

Introduction to EPA's Office of Research and Development

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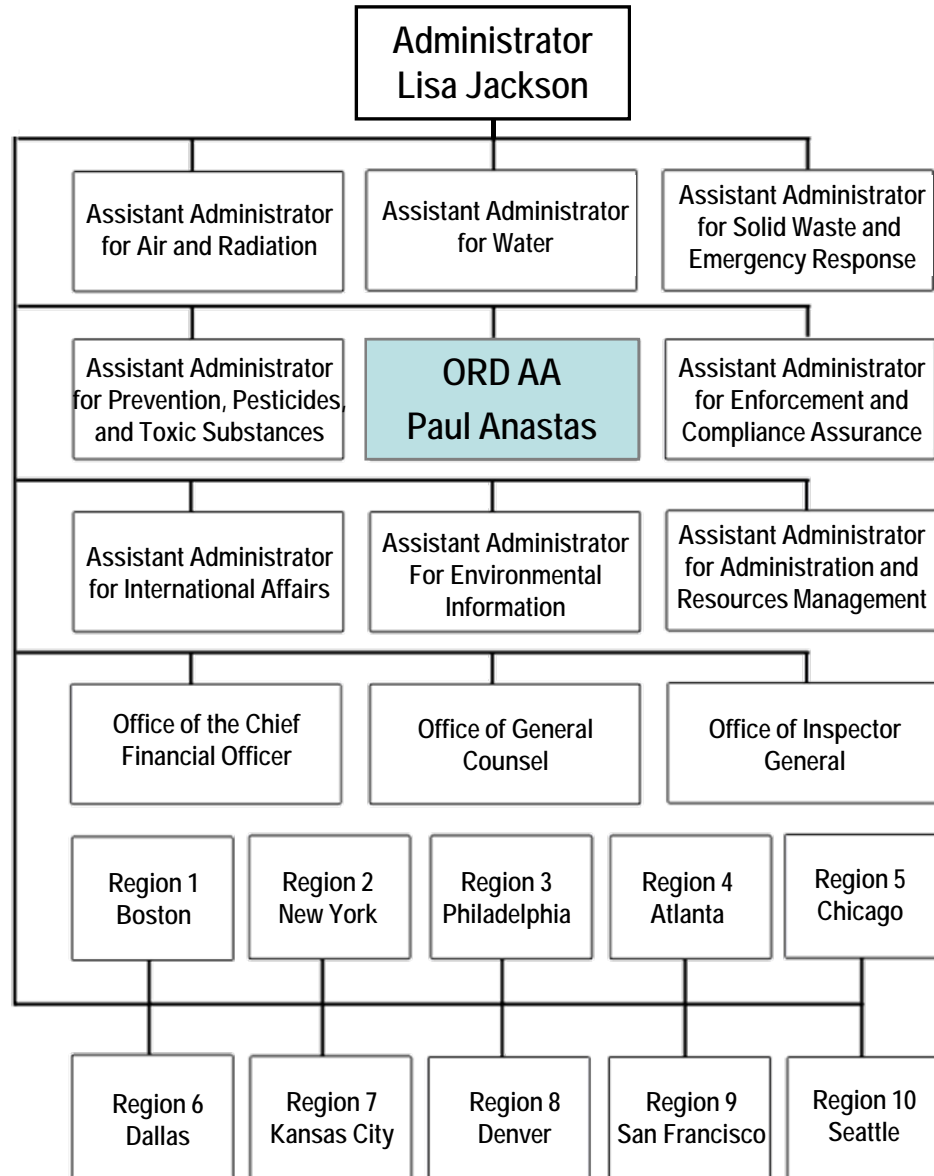


EPA Commemorates its 40th Anniversary

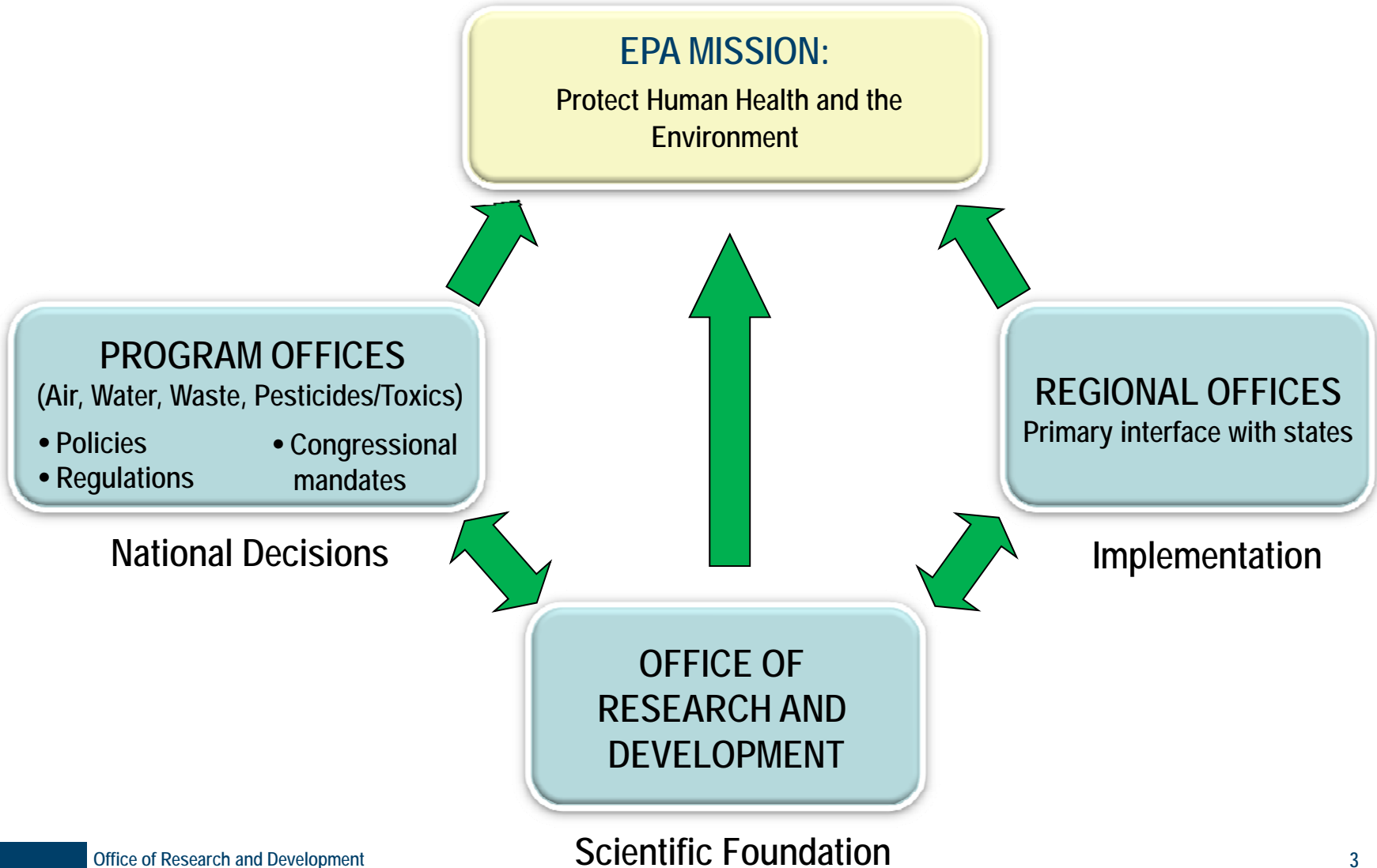
10 Ways EPA has Strengthened America

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 Does Research!



ORD's Role in Achieving EPA's Mission



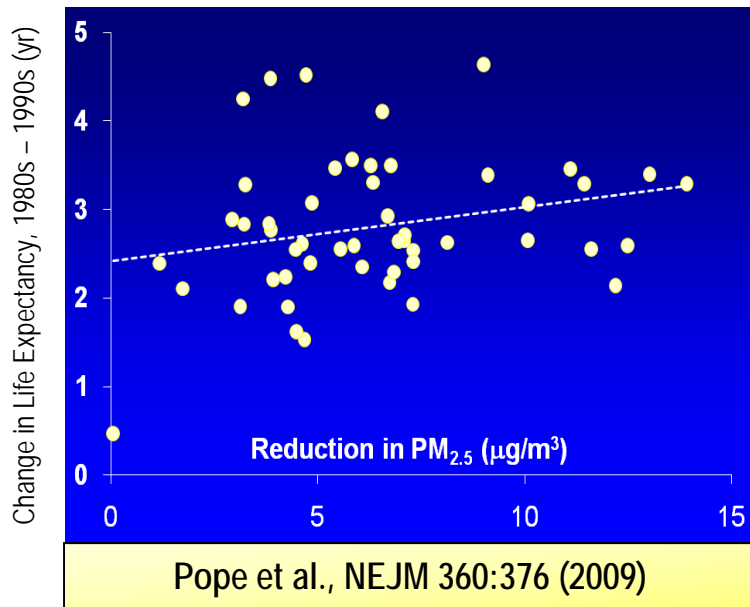
ORD at a Glance

- 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

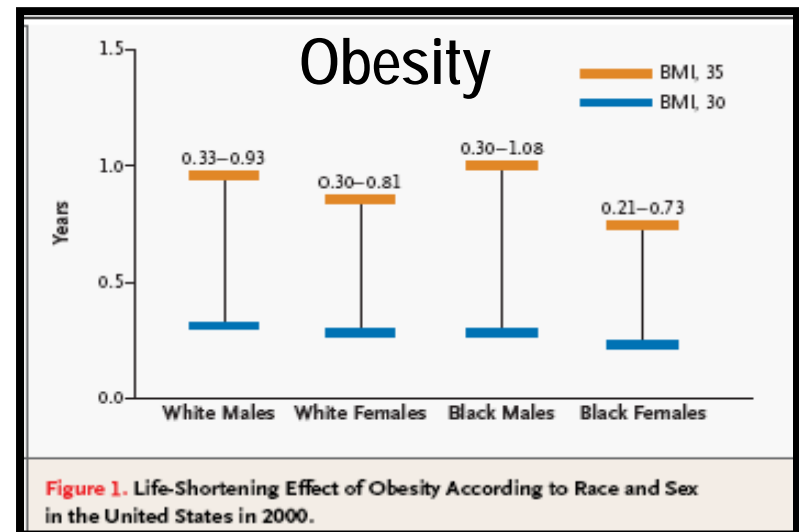
Breathe Cleaner, Live Longer



The effects of PM_{2.5} on life expectancy are equivalent to those from obesity.

PM_{2.5} reduction between 1980 & 2000 has led to increased life-expectancy in the U.S.

**A gain of
+0.61 yr/10 µg/m³**

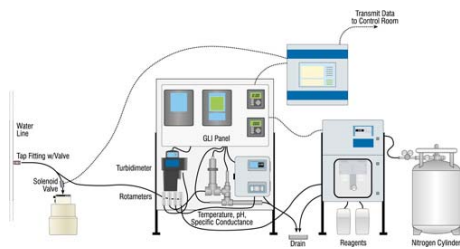


Olshansky et al., NEJM 352:11 (2005)

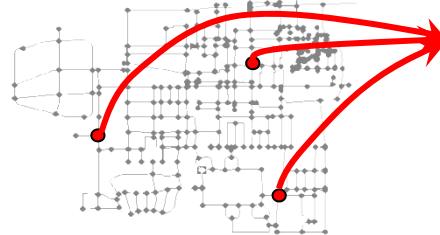
Ensuring Security of Water Supplies

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

Consequence Management Plan

**CANARY
ALERT!**

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

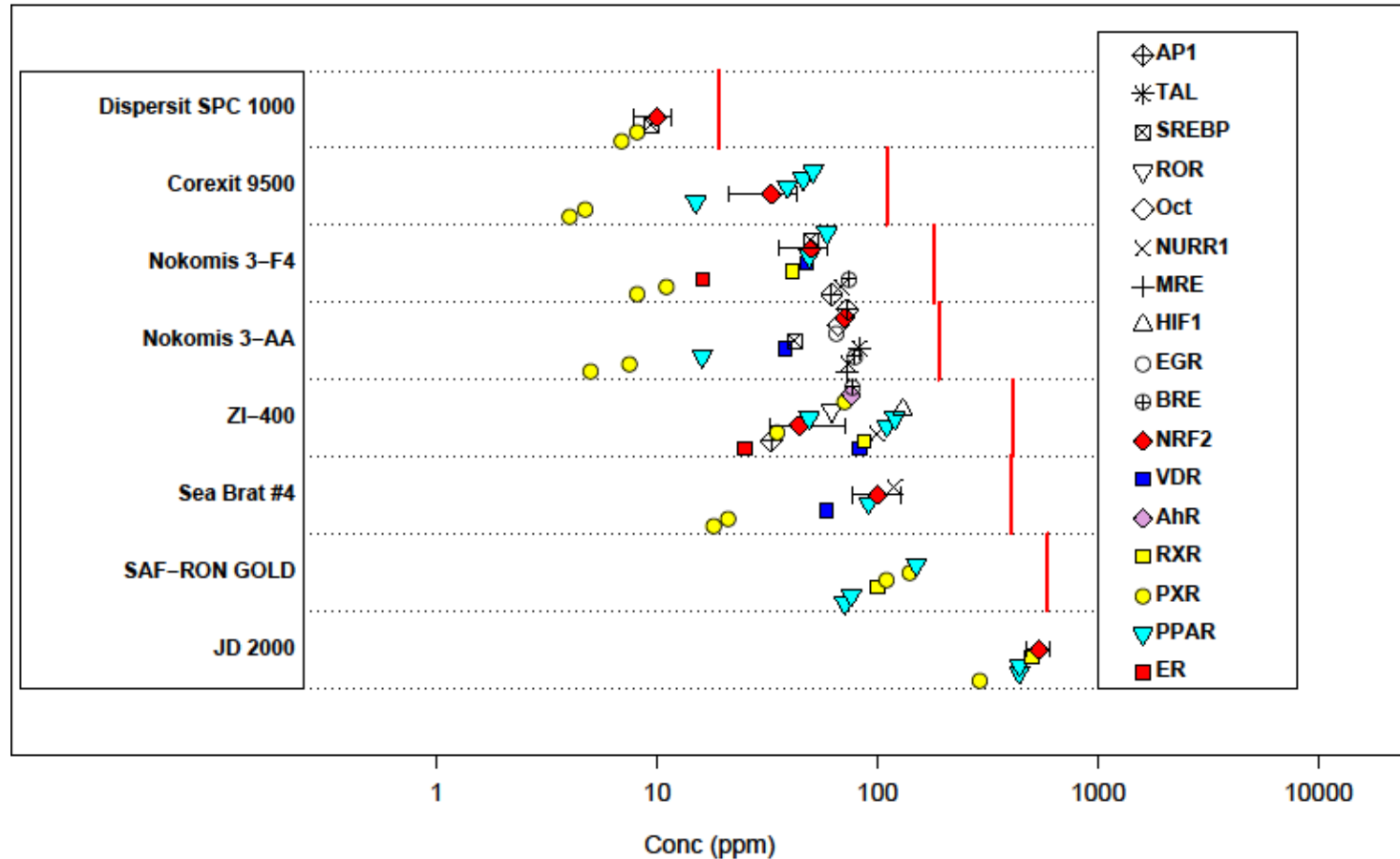
Testing the Toxicity of Dispersants from the BP Oil Spill

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



TOXICITY TESTING IN THE 21ST CENTURY
A VISION AND A STRATEGY
NATIONAL RESEARCH COUNCIL
OF THE NATIONAL ACADEMIES



- Research, develop, validate and translate innovative chemical testing methods that characterize toxicity pathways
- Investigate the use of new tools to:
 - identify mechanisms of chemically induced biological activity
 - prioritize chemicals for more extensive toxicological evaluation
 - develop more predictive models of *in vivo* biological response
- Success in achieving these goals is expected to result in test methods for toxicity testing that are more scientifically and economically efficient and models for risk assessment that are more biologically based

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

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.”

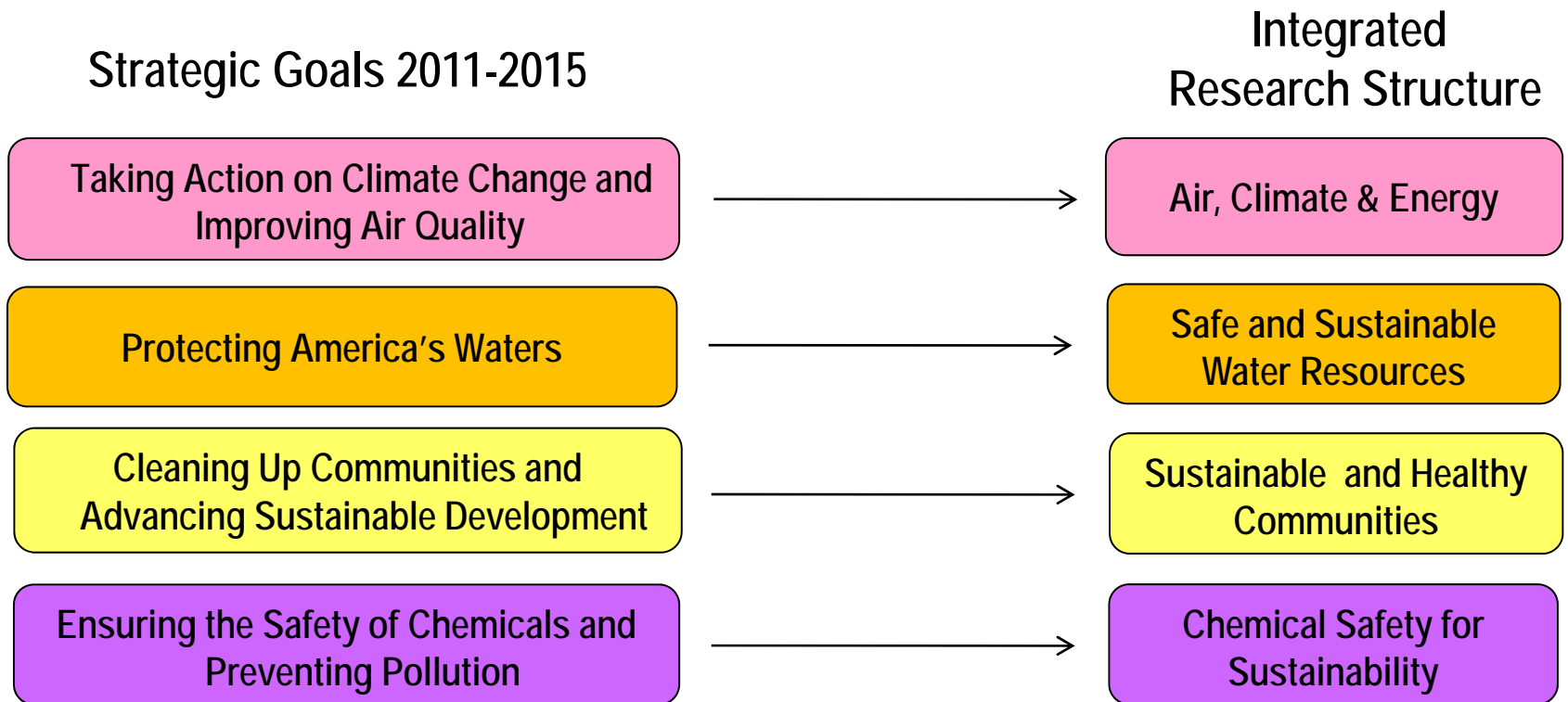
- Albert Einstein

Moving Toward an ITR Approach

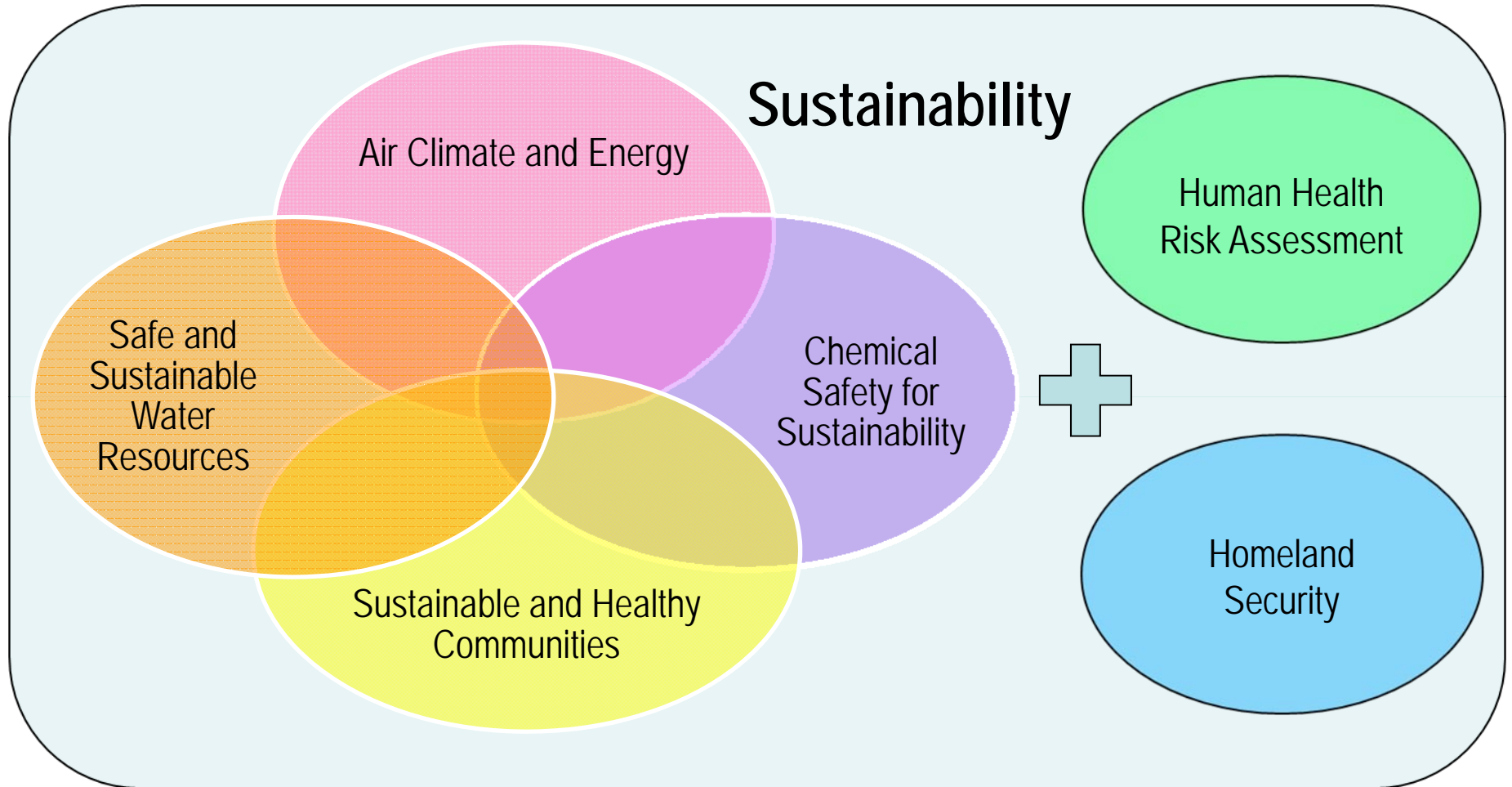
- Re-orient our research to sustainability: healthy environments v. acceptable risk
- Move away from stove-pipes
- Promote systems thinking and innovation
- Couple excellence in problem assessment with excellence in solving problems
- Encourage integrated, transdisciplinary research
 - Across ORD labs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

Realigning our Research

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



Integrated ORD Research Programs



Unsustainable Resource Utilization

Industry
(products, energy)

*Economic value
is created for society*

Society
(communities, governments)

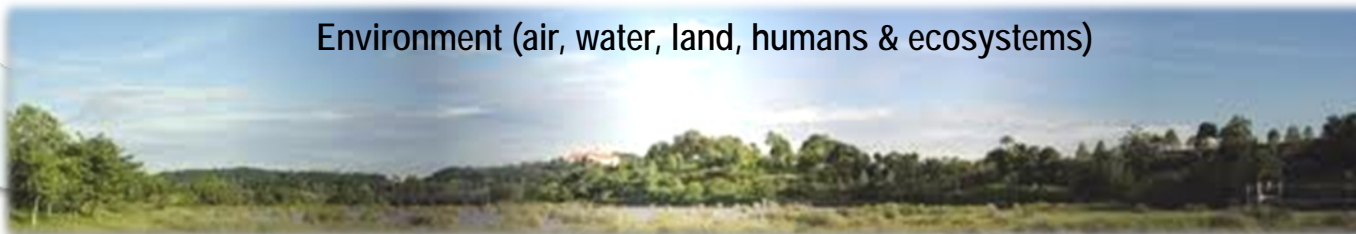


Labor is utilized in industry

*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)



Incorporating Sustainability in the EPA

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

Timely, Relevant, and Responsive Research

- “All NAAQS all the time”
- Cook Stoves
- Hydraulic Fracturing
- Water Technology Cluster
- National Conversation
- Libby, MT Asbestos
- PCBs in Schools
- IRIS Assessments

EPA is Very Involved with SOT

- Over 200 U.S. EPA Presentations and Posters
- Exhibition Booth (All week)
- Announcement of EPA's Clean Air Research Centers (Monday)
- Paul Anastas on Sustainable World Workshop (Tuesday)
- Tox 21 Consortium Progress (Wednesday)
- Bob Perciasepe Plenary Lecture (Thursday)



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 SOT as we position our research program to continue to anticipate and respond to increasingly complex environmental challenges.