EDCi WHITE PAPER
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EuroData Council

Digital Product Passport (DPP)

Investigation of Identifiers for use with DPP ID Codes

for enabling unique identification AND internet access

A brief look at the development of product identification & internet access

Period ▼	Product code ▼	+ Internet (ID first) ▼	Internet + ID (URL first) ▼
80s	Code 39 U.P.C. / EAN		
90s	Code 128 + EN 1571 + ISO/IEC 15418 (1P)BATT01X (01)01234567123455		
2000	Code 128 + Data Matrix + ISO/IEC 15459 (25P)QCELMIBATT01X (S)123456XYZ (21)123456XYZ		
2016	ISO/IEC 15459 → + (25P)QCELMIBATT01X (S)123456XYZ (01)01234567123455 (21)123456XYZ	+URL DI 33L/34L + AI 8200 (25P)QCELMIBATT01X (S)123456XYZ (34L)HTTPS://WWW.E-D-C.INFO/AUTOID/? (01)01234567123455 (8200)HTTPS://TEST.DE (21)123456XYZ	
2022			AutoID URL, GS1 Digital Link IEC 61406-1 ID Link-1
2023			+ IEC 61406-2 ID Link-2
2024 ⋮	Ongoing development of scan applications interoperable with supplementary codes for supply chain management, e.g. transport codes, RTI, etc.		e.g. ISO/IEC 18975 in development
	Target: Priority to ERP compatibility for global supply chain management & control, backward compatibility according to best practises Low investment for ERP upgrades - „APP“ required for smartphones.		**Target: Priority to web access via smartphone** <no investment for consumers - high investment for ERP systems>

State of the art, ERP friendly

Smartphone friendly

Note:
QR Code for public internet access via smartphone developed in parallel since the year 2000 but without unique product identification.

“ID first” versus “URL first” for double use

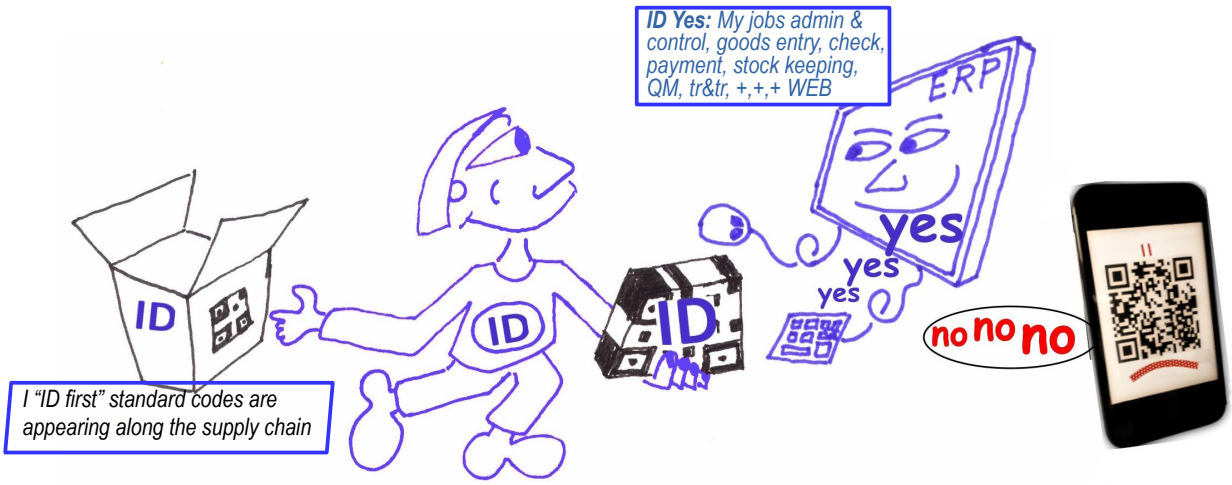
“ID first” means that a code starts with an unique ID, telling what the code contains, e.g. conforming to ISO/IEC 15459-4 to identify individual products. This principle is used globally for all other codes appearing along the supply chain, e.g. codes for transport items, containers, papers, locations, parameters, etc. The method of “ID first” is in practical use in cross company, cross sector, cross country applications for shipping and transportation, goods receipt, stock taking, production, etc. Usually such codes are scanned with manual scanners or automatic devices at the data entry points of ERP systems for control and admin. The picture “ID first” is illustrating material handling processes. Supply chain management processes rely on such codes in all sectors.

“URL first” stands for codes where the URL is the first and only data element of an encoded data string. It may contain sub-elements like “ID first strings” but structured differently. “URL first” was invented to ease access to web addresses by smartphones and for the public. Meanwhile all kinds of services can be accessed by an URL through smartphone. The success of QR and smartphones led to considerations of how access to the Internet can also be achieved via codes used for material handling.

The developments are going in two directions: Priority on the application with the ERP systems of the world, or priority for smartphones and their camera APPs. The challenge is “DUAL USE” of “ID first” and “URL first” in same system(s),

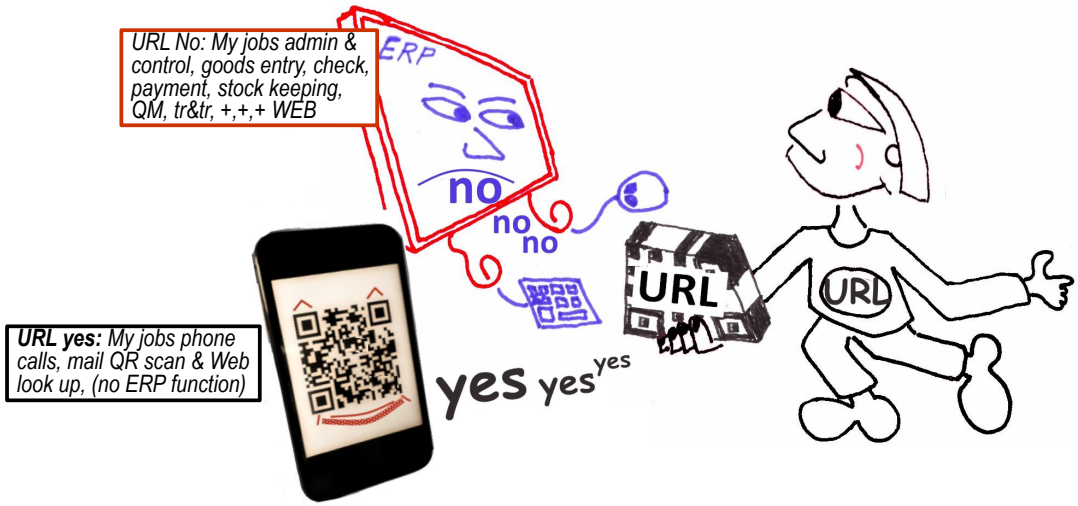
Prior to draw down “ID first” and “URL first” examples, the two directions are illustrated below.

Illustration: “ID first” is ERP friendly but not smartphone friendly (yet), meaning a smartphone would need an APP



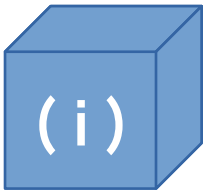
The picture “ID first” is illustrating, that current ERP systems are set to understand “ID first” codes, but smartphones would need an APP for extracting the URL if following ID first in a code. So “no” without APP, “ID first” codes cannot be processed. However, specific Apps are available already, and can be installed.

Illustration: “URL first” is smartphone friendly avoiding special APPs, but is not ERP friendly, meaning investments for ERPs.



The picture “URL first” is illustrating that smartphones with camera APPs understand how to interpret URLs and how to access the related web page.
If ERPs, which are processing current ID first codes, should understand “HTTPS://… flags” the ERPs would need a middleware with a set up to parse potential IDs if there are any.

Starting point



DPP is a module of the European Union's initiative for a Sustainable Products Regulation which includes transparent product information in regard of sustainability and circular economy.
DPP will require an unique identifier applied to the product for product identification and a link to the DPP data accessible via web interface. The DPP identifier will be encoded in a data carrier like barcode and/or RFID, the DPP code.

Investigations

This paper is investigating two different paths (A and B) how to design such a DPP-Code. One is more ERP friendly, the other targets to smartphone applications. Each of the paths shows certain varieties in view of technical details.

A) ERP system compatible solution „ID first", means commonly used identifiers according to ISO/IEC 15459-4, -6 concatenated by a URL linking to a web portal where the DPP data are stored.
Such DPP Codes can be combined for supply chain management applications with DPP data viewing and processing. For Smartphones a DPP App would be required.

B) Smartphone compatible solution „URL first", means a specific DPP Code flagged by an URL linking to the DPP portal and followed by a unique product identifier. This solution is targeting to data viewing but not to data processing (e.g. without ERP storage, documentation, assignment to logistical processes, etc.).
For smartphones, no special DPP App would be required but for ERP systems along the supply chain a middleware would be required for viewing DPP data and for processing in conjunction with other accompanying „ID first" codes (ISO/IEC 15459-x codes on transport units, returnable containers, delivery papers, etc).

DPP code examples

For the investigations of suitable DPP identifiers, data strings will be generated based on relevant data elements like:

- ISO/IEC 15459-2 Issuing Agency code (IAC) and registered Company Identification Code (CIN)
- Product REF: BATT01X and second reference (GTIN) in case of GS1 codes
- Serial number: 123456XYZ
- Manufacturing date: 2023-08-03
- URLs: HTTPS://WWW……..

The examples will enable comparison of (A) „ID first" and (B) „URL first" and it's different expressions like different syntax. Illustrations will be completed by presentation as DPP code by help Data Matrix and/or QR code.
Other codes with other data elements and options might be derived from the generated examples.

Please direct questions, comments, notes to the approaches to: Heinrich.Oehlmann@e-d-c.info

Note: EDCi does not take any liability, in any form, for the use of the examples of the investigations, also EDCi cannot made liable for unintended errors, as the investigations shall include a variety of different solutions, even those with disadvantages for certain applications.

Examples A) ERP system compatible solution „ID first“

conforming to ISO/IEC 15459-4

for most simple implementation along the supply chain.

State of the art, ERP friendly

Example A1) „ID first“ with „URL add on“ conforming to ISO/IEC 15459-4
using ISO/IEC 15418 (ANS MH 10.8.2) Data Identifiers (DIs) with KB&WEB compatible syntax DIN 16598

As data elements for investigation and generation of DPP code examples, the following data elements will be used: Product reference: BATT01X
Attributes: Serial number 123456XYZ, manufacturing date: 2023-08-03
DPP portal URL: HTTPS://WWW.E-D-C.INFO/AUTOID/?

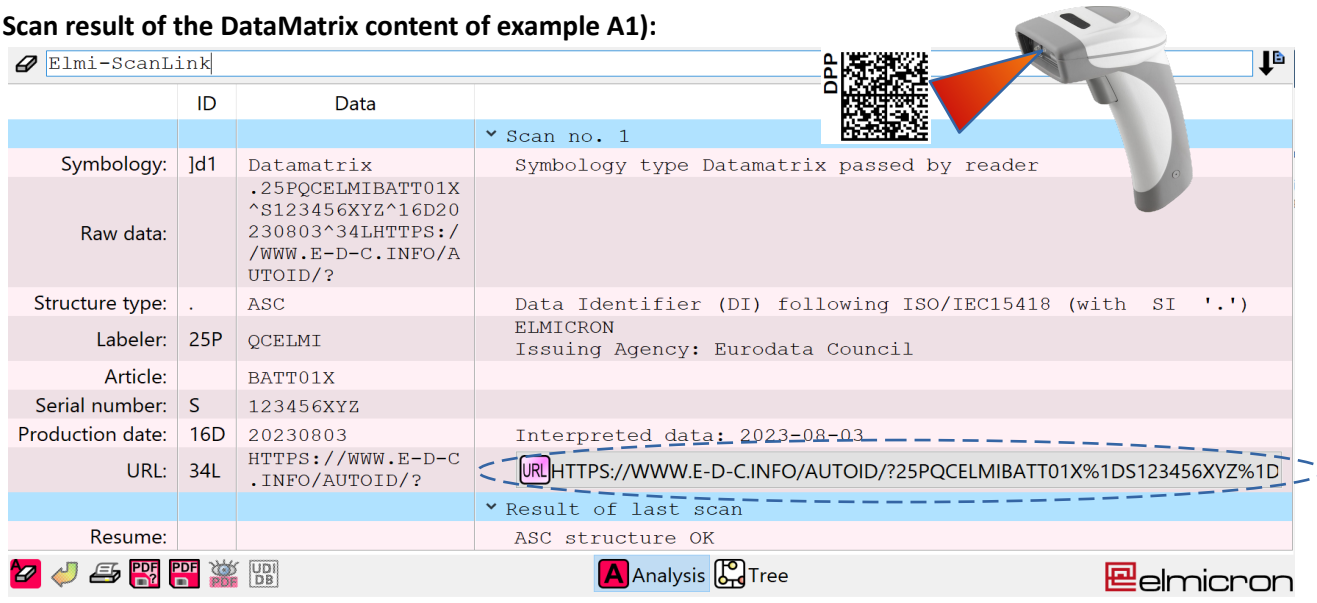
Data elements structured for scanning applied with: **URL for web access,**
processing throughout the supply chain. might be ignored if not needed for SCM

```
.25PQCELMIBATT01X^S123456XYZ^16D20230803^34LHTTPS://WWW.E-D-C.INFO/AUTOID?
| |      |        |     | |      |      |  |      |      |  |                    |
| |      |        |     | |      |      |  |      |      |  |_DI „34L“           |_DPP portal URL
| |      |        |     | |      |      |  |      |      |_ separator „^“
| |      |        |     | |      |      |  |      | Mf date
| |      |        |     | |      |      |  |_  DI Mf date
| |      |        |     | |      |      ^ separator
| |      |        |     | |      |_SN: 123456XYZ
| |      |        |     | |_DI „S“ for SN
| |      |        |     |_separator „^“
| |      |        |_Product REF: BATT01X
| |      |_IAC“QC“&CIN „ELMI“ for the labeler
| |_DI „25P“ for ISO/IEC 15459-4 sequence
|_System Identifier for DIN 16598 syntax
```

Example data encoded with ISO/IEC 16022 Data Matrix and ISO/IEC 18004 QR Code as carrier (both printed X=0,25mm):

DPP 8x8mm DPP 10x10mm

Scan result of the DataMatrix content of example A1):



	ID	Data	
			Scan no. 1
Symbology:	]d1	Datamatrix	Symbology type Datamatrix passed by reader
Raw data:		.25PQCELMIBATT01X^S123456XYZ^16D20230803^34LHTTPS://WWW.E-D-C.INFO/AUTOID/?	
Structure type:	.	ASC	Data Identifier (DI) following ISO/IEC15418 (with SI '.')
Labeler:	25P	QCELMI	ELMICRON Issuing Agency: Eurodata Council
Article:		BATT01X	
Serial number:	S	123456XYZ	
Production date:	16D	20230803	Interpreted data: 2023-08-03
URL:	34L	HTTPS://WWW.E-D-C.INFO/AUTOID/?	URL HTTPS://WWW.E-D-C.INFO/AUTOID/?25PQCELMIBATT01X%1DS123456XYZ%1D
			Result of last scan
Resume:			ASC structure OK

Screenshot of scan result with generated URL for WEB transmission according to *DI definition „34L“.

Transmission of scanned data of example A1 to the web

According to the definition of the DI „34L“ (and DIN 16589 P2P) the following data string will be transmitted to the WEB in sequence „URL first“ in RFC format, dropping DI „34L“ and control character SI:

Scanned data: *.25PQCELMIBATT01X^S123456XYZ^16D20230803^34LHTTPS://WWW.E-D-C.INFO/AUTOID/?*

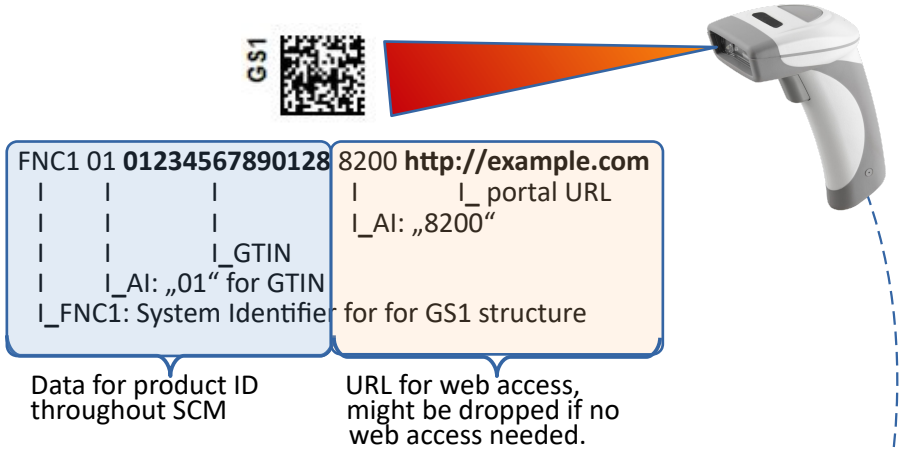
Transmit to web → *HTTPS://WWW.E-D-C.INFO/AUTOID/?**25P**QC**ELMI**BATT01X^**S**123456XYZ^**16D**20230803*

WEB set up might link to DPP data in highest granularity on item level, e.g. by serial no.

Example A2) „ID first“ with „URL add on“ conforming to ISO/IEC 15459-4
using ISO/IEC 15418-GS1 Application Identifiers (AIs)
(example GTIN + Target URL without further encoded attributes)

State of the art

Example data with AI „01“ for „GTIN“ followed by AI „8200“ and URL : GTIN „**01234567890128**“, URL „**http://example.com**“ *(example data taken from GS1 Genspec., release 23.0), data string FNC1 01* ***01234567890128*** *8200* ***http://example.com***
encoded e.g. with ISO/IEC 16022 (GS1) Data Matrix



Scan result of the DataMatrix content of example A2):

	ID	Data	Comment
			Scan no. 1
Symbology:	]d2	GS1DataMatrix	Symbology type GS1DataMatrix passed by reader
Raw data:		01012345678901288200 http://example.com	
Structure type:		GS1	Application Identifier (AI) following ISO/IEC15418
Packing index:	01	0	
Article:		123456789012	GTIN-14 product code Labeller ID Issuing Agency: GS1
Check character:		8	Modulo 10 check character correct
URL:	8200	http://example.com	URL http://example.com/01234567890128/
			Result of last scan
Resume:			GS1 structure OK

Analysis Tree elmicron

Screenshot of scan result with generated URL for WEB, transmission according to AI definition „8200“.

***Transmission of scanned data of example A2 to the WEB**
According to the definition of the AI „8200“ (and DIN 16589 P2P) the data string will be converted and transmitted to the WEB in sequence „URL first“ in RFC format, avoiding the control character for GS1 codes:
The Scanned data: „012345678901288200http://www.portal-99“

Transmission to web → www.portal-99/01234567890128

Note: For more granularity of product data applied with web link, see part B2: GS1 Data Link.

Examples B) Smartphone compatible solutions „URL first“

for most simple use with smartphones for DPP-data viewing
but without data processing

Example B1) URL first with AutoID URL 1.1

for WEB access and online/offline parsing of the product data e.g. „Product ID + SN“

DPP

HTTPS://WWW.E-D-C.INFO/AUTOID?.25P=QCELMI**BATT01X**&.S=**123456XYZ**
I I I I I I I I_Serial no.
I I I I I I_DI „S“ with SI „.“
I I I I I_& next element follows
I I I I_Product REF: BATT01X
I I I_IAC“QC“&CIN „ELMI“ for the labeller
I I_DI „25P“ for ISO/IEC 15459-4 sequence
I_System Identifier „.“ for DIs
I_URL DPP portal

URL for web access
for scanning e.g. per smartphone
(ERP systems will need upgrades)

Data elements structured with „DIs“ for detailed DPP data access AND for parsing for data capture and data processing in the supply chain.

Note: Characters „/“, „?“, „=“, „&“ are URL control characters.

Scan result of the DataMatrix/QR content of example B1)
with AutoID URL 1.1 structure for passing to the WEB
and/or online/offline parsing for data capture & processing

ELMI-ScanLink

	ID	Data	Comment
			Scan no. 1
Symbology:	]Q1	QR	Symbology type QR passed by reader
Raw data:		HTTPS://WWW.E-D-C.INFO/AUTOID?.25P=QCELMIBATT01X&.S=123456XYZ	
Structure type:		MobileTagging	Mobile Tagging
URL:		HTTPS://WWW.E-D-C.INFO/AUTOID?.25P=QCELMIBATT01X&.S=123456XYZ	URL HTTPS://WWW.E-D-C.INFO/AUTOID?.25P=QCELMIBATT01X&.S=123456XY
			Contained AutoID URL fields
Labeler:	25P	QCELMI	ELMICRON Issuing Agency: Eurodata Council
Article:		BATT01X	
Serial number:	S	123456XYZ	
			Result of last scan
Resume:			AutoID URL Ok

screen

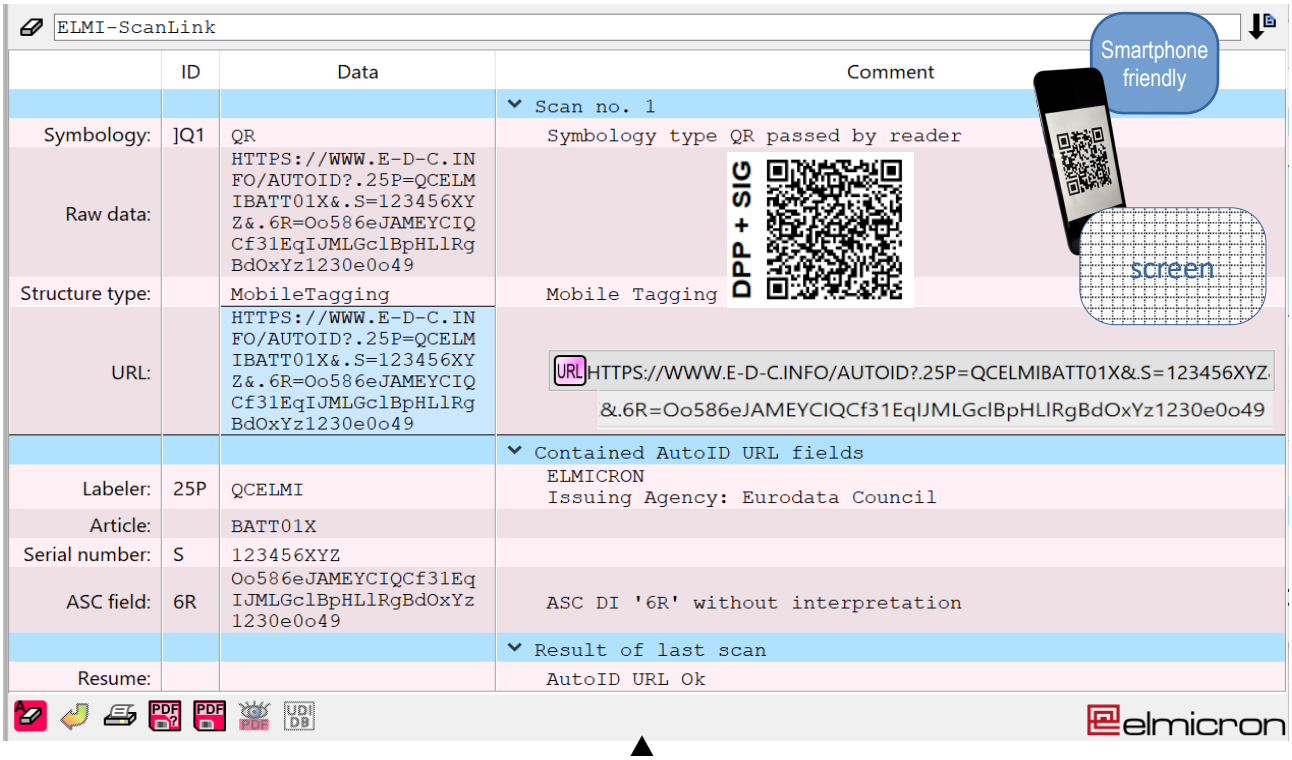
elmicron

▲ Screenshot of the Android App „Elmi-ScanLink

B1.1 Verification, authentication of DPP identifiers
Example of „URL first“ Code applied with ISO/IEC 20248 Digital Signature (DigSig) for varification

Applied with a DigSig, codes can be verified in regard of authentication. ISO/IEC 20248 is one solution for it.
The DigSig for a specific code might be generated by software tools or by a DigSig service provider.
A trusted service provider must host the certificate and revocation lists for it.

Example B1.1 AutoID URL B1 applied with DigSig „Oo586eJAMEYCIQCf31EqIJMLGclBpHLlRgBdOxYz1230e0o49“



▲ Screenshot of the Android App „Elmi-ScanLink

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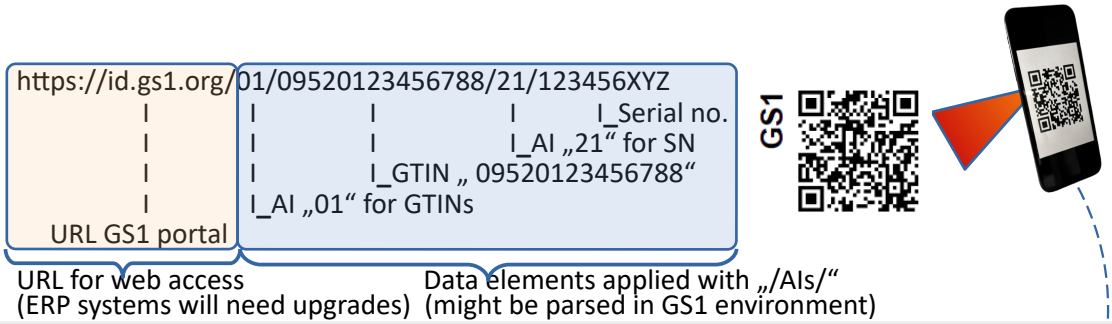
Example B2) URL first with GS1 Digital Link, applied with GTIN & SN (serialised GTIN)



	ID	Data	
			Scan no. 1
Symbology:	]Q1	QR	Symbology type QR passed by reader
Raw data:		https://id.gs1.org/01/09520123456788/21/123456XYZ	
Structure type:		MobileTagging	Mobile Tagging
URL:		https://id.gs1.org/01/09520123456788/21/123456XYZ	https://id.gs1.org/01/09520123456788/21/123456XYZ
			Result of last scan
Resume:			MobileTagging structure OK

▲ Screenshot of App „Elmi-ScanLink for ERP and smartphones

Note: Example „https://id.gs1.org/01/09520123456788“ is taken from GS1 Digital Link standard, Release 1.0.1, chapter 5.4, but SN flagged by AI „21“ is same SN „123456XYZ“ as in example B1.

B2.1 Verification, authentication for GS1 Digital Link DPP identifiers
Same principle for adding a Digital Signature to a GS1 Digital Link might be feasible, but at the time of writing this paper there was no guideline available for it, e.g. by help of an adequate AI. Such an AI is not yet established.

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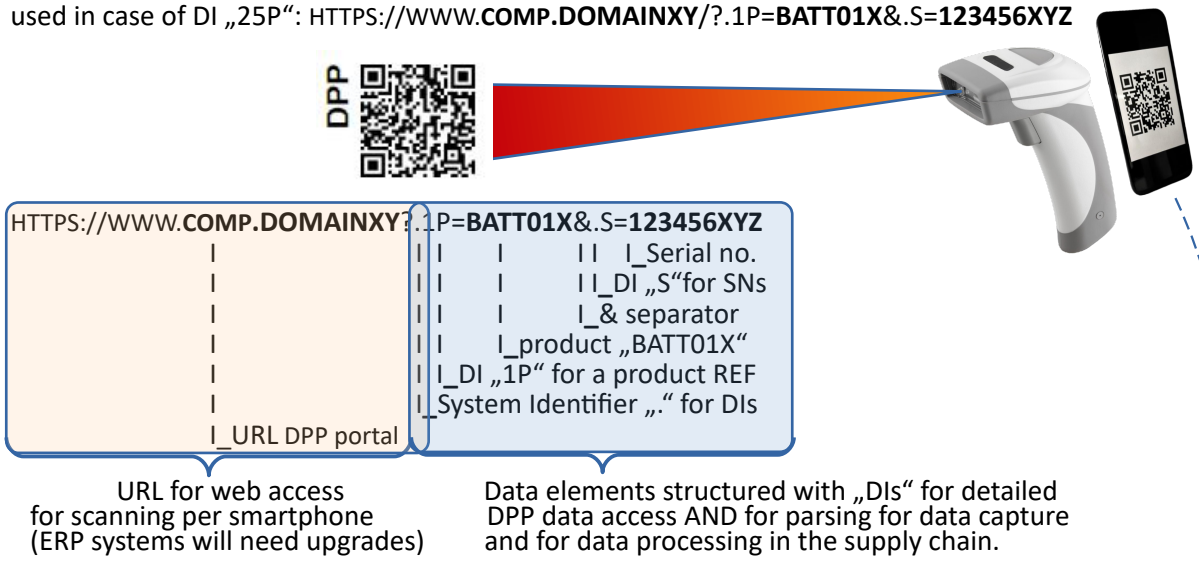
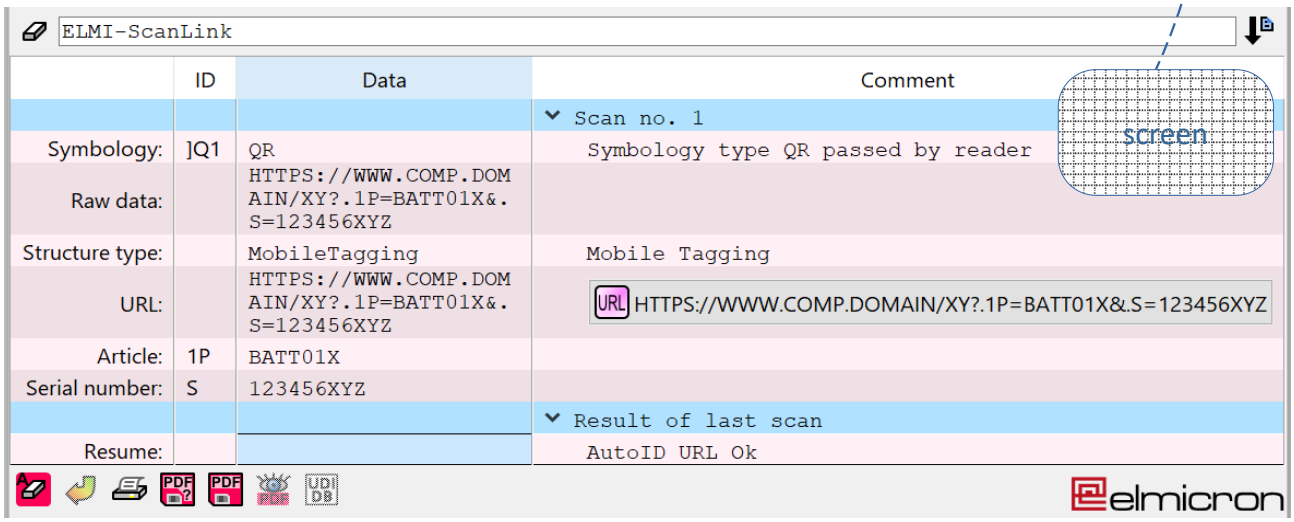
Example B3) URL first using IEC 61406-2 Identification Link - Part 2: Types/Models, Lots/Batches, Items and Characteristics

Example B3 is based on same product reference „BATT01X“ and serial number „123456XYZ“ used for example B1 but domain name „COMP.DOMAINXY“ represents the responsible labeler and DI „1P“ can be used in case of DI „25P“: HTTPS://WWW.**COMP.DOMAINXY**/?.1P=**BATT01X**&.S=**123456XYZ**



Note: Characters „/“, „?“, „=“, „&“ are control characters according to RFC format.

Scan result B3) IEC 61406-2 for passing to the WEB and/or online/offline data capture



▲
Screenshot of App „Elmi-ScanLink for ERP and smartphones

Specifications and tools used for the white paper

Specifications
AutoID URL 1.1
DIN 16589 Automatic identification and data capture techniques - Traceability Pointer to Process (P2P)
GS1 Digital Link 1.0.1
IEC 61406 2 Identification Link - Part 2: Types/Models, Lots/Batches, Items and Characteristics
ISO/IEC 15418, part ANS MH10.8.2 Data Identifiers, DIs „25P“, „1P“, „S“, „16D“, „34L“, „6R“
ISO/IEC 15418, part GS1 Application Identifiers, AIs „01“, „21“
ISO/IEC 15459 Unique Identification, Part 3, 4
ISO/IEC 16022 Data Matrix
ISO/IEC 18004 QR Code
ISO/IEC 20248 Digital signature data structure schema

Tools
Symbology designer „ZINT“
App and ERP data capture software „Elmi-ScanLink“
Scanner: ECR 15
Smartphone with and without AutoID APP