

Unlocking the Secrets of Successful Industry, Government and University Partnerships

*John “Buddy” Showalter, P.E.
AF&PA/American Wood Council*

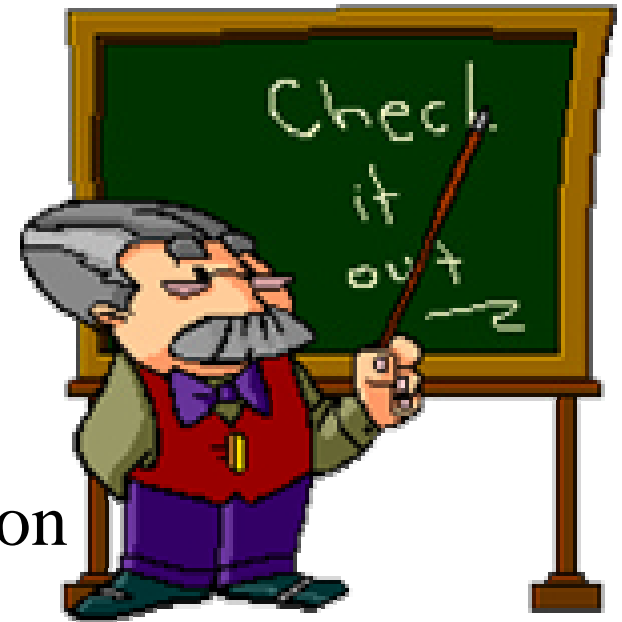
*Dr. Delmar R. Raymond
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SWST Annual Meeting

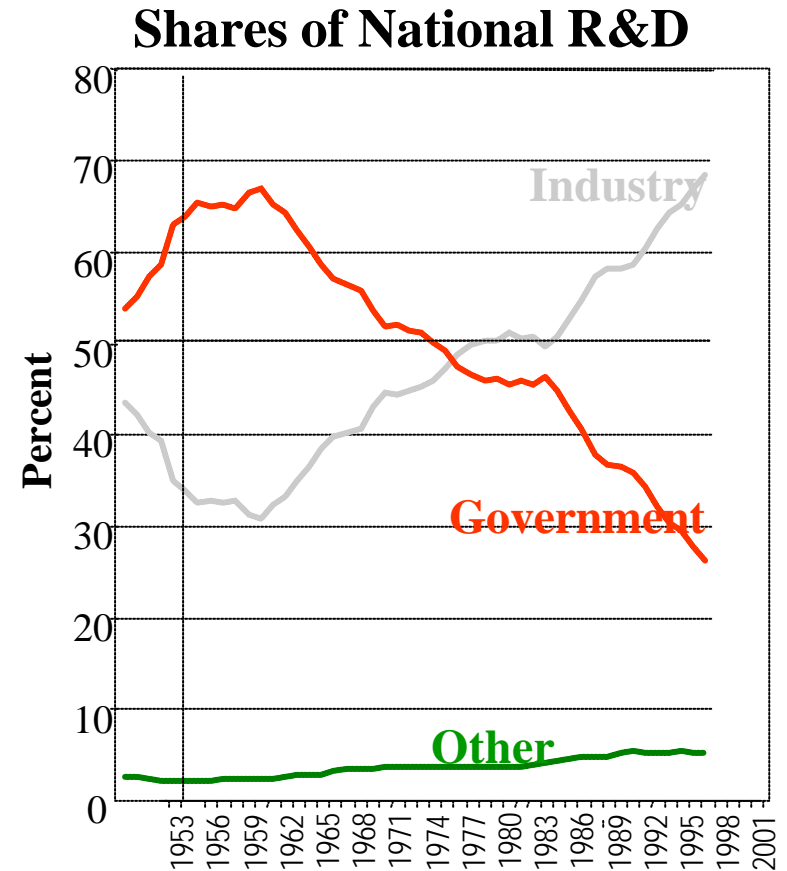
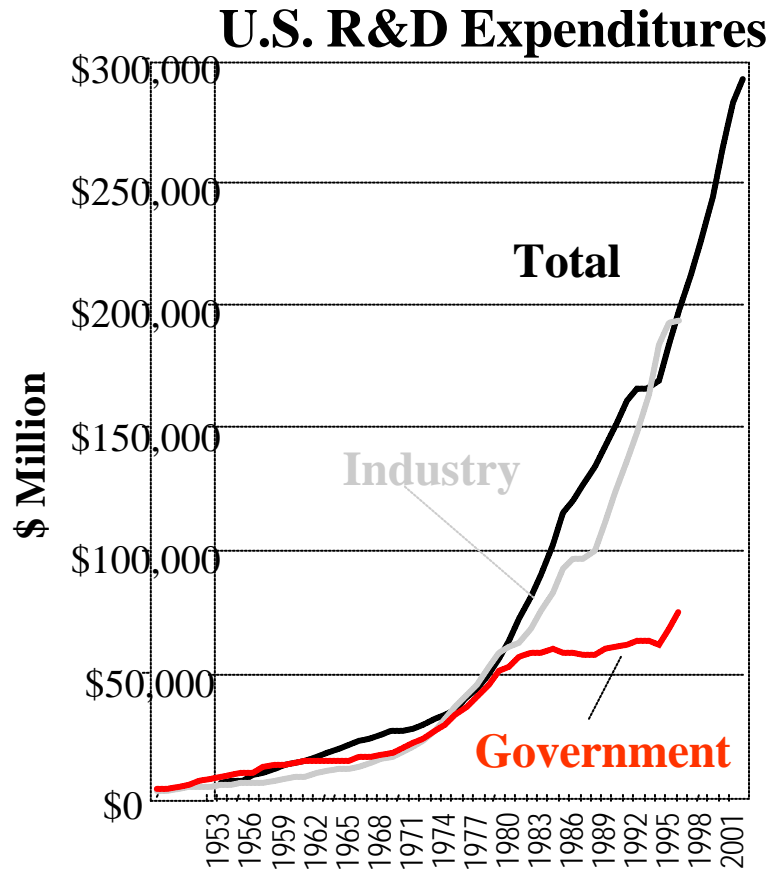
**June 27, 2004
Grand Rapids, MI**

Discussion Points

- ◆ Research Trends
- ◆ Agenda 2020 – Past & Future Success
- ◆ Why Partner
- ◆ Business Plan
- ◆ Technology Platforms
- ◆ Technology Summit II
- ◆ Portfolio Management
- ◆ Deployment/Commercialization



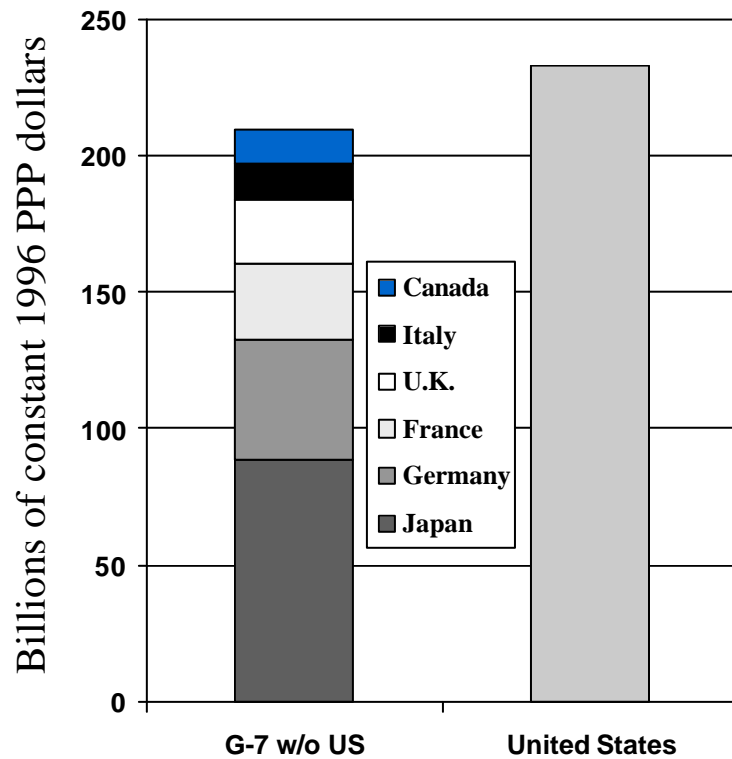
National R&D Investment Trends 1953 - 2002



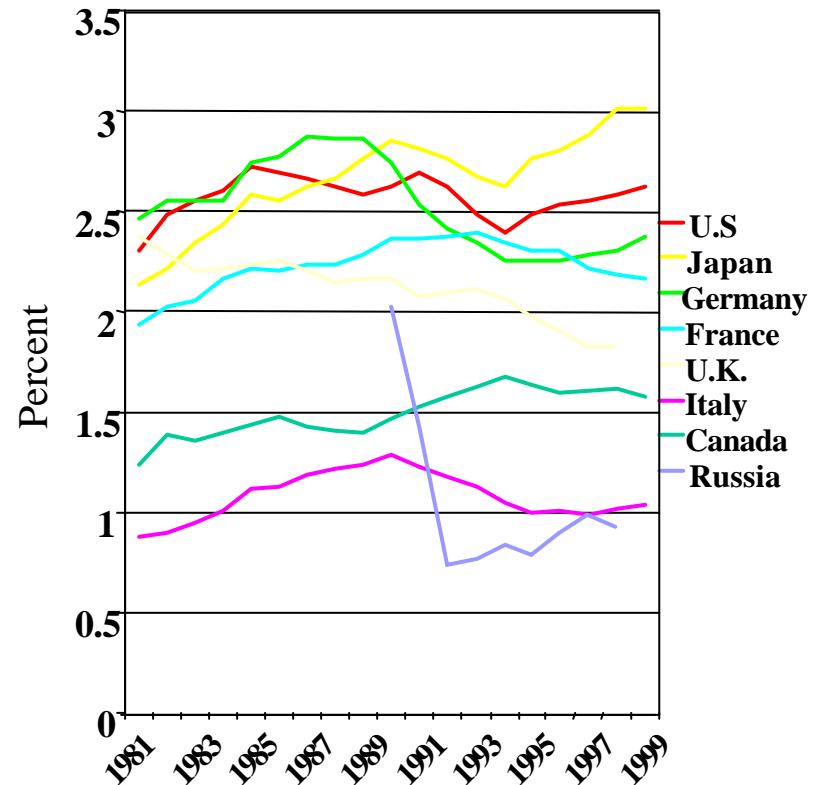
Source: NSF 2002, National Patterns of Research and Development Resources

International R&D Trends

R&D Spending by G-7 Countries (1999)

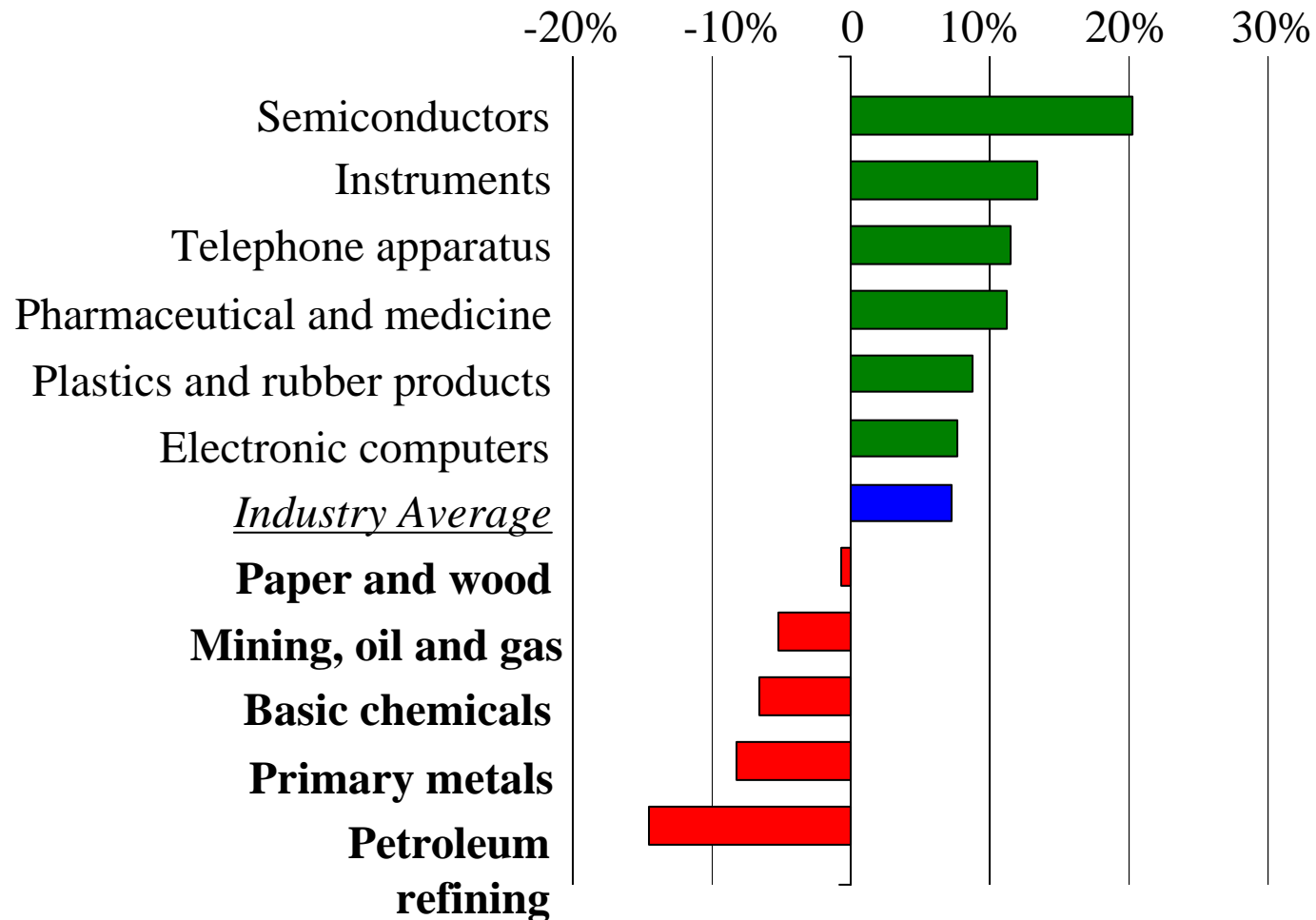


R&D/GDP



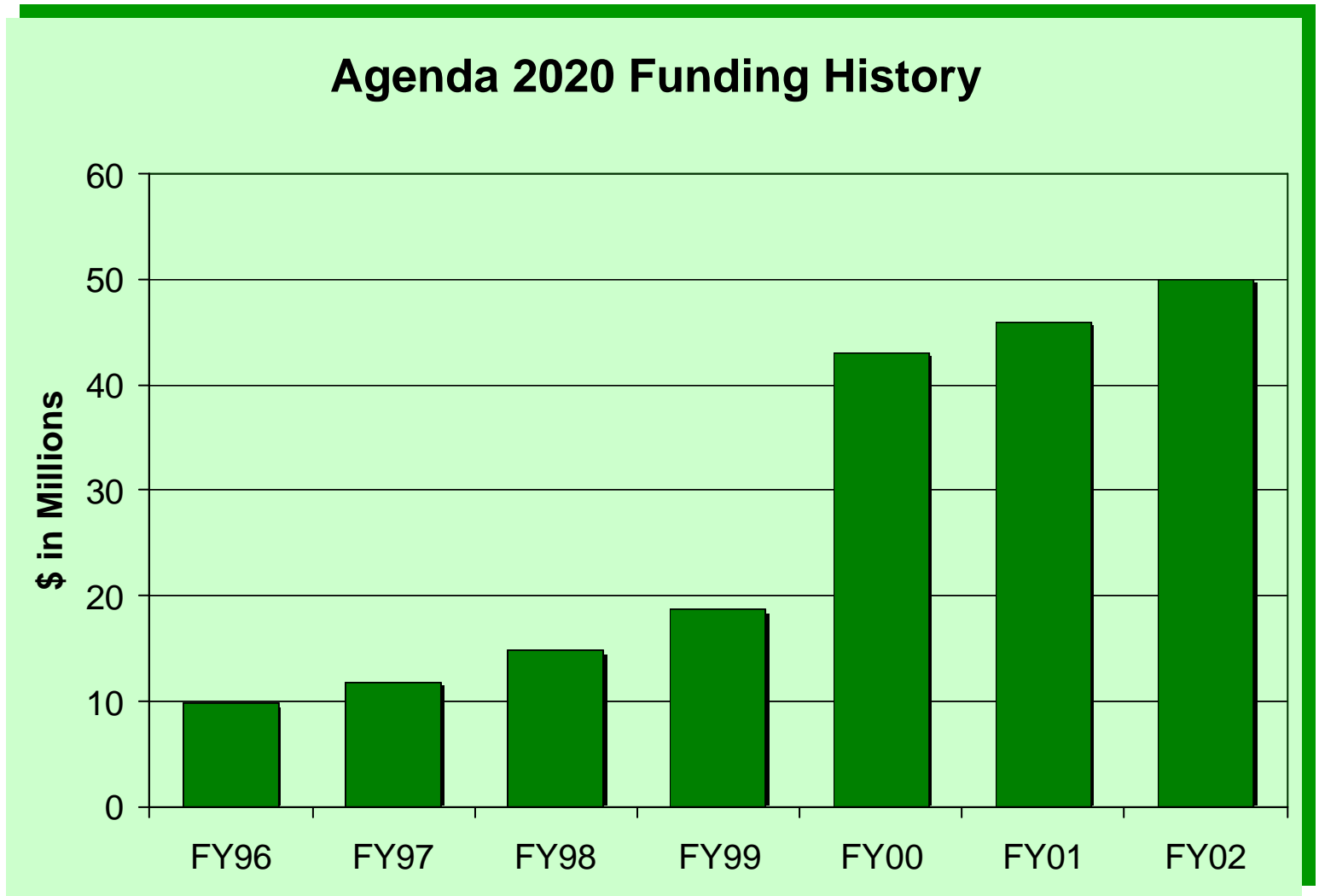
Source: NSF 2002, Science and Engineering Indicators

R&D Spending: Annual Growth 1998-2000



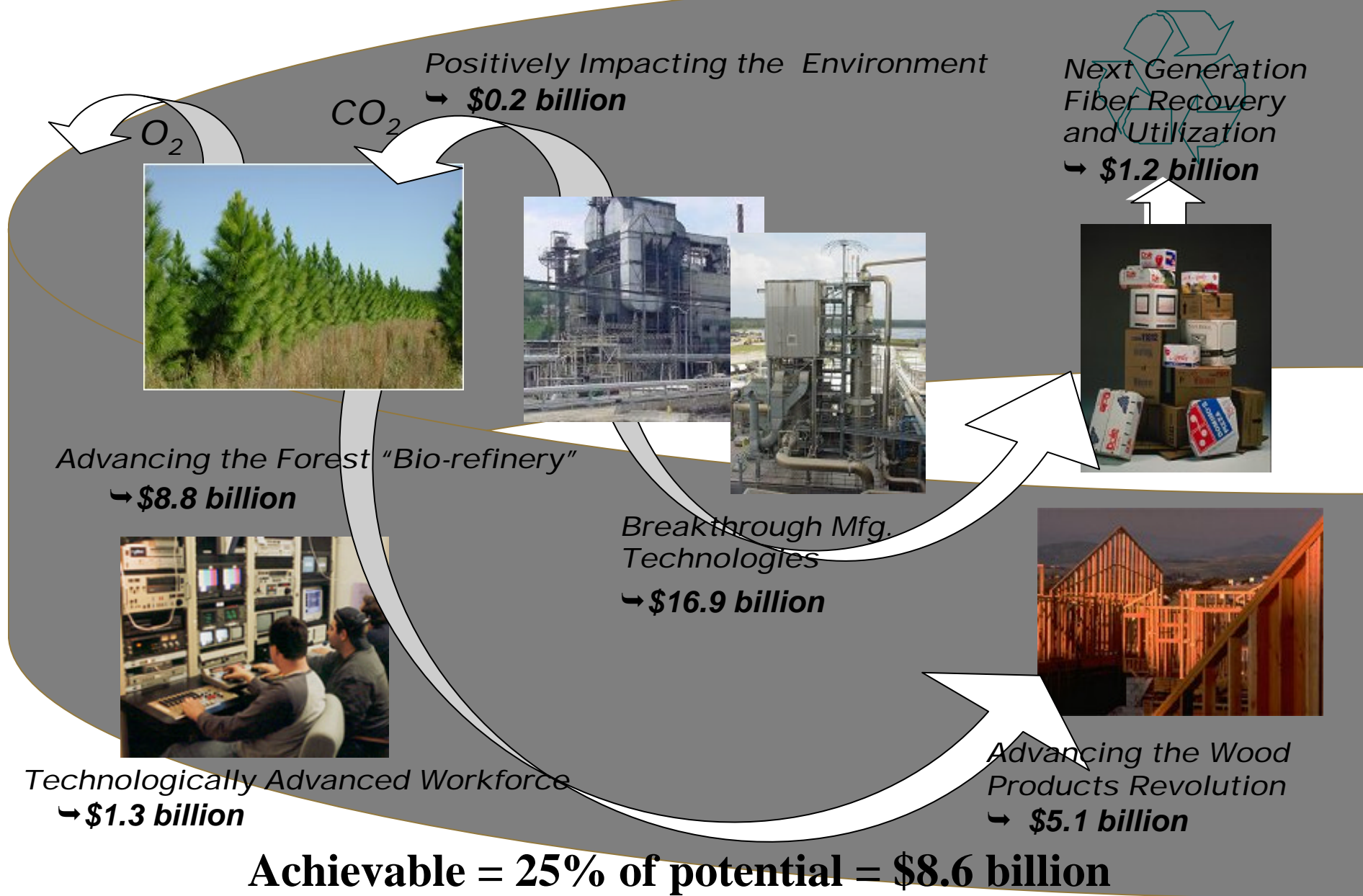
Source: DOC 2002. *Corporate R&D Investments, 1994-2000*

Historical Success – Agenda 2020



Agenda 2020 Focus for the Future

The New Portfolio Potential Net Cash Flow



Why Partner - the need for leverage

- ◆ *Industry alone cannot fund the technology needed for the future*
- ◆ *Government/Universities alone cannot get traction to implement significant change*
- ◆ *The Forest Products industry is recognized as a leader in partnering with Government and Universities—and can act as a model for others*



Why Partner – what's in it for industry?

- ◆ *Poor profitability*
- ◆ *Increasing environmental pressures*
- ◆ *Aging infrastructure*
- ◆ *Lack of technological breakthroughs*
- ◆ *Increasing difficulty attracting best:*
 - *People, Technologies and Tools*
- ◆ *Growing vs. defending industry*
- ◆ *Capital intensity limits new investments*



*Industry needs breakthrough technologies,
the will to use them, and skills to
practice them*

Why partner - what's in it for government/university?

- ◆ **Concept to commercialization**
- ◆ **Technology deployment**
- ◆ **Research \$\$**



- ◆ **Partnering with forest products industry:**
 - support/increase jobs
 - support education/training
 - provide renewable raw materials
 - indigenous power and liquid fuels
 - foster new businesses
 - positively impact GHG emissions
 - do it all sustainably





Business Plan

“Forest Industry Technology Alliance”

? Key Technology Platforms

? Portfolio Management

? Expanded Reach

? Funding Strategy

? Full-time Staff

Technology Platforms

- ◆ *Advancing the Forest “Bio-refinery”*
- ◆ *Next Generation Fiber Recycling and Utilization*
- ◆ *Breakthrough Manufacturing Technologies*
- ◆ *Environmental Performance*
- ◆ *Technologically Advanced Workforce*
- ◆ *Wood/Composite Technologies (Including Recycling)*



Advancing the Forest “Bio-refinery”

- ◆ *Sustainable Forest Productivity*
- ◆ *New Forest-Based Materials*
- ◆ *New Value Streams*



- ◆ *Example result – Clonal propagation of softwoods*
 - *10% reduction in energy*
 - *10% reduction in wood production cost*
 - *remain globally competitive*
 - *sustain jobs in rural-forest based communities.*

Next Generation Fiber Recycling and Utilization

- ◆ Recycled fiber interchangeable with virgin fiber
 - product quality and economics
 - allowing competition on:
 - Availability
 - Strength potential
 - Quality
 - Processing performance
 - Cost



Example result – H.B. Fuller & Boise to commercialize environmentally benign PSA label product

- *save over 1.5 million barrels oil equivalent per year*
- *reduce landfill*
- *increase fiber recovery*

Breakthrough Manufacturing Technologies

- ◆ Utilize new/emerging technologies:

- 50% reduction in manufacturing cost
- 50% reduction in capital intensity
- 50% increase in fiber/product properties
- 50% reduction in thermal/electric utilization
- 100% increase in power production



- ◆ *Example result – Commercial demonstrations of both high and low temperature black liquor gasification in the U.S. in 2004*

- over 40 million gallons/day of liquid fuels



Environmental Performance

- ◆ Build in environmental improvements as a key benefit to new products and processes
 - emissions and discharge limits focused on appropriate environmental and human health endpoints
 - document scientifically defensible approaches for quantifying, characterizing and improving the industry's sustainability
 - understand and improve industry's ability to impact the global carbon cycle.

Example result – VOC/HAP project: potential avoided use of 2.07 MMW-hrs & 34.1 TBTU's gas. Reduction of 4.6 MMT of CO₂, 10,000 tons HAP's, 12,900 tons NOx , 31,000 tons VOC and 49,700 tons SO₂.



Technologically Advanced Workforce

- ◆ *Recruitment*
- ◆ *Operator training*
- ◆ *Continuing education*
- ◆ *Paper and Wood Products*



*Example result - \$5 million
NSF grant to provide mill
worker education*

Wood/Composite Technologies

- ◆ *Improve building materials and systems*
 - *Increase durability by 100%*
 - *Increase disaster resistance by 50%*
 - *Incorporate disposal and recycling into the design of wood products to reduce life-cycle costs by 30%*
- ◆ *Reduce system costs*
 - *Reduce product costs by 50%*
 - *Reduce construction time and cost by 25%*
 - *Reduce embodied energy of wood products by 50%*
 - *Improve whole house energy efficiency by 10%*



Example result – anticipated \$1 million in new research from DOE in 2004

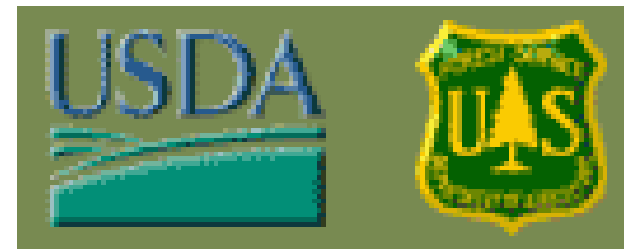
CORE Reorganization

◆ *AF&PA Committee on Research Evaluation*

- *Annual evaluation of Forest Service research*
- *Provides industry input to FS*
- *AF&PA provides input to Congress for budgeting*

◆ *Agenda 2020 Wood TG*

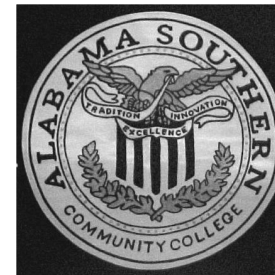
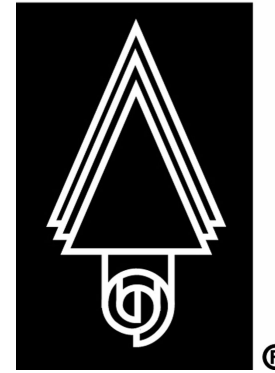
- *Maintain existing CORE structure*
- *Higher visibility in industry*
- *Coordination with AF&PA/TAPPI Industrial Liaison group*
- *Portfolio management*



Technology Summit II

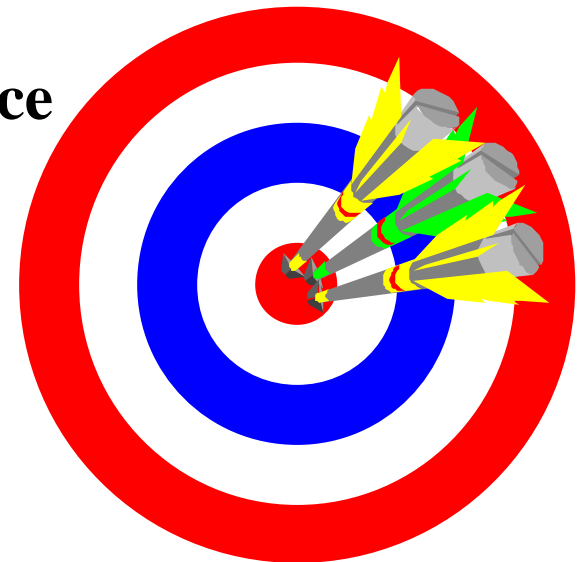
- ◆ *March 28-30, 2004*
- ◆ *Peachtree City, GA*
- ◆ *Prioritize Goals*
- ◆ *Alliance/Consortia*
- ◆ *Portfolio Management*
- ◆ *Commercialization/
Deployment*

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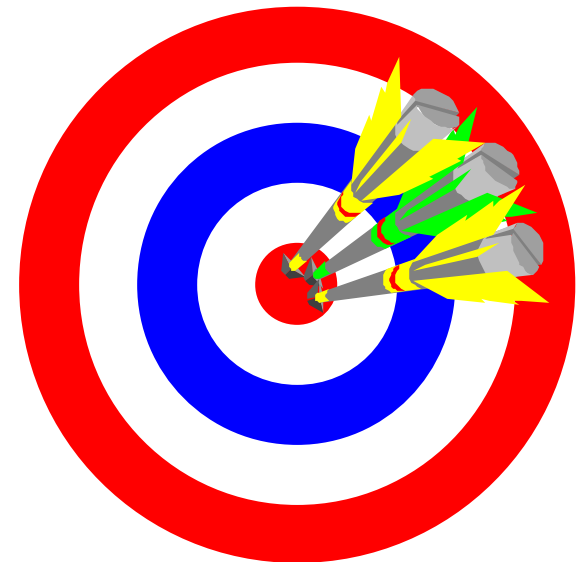
Technology Summit II Results

- ◆ **Increasing Fiber Yield**
- ◆ **Retaining and Improving Fiber Functionality**
- ◆ **VOC/HAP Destruction**
- ◆ **Extracting Value Prior to Pulping**
- ◆ **Creating New Value Streams from Residuals
and Spent Pulping Liquors**
- ◆ **Technologically Advanced Workforce**



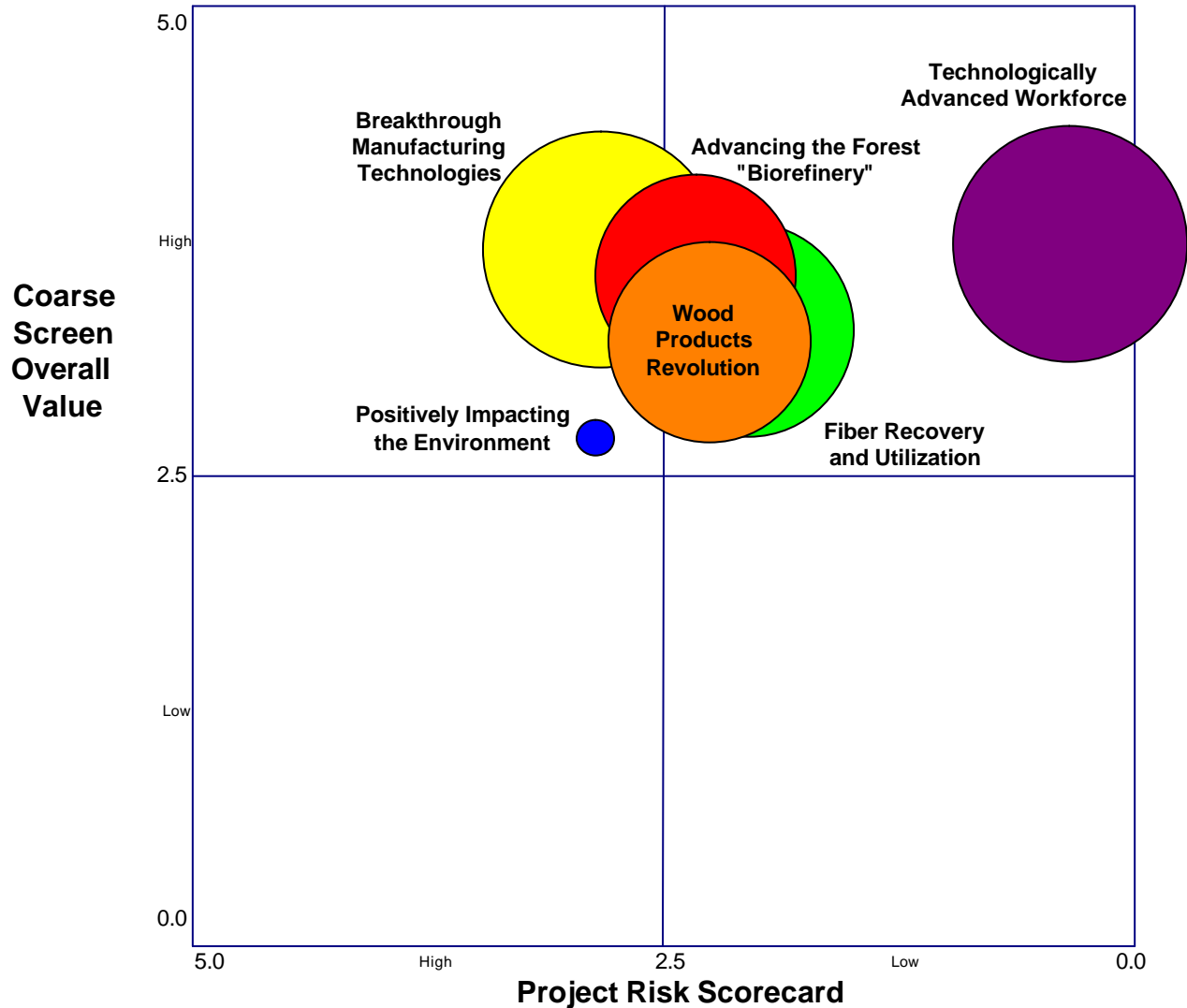
Technology Summit II Results

- ◆ **Positively Impacting the Environment**
- ◆ **Reducing the Complexity of Drying**
- ◆ **Durability in Wood Products**
- ◆ **Sustainable Forest Productivity**
- ◆ **A Societal Assessment of the Agenda 2020 Vision**
- ◆ **Nanotechnology**



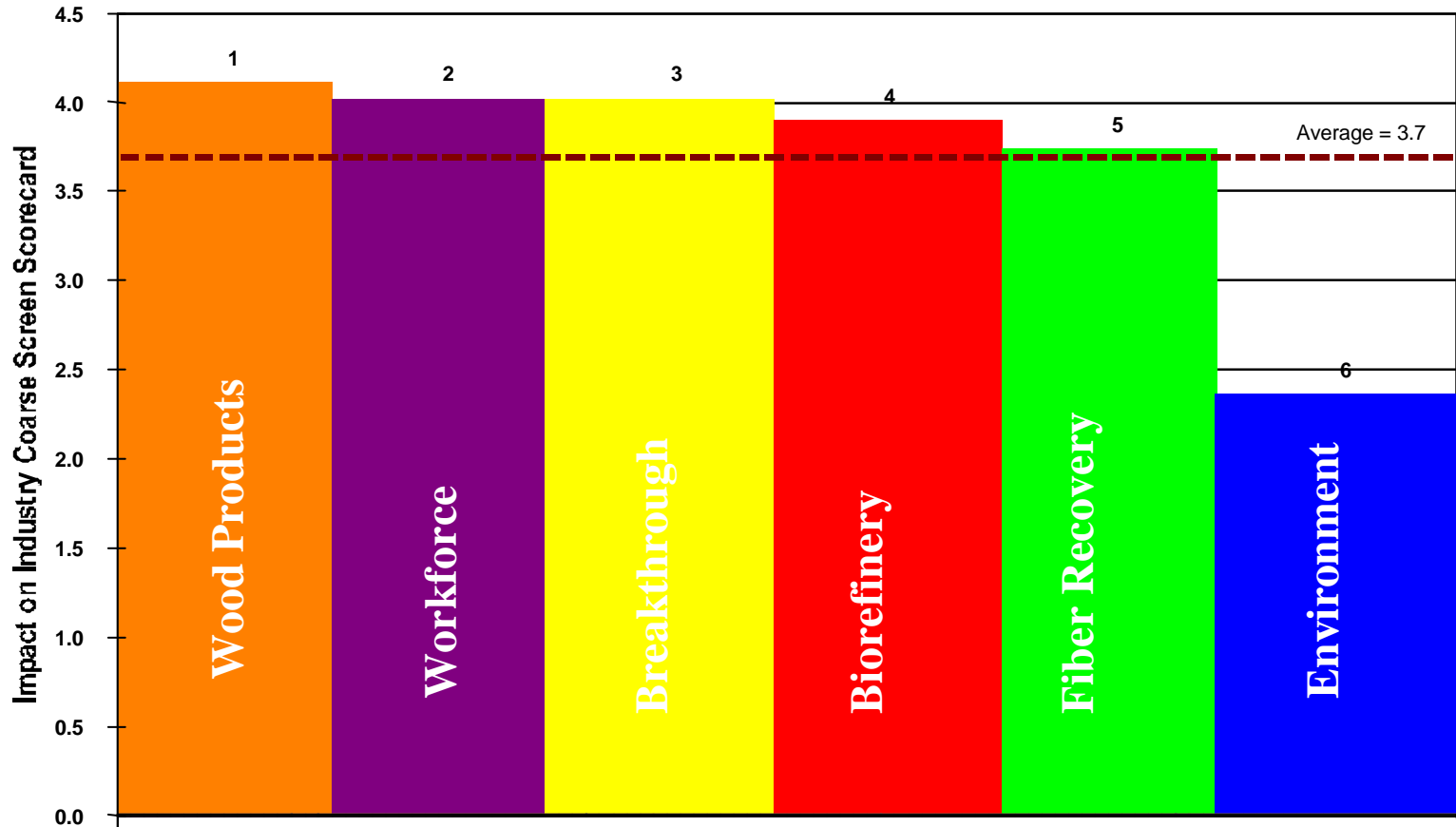
Portfolio Management

Coarse Screen Overall Value versus Project Risk



Portfolio Has High Overall Impact on Industry

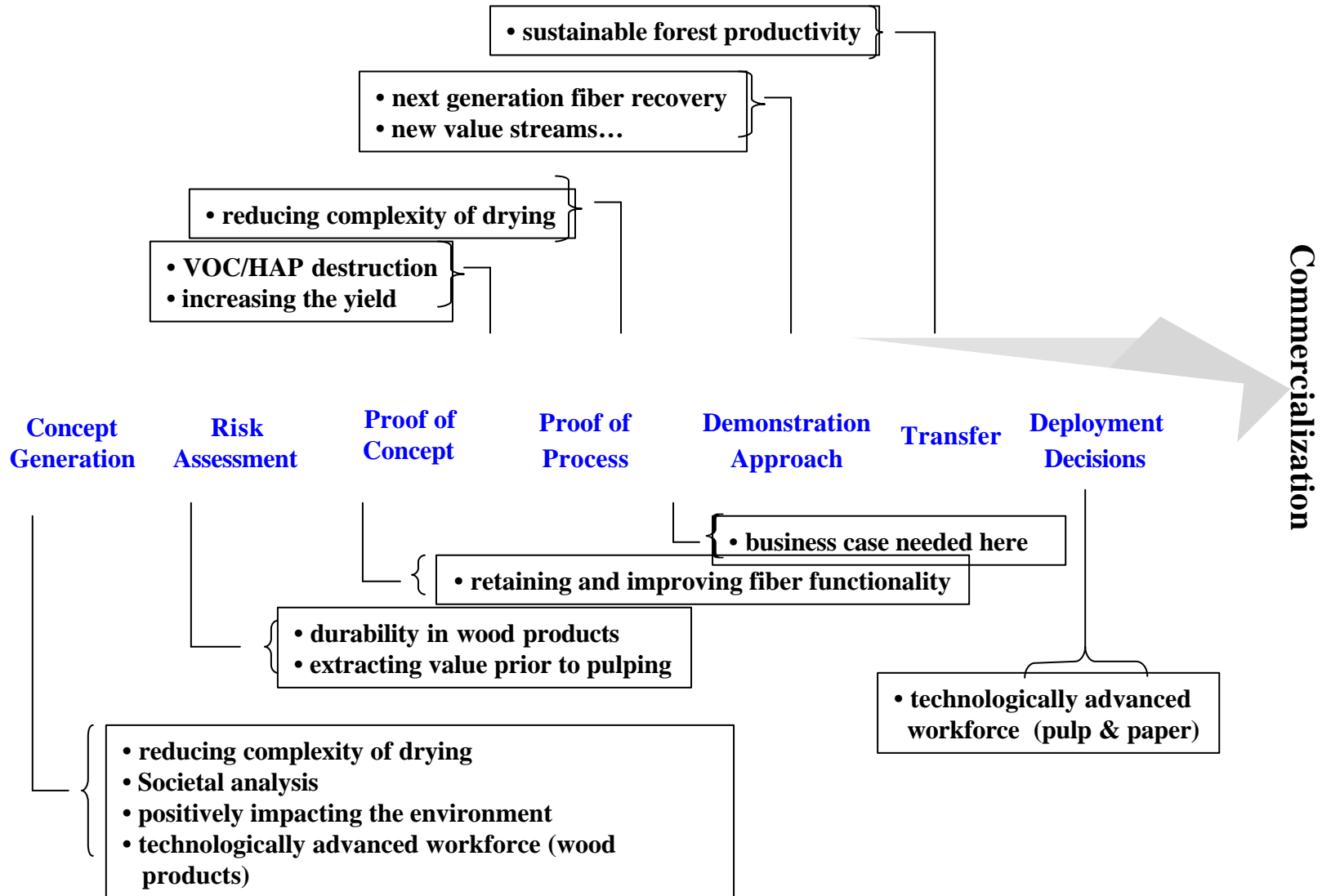
Impact on Industry Coarse Screen Scorecard Analysis



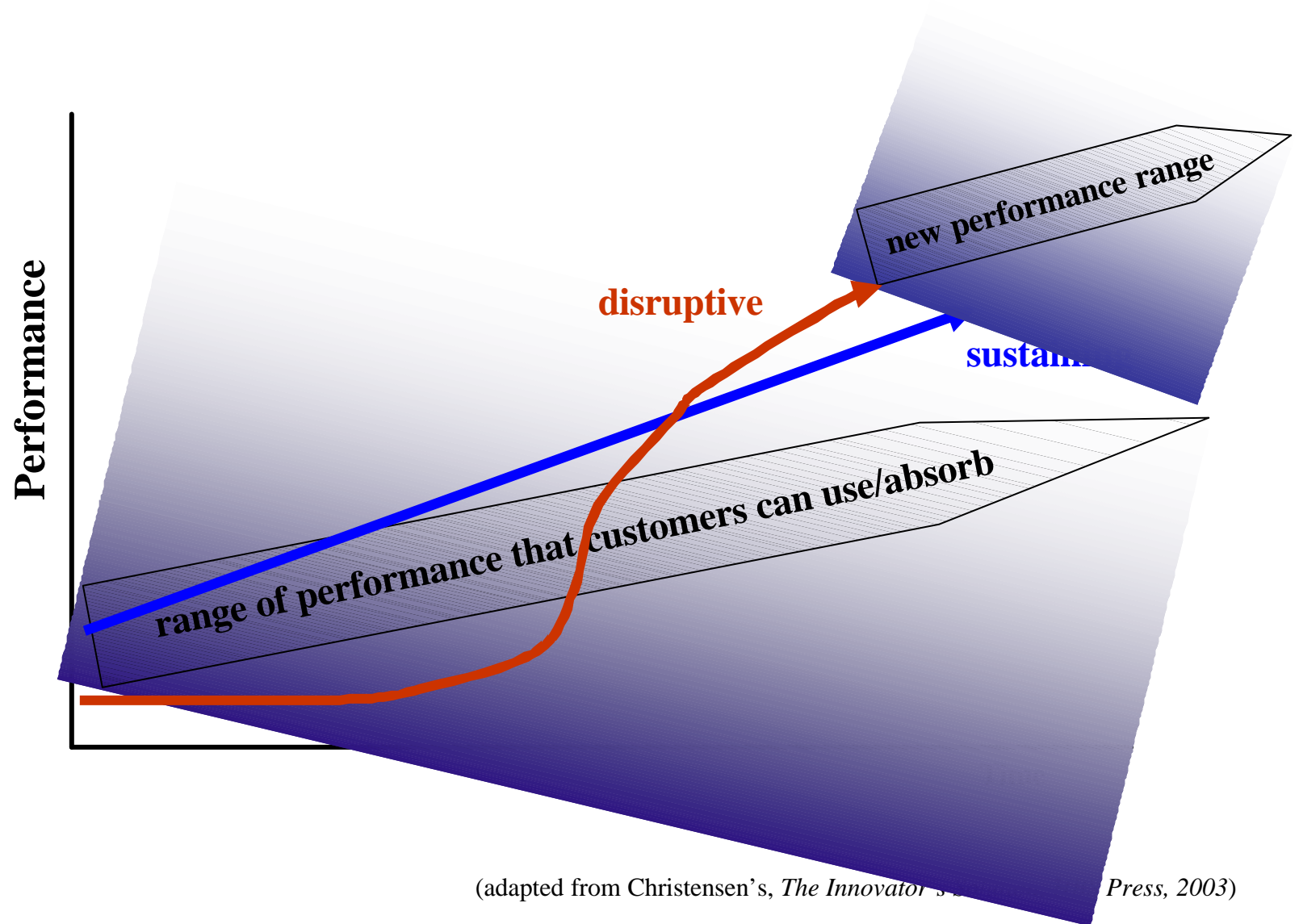
Commercialization/Deployment

- ◆ Technology Summit Workshop
- ◆ *The Innovation Process*
- ◆ Ben Thorp – GP
- ◆ <http://www.tappi.org/redirects/techsummit.asp>

The Innovation Arrow



Types of Innovation



Case Histories

CASE HISTORIES

INNOVATION TYPE

Kimberly Clark's Pull-Ups

sustaining

Kamyr's continuous digester

disruptive

I-Joists (versus sawn lumber)

disruptive

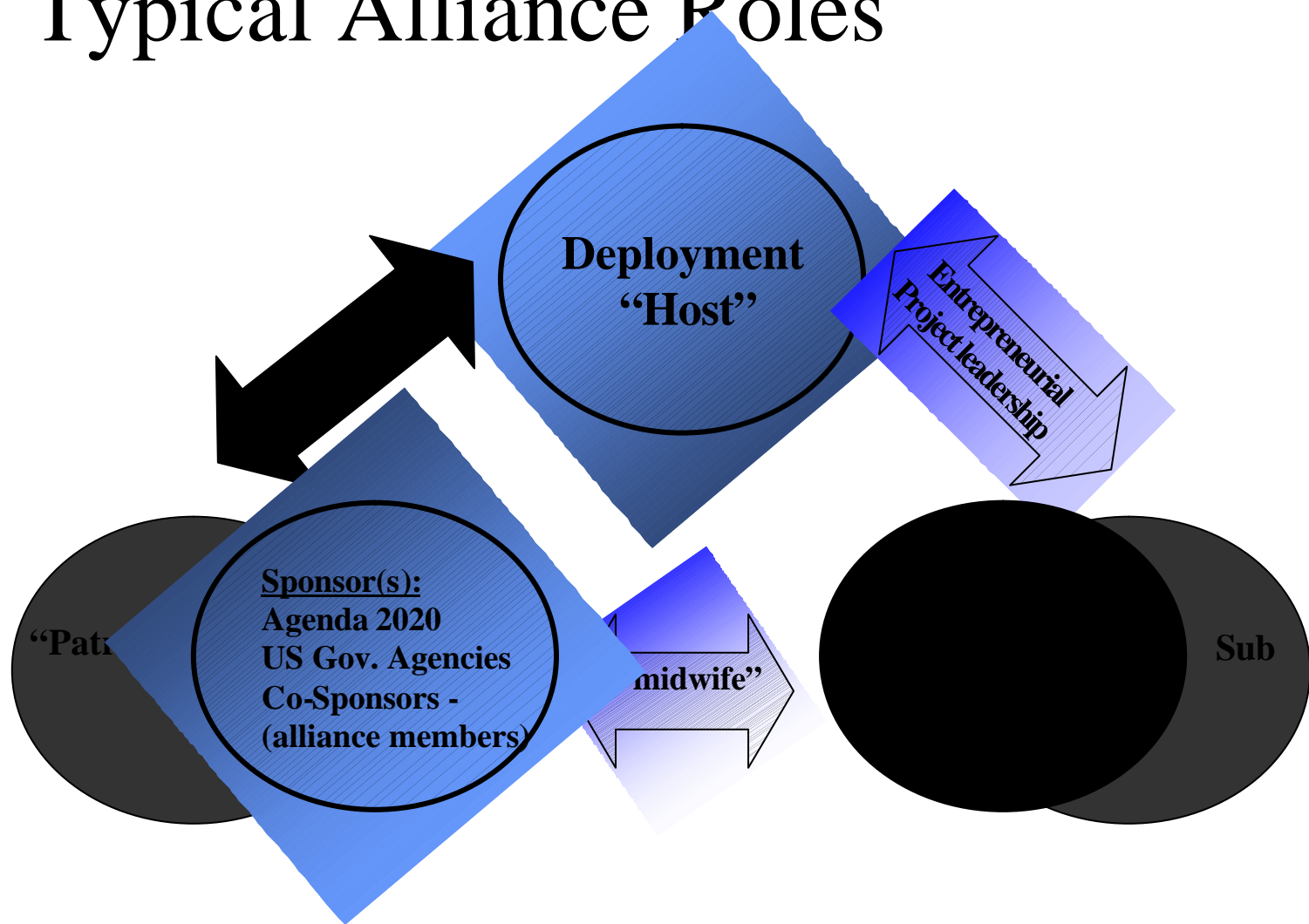
Twin Wire Forming (printing papers)

disruptive

Intensive Forestry

potential disruptive

Typical Alliance Roles



(adapted from **Vincent & Associates**, Innovation Practitioners' Network--
a collaborative of veteran innovation practitioners from seven companies, 2003)

Thank You