VAMAS and Nanotechnology

Steve Freiman

VAMAS Secretary

National Standards Panel

December 5, 2013

What is VAMAS?

- Formed as one of 18 cooperative projects at the1982 Economic Summit of the GATT 7 to stimulate trade in new technologies
- Supports trade in products using advanced materials through pre-standards research
- 16 Current Members: Australia, Brazil, Canada, China, Chinese Taipei, France, Germany, India, Italy, Japan, Korea, Mexico, South Africa, UK, USA, and the EC
- Researchers from VAMAS and non-VAMAS countries

MOUs with Other Organizations

- ISO – 1993 (Being updated)
- IEC – 1995
- IEA – 2002
- CIPM - 2008
- WMRIF - 2008

VAMAS Outputs

- **National, regional, and international standards**
- **Reference materials**
- **Technical/scientific publications**

Current VAMAS Technical Working Areas

- Surface Chemical Analysis
- Polymer Composites
- Nanomechanics Applied to SPM
- Modulus Measurements
- Creep, Crack Growth, and Fatigue in Weldments
- Nanoparticle Populations
- Materials Databases Interoperability
- Organic Electronics
- Superconducting Materials
- Mechanical Measurements of Thin Films and Coatings
- Performance Properties for Electroceramics
- Spectrometry of Synthetic Polymers
- Polymer Nanocomposites
- Quantitative Microscopic Analysis

Nanotechnology TWAs

- **TWA 29: Nanomechanics Applied to SPM: Richard Gates, NIST**
  - **Goal is the development of reference calibration spring constants**

- **TWA 33: Polymer Nanocomposites: Andreas Schonhals, BAM**
  - **Three active projects:**
    - **Determination of shape and size of filler particles**
    - **Electrical characterization of polymer nanocomposites**
    - **Mechanical testing of polymer nanocomposites**

Nanotechnology TWAs

- **TWA 34: Nanoparticle Populations: Jeffrey Fagan, NIST**
  - **Six Active Projects:**
    - **Single-wall carbon nanotube chiral vector determination**
    - **Techniques for characterizing morphology of airborne nanoparticles**
    - **Raman spectroscopy of fullerene nanofibers**
    - **Method for determination of aspect ratio of gold nanorods**
    - **Particle size distribution measurements using TEM**
    - **Uniform system for describing materials on the nanoscale**

CODATA-VAMAS Working Group

A Uniform Description System (UDS) for Materials on the Nanoscale

Steve Freiman

John Rumble

Clayton Teague

Goals of the UDS Project

- Develop a systematic approach to describing nanomaterials
  - Uniqueness; system has the ability to differentiate one material from every other
  - Equivalency; system can establish that two materials are the same such that data sets from each material can be combined
- Define a complete set of descriptors and put them into information categories that can be used by all nanomaterial communities
- Identify areas in which insight and work is needed to understand relevant descriptors
- Engage the broad nano-community in the effort

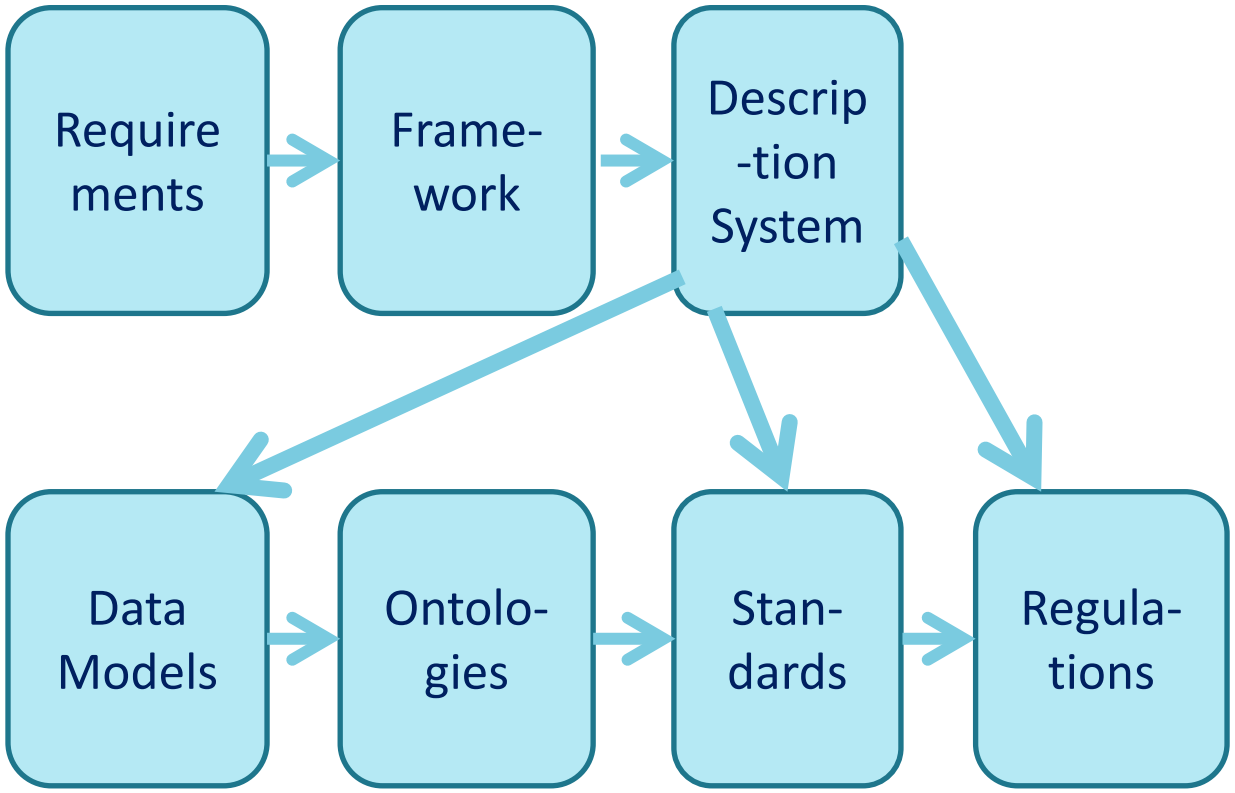
Some Key Definitions

- **Descriptor – an item of information about an object (here a nanomaterial) that is measured, calculated, or assigned**

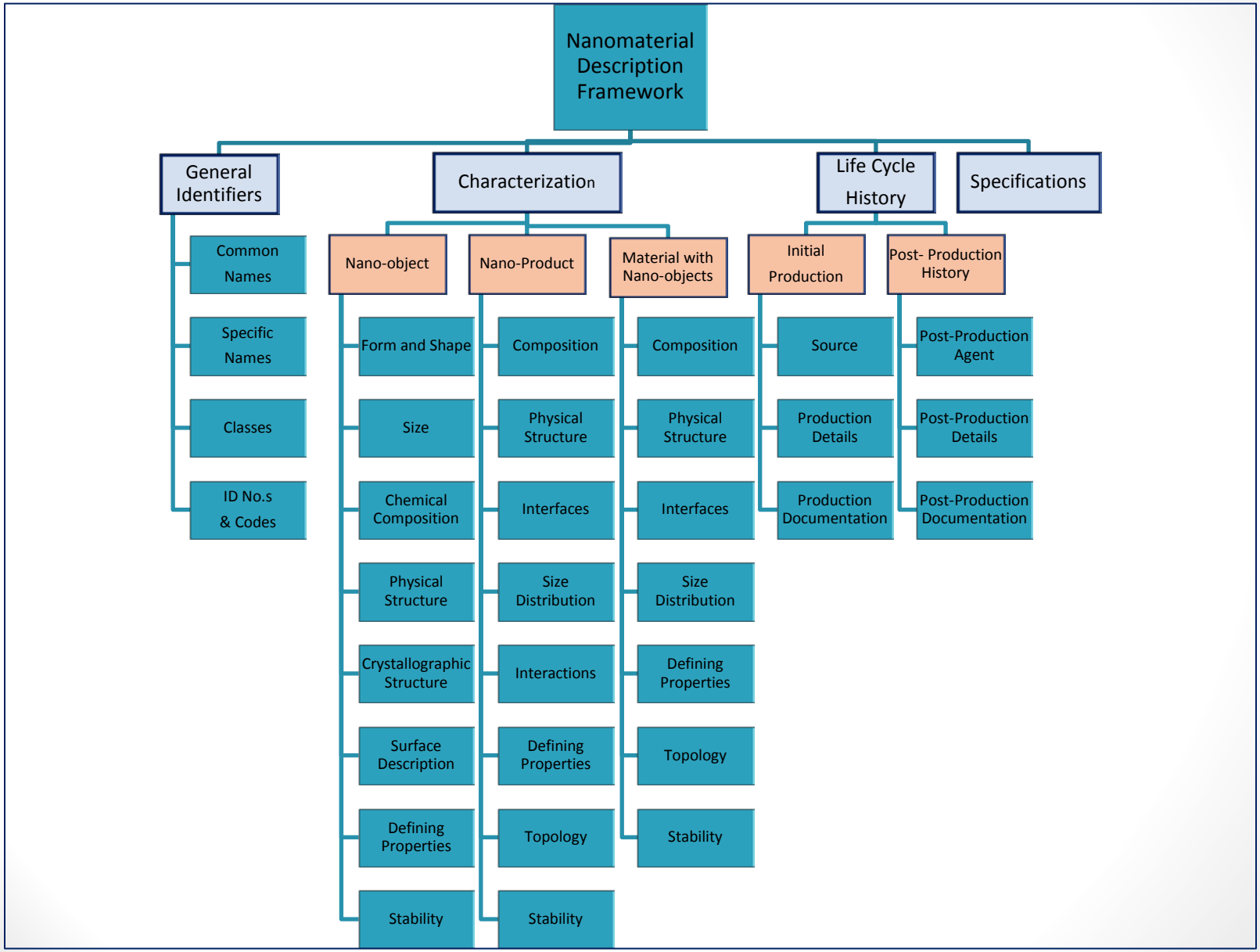
- **Information category – a group of descriptors that explain one aspect of a nanomaterial.**

- **An information category can be divided into one or more layers of subcategories for clarity or convenience in describing complex information**

Path to and from the Description System



DRAFT FRAMEWORK



VAMAS and Standards Committees

- **Formal liaison with ISO TC 229: Jan Herrmann**
- **Continuing discussions with ASTM E56: Presentation on 10-30-13 on VAMAS nanotechnology activities**
- **Plans for more extensive relationships with IEC 113**

Summary

- **This Framework is only the starting point for our discussions.**

- **An international workshop is being organized in Dublin, Ireland, late June, 2014. This workshop should lead to further refinements of the framework.**