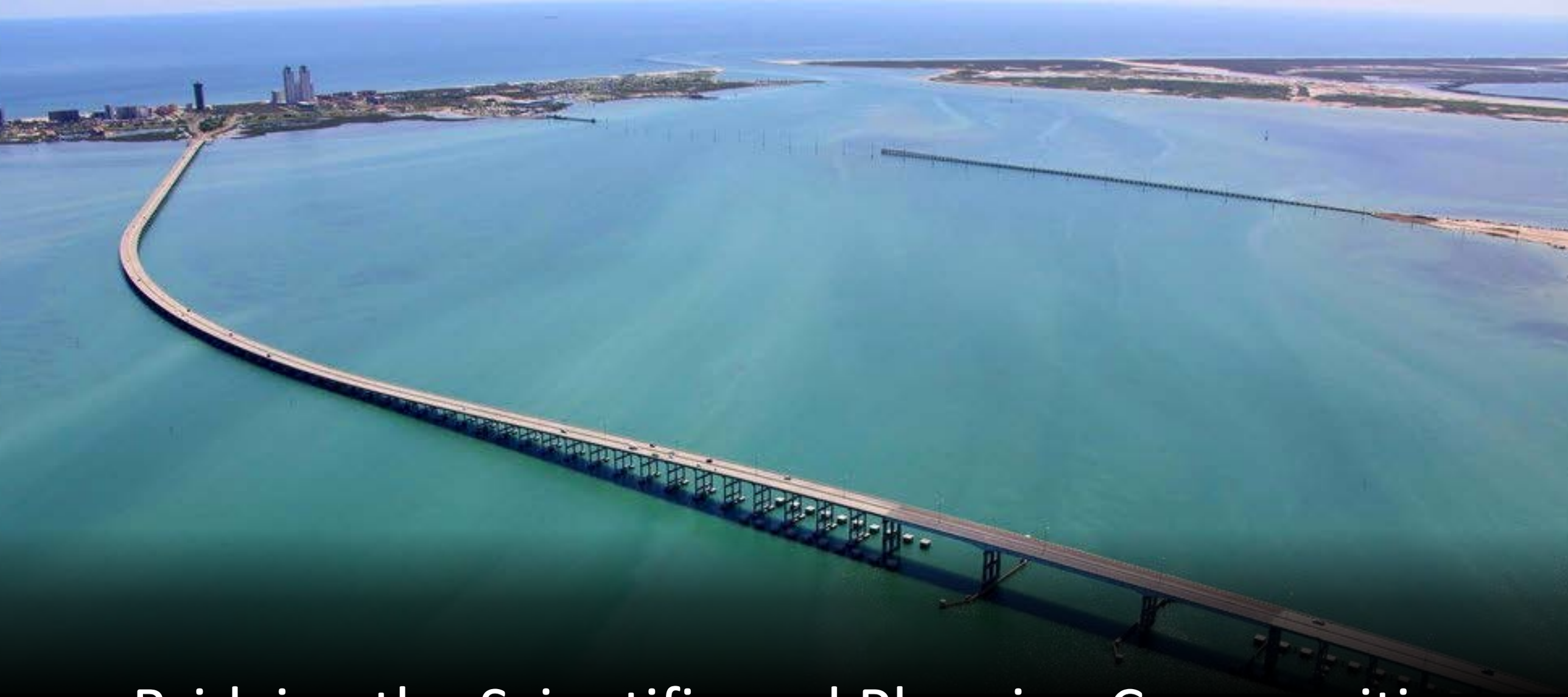


Bridging the Scientific and Planning Communities to Improve Coastal Resilience: A Science Communication Workshop

NOAA

MISSION · ARANSAS NATIONAL ESTUARINE RESEARCH RESERVE

THE UNIVERSITY OF TEXAS MARINE SCIENCE INSTITUTE

COMPASS

COASTAL TRAINING PROGRAM

GULF OF MEXICO PROGRAM

Beginning with the END in mind

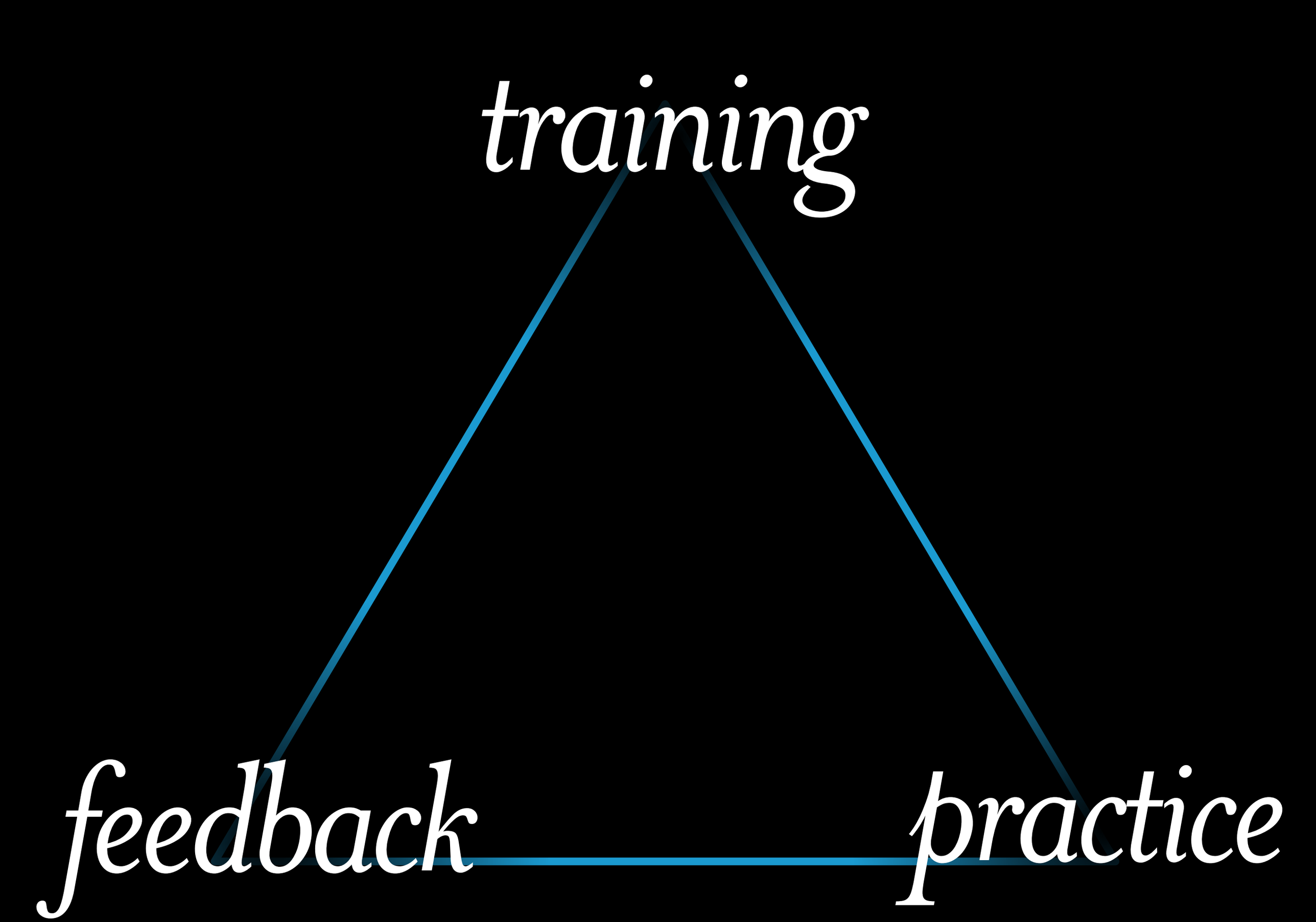
How resiliency science & scientists can be more useful to planners & policy makers?

Understanding how to be better communicators

Getting to know the decision makers & planners

Tools & Skill building

Next steps


training
feedback
practice

Confidentiality

Constructive candor

Be present

Have fun!

Rules of the Road

Who are you?

What do you work on?

What you hope to get out of today?

(30 seconds)

Setting the Stage for *Engagement*

… science should be at the table in a way that is understandable and relevant and credible and salient.

Jane Lubchenco
Founder of COMPASS and
the Leopold Leadership Program
Former Chief of NOAA

Develop research questions and plan

Assess Results

ENGAGE

SCIENCE

Conduct Research

Publish Findings

Connect

Scientists

Managers

Public

NGOs

Media

Policymakers

CHANGE

The Valley of Death

Develop research questions and plan

Assess Results

ENGAGE

SCIENCE

Conduct Research

Publish Findings

Connect

Scientists

Managers

Public

NGOs

Media

Policymakers

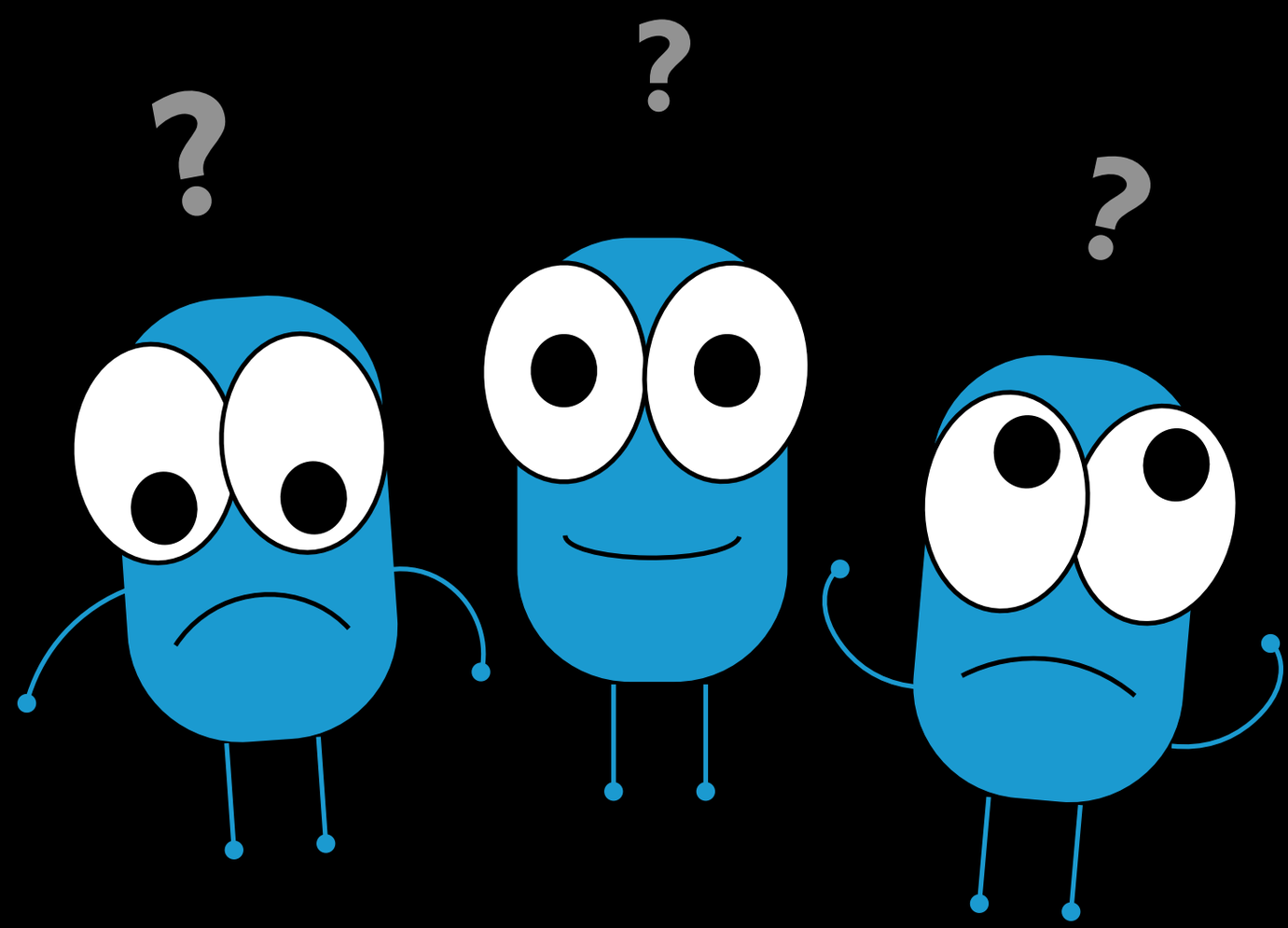
CHANGE

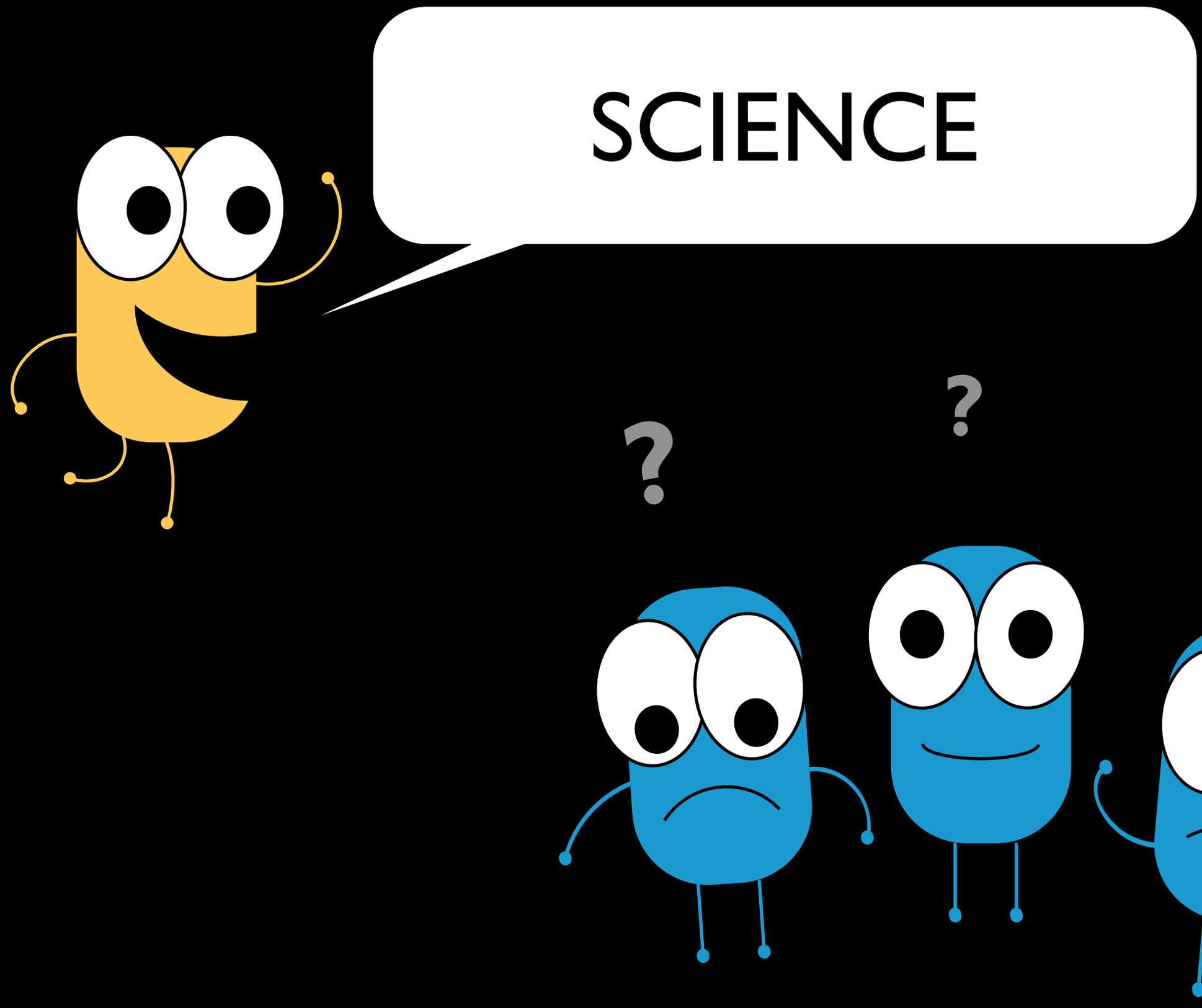
"I don't know why I don't care about the bottom of the ocean, but I don't."

Oxford Dictionaries

WORD OF THE YEAR

post-truth




SCIENCE
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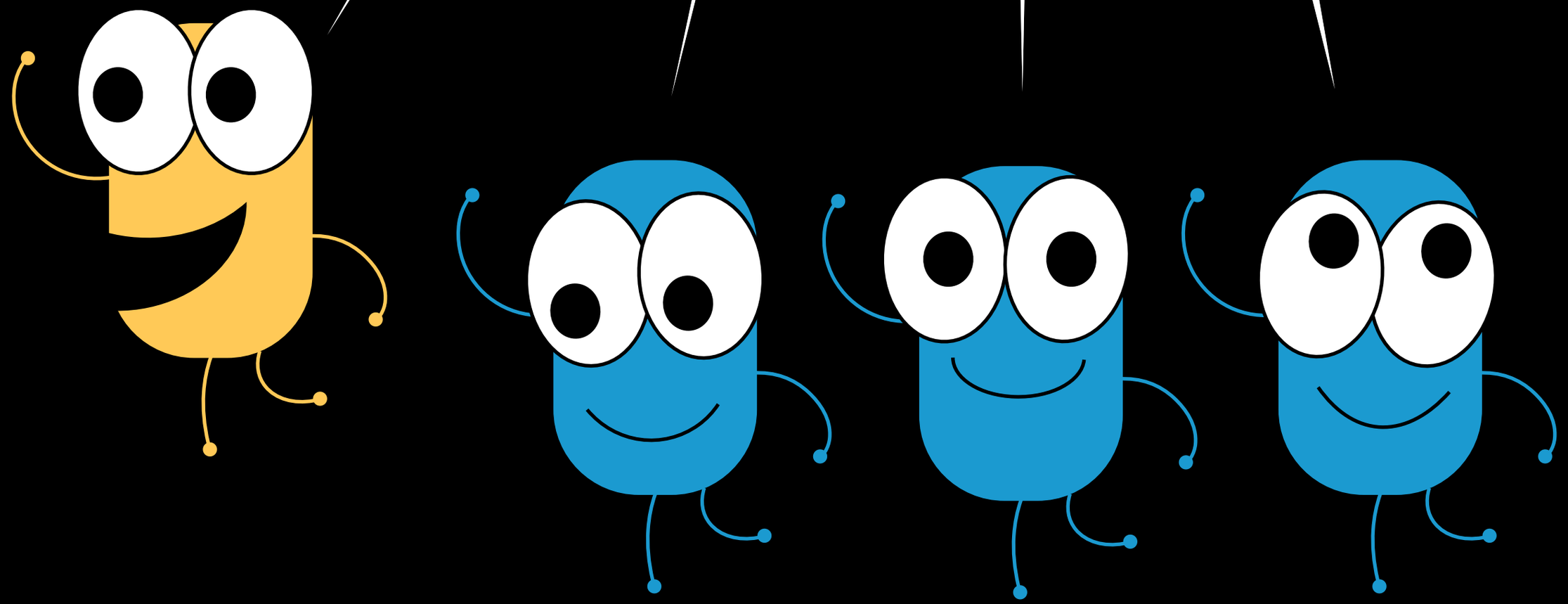
?

SCIENCE!



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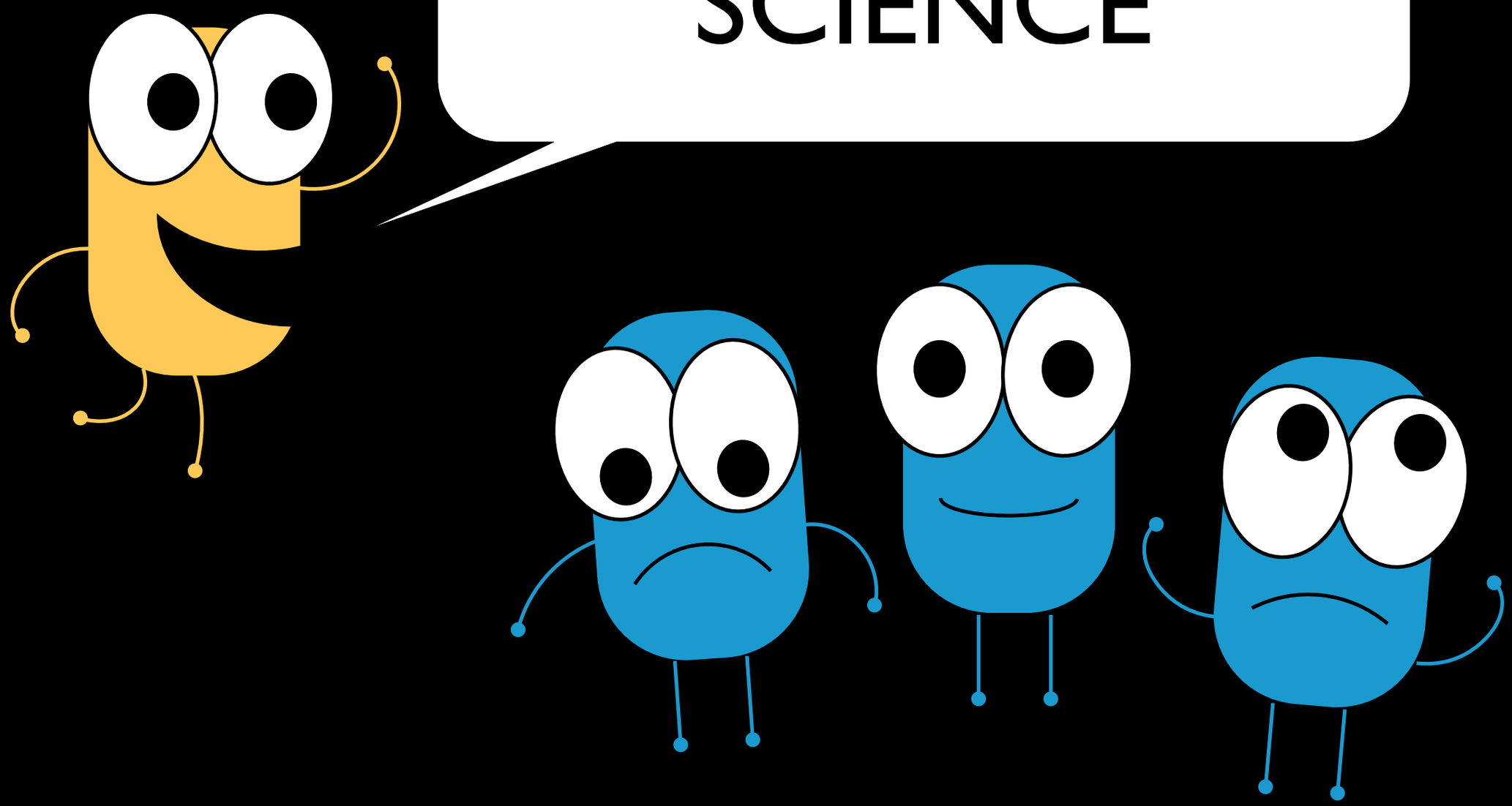

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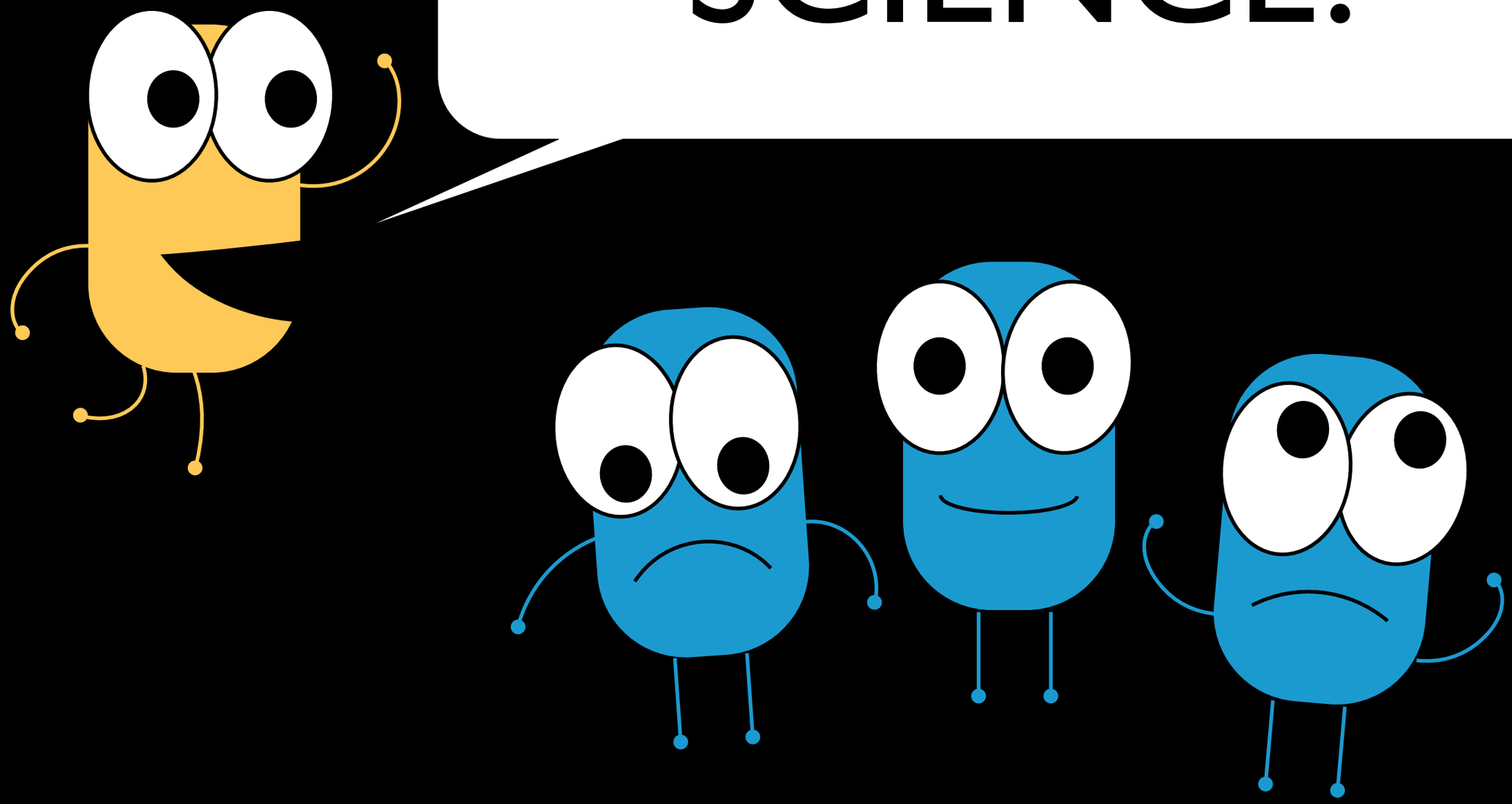

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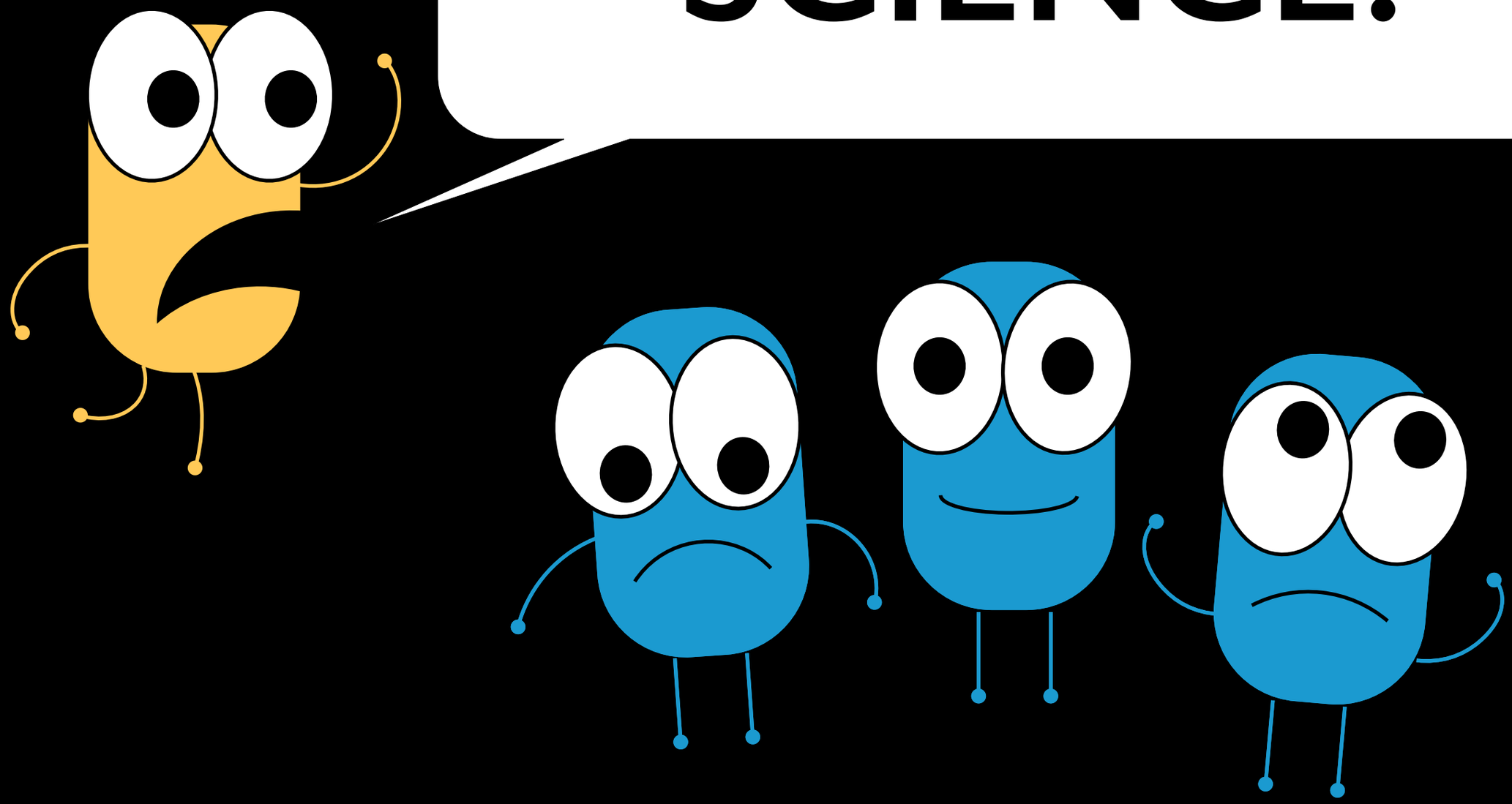
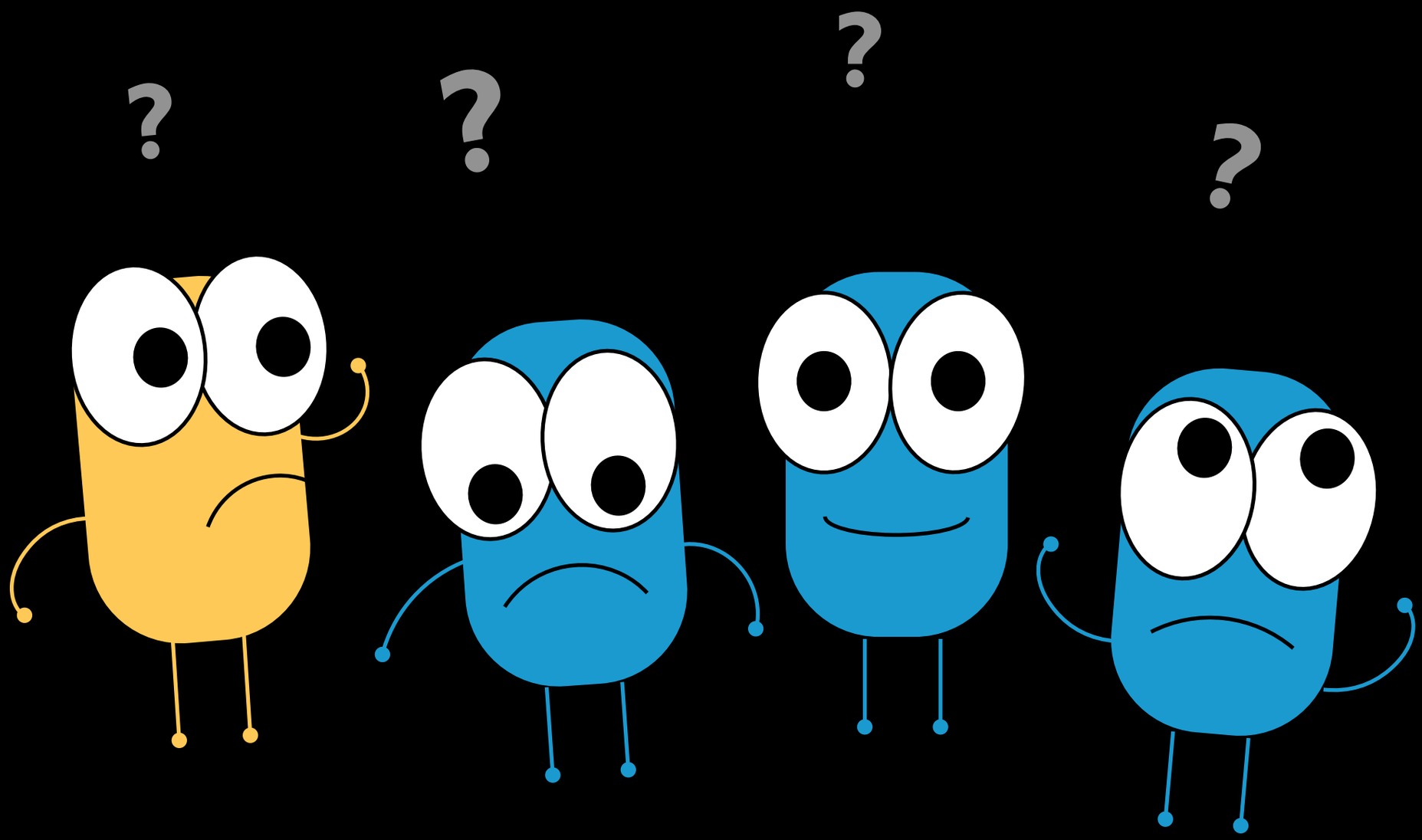




Sometimes [we are] like tourists;
we think if we just speak loudly
enough, people will understand

– Kevin Finneran
Editor–in–Chief, Issues in Science and Technology
New York Academy of Sciences "Two Cultures" Workshop, May 2009

Before

US

THEM

After

Before

US

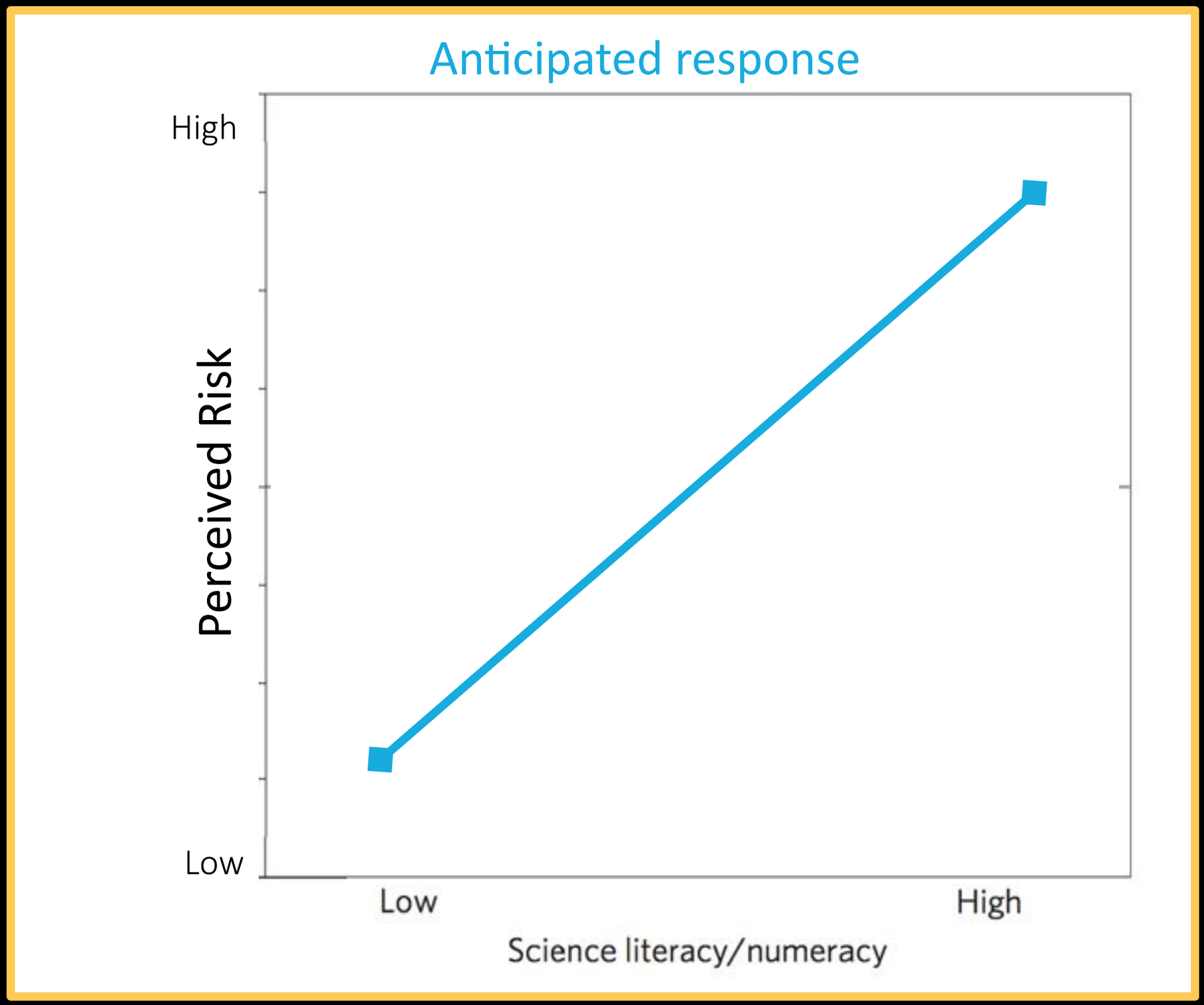
THEM

After

Context & Values

Matter

'How much risk do you believe climate change poses to human health, safety or prosperity?'



(N = 1,540)

Kahan et al (2012) Nature Climate Change

Cultural Cognition: Why such polarization?

People react differently to scientific evidence according to their **identities**.
They endorse whichever position reinforces their connection to others with whom they share important social ties.

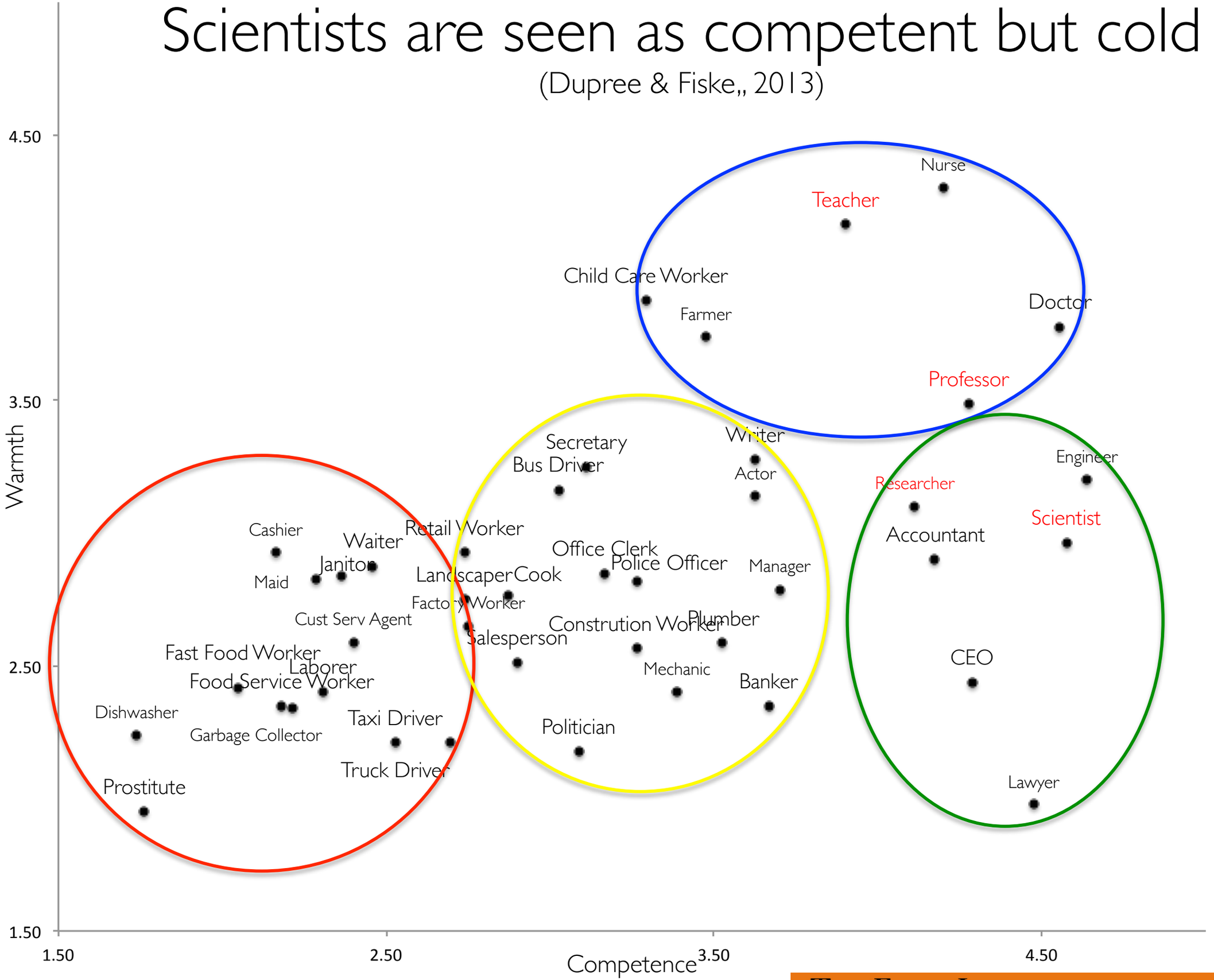

FIGHTING
23
DUCKS
FIGHTING
10
DUCKS

we are

tribal

Scientists are seen as competent but cold

(Dupree & Fiske,, 2013)

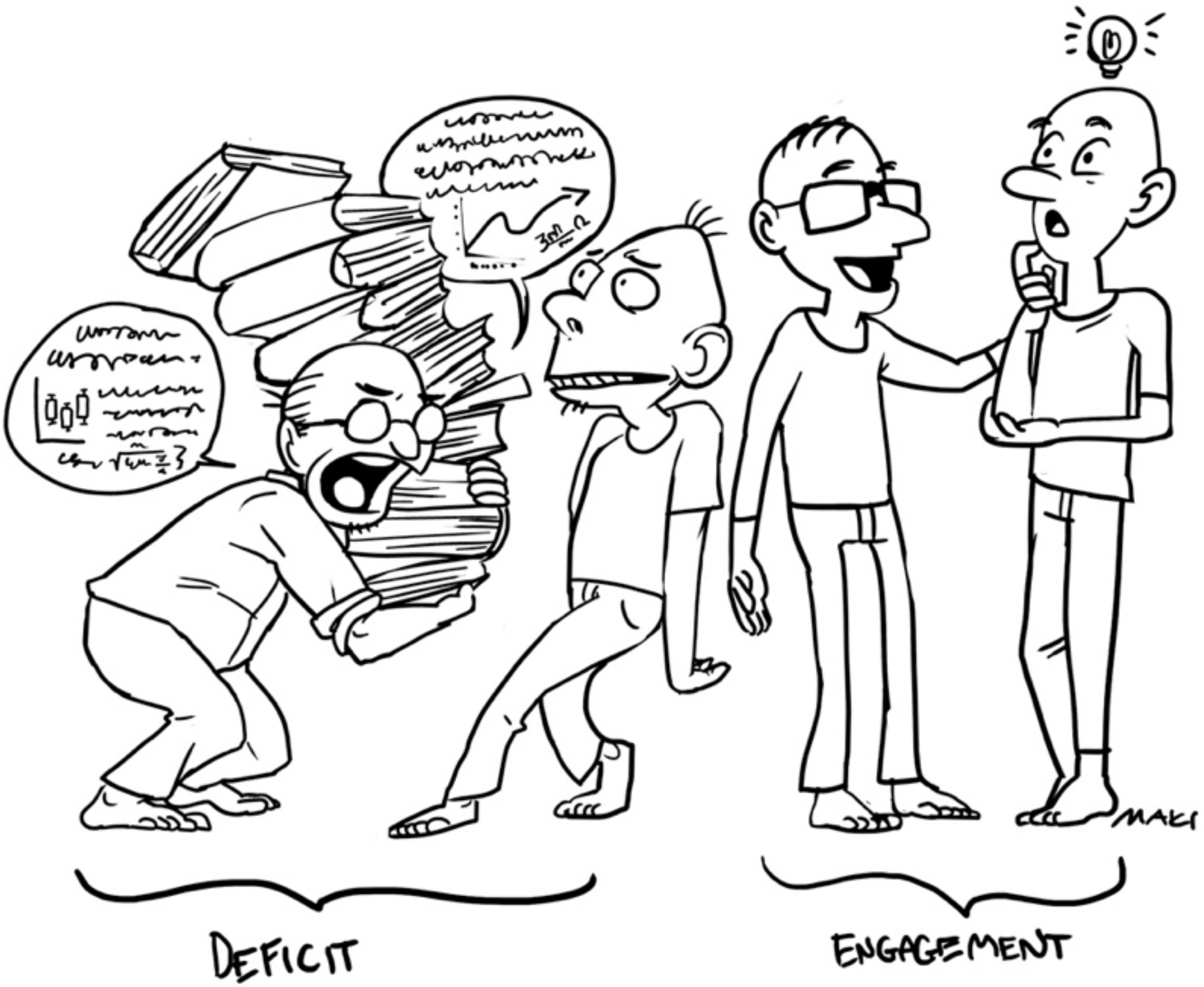


Positive beliefs about science and scientists are more likely to stem from *high quality interactions* with *likable and engaging scientists* who are willing to *listen*.

Dudo A, Besley JC (2016) Scientists' Prioritization of Communication Objectives for Public Engagement. PLoS ONE 11(2): e0148867

Reframe the issue
and meet people
where they are.

– Jon Foley


DEFICIT
ENGAGEMENT
MAKI

Know your audience

Understand the So What?

coastal decision makers policymakers non-science audiences journalists general pu
media citizen-scientists scientific peers donors all ages families children K-12 medi
sources natural resource managers board members stakeholders funding agencies
college students managers fundraisers landowners researchers scientists board mem
community groups coastal decision makers policymakers non-science audiences
journalists general public media citizen-scientists scientific peers donors all ages
families children K-12 media sources natural resource managers board members
stakeholders funding agencies college students managers fundraisers landowners
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community groups coastal decision makers policymakers non-science audiences
journalists general public media citizen-scientists scientific peers donors all ages
families children K-12 media sources natural resource managers board members
stakeholders funding agencies college students managers fundraisers landowners

GENERAL PUBLIC

policymakers non-science audiences journalists general public media citizen-scient
scientific peers donors all ages families children K-12 media sources natural resou
managers board members stakeholders funding agencies college students managers
fundraisers landowners researchers scientists board members community groups co
decision makers policymakers non-science audiences journalists general public me
citizen-scientists scientific peers donors all ages families children K-12 media sour
natural resource managers board members stakeholders funding agencies college
students managers fundraisers landowners researchers scientists board members

Try to be more specific.

The science is the same, but the audience and the use of the science may be different. You have to think, who is your audience and what is the action you want them to take with your science?

– *Marcia McNutt*
National Academy of Sciences

so what?

Depends on the audience …

Each person wants to know

why this matters to them.

Policymakers

Does this support or refute my agenda? Do my constituents care?

Managers

Does it help me meet my mandate? What will it cost - time, effort, money?

Planners

How does this help me protect life & property?

Landowners

Why does THIS matter to ME?

What are the incentives? Will this help my tax burden? Increase land value?

Media

Is it news? Will it sell?

Communities

Is there risk to my community? Benefits?

Business/Industry

How will this affect my bottom line?

coastal decision makers policymakers non-science audiences journalists general pu
media citizen-scientists scientific peers donors all ages families children K-12 medi
sources natural resource managers board members stakeholders funding agencies
college students managers fundraisers landowners researchers scientists board mem
community groups coastal decision makers policymakers non-science audiences
journalists general public media citizen-scientists scientific peers donors all ages
families children K-12 media sources natural resource managers board members
stakeholders funding agencies college students managers fundraisers landowners
researchers scientists board member community group coastal decision makers

DECISION MAKERS

policymakers non-science audiences journalists general public media citizen-scient
scientific peers donors all ages families children K-12 media sources natural resou
managers board members stakeholders funding agencies college students managers
fundraisers landowners researchers scientists board members community groups co
decision makers policymakers non-science audiences journalists general public me
citizen-scientists scientific peers donors all ages families children K-12 media sour
natural resource managers board members stakeholders funding agencies college
students managers fundraisers landowners researchers scientists board members

Policymakers are not interested in science *per se*, but in the public goods that science can deliver.

– Michael Rodemeyer
Executive Office of the President

SCIENTISTS	DECISION MAKERS
• Cumulative evidence	• Relevance to decisions
• In depth	• Bottom line
• Uncertainty	• Certainty
• Credentials matter	• Perspectives matter
• Slow, ongoing	• Rapid, top-of-mind today
• Accountable to institution, funders	• Accountable to communities, stakeholders

Senator Bill Nelson's Schedule for Feb 13, 2013

8:00 am: Arrive at Capitol Building

9:00 am: Meet with Canada's Ambassador to the United States

9:30 am: Meet with Florida Citrus Mutual and growers re: the citrus trust fund legislation

10:00 am: Finance hearing: Nomination of J. J. Lew, of New York, to be Secretary of the Treasury

10:30 am: Budget hearing: Impact of Federal Budget Decisions on Families and Communities

12:00 pm: Meeting with Gulf Coast fishermen re: NOAAs plans to transition to sustainable fishing

2:15 pm: Meeting with General David Rodriguez, AFRICOM nominee

2:30 pm: Meet with Florida State Troopers re: truck size and weight issues

2:30 pm: VOTE: nomination of W. J. Kayatta, of Maine, to be US Circuit Judge for the First Circuit

2:45 pm: Executive Session: consider and approve Rules and Budget Resolution for Senate Committee on Commerce, Science, and Transportation, and to ratify

3:30 pm: Meet with Jacksonville Port Authority re: Mile Point update

4:00 pm: Deliver speech to Florida Bankers Association

4:30 pm: Meet with representatives from Palm Beach State College, Indian River State College, Hillsborough Community College, Florida State College at Jacksonville and Santa Fe College re: grant efforts and higher education

5:00 pm: Meet with Nat'l Assn of Industrial Property Owners re: tax policy, energy efficiency, and other matters affecting commercial real estate

5:45 pm: Meet with General Lloyd Austin, CENTCOM nominee


windows of opportunity

navigators

champions

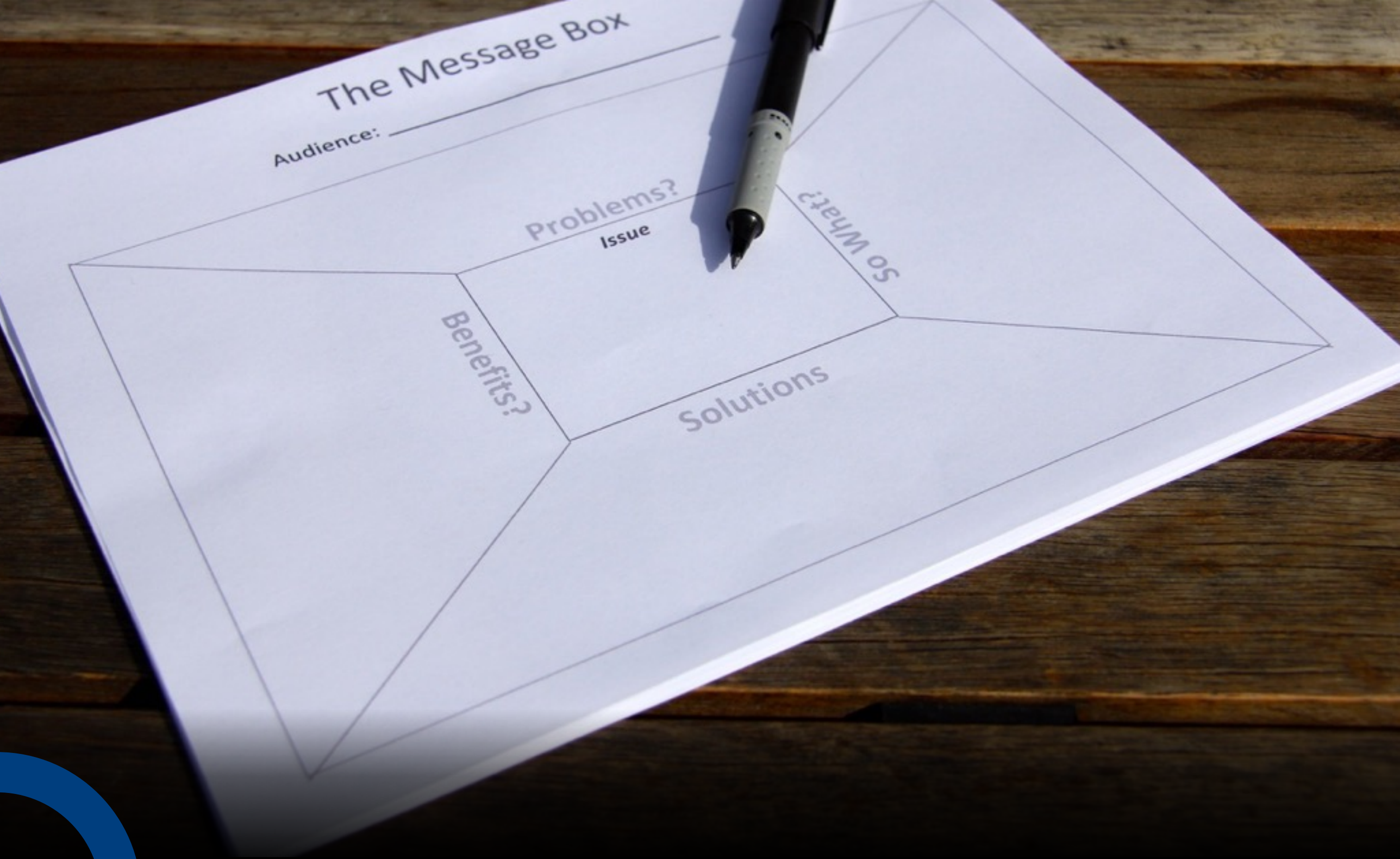
Panelists

Scott Cross

Katya Wowk

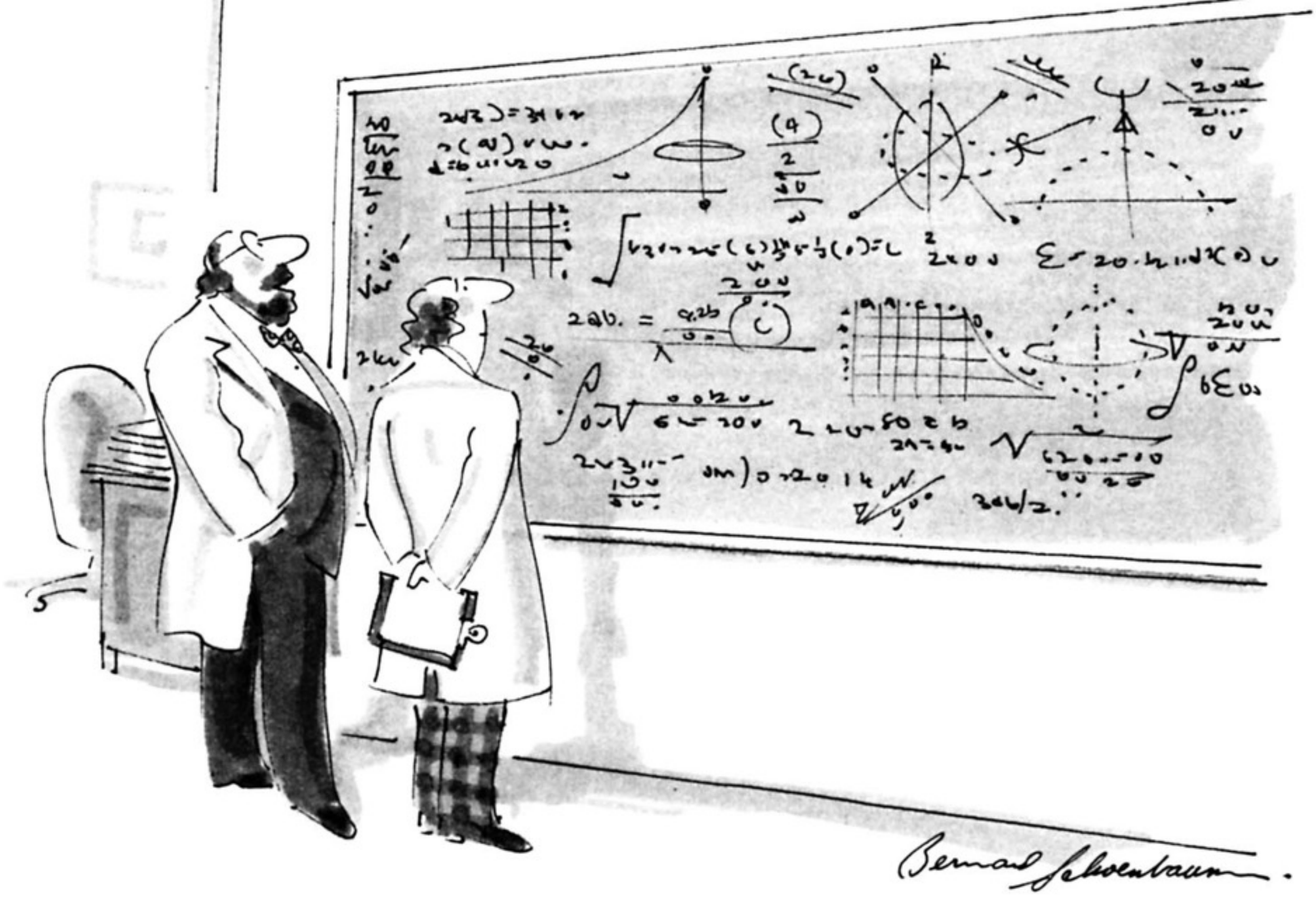
Pat Rios

lunch time



Distilling Complexity

The Message Box



"Oh, if only it were so simple."


FIRE

The secret of being a bore...
is to tell everything.

– Voltaire


NAT·
MDCCC
XXXIII
OB·
MDCCC
XCVI
ALFR·
NOBEL
F·LINDBERG 1902

Limit the number of *ideas*

No one can translate your work better than you can…

but you need a new way

of thinking about
how to structure your
information

Scientists & Researchers

Background

Supporting Details

Result

Everyone else

Result

So What?

Supporting Info

Distichopora robusta sp. nov., the first shallow-water stylasterid (Cnidaria: Hydrozoa: Stylasteridae) from the tropical eastern Pacific

Scientific Title

Abstract

Background

Methods

Results

Discussion

Conclusion

AUDIENCE

Problems?

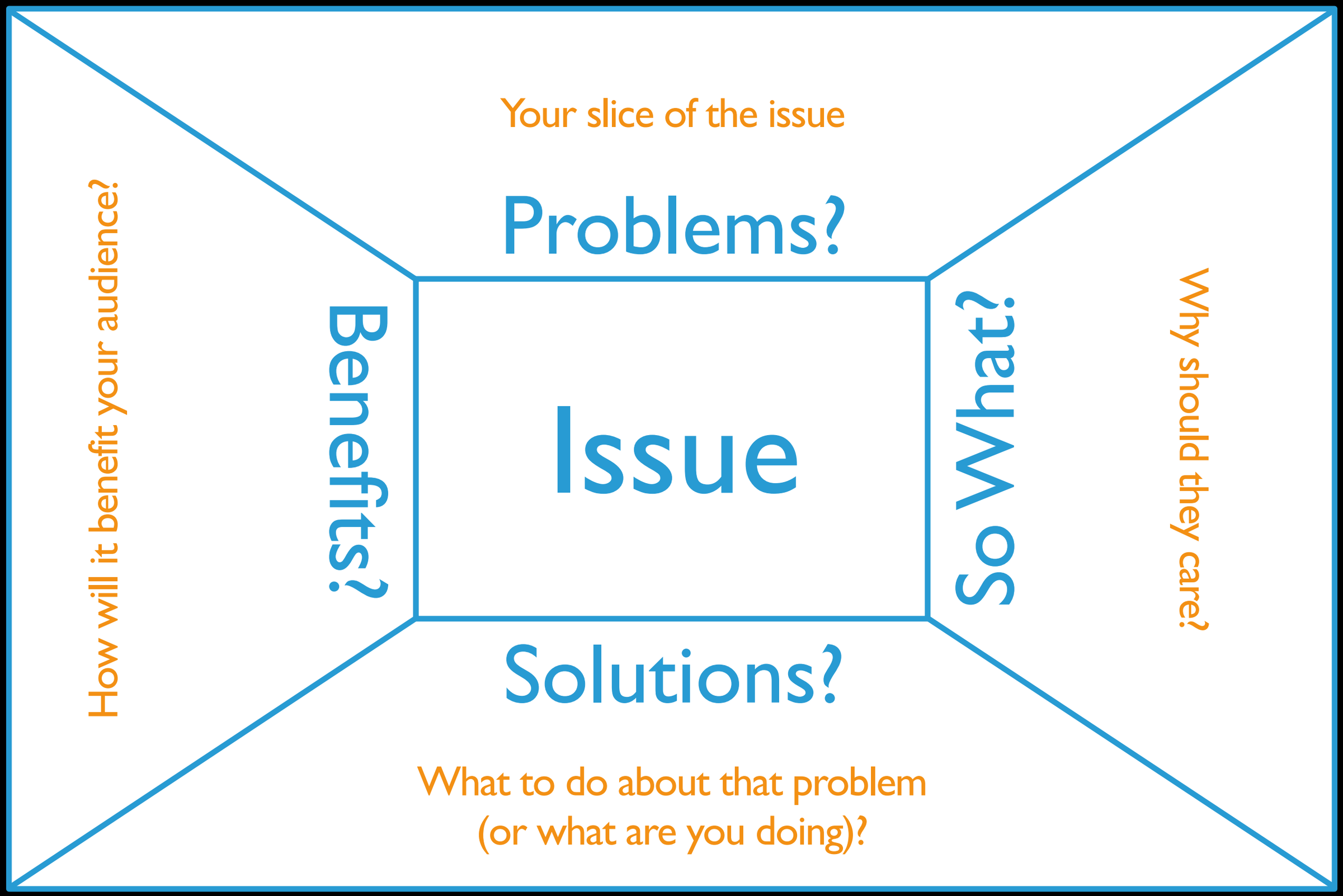
Benefits?

ISSUE

So what?

Solutions?

Audience:


Your slice of the issue
Problems?
Issue
Solutions?
What to do about that problem
(or what are you doing)?
How will it benefit your audience?
Benefits?
So What?
Why should they care?

CLIMATE SUMMIT

WHAT IF IT'S A BIG HOAX AND WE CREATE A BETTER WORLD FOR NOTHING?

- ENERGY INDEPENDENCE
- PRESERVE RAINFORESTS
- SUSTAINABILITY
- GREEN JOBS
- LIVABLE CITIES
- RENEWABLES
- CLEAN WATER, AIR
- HEALTHY CHILDREN
- ETC. ETC.

12/7/9 USATODAY

JOEL PETT

Audience: Staff of Rep. Dan Newhouse (R-WA)

Problems?

- Global trade and travel increase the risk of introduced diseases to wildlife. Diseases can cause extinctions locally, regional and globally.
- Washington State in particular has seen unprecedented outbreaks of White Nose Syndrome (WNS) in bats this summer.

Issue

Impacts of wildlife disease on agriculture

Benefits?

- Managing wildlife diseases can reduce disease burden to human and agricultural health.
- Healthy bat populations will reduce pests, and increase agricultural efficiency.
- Rapid action against emerging disease threats will increase our odds of successful management and reduction of disease.

So What?

- WNS has killed more than 6 million bats in the eastern U.S. - the most precipitous decline of North American wildlife in the past century.
- Bats are crucial for controlling populations of insects that can disrupt farming by damaging wheat and other crops.
- Control strategies are most effective early in an epidemic (i.e. Ebola control in the U.S.).

Solutions?

- Currently no agency is responsible for responding to wildlife diseases. Designate agencies responsible for responding to wildlife diseases through U.S. Fish & Wildlife Services.
- Lack of funding often results in solutions coming too late. Setup emergency response fund and systematic response to allow for rapid action against emerging disease threats.

J8 A1 R1 G2 O1 N1

Breaking it down

Microbiota

Hypoxic

Trophic Structure

Piscivorous

Pelagic

Phototactic

Tiny living things

Low on oxygen

Food web

Eats fish

Open ocean

Moves towards light

Terms that have different meanings for scientists and the public

Scientific term	Public meaning	Better choice
enhance	improve	intensify, increase
aerosol	spray can	tiny atmospheric particle
positive trend	good trend	upward trend
positive feed back	good response, praise	vicious cycle, self-reinforcing cycle
theory	hunch, speculation	scientific understanding
uncertainty	ignorance	range

Somerville, R.C., and Hassol, S.J., 2011, Communicating the Science of Climate Change, *Physics Today*, October, p. 51.

MARINE POLLUTION

Plastic waste inputs from land into the ocean

Jenna R. Jambeck,[1]* Roland Geyer,[2] Chris Wilcox,[3] Theodore R. Siegler,[4] Miriam Perryman,[1] Anthony Andrady,[5] Ramani Narayan,[6] Kara Lavender Law[7]

Plastic debris in the marine environment is widely documented, but the quantity of plastic entering the ocean from waste generated on land is unknown. By linking worldwide data on solid waste, population density, and economic status, we estimated the mass of land-based plastic waste entering the ocean. We calculate that 275 million metric tons (MT) of plastic waste was generated in 192 coastal countries in 2010, with 4.8 to 12.7 million MT entering the ocean. Population size and the quality of waste management systems largely determine which countries contribute the greatest mass of uncaptured waste available to become plastic marine debris. Without waste management infrastructure improvements, the cumulative quantity of plastic waste available to enter the ocean from land is predicted to increase by an order of magnitude by 2025.

Reports of plastic pollution in the ocean first appeared in the scientific literature in the early 1970s, yet more than 40 years later, no rigorous estimates exist of the amount and origin of plastic debris entering the marine environment. In 1975, the estimated annual flux of litter of all materials to the ocean was 6.4 million tons [5.8 million metric tons (MT)], based only on discharges from ocean vessels, military operations, and ship casualties (*1*). The discharge of plastic from at-sea vessels has since been banned (*2*), but losses still occur. It is widely cited that 80% of marine debris originates from land; however, this figure is not well substantiated and does not inform the total mass of debris entering the marine environment from land-based sources.

Plastics have become increasingly dominant in the consumer marketplace since their commercial development in the 1930s and 1940s. Global plastic resin production reached 288 million MT in 2012 (*3*), a 620% increase since 1975. The largest market sector for plastic resins is packaging (*3*); that is, materials designed for immediate disposal. In 1960, plastics made up less than 1% of municipal solid waste by mass in the United States (*4*); by 2000, this proportion increased by an order of magnitude. By 2005, plastic made up at least 10% of solid waste by mass in 58% (61 out of 105) of count
available data (*5*).

Plastics in the marine enviro
increasing concern because of t
and effects on the oceans, wil
tially, humans (*6*). Plastic deb
lines, in Arctic sea ice, at t
on the sea floor (*7*, *8*). W
debris causes fragmentati
even small marine inverte
Its small size also renders
to its source and extrem
from open ocean enviro
the most effective mitig
duce inputs.

We estimated the an
ocean from waste gen
tions worldwide. We d
as material that is eith
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or open, uncontrolled
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[1]College of Engineering, University of Georgia, 412 Driftmier Engineering Center, Athens, GA 30602, USA. [2]Bren School of Environmental Science and Management, University of California, Santa Barbara, CA 93106, USA. [3]Oceans and Atmosphere Flagship, Commonwealth Scientific and Industrial Research Organization, Castray Esplanade, Hobart, Tasmania 7000, Australia. [4]DSM Environmental Services, Windsor, VT 05089, USA. [5]Department of Chemical and Biomolecular Engineering, North Carolina State University, Raleigh, NC 27695, USA. [6]Department of Chemical Engineering and Materials Science, Michigan State University, East Lansing, MI 48824, USA. [7]Sea Education Association, Woods Hole, MA 02543, USA.
*Corresponding author. E-mail: jjambeck@uga.edu

1. Global plastic resin production reached 288 million MT in 2012, a 620% increase since 1975.

2. In 1960, plastics made up less than 1% of municipal solid waste by mass in the United States. By 2005, plastic made up at least 10% of solid waste by mass in 58% (61 out of 105) of countries with available data

3. We estimate that 2.5 billion MT of municipal solid waste was generated in 2010 by 6.4 billion people living in 192 coastal countries (93% of the global population). Approximately 11% (275 million MT) of the waste is plastic.

4. We estimate that 99.5 million MT of plastic waste was generated in coastal regions in 2010. Of this, 31.9 million MT were classified as mismanaged and an estimated 4.8 to 12.7 million MT entered the ocean in 2010, equivalent to 1.7 to 4.6% of the total plastic waste generated in those countries.

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4. W
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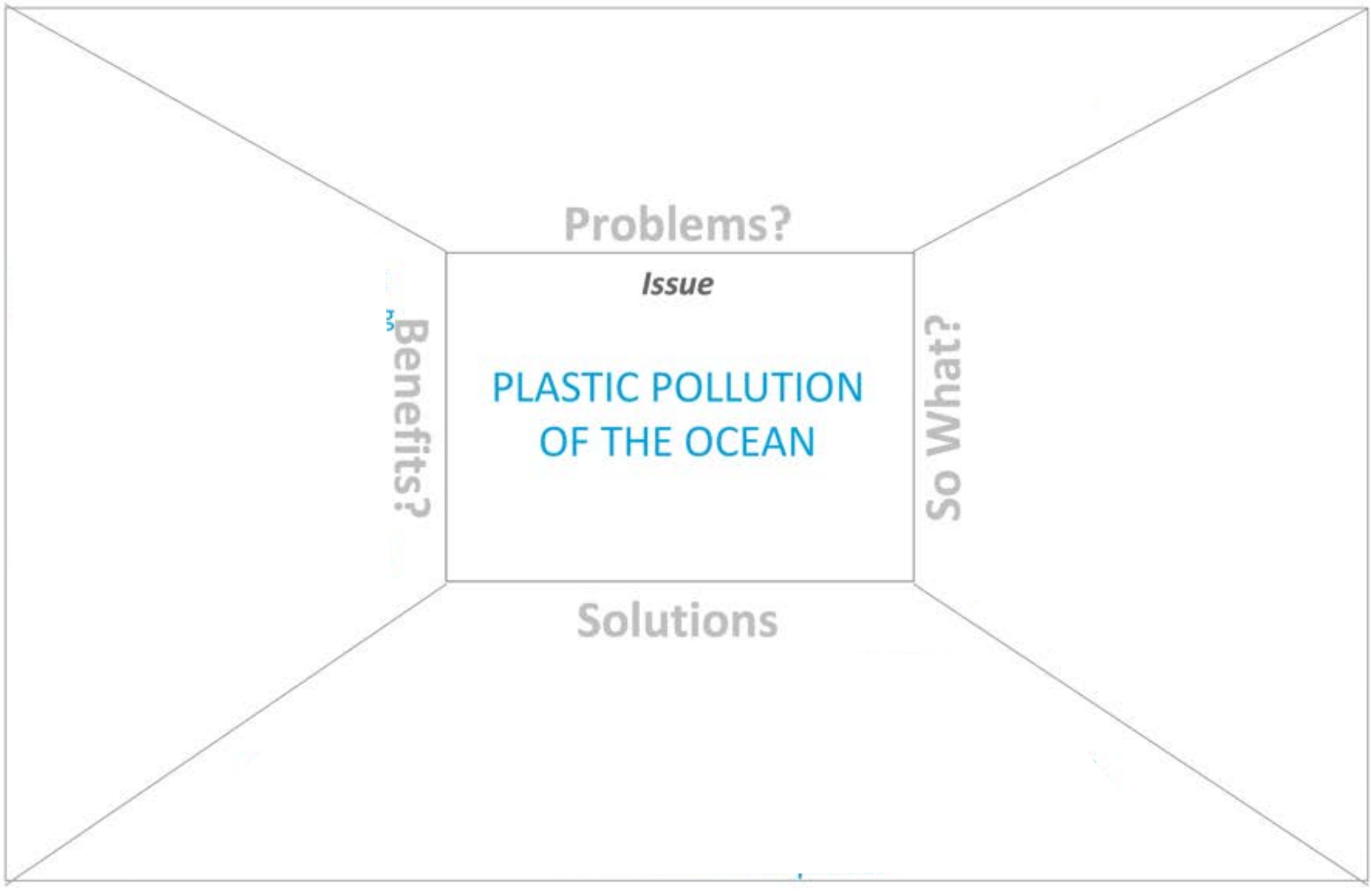
26!

The Message Box

Audience: Prestige Media - NPR, Economist, NYT, BBC



Large scale clean-up is unfeasible:
we need to stop the flow.
Our study is first ever to track annual inputs by country,
so we design systems that prevent plastics from entering
the ocean in the first place.

"That is five grocery bags of plastic going into the ocean along every foot of coastline in the world."

Oceans filling with plastic may make toxic seafood

From www.cnbc.com - Today, 2:30 PM

Robert Ferris - Coastal countries are leaking millions of tons of plastic into the oceans every year, says a new study. And it is getting tougher to remove.

Plastic waste heading for oceans quantified

From www.bbc.com - Today, 2:19 PM

Jonathon Amos - About eight million tonnes of plastic waste find their way into the world's oceans each year, a new scientific assessment suggests.

Coastal nations dump 8 million tonnes of plastic in sea annually | The Times

Scoop.it!

From www.thetimes.co.uk - Today, 3:05 PM

Tom Whipple - For every foot of coastline on Earth, the equivalent of five carrier bags full of plastic are dumped into the sea every year, new analysis suggests

Humans are putting 8 million metric tons of plastic in the oceans — annually

From www.washingtonpost.com - Today, 3:06 PM

Chris Mooney - That's five bags filled with plastic for every foot of coastline in the world, researchers say.

Oceans swallowed 13 million tonnes of plastic in 2010 - environment - 12 February 2015 - New Scientist

From www.newscientist.com - Today, 2:52 PM

Colin Barras - For the first time, we have a figure for how much plastic ends up in the ocean - and what's on the surface is nothing compared with what's underwater

Heather Mannix
@heathermannix12

J.Jambeck speaking at packed briefing at US Congress on marine plastic @COMPASSonline @JambeckResearch #sciencepolicy

RETWEETS 5 LIKES 3

9:42 AM - 16 Mar 2015

Senate Ocean Caucus

2016 Priorities

- Ocean Observing
- Illegal, Unregulated, Underreported (IUU) Fishing
- Marine Plastics

Game Plan

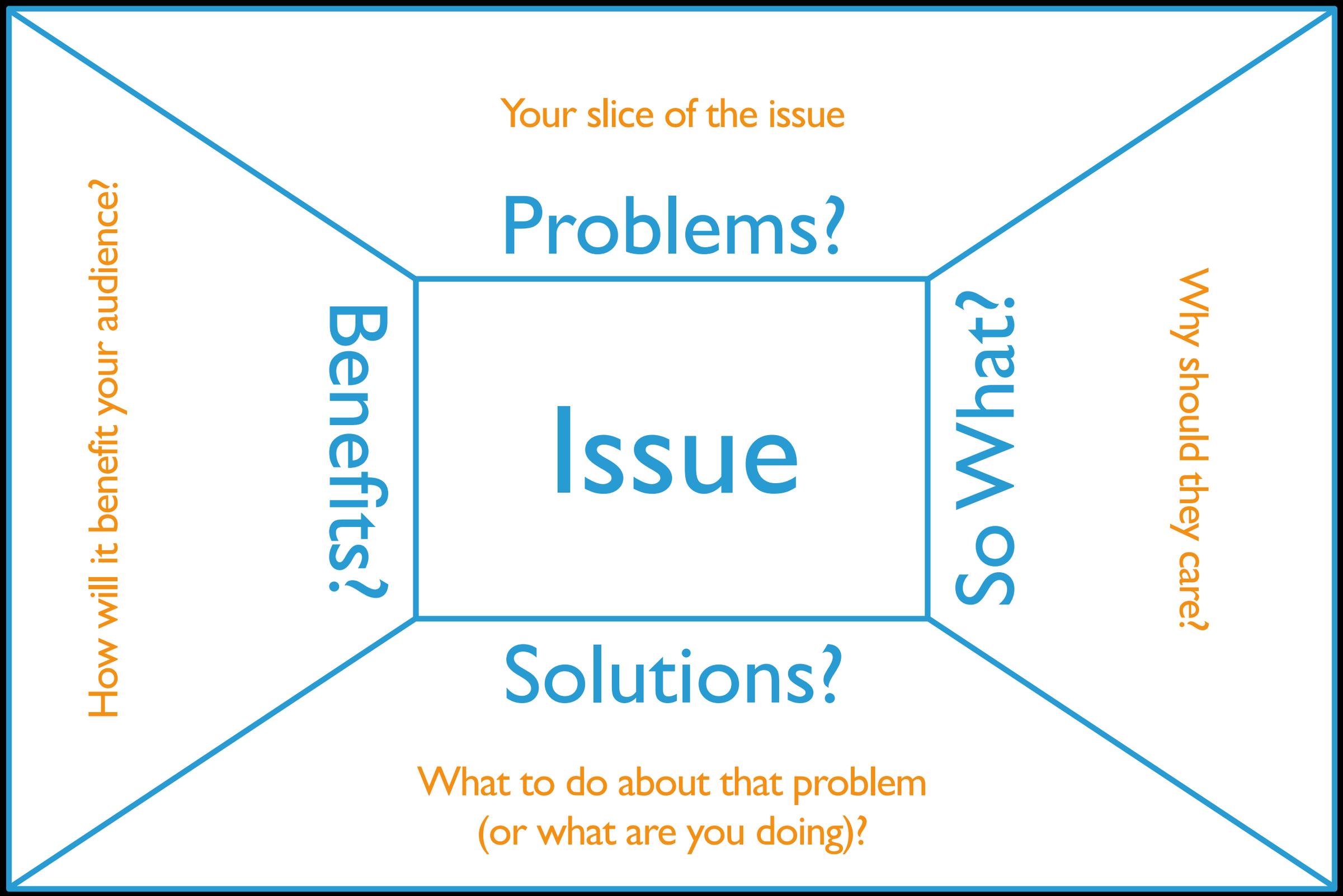
- Individual work time
- Partner Practice
- Share with the group

Support your message

In the MidWest, it's 7°F warmer in the winter since 1974. That's the difference between wearing and not wearing long underwear.

– Tracey Holloway

Audience:


Your slice of the issue
Problems?
Issue
Solutions?
What to do about that problem
(or what are you doing)?
How will it benefit your audience?
Benefits?
So What?
Why should they care?

Audience: Durham, NC Town Planners & local community advocacy groups

Problems?

- Trees are not evenly distributed across the city of Durham, NC.
- Minority and low-income communities, in particular, have fewer trees.
- Many of the legacy trees across the area are dying.
- Durham has a limited amount of money to plant new trees.

Issue

Value of green space and trees to communities.

Benefits?

- Reduce air, water, and noise pollution.
- Cool down neighborhoods and reduce the urban heat island effect.
- Increase wildlife habitat.
- Contribute to respiratory and mental health benefits.
- Improve aesthetic values, vitality, and social cohesion of neighborhoods.

So What?

- With fewer trees, minority and low income communities disproportionately miss out on the benefits that trees and green space provide.
- Trees represent a wise investment for enhancing human health and quality of life, attracting residents and businesses that can increase the tax base.

Solutions?

Durham should plant trees strategically:

- Improve tree coverage in underserved neighborhoods while avoiding areas where trees may contribute to decreased safety.
- Plant along roadways and near hospitals and schools to buffer pollutants and improve aesthetics and walkability.
- Use native species to replace dying trees and for new plantings.
- Provide incentives to developers to leave trees in place.

First…

What is the *main* message?

Then…

- Do they use jargon?
- Is this information appropriate for the audience?
- Are there any metaphors that could help explain a concept?

Next Steps

New ideas are the easy part of policy change

It's spreading them that's hard…


windows of opportunity

Navigators

Change Chart: Next Steps for Engagement
Resilience in the Texas Coastal Bend

The Overarching Issue
(identified in your Message Box)

Key Influencers/Navigators/Champions:
Who should you reach out to next?

Key Points: What information would be most
important to convey? What questions will you ask?

Reflections

Presenting Yourself Elevator Speech

30 second speed dating

with
Susan Barry
Neurobiologist

Communicate from your "why." It's the why that motivates people to care and builds trust.

– Simon Sinek

Voice

- Speed & Volume
- Project Confidence
- Use signposting to emphasize key points

Who you are

(your name, and a greeting, if you wish)

What you do

(e.g. I study the fragile coastal environment)

As a scientist, I want you to know…

(so what? why does this matter?)

Putting it to the test....

00:30

What did you learn?