

EPA Tools & Resources Webinar: The Opportunity for Prize Competitions at EPA

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Today's Agenda

1. The Opportunity of Crowdsourcing
2. EPA's Challenges & Prizes Program
3. Highlighted Challenges
 - Advanced Septic Sensor Challenge
 - Enhanced Efficiency Fertilizer Challenge
 - Wildland Fire Sensor Challenge
 - STEM Challenges
4. Working with Partners
 - PFAS Challenge
5. Resources
6. Questions and Discussion

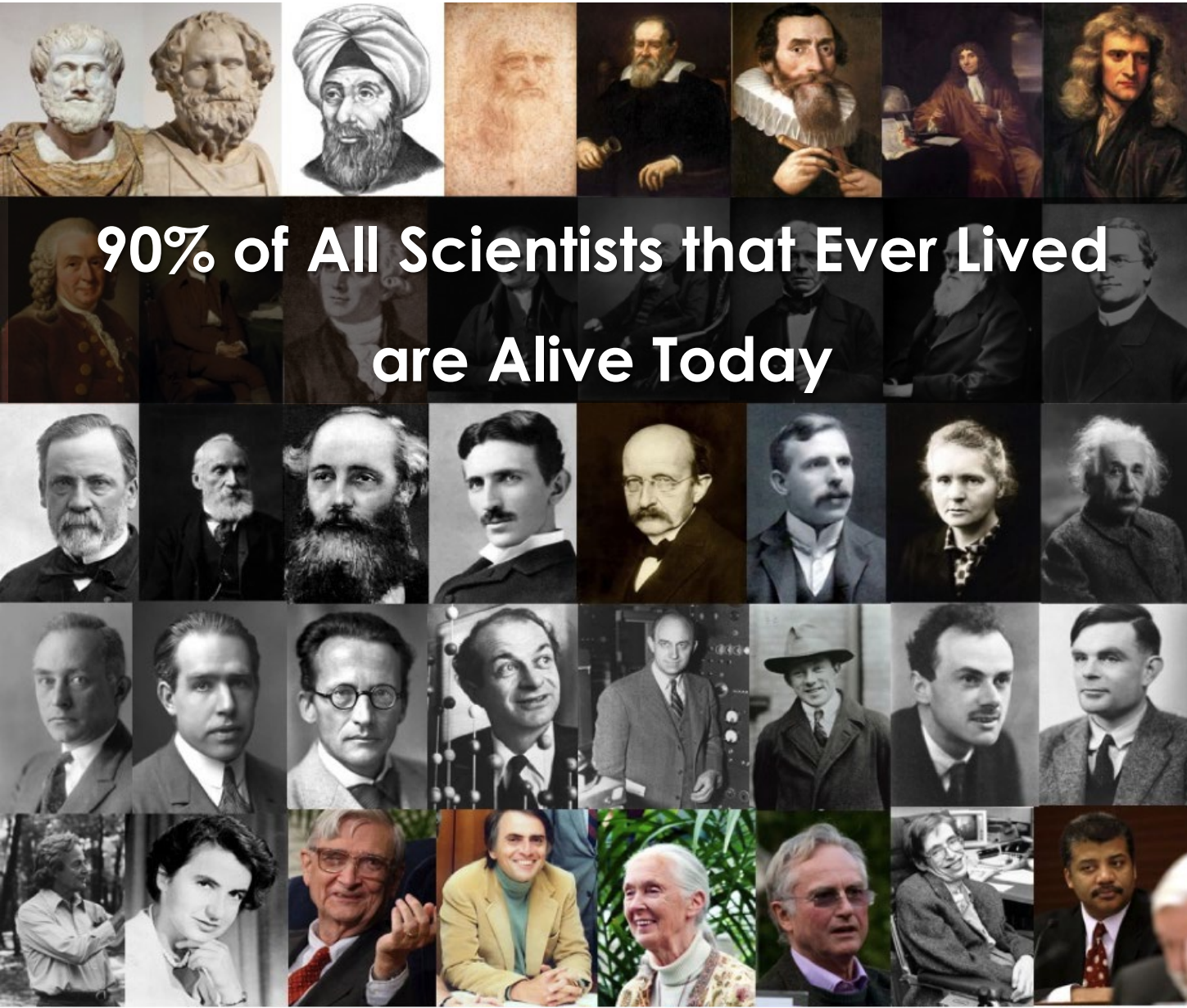




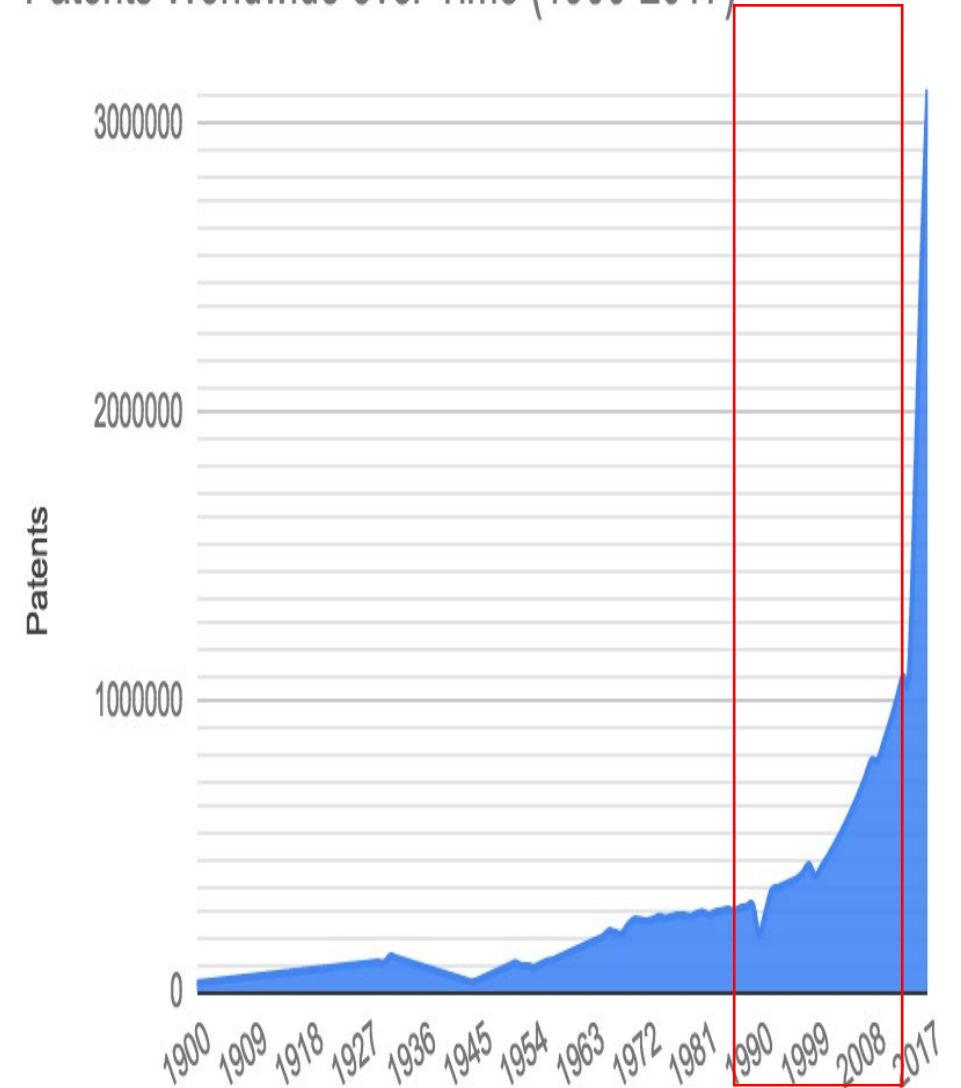
THE WORLD IS CHANGING...



The Opportunity of Crowdsourcing

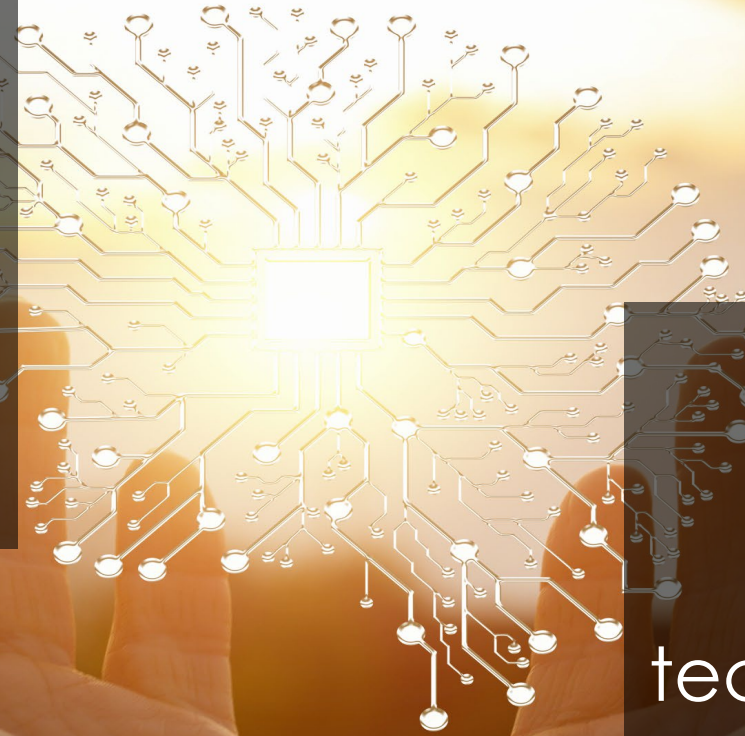


Patents Worldwide over Time (1900-2017)



PRO

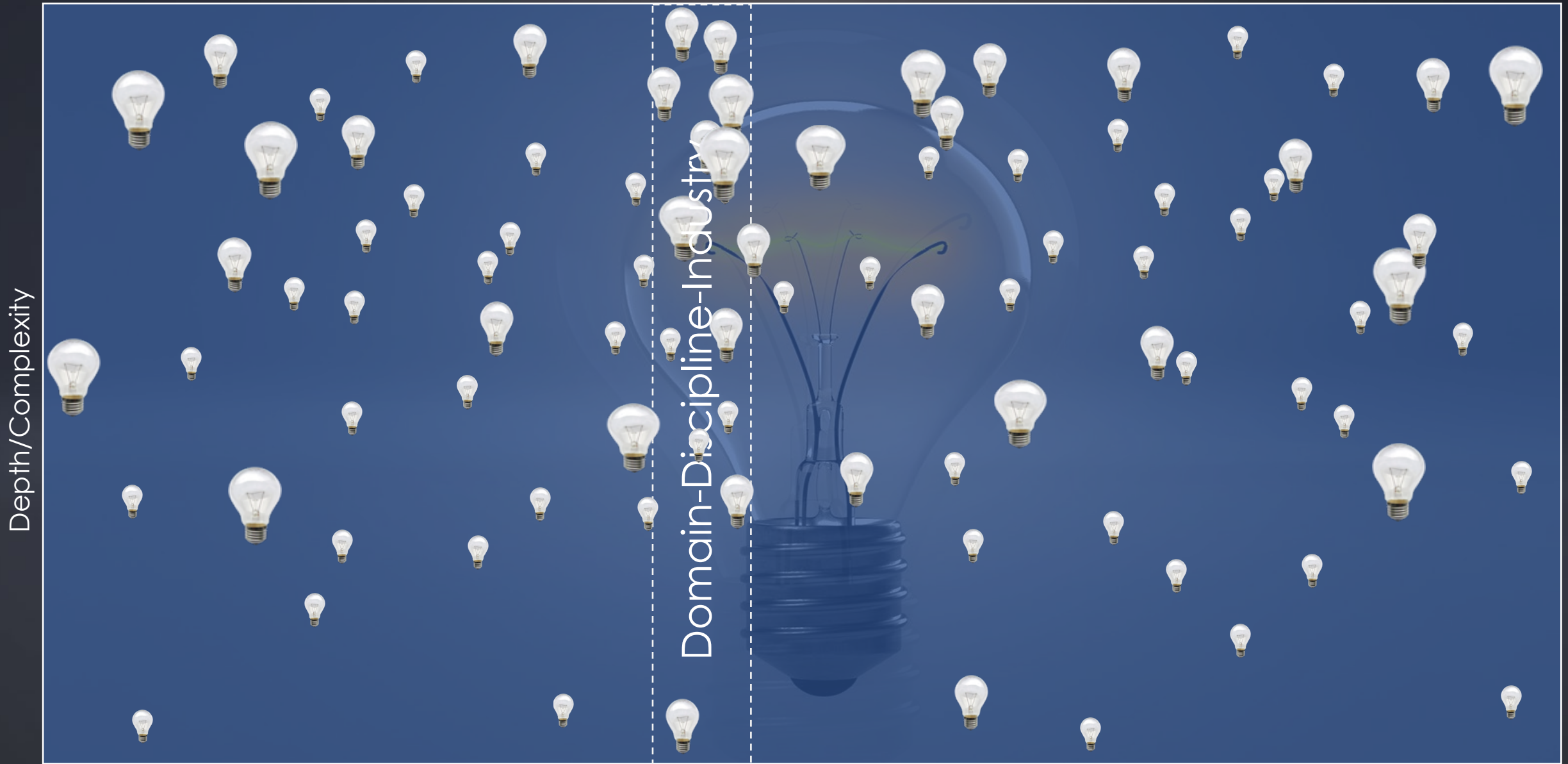
Amazing new technologies that could result in significant gains towards solving hard problems



CON

Finding these technologies & solutions across the growing number of possible sources is hard

The Breadth and Depth of Skills, Expertise, and Technology

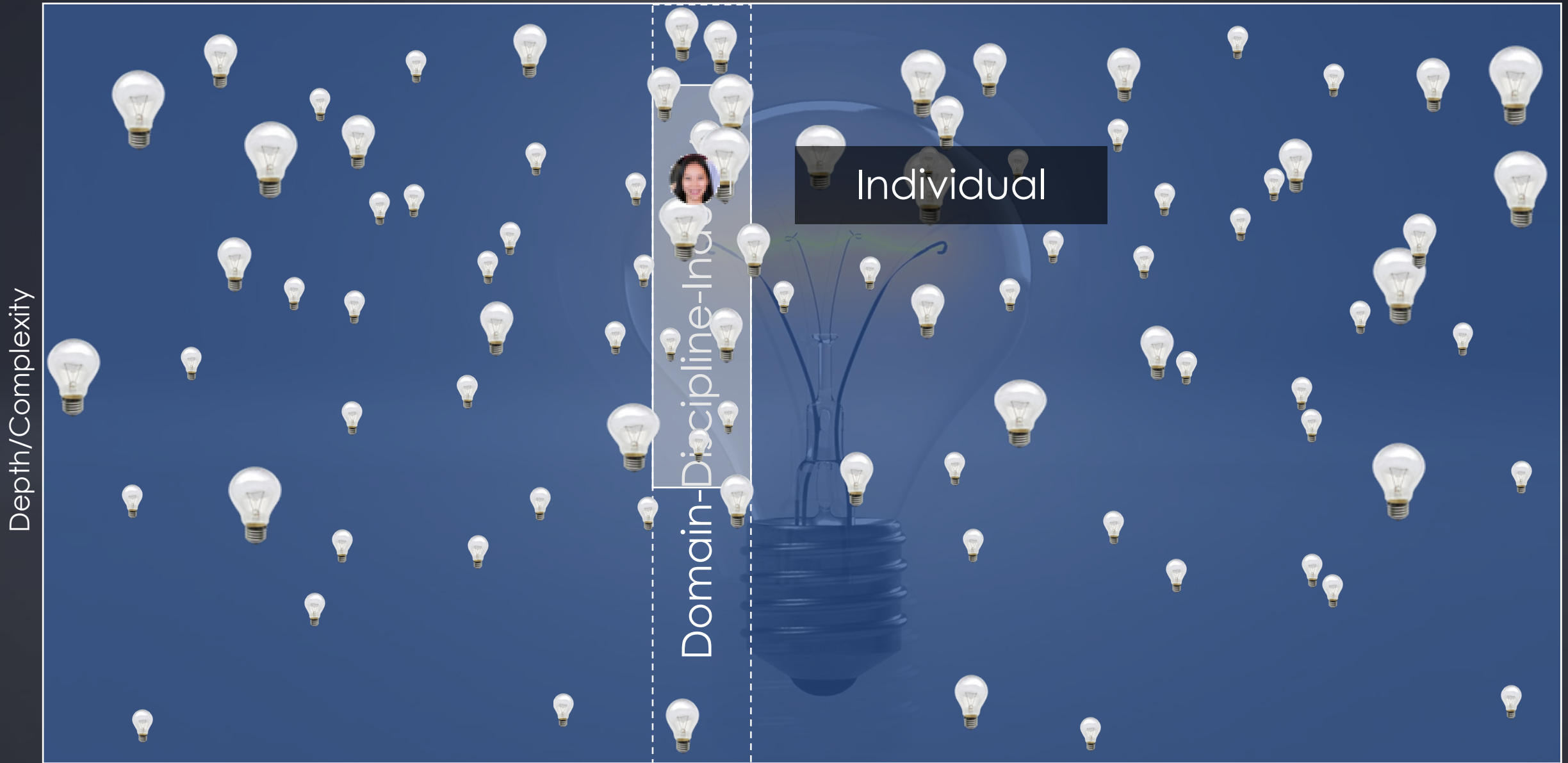


Depth/Complexity

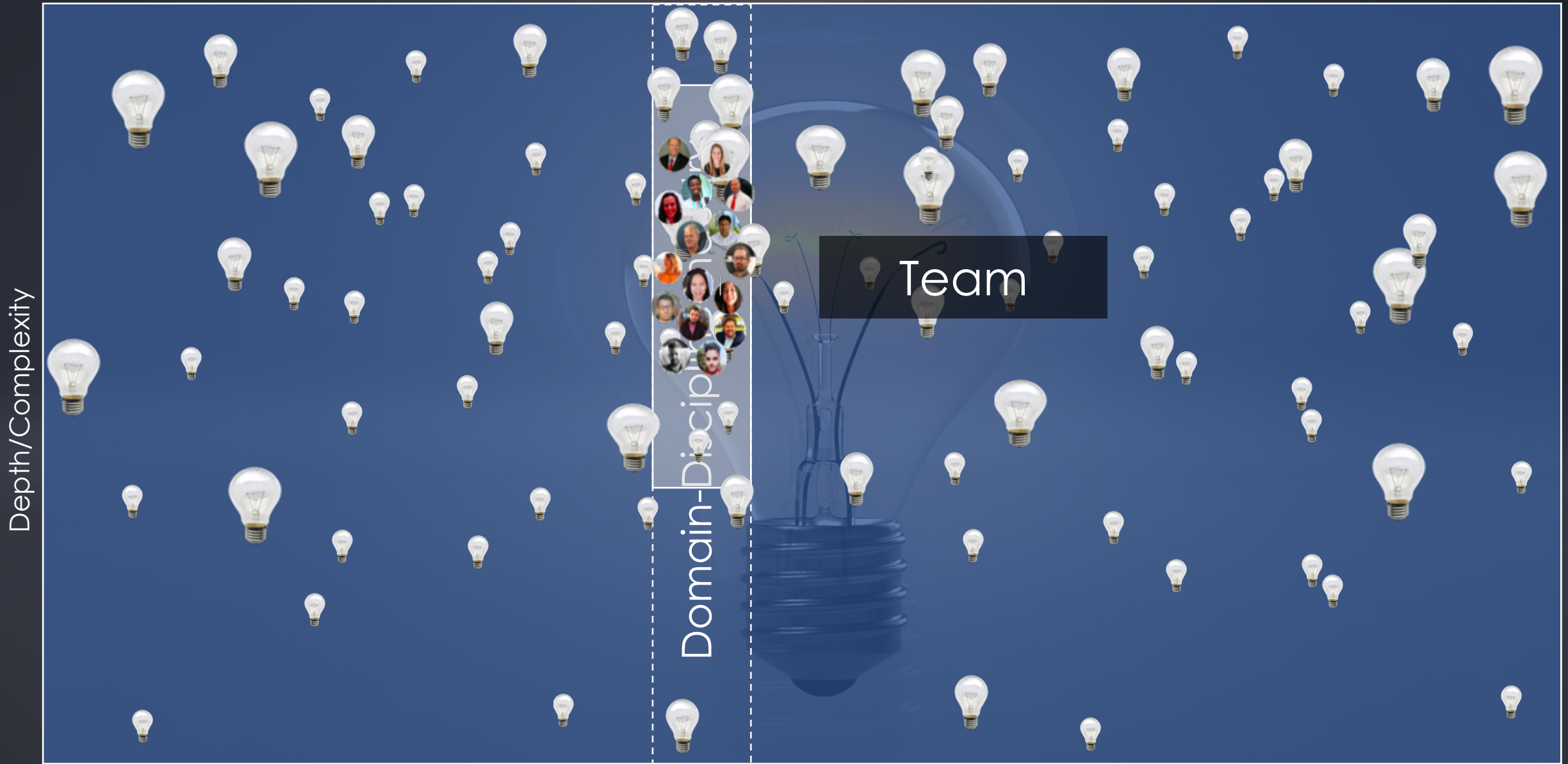
Domain-Discipline-Industry

Breadth of Domain Expertise and Technologies

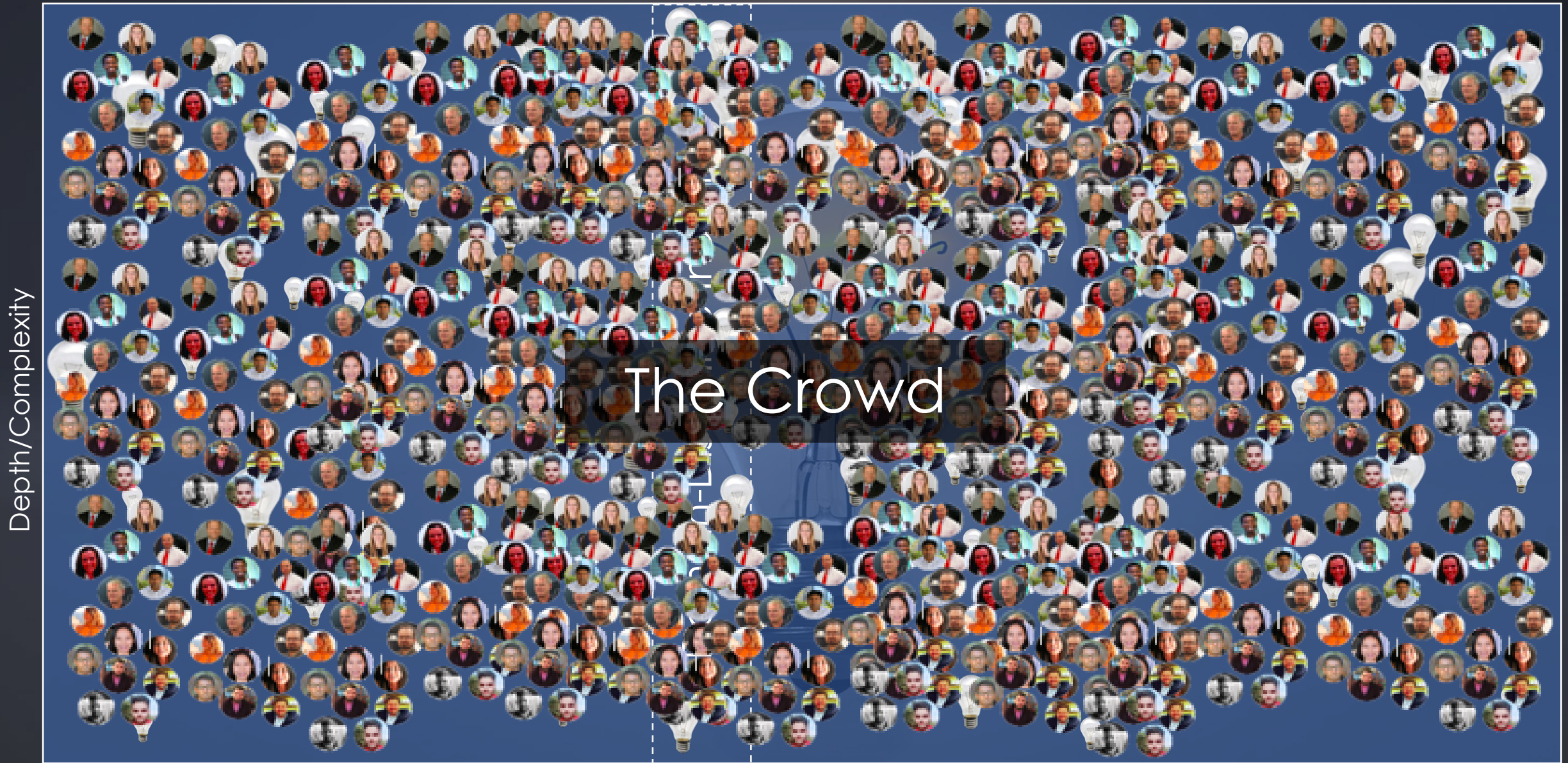
The Breadth and Depth of Skills, Expertise, and Technology



The Breadth and Depth of Skills, Expertise, and Technology



The Breadth and Depth of Skills, Expertise, and Technology



Depth/Complexity

The Crowd

Breadth of Domain Expertise and Technologies

The Value Provided by Diverse Crowds

Study data of successful InnoCentive challenge solutions showed...

70% of successful challenge solutions are solved by individuals outside of the challenge's specific technical domain.

"75% of successful solvers already knew the solution to the problem."

*Dr. Karim Lakhani **

- *Jeppesen, Lars Bo and Karim R. Lakhani. Forthcoming. Marginality and problem solving effectiveness in broadcast search. *Organization Science* 20. Published Version <http://orgsci.journal.informs>.

Since the authorization of America COMPETES in 2011, challenges have been used across the federal government

Since 2014, there have been...

Over 700 Challenges

Over \$220,000,000 prizes

Over 40 EPA Challenges



Environmental Protection Agency

WATER TOXICITY SENSOR CHALLENGE

Water Quality Monitoring for the 21st Century: A Sensor to Measure Toxicity

Open Until: 07/26/2021 11:59 PM ET

[View Details](#)



NASA

DEEP SPACE FOOD CHALLENGE PHASE 1

Help Feed the Next Generation of Space Explorers!

Open Until: 07/30/2021 06:00 PM ET

[View Details](#)



U.S. Department of Defense, National Security Innovation Network

POLAR VORTEX

Develop solutions to help collect, analyze, process, and visualize geospatial data in the Arctic.

Open Until: 07/19/2021 11:59 PM ET

[View External Challenge Details](#)



Environmental Protection Agency – Region 7

SEE A BLOOM, GIVE IT ROOM URBAN WATERS EDITION – HARMFUL ALGAL BLOOM VIDEO CHALLENGE

Make a video teaching people 1) how to spot harmful algal blooms and 2) how to be safe around them....

Open Until: 08/01/2021 11:59 PM ET

[View External Challenge Details](#)

[Challenge.gov](https://www.challenge.gov)

Allows you to find and learn about challenges led by federal agencies



EPA's Challenges & Prizes Program

EPA CHALLENGES & PRIZES

40+ EPA hosted challenges

From addressing PFAS to indoor air quality, EPA challenges have addressed a wide range of issues all aimed at improving human health and the environment.



More than
\$1,000,000
awarded to prize winners



Types of Challenges

- Sensor development
- Video challenges
- Hack-a-thons
- App development
- Project designs



EPA has partnered with over:

14 federal agencies



25 non-profits



10 private companies



Solvers Engaged



- Students
- Academic researchers
- Non-profit organizations
- Private Individuals
- Businesses

Solvers' Impacts

Green infrastructure designs implemented

Air sensors deployed



Winning technologies on the market

...and more

Highlighted Prize Competitions

1. Septic Sensor Challenge – Ian Dombroski
2. Wildland Fire Sensor Challenge – Gail Robarge
3. Enhanced Efficiency Fertilizer Challenge – Chris Clark & Britta Bierwagen

Advanced Septic System Nitrogen Sensor Challenge

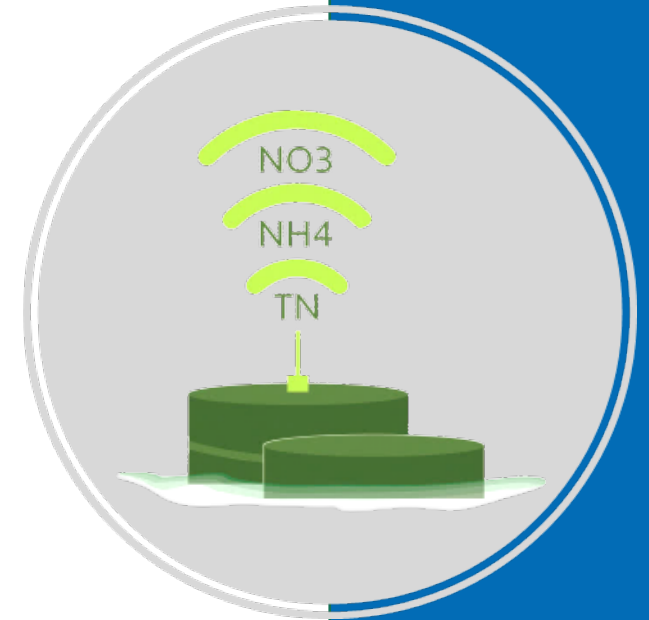
Ian Dombroski, EPA Region 1

What was the need?

- No commercially available nitrogen sensor to monitor the effluent from Innovative and Alternative (nitrogen-reducing) onsite wastewater treatment systems (I/A OWTS).
- Conventional septic systems are not designed to remove nitrogen and can lead to eutrophication, hypoxia, toxic algal blooms, and other issues that negatively affect coastal communities.
- State and local governments have major initiatives underway to upgrade conventional systems to I/A OWTSs.

What was the aim?

- To monitor nitrogen levels in the effluent of I/A OWTSs.



Partners & Use of Technical Panel Experts



Challenge Winner



Dr. Qing Zhu, Winner of the Advanced Septic System Nitrogen Sensor Challenge

Impact

The winning sensor's performance has been Verified pursuant to the ISO 14035 ETV standard.

Technology developer now working to commercialize and manufacture sensor in the next year or so.

In the near-term small number of hand-built sensors will be installed in selected areas in New England.

Results & Impact

Advanced Septic System Nitrogen Sensor Challenge

Wildland Fire Sensor Challenge

Gail Robarge, EPA ORD

What was the need?

- To provide better information on smoke during wildfires, which can irritate the eyes, nose and throat, cause persistent coughing, wheezing and difficulty breathing and worsen heart and lung disease.

What was the aim?

- To develop innovative, low-cost air sensors that are **easier to deploy**, usable for **high concentration events**, **durable** in difficult field conditions, and able to report data **continuously and wirelessly**.



Who was involved?



Challenge Winners

1st Place – \$35,000
Sensevere/Sensit Technologies

2nd Place – \$25,000
Thingy LLC

Honorable Mention
Kunak Technologies

[Click here for more information on the sensors](#)

Impact

Winning sensors are now commercially available and in use for wildland fire response.

Increasing awareness of smoke monitoring needs and catalyzing development of the next generation of sensor technology systems for wildland fire applications.



ThingyAQ measures PM_{2.5}, CO, CO₂, TVOCs, and is part of EPA's WSMART equipment loan program for states, tribes, and local governments.

Results & Impact

Wildland Fire Sensor Challenge

Enhanced Efficiency Fertilizer Challenge

Christopher Clark & Britta Bierwagen, EPA ORD

What was the need?

- Needed new technologies for fertilizers that control nutrient release and reduce nutrient losses to the environment while maintaining agricultural productivity and profitability.

What was the aim?

- To accelerate the development and use of new, affordable Enhanced Efficiency Fertilizers (EEF) that reduce environmental releases of nitrogen and phosphorus from corn and other row crops in the U.S.

Who was involved?



Challenge Winner

Stage 1 of the challenge resulted in 16 finalists that will receive scientific evaluation and recognition from EPA, USDA, and other partners.

Finalists will also participate in a showcasing event where winners will share ideas and spark innovation.

Impact

Finalists who pass stage 2 greenhouse trials will successfully identify existing EEFs currently on or near-market that are anticipated to meet or exceed certain environmental and agro-economic criteria.

Results & Impact

Enhanced Efficiency Fertilizer (EEF) Challenge



STEM Challenges

Including: Environmental Justice Video Challenge, National Aquatic Resource Survey Challenge, Toxic Release Inventory Challenge, and Campus Rainworks Challenge

Working Together



Nutrient Recycling Challenge Partners

www.nutrientrecyclingchallenge.org

- Co-sponsors are important to EPA challenges
- They can bring valuable perspectives, resources, and judging expertise to a challenge

Cleaner Indoor Air During Wildfires Challenge Partners

Working Together on PFAS

EPA's Innovative Ways to Destroy PFAS Challenge

Collaborated with:

- Environmental Council of States (ECOS)
- Environmental Research Institute of the States (ERIS)
- Michigan Department of Environment
- Great Lakes & Energy
- Colorado Department of Public Health & Environment
- U.S. Department of Defense's Strategic Environmental Research and Development Program (SERDP)
- Environmental Security Technology Certification Program (ESTCP)



Tools and Resources

[EPA's Challenges & Prizes Homepage](#)

[External Federal Community of Practice](#)

[Challenge.gov Prize Toolkit](#)

[America Competes Act](#)

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EPA CHALLENGES & PRIZES