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● **Research**
● **Partnership to**
● **Secure Energy**
● **for America**
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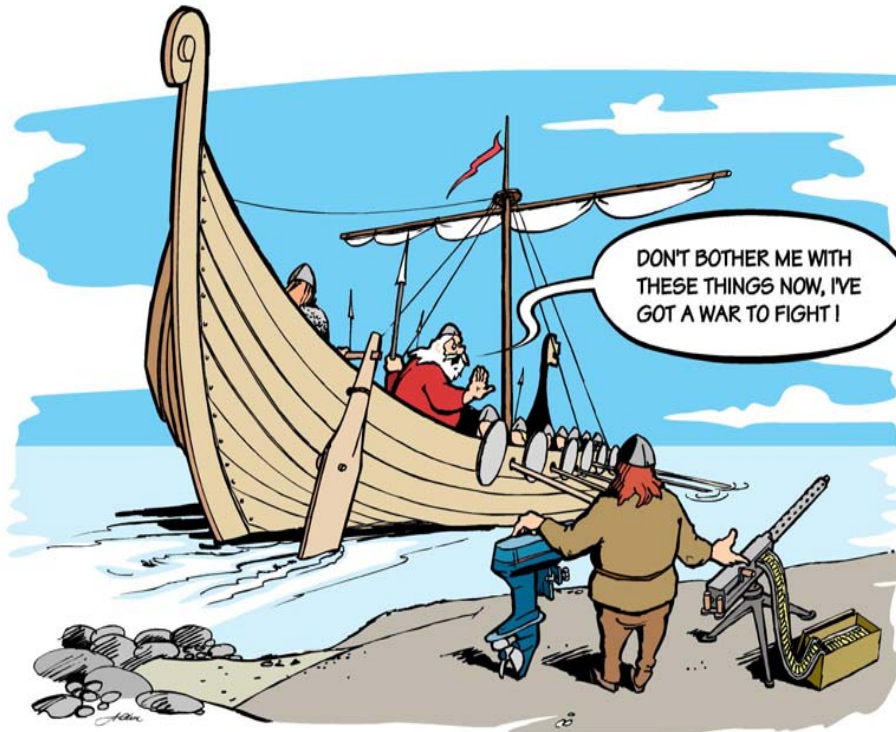
*Technologies for Mitigation of
Environmental Impact of
Rocky Mountain
Unconventional Oil and Gas
Operations*

**RPSEA Member Forum
C. Michael Ming
Colorado School of Mines
May 12, 2008**

SECURE ENERGY FOR AMERICA

The Energy Policy Act of 2005 And Section 999:

A Industry led Public/Private Partnership for R&D in the Ultra-Deepwater in the Gulf of Mexico and in Unconventional Onshore Natural Gas and Other Petroleum Resources of the United States.



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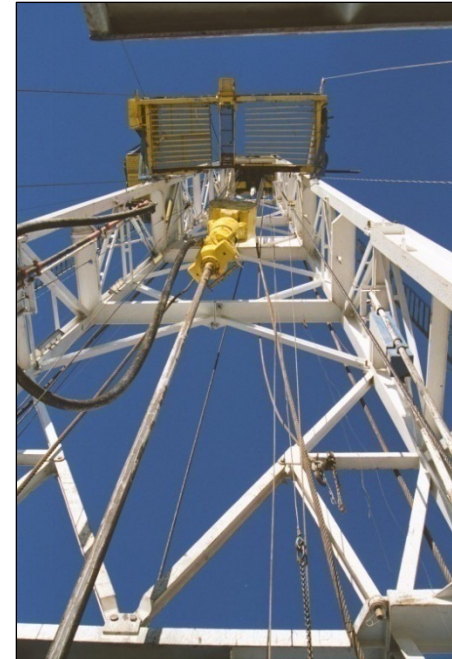
What is Section 999?

Specifically, the law directs --

- Research, development, demonstration, and commercial application of technologies for ultra-deepwater and unconventional natural gas and other petroleum resource

- Maximize the U.S resource value by:

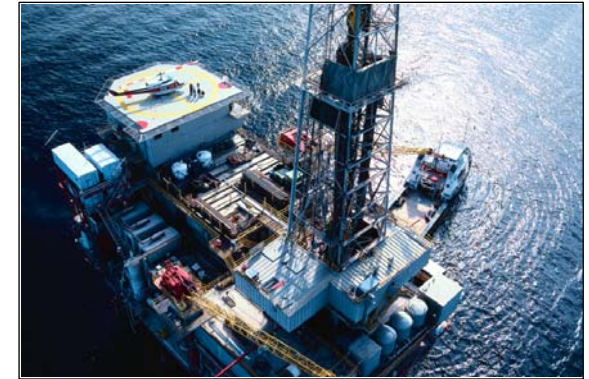
- Increasing supply
- Reducing the cost
- Increasing E&P efficiency
- Improving safety and minimizing environmental impacts



What is the Program's Focus?

The Program has four program elements:

- Ultra-deepwater 35%
(> 1500 Meters water or
15,000' OCS drilled depth)



- Unconventional Onshore 32.5%
(Economic accessibility)

- Small Producers 7.5%
(< 1000 BOEPD)

- Complementary Program 25%

Managed by NETL



Unconventional Onshore Themes

■ Gas Shales

- Rock properties/Formation Evaluation
- Fluid flow and storage
- Stimulation
- Water management

■ Coalbed Methane

- Produced water management

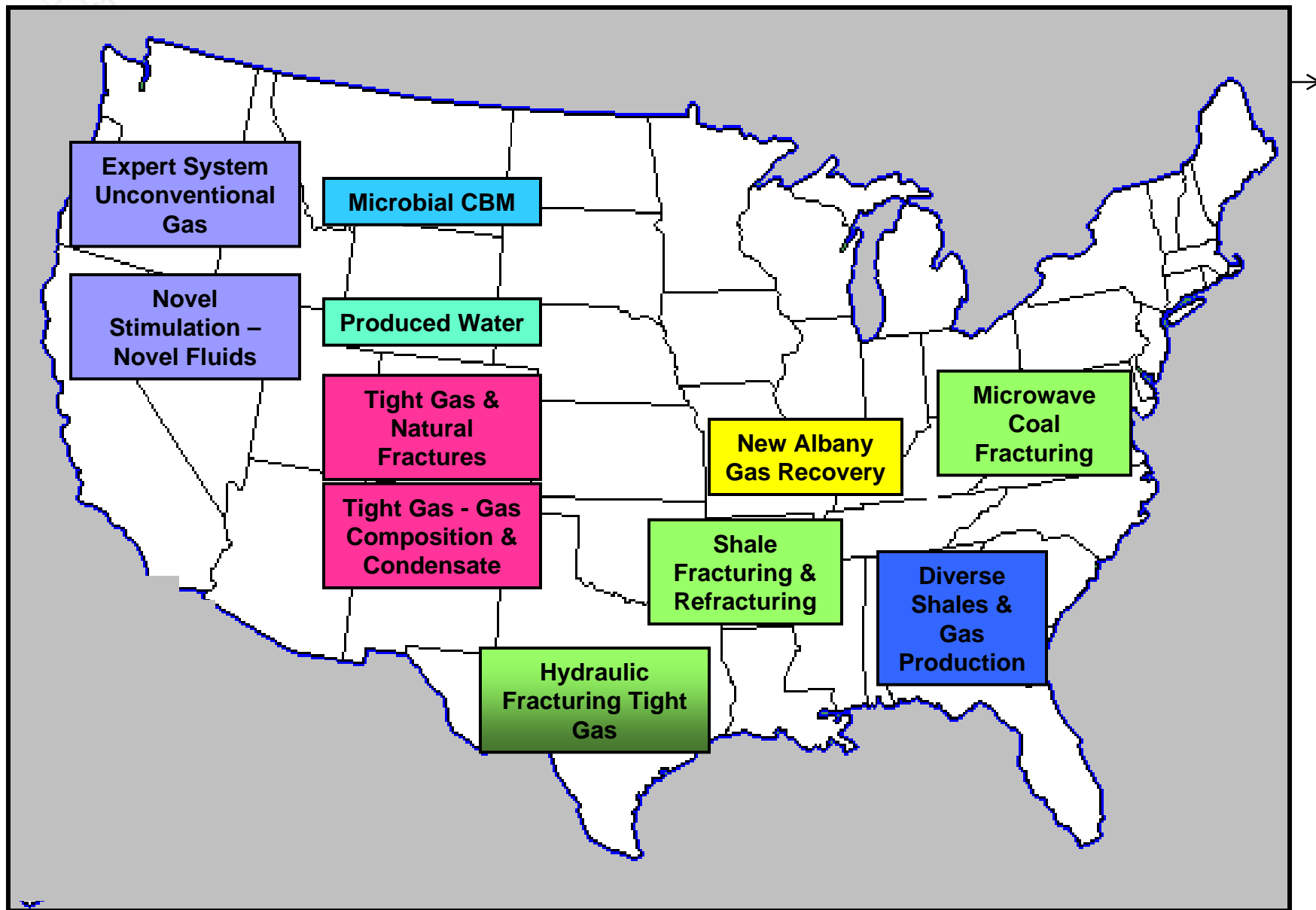
■ Tight Sands

- Natural fractures
- Sweet spots
- Formation Evaluation
- Wellbore-reservoir connectivity
- Surface footprint

**Cost Reduction
in All Aspects
of Operations**



Research Topics and Geographic Coverage



Significant Producer and Service Industry Involvement

– Crucial for Program Relevancy

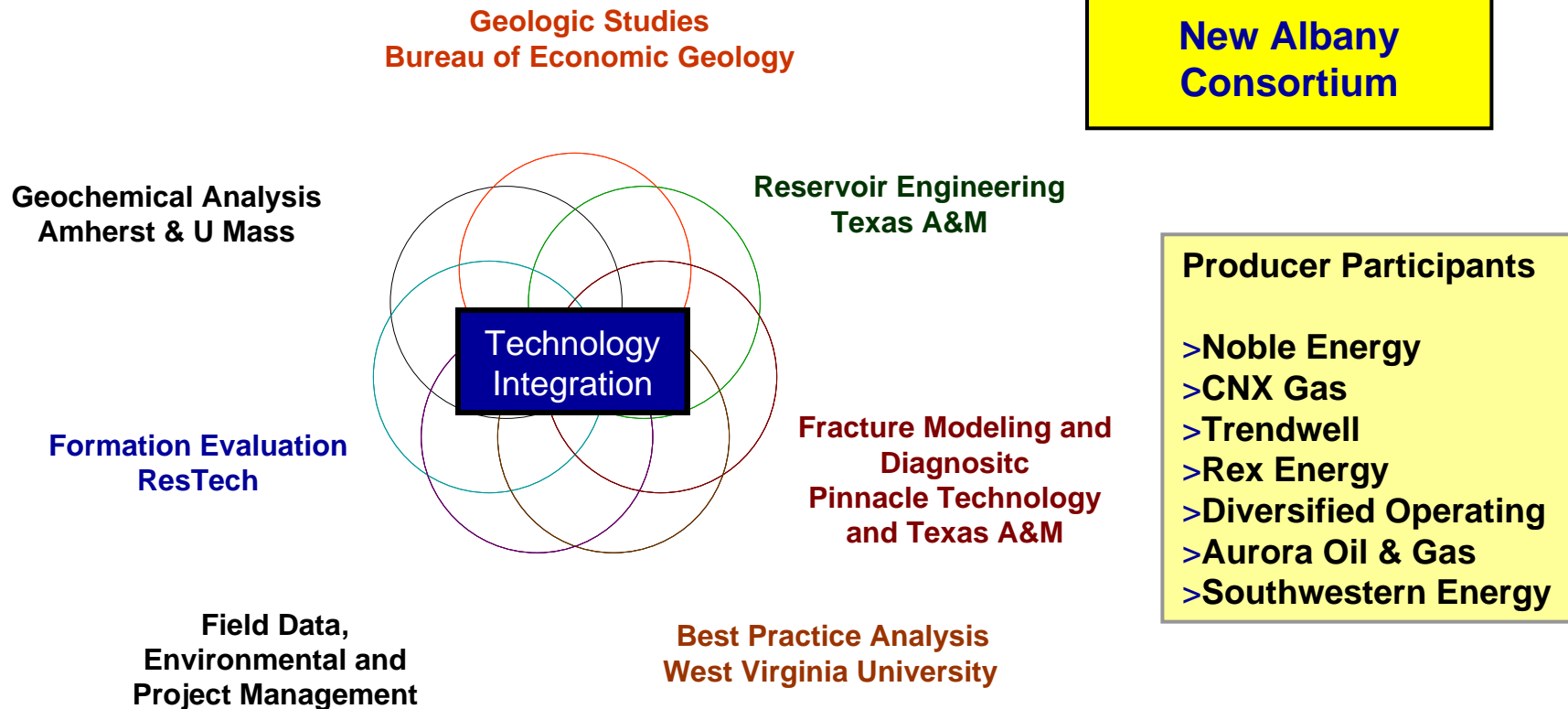
- Anadarko
- Chevron
- Pioneer Natural Gas
- Williams E&P
- ConocoPhillips
- ExxonMobil
- Newfield Exploration
- Encana
- BP
- Bill Barrett Corp.
- Pinnacle Gas Resources
- Coleman Oil & Gas
- Ciris Energy

- Devon Energy
- Unconventional Gas Resources Canada
- Whiting Petroleum
- CNX Gas
- Trendwell
- Diversified Operating Corp
- Noble Energy
- Jones Energy
- Aurora Oil & Gas

- Schlumberger
- Halliburton
- Pinnacle Technologies
- BJ Services
- Carbo Ceramics

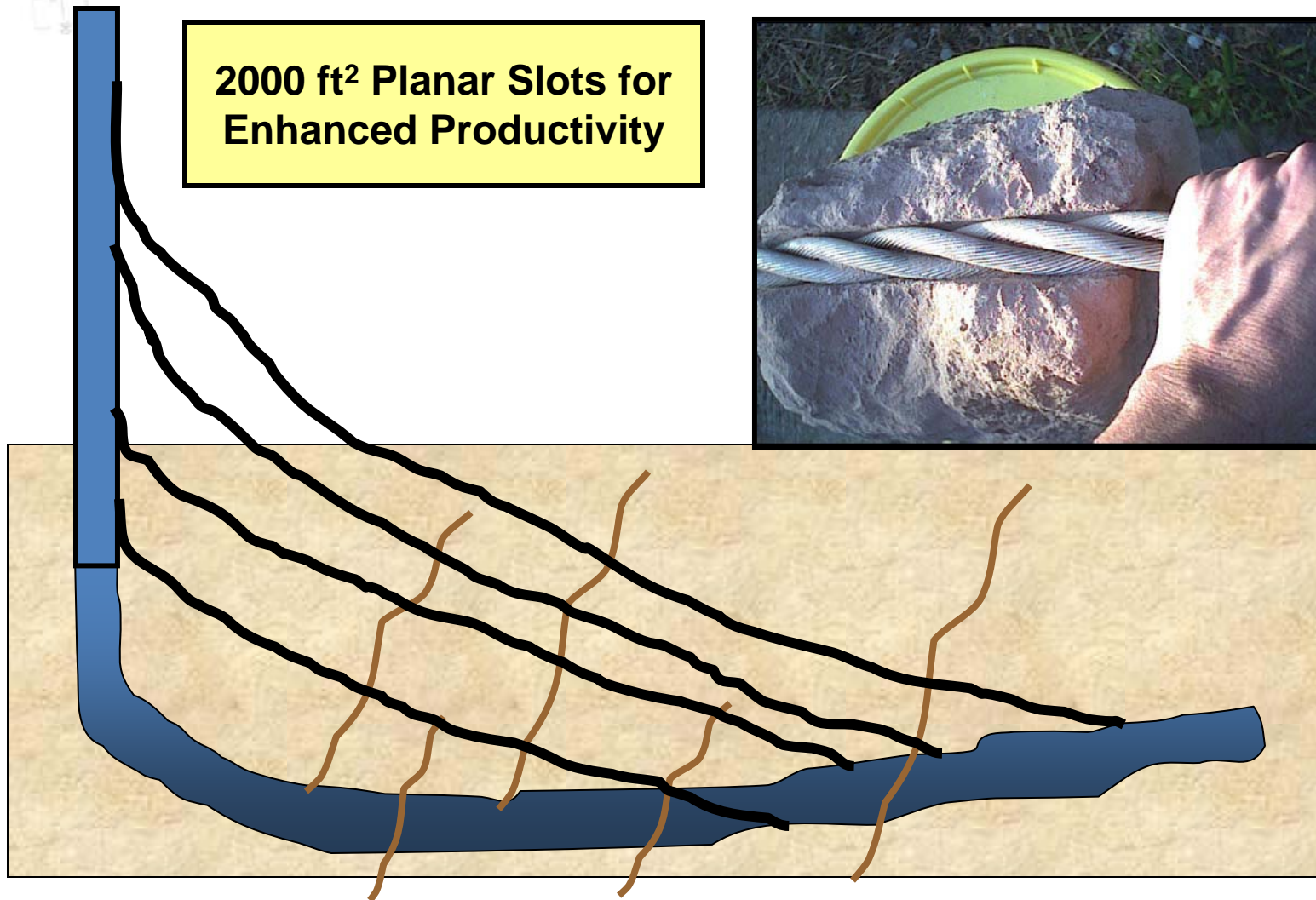
GTI New Albany Shale Research Project

Resource Characterization - Well Stimulation - Well Cost



Key Seat Slots Cut in Dogleg Hole

2000 ft² Planar Slots for Enhanced Productivity



An Integrated Framework for Treatment and Management of Produced Water

Research Objectives

- **Compile data on quality and quantity of produced water associated with unconventional gas production**
- **Explore most appropriate and cost-efficient water treatment technologies**
- **Assess requirements to minimize environmental impacts and reduce institutional barriers**
- **Compile findings into a decision analysis framework for management of produced water**

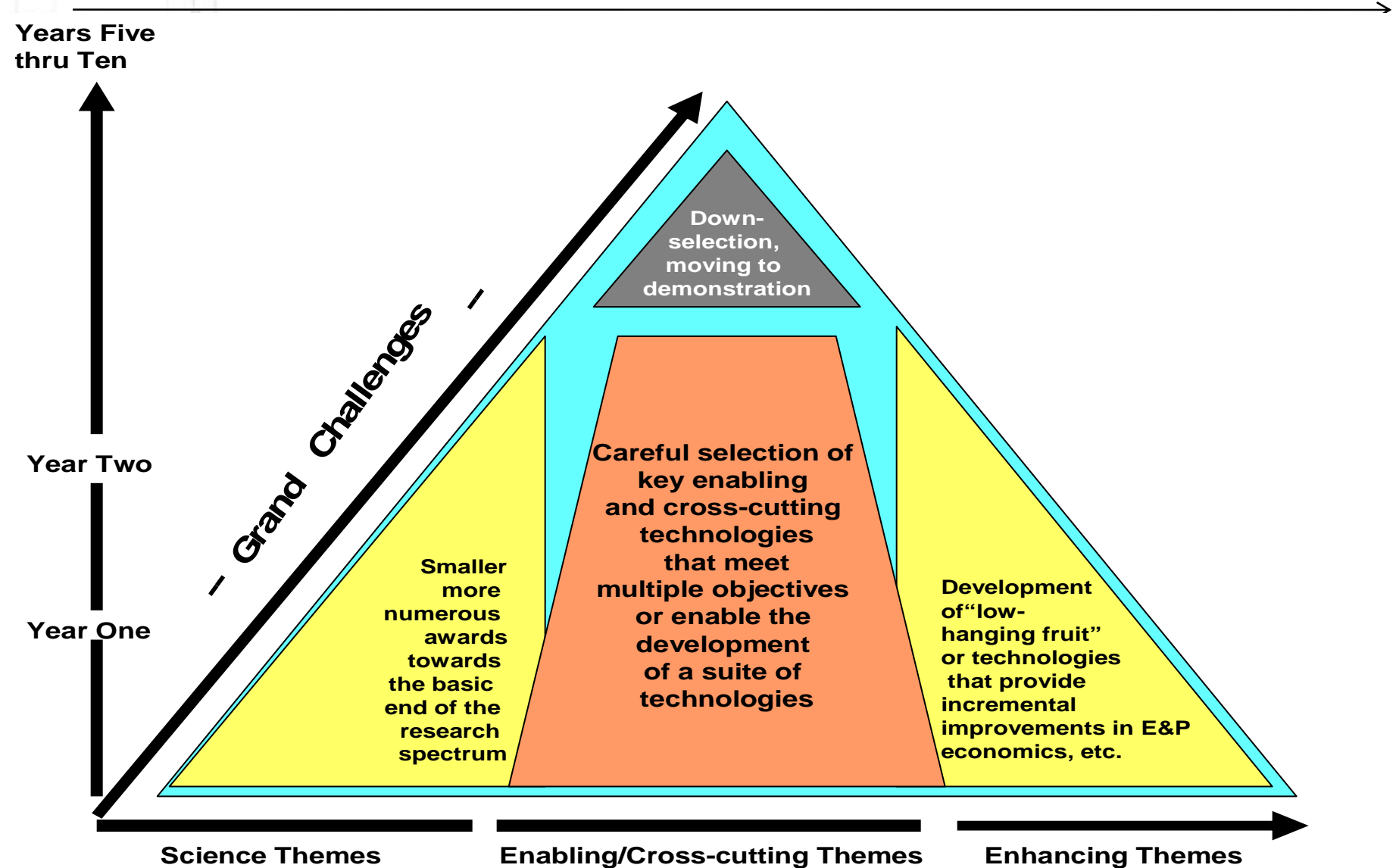




The Path Forward

- The 2008 plan is a continuation of the Initial 2007/2008 Annual Plan
- 2008 Solicitations will be issued upon approval of the 2008 Annual Plan
- The 2009 planning process has begun

General Attributes of the Annual Plan





“You miss 100% of the shots
you don’t take.”

Wayne Gretzky

QUESTIONS?

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