

TRACEABLE MACHINE VISION SYSTEMS TO THE SI METRE DEFINITION FOR ADVANCED MANUFACTURING

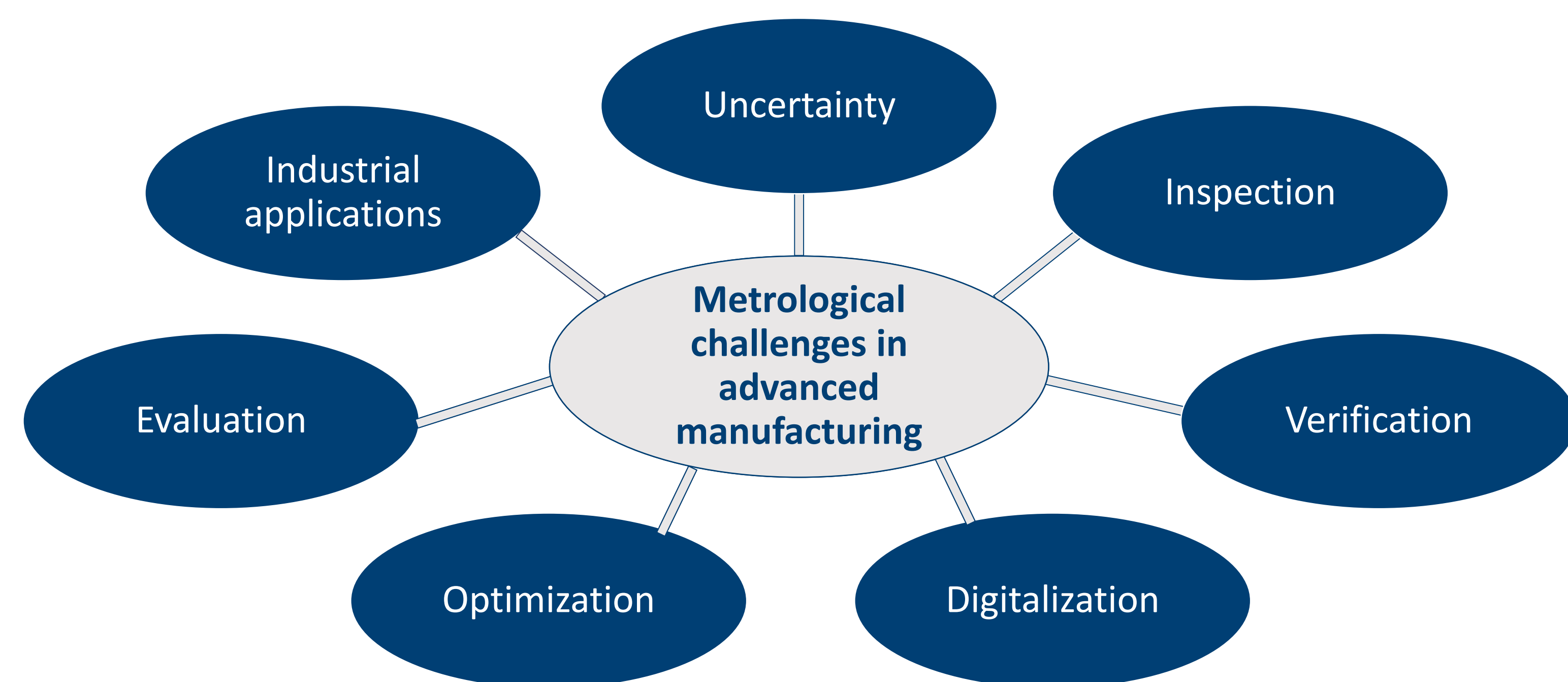
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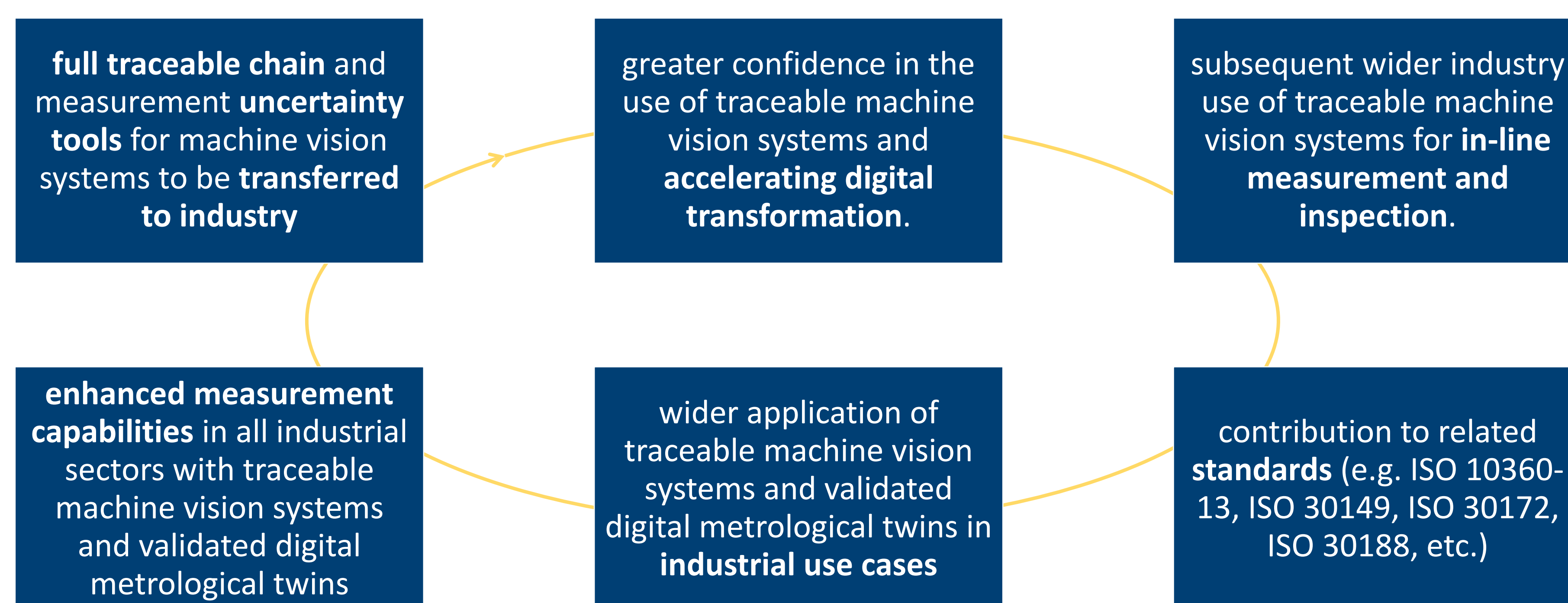
INTRODUCTION

In advanced manufacturing, metrology faces significant challenges : → addressing the measurement of new products with complex geometries at multiple scales and embedding → integrating measurement processes into cyber-physical systems [1].



OUTCOMES

The final objective of the project 236IND08 DI-Vision [3] : optimise production processes via enhanced productivity and flexibility, assured safety, and reduced environmental impact by minimising material waste and energy consumption in industrial applications.



REFERENCES

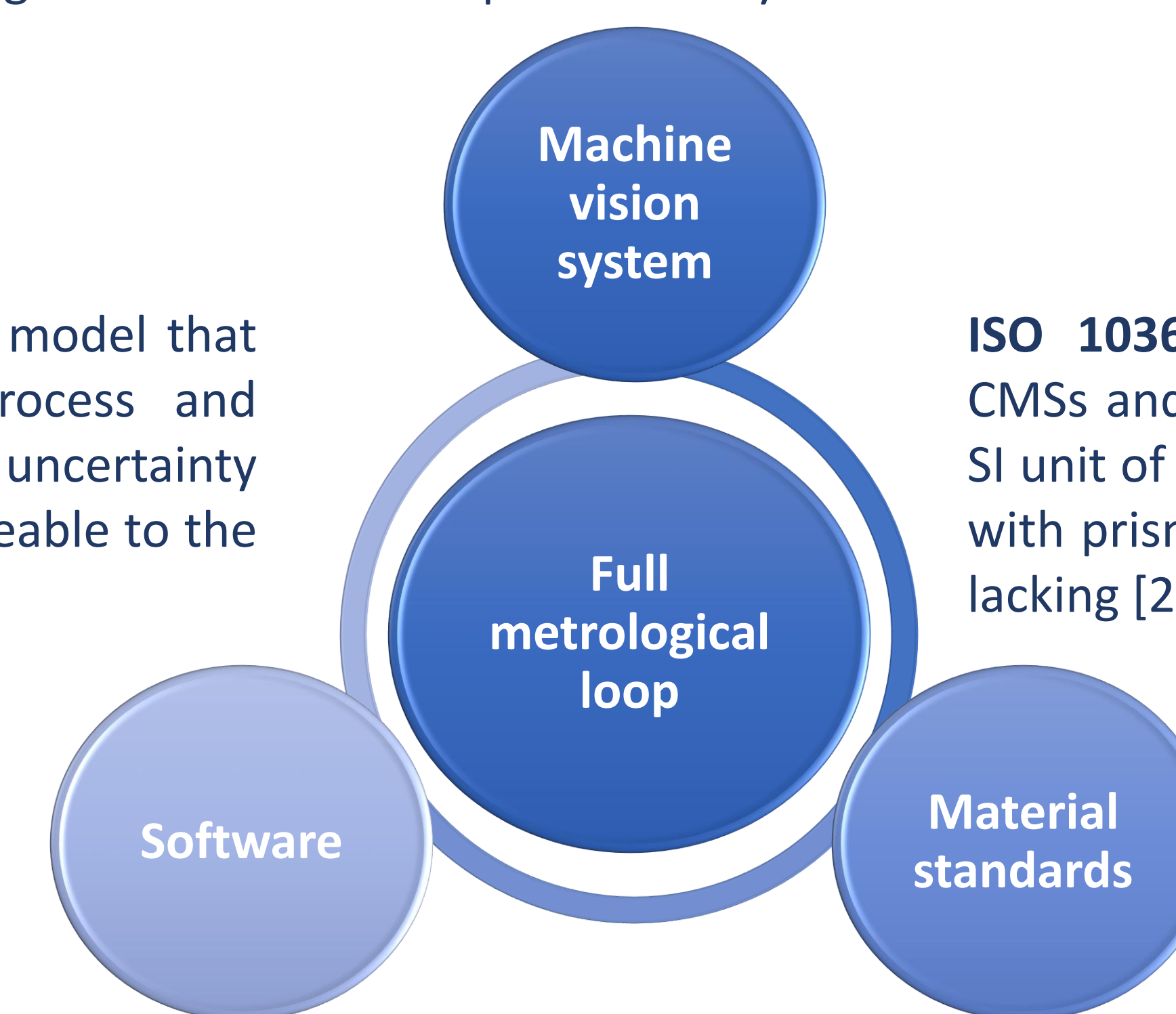
- [1] Przyklenk, A. *et al.* (2021) 'New European Metrology Network for advanced manufacturing', *Measurement Science and Technology*, 32(11), p. 111001. Available at: <https://doi.org/10.1088/1361-6501/ac0d25>.
- [2] ISO 10360 part 13 2021 Geometrical Product Specifications (GPS)— Acceptance and reverification tests for coordinate measuring systems (CMS) - Part 13: Optical 3D CMS (Geneva: International Organization for Standardization)
- [3] <https://projects.lne.eu/jrp-di-vision/>

METHODOLOGY

Machine Vision Systems :

- automated inspection, quality control and precision measurement in many industries, such as aeronautics, pharmaceuticals, medical devices, electronics and semiconductors;
- dynamic adaptability to environmental and system changes;
- creating a reliable closed-loop feedback system.

Digital Metrological Twin: numerical model that depicts a specific measurement process and indicates an associated measurement uncertainty for a specific measurement value traceable to the SI metre unit.



ISO 10360-13:2021: traceability of optical 3D CMSs and contains two spheres traceable to the SI unit of length. Nonetheless, material standards with prismatic and complex shapes are definitely lacking [2].

Currently, no metrological standards or validated digital metrological twins have been established at National Metrological Institutes/Designated Institutes for machine vision systems as 'ground truth' for the verification of commercial metrology machine vision systems offering real-time (in-line) measurements in industry.

MACHINE VISION SYSTEM

Quick measurement at multiple scales
Real-time operation
Digital workflows
Data processing technologies

Increased productivity and quality
Waste reduction
Dynamic data update
Optimised measurement strategy

DIGITAL METROLOGICAL TWIN

Correction of systematic errors
Minimisation of cycle times
Traceability establishment
Reduction of measurement uncertainty

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23IND08-DI-Vision



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