



A Baumer Company



QualiVision

Product Serialization: A Key to Ensuring Product Quality and Traceability

Dr. Jens Kubacki

Computer Vision & Machine Learning

Agenda



QualiVision

Basics of product serialization

**Serialization, inspection, Predictive Maintenance,
Process Optimization**

Deep Learning in QualiReader

Needs and challenges

Basics of product serialisation

Serialization in the pharmaceutical industry refers to the process of **assigning a unique identifier**, usually in the form of a **serial number**, to each saleable **unit** of a pharmaceutical product. This unique identifier is typically encoded in a **2D data matrix barcode** or similar format that can be scanned and **tracked throughout the supply chain (traceability/transparency)**, from manufacturing to distribution, and ultimately to the point of sale or dispensing to the **patient**.

It is a critical process in the pharmaceutical industry to **enhance drug safety**, prevent **counterfeiting**, ensure regulatory **compliance (FDA/EMA)**, and improve overall **supply chain efficiency**.

It involves not just assigning unique serial numbers but also **managing vast amounts of data** for :

- **tracking**,
- **reporting**,
- and **analytics** purposes.

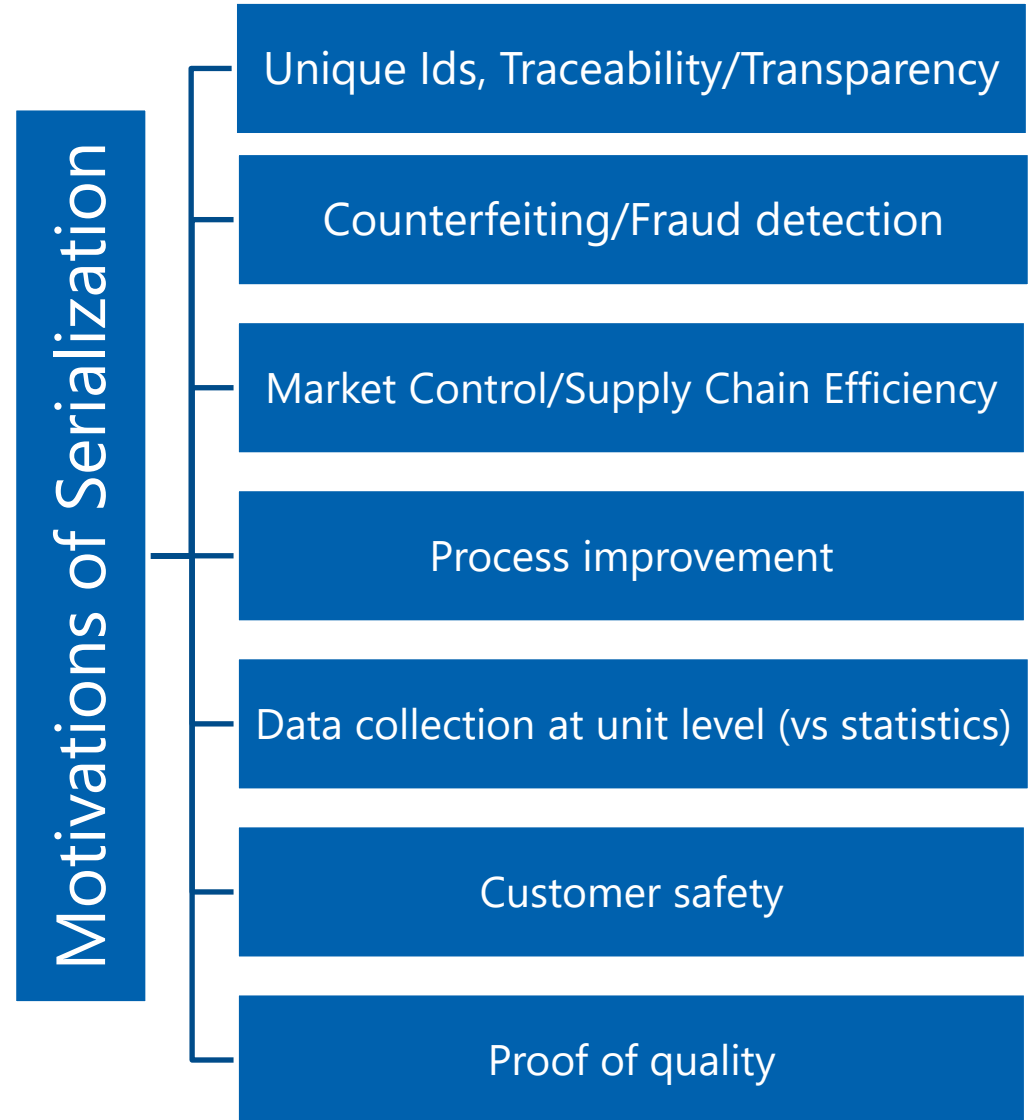
Aggregation: This refers to the process of linking serial numbers of individual units to their cases and pallets. It enables efficient scanning and tracking of products at different packaging levels, ensuring that the entire batch or lot can be traced as it moves through the supply chain.

Basics of product serialisation

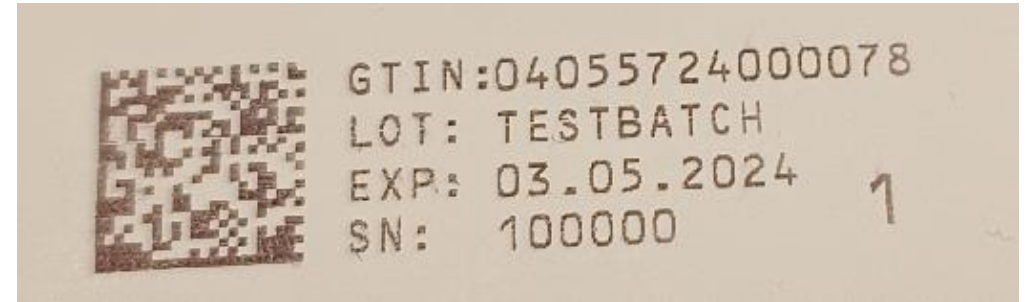
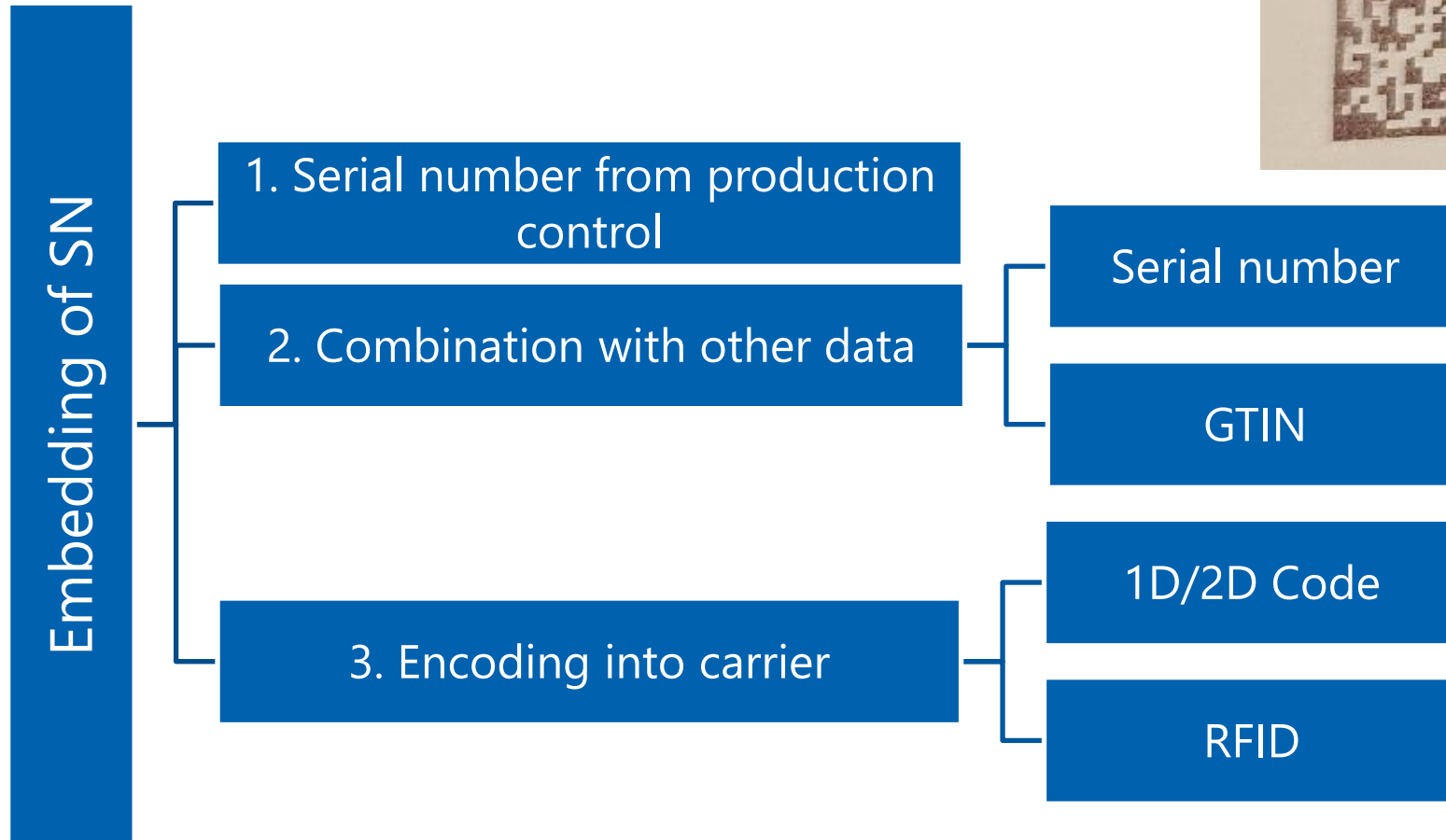


Practical examples (transparency):

- Q-data collection
(checking results, weights, ...)
- targeted recalls
- improvements



Basics of product serialisation

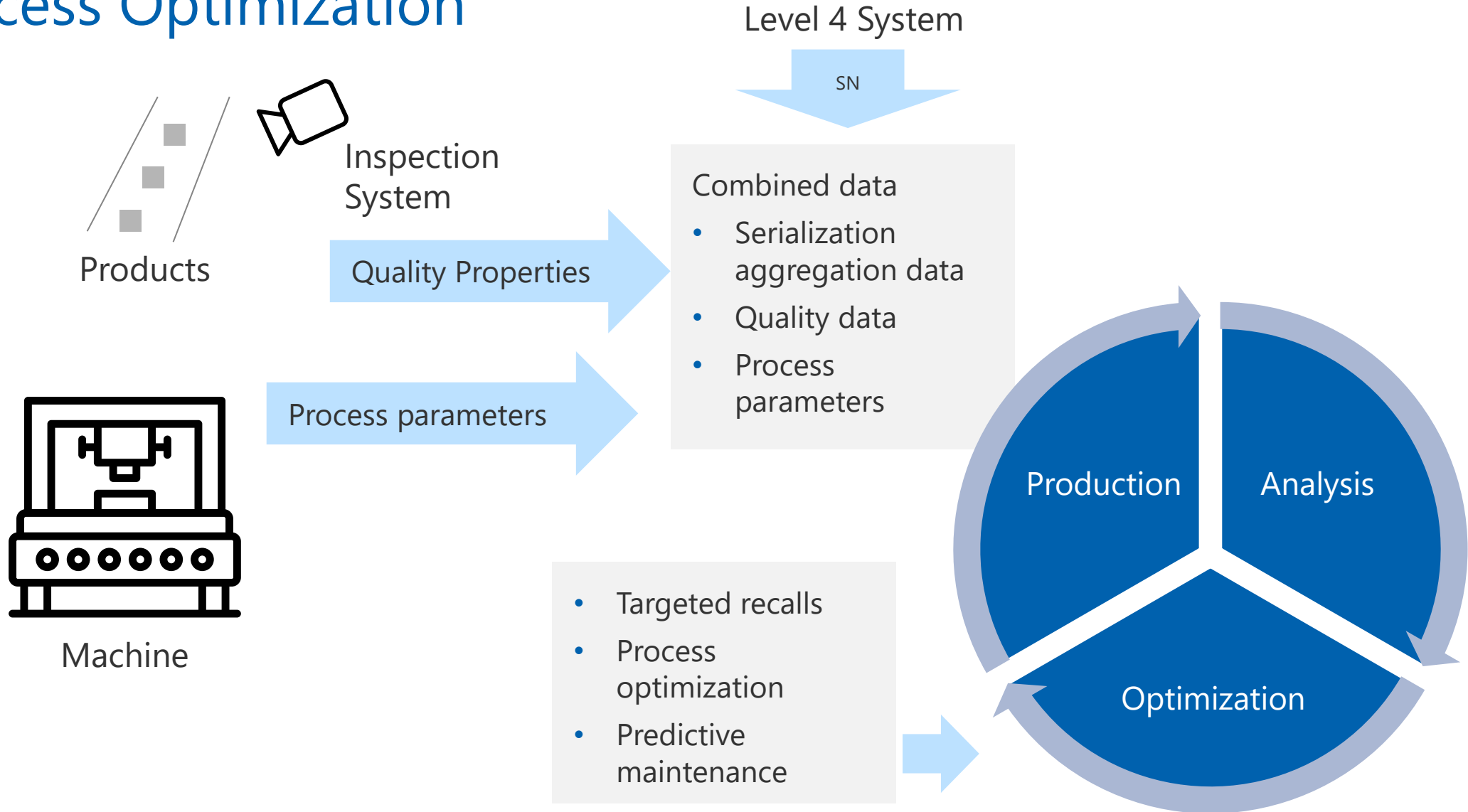


- **Standards:**

- **GTIN:** A globally unique identifier to look up product information in a database
- **Digital Link:** A GS1 standard, digital representation of product information by encoding GS1 identifiers (e.g., GTIN) in a URL

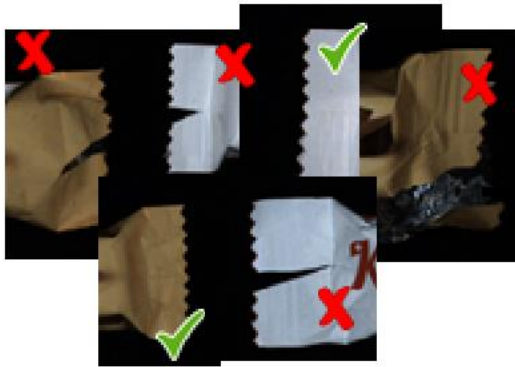
GS1 is a global not-for-profit organization that develops and maintains standards for supply and demand chains

Serialization, inspection, Predictive Maintenance, Process Optimization

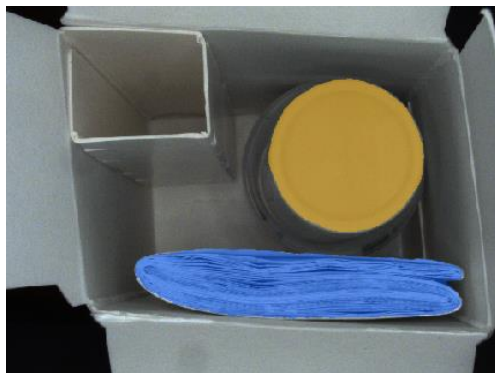


Deep Learning in QualiReader

Supported Modes

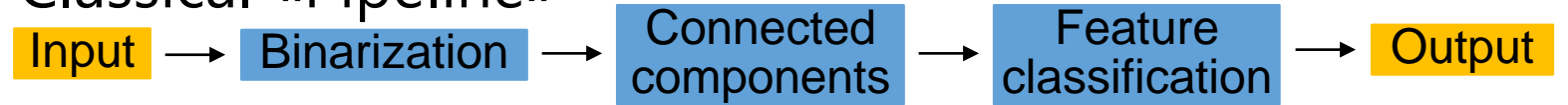


- classification



- segmentation

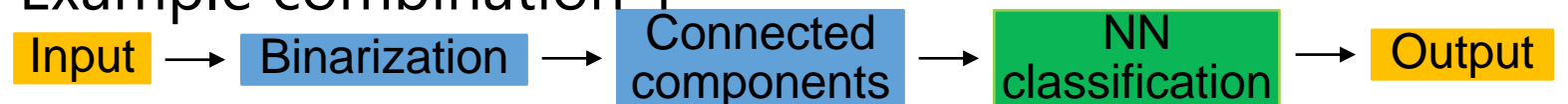
Classical «Pipeline»



«All DL End-To-End Pipeline»



Example combination 1



Example combination 2



Pros and cons!

Deep Learning in QualiReader



- VAX Smartcamera
- NVIDIA Jetson
- Ported QualiReader
- PyTorch CNN model

- 660 Cigarillos per minute!

QualiReader

2.Sep. 14:18

47.6%

Overlays

Resultat

Inspektion NN

Einstellungen

Debug

Zeiten 1

Zeiten 2

Resultatstatistik - Auswurfe detektiert mit neuronalen Netzen

Bezeichnung	Total	Anz. Auswurfe
Status	31870	202
Result_Leaving	31870	202

Serienfehler zurücksetzen

Resultatstatistik - Detektionen per Position

Bezeichnung	Total	Anz. Detektionen
Status	31870	0
Arbeitsbereich 0: detection	31870	57
Arbeitsbereich 1: detection	31870	53
Arbeitsbereich 2: detection	31870	57
Arbeitsbereich 3: detection	31870	118
Arbeitsbereich 4: detection	31870	102
Arbeitsbereich 5: detection	31870	95
Arbeitsbereich 6: detection	31870	102
Arbeitsbereich 7: detection	31870	73
Arbeitsbereich 8: detection	31870	77
Arbeitsbereich 9: detection	31870	118
Arbeitsbereich 10: detection	31870	114

Einzelbild

Needs and challenges

- Topics for Bachelor/Master theses regularly
- Serialization/Aggregation typically done internally
- External/cooperative projects for specific (e. g. vision/deep learning) tasks possible