United States Environmental Protection Agency

Science for EPA's Future: Innovative Thinking, Creative Solutions

Presentation to the EPA Science Advisory Board and ORD Board of Scientific Counselors

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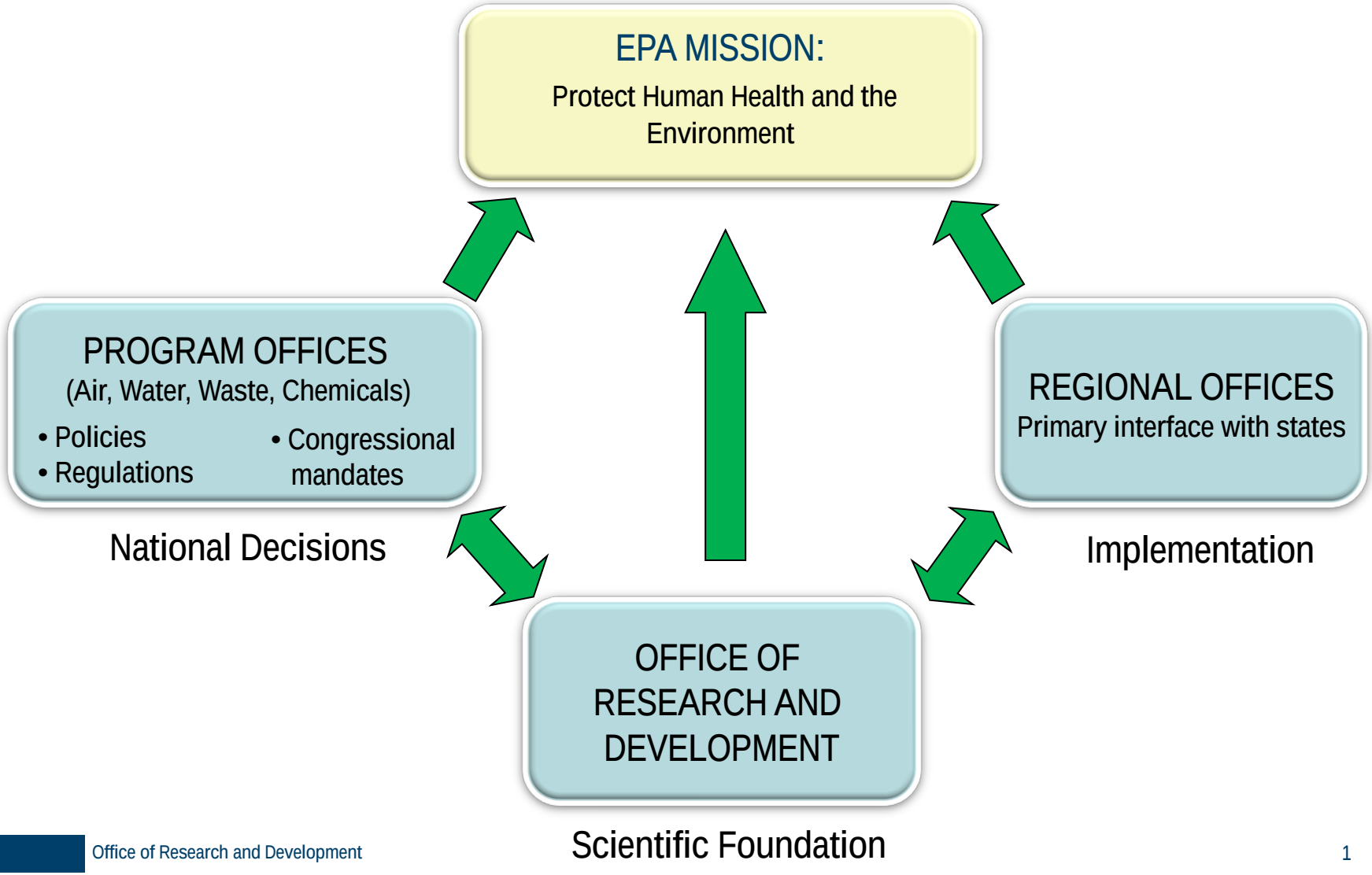
29 June 2011

ORD's Role in Achieving EPA's Mission



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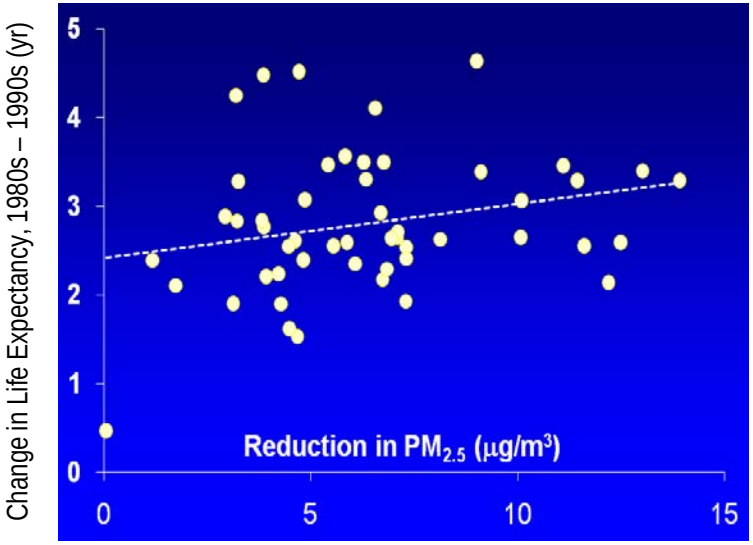
ORD at a Glance

- 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

Exemplary ORD Accomplishments

- Demonstrated $PM_{2.5}$ reduction between 1980 and 2000 has led to increased life-expectancy in the United States
- Developed the CANARY water contamination detection tool to observe water quality data in real time and flag possible contamination events
- For the BP Oil Spill, conducted tests of eight chemical dispersants alone and mixed with oil
- Participating in interagency efforts to develop both test methods for toxicity testing that are more scientifically and economically efficient and models for risk assessment that are more biologically based



A gain of
+0.61 yr/10 µg/m^3

Pope et al., NEJM 360:376 (2009)

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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

21st 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 exposures
- Increasing nitrogen and phosphorous impair water quality
- Environmental justice
- Thousands of new industrial chemicals and pesticides each year
- Chemical, biological, radiological-based terrorism

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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

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"Problems cannot be solved at the same level of awareness that created them."

- Albert Einstein

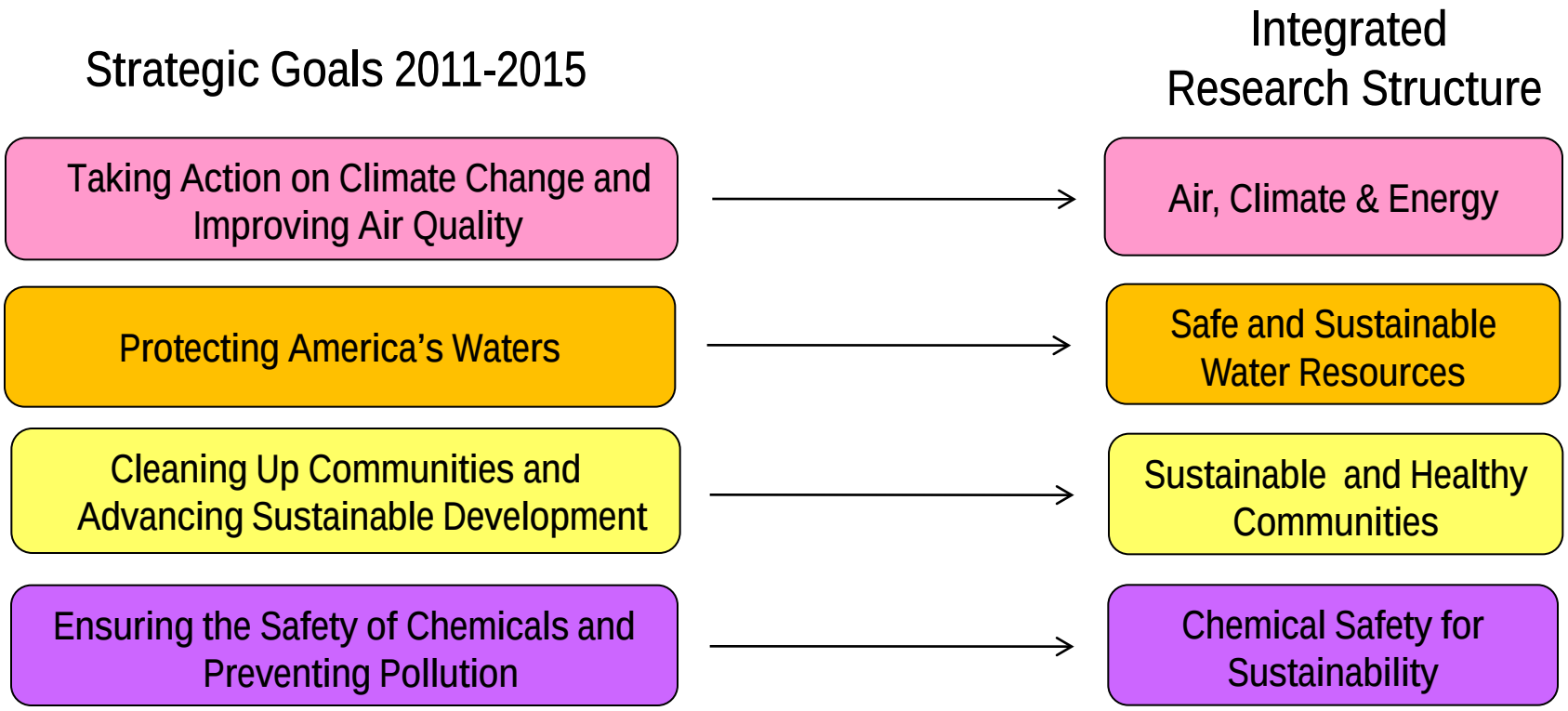
Moving Toward an ITR Approach

- 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

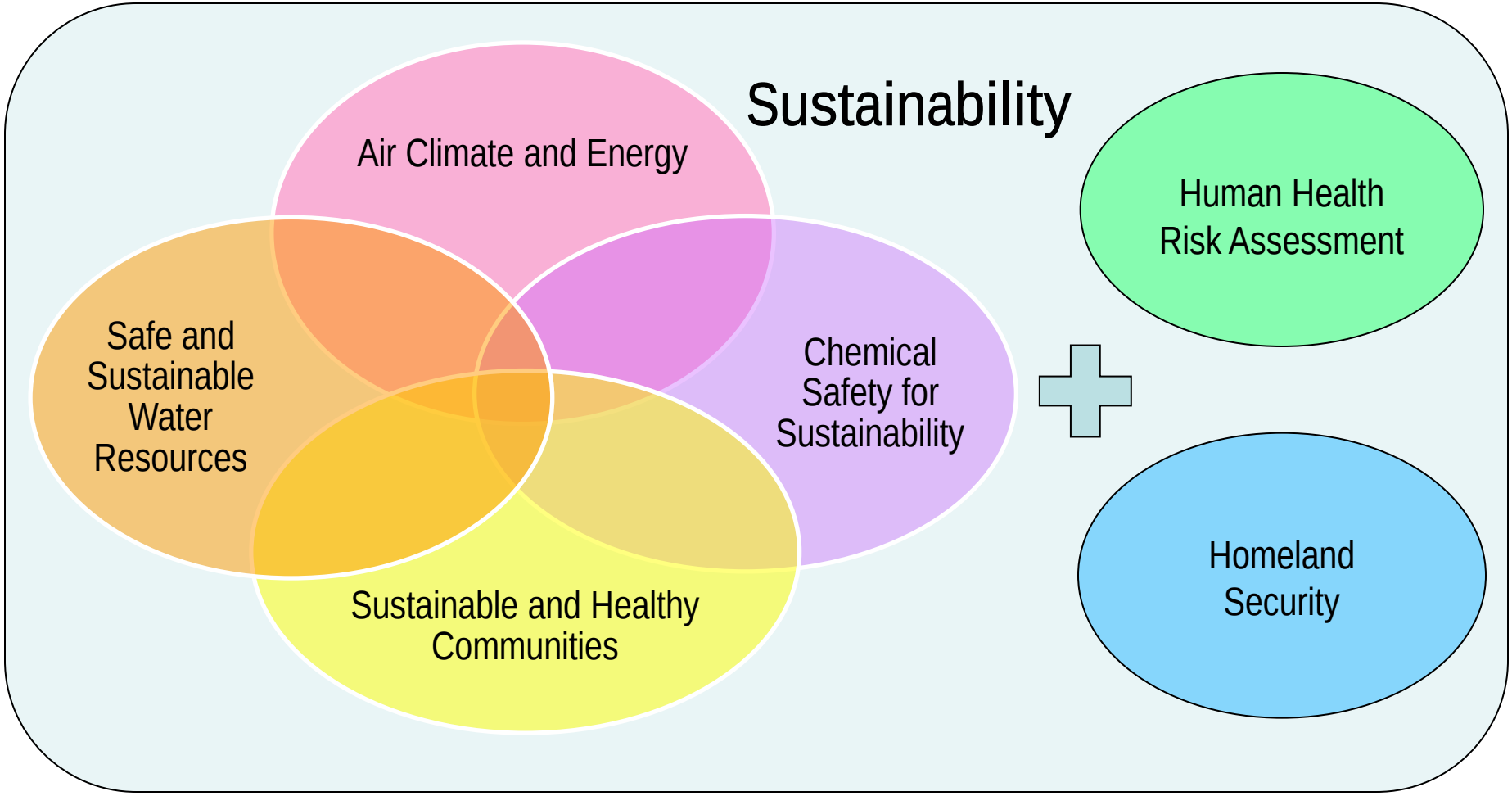
Former ORD Research Structure	Integrated ORD Research Structure
Global Change Research	Air, Climate & Energy
Sustainability Research	
Clean Air Research	
Human Health and Ecosystems Research	
Drinking Water Research	Safe and Sustainable Water Resources
Water Quality Research	
Human Health and Ecosystems Research	Sustainable and Healthy Communities
Pesticides & Toxics Research	
Sustainability Research	
Fellowships	
Land Research (Excluding Nanotechnology)	
EDCs Research	Chemical Safety for Sustainability
Computational Toxicology Research	
Human Health & Ecosystems Research	
Human Health Risk Assessment (NexGen)	
Pesticides & Toxics Research	
Land Research (Nanotechnology)	
Clean Air Research (Nanotechnology)	
Sustainability Research	
Human Health Risk Assessment	Human Health Risk Assessment
Homeland Security	Homeland Security

Realigning our Research

We re-structured our research programs to be aligned with EPA's Strategic Goals



Integrated ORD Research Programs



A Systems Approach to Sustainability

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

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

Ecological goods and services are utilized in society

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

Adapted from: J. Fiksel, A Framework for Sustainable Materials Management, *Journal of Materials*, August 2006.

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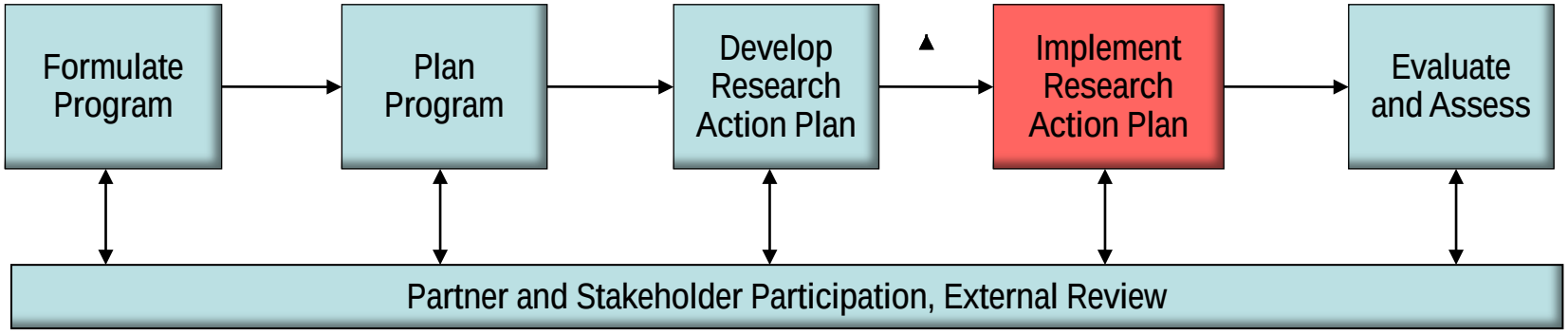
The National Research Council "Green Book"

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?

Research Portfolio Development and Management Process



Challenges

- Meeting the short-term and long-term needs of ORD's Agency partners
- Incorporating social sciences into ORD's research efforts
- Rewarding integrated transdisciplinary research
- Operationalizing sustainability in ORD and EPA
- Identifying "game changing" vs. incremental research

Change "Science for EPA's Future"
to "EPA Science for the Planet's Future"

Behavioral/Social Sciences

- Human Behavior
- Role of Communication
- Relationship between Perceptions, Beliefs and Attitudes
- Status of Environmental Education
- Role of Business and other Organizations
- Governance and Community-led Engagement
- Economic Valuation of Environmental Policy

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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

EPA's FY 2012 Pres Bud Request for Research

Extramural, Intramural, and Administrative Resources

Program/Project	Extramural Research Program (STAR)		Intramural Research Program		Administrative Costs		ORD Total	
	$000	FTE	$000	FTE	$000	FTE	$000	FTE
Air, Climate & Energy	$26,751	6.9	$72,409	237.2	$8,839	65.5	$108,000	309.6
Safe & Sustainable Water Resources	$11,870	2.2	$94,355	344.4	$12,551	93.0	$118,776	439.6
Sustainable & Healthy Communities	$33,743	18.4	$137,809	471.8	$17,750	131.5	$189,302	621.7
Chemical Safety for Sustainability	$18,080	5.0	$69,220	225.8	$8,357	61.9	$95,657	292.7
Human Health Risk Assessment	$0	0.0	$40,152	154.4	$5,590	41.4	$45,742	195.8
Homeland Security	$0	0.0	$24,805	51.0	$1,847	13.7	$26,652	64.7
Total	$90,444	32.5	$438,750	1484.6	$54,935	407.0	$584,129	1924.1

Charge Questions to the SAB/BOSC

- How well do ORD's research programs align with the strategic program priorities identified by EPA's National Program and Regional Offices? If resources allow, what are areas for increased emphasis? If resources decline, what areas might be appropriate for decreased emphasis?

- How can ORD enhance coordination among its research programs, and better ensure that they complement one another?

- How well do ORD's proposed research directions reflect its commitment to sustainably protecting human health and the environment?

Charge Questions to the SAB/BOSC

- How do the six programs fit together as an integrated environmental research strategy, charged with informing decisions on the nation's most critical environmental issues? Are these programs positioned to address the nation's highest priority, emerging environmental issues in the coming years?

- Based on Board members' familiarity with efforts in the broader scientific community, how well do ORD's research programs appear to catalyze and complement environmental science programs elsewhere? What suggestions do the members have for how EPA's research programs could improve upon their leveraging with those of others?

- How does the SAB/BOSC view ORD's activities in stimulating innovative research and what other suggestions would the SAB/BOSC have to promote innovation in EPA research?

EPA Commemorates its 40th Anniversary

10 Ways EPA has Strengthened America

1. Banning widespread use of DDT
2. Removing the acid from rain
3. Rethinking waste as materials
4. Removing lead from gasoline—and the air
5. Clearing secondhand smoke
6. Vehicle efficiency and emissions controls
7. A cleaner environment for all
8. Managing toxics
9. Cleaner water
10. Public information and community right to know

EPA Commemorates its 50th Anniversary

10 Additional Ways EPA has Strengthened America

1.
2.
3.
4.
5.
6.
7.
8.
9.
10.

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sustainable

A cleaner environment for all

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Conclusion

- EPA research is addressing the nation's most critical science and technology priorities to assure that policy and regulatory actions needed to protect public health and our natural environment are based on strong science.
- The Agency's research program must evolve to effectively solve 21st century environmental challenges.
- EPA has shifted its research focus toward an integrated, systems approach to develop innovative, sustainable solutions to these challenges.
- We look forward to continued collaboration with the SAB and the BOSC as we position our research program to continue to anticipate and respond to increasingly complex environmental challenges.