Expectations of ISO from International Workshop on Documentary Standards for Measurement and Characterization for Nanotechnologies

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USA

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IonBond

Why is nanotechnology important?

US Interagency Working Group on Nano Science, Engineering and Technology (IWGN) workshop on Nanotechnology Research Directions (Sept. '99):
"***nanotechnology will*** *be a strategic branch of science and engineering for the 21st century, one that will* ***fundamentally restructure*** *the technologies currently used for* ***manufacturing, medicine, defence, energy production, environmental management, transportation, communication, computation and education****."*

US NSF report on "SOCIETAL IMPLICATIONS OF NANOSCIENCE AND NANOTECHNOLOGY" March 2001:
"the impact of nanotechnology in the 21st century is likely to be at least as significant for health, wealth and security as the combined influences of antibiotics, integrated circuits and polymers."

Projected world-wide market for n-t enabled products will be from $500 billion to <$3 trillion by 2015

"It is estimated that Nanotechnology is presently at a level of development similar to that of computer/information technology in the 1950s" **(Nanostructure Science and Technology: A Worldwide Study, WTEC Panel report, 1999)**

The challenges

The Interagency Working Group on Nanotechnology workshop in 1999 concluded:

"while recognizing nanotechnology's potential to spawn an industrial revolution in coming decades, the consensus was that the challenges ahead in basic discovery, invention and eventual manufacturing are formidable. New methods of investigation at the nanoscale, novel scientific theories, and different fabrication paradigms are critical."


National Science and Technology Council
Committee on Technology
Interagency Working Group on Nanoscience, Engineering and Technology (IWGN)

Nanotechnology Research Directions:
IWGN Workshop Report

Vision for Nanotechnology R&D in the Next Decade

SEPTEMBER 1999

"Nanotechnology will only become a coherent field of endeavour through the confluence of three important technological streams:

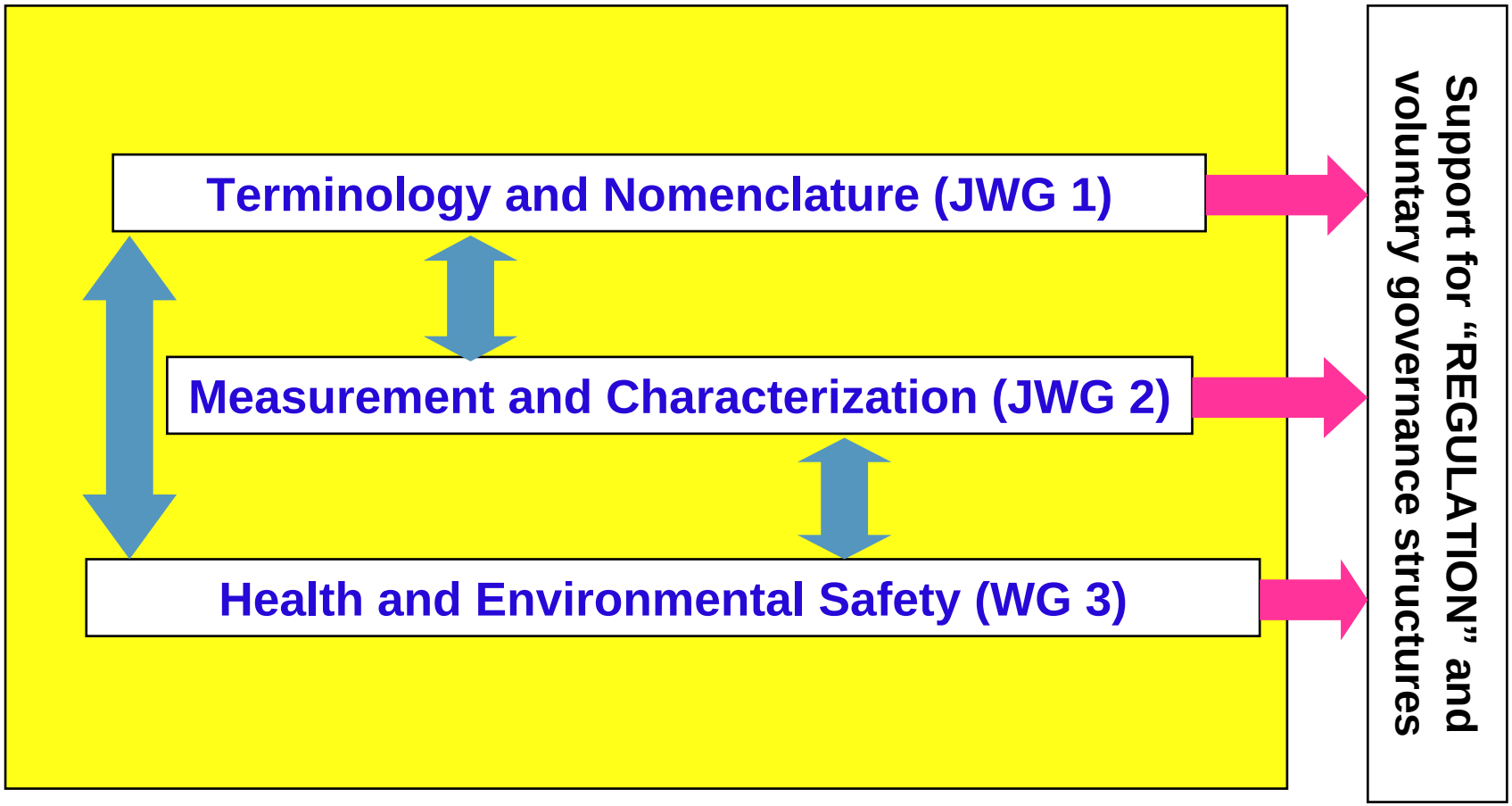
- ***New and improved control of the size and manipulation of nanoscale building blocks;***
- ***New and improved characterization (spatial resolution, chemical sensitivity, etc) of materials at the nanoscale;***
- ***New and improved understanding of the relationship between nanostructure and properties and how these can be engineered"***

- ***And don't forget safety and consumer acceptance!!***

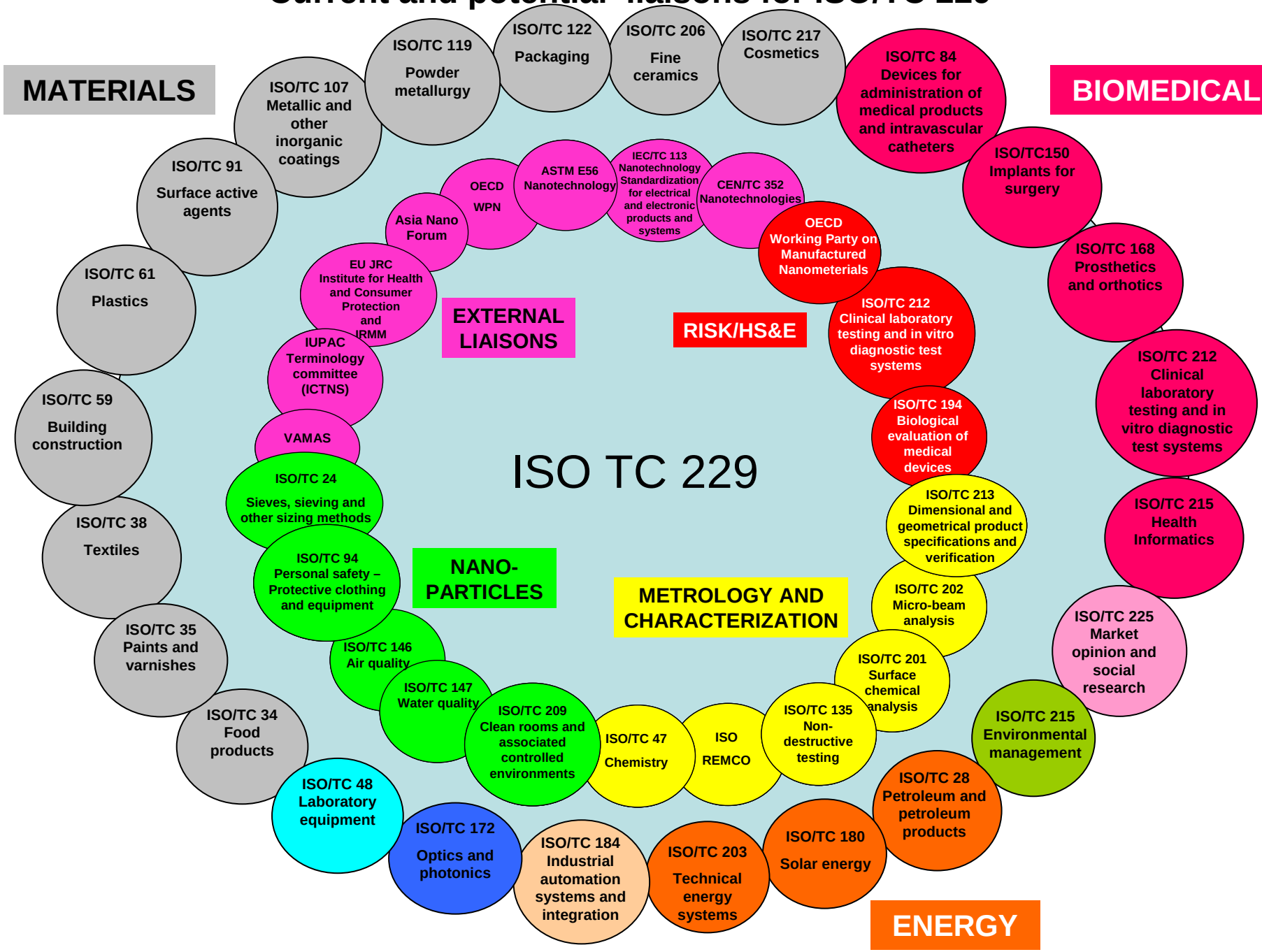
Major issues for standardization for nanotechnologies

- ***Diversity of disciplines impacted by and contributing to nanotechnologies***
- ***Global impact***
- ***Speed of development and apparent speed of commercialisation***
- ***Critical areas:***
  - ***Coordination and harmonization across stakeholders***
  - ***Terminology***
  - ***Measurement and characterization***
  - ***Health and environmental safety – cooperation with OECD WPMN***

Nanotechnologies standardization - generic areas



Current and potential liaisons for ISO/TC 229



Phys-chem characterization of nanomaterials prior to tox testing – critical parameters

- agglomeration/ aggregation
- catalytic properties
- composition
- concentration
- crystalline phase
- dustiness
- fat solubility/ oleophilicity
- grain size
- hydrodynamic size/particle size measurement/ distribution
- length
- purity
- shape
- specific surface area
- surface charge
- surface chemistry
- water solubility/hydrophilicity
- Zeta potential

Expectations

- **Identify existing standards for nanoscale measurement and characterization and their limitations**
- **Identify existing work programmes in the area, needs for harmonization, and opportunities for collaboration**
- **Identify, *and prioritize,* existing and future needs for documentary standards and supporting pre- and co-normative research and who might be responsible for satisfying these needs**
- **Identify supporting “infrastructural” requirements, particularly for new instrumentation and CRMs.**