

# Presentation to the Science Advisory Board

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March 23, 2011



# Overview

- EPA Strategic Goals
- ORD Research Accomplishments
- Future Challenges and Sustainable Approaches
- Realigning Budget Structure
- ORD Innovation
- Charge Questions to the SAB



*"Science must once again be the determining factor in EPA decision making. When we make a decision that will affect the health and welfare of a community, we must have an unwavering commitment to the very best scientific analysis."*

EPA Administrator Lisa Jackson

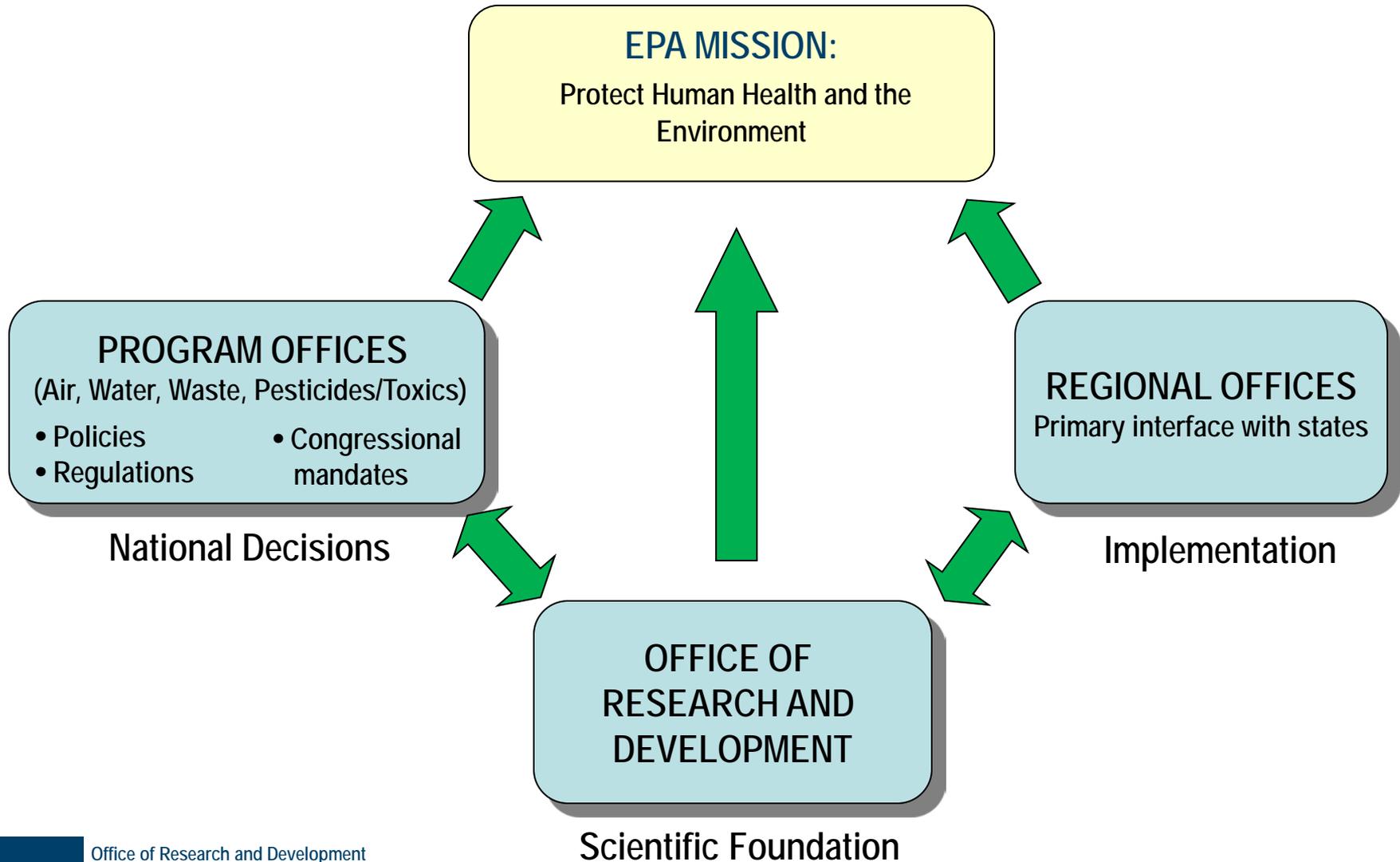
March 11, 2009

# EPA Strategic Plan 2011-2015

## EPA's Strategic Goals

- Taking Action on Climate Change and Improving Air Quality
- Protecting America's Waters
- Cleaning Up Communities and Advancing Sustainable Development
- Ensuring the Safety of Chemicals and Preventing Pollution
- Enforcing Environmental Laws

# ORD's Role in Achieving Strategic Goals



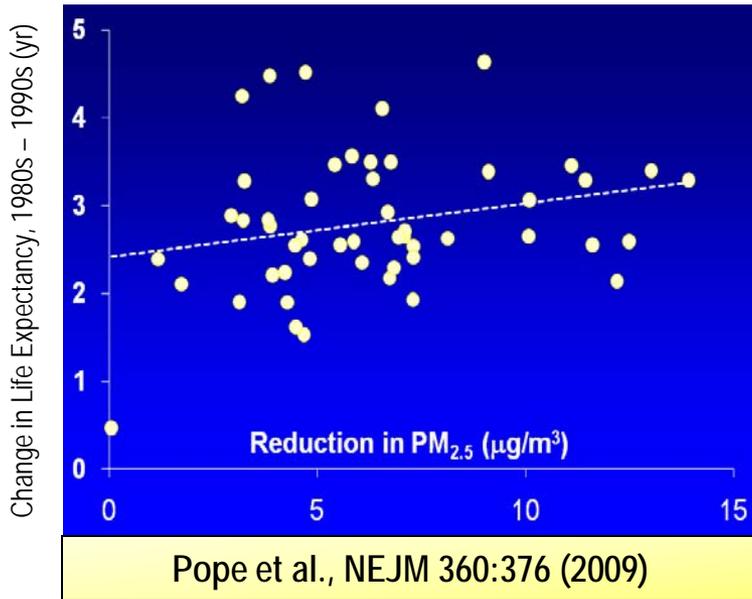
# ORD at a Glance

- 1924 full time equivalents\*
- \$584 million budget\*
  - \$72.1 million extramural research grant program (STAR)\*
  - \$14 million STAR fellowship program\*
- 13 lab or research facilities across the U.S.
- Credible, relevant and timely research results and technical support that inform EPA policy decisions

\*FY 2012 President's Budget Level



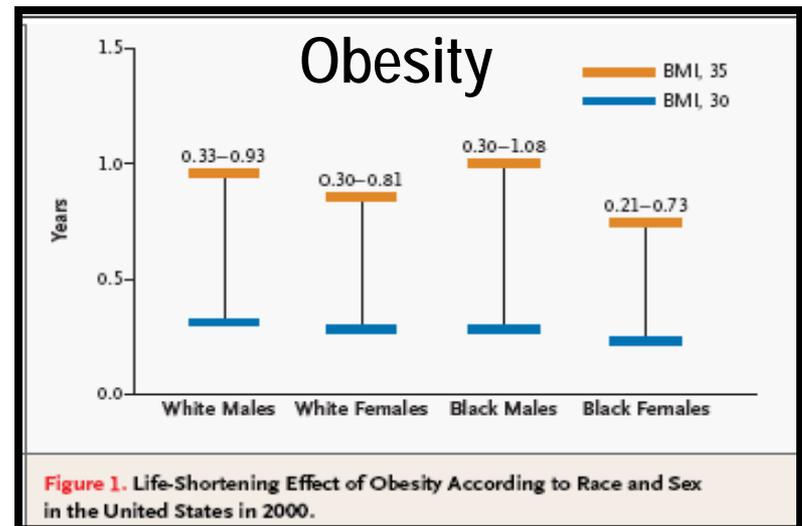
# Breathe Cleaner, Live Longer



The effects of PM<sub>2.5</sub> on life expectancy are equivalent to those from obesity.

PM<sub>2.5</sub> reduction between 1980 & 2000 has led to increased life-expectancy in the U.S.

**A gain of  
+0.61 yr/10 µg/m<sup>3</sup>**

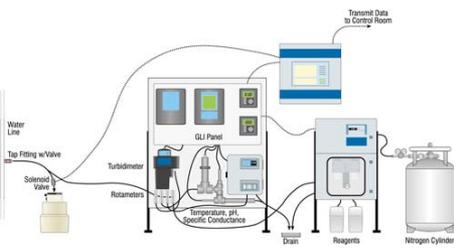


Olshansky et al., NEJM 352:11 (2005)

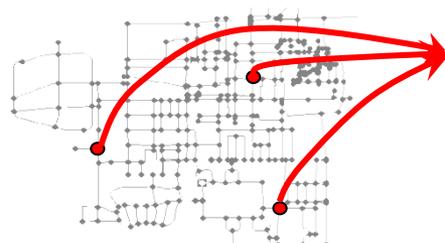
# Ensuring Security of Water Supplies

CANARY water contamination detection tool observes water quality data in real time and alerts to possible contamination events.

- Integral component of OW's contamination warning system
- In use by several large water utilities
- Winner of the 2010 R&D Award



Sensor Station



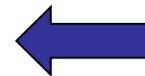
Distribution Network



CANARY  
Analysis



**CANARY  
ALERT!**



Consequence Management Plan

# Finding Solutions for the Chesapeake Bay

- Recent ORD study evaluated use of green and gray infrastructure in the Chesapeake Bay watershed, and found that an optimal 2:1 mix of infrastructure will:
  - Provide a least-cost solution to meet nutrient and sediment reduction targets.
  - Achieve benefits for greenhouse gas mitigation, floodwater storage, and recreational use.
- EPA partners plan to use this model to explore options for water quality trading and other policy options.



Ecosystem Service Co-benefits

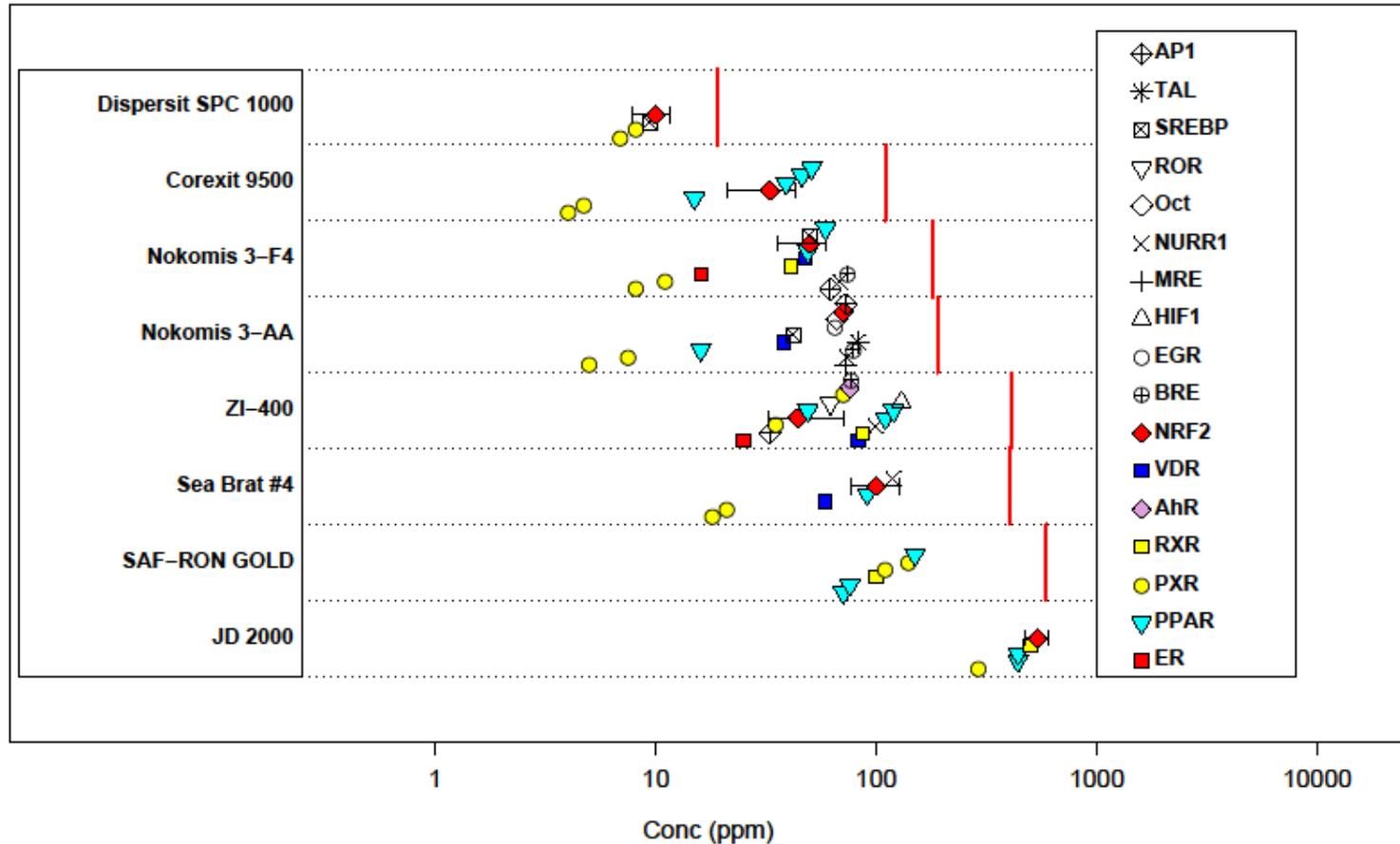
# Testing the Toxicity of Dispersants from the BP Oil Spill

EPA conducted tests of 8 chemical dispersants alone and mixed with oil, and found that:

- All 8 dispersants had roughly the same toxicity.
- No dispersant displayed endocrine-disrupting activity of biological significance.
- The 8 dispersants mixed with oil had similar toxicities to each other.
- The mixtures of dispersants used in the Gulf were no more toxic to aquatic test species than oil alone.
- EPA research continues to play an active role in supporting the BP oil spill clean-up and restoration.



# ToxCast Bioactivity Profiling of 8 Oil Spill Dispersants



Little specific activity seen except for PXR/ PPAR xenosensors

# 21<sup>st</sup> Century Environmental Challenges

Today's issues are broad in scope, deep in complexity and widespread in their impacts.

- Climate change
- Changing energy landscape
- Multi-pollutant exposure
- Increasing nitrogen and phosphorous impair water quality
- Environmental justice
- Thousands of new industrial chemicals and pesticides each year
- Chemical, biological, radiological-based terrorism

# Integrated Transdisciplinary Research (ITR)

*“It will be essential for EPA as a whole, and not just ORD alone, to adopt a systems approach to research planning. It will also be essential to plan and conduct research in new, integrated and cross-disciplinary ways to support this systems approach.”*

EPA Science Advisory Board  
July 8, 2010

*“Problems cannot be solved at the same level of awareness that created them.”*

- Albert Einstein

## Moving Toward an ITR Approach

- Re-orient our research to sustainability: healthy environments v. acceptable risk
- Move away from stove-pipes
- Promote systems thinking and innovation
- Couple excellence in problem assessment with excellence in solving problems
- Encourage integrated, transdisciplinary research
  - Across ORD labs
  - Engage EPA partners and outside stakeholders
- Align with EPA strategic goals

# Unsustainable Resource Utilization

Industry  
(products, energy)

*Economic value  
is created for society*

Society  
(communities, governments)



*Labor is utilized in industry*

*Ecological goods  
and services are utilized in  
industry*

*Ecological goods  
and services are utilized in  
society*

Environment (air, water, land, humans & ecosystems)

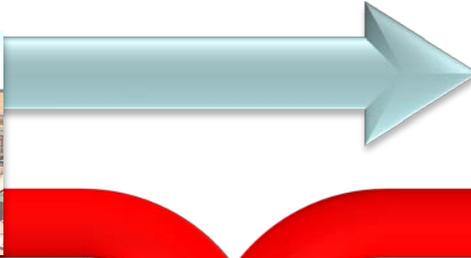


# A Systems Approach to Sustainable Resource Use

Industry  
(products, energy)

*Economic value  
is created for society*

Society  
(communities, governments)



*Labor is utilized in industry*

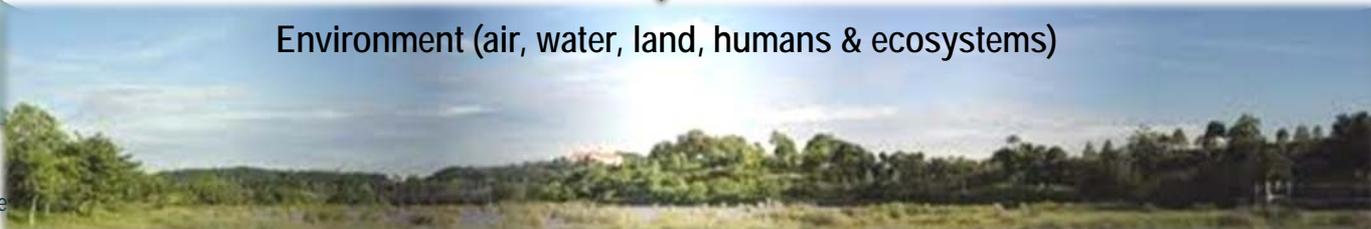
*Minimize impact of waste and  
emissions on the environment and  
protect our ability to produce  
ecological goods*



*Ecological goods  
and services are utilized in  
industry*

*Ecological goods  
and services are utilized in  
society*

Environment (air, water, land, humans & ecosystems)



# Realigning our Research

We re-structured 12 of our research programs into 4 programs aligned with the EPA Strategic Goals:

## Strategic Goals 2011-2015

Taking Action on Climate Change and Improving Air Quality

Protecting America's Waters

Cleaning Up Communities and Advancing Sustainable Development

Ensuring the Safety of Chemicals and Preventing Pollution

## Integrated Research Structure

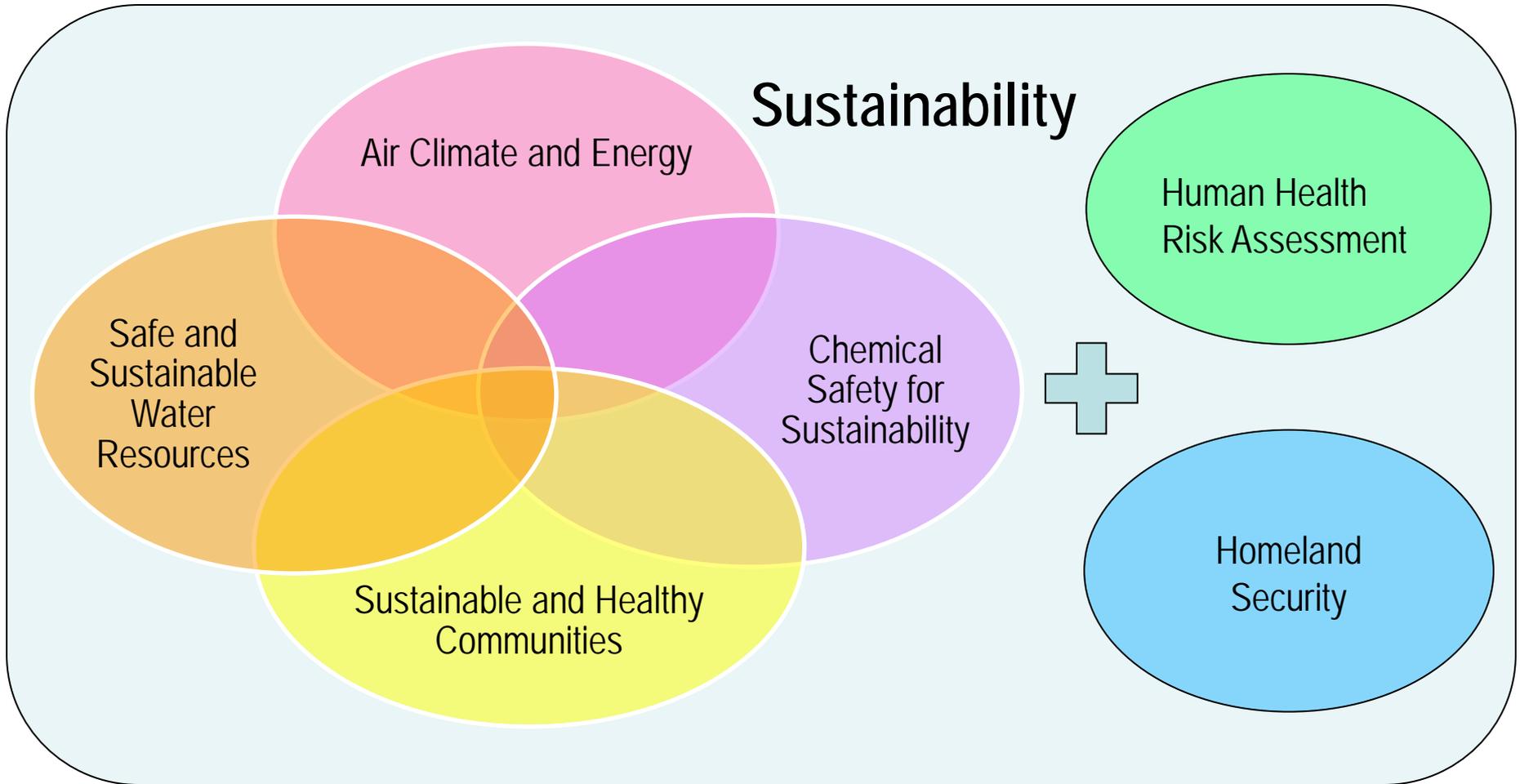
Air, Climate & Energy

Safe and Sustainable Water Resources

Sustainable and Healthy Communities

Chemical Safety for Sustainability

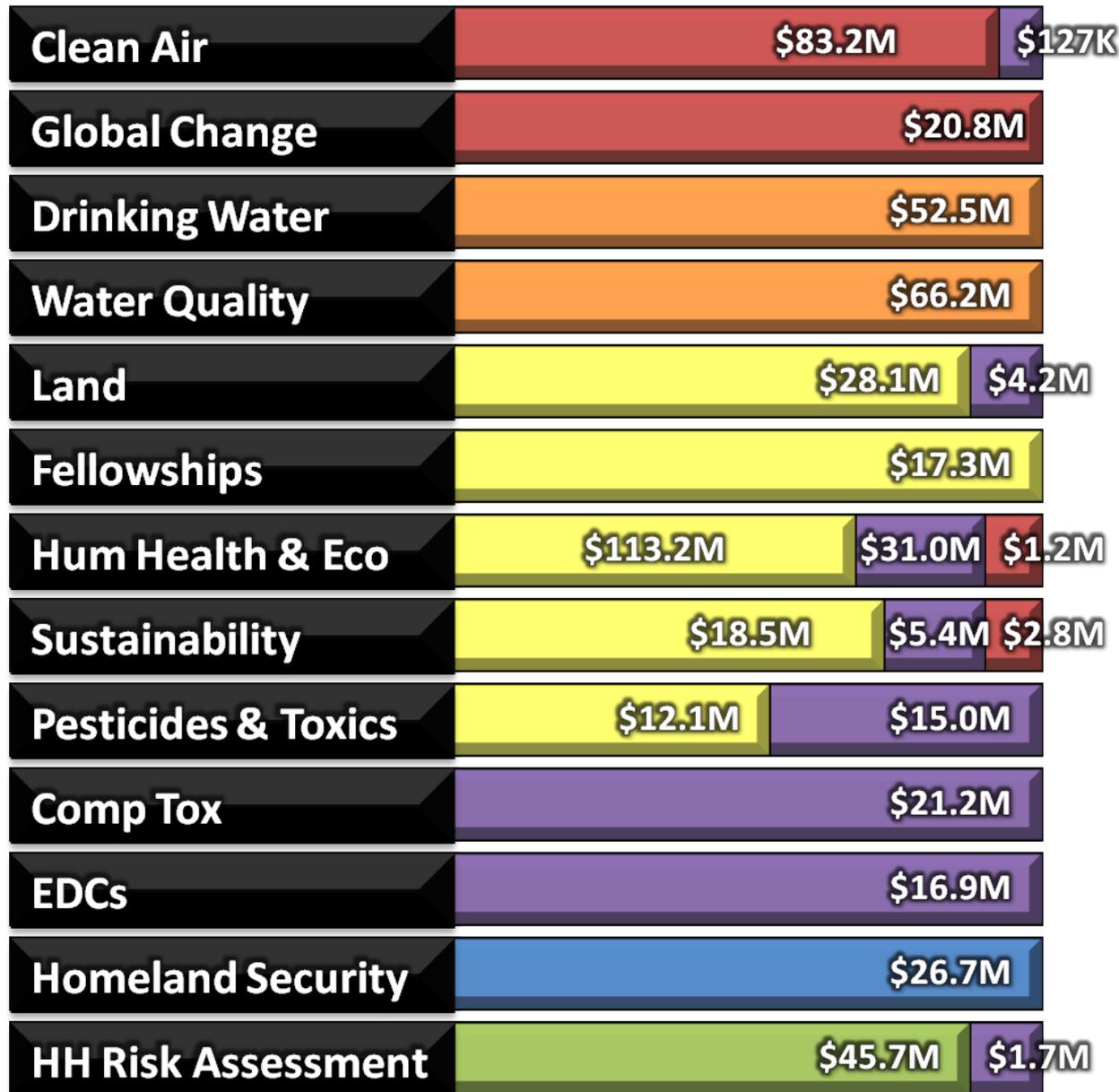
# Integrated ORD Research Programs



# CURRENT PROGRAMS

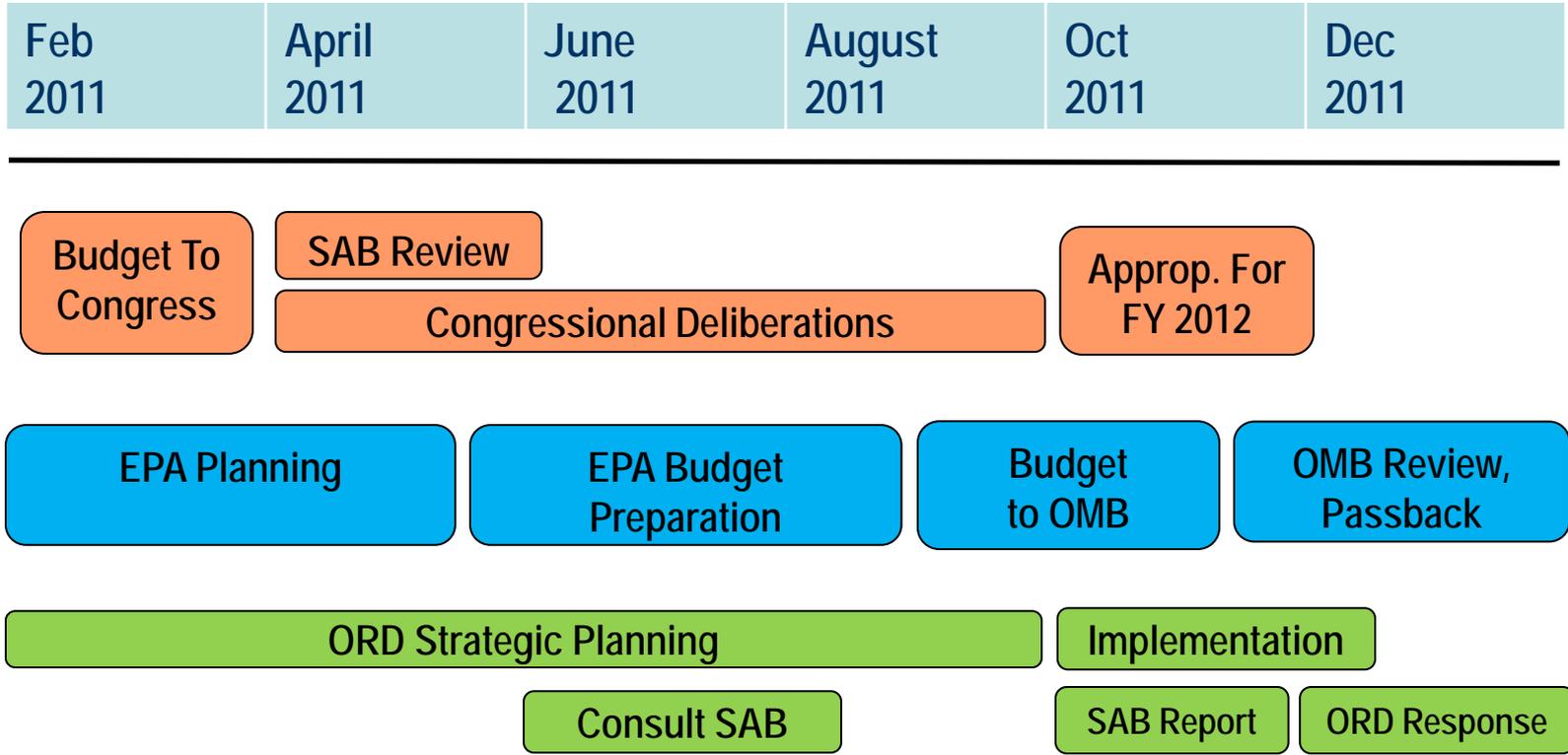


# INTEGRATED FY2012 PROGRAMS

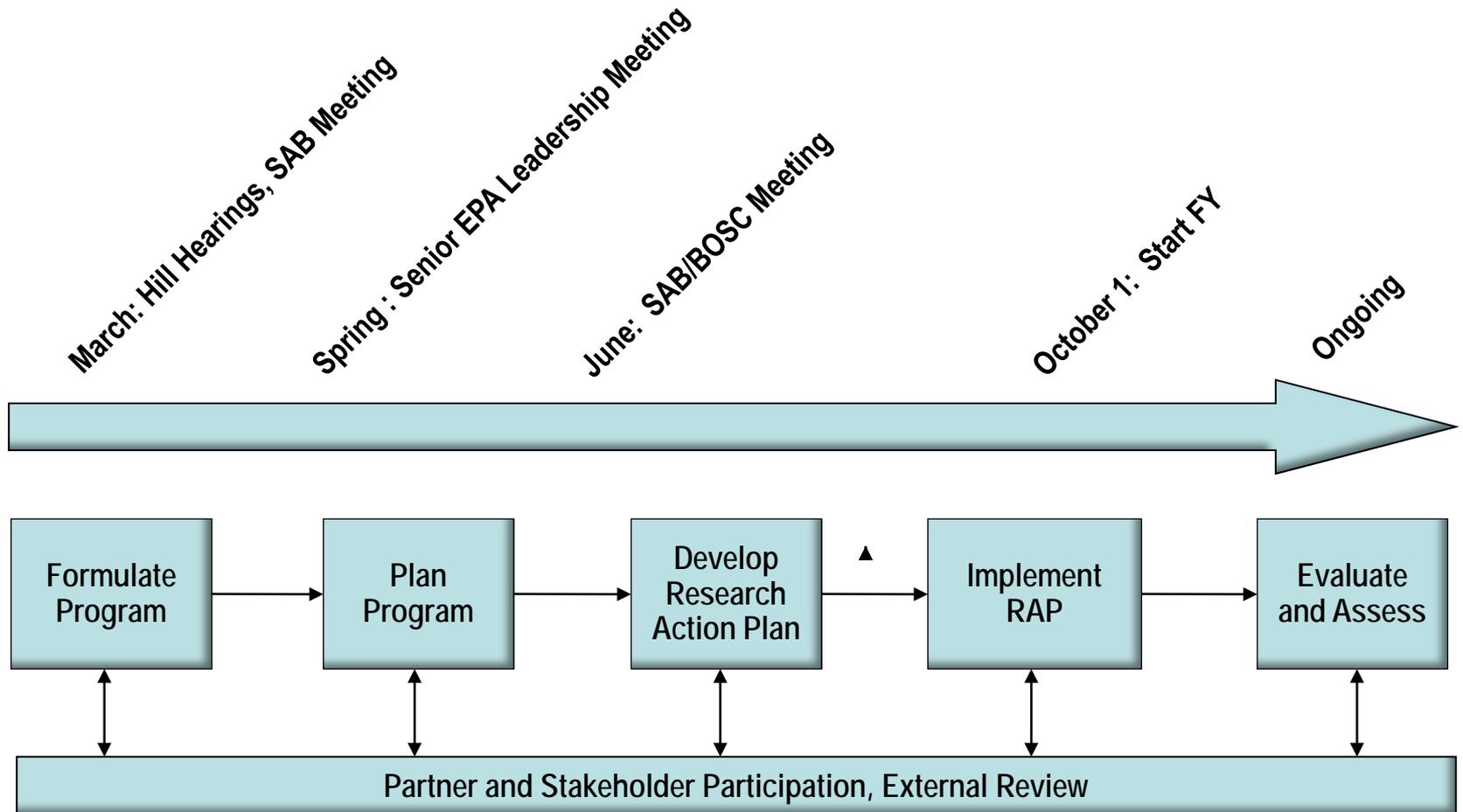


# Planning and Budgeting Activities

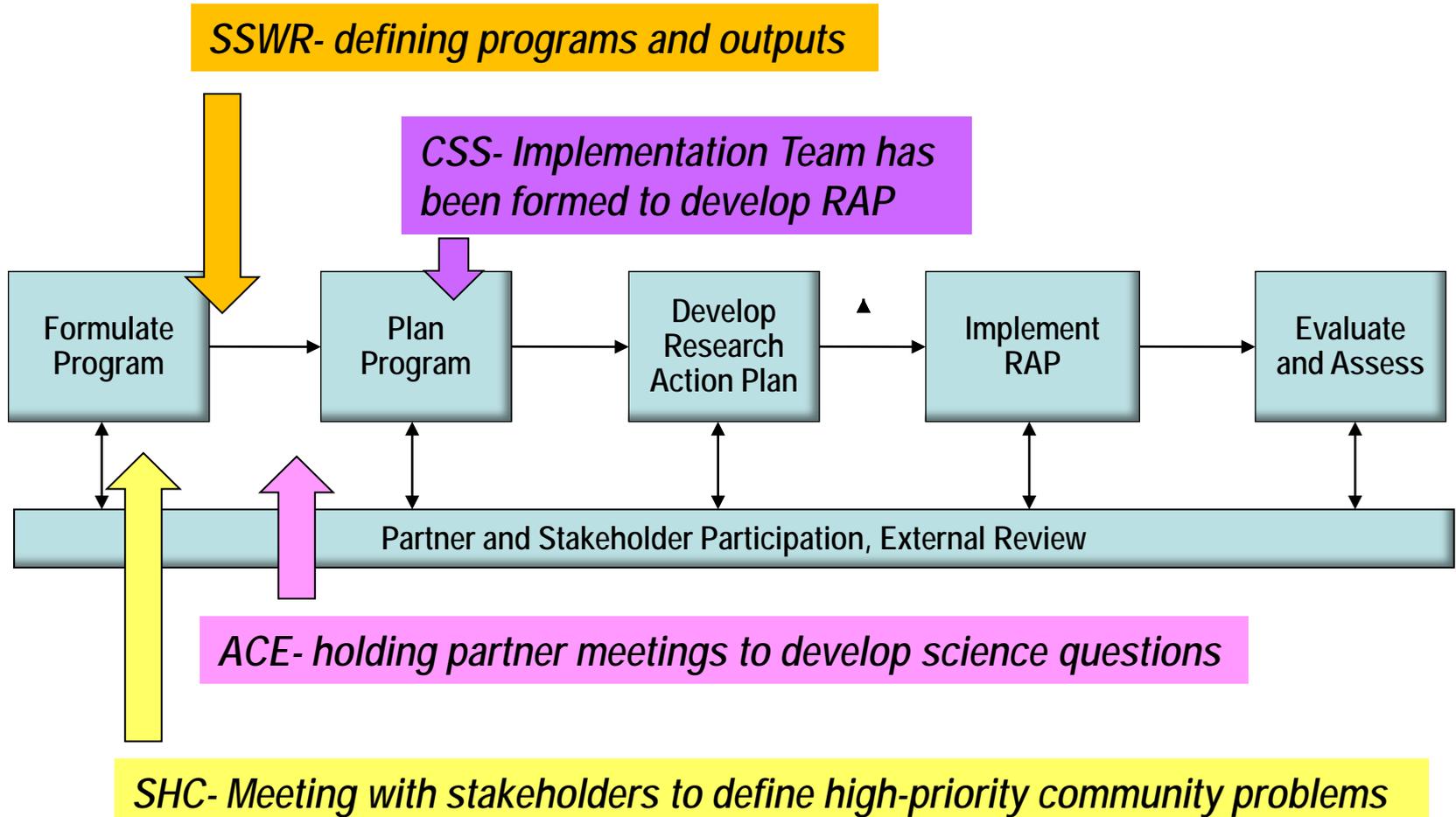
## February 2011-December 2011



# Research Portfolio Development and Management Process



# Research Portfolio Development and Management Process: Status



## Rising to the Challenges of Today

*“As we celebrate 40 years of incredible accomplishments, we find ourselves at a critical juncture. We have a new awareness of environmental complexity and, at the same time, we have new tools, insights, and experiences to guide our mission. It is time to rise to the challenges of today, using the best of what we have, to meet the needs of the current generation while preserving the ability of future generations to meet theirs as well.”*

EPA Administrator Lisa Jackson  
November 30, 2010 speech to the  
National Academy of Sciences

# The National Research Council “Green Book”

1. What should be the operational framework for sustainability for EPA?
2. How can the EPA decision-making process rooted for more than two decades in the risk assessment/risk management paradigm be integrated into this new sustainability framework?
3. What scientific and analytical tools are needed to support the framework?
4. What set of strategic metrics and indicators should EPA build to determine if sustainable approaches are or are not being employed successfully?
5. Which assessment techniques and accounting protocols should the Agency adopt to inform ongoing efforts to improve Agency sustainability practices and procedures?

# ORD Innovation

## What we are working towards. . .

- Pathfinder Innovation Projects: supporting the inherent talents of ORD scientists and engineers to be innovative
- External challenges: harnessing external ingenuity to help solve problems
- Collaborative platforms for both internal and external participants

## Charge Questions to the SAB

The SAB is requested to provide EPA with advice on the following:

1. Do ORD's research programs, as presented to the SAB, align with the strategic program priorities identified by EPA's National Program and Regional offices?
2. Do ORD's research programs reflect coordination, and do they complement one another?
3. Do ORD's research plans reflect its commitment to sustainably protecting human health and the environment?
4. Based on EPA's presentations to the SAB, and Board members' own knowledge of efforts in the broader scientific community, how well does ORD's research program appear to complement environmental science programs elsewhere?
5. Based upon the SAB's knowledge of ORD's research programs, are these programs positioned to address the nation's highest priority, emerging environmental issues in the coming years?