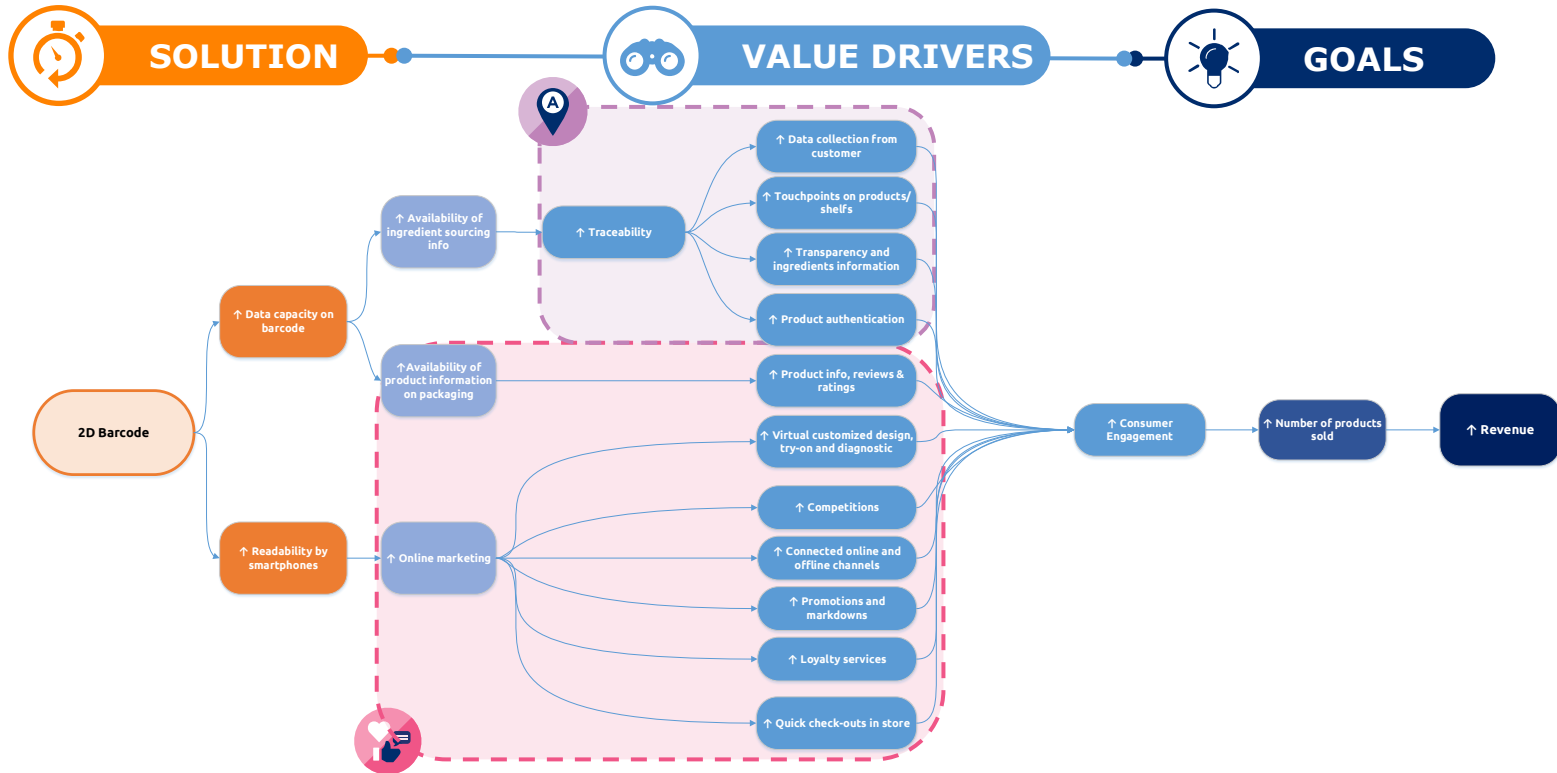
- Inventory Management, Sustainability & Transparency**
- Inventory accuracy
 - Number of scanning errors
 - Accuracy of forecast
 - Lead time
 - Safety stock levels
 - Utilization rate
 - Cost of waste
 - Lost sales ratio
 - FTE productivity
 - Time to recall
 - Recycling rates
 - Sell-through rate
 - Perfect order rate
 - Throughput





Benefits

A number of possible consumer benefits leading to increased revenue



KPIS

Consumer Engagement & Transparency

- Average sales volume per consumers
- Consumer Return Rate
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- Brand perception
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Benefits

Possible operational benefits leading to a reduction in cost and working capital

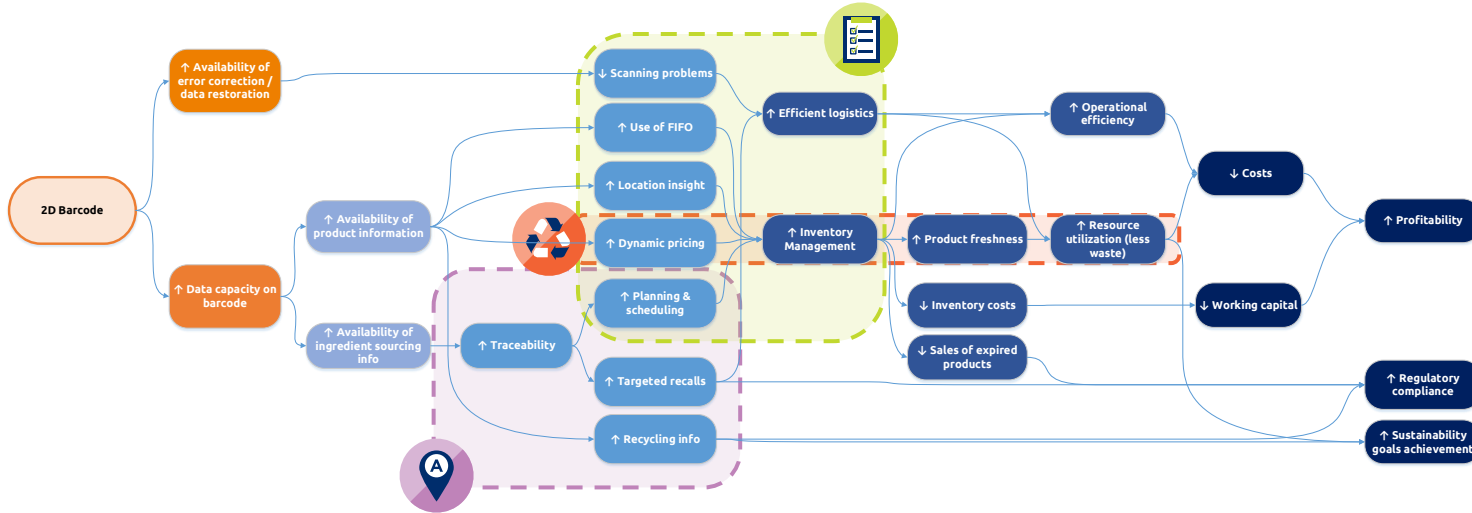
For retailers



KPIS

Inventory Management, Sustainability & Transparency

- Inventory accuracy
- Number of scanning errors
- Accuracy of forecast
- Lead time
- Safety stock levels
- Utilization rate
- Cost of waste
- Lost sales ratio
- FTE productivity
- Time to recall
- Recycling rates
- Sell-through rate
- Perfect order rate
- Throughput



Evaluate your Cost Logic



ABOUT

The Cost Logic method (also called Cost Breakdown) identifies and divides costs into meaningful components.



STEPS

1. Listing and mapping
 - Solutions
 - Cost drivers
 - Results
2. Connecting elements if they are in dependency



WHY COST LOGIC

- The cost logic defines the cost areas to reach the ambition set by the stakeholders and calculate the Business Case.
- It also provides a framework for linking defined solutions to the cost areas. By doing this, it automatically creates insights into the cost of priorities activities.
- 2D introduction requires investments in technology, processes and people.
- Note that investments can differ depending on the category and brand label. Take this into account when setting priorities for implementation.

EXAMPLE



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Cost Logic Level 1

 SOLUTION

2D BARCODE 

 COST DRIVERS

 COSTS

One-time costs:
Materials

One-time costs:
Labor

Recurring costs:
Materials

Recurring costs:
Labor

IT hardware

IT infrastructure

IT software &
architecture

Own employees

External
employees



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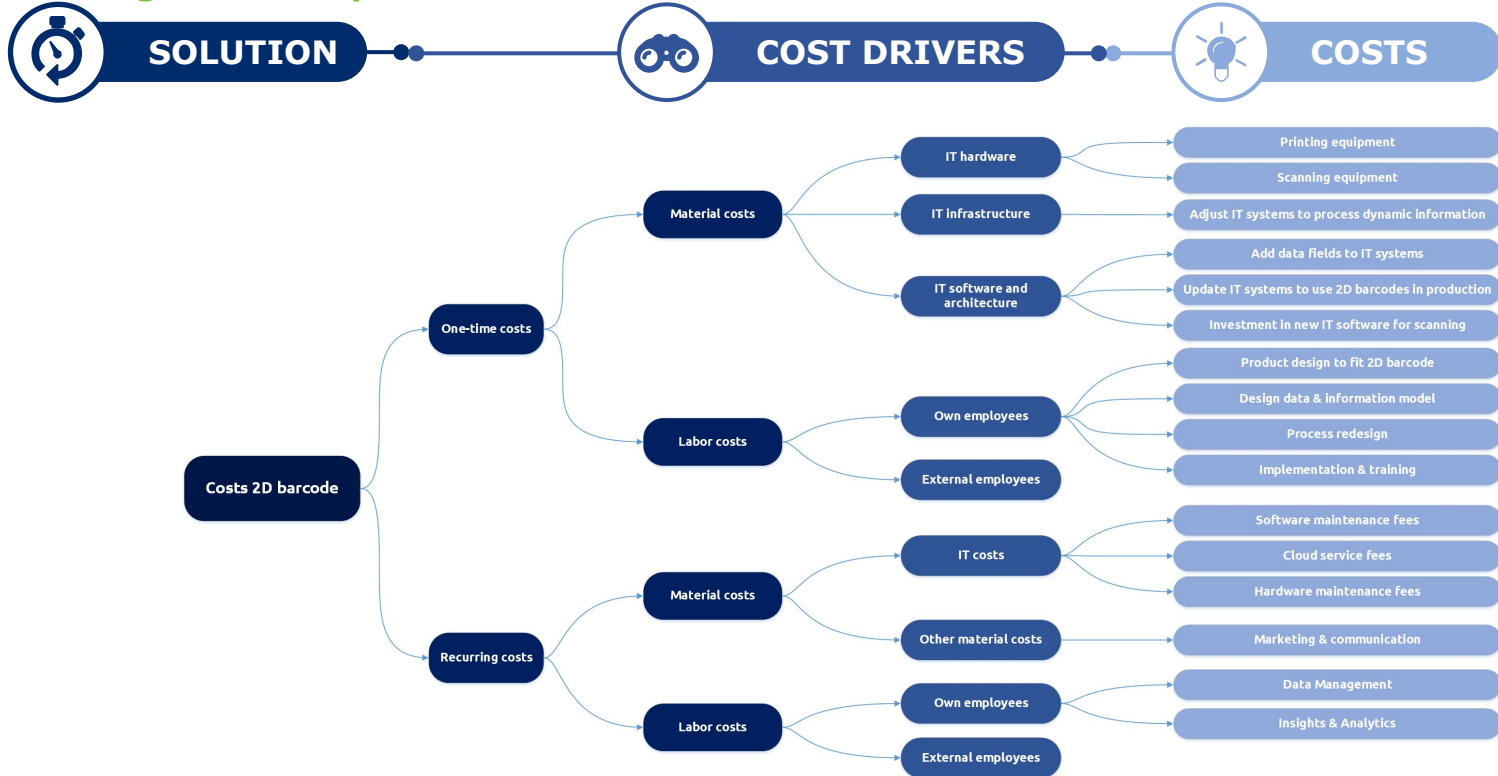
REPORT & LEARN



Cost Logic

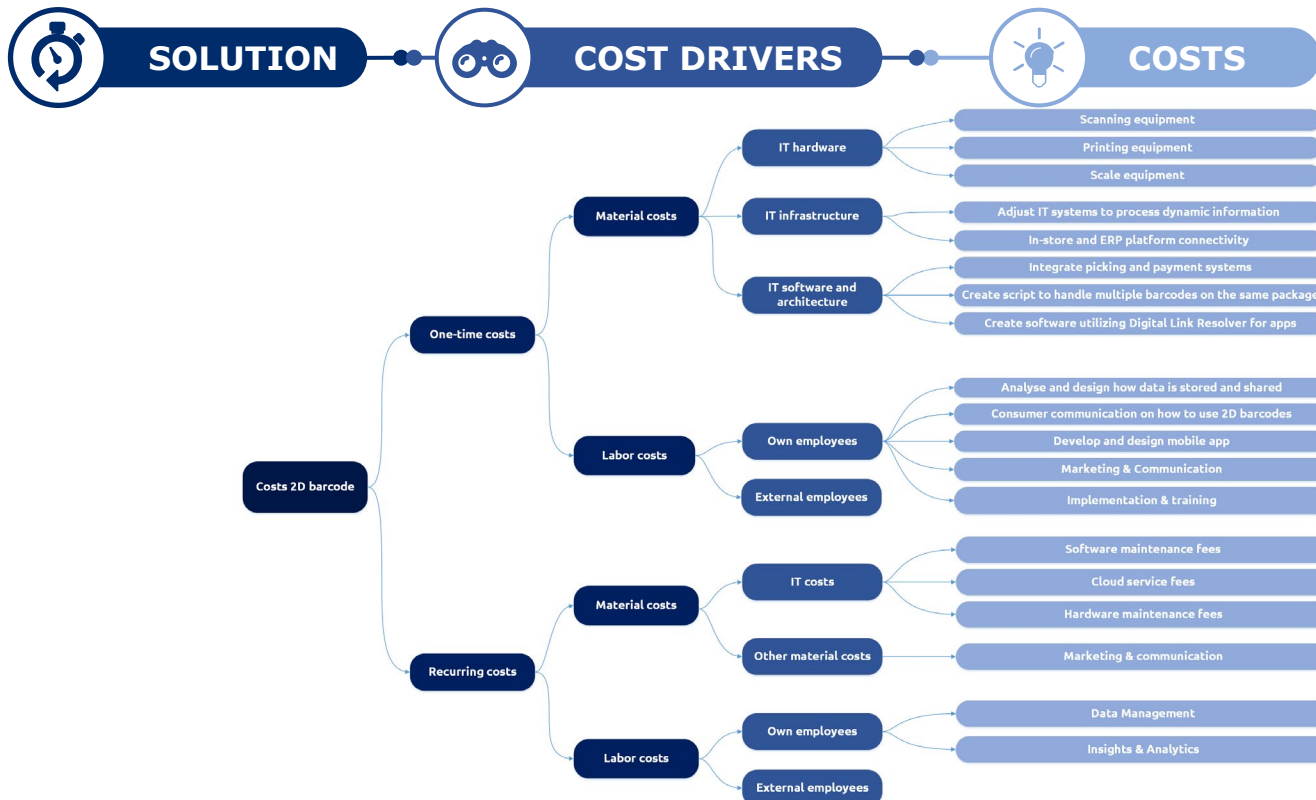
Introducing 2D can require investment in different areas

For manufacturers
or brand owners



Cost Logic

Introducing 2D can require investment in different areas



Key learnings



WHY

Review the key learnings and pitfalls from previous global 2D pilots to jump start your 2D pilot. You will find the learnings throughout the 2D pilot toolkit.



Key learnings

CONSUMER ENGAGEMENT (WHY)

- The content behind 2D barcodes is dynamic and can be changed instantly
- The biggest value for Consumer Products manufacturers lies in the direct contact with the end consumer
- For operational departments, engage with your brand marketing teams to align on goals and opportunities for 2D barcodes
- Using 2D barcodes can provide a competitive advantage for brand owners
- Enable real estate, not the package
- 2D barcode is interoperable and cross-platform
- Consider a call-to-action on pack to ensure your consumers are aware of 2D codes and what to use them for (e.g., at self check-out, to access product information)
- Measure the numbers of 2D scans by consumers to track consumer engagement
- Ensure consumers land on destination pages with one click (no menu)
- Ensure to start piloting with consumers before making any large changes to processes or system to ensure you get the desired results



Deciding on the **WHAT**



What is the scope of the pilot and what variables to consider when setting up a pilot

Decide the scope for your 2D pilot



WHAT

Once you know why you want to conduct a pilot, what benefits can be realised and have selected use cases, it is time to set the scope for your pilot.



Geography & product scope

- Country/geographical area
- Number of stores for retail
- Product category
- Type of product (fixed/variable weight or fixed number)
- Brand of the product (private label or branded)
- Products (number of products impacted)



Value chain scope

- Identify the end-to-end value chain stakeholders involved
- Outline business processes impacted
- Map the Data & IT systems impacted

SCOPE



Barcode & data scope

- Selection of 2D code
 - QR code with GS1 Digital Link
 - Data Matrix with GS1 Digital Link
 - GS1 DataMatrix with GS1 element strings
- The GTIN should be included in every 2D barcode
- Selection of additional data to include in 2D barcodes is based on use case(s)



Pilot scope

- Type of ecosystem (closed or open)
- Type of project (research, proof of concept, pilot, implementation)
- Type of implementation (virtual, full, or hybrid)
- Time (start and duration of pilot)



Geography & Product Scope



WHAT

First in scope is deciding in what country or geographical area to pilot. If you are in retail decide on how many stores to pilot in.

Next in scope is deciding what type of product to pilot with and how many different products to include in the pilot.

A. Type of product

- Food
- Non-Food
- Fixed number
- Variable weight
- Fixed weight
- Private label
- Brand

B. Number of different products



ABOUT

- Starting with one country or region and a small number of stores will make the project more feasible and time-boxed.
- Choosing the type of product will have impact on the whole pilot set-up.
- It will have impact on the benefits and the barcode and data attributes that need to be chosen.



APPENDIX

See sections 7 and 8 of the [2D Barcodes at Retail POS Getting Started Guide](#) for guidance for brand owners and retailers

See the [Fresh Foods implementation guide](#)



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Barcode & Data Scope



WHAT

Second in the scope is deciding which barcode to use and what data attributes to use for your pilot purpose.

A. Type of 2D barcodes

- QR Code with GS1 Digital Link syntax
- DataMatrix with GS1 Digital Link syntax
- GS1 DataMatrix with element string syntax

B. Data Attributes

- GTIN
- Use By Date
- Best Before Date
- Batch/lot number
- Serial Number
- Weight per kilo
- Price to Pay
- Price/kg



ABOUT

- Barcode and data selection is dependent on three key factors: who needs to scan the barcode, how will they scan the barcode and what data is needed for the desired use case.
- In some cases, you may want to start small by just using the GTIN in a 2D barcode and then scaling up to add other data as needed. In other cases, incorporating additional data will be needed.
- Your local GS1 office can help with barcode and data selection.



APPENDIX

See sections 5 and 6 for details on barcode types and how to use GS1 Application Identifiers in the [2D Barcodes at Retail POS Getting Started Guide](#)

Visit the [2D in Retail webpage](#)

Use the [2D Barcode Explorer](#) to learn more about barcode types

See more on [Best practices for creating QR Codes powered by GS1](#)

See also other [tools and templates](#)



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Barcode & Data Scope



WHAT

GS1 standards create a common language to identify, capture and share product data, ensuring important information is accessible, accurate and easy to understand.

Choose the appropriate data carrier and implement across the end-to-end Value Chain

- Manufacturer
- Wholesaler
- Distributor
- Customs authorities
- Online store
- Retailer
- E-fulfilment center
- Logistic service provider
- Distribution center
- Pick-up point
- Consumer

IDENTIFY, CAPTURE & SHARE



Identify

GS1 Standards for Identification

Company & Location

- Global Location Number (GLN)

Product

- Global Trade Item Number (GTIN)

Logistics & Shipping

- Serial Shipping Container Code (SSCC)
- Global Shipment Identification Number (GSIN)
- Global Identification Number for Consignment (GINC)

Assets

- Global Individual Asset Identifier (GIAI)
- Global Returnable Asset Identifier (GRAI)

Other

- Global Service Relation Number (GSRN)
- Global Document Type Identifier (GDTI)
- Global Coupon Number (GCN)
- Global Model Number (GMN)
- Component/Part Identifier (CPID)



Capture

GS1 Standards for Barcodes & EPC/RFID

GS1 Barcodes

EAN/UPC
 9 501101 102103 7

GS1-128
 (00) 3 9501100 0000011001 9

ITF-14
 09501101021037

GS1 DataBar
 (01) 0 9901001 02103 7

GS1 DataMatrix

GS1 QR Code

GS1 Composite Barcode

GS1 EPC/RFID

Electronic Product Code (EPC) RFID

EPC HF Gen 2

EPC UHF Gen 2



Share

GS1 Standards for Data Exchange

Master Data

- Global Data Synchronisation Network (GDSN)

Transactional Data

- Electronic Data Interchange (EDI): EANCOM, GS1 XML

Event Data

- EPC Information Services (EPCIS)



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Barcode & Data Scope



WHAT

There are three types of 2D barcodes that enable a wide range of use cases:

- QR Code with GS1 Digital Link syntax
- Data Matrix with GS1 Digital Link syntax
- GS1 DataMatrix with element string syntax

2D BARCODE TYPES



QR Code

- The only 2D barcode that is consumer scannable with all smartphone cameras.
- Connects to the web.



Data Matrix

- Can connect to the web but requires an app to scan with a smartphone.
- Can be printed a little smaller than a QR Code with the same data.



GS1 DataMatrix

- Useful in supply chain applications where consumer engagement is not a requirement today, such as variable-measure products at POS.
- Requires an app to scan with a smartphone

GS1 Digital Link syntax

GS1 element string syntax



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Barcode & Data Scope

Use cases including supporting data attributes

Example data that could unlock the use cases								
	GTIN	Digital Link URL/URI	Consumer Product Variant (CPV)	Net Weight + Price + Best Before Date (Variable Measure)	Batch/Lot Number	Expiration Date/ Best Before Date	Serial Number	Country of Origin
Consumer Engagement								
Sustainability								
Traceability								
Safety								
Inventory Management								
Improved Packaging								
CRAWL (2D + GTIN • in store printing)				WALK (Preprinted labels w/more data)			RUN (In-line printing)	



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Value Chain Scope



WHAT

Third in scope is thoroughly looking at the end-to-end value chain to see who is impacted by the pilot and what adjustments need to be made in process, data and IT.



ABOUT

- Analyzing the end-to-end value chain will ensure you will not overlook any players nor steps that may be impacted.
- It will give you an insight into the impact for the different stakeholders whether technically, operationally or organizationally.
- During the project planning decide what changes are necessary for the pilot and which are not (resolve through workarounds, e.g. virtual stock counting).



APPENDIX

[End-to End Value Chain](#)
[High-level Value Chain process impact](#)
[High-level Value Chain data & IT impact](#)



Value chain

Think about the E2E impact in the whole value chain and all process, data and IT touchpoints



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Value Chain

Possible process impact



Manufacture and packaging of finished goods

Process impact

- Printing
- Packaging
- Labelling

Adjustments

- Redesign packaging and labels
- Adjust production lines (packaging & printing)
- On-demand 2D print solutions for item/case/pallet labelling



Sell

Process impact

- Scanning
- Weighing
- Consumer communication
- Processing payment

Adjustments

- Adjust in-store printing
- Adjust scales systems
- Adjust in-store processes
- Educate consumers
- Train in-store staff



Transport and receive

Process impact

- Scanning

Adjustments

- Scanning/reading hardware and software



Return

Process impact

- Tracking returned goods
- Revalorisation

Adjustments

- Develop consumer communications
- Develop digital touchpoints (web/apps)
- Utilise GS1 Digital Link for apps



Replenish

Process impact

- Replenishment
- Inventory checking

Adjustments

- Adjust replenishment models
- Adjust replenishment processes (including picking)



Use

Process impact

- Engaging consumers
- Process post-purchase data

Adjustments

- Educate consumers



Value Chain

Possible data and IT system impact



Manufacture and packaging of finished goods

Data impact

- Product packaging
- Load carrier labels
- Product data
- Production data

IT system impact

- Factory ERP
- Manufacturing Execution systems
- Printing & scanning systems
- Quality Management Systems
- Material Sourcing systems
- Product Information Management systems



Transport and receive

Data impact

- Load carrier labels
- Advanced Ship Notice messages
- Warehouse instructions

IT system impact

- Scanning systems
- Global IoT tracking systems
- Mobile apps, including scanning
- Warehouse management systems
- BI-systems



Replenish

Data impact

- Inventory management data
- Warehouse instructions

IT system impact

- Mobile apps, including scanning
- Warehouse management systems
- Store Fulfillment Management systems
- BI-systems



Sell

Data impact

- Production data
- Dynamic pricing
- Product info
- Product photos

IT system impact

- Point of sales system (POS)
- Weight systems
- Mobile consumer apps
- PIM/DAM systems



Return

Data impact

- Returns and recycling instructions
- Returns data
- Repairs/refurb data
- Recalls

IT system impact

- Store Fulfillment Management system
- Recycling systems



Use

Data impact

- Web links
- Consumer opt-in

IT system impact

- Consumer mobile platforms and apps
- Web shops

Key learnings



WHAT

Review the key learnings and pitfalls from previous global 2D pilots to jump start your 2D pilot. You will find the learnings throughout the 2D pilot toolkit.



Key learnings

SCOPE (WHAT)

- Map the entire process
- Understand the entire IT changes needed, not just how back-end systems connect to POS
- Think through a roadmap of use cases & how to combine them to simplify codes on-pack
- Evaluate opportunities for your private label products
- Keep in mind that a logistical unit is not the same as a consumer unit during set-up
- Check if your back-end systems can accept a 14-digit GTIN, next to 12 or 13 digits
- Think carefully before choosing your data carrier
- Validate on-pack data with data available elsewhere
- Consider opportunities to connect 2D to more information at different stages
- Check the format of dates and other structures that are fully defined within [GS1 standards](#)
- Even if you are not starting a pilot yet, when making changes to your data environment, start preparing for more product data.
- Please note that 2D implementation (and sometimes even piloting) is often not easy with e.g. in grocery with over 30k SKUs and many suppliers. It is therefore key to start with the right scope and set-up to then use the results to decide on further roll-out.
- Understanding obstacles and thinking about them up front will increase your chances of success. Key obstacles can be limited upside for a category/SKUs, large print and system investments, complex value chains, limited consumer response, number of SKUs, difficult cooperation in the value chain.



Involving the **WHO**



Which supply chain partners, solution providers and internal stakeholders will you engage to create success



Identify Stakeholders for Pilot



WHO

Select your subject matter experts and other champions based on your pilot scope and use cases.

Each internal stakeholder should be aligned with their counterparts at external partners.

GS1 helps to provide:

- Guidance on the use of GS1 standards and solutions
- Expertise in 2D barcode and data selection
- Key learnings and other best practices for pilot implementation

STAKEHOLDERS

Internal

- IT
 - ERP systems
 - Point of sales systems
 - Web and app infrastructure
 - Reporting & analytics systems
 - Other systems
- Supply chain (incl. logistics)
- Marketing
- Finance
- Legal
- Operations (incl. in store employees)
- Purchasing department

External

- Manufacturers / Brand owners
- Retailers
- Solution Providers
 - Scanning hardware & software
 - On demand barcode printing
 - Printing
 - Scales
 - POS software
 - Other
- Local GS1 office



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Key learnings



WHO

Before selecting stakeholders for your 2D pilot, it is important to consider and achieve the following:



Key learnings

STAKEHOLDERS (WHO)

- Ensure top-management commitment
- Identify updates needed to data governance models
- Identify adjustments needs to product lifecycle management processes
- Ensure cross-functional teams are involved from IT, Supply Chain and marketing
- Consider partnering with a trading partner that has similar timelines and goals
- Involve applicable equipment system and IT solution providers
- Ensure retailers and manufacturers collaborate on the desired barcode and data attributes and outline the benefits for each stakeholder
- Set up a matrix to clarify roles and responsibilities within your organisation and between external partner organisations
- Partner with internal and regulatory compliance resources if regulatory requirements need to be met

Set up the project, the **HOW**



How to set up and implement a 2D pilot; looking at different pilot building blocks, learnings and pitfalls

Set Up Pilot



HOW

Now that you've explored the use cases, identified the scope and partners, it is time to set up and run your pilot. This section breaks down the key steps to not only prepare for a successful pilot but guides you in reporting on the results and capturing learnings.

Pilot Steps





1

Discovery

Project Phase Overview

KEY OBJECTIVE

The key objective of the Discovery phase is to gather information and to enable a data-driven decision on the pilot

	OVERVIEW	ELEMENT	ELEMENT DESCRIPTION*
1	Discovery	2D use cases	Determine use cases from based on business priorities
2	Prepare & Mobilize	KPIs	Determine objective/goal (KPIs)
3	Execute	Benefits	Determine expected benefits for business cases
4	Report & Learn	Costs	Define possible costs for business cases
		Impact/effort matrix	Create impact/effort matrix

* Click links to access additional information





2

Prepare & Mobilize

Project Phase Overview

KEY OBJECTIVE The key objective of the Preparation & Mobilize phase is to set-up the pilot project and mobilize people

OVERVIEW		ELEMENT	ELEMENT DESCRIPTION*
1	Discovery	Stakeholders	Involve end-to-end stakeholders along value chain
2	Prepare & Mobilize	Collaboration model	Define collaboration model
3	Execute	Checklist	Validate checklists for Brands/Manufacturers, Retailers and Solution Providers
4	Report & Learn	Scope	Define scope
		Governance	Set up a governance model
		Project team	Set up (pilot) project team
		Project planning	Develop pilot/project planning
		Communication plan	Make communication plan for end-to-end stakeholders
		Kick-off	Kick-off pilot

* Click links to access additional information





3

Execute

Project Phase Overview



KEY OBJECTIVE

The key objective of the Execute phase is to put the plan into action



OVERVIEW



ELEMENT



ELEMENT DESCRIPTION*

1

Discovery

Process analysis & design

Define [process](#) impact along end-to-end value chain

2

Prepare & Mobilize

Data impact

Define [data](#) impact along end-to-end value chain

3

Execute

IT

Define [IT](#) Architecture, hardware, infrastructure & software impact

4

Report & Learn

Development cycle

Develop/Build/Test/Run/Run model support (e.g. consumer service)

Change management

People training or change management

Documentation

Documentation

Budget tracking

Coordinate with finance

Stakeholder management & communication

Coordinate frequent communication across all internal and external stakeholders

* Click links to access additional information



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4

Report & Learn

Project Phase Overview

KEY OBJECTIVE

The key objective of the Report & Learn phase is to share your learnings with the wider GS1 community

OVERVIEW	ELEMENT	ELEMENT DESCRIPTION*
1	2D Pilot tracker	A tool to document status during your 2D pilot (incl. KPIs)
2	2D Pilot report	Template to document pilot details and facts
3	Storytelling template	Further build out via 2D pilot template storytelling
4	Scale-up	Consider next steps and process adjustments for scale-up to a full implementation
Report & Learn		* Click links to access additional information



Checklist Brand Owners

For manufacturers
or brand owners



HOW

While the pilot toolkit includes a lot of information for discovery and planning for a pilot, this checklist can be valuable for Manufacturers/Brands to confirm all business, technical and partnership steps have been met.

Download a PDF checklist:

https://www.gs1.org/docs/retail/Brand_and_Manufacturer_2D_barcode_checklist.pdf



Scope checklist

- Evaluate business use case opportunities.
- Pick a pilot product, line or category.
- Evaluate existing barcodes on-pack.
- Select 2D barcodes based on use cases and requirements.
- Identify additional data needs that need to be encoded with the GTIN.
- Understand data and GS1 standards before making decisions.



Technical checklist

- Ensure technical capabilities for encoding dynamic data (where applicable).
- Assess print capabilities and print quality.
- Check for scanning compatibility with the new barcode.
- Ensure software, hardware and databases are up-to-date.



Stakeholder checklist

- Align internal stakeholders, such as Supply Chain, IT dept, Marketing.
- Engage with your Solution providers.
- Collaborate with a retailer to test POS checkout feasibility for the new 2D code.
- Identify common goals and measures with collaboration partners.
- Involve authorities if required in your region.

Checklist Retailers

For retailers



HOW

While the pilot toolkit includes a lot of information for discovery and planning for a pilot, this checklist can be valuable for Retailers to confirm all technical and partnership steps have been met.

Download a PDF checklist:

https://www.gs1.org/docs/retail/Retailer_2D_barcode_checklist.pdf



Technical checklist

- Partner with your scanner and POS solution providers for guidance on system readiness for 2D.
- Evaluate backend system upgrades required to leverage additional data.
- Ensure systems can ingest additional data to support new business use cases.
- Ensure your scanners are ready to read all 2D in Retail standard barcodes.



Stakeholder checklist

- Collaborate with trading partners to align on business use case opportunities and additional data that you would like to capture.
- Evaluate opportunities for your private label products (see checklist for manufacturers).
- Collaborate closely with solution providers; make sure POS checkout is updated and configured for your business use cases.
- Identify common goals and measures with collaboration partners.
- Educate in-store associates.
- Educate consumers: self checkout, omni-channel and consumer engagement.

Checklist Solution Providers



For Solution Providers



HOW

While the pilot toolkit includes a lot of information for discovery and planning for a pilot, this checklist can be valuable for solution providers to determine the right technical solution.

Download a PDF checklist:

https://www.gs1.org/docs/retail/Solution_Provider_2D_barcode_checklist.pdf



Scope checklist

- ❑ Review products that will be used in the pilot, including evaluating the product substrate.
- ❑ Understand which static and dynamic data needs to be encoded in 2D barcodes, which are determined by the desired use case.
- ❑ Understand the GS1 data structure and quality standards.
- ❑ Evaluate the printing and scanning environment including print surface.



Technical checklist

- ❑ Ensure technical capabilities for encoding dynamic data (where applicable).
- ❑ Assess print capabilities and print quality and adjust based on the print environment.
- ❑ Check for scanning compatibility with 2D barcodes.
- ❑ Ensure software, hardware and databases are up-to-date.
- ❑ Optimise how data is encoded in the 2D barcode.



Stakeholder checklist

- ❑ Internal stakeholders to take on board include brand marketing/manufacturing, information technology, shop floor operations and maintenance departments.
- ❑ Engage with up and downstream solution providers (label software, printing, scanning, enterprise, etc.).
- ❑ Collaborate with brand and retailer to ensure POS checkout feasibility for the new code.
- ❑ Identify common goals and measures with collaboration partners to avoid conflicts later.
- ❑ Involve authorities if required in your region.



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Key learnings



HOW

Review the key learnings and pitfalls from previous global 2D pilots to jump start your 2D pilot. You will find the learnings throughout the 2D pilot toolkit.



Key learnings

PRINTING (HOW)

- Evaluate your current printing systems and explore how it can be adapted for various use cases
- Migrating to 2D barcodes is easiest for products that you are already labeling individually (such as deli or fresh meat, where an expiry date could be added)
- For pre-printed products, adding the GTIN to a QR Code may be most appropriate for consumer engagement
- Static printing is much cheaper to start with than dynamic printing (evaluate production process, print capabilities and investment needed)
- Evaluate all printers also in store; e.g. for in-house deli system
- Test 2D barcode printing on labels until barcode quality is good
- Beware that bright sunlight, and background colors might cause issues for efficient scanning
- Clean printers regularly to ensure the printed barcodes can be scanned
- Prepare to include 2D in your natural packaging (re)design cycle
- Prepare to changeover to 2D in your regular printing systems investment cycle

Learnings



HOW

Review the key learnings and pitfalls from previous global 2D pilots to jump start your 2D pilot. You will find the learnings throughout the 2D pilot toolkit.



Key learnings

IMPLEMENTATION (HOW)

- Evaluate all scanners and update hardware or software where needed: POS, flatbed scanners, fixed scanners, handheld scanners, in-store apps-including APIs, and warehouse scanners
- Understand the capabilities of 2D image scanners in collaboration with your solution providers (For example, can your scanners accommodate two barcodes with the same GTIN on the product? You may need a software upgrade to achieve this)
- Ensure mobile devices from consumers can interact with the 2D barcodes
- Train in-store employees and gain buy-in as part of the pilot planning
- Translate the improved (future) system capabilities into associate training (what to do when I see multiple barcodes?)
- Educate consumers: self checkout, omni-channel and consumer engagement
- Check the latest GS1 Standards guidelines for the human readable text under the 2D barcodes and review GS1's scanner testing outcomes

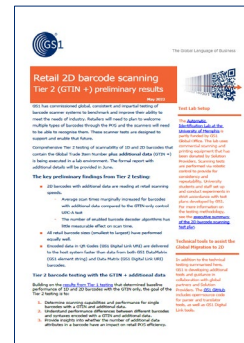
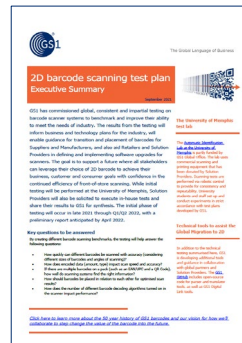
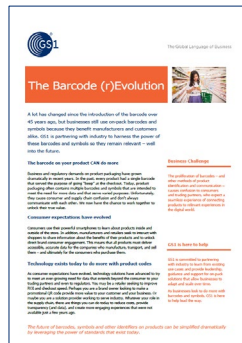
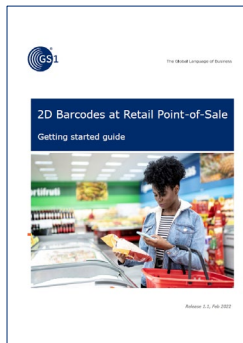
Additional Resources



TOOLS

Reference documents are available such as guidelines, use cases, media and other links that provide information for 2D pilots.

REFERENCE DOCUMENTS



LINKS

[2D in Retail: main webpage resource](#)

[GS1 Digital Link](#)

[Global 2D Programme - Foundational FAQs](#)

[GS1 DataMatrix Guideline](#)

[2D Barcode Explorer](#)

[GS1 GitHub](#)

[Best practices for creating QR Codes powered by GS1](#)

[GS1 General Specifications](#)



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Additional Resources



TOOLS

Case Studies document specific industry success stories from implementing 2D barcodes

CASE STUDIES



- Inventory management
- Sustainability
- Safety



Case study



Video



- Consumer engagement
- Sustainability
- Safety
- Inventory management
- Improved packaging



Case study



Video



- Inventory management
- Sustainability
- Safety



Video

Additional Resources



TOOLS

Case Study videos document specific industry success stories from implementing 2D barcodes

VIDEO LINKS



GS1 DataMatrix for variable weight products
GS1 Belgium-Luxembourg



Woolworths implements 2D barcodes
GS1 Australia



First scan of a 2D QR Code with GS1 Digital Link
GS1 Brasil



2D barcodes gain momentum in China
GS1 China



Expiry date management across 12,432 convenience stores
GS1 Thailand



GS1 DataMatrix implementation for fresh products
GS1 Switzerland



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Reporting & learnings



How to capture learnings and report back to the GS1 community

Reporting & Learning



REPORTING

- Reporting 2D pilots
 - Storytelling
 - Facts
- Share learnings



ABOUT

- Reporting 2D pilots and sharing learnings will enable other Consumer Products and Retail organizations to recognize benefits as well as jump start their own 2D pilots; the power of the GS1 community!



TOOLS

- Using templates provided by GS1 enables the set-up of a repository in the future, where other companies can look up similar pilots



TEMPLATES

[2D pilot tracker](#)
[2D pilot report for repository](#)
[2D pilot template storytelling](#)



On Schedule



Minor risk/~10% behind schedule



Significant risk/>10% behind schedule



Complete

Report & Learn

2D Pilot tracker

Stage	Date/Status
Planning	
Pilot Duration	
Review/Report	

Pilot Scale		
Test Lab	In Store	Multi-location

Updated

Key Stakeholders	Company	Name
GS1 Lead		
Retailer Lead		
Brand/ Manufacturer/ Supplier Lead		
Solution Provider Lead		
Other Participants		

Key Learnings
<ul style="list-style-type: none"> • • • •

KPIs	Baseline	New



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Report & Learn

2D Pilot Report for repository

Business Use Case Definition			Organisation Details		
Description of business challenge and desired outcome:			GS1 Member Organisation:		
Key Drivers: (check all that apply)			Retailer, Brand / Manufacturer and Solution Provider Company Names involved in pilot:		
<input type="checkbox"/> <i>Inventory Management</i> <input type="checkbox"/> <i>Traceability</i> <input type="checkbox"/> <i>Safety</i> <input type="checkbox"/> <i>Sustainability</i>			<input type="checkbox"/> <i>Consumer Engagement</i> <input type="checkbox"/> <i>Improved Packaging</i> <input type="checkbox"/> <i>Maintain POS efficiency</i> <input type="checkbox"/> <i>Other:</i>		
Pilot Scale & Product Details:			Core Focus		
<i>Number of stores:</i> <i>Type of product:</i> <i>Number of products:</i>			<input type="checkbox"/> <i>Retailer</i> <input type="checkbox"/> <i>Manufacturer</i>		
Participants:			Key benefits / learnings		
<input type="checkbox"/> <i>Supplier</i> <input type="checkbox"/> <i>Retailer</i>			<input type="checkbox"/> <i>Solution Provider</i> <input type="checkbox"/> <i>GS1 MO</i>		
Data encoded:			Qualitative benefits/outcomes:		
<input type="checkbox"/> <i>GTIN</i> <input type="checkbox"/> <i>Best Before Date</i> <input type="checkbox"/> <i>Batch/Lot Number</i>			<input type="checkbox"/> <i>Serial Number</i> <input type="checkbox"/> <i>Expiry Date</i> <input type="checkbox"/> <i>Other:</i>		
2D Barcode Selected:			Quantitative metrics:		
<input type="checkbox"/> <i>QR Code</i> <input type="checkbox"/> <i>Data Matrix</i>			<input type="checkbox"/> <i>GS1 DataMatrix</i>		

Contact:

Email:

Date:



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Report & Learn

Additional Template for Detailed Storytelling

Download online: https://www.gs1.org/docs/retail/2D_pilot_storytelling_template.docx



The Global Language of Business

2D Barcodes case study template

[Author] | [Company] | [Country] | [Date]

TITLE

[Include name of company, country and catchy headline]

SUB-TITLE

[Introductory sentence highlighting the success or measurable outcome from the pilot]

Challenge

[Describe the challenge that motivated starting a 2D pilot]

Solution

[Describe the solution]

Benefits

[Outline the benefits realised by using 2D barcodes]

MAIN BODY OF TEXT

[DESCRIPTION OF THE PROJECT HERE]

YOU CAN TALK ABOUT:

1. Set-up of the pilot:
 - a. Involved stakeholders internal and external
 - b. Collaboration opportunities
 - c. Preparation for the pilot
 - d. Key activities of the pilot
2. Impact of the pilot:
 - a. Impact on business, consumers, operations
 - b. Impact on technology and processes
 - c. Benefits and value of the pilot
3. Key learnings from the pilot

QUOTES

[Include 1-3 quotes highlighting the business success and outcomes from the pilot]

[NAME]

[TITLE]

[COMPANY]

ABOUT

[Provide information about the retailer, brand and manufacturers highlighted in the case study – history, number of products/stores, global reach, etc.]

PICTURES

[Include relevant pictures from the pilot that help tell the story – photos of products with 2D barcodes, scanning of products, products on the shelf, etc.]



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Have questions?



[CONTACT GS1 Support](#)



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