SAB/BOSC Meeting on Strategic Directions for EPA Research, 2016-2019

U.S. EPA’s Office of Research and Development

Robert Kavlock, Ph.D.
Deputy Assistant Administrator for Science
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This Presentation

- ORD Strategic Directions 2016-2019
- ORD Cross-cutting Research
- Role of the SAB and the BOSC
- Charge to the SAB/BOSC
Aligning Research with EPA Strategic Goals

Cross-Agency Strategies

- Sustainable Future
- Visible Difference in Communities
- New Era of Partnerships
- High-Performing Organization

EPA Goals 2014-2018

- Addressing 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 Laws, Ensuring Compliance

Research Programs

- Air, Climate & Energy
- Safe and Sustainable Water Resources
- Sustainable and Healthy Communities
- Chemical Safety for Sustainability
- Human Health Risk Assessment
- Homeland Security
### Research Planning to Research Results

#### Advisors and Stakeholders

<table>
<thead>
<tr>
<th>EPA Programs and Regions</th>
<th>EPA Strategic Strategic Plan</th>
<th>Congressional Mandates</th>
<th>States, Tribes, Local governments Other stakeholders</th>
<th>External Science Advisors</th>
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#### Process Flow

1. **Strategic Research Action Plans**
   - Needs & Priorities

2. **Conduct Research and Develop Products**
   - Research Priorities & Schedule
   - Feedback

3. **Deliver Products**
   - Feedback & Evaluation
ORD’s FY 2015 President’s Budget by Research Program Projects

- Air, Energy, and Climate, $101.9M
- Safe and Sustainable Water Resources, $114.2M
- Sustainable and Healthy Communities, $158.6M
- Chemical Safety and Sustainability, $98.6M
- Human Health Risk Assessment, $40.7M
- Homeland Security, $23.2M

Totals may not add due to rounding.
**ORD Total Budget with Inflation Indices**

*(enacted budget, includes earmarks, dollars in millions)*

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**Nominal**

<table>
<thead>
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<th>Year</th>
<th>Budget (in millions)</th>
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<td>1999</td>
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<tr>
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**CPI**

- Denotes non-linear changes in resources between 1999-2009.

Becoming a High-Performing Organization

- Re-orienting our research to sustainability: healthy environments v. acceptable risk
- Moving away from stove-pipes
- Promote systems thinking and innovation
- Relevant, responsive and timely research
- Emphasizing communication of our results
Next Generation Air Monitoring

- Developing and stimulating new technology
- Evaluating emerging sensor technology
- Promoting community participation in air monitoring
- Satellite-based air quality measurements
- Working with federal partners (NASA, NOAA, NSF)

Mobile monitoring for geospatial mapping of pollutants (GMAP)  "Village Green" park bench monitors air quality
Transformative Science for Risk Assessment

- Combine different types of data in new ways to characterize impacts of chemicals to human health and the environment
- Develop and apply rapid, efficient and effective chemical safety evaluation methods
  - High throughput toxicology
  - Working with NIEHS, NCATS, FDA
- Adopt a systems-based approach to examine the complex interactions among exposures and biological effects
  - Virtual tissue models
- Incorporate new science, methods and technologies into risk assessment
• **What is a Strategic Research Action Plan (StRAP)?**
  – Describes our research program for internal and external audiences
  – Developed in consultation with advisors (SAB and BOSC), EPA partner offices, other stakeholders
  – Serves as our planning document; guides allocation of resources ($ and people)
  -- High level strategic document

• **Early Input from SAB and BOSC**
  – Preliminary Drafts: just beginning 2016-2019 StRAP updates
  – This kicks off the year long process with EPA partners and stakeholders
  – High level strategic plan; are we heading in the right directions?
Cross-cutting Research

- Climate change
- Nitrogen and co-pollutants
- Children’s environmental health
- Environmental justice
Roadmaps for Cross-cutting Issues

• Purposes
  – Describe coordination/collaboration with EPA and federal partners, and others
  – Show how research is integrated across the six programs; identifies gaps
  – Catalyze integration across the 6 programs
  – Focused on a small number of cross-cutting issues

• Research Roadmaps at different stages of development
  – Nitrogen and Co-Pollutants
  – Climate Change
  – Children’s Environmental Health
  – Environmental Justice

• Key Distinction from StRAPs
  – Not creating additional research programs beyond the six
  – Do not serve as basis for resource planning
  – Informed by and inform the StRAPs
Strengthening Our Science

Strong commitment to quality science and peer review

- **EPA’s Science Advisory Board**
  - Input on strategic directions for research; special topics

- **ORD’s Board of Scientific Counselors**
  - Advice on program operations
  - Ongoing advice through new subcommittees for research programs

- **National Academy of Sciences**
  - Provides recommendations on special topics
Strategic Directions

Why input at such a high level?

- Many EPA partner needs
- Many possible directions/topics
- Resources and staff are limited
- Balance between filling immediate partner needs and longer-term research investment

Need to maximize impact

Many agencies & organizations conduct environmental research

EPA has unique capabilities and niche

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What do we mean by strategic direction?

Research Topics

Over-Arching Issues

SSWR

Watershed Sustainability

Nutrients

Green Infrastructure

Water Systems (small)

Sustainability

Stressors (climate change, extreme events)
Future Interaction with BOSC

• BOSC Executive Committee
  – Provides advice, information and recommendations on technical and management issues

• Five new BOSC Subcommittees
  – ACE, CSS/HHRA, HS, SHC, SSWR
  – Chair/Vice-Chair for each on BOSC EC
  – Provide periodic advice to the programs
    • research program design, science quality, innovation, relevance and impact
Future Interaction with SAB

• Review of ORD science products
  – Report on the Environment
  – Chemical assessments (IRIS)
  – other

• Science advice on priority topics for EPA

• Review of the EPA FY16 S&T President’s Budget?
Overall Questions

1. a. Considering the proposed research directions and focus, how well is ORD as a whole poised to support EPA in meeting the goals of the EPA Strategic Plan?

1. b. What are the SAB/BOSC perspectives overall on the proposed research directions providing research to address environmental issues of 2020 and beyond?

9. a. Do ORD’s plans, taken collectively, indicate that integration, where appropriate, will develop the needed scientific knowledge and produce results that advance EPA’s ability to address complex problems?
2. a. How well will the research directions in each Early Draft StRAP (2016-2019) support EPA in achieving the relevant Agency objectives and cross-cutting strategies, as described in the EPA Strategic Plan (2014 – 2018)?

2. b. What are the SAB/BOSC perspectives on the proposed research directions in each StRAP providing research to address environmental issues of 2020 and beyond?

2. c. For each program, do the presentations and plans indicate that ORD is designing for integration, where appropriate, on topics that are relevant to other research programs?

Additional specific charge questions articulated for each research program
8a. How effective is each Draft Roadmap in presenting a problem statement, elucidating key research topics, capturing relevant research in each of the six programs, and identifying any important scientific gaps?
Looking Ahead

Building expertise for the Future

• Social Science
  – economics, anthropology, psychology
• Computational Science
  – informatics, chemistry
• Monitoring
  – air and water sensors
• Ecological Assessment
  – restoration, energy extraction impacts
• Decision Support
  – GIS expertise, energy modeling
Looking Ahead with Citizen Science

• Citizen science is volunteers partnering with scientists to answer real-world questions.

• What can ORD do with citizen science?
  – Reconnect people to the environment and increase understanding of the scientific process.
  – Collect data at a scale not possible before.
  – Utilize new technologies – mobile internet, apps, online databases, low-cost sensors, social media.
  – Use science to engage / empower communities to solve local environmental issues.
  – Provide guidance on new technologies (sensors)
Of all the challenges we face as a nation and as a planet, few are as pressing as the three-pronged challenge of climate change, sustainable development and the need to foster new and cleaner sources of energy.

*U.S. Office of Science and Technology Policy, 2014*

The Next Industrial Revolution will fundamentally change the way we make things and where. The transformation to digital fabrication … will impact everything.

*The Wilson Center, 2012*

The emerging field of “synthetic biology” holds great promise…but the US government needs to take precautions to ensure that laboratory-made microbes do not cause unexpected catastrophes.

*The Presidential Commission for the Study of Bioethical Issues, 2010*

Global systemic environmental risks include…. greater incidence of extreme weather events, natural catastrophes, and man-made environmental catastrophes; major biodiversity loss and ecosystem collapse; and water crises.

*World Economic Forum, Global Risks 2014*
ORD’s Future

• President’s nominee for the Assistant Administrator for ORD announced, Tom Burke

• Experience with NAS and BEST
  – Member of several committees relevant to EPA, including *Science and Decisions*

• Served on EPA’s Science Advisory Board & the Executive Committee of the Board of Scientific Counselors

*Tom Burke*
Questions?