

Session: NSF Networking and Business Panel. *with Bob Burhman and Dick Siegel*

The “Bottom Up” Nanocenter Network.

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The National Nanotechnology Initiative (NNI) has taken an active role in the creation and development of a set of Nanotechnology Centers such as NSECs and other centers focused on important aspects such as societal impact, education, and information dissemination. The NNI has also actively developed facilities and capabilities such as NNIN and NCN to help foster nanotechnological advancement and many, many other related programs. The activities of these centers are extremely diverse and are concerned primarily with the development of generic concepts, understandings, and capabilities. Furthermore the NNI has generated or created a large number of associated or related programs including the NIRT programs and has served as a driver for the creation of a number of partnerships with industry such as the SIA-NSF partnership. We can think of these as “top down” generation of programs and structured organizations. This activity has spawned the formation of many other center-level programs and activities (for example DOE Nanocenters) both in the United States and elsewhere. In fact we could say that this “top down” initiative has truly served as the catalyst for the entire set of Nanotechnology activities currently under way.

At the same time we know that Nanotechnology provides opportunity for societal impact and business interaction usually in realms or spaces which are usually defined differently: materials, medicine, biology, electronics, energy, environment etc. We also note that the evolution and development of nanotechnology is truly international today, both in terms of scientific and technical discovery and in terms of business opportunity.

The NNI and the corresponding coordination office (NNCO) have provided the umbrella for the very successful “top down” development and initiation of Nanotechnology with a United States focus. However ultimately the development and evolution of Nanotechnology needs to be “bottom up” – that is driven by the natural needs, goals, and demands of the community actively engaged in the development and evolution of Nanotechnology. However at this time we have very little in the way of networks and network structure derived from the “bottom up” perspective. Is it time for the development or creation of some formal or informal networks and if so, how will these come about and how will they be organized? For example will they be aligned by discipline or will they be aligned by business interest and capability or perhaps some combination? How can or should a “bottom up” network arise?

What would such a “bottom up” alliance provide – what would be the benefits? I believe that there are a number of opportunities that are currently not being fulfilled or that could be much more effectively fulfilled. Some of these include:

- Effective exchange of information and perspective...either from the “business” or “technology” point of view.
- Sharing of best practices (including organization; human resource development; health, safety, and environmental activities).
- Development of a human resource network and corresponding support network.

- Sharing of international perspectives and developments, especially as sources for international cooperation and collaboration.
- Effective means for fostering collaborations that provide genuine synergy.
- Creation and dissemination of models and templates for guiding interactions and collaborations (templates for intellectual property issues for example).
- Place to bring together important ancillary elements of nanotechnology development – legal for example.

What are the driving forces for the “bottom up” development of such a network? Why and how could or would such networks be created? For “bottom up” to work there needs to be a strong need or desire at the individual or personal level. Where will we find such forces? It is clear that there are a number of clearly articulated needs generated by business interests or by societal needs and interests. One example is a very strong desire to push information processing capabilities into much greater realms leading to a set of program concepts in Beyond CMOS. Another example derives from the Health Safety and Environmental issues that will evolve from the development of Nanotechnology or that can be addressed through nanotechnology. A third example is in the new materials and processes needed to enhance the world’s energy demands. Such driving forces form one set of potential building blocks for “bottom up” network development. Are there other forces?

From my point of view, this movement toward “bottom up” network development or evolution conjures up a number of important issues and concerns. If there is value in or need for development of “bottom up” networks, can we simply wait and expect them to spontaneously arise? Or should some group consider putting in place enablers: organizing or supporting forces that can help facilitate these developments? Where could these enabling forces come from – Existing professional societies? NSF? Business? Development of new organizations or societies? Do we really need more professional societies or new alignments of professional societies? What can or should be the role of international cooperation and collaboration in the development of these networks? How can this level of international cooperation come about?

If we look more narrowly at our current NSF-sponsored Nanocenters, Networks, NIRTs, and other programs perhaps in combination with closely related groups such as the DOE Nanocenters, is there a need for “bottom up” network development? I submit that such a network would be extremely important in helping these groups move forward toward efficiently and effectively meeting the needs of our international community. This network could derive from the identification of those needs of the community that could be met from such a network and then by some agreement as to a means for moving this network forward.