Nanotechnology Standards – The New Frontier

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Standards for new technologies

- Are a real boon to encouraging developing markets e.g. ieee 802.11 b,g,h,n…

But…

- Can encourage commoditization where IP, brand, features and attributes aren't important
  - Wireless router vs cell phone
  - Resistance from those who fear commoditization
- Can lag technology development
  - International cycle up to 6 years
  - Can be perceived as a non-tariff barrier e.g new wi-fi standards discussed in China 2005
- Only have value where value is perceived by users

Standards organizations

- In most countries there are national groups like BSI
- There are international groups such as ISO and IEC and CEN who try to reach consensus often on a standard derived from one country's efforts
- But in the USA there are different types of organization
  - Not for profit patent organizations e.g. IPC use volunteers to develop patents often fed by consortia like iNEMI and sell patents at minimal cost
  - For profit organizations invest in developing patents and derive income from their sale e.g. Telcordia, ASTM, UL….
  - This can create some interesting discussionst

New technology concerns

- "Patents aren't appropriate to a rapidly evolving technology"
  - Counter – develop common areas that affect everyone e.g. optical connector cleanliness or model patents e.g. standards on single wall carbon nanotubes
- "We can't get companies together because of IP issues"
  - Counter – iNEMI medical component reliability group
- "We can't get international consensus"
  - Counter – carve the market e.g. optoelectronics
    - USA – datacom
    - Europe – autocom
    - Japan – consumer games etc.
- "There's nothing out there"
  - Counter – spread your net wide e.g. NASA had some great internal standards on optoelectronics and there were terrific (untranslated) standards in Japan

The standards challenge

- How do I make sure you are selling what I'm buying?
  - Nomenclature
  - Packages v modules v SIP
  - Tests e.g. MSL vary depending on what they are called!
- How do I know the tests you use in your industry are relevant to mine
  - JISSO concept semiconductor vs package vs assembly
  - Test method standardization
- How do I know these products are safe to use and won't leave me with an environmental legacy
  - RoHS, WEEE, REACH, TSCA….

The nanotechnology challenge

- All of the above issues plus
  - Nanotechnologies are a range of tools that can be applied to a whole range of industries
    - From foodstuffs to medicines to textiles to semiconductors
  - They may be transient - used in production of an item that itself is not nano
    - Cosmetics vs fuel cell
  - Many are customized for a particular application
    - Carbon nanotubes are becoming a commodity – but don't work without functionalizing. Functionalized nanotubes won't necessarily become commoditized until patents run out.

What we can standardize

- Nomenclature
- Metrology (a big issue in nano)
- HS&E procedures

But not

- Product performance (covered by existing standards except for completely new applications)

- This is the approach followed by ISO TC229, Nanotechnologies

ISO TC 229, "Nanotechnologies"

- Nomenclature
  - Headed up by Canada
  - Input from ASTM, BSI
- Metrology
  - Headed up by Japan
- HS&E
  - Headed up by USA
  - Working with the NIOSH roadmap
    - http://www.cdc.gov/niosh/topics/nanotech/pdfs/NIOSH_Nanotech_Strategic_Plan.pdf
  - Official liaison with ASTM, IEC and other bodies

The value of standards to NanoDynamics

- Nomenclature
  - Having a common language worldwide
- Metrology
  - SEM is a dreadful QA tool!
- HS&E
  - Appropriate guidelines from production to recycling