



**MEASUREMENTS
MATTER**
In our daily life

Quality Assurance for *Characterisation of Nanomaterials* and *Implementation of Labelling Requirements for Food and Consumer Products*

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<https://ec.europa.eu/jrc/en/institutes/irmm>

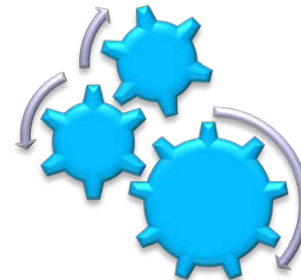
Measurements, legislation and standardisation

- Millions of measurements are performed every year
- Important decisions are taken based on those measurements
- Need for harmonised implementation of policies in EU28+
- 40 % of EU legislation is related to measurements



Who benefits of standardisation?

- **Industry: competitiveness and innovation**
- **Producers and Authorities: effective implementation of legislation**
- **Trade: facilitated movement of goods**
- **Environment: sustainable processes**
- ***Consumers: safe and high-quality products on the market***



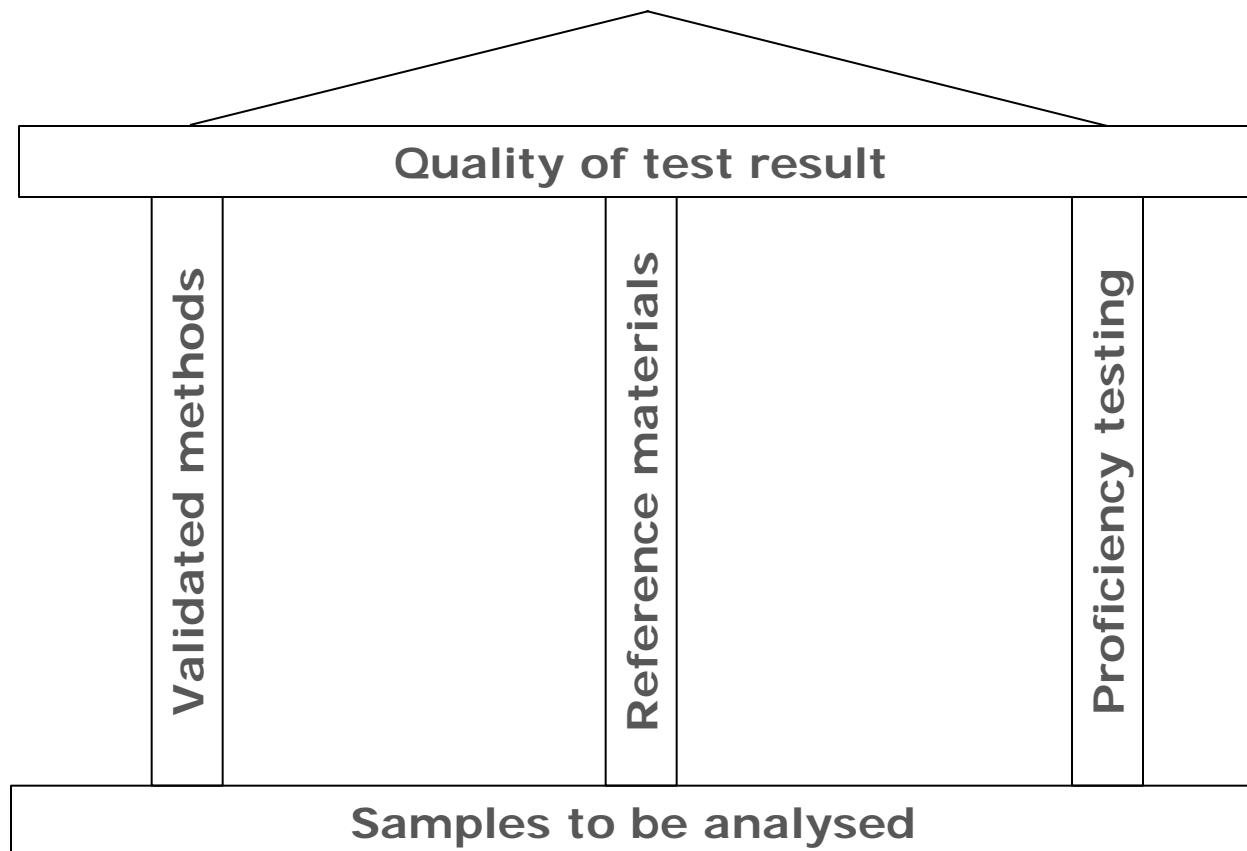
Prerequisite for consumers' acceptance

Harmonisation and standardisation

- Definition and characterisation of potentially hazardous compounds
- Safety assessment (methodologies for risk assessment)
- Control of final products on the market (analytical methods, sampling, etc.)
- Quality assurance tools (reference methods and materials, proficiency testing)



Quality assurance tools for quality of test results



Nanomaterials - harmonisation/ standardisation

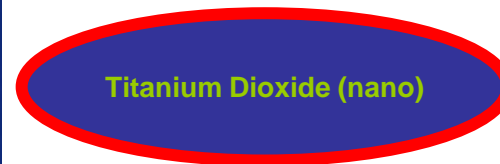
- Hazard assessment requires comparable data
- Labelling requirements based on nanomaterial definition
- Analysis (characterisation) is difficult
- Detection and determination in complex matrices such as food or cosmetics is challenging

Detection and Quantification of Nanomaterials

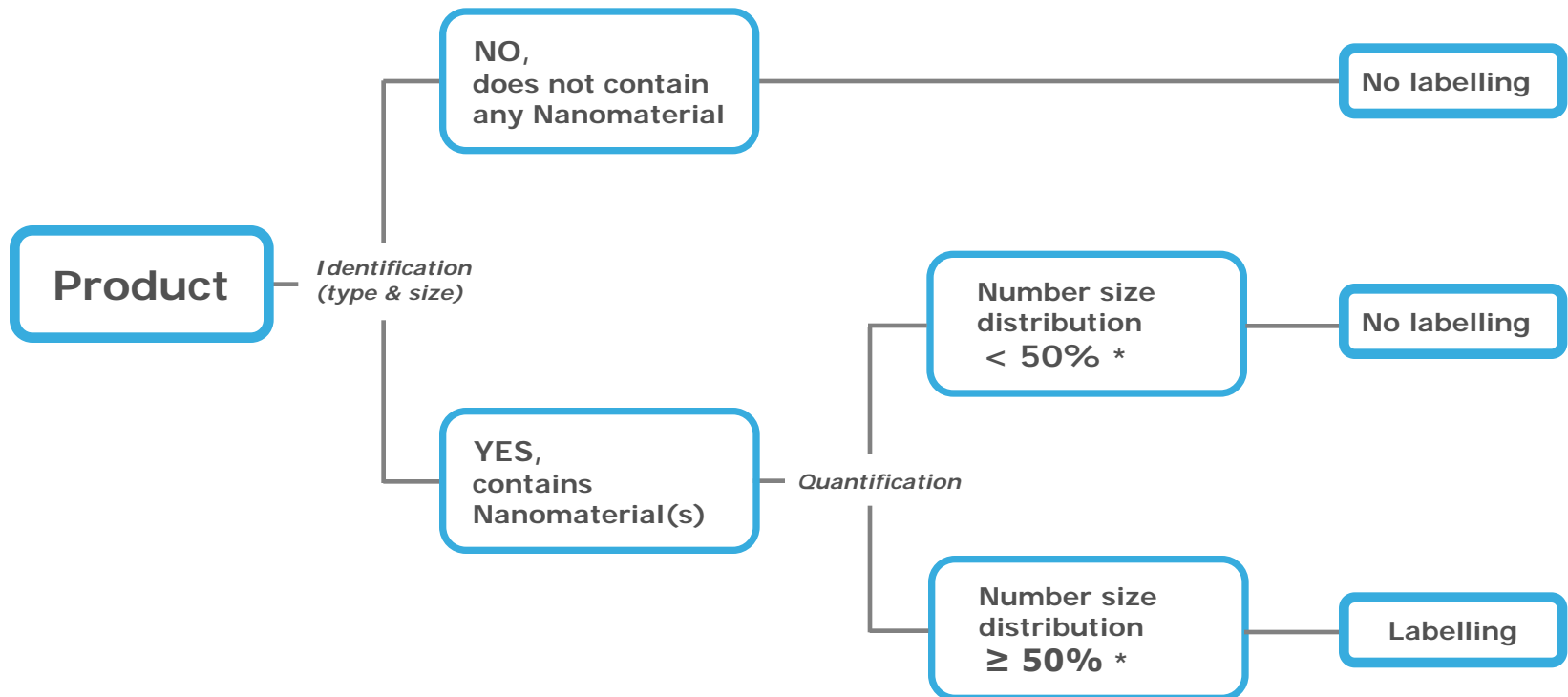
Implementation of labelling requirements

- No hazard labelling
- Consumer information

Need for appropriate analytical and quality assurance tools



Labelling of products containing nanomaterials



* in specific cases lower

Characterisation, Identification, Detection - Challenges

'Simple' suspension of nanoparticles

*Dynamic Light
Scattering*

19.0 ± 0.6
nm



21.8 ± 0.7
nm

*Small angle X-
ray scattering*

Which size?

20.1 ± 1.3
nm

*Centrifugal liquid
sedimentation*

Measurement and standardisation challenges from nanomaterials & related regulations

Challenges for CRM production

Measurands

- What to measure?
- Decision relevance!
- Method defined or operationally defined

Qualified expert collaborators

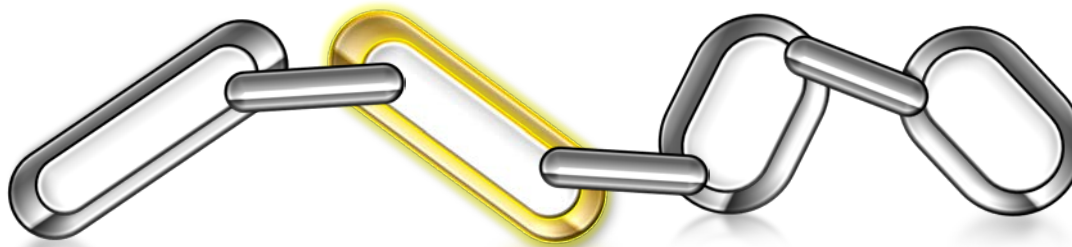
- Quality Assurance (ISO/IEC 17025)
- Proficiency
- Availability of instruments

Measurement uncertainties

- Realistic
- Fit-for-decision

Metrological traceability

- SI
- Method
- CRM



CEN/TC 352 Nanotechnologies

EC Mandate M461

**Coordination with other
CEN/TCs**

- **Measuring nano-objects in complex matrices**
- **Definition of relevant measurands**



ISO/TC 229 Nanotechnologies

**Harmonisation across
industrial sectors**

**Coordination with other
ISO/TCs**

- **Nanomaterial terminology**
- **Characterisation of specific nanomaterials (quantum dots, carbon nanotubes, ...)**

ISO/TC 24/SC4 Particle characterization

**Harmonisation of particle
sizing across size scales
(nano to macro)**

**Basic particle sizing
instrument standards**

- **Dispersion stability**
- **Characterization of particles, including nanoparticles**
- **Reference materials**



Outcome of EC-FP 7 Project Nanolyse



Development of analytical methods

Ag nanoparticles in chicken paste



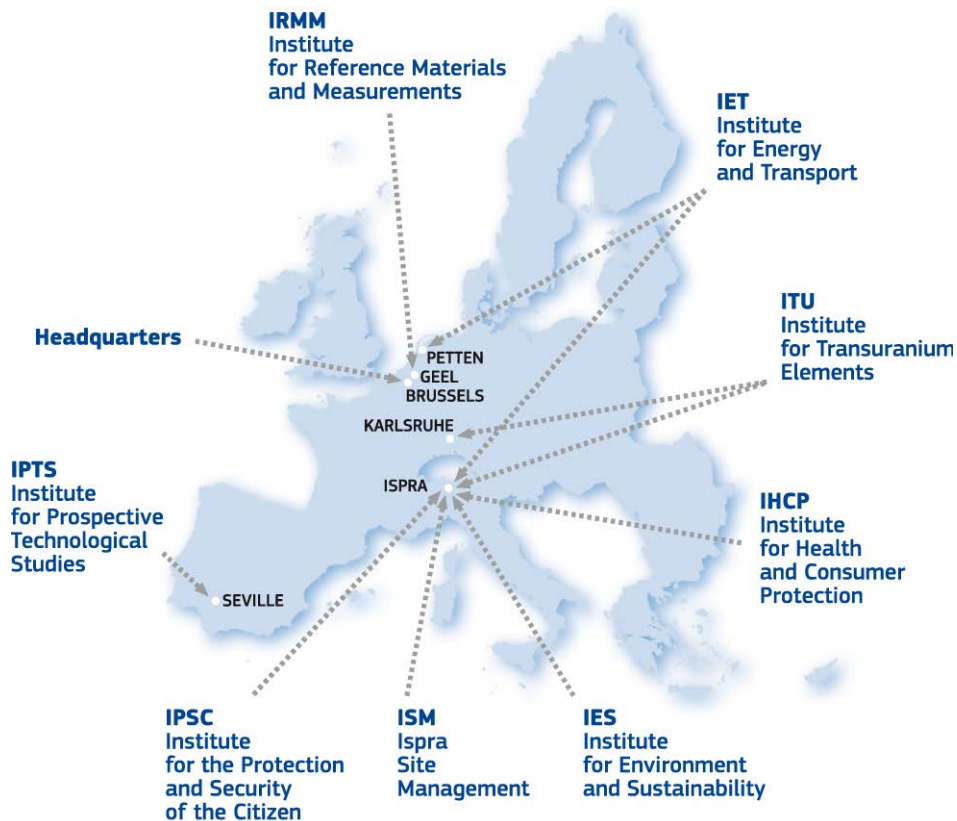
SiO₂ nanoparticles in tomato soup



Cross-linked gelatine nanoparticles in beverage



The Joint Research Centre (JRC) and Nanotechnology/Nanomaterials



- European Commission's in-house science service
- Supporting EU policies with independent, evidence-based scientific and technical support
- ~ 3.000 staff (2015)
- 6 locations

The JRC and Nanotechnology/Nanomaterials

Analysis of nanomaterials in consumer products

- Developing methods for detection and quantification
- Validating fit-for-the-purpose analytical methods
- Developing and providing certified reference materials

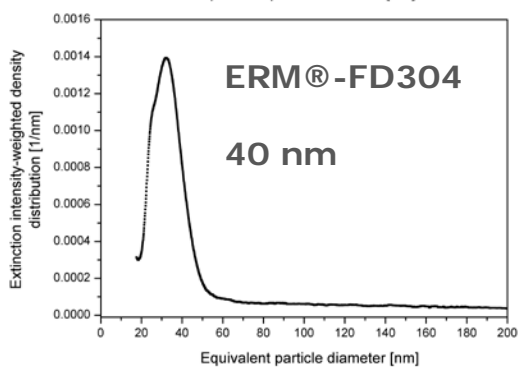
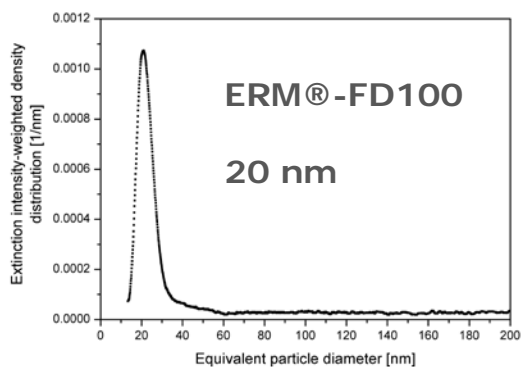


Safety assessment of nanomaterials

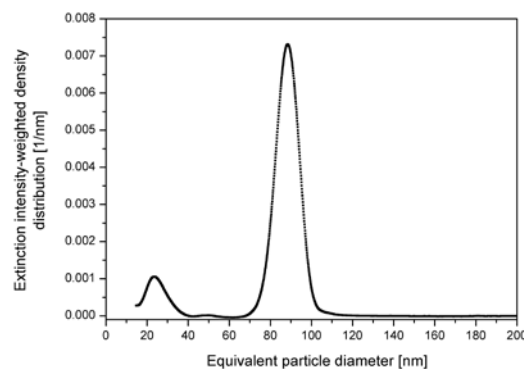
- Developing standardised protocols for toxicity testing
- Establishing testing strategies and risk assessment methodologies
- Hosting a repository of representative nanomaterials for testing and the NANOhub database

Certified Reference Materials (CRMs)

Silica nanoparticles with monomodal particle size distributions



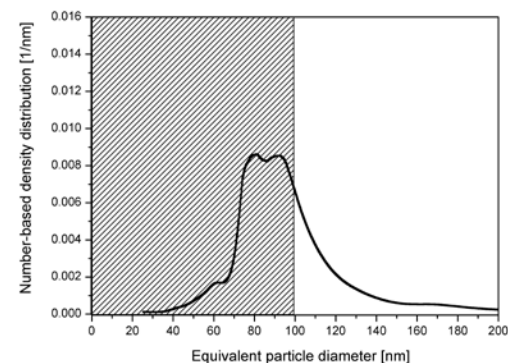
Silica nanoparticles with bimodal particle size distribution



ERM®-FD102

**Nominal particle size
20 nm and 80 nm**

Nanoparticles with polydisperse size distribution



Representative for most industrial materials

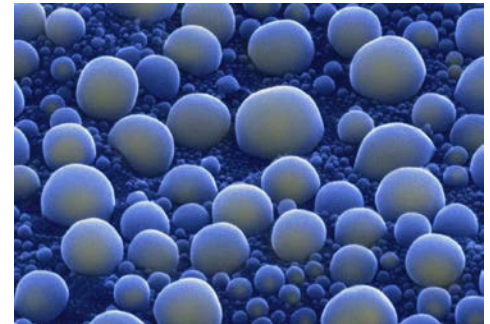
FUTURE

Increasing complexity



Summary

- **Need for reliable measurements**
- **Need for quality assurance tools such as**
 - Certified Reference Materials (CRMs)
 - Fit-for-purpose validated analytical methods
 - Proficiency Tests
 - Documentary standards, guidance on measurements
- **Need for increased collaboration of measurement communities**
- **Need for scientific advice to policy makers**



Quality Assurance and cooperation are important

- to ensure reliable data and therefore
 - to ensure consumer's confidence
 - to facilitate trade
- to have confidence in measurements avoiding disputes between Member States and other countries
- to have confidence in risk (hazard) assessment results
- to reduce costs providing efficiency and preventing duplication of measurements





European
Commission



**Thank you
for
your attention!**

Colloidal silica ERM®-FD102