Converging and Emerging Technologies: Developing ISO and IEC Standards for Accelerating Global Technology Innovation

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Outline

- **Converging and Emerging Technologies**
- **Observations and Proposals**
- **Conclusion**
- **Questions?**
- **Main Message:**

  Because nanotechnology differs substantially from many of the other fields for which the ISO and IEC develop standards, the ISO and IEC may want to consider whether their present business models and decision making processes are optimal for this very fast moving, diverse, and globally well-funded field.

Converging and Emerging Technologies

Examples:

nanotechnology, nanoelectronics, molecular electronics, information technology, robotics, artificial intelligence, and advanced medical imaging (extracting quantitative health parameters from computer assisted interpretations of images)

Attributes:

Fast moving,
Potentially disruptive,
Meet diverse market and industry needs,
Many international players and stakeholders – but none is dominant and not localized to one region, and
Numerous disciplines contribute.

Converging and Emerging Technologies
(continued)

Challenges:

Involve relevant players and stakeholders in international standards – Global collaborations and cooperation will be key.

Establish decision making procedures.

Build consensus and priorities to accommodate limited resources.

Account for varying national and regional priorities.

Make best decisions when competition amongst standards developers to be "first out of the gate" or to "stake out their scope " exists.

Building ISO - IEC Consensus

Governing Assumptions

I. Build a consensus on which technologies and products to consider first.

II. Present resources are not adequate to address all of the standardization areas of interest to ISO and IEC in converging and emerging technologies.

III. Consider five stages in linear economic model for innovation: research, development, initial deployment, commercialization (large-scale, high volume manufacturing), and end use by the customers-consumers.

Decision Making for Nanotechnology Standards

Input averaging from many experts based on collective wisdom techniques has advantages for standards development in nanotechnology that involves many diverse disciplines.

A lesson from the semiconductor industry – production became resource limited and too expensive for each economy to support the entire infrastructure (e.g., lithography) so the international semiconductor industry now shares pre-competitive R&D resources.

Proposed Converging and Emerging Technology Product Inventory

We do not have adequate quantitative product data and trends as inputs for:

- **Setting priorities and allocating resources.**
- **Identifying standards and measurements appropriate for ISO and IEC.**

ISO and IEC undertake a joint inventory of products and systems based on converging and emerging technologies; perhaps starting with electrical, electronic, optical, and magnetic products and systems that contain nanoscale components or will likely contain them.

Proposed Converging and Emerging Technology Product Inventory
(continued)

Do the product inventory and validate the nanotechnology content of what is in the marketplace today, and then for
What is expected to be in the marketplace by 2012.

This inventory could:

- **Reinforce direction and scope of selected ISO and IEC TCs.**
- **Motivate and engage the technical community to pursue appropriate standardization activities; especially that portion of the technical community that is not presently contributing to ISO and IEC TC efforts.**

Proposed Global Summit on Nanotechnology Standards and Metrology

1) Establish an international forum on nanotechnology to gather information for priority setting from as many stakeholders as possible.

2) In addition to ISO and IEC, actively invite all stakeholders, i.e., members of organizations such as the ITRS, iNEMI, SEMI, SRC, MARCO, International SEMATECH, IEEE-SA (e.g., NESR and IEEE STD 1650), JEDEC JC-14, OECD, MRS, IEEE - (EDS, MTTS, and LEOS), APS, ECS, ACS, ANSI, ASTM, NEMA, etc. to participate.

Proposed Global Summit on Nanotechnology Standards and Metrology
(continued)

3) Do a "survey" on "who is doing what" and identify areas of overlap that would be appropriate for collaboration.

4) At some technical/scientific meetings, arrange town hall meetings/receptions to discuss the Summit results and to encourage participants to contribute to the global adventure in standards for nanotechnology.

Does the ANSI Nanotechnology Standards Panel have a potential role in organizing this proposed global summit?

Conclusion

A GRAND CHALLENGE

Coordination with all the global stakeholders - the overload of overlaps or Who is doing what?

Just in the area of nanotechnology, US TAGs for ISO and IEC co-exist with:
JEDEC JC-14 Quality and Reliability – before 2001
NEMA Nanotechnology Advisory Council - 2006
IEEE Standard Test Methods for Measurement of Electrical Properties of Carbon Nanotubes - 2005
ASTM Committee E56 on Nanotechnology – 2005
IEEE-SA (STD 1650 – 2005 and NESR – 2007)
ANSI NSP - 2005
And this list go on and on and on ……. .

Questions Suggested by Previous Observations

In view of U.S. nanoproliferation (CEN – 9 April 2007), the collective set of unique nanotechnology attributes raise questions such as:

Are ISO and IEC national based committees optimal for nanotechnology standards?

Are present business models suitable for keeping pace or would new business models be more appropriate?

Are the present US TAG to ISO and USNC TAG to IEC decision making processes the best for standards development in nanotechnology?

Should the ISO and IEC increase their use of collective wisdom techniques (e.g., Delphi Method and Nominal Group Process) to make decisions and select which standards to develop?