Different data carriers enable different use cases throughout the life of a tyre

GDSO services and standards are designed on the SGTIN-96 [1] standard as tyre Unique Item Identifier, not on a specific type of data carrier. Different technologies can therefore be chosen to enable access to tyre data.

In this paper GDSO outlines how different data carriers can fit different use cases.

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GDSO services and standards are based on a **serialized tyre identification** defined by the **SGTIN-96** [1] standard, also known as a **Unique Item Identifier (UII)**.

These services are **technology agnostic** and welcome **all accessible and standardized data carriers** that can be **securely coded** with the tyre UII **by tyre manufacturers** to enable data sharing.

With the aim of answering different stakeholders' requests, GDSO has identified here below all **available data carriers** that as of today can be coded with a SGTIN-96 UII, describing the benefits of each as well as **the use cases they can enable**.

Depending on how they are attached to the tyre, data carriers have a different lifespan and support a variety of different use cases. **Embedded RFID is today the only solution which accompanies the tyre from cradle to grave and truly offers full traceability of the tyre lifecycle**.

List of accessible and standardized data carriers compatible with the SGTIN96 UII format:

- **Barcode, Data Matrix** or **QR codes** based on GS1 standards and printed on tyre stickers:
    - GS1-128 Barcode based on ISO/IEC 15417
    - GS1 Data Bar
    - GS1 Data Matrix based on ISO /IE 16002
    - GS1 QR Code based on ISO/IEC 18004
    - GS1 Data Matrix leveraging GS1 Digital Link URI

    NB: QR codes engraved on sidewall are not listed here because they are not standardized and not accessible, as they are subject to copyright or other intellectual property rights.

- **RFID tags** standardized according to ISO 20909 and ISO 20910, supported by a sticker, or integrated into a rubber patch, or directly embedded in the tyre before curing.

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[1] SGTIN-96 stands for Serialized Global Trade Identification Number, it is an Electronic Product Code (EPC) scheme developed by GS1 that allows to have unique identification based on 96 bits. The serial number distinguishes a specific good compared to others that carry the same product code.

GDSO remains open to **innovation** and **emerging technologies**, therefore willing to assess and prepare the standardisation to pair the tyre's UII with the **Tyre Mounted Sensor** (TMS):

A **TMS** is an electronic device attached to the tyre that is capable of capturing its operating conditions while allowing tyre manufacturers, vehicle manufacturers and other stakeholders to run prognostic[2] models. Today TMS communications are not standardized.

The sketch below is providing a high-level view of the different data carriers (reported in the column on the left) versus the possible use cases that they enable:
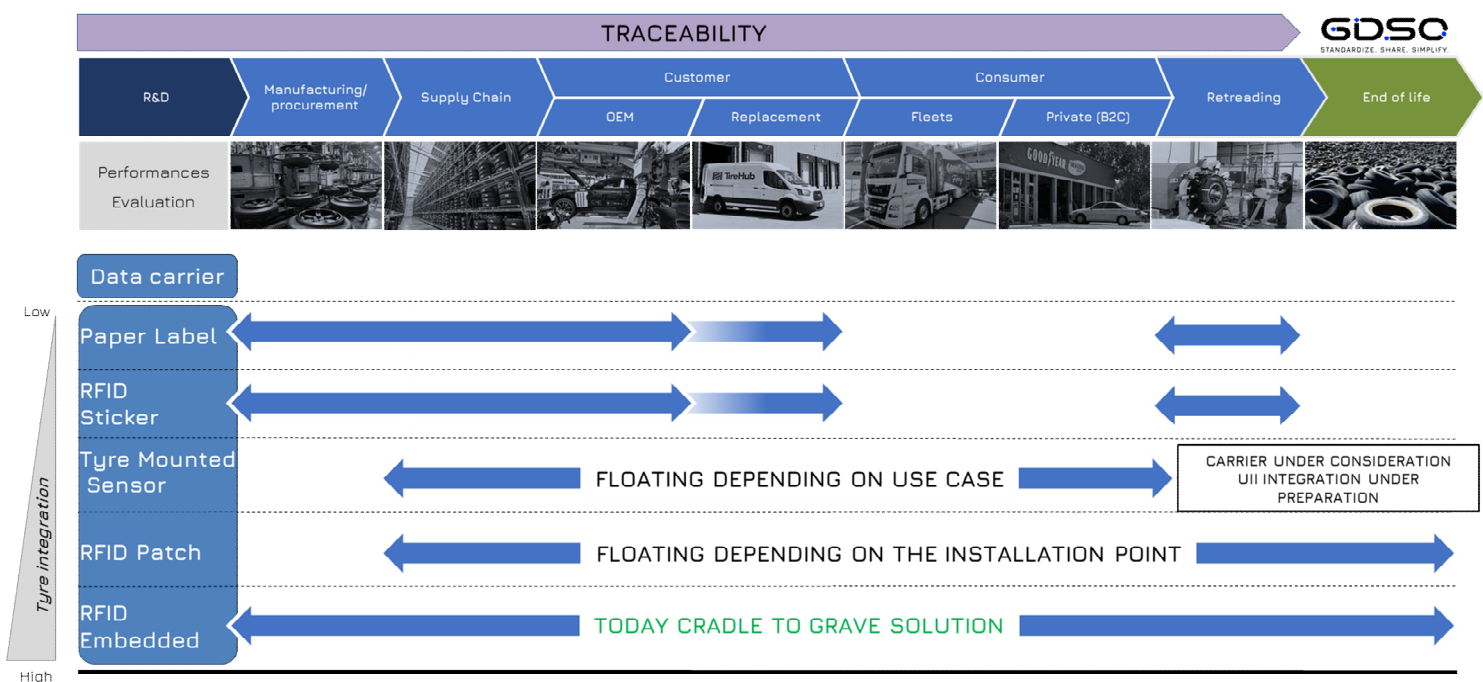
Also, data carriers are not equivalent regarding their abilities to:

- **ensure data integrity** (trustable SGTIN-96 encoding and trustable access to tyre manufacturer database)

- **allow update** of tyre related data over time (on tyre Manufacturer database)

- **be read** in different environmental conditions through standardised reader.

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[2] Prognostics stands for prediction and diagnostic

The sketch below is providing the assessment of the data carriers' ability in terms of data management, security and readability:

GDSO	Paper Label BAR 128 / QR Code	Paper Label RFID	RFID Patch	RFID Embedded	Tyre Mounted Sensor
Ability to store the required identifier (SGTIN-96)	Yes by design	Yes by design	Yes by design	Yes by design	UII integration under consideration
Ability to update tyre data over time (on Tyre Manufacturer database)	Only possible until label is removed. Out of control if not encoded by original tyre manufacturer	Only possible until label is removed. Out of control if not encoded by original tyre manufacturer	Yes, through a digital platform connection, if encoded by original tyre manufacturer	Yes, through a digital platform connection	Yes, through a digital platform connection but it depends on TMS battery life, integrity over time and removability
Ability to ensure data integrity (reliable SGTIN-96 encoding and trustable access to tyre manufacturer database)	No as it can be easily removed or replaced with a counterfeit	No as it can be easily removed or replaced with a counterfeit	Yes if encoded by original tyre manufacturer	Yes by design	Sensor can be removed, damaged or disabled.
Readability in different environmental conditions through standardised readers.	Need to spot **every single tyre** and manual operations. **NOT READABLE IN USE**	RF tools investments. **NOT READABLE IN USE**	RF tools investments working indoor/outdoor, static/dynamic and in use	RF tools investments working indoor/outdoor, static/dynamic and in use	Reading tools investments working indoor/outdoor, static/dynamic and in use

LEGEND | Assessed fine | Improvement needed | Critical |

Conclusion:
Different data carriers can be coded with a Serialized Global Trade Identification Number (SGTIN-96) and enable tyres' data transfer through GDSO Services. Depending on the way they are associated with tyres and on the level of cybersecurity that they provide, they can enable different use cases along tyre life.

For further information contact us at info@gdso.org

ABOUT GDSO:
Established in January 2022 the « Global Data Service Organisation for Tyres and Automotive Components», is an international non-profit association, aiming to: standardize data related to tyres and define solutions to access and exchange them; develop solutions tackling online tyre data access; establish worldwide agreement on a webservice to facilitate data access by stakeholders; promote the use of the GDS to tyre manufacturers and external stakeholders; represent the Members in regard to external bodies/organisations.

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