

# **ISO TC229/ Nanotechnology**

## ***- Current activities and Future plans -***

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## Scope

Standardization in the field of nanotechnologies that includes either or both of the following:

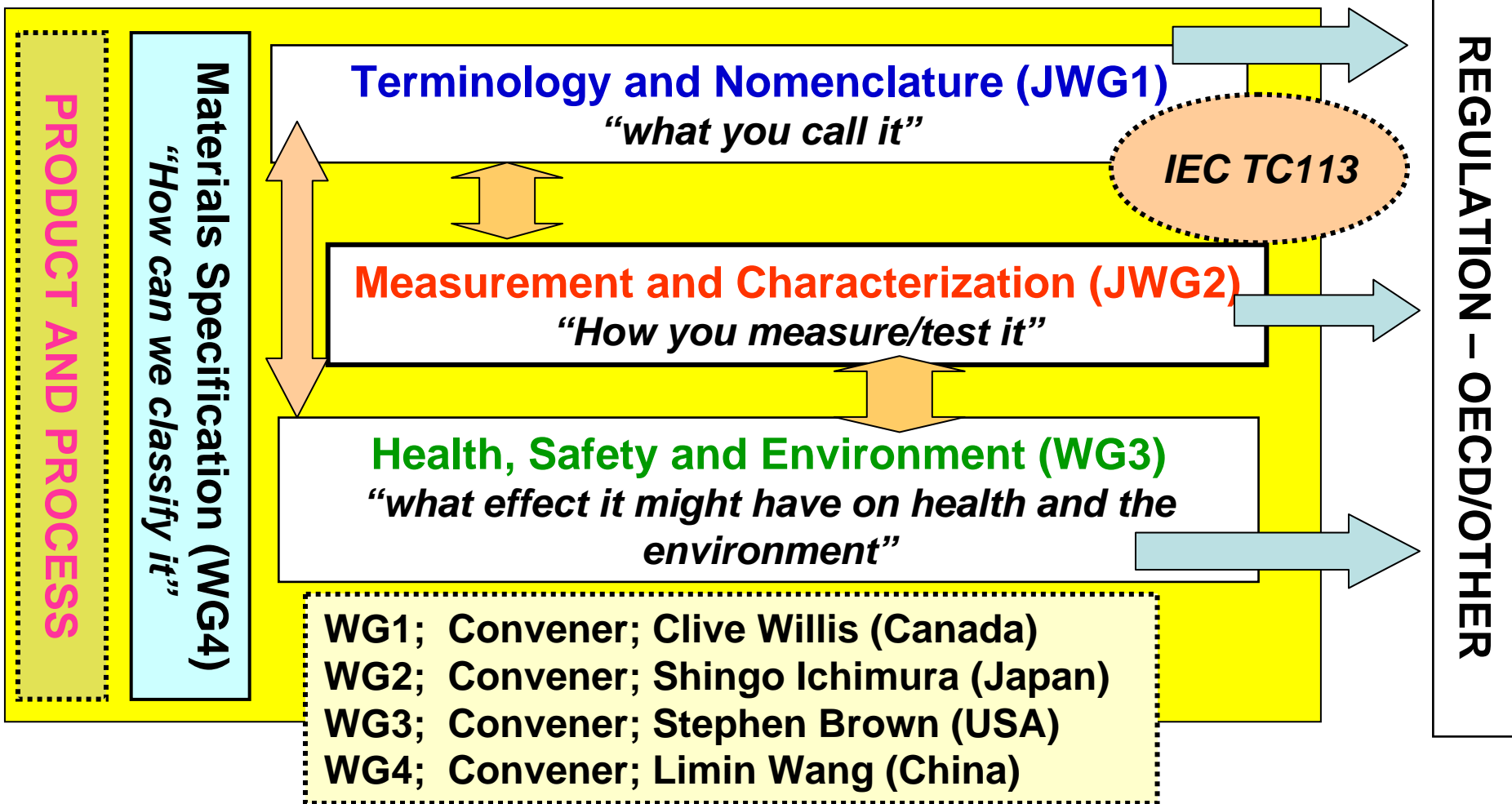
**1. Understanding and control of matter and processes** at the nanoscale, typically, but not exclusively, below 100 nanometers in one or more dimensions where the onset of size-dependent phenomena usually enables novel applications,

**2. Utilizing the properties of nanoscale materials** that differ from the properties of individual atoms, molecules, and bulk matter, to create improved materials, devices, and systems that exploit these new properties.

**Chairperson; Dr. P. Hatto (UK), Secretariat; BSI(UK)  
30 P-members, 9 O-members**

# Structure of the ISO TC229

Specific tasks include developing standards for: **terminology and nomenclature**; **metrology and instrumentation**, including specifications for reference materials; test methodologies; modeling and simulation; and **science-based health, safety, and environmental practices**.



2005

2010

2015

## Carbon Nano-Materials

**Basic Character set**  
 Purity Geometrical property  
 Morphology Dispersability Tube type

**Advanced Character set**  
 Electrical, Magnetic, Mechanical , Optical properties

## Engineered nanoparticles

**Basic Character set**  
 Purity Composition, Geometrical property, Sampling method.

**Advanced Character set**  
 Elemental structure, Chemical functionality,  
 Electrical, Magnetic, Mechanical , Optical properties

## Coatings/ Nanostructured materials

**Basic Character set**  
 Geometrical property, Composition, Density

**Advanced Character set**  
 Electrical, Magnetic, Mechanical , Optical properties

## Basic Metrology

Length, Depth, Force, Traceability, Definition of Measureand, Uncertainty

Interoperability

# JWG2: Approved Projects

6 projects (TS) for the use of the following methods in the characterization of Single Walled Carbon Nanotubes (SWCNTs)

- ① Scanning Electron Microscopy (**SEM**) and Energy Dispersive X-ray Analysis (**EDXA**)
- ② Transmission Electron Microscopy (**TEM**)
- ③ Ultraviolet-Visible-Near Infrared (**UV-Vis-NIR**) absorption
- ④ Near Infrared-Photoluminescence/ Fluorescence (**NIR-PL/Fluorescence**) absorption
- ⑤ Evolved Gas Analysis-Gas Chromatograph Mass Spectrometry (**EGA-GCMS**)
- ⑥ **Raman** Spectroscopy

1 project (TS) for the use of Thermo Gravimetric Analysis (**TGA**) in the purity evaluation of **SWCNTs**.

*All projects are now at WD stage.*

# JWG2: Approved Projects (continued)

**2 projects (TS) for Multi-walled Carbon Nanotubes (MWCNTs).**

- ① **Measurement methods** for the Characterization
- ② **Determination of mesoscopic shape factors**

**1 project (ISO) for “General Framework for Determining Nanoparticle Content in Nanomaterials by Generation of Aerosols”**

*All projects are now at WD stage.*

## *Current stage*

Part A-Initial Screening Step

*Morphology, Purity, Length and Diameter, Tube type, Dispersability/ Solubility,*

**SEM/EDX, TEM, Raman, UV-Vis-NIR absorption, TGA(EGA-GCMS)**

## *Further development*

Part B-More Detailed Analysis

**Fluorescence spectroscopy, Surface area measurement, XPS, AFM, FTIR, Micro ICP**

Part C-Additional Analysis

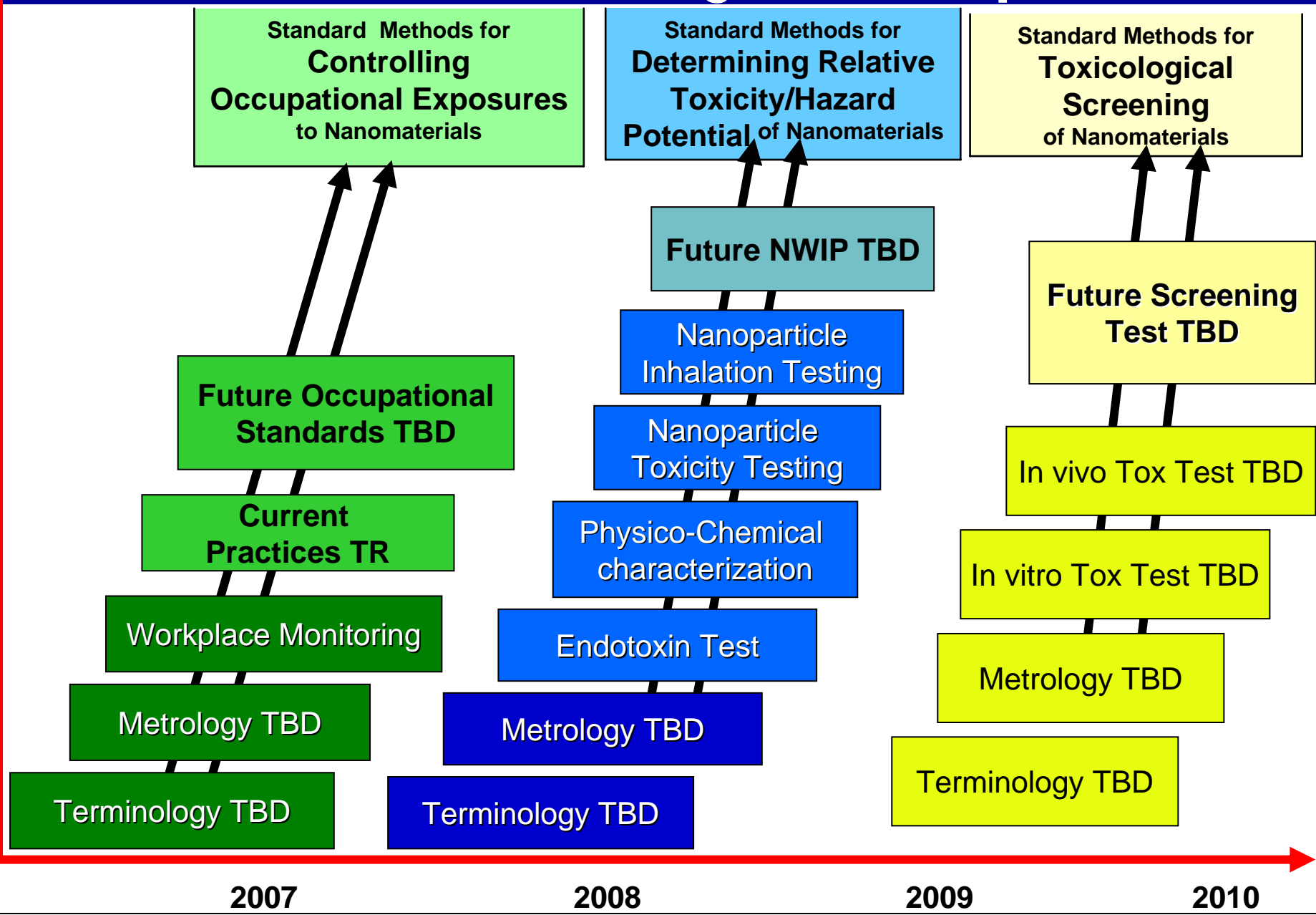
**STM, XRD, XRF, EXAFS, E-beam diffraction, Light, X-ray, and Neutron scattering**



- **Project 1**: Terminology- **Nanoparticles**, now at the DTS (Draft Technical Specification) stage and TC level ballot has begun, closing Feb.28, 2008.
- **Project 2**: Terminology **Framework and Core Terms**, will provide a common high level framework for terminology. Proposed core terms have been categorized. Five concept-specific diagrams have been developed, from which a core term list will be derived. Development of definitions to the core terms is subject to a New Work Item Proposal.
- **Project 3** :Terminology – **Carbon nanomaterials**, has had its start-up meeting.
- **Project 4** :Outline of **Nanomaterials Classification (Nano tree)**, has had its start-up meeting.

# WG3 : Strategic Roadmap

Sequence



2007

2008

2009

2010

**WG3**

**Project 1: (TR) “Health and safety **practices in occupational settings** relevant to Nanotechnologies”**

- Forwarding the final draft to ISO/TC 229 for approval.

**Projects 2: (ISO) “**Endotoxin test** on nanomaterial samples for in vitro systems”.**

- Intended to submit CD by February, 2008.

**Project 3 & 4: (ISO) “**Generation of nanoparticles for inhalation toxicity testing**”, and “**Characterization of nanoparticles** for exposure chambers for inhalation toxicity testing”**

- Intend to submit CD by April 2008

**WG4**

**2 projects (ISO) for the “**Nano-titanium dioxide**” and “**Nano-calcium carbonate**”**

*Discussion will start from the next TC229 meeting in Bordeaux/France (May, 2008).*

# TC229; Future Plans

JWG1; Terminology	JWG2; Measurement & Characterization	WG3; Environmental Health and Safety
<p><i>Nanoscale measurement applications</i></p> <p><i>Bio-nano interface applications</i></p> <p><i>Nanofabrication applications</i></p> <p><i>Medical, health, and personal care applications</i></p> <p><i>Nanomaterials applications</i></p>	<p><i>Carbon Nanotubes and related structures</i></p> <p><i>Engineered nanoparticles</i></p> <p><i>Coatings</i></p> <p><i>Nanostructured materials (composite and porous structures)</i></p> <p><i>Basic metrology at the nanoscale</i></p> <p><i>Guidance for the characterization, specification and production of reference materials</i></p> <p>➤ <i>Giving high priority to supporting WG3</i></p> <p>➤ <i>Developing underpinning M &amp; C standards for industrial products.</i></p>	<p><i>Controlling Occupational Exposures to Nanomaterials</i></p> <ul style="list-style-type: none"> <li>✓ Current Practices TR</li> <li>✓ Future Occupational Standards</li> </ul> <p><i>Determining Relative Toxicity/Hazard Potential of Nanomaterials</i></p> <ul style="list-style-type: none"> <li>✓ Physico-Chemical Characterization</li> <li>✓ Nanoparticle Toxicity Testing</li> <li>✓ Nanoparticle Inhalation Testing</li> </ul> <p><i>Toxicological Screening of Nanomaterials</i></p> <ul style="list-style-type: none"> <li>✓ In vitro Tox Test</li> <li>✓ In vivo Tox Test</li> <li>✓ Future Screening Test</li> </ul> <p><i>Environmental Protection Product Safety</i></p> <p><i>Life Cycle Assessment of nanomaterials</i></p>