

# Nanotechnology

*“A True Business Opportunity?”*  
*-- The Challenges Ahead --*

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# The Nanotechnology Engine

- Worldwide research focus:
  - ✓ ***\$3.6 billion government investment in nanotechnology in 2004***
    - \$0.96 in U.S. (\$0.25 billion NSF)
    - \$1 billion each in Europe, Japan and other countries
  - ✓ ***Industry/venture capital investments nearly \$1 billion each***
  - ✓ ***\$6-8 billion worldwide research on material science***
- Predicted to be a \$1 trillion market in 2015
- Commercialization of nanoscience in other industries – petroleum, semiconductor, material science – with traditional industries, in general, achieving successful deployment sooner

# Nanotechnology in the Paper industry

- Obvious application of technology to paper production
  - ✓ *Nano-scale factors in paper bonding and coating*
  - ✓ *Industry adds value to renewable raw materials*
  - ✓ *Create products used throughout society*
- Pulp and paper industry investing more resources in nanotechnology
  - ✓ *Technological road mapping for U.S. and Europe underway*

*Is Nanotechnology a true business opportunity for the pulp and paper industry?*

# A Business Opportunity?

- What makes a good business opportunity in tomorrow's marketplace?
  - ✓ *What are the business drivers in the new global economy?*
  - ✓ *What are the economic and societal needs?*
  - ✓ *Where and how do we apply nanotechnology to create value?*
- Are we developing technology for the sake of technology?
- What is the best way to develop, transfer and deploy the new technology effectively to achieve success?



# The Need to Understand Business Drivers

In the recent past:

- ✓ *Business drivers resulted in bigger machines, increased production, economy of scale, cost reduction*

Changing business climate:

- ✓ *Global and customer economy*
- ✓ *Offshore migration of commodities - cheaper labor, government subsidies*

New business drivers:

- ✓ *Economic/societal issues: sustainability, dematerialization, decreased energy use, decrease emissions*

# The Socio-Economic Context

- The U.S. forest products industry
  - ✓ *Ranks 8<sup>th</sup> in domestic manufacturing sector in GDP*
  - ✓ *Manufactures products valued at \$250 billion*
  - ✓ *Represents 7% of manufacturing output*
  - ✓ *Employs 1.5 million people*
- Can nanotechnology impact our industry in such a way as to:
  - ✓ *Position us on the national agenda?*
  - ✓ *Completely transform our business models? If so How and in What Ways?*

# Path Forward

- Align efforts with U.S. agenda for nanotechnology
- Need to identify and understand business drivers
- Develop technology and business solutions that align with these drivers so as to create true value
  - ✓ *Understand the true need and potential*
  - ✓ *Devote effort and resources wisely*
  - ✓ *Evaluate the right nanotechnology opportunities for the right reasons*
- Innovate so as to generate a platform of *intangible assets and intellectual property* that will *create value*
- Work together to identify the best and most effective ways of developing, transferring and deploying new and needed *business and socially enhancing opportunities*



# Challenges

- **Difficult business environment**
  - ✓ *Increasing global competition*
  - ✓ *Need to protect core business, reduce costs*
- **Innovate within our existing cultures which are not comfortable with risk**
- **Limited resources**
  - ✓ *Reduced R&D budgets*
  - ✓ *Changing workforce*
- **Skepticism Factor associated with “new” science**



# Resources

- CPBIS
  - ✓ *Center devoted to providing insight, through academic research, into socio-economic factors facing industry*
- Collaborative R&D models that can be adapted to meet new needs
  - ✓ *Agenda 2020*
  - ✓ *Semiconductor, RFID initiatives*
- Installed Capital
  - ✓ *In place to meet new demands created for new products*
  - ✓ *Shortened time-to-market pathway*