

Reference materials for standardisation and metrological anchoring of measurements for nanotechnologies –



Existing ISO Guides and work program of ISO REMCO

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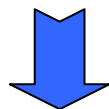
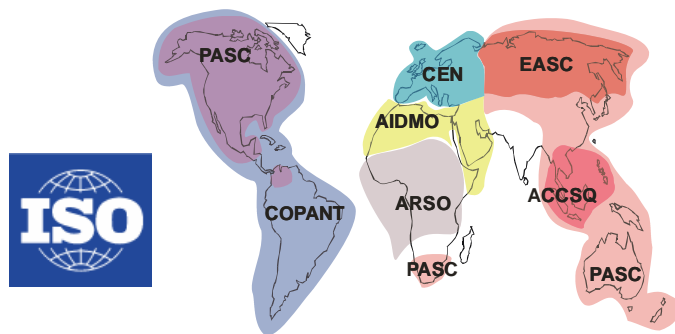
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www.iso.org/remco

Approach 1: **Standardisation**

“harmonized methods”



**prescribed
methods/procedures**

sampling,
method-defined parameters

Legislation



Comité international des poids et mesures

Bureau
international
des poids
et mesures

Organisation
intergouvernementale
de la Convention
du Mètre



**prescribed
method-performance
characteristics**

“SI-traceable” parameters

“ultimate” analysis

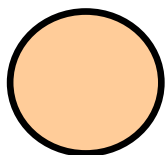
- metrol. traceability
- measurement uncertainty

concepts & quality assurance ?

Problem-related: identity/structure/amount ?
(functional) properties ?

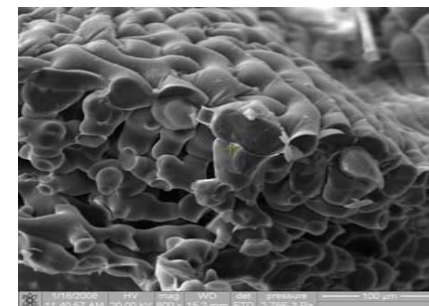
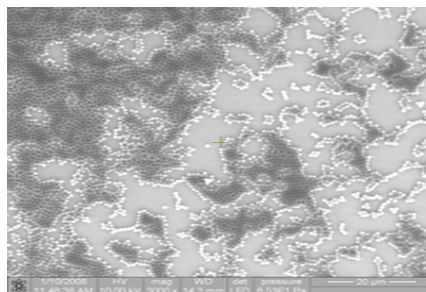
morphology
“trivial” for:
‘symmetric’
objects

sphere



cylinder

relevant parameters
for engineered nanoparticles
(in a matrix) / nanostructures ?

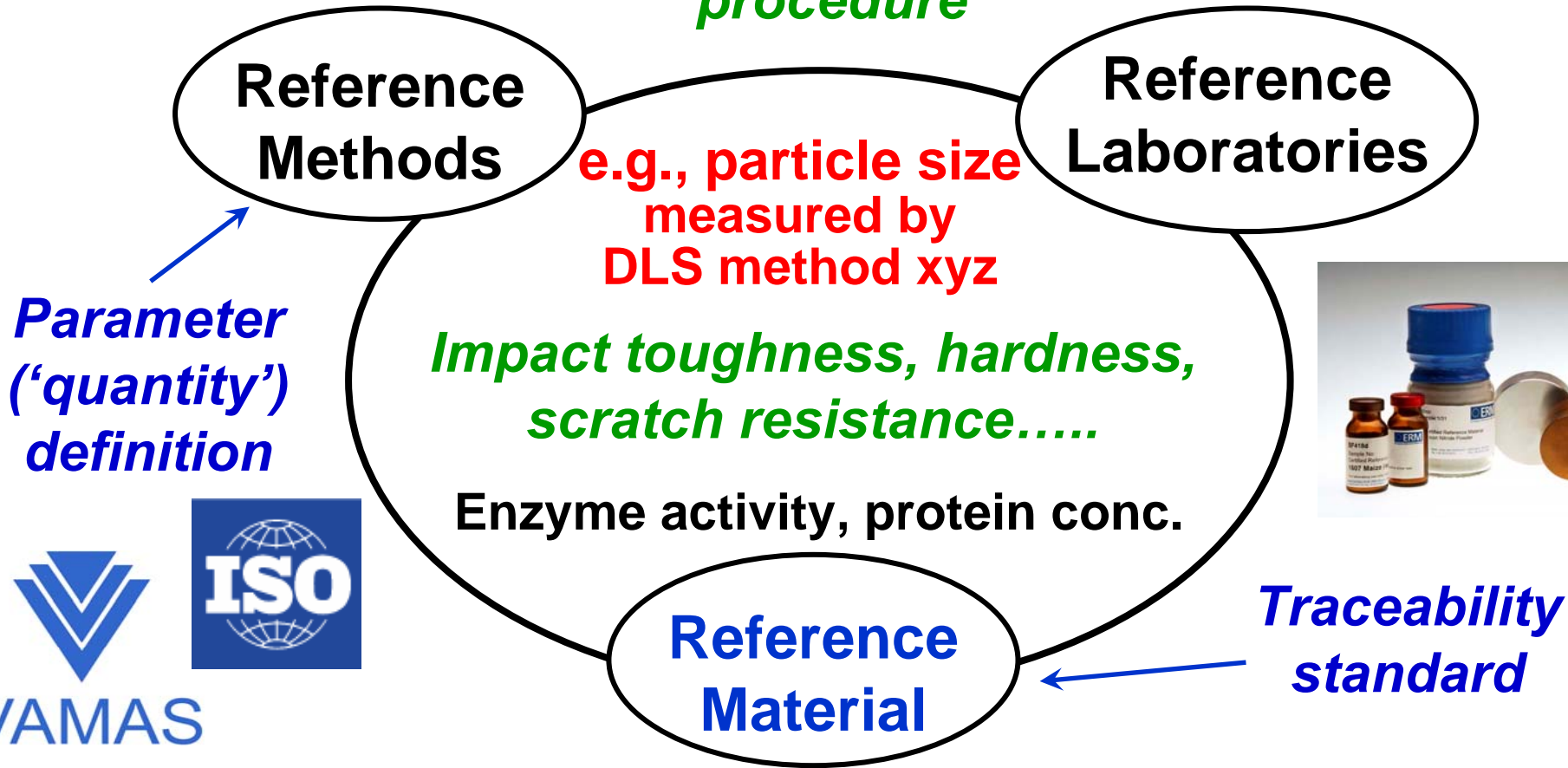


- ▶ *Morphology ? How to describe?*
- ▶ *Localized (surface) reactivity ?*
- ▶ *“Toxicity” ? which ?*

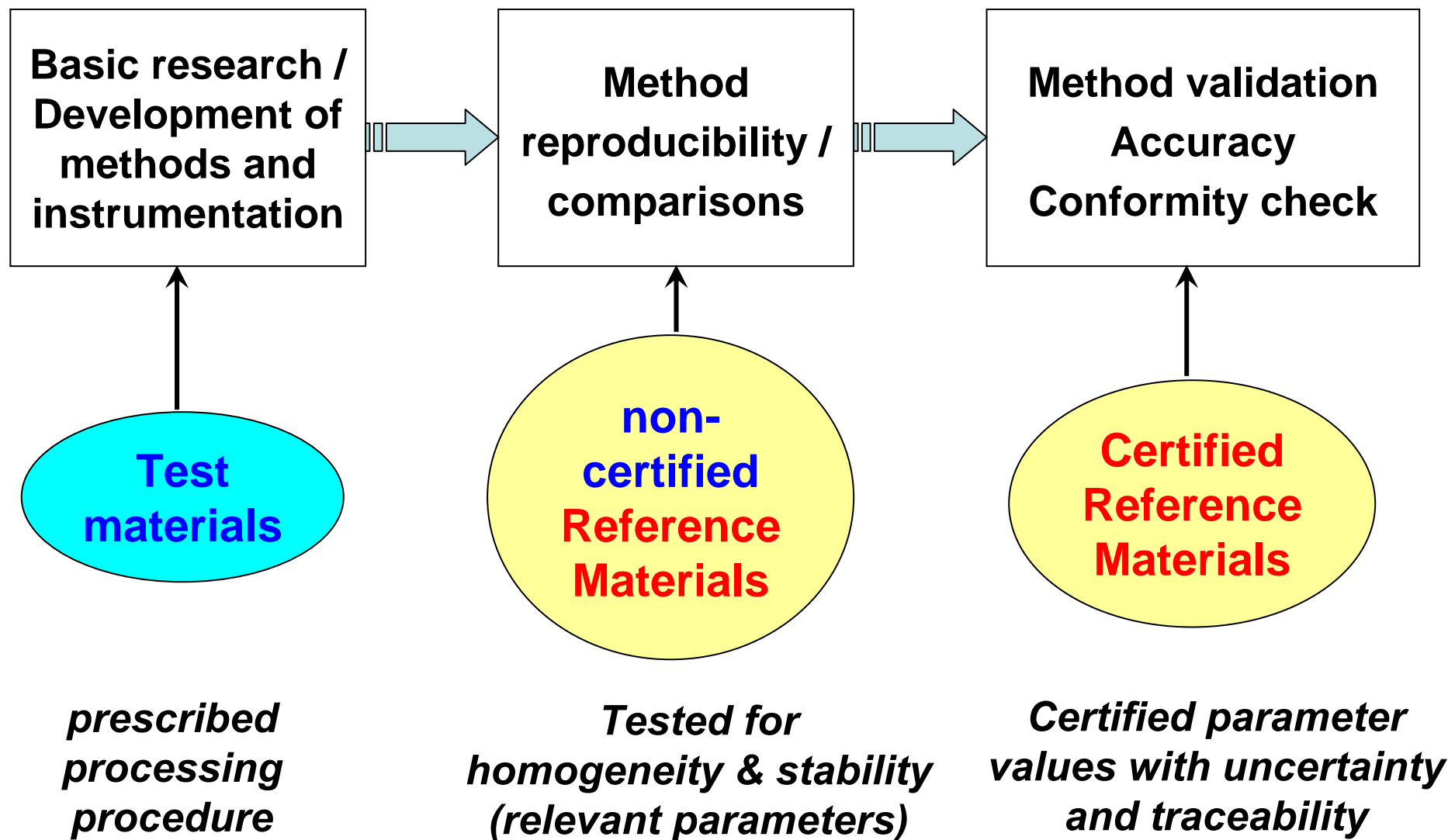
Challenge & prerequisite for RM development:

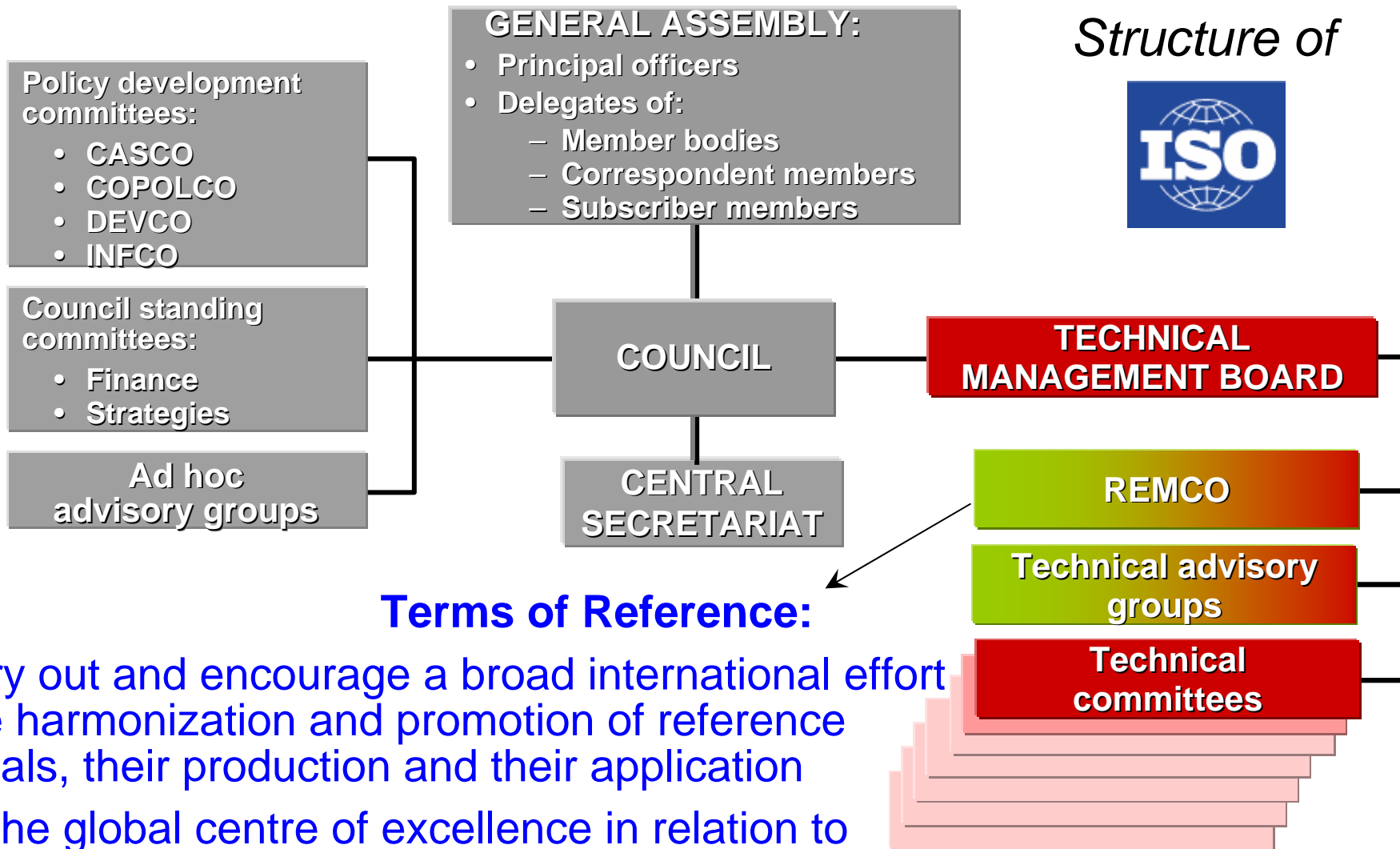
➔ Definition of measurand & its unit

“temporary” solution: *measurands defined by the measurement procedure*



Reference Measurement System





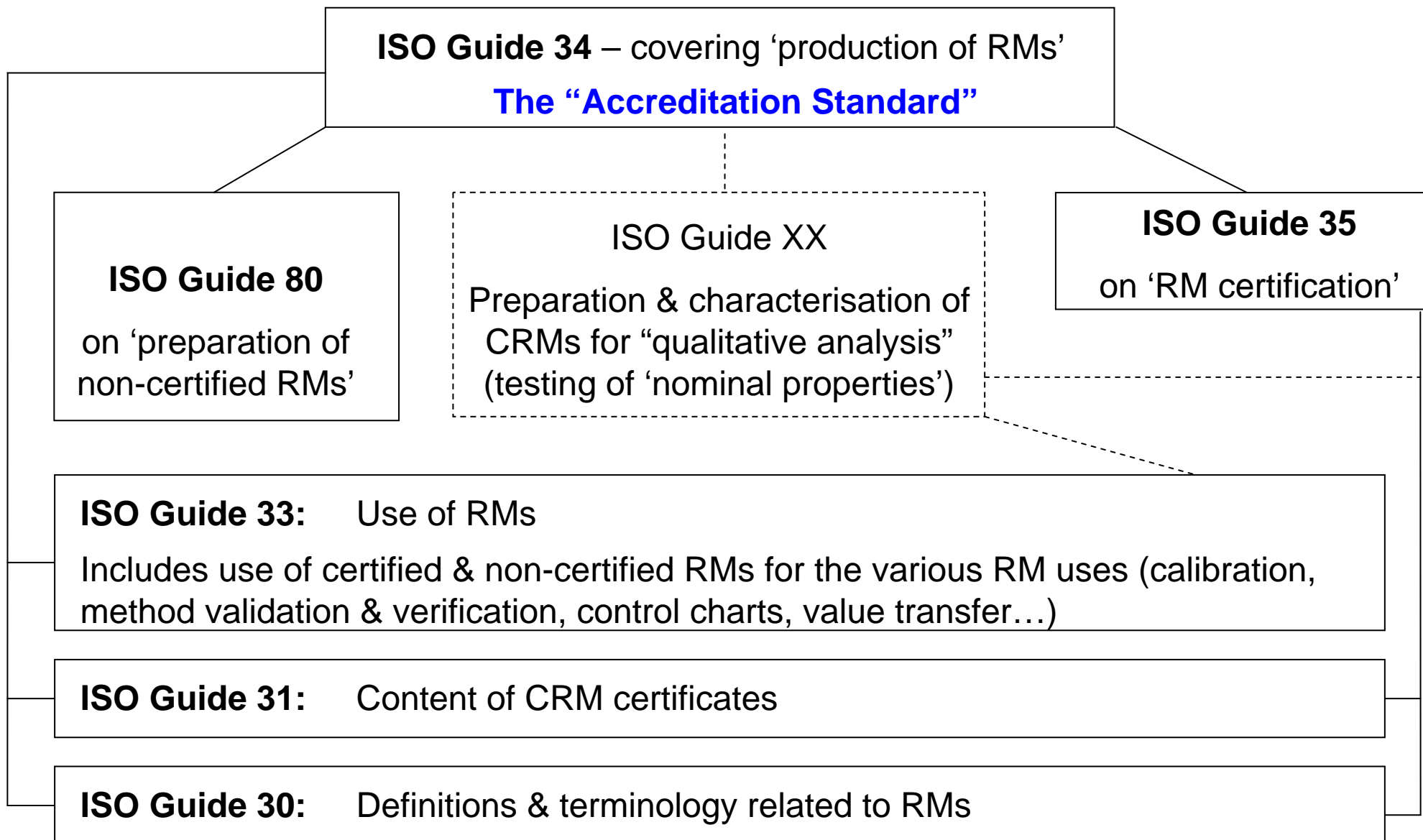
ISO REMCO = 31 P-members; 38 O-members; 21 liaisons

Stakeholders:

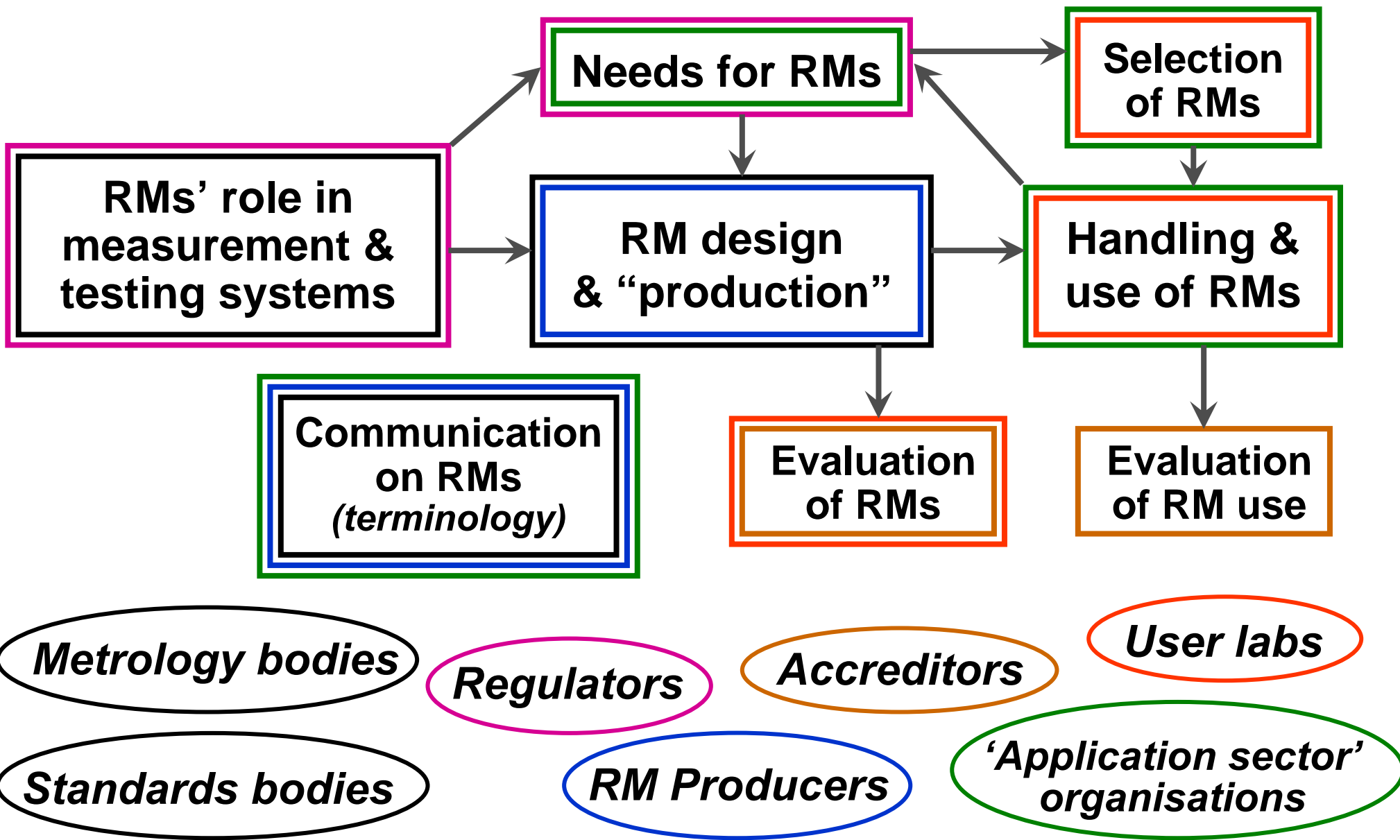
- ❖ **Standardisation bodies**
- ❖ **Metrology institutions**
- ❖ **International and regional liaison partners**

Clients:

- **ISO committees (*horizontal advisory function*)**
- **Users of reference materials (*e.g., analytical laboratories*)**
- **Producers of reference materials**
- **Accreditation bodies (*in particular for RM producers*)**



- ISO Guide 30: Terms and definitions used in connection with reference materials **(under revision)**
- ISO Guide 33: Uses of reference materials **(under revision)**
- ISO Guide 34: General requirements for the competence of reference material producers **(editing ongoing)**
- ISO Guide 79: “Guide to the Guides” (in drafting stage)*
- ISO Guide 80: Non-certified reference materials **(new)**
- ISO Guide xy: Reference materials for qualitative testing / nominal properties (at conceptual stage)*



Material, sufficiently homogeneous and stable with respect to one or more specified properties, which has been established to be fit for its intended use in a measurement process.

Notes: 1) RM is a generic term.

2) Properties can be quantitative or qualitative, e.g. identity of substances or species.

3) Uses may include the calibration of a measurement system, assessment of a measurement procedure, assigning values to other materials, and quality control.

4) An RM can only be used for a single purpose in a given measurement.

ISO Guide 35 (2006)

Reference material characterized by a metrologically valid procedure for one or more specified properties, accompanied by a certificate that provides the value of the specified property, its associated uncertainty, and a statement of metrological traceability.

- Notes:
- 1) The concept of values includes qualitative attributes such as identity or sequence. Uncertainties for such attributes may be expressed as probabilities.
 - 2) Metrologically valid procedures for the production and certification of reference materials are given in, among others, ISO Guides 34 and 35.
 - 3) ISO Guide 31 gives guidance on the contents of certificates.

ISO Guide 35 (2006)

Method development

Method validation

- evaluation of trueness**
- uncertainty estimation**

Calibration

Proof of method performance

- lab-internal quality control ('charting')**
- operator or equipment qualification**

Proficiency testing

- training and verification of competence
(external benchmarking)**