

Public Health Laboratories' Path Forward

Glenn Paulson, US Environmental Protection Agency

Public Health Laboratories are Essential to Improving Public Health

Top 10 Achievements in Public Health

1. Vaccines
2. Clean air and water
3. Safer and healthier food
4. Healthier and safer workplaces, homes and schools
5. Safer and healthier products
6. Healthier and safer communities
7. Healthier and safer environments
8. Healthier and safer workplaces
9. Healthier and safer products
10. Healthier and safer communities

Looming Issues

- Environmental Health**
Climate Change is the biggest public health challenge we face. It will affect all the biggest environmental health issues.
- In Our Lives**
Healthier, longer lives. Healthier, longer lives. Healthier, longer lives.

Moving Pollutant Assessment Forward

Multi-pollutant health effects
Integrate what we know about individual pollutants and how they interact to assess overall health effects.

High Throughput Screening
Subscreen laboratory studies to assess toxicity. Current test of choice: **in vitro** biological assays.

Integrated Environmental Modeling
Model complex interactions between environmental factors and human health. Key areas: Air Quality, Land Use, Socioeconomics, Environmental Health, and Human Health.

Moving Laboratory Efficiency Forward

Laboratory Enterprise Evaluation
Assess laboratory performance and efficiency.

Competency
Ensure laboratory staff have the necessary skills and knowledge.

Big Data
Analyze large volumes of data to improve laboratory operations.

Moving Community Involvement Forward

Citizen Science
Engage the public in scientific research and data collection.

Outreach
Communicate scientific findings to the public and stakeholders.

Public Health Laboratories are Moving Forward

Research and Innovation
Public Health Laboratories are Moving Forward

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Top 10 Achievements in Public Health

1. Clean Air Act
2. Clean Water Act
3. Superfund
4. Food and Drug Administration
5. National Environmental Policy Act
6. Occupational Safety and Health Act
7. National Traffic and Motor Vehicle Safety Act
8. National Highway Traffic Safety Act
9. National Child Abuse and Neglect Reporting Act
10. National Child Support Enforcement Act

Looming Issues

- Environmental Health**
Climate Change & the Impact on Public Health
Air Quality & the Impact on Public Health
Water Quality & the Impact on Public Health
- In the Lab**
Quality, Integrity, and Reliability
Efficiency, Cost, and Access
Workforce Development

Moving Pollutant Assessment Forward

Multi-pollutant health effects
Integrate chemical and physical pollutants to assess health effects. Includes: Multi-pollutant health effects, Multi-pollutant risk assessment, Multi-pollutant exposure assessment, Multi-pollutant toxicity assessment.

High Throughput Screening
Screening for chemical and physical pollutants. Includes: High throughput screening, High throughput toxicology, High throughput genomics, High throughput proteomics.

Integrated Environmental Modeling
Integrate environmental and health data. Includes: Environmental modeling, Health modeling, Integrated environmental modeling, Integrated health modeling.

Moving Laboratory Efficiency Forward

Laboratory Enterprise Evaluation
Assess laboratory performance. Includes: Laboratory Enterprise Evaluation, Laboratory Enterprise Review, Laboratory Enterprise Assessment.

Competency
Ensure laboratory staff are qualified. Includes: Competency, Laboratory Staff Competency, Laboratory Staff Training.

Big Data
Analyze large volumes of data. Includes: Big Data, Laboratory Data, Laboratory Information Systems.

Moving Community Involvement Forward

Citizen Science
Engage the public in scientific research. Includes: Citizen Science, Community Science, Public Participation.

Outreach
Communicate scientific findings. Includes: Outreach, Public Communication, Community Engagement.

Public Health Laboratories are Moving Forward

Research and Innovation
Quality and Reliability
Efficiency and Cost
Workforce Development

Public Health Laboratories are Essential to Improving Public Health

Top 10 Achievements in Public Health



1. Vaccination
2. Motor-vehicle safety
3. Safer workplaces
4. Control of infectious diseases
5. Decline in deaths from coronary heart disease and stroke
6. Safer and healthier foods
7. Healthier mothers and babies
8. Family planning
9. Fluoridation of drinking water
10. Recognition of tobacco use as a health hazard



Looming Issues

Environmental Health



"Climate change is the biggest public health challenge we face as well as the biggest economic challenge we face."
-Gina McCarthy 4/21/2014

In the Lab



Rapidly changing technology
Increased scrutiny
Decreased funding
Anti-science sentiment

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**THIS IS PUBLIC
HEALTH.**
thisispUBLIChealth.org

Looming Issues

Environmental Health



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In the Lab



Rapidly changing technology

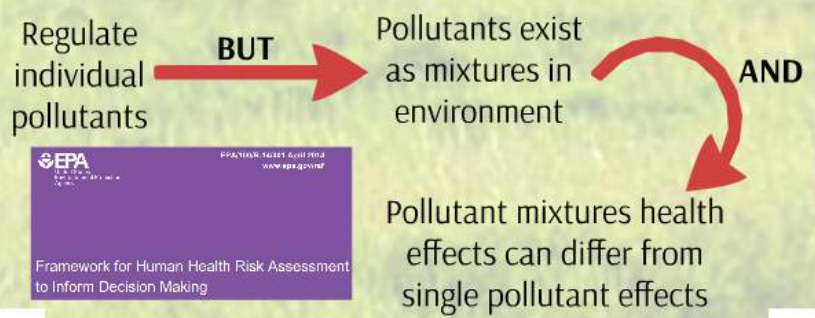
Increased scrutiny

Decreased funding

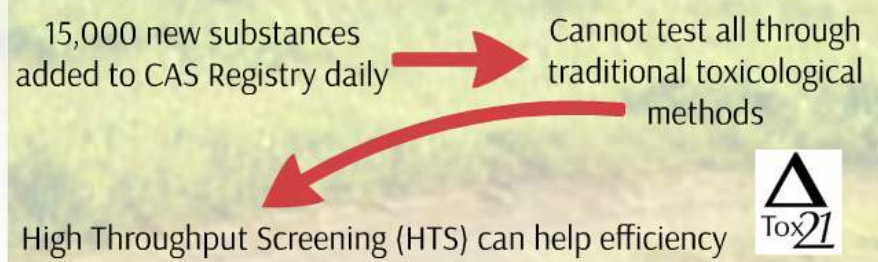
Anti-science sentiment

Moving Pollutant Assessment Forward

Multi-pollutant health effects



High Throughput Screening



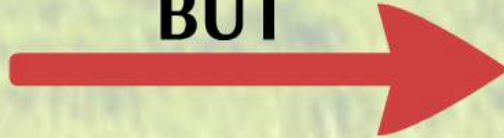
Integrated Environmental Modeling



Multi-pollutant health effects

Regulate individual pollutants

BUT



Pollutants exist as mixtures in environment

AND



Pollutant mixtures health effects can differ from single pollutant effects



EPA/100/R-14/001 April 2014
www.epa.gov/raf

Framework for Human Health Risk Assessment to Inform Decision Making

Integrated Envi

Assessment Forward

High Throughput Screening

15,000 new substances added to CAS Registry daily



Cannot test all through traditional toxicological methods



High Throughput Screening (HTS) can help efficiency



Computational Modeling

Pollutant mixtures health effects can differ from single pollutant effects

High Throughput Screening (HTS)

Integrated Environmental Modeling

Must consider

Culture

Location

Economics

Diverse Stakeholders

Current Health Condition

IEM can help incorporate these issues

Moving Laboratory Efficiency Forward

Laboratory Enterprises Evaluation

Background



Purpose and Status



Competency

Assuring the competency of environmental data generation and use

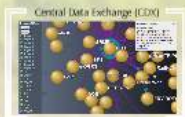


Ensure effective quality management systems and technical competence



Effective and efficient laboratories

Big Data



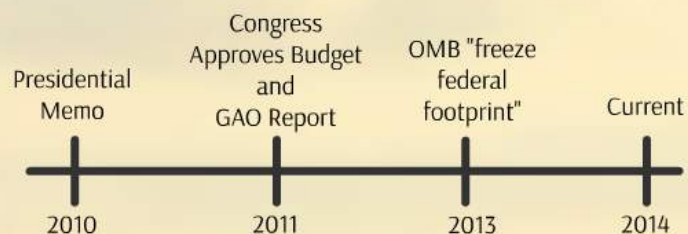
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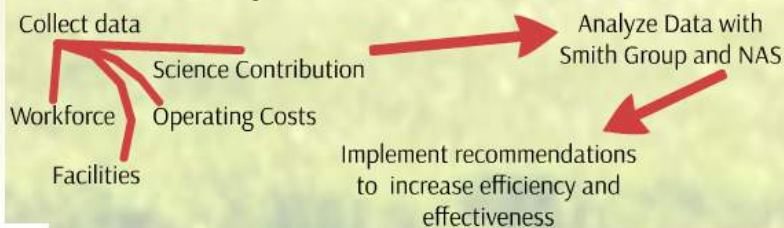
Moving Laboratory

Laboratory Enterprises Evaluation

Background



Purpose and Status

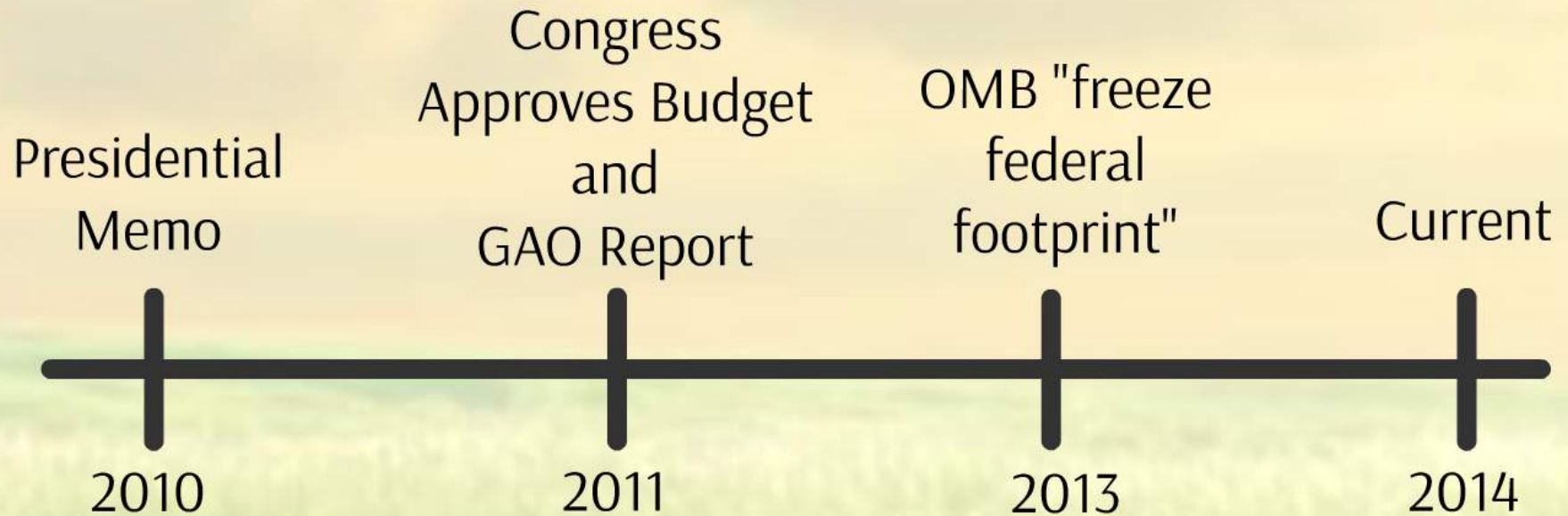


Big Data



Laboratory Effect

Background



Purpose and

EPA Laboratory Portfolio contains 34 facilities

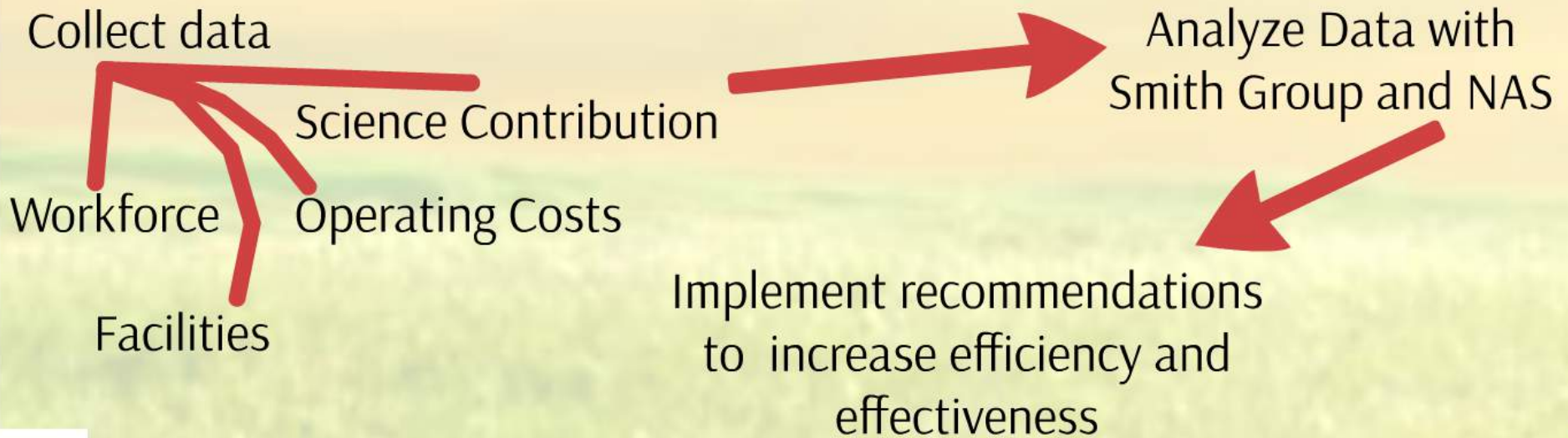


2013

2014

- Research Lab
- Regional Lab
- Program Lab

Purpose and Status



Competency

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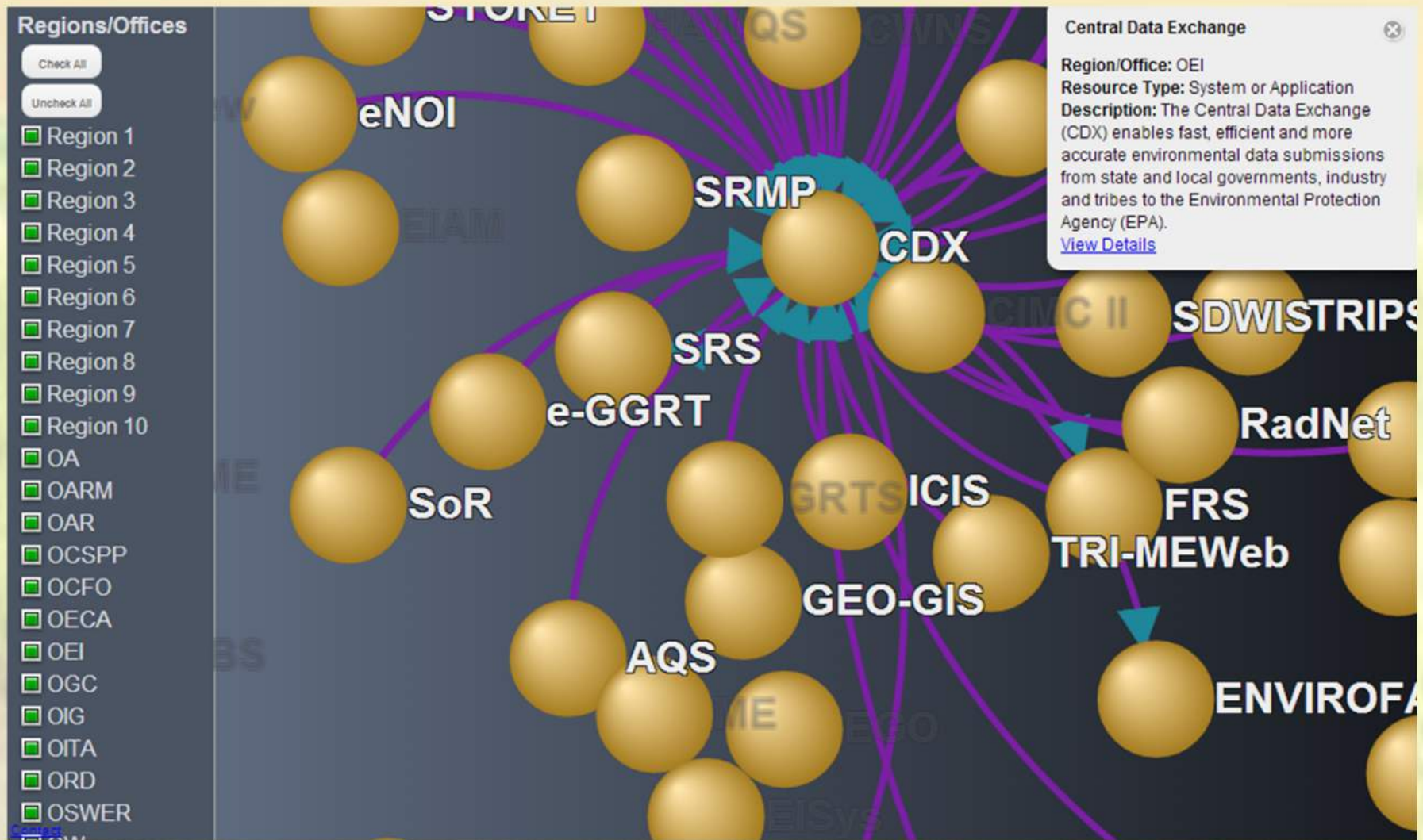
Ensure effective quality management systems and technical competence



Effective and efficient laboratories



Central Data Exchange (CDX)



Effective and efficient laboratories

**Analytical
Excellence, Inc.**

 **City of Lawrence**
K A N S A S

 **W A D E**
CONSULTING
AND SOLUTIONS

 **Analytical
Consulting
Technology, Inc.**

 **State
Hygienic
Laboratory**
at The University of Iowa

UC DAVIS
UNIVERSITY OF CALIFORNIA

 **FPL**

 **GRADIENT®**

IDEXX
LABORATORIES

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING



QCL
QC LABORATORIES



 **APHL**

 **ENVIRONMENTAL
MONITORING
DIVISION**

 **SAN ANTONIO
RIVER AUTHORITY**
Leaders in Watershed Solutions

 **ENVIRONMENTAL®
STANDARDS**

Moving Community Involvement Forward

Citizen Science

Public participation

Increase capabilities

Public cooperation

DISCOVER-AQ

Worked with public to test new sensor technology



Most citizen science sensors correlated with established EPA sensors

Outreach



Communicate laboratory science



Increase feedback and participation



Create better models and methods



Improve public health

Citizen Science

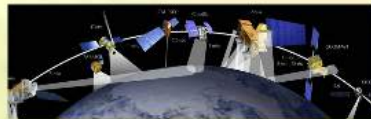
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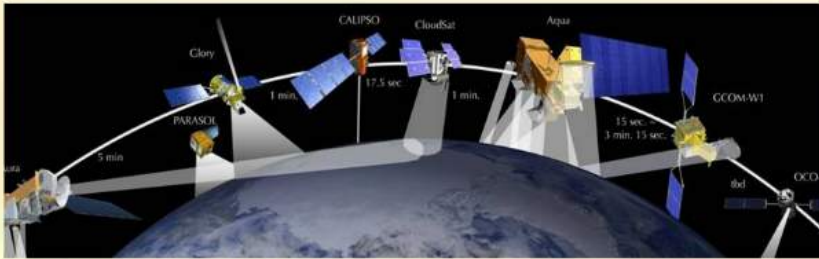
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Improve public health

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**Biomonitoring:
An Integral
Component**
OF PUBLIC HEALTH PRACTICE



**LABORATORY
EFFICIENCIES
INITIATIVE**

Transforming to a Sustainable Public Health Laboratory System



Lara Phelps
Senior Advisor on
Measurement, Monitoring
and Modeling

Biomonitoring: An Integral Component

OF PUBLIC HEALTH PRACTICE



WLA SECURITY SUMMIT



LABORATORY EFFICIENCIES INITIATIVE

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Outreach
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