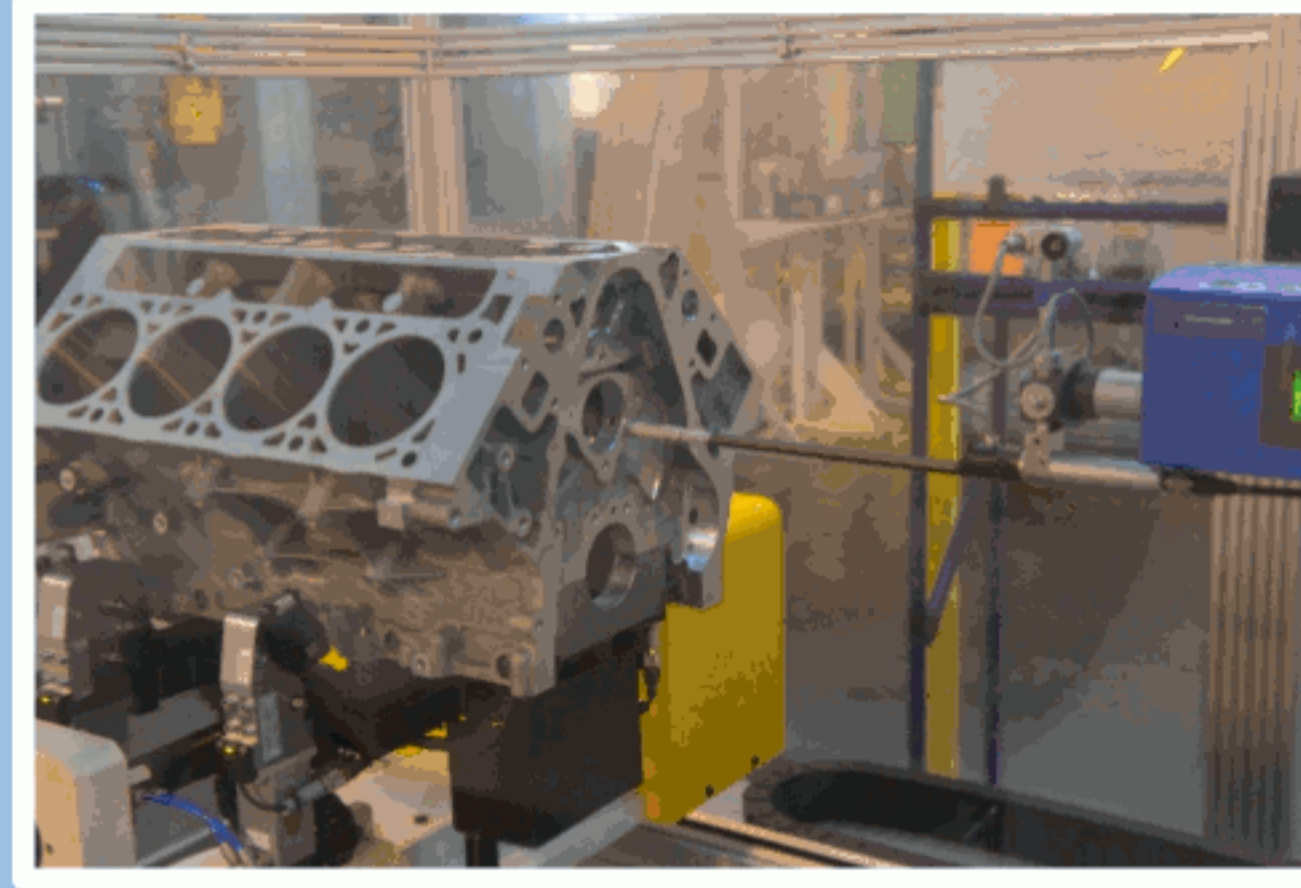


Excellence

CMMs (Coordinate Measuring Machine) are state of the art in industry:

- Universal measuring devices able to measure complex geometries where no dedicated measuring instrument exists
- Digital oriented, separating clearly point sampling from data reduction
- Broad range available on the market, in size and in accuracy

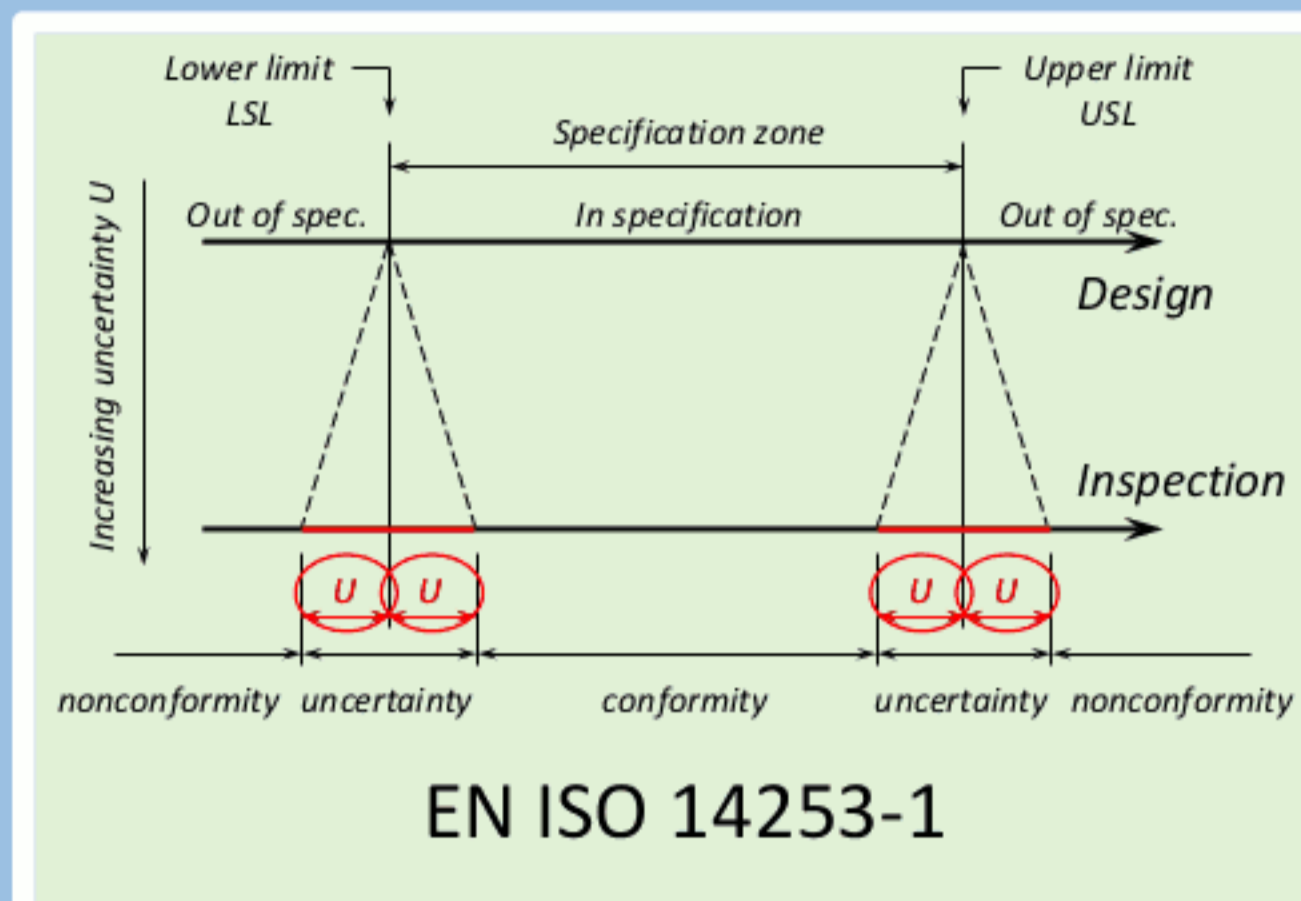


CMMs are very popular in industry:

- Wherever there is manufacturing
- ~ 40 000 CMMs in the EU (50 M€ turnover in manufacturing/CMM)

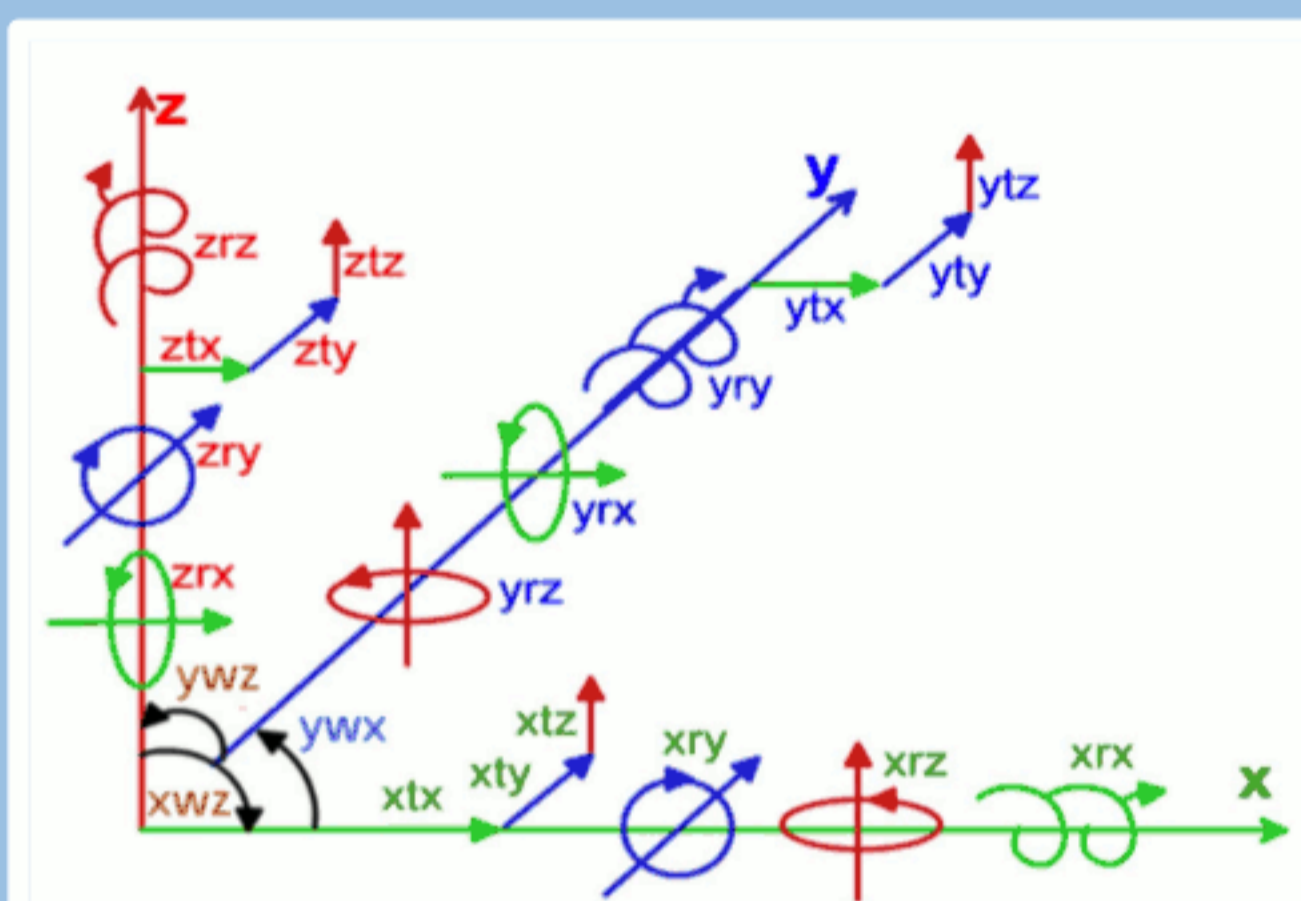
The uncertainty is very needed:

- CMMs mainly used for conformity assessment of parts
- The EN ISO 14253-1 applies and asks for an uncertainty value to decide conformity or non conformity



The uncertainty is very difficult to estimate for CMMs:

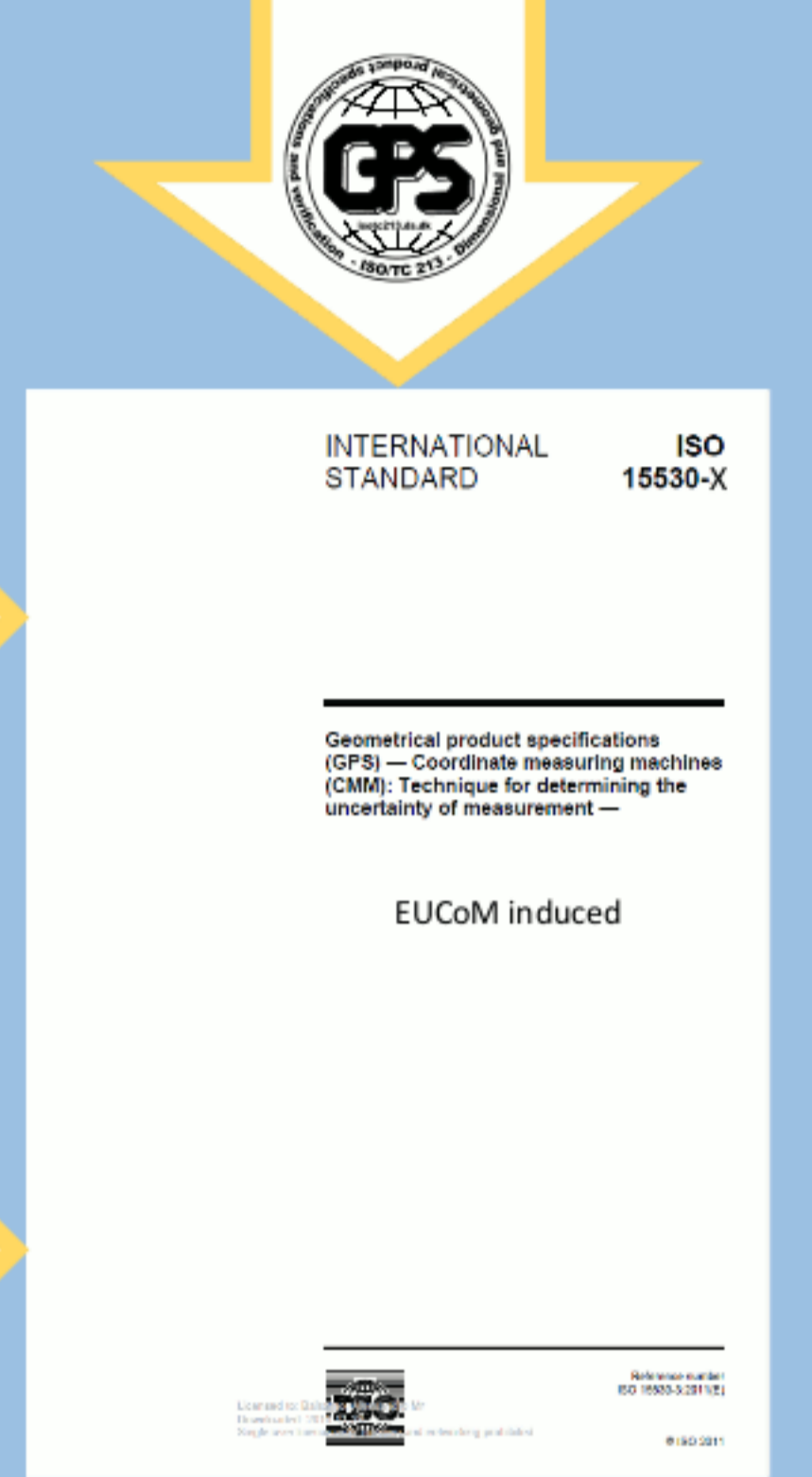
- The possible measurands are virtually infinite, each deserving task-specific evaluation
- Features are computed iteratively, no analytical close-form evaluation
- The error parameters of a CMM are many (200+)
- This is a recognised difficult scientific problem



The EN ISO 15530 series:

- Guiding standards exist on the CMM uncertainty evaluation
- The EN ISO 15530-3 *Use of calibrated workpieces*
- The ISO/TS 15530-4 *Simulation* (Monte Carlo)
- Both suffer severe limitations in their applicability

	Limitations	Applicability
EN ISO 15530-3	A calibrated workpiece and a long experimental investigation	Serial measurements, e.g. at the end of a production line
ISO/TS 15530-4	Initial experimental effort, time consuming simulations, not all components included	Calibration or high end laboratories



EUCoM

A posteriori (type A) method
(measure first, then evaluate)

Possible
ISO 15530-2

A priori (type B) method
(evaluate first, then measure)

Possible
ISO 15530-5

Impact



now

EUCoM

JRP end



Strong relation to the ISO/TC213/WG10:

- The need for methods of uncertainty evaluation is recognised by standards committee ISO/TC213/WG10 (CMM)
- The ISO 15530 series (Measurement uncertainty for CMMs) was originally designed to include the two methods of this JRP (as ISO 15530-2 and -5, respectively)
- These ISO projects were not completed due to lack of resources

The ISO/TC213/WG10 is open and welcoming EUCoM outputs

Four JRP members are:

- Long standing permanent members of the ISO/TC213/WG10 (CMMs)
- One (A. Balsamo) is coordinator of EUCoM
- One (A. Sato) is project leader of the ISO/WD 15530-2
- One (A. Balsamo) is Convenor of the ISO/TC213/WG4 (Uncertainty and decision rules)

EUCoM

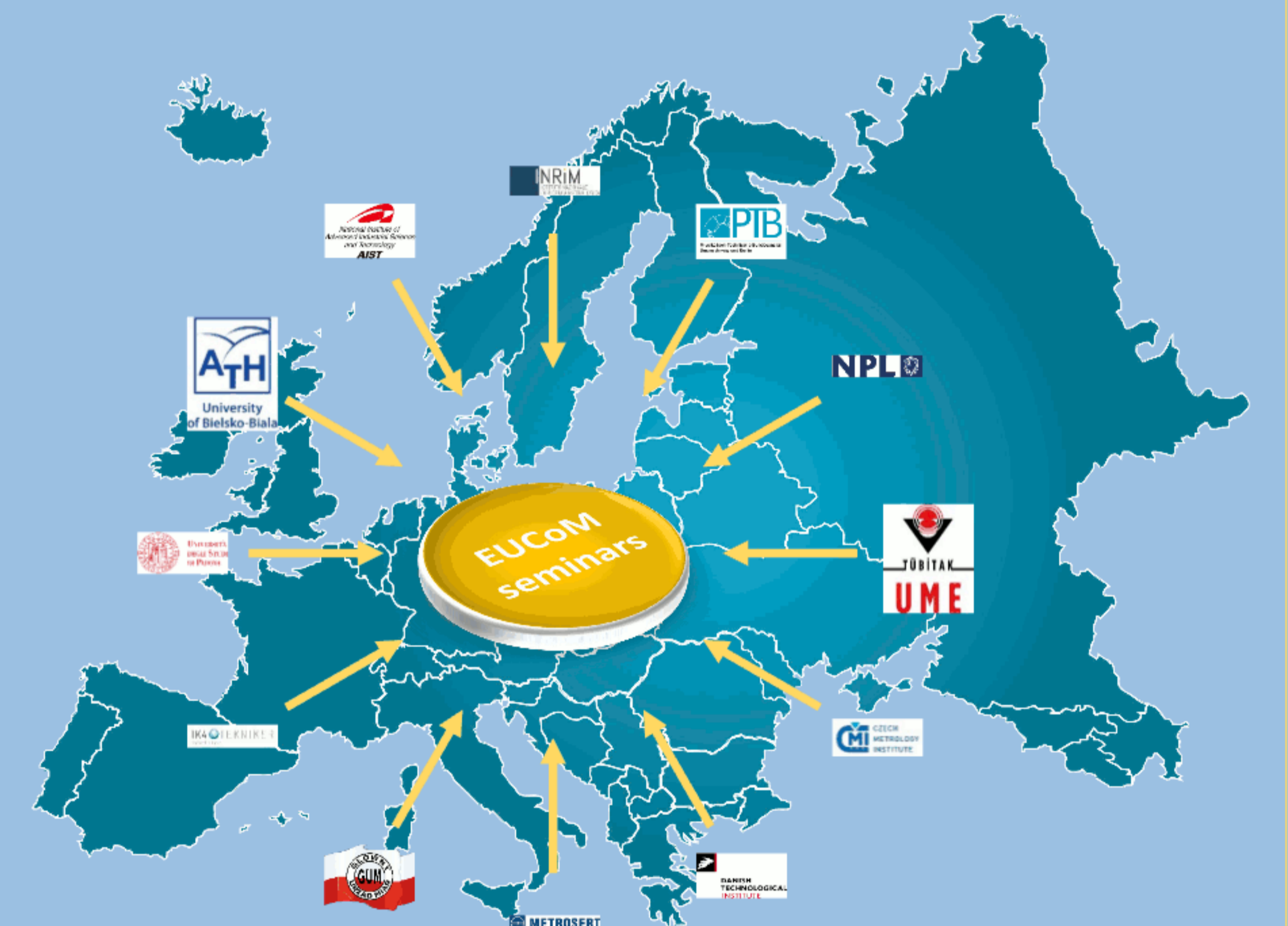
3 years

ISO 15530-2 & -5

5-10 years

EUCoM seminars:

- The developed methods will be transferred to industry before standards are published
- 10 EUCoM seminars of identical content
- Each in a different country, to be close to users
- Each in local tongue, to overcome language barriers



Time gap:

- Developing standards takes much longer than a JRP time span
- Standards have long term impact
- Need for early impact
- Dissemination actions scheduled within the project time limits

Implementation

SRT Objectives:

Traceable and standardised a posteriori methods

Simplified and validated a priori methods

Demonstration of the validity of the methods in industrial conditions

Revisions of normative and dissemination of methods

WP5: management and coordination

WP1: a posteriori (type A) methods

- Development of procedures
- Development of simulation programs
- Coordinated measurement exercise

- Documentation of a priori information
- Development of algorithms / software
- Experimental evidence

WP2: a priori (type B) methods

- Independent measurement on case studies
- Determination of measurement uncertainty using the results of WP1 and WP2
- Comparison of results

WP4: Creating impact

- Stakeholder Committee
- EUCoM seminars
- Scientific publications
- Input to GPS and standardisation bodies

WP3: Experimental validation of methods



Stakeholder Committee:

- EUCoM is all about industry and industrial needs: the Stakeholder Committee provides important feedback and ensures compatibility of approaches to industry demands
- Only one meeting in person at mid term (when the methods will be already available), not to overload stakeholders, and periodic teleconferences in conjunction with the project meetings
- Special role to the Chief Stakeholder, involved and invited
- The project consortium can count on the experience of Skoda Auto as Chief stakeholder

Validation of the developed methods:

- The validation is essential to gain acceptance and approval for standardisation
- The validation process must be as large and diverse as possible
- All JRP partners have experience but with different equipment, environments, industrial background
- Extensive validation made possible by the consortium structure

