

Transformations to Global Sustainability: the role of Research and Innovation

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Future Earth

Transformation to Sustainability



Ideas to explore.

- What is Transformation?
- How does transformation happen?
- How to **make** transformation happen?
- What is the role of science?
 - in transformations to global sustainability

What is Transformation?

A marked change in form, nature, or appearance.

-- Oxford English Dictionary



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A marked change in form, nature, or appearance.

-- Oxford English Dictionary



Industrial



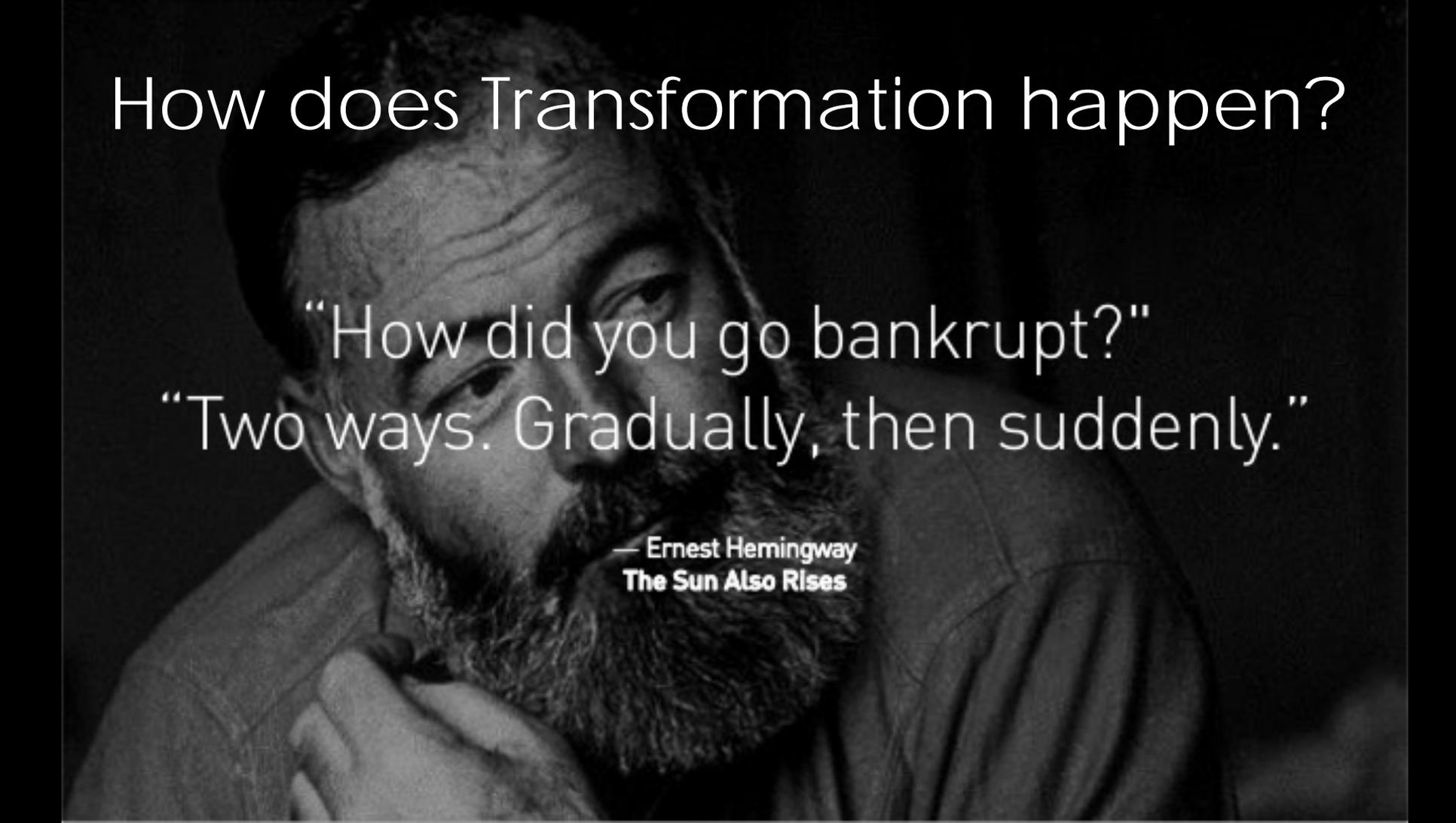
Social



Environmental



Digital



How does Transformation happen?

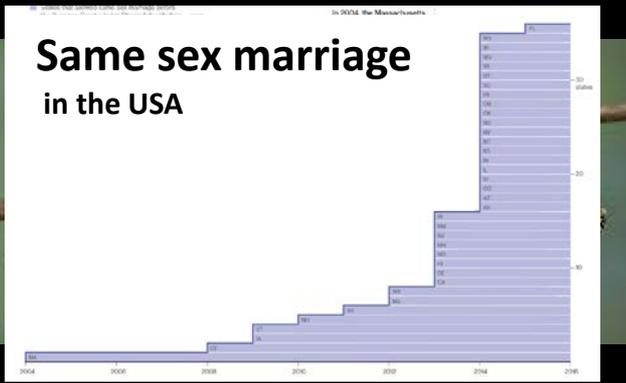
“How did you go bankrupt?”
“Two ways. Gradually, then suddenly.”

— Ernest Hemingway
The Sun Also Rises

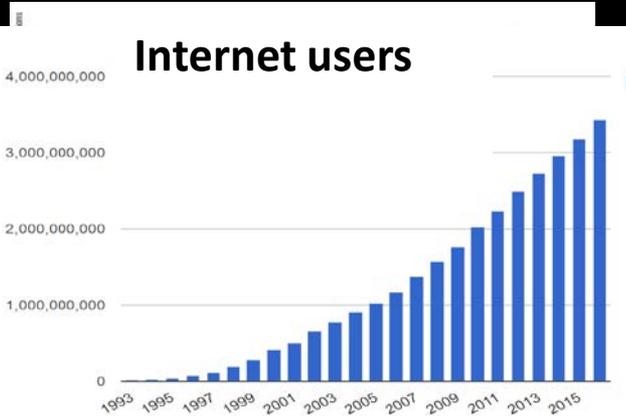
How does Transformation happen?

“Gradually, then suddenly.” — Ernest Hemingway, *The Sun Also Rises*

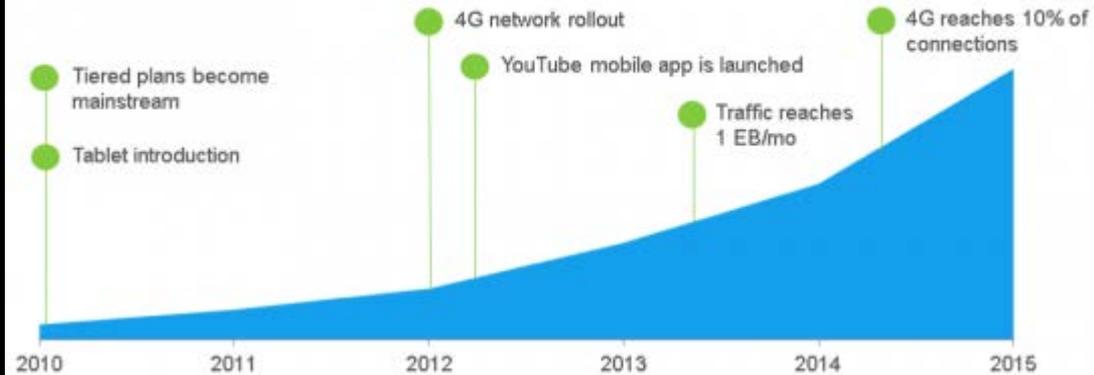
Same sex marriage in the USA



Internet users

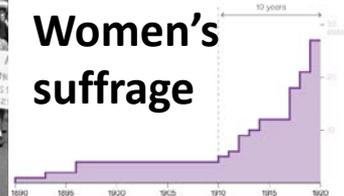


Mobile Data Traffic, 2010-2015: 18-fold growth



States that let women vote in presidential elections before the 19th Amendment took effect

Women's suffrage



How to **make** transformation happen?

- Imagination
- Collaboration
- Experimentation
- Transgression

How to **make** transformation happen?

- **Imagination**
- Collaboration
- Experimentation
- Transgression

Imagining the future is hard

The future will not be like the past

IPCC Assessment Reports since 1990: WGI Contribution



IPCC AR5 Working Group I
Climate Change 2013: The Physical Science Basis

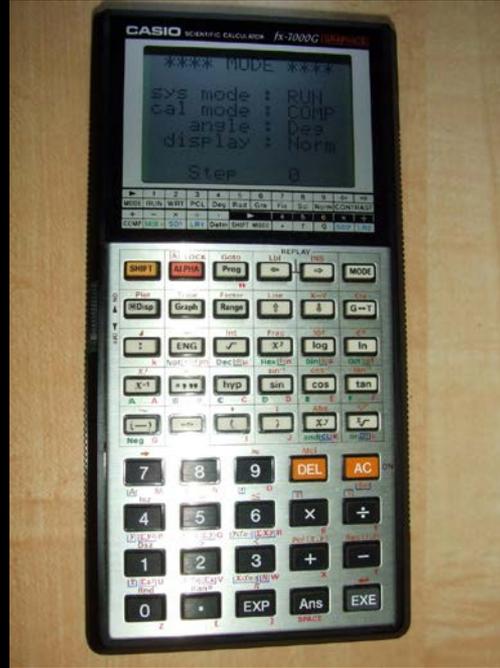
ipcc
INTERGOVERNMENTAL PANEL ON climate change



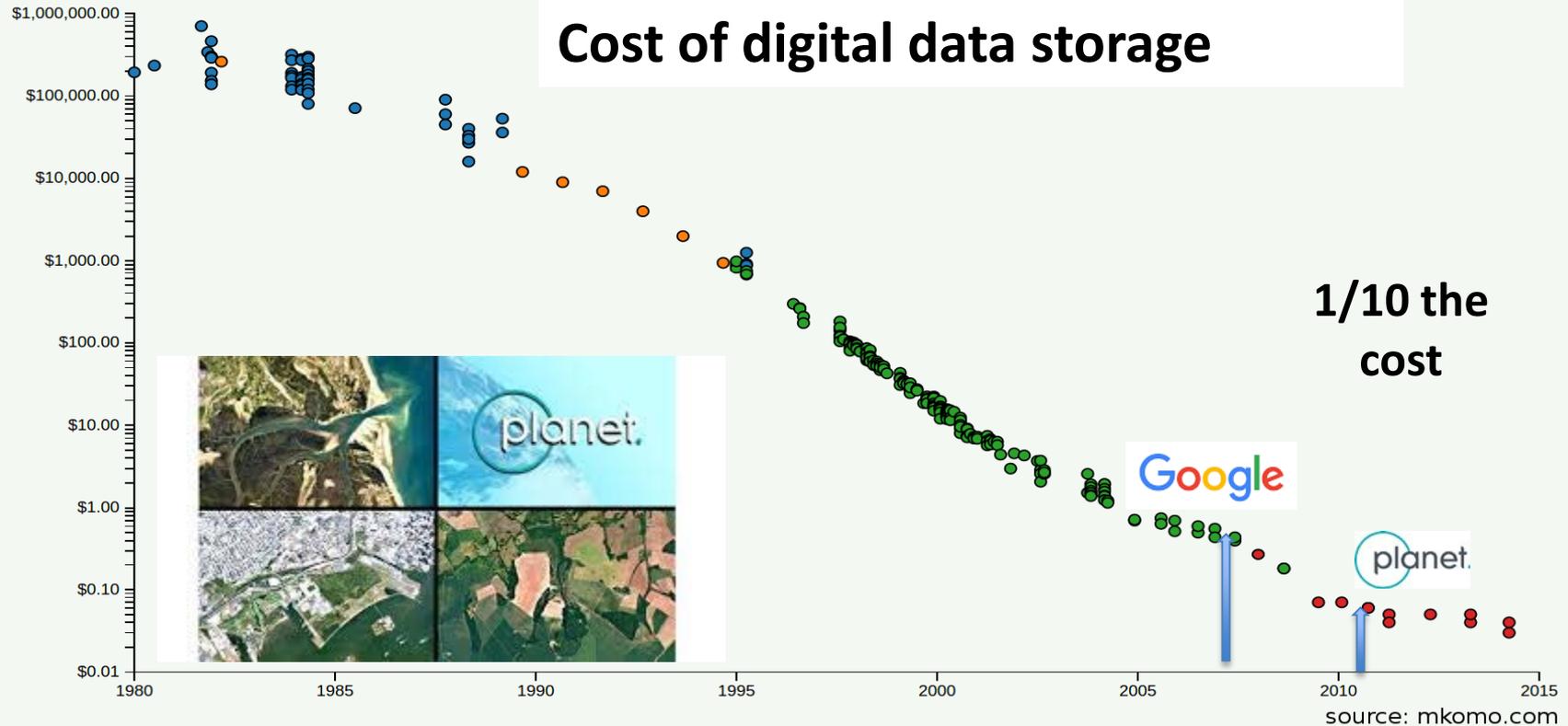
The confidence people have in their beliefs is not a measure of the quality of evidence but of the coherence of the story the mind has managed to construct.

--Daniel Kahneman,
Social Psychologist, Nobel Laureate.

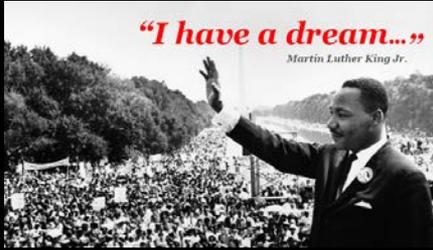
Imagining the unfamiliar is hard



Imagining the unfamiliar is hard



Imagination

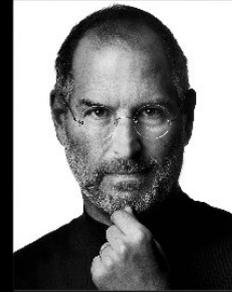


"I have a dream..."
Martin Luther King Jr.



"One child,
one teacher,
one pen and
one book can
change the world."

-Malala Yousafzai



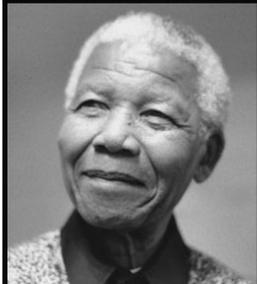
*"A lot of times,
people don't know
what they want
until you show it to
them."*

- Steve Jobs, Co-
founder of Apple



"We Have
This Handy
Fusion Reactor
In The Sky Called
The Sun"

Elon Musk



The power of imagination created the illusion
that my vision went much farther than the
naked eye could actually see.

(Nelson Mandela)



"It's the little things citizens do. That's what will
make the difference." Wangari Maathai

How to **make** transformation happen?

- Imagination
- **Collaboration**
- Experimentation
- Transgression

STEVEN JOHNSON

WHERE GOOD IDEAS COME FROM

THE NATURAL HISTORY OF INNOVATION

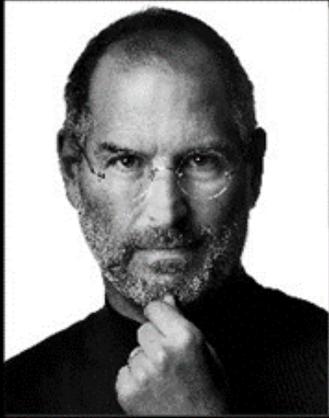
FROM THE BESTSELLING
AUTHOR OF *EVERYTHING
BAD IS GOOD FOR YOU*
AND *THE INVENTION
OF AIR*

Where Good Ideas Come From

- Innovations don't come from individuals working alone.
- Innovations come from an environment that fosters the cross pollination of hunches and small innovations.
- Innovations come from a community of thinkers and doers in close proximity to each others thinking.
- We are often better served by *connecting* ideas than we are by protecting them.
- **Chance favors the connected mind**
 - Steven Johnson, *Where Good Ideas Come From*

Ted Talk video

⁴ <https://www.youtube.com/watch?v=NugRZGDbPFU> based on his book



"Creativity is just connecting things. When you ask creative people how they did something, they feel a little guilty because they didn't really do it, they just saw something. It seemed obvious to them after a while."

-- Steve Jobs

Birth of the open work space



How to **make** transformation happen?

- Imagination
- Collaboration
- **Experimentation**
- Transgression

Scientists and innovators **experiment** to understand the world and build knowledge and tools

“Launch Your Vision, Experiment & Disrupt Yourself”

“Do first, then learn”

“Experimental Enterprise”

“Fail Fast and iterate”

“Learn by doing”

“Innovation is about experimentation”

“Accept and Reward Failure”

“Fail Fast and often”

How to **make** transformation happen?

- Imagination
- Collaboration
- Experimentation
- **Transgression**

Transgression

Act beyond the bounds of established standards of behavior.

Hacker Culture

Ignores the rules and norms

Just imagine the possible

Start making it happen

Transgression

Act beyond the bounds of established standards of behavior.



“**Transformation**”
new buzz word in
Sustainability

But perhaps the word Transformation may be too passive for what is needed

-- “**Hacker**” will likely not work...

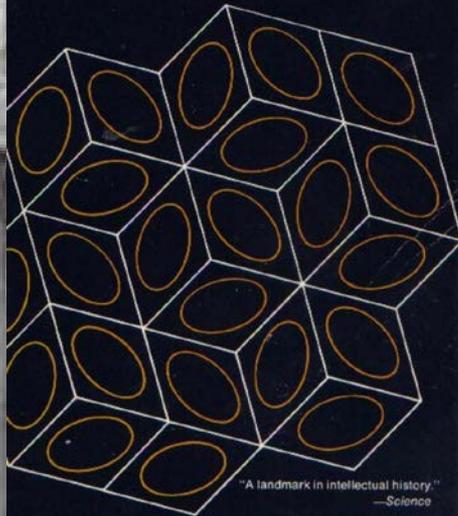
Perhaps --**Revolution** as it implies a bit of struggle – a bit of transgression

a forcible overthrow of a social order, in favor of a new system.

The Scientific Revolution

Kepler, Galileo,
Descartes, and Newton

**The Structure of
Scientific Revolutions**
Second Edition, Enlarged
Thomas S. Kuhn



"A landmark in intellectual history."
—*Science*

Transformations to global sustainability will likely

be..

Non-linear

Inspired by..

Imagination

Sparked through..

Collaboration

Enabled by

Experimentation

Requires a bit of..

Transgression

Transformations to global
sustainability....

What is the role of science?

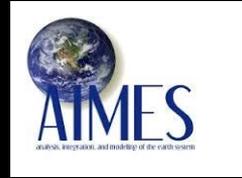
What is the role of scientists?

- *Build our fundamental understanding of linked Human-Earth systems*

Global Research Projects



oneHEALTH

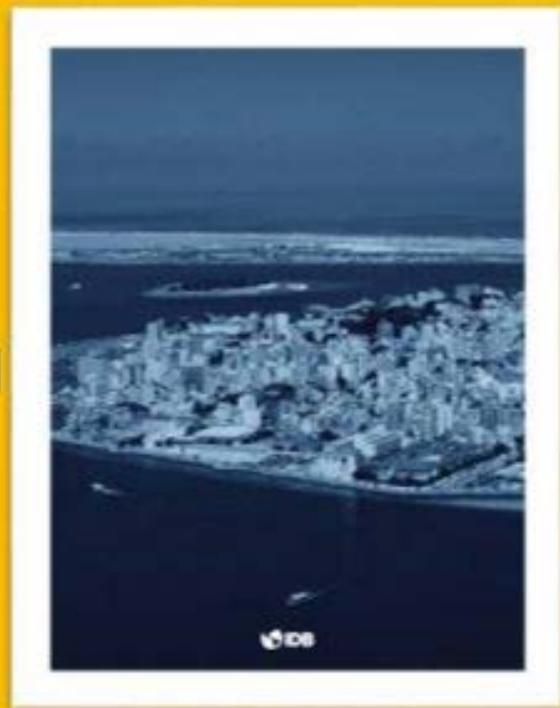


Programme on Ecosystem Change and Society

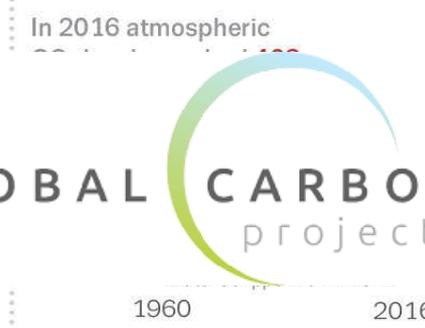




A Blue Urban Agenda:
Adapting to Climate
Change in the Coastal
Cities of Caribbean and
Pacific Small Island
Developing States

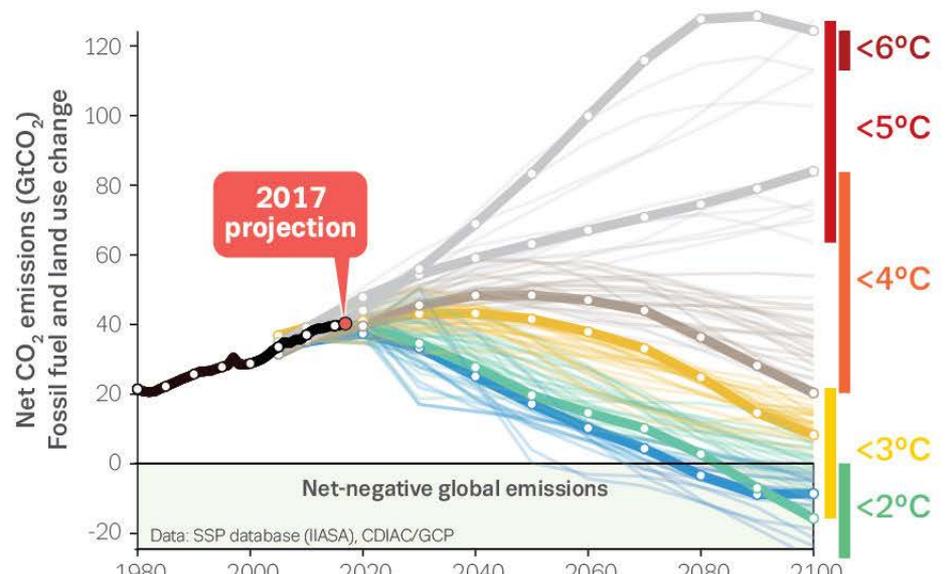
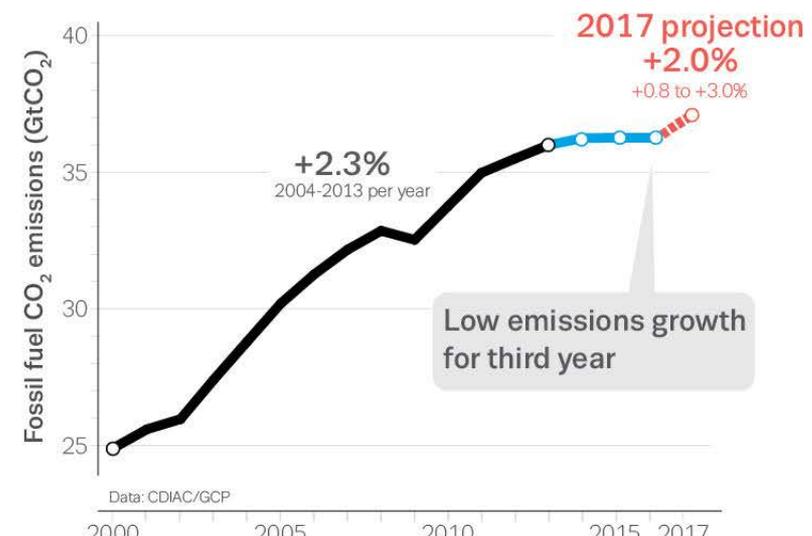


Global Carbon Budget 2017



In 2017, CO₂ emissions from fossil fuels and industry are projected to **grow by 2.0%** (+0.8 to +3.0%). This follows three years of nearly **no growth (2014-2016)**

The **plateau** of last year was not peak emissions after all...



BY 2050 CAN WE FEED 9 BILLION PEOPLE
WITHOUT FURTHER DEFORESTATION?



YES

500 scenarios for how to feed world
without deforestation

Erb et al 2016 *Nature Communications*

Lower meat consumption could reduce global mortality 6–10%
and food-related greenhouse gas emissions 29–70% by 2050

Springmann et al 2016 *PNAS*



What is the role of scientists?

- *Build our fundamental understanding of linked Human-Earth systems*

But for transformation scientists **must also**:

- Recognize that transformations will be driven by people not knowledge alone. People who can or could **imagine** transformations.

There are many visionary sustainability leaders
who are **imagining** transformations

Business

Government

Civil Society

But research and science remains
mostly on the sidelines of these

We need to seek out those who can **imagine**
and enable them to drive change

Business



Local government



"We Have
This Handy
Fusion Reactor
In The Sky Called
The Sun"

Elon Musk

Facilitate their leadership and co-develop with others the pathways to these transformations

Science can help expand but also ground the imagination – and at times redirect

What is the role of scientists?

- *Build our fundamental understanding of linked Human-Earth systems*

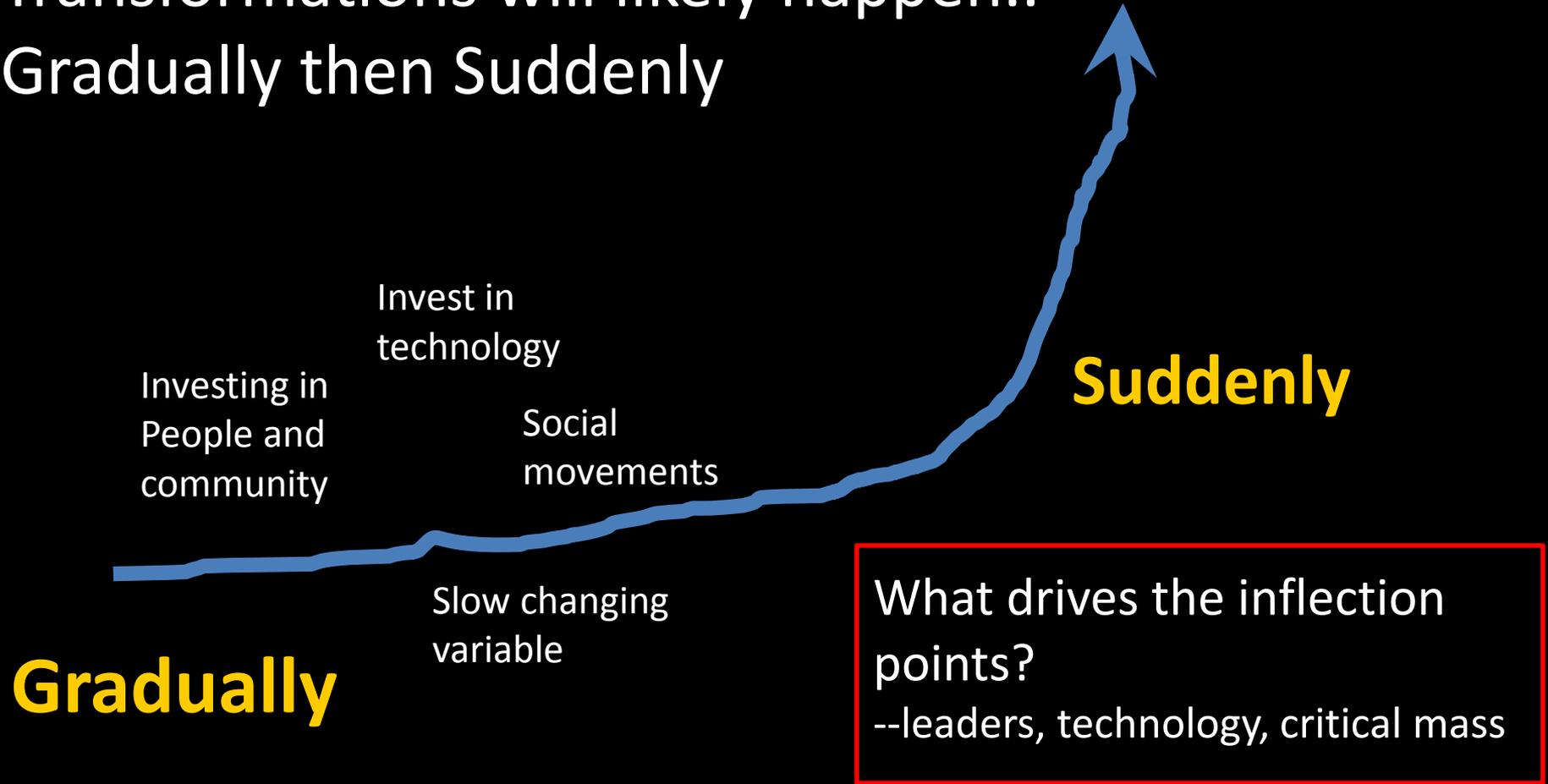
But for transformation scientists [must also](#):

- Recognize that transformations will be driven by people not knowledge alone. People who can **imagine** transformations.
- Embrace the **non-linear** and seek out the inflections.

Science has long history of characterizing and forecasting non-linear changes

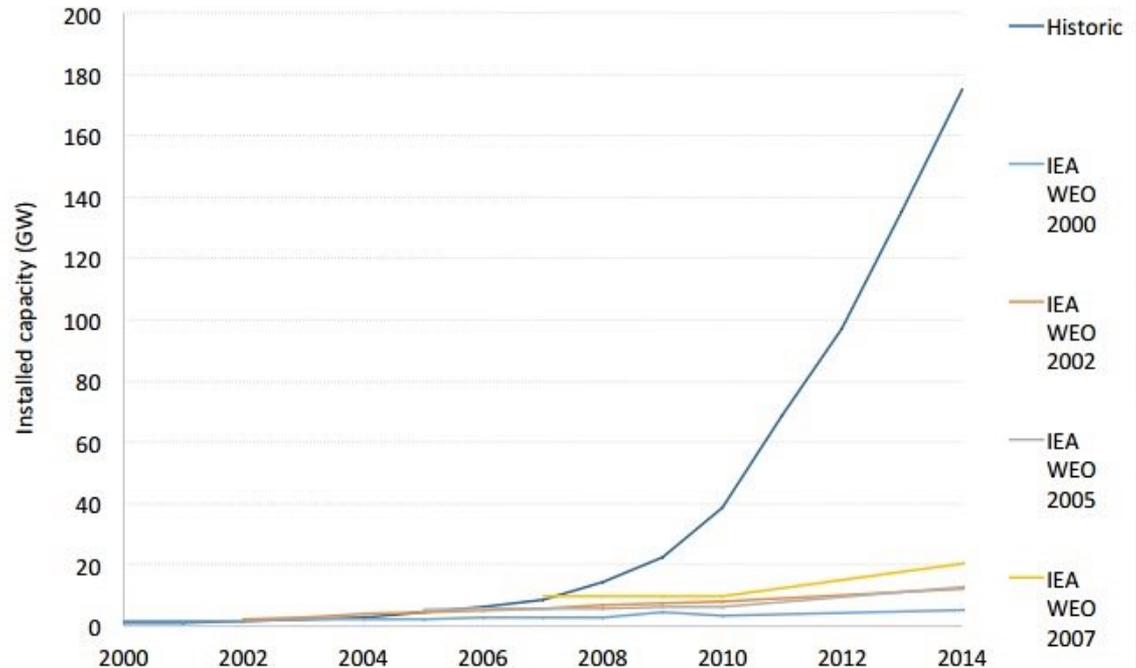
Next steps work with
visionary change makers
to **imagine** and develop **non-linear**
pathways to sustainability

Transformations will likely happen.. Gradually then Suddenly

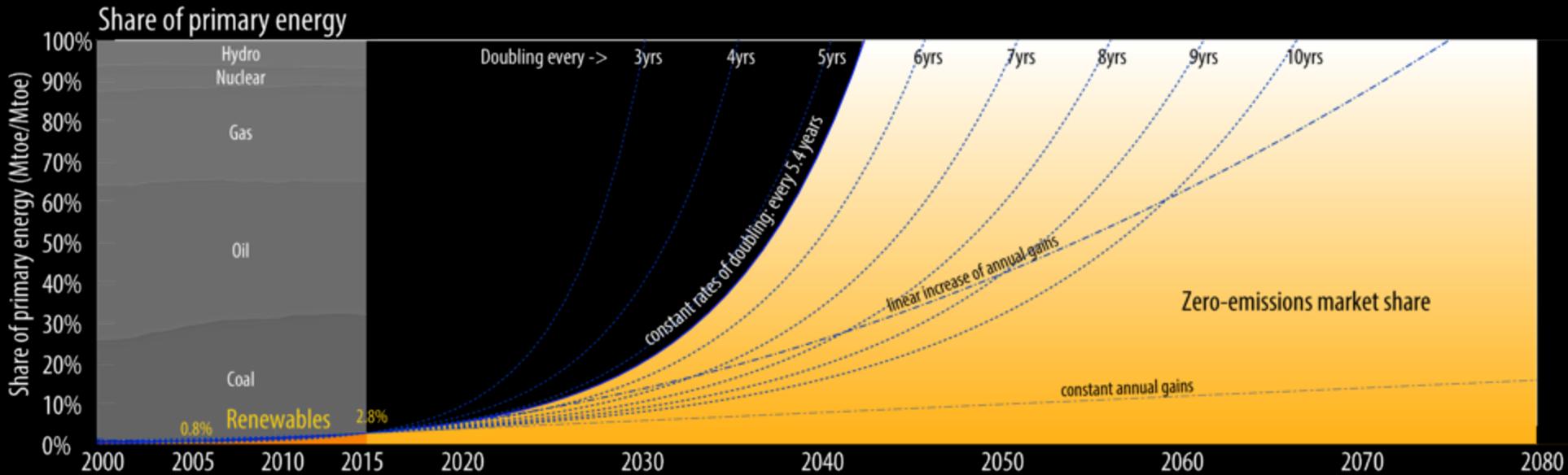


In the past we often miss inflection points..
Growth in clean energy is exceeding projections ...

Figure A: IEA solar PV capacity forecasts against actual



If we IMAGINE the current rate of growth- simple math suggests an inflection around 2030



Renewables: Share of primary energy – doubling every 5.4 yrs

Potential drivers of inflection points in the global sustainability agenda:

- Operationalizing Resilience for SDGs and Paris Agreement
- Operationalizing consumption-based carbon tracking
- Synergies and trade-offs of regional development and global sustainability priorities

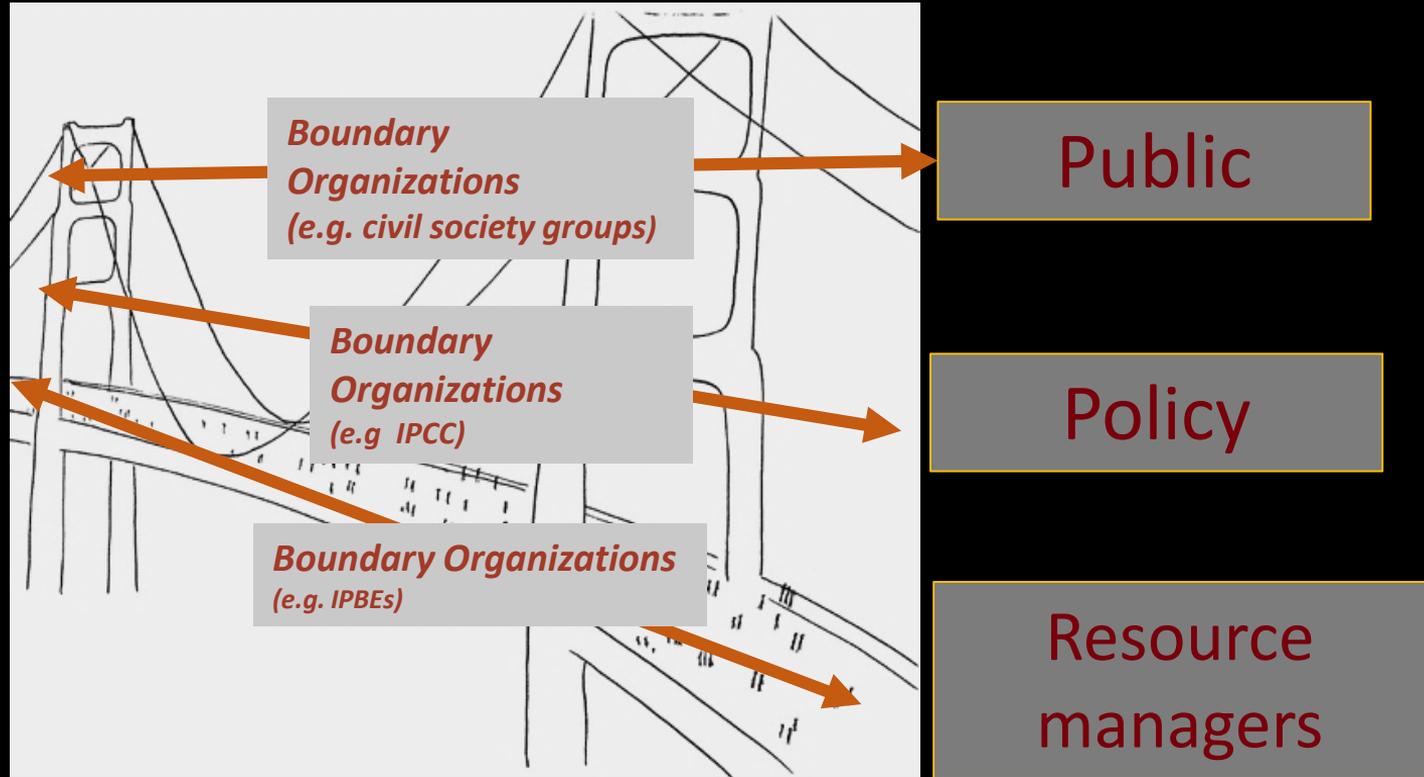
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- Build community and space to **collaborate**

OLD MODEL: Bridging Science-Society Gap



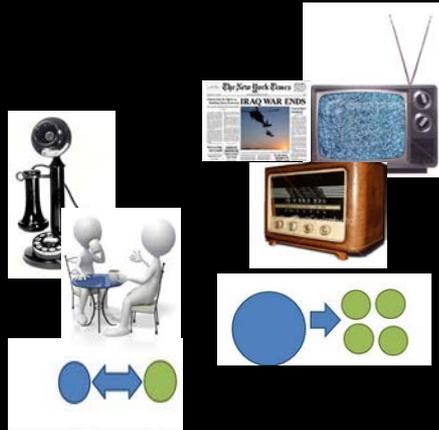
(R)evolution of information and communication



one-to-one
telegraph, phone



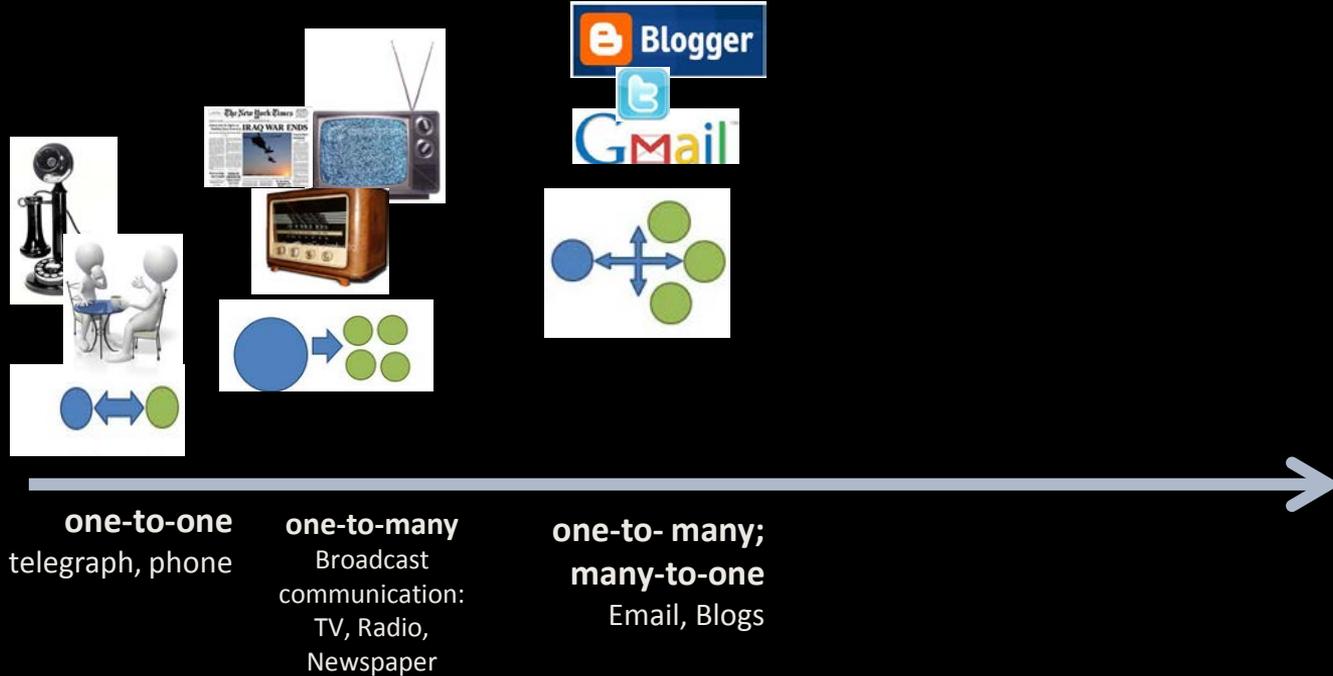
(R)evolution of information and communication



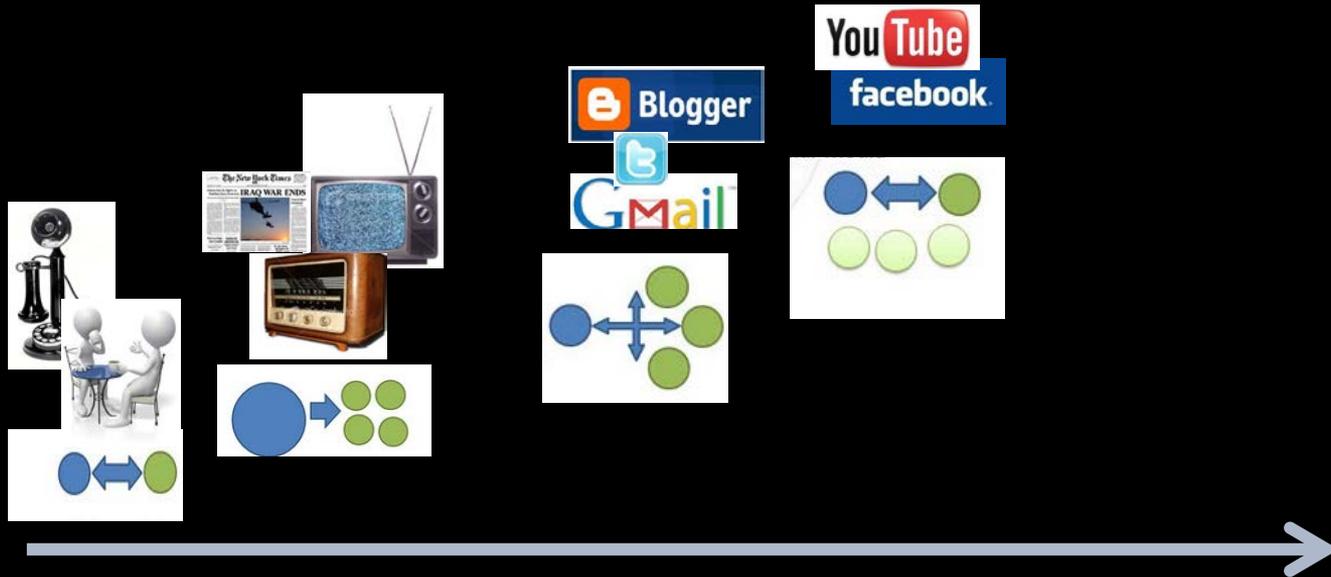
one-to-one
telegraph, phone

one-to-many
Broadcast
communication: TV,
Radio, Newspaper

(R)evolution of information and communication



(R)evolution of information and communication



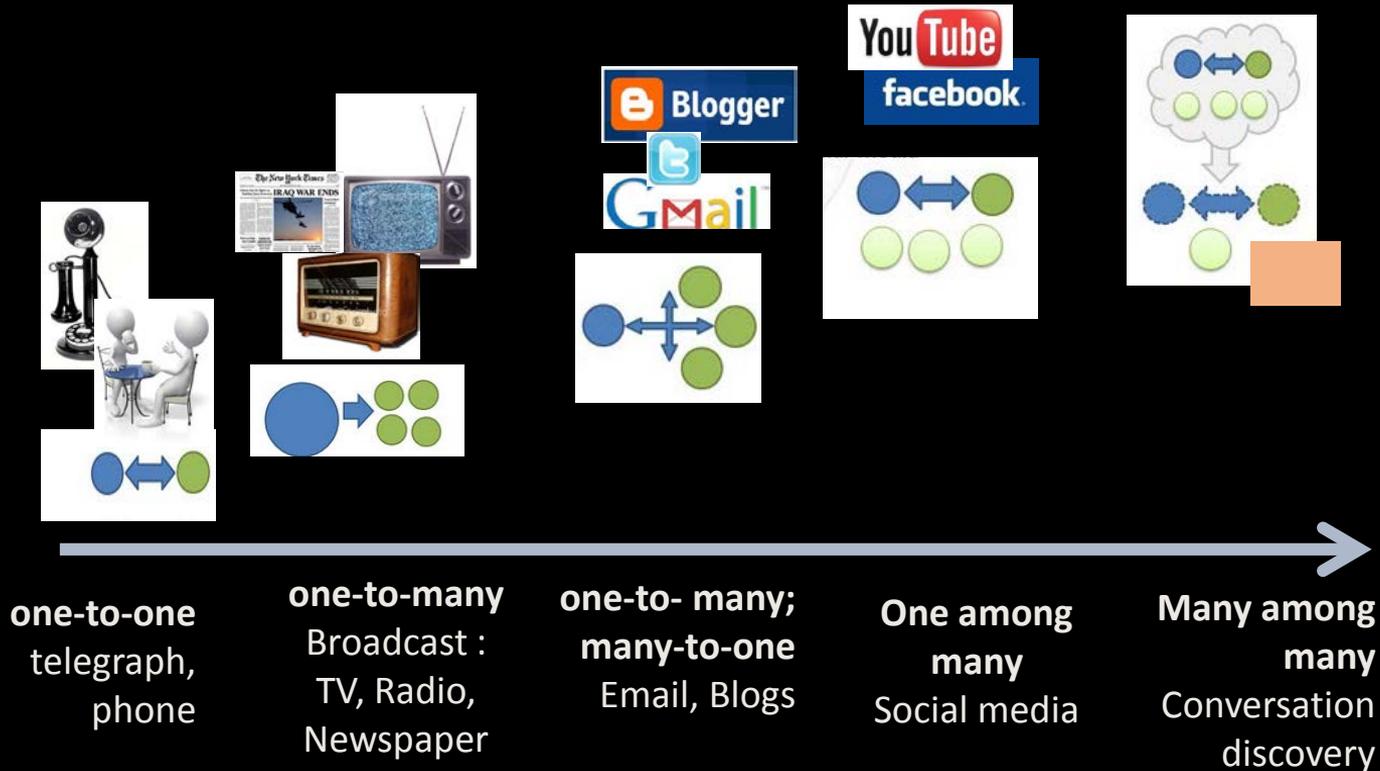
one-to-one
telegraph,
phone

one-to-many
Broadcast :
TV, Radio,
Newspaper

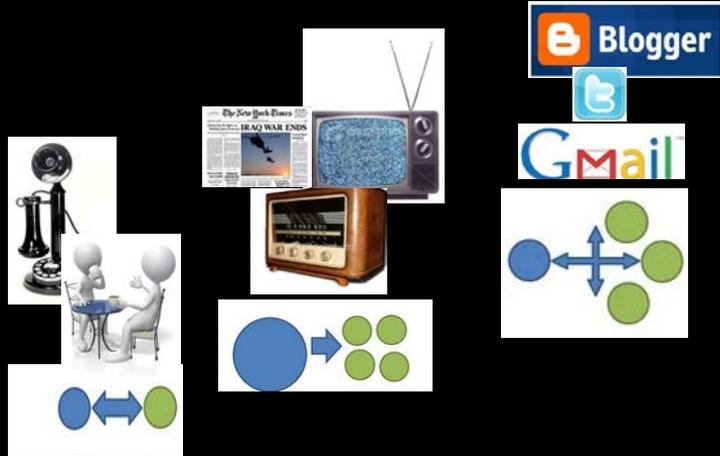
**one-to-many;
many-to-one**
Email, Blogs

**One among
many**
Social media

(R)evolution of information and communication



The credential "Expert"



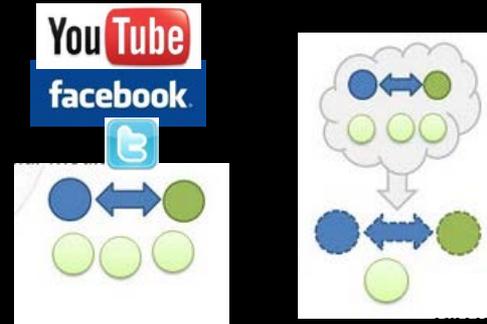
one-to-one
telegraph,
phone

one-to-many
Broadcast:
TV, Radio,
Newspaper

one-to-many;
many-to-one
Email, Blogs

Beyond credentials

The Crowd



One among
many
Social media

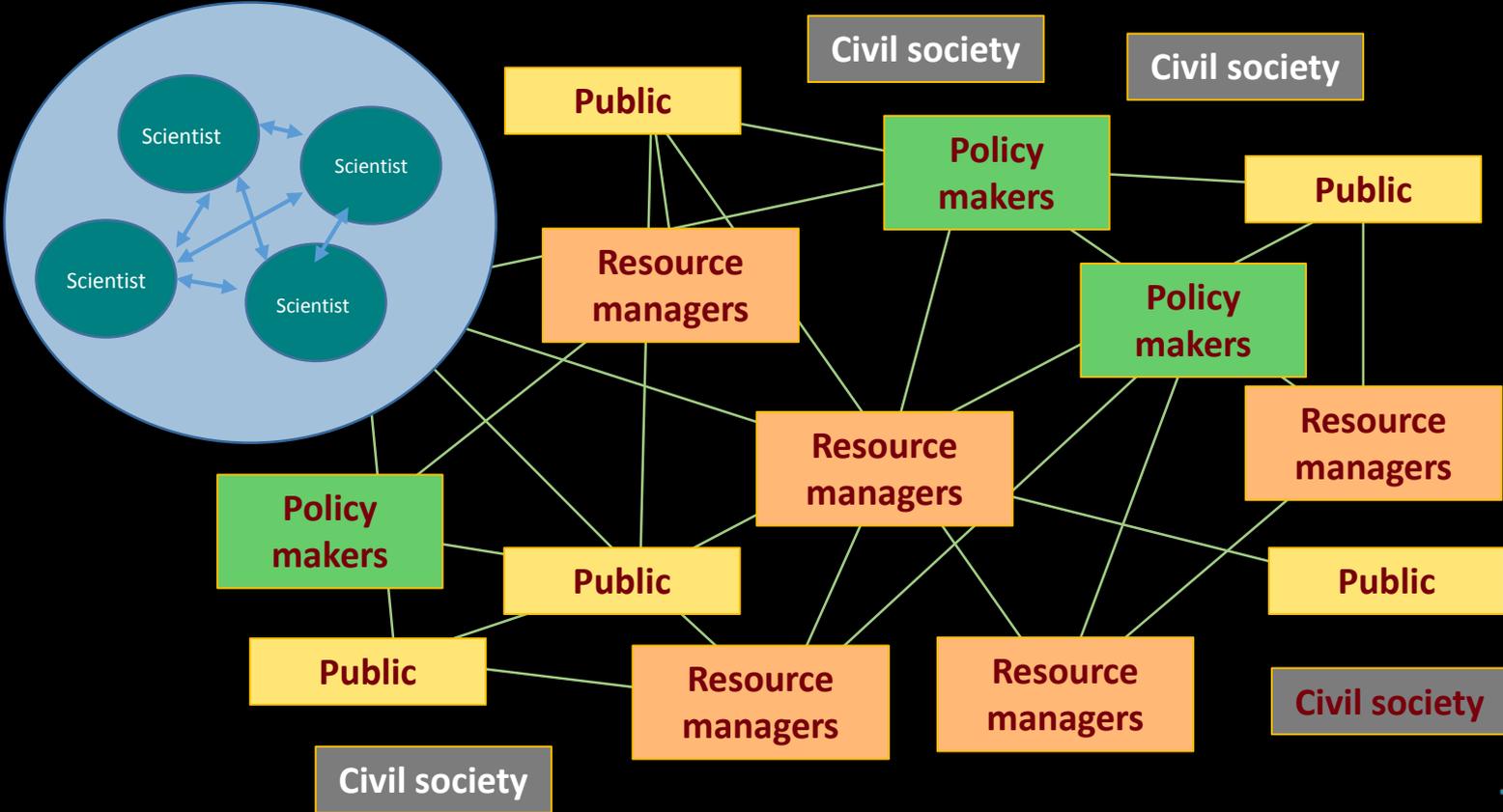
Many among
many
Conversation
discovery

The Algorithm



Machine
generated and
Interpreted

From Bridge to Networks



In Networked World the role of “Experts” is changing

Peers Now as Credible as Experts

Percent who rate each spokesperson as extremely/very credible, and change from 2016 to 2017

– + Y-to-Y Change

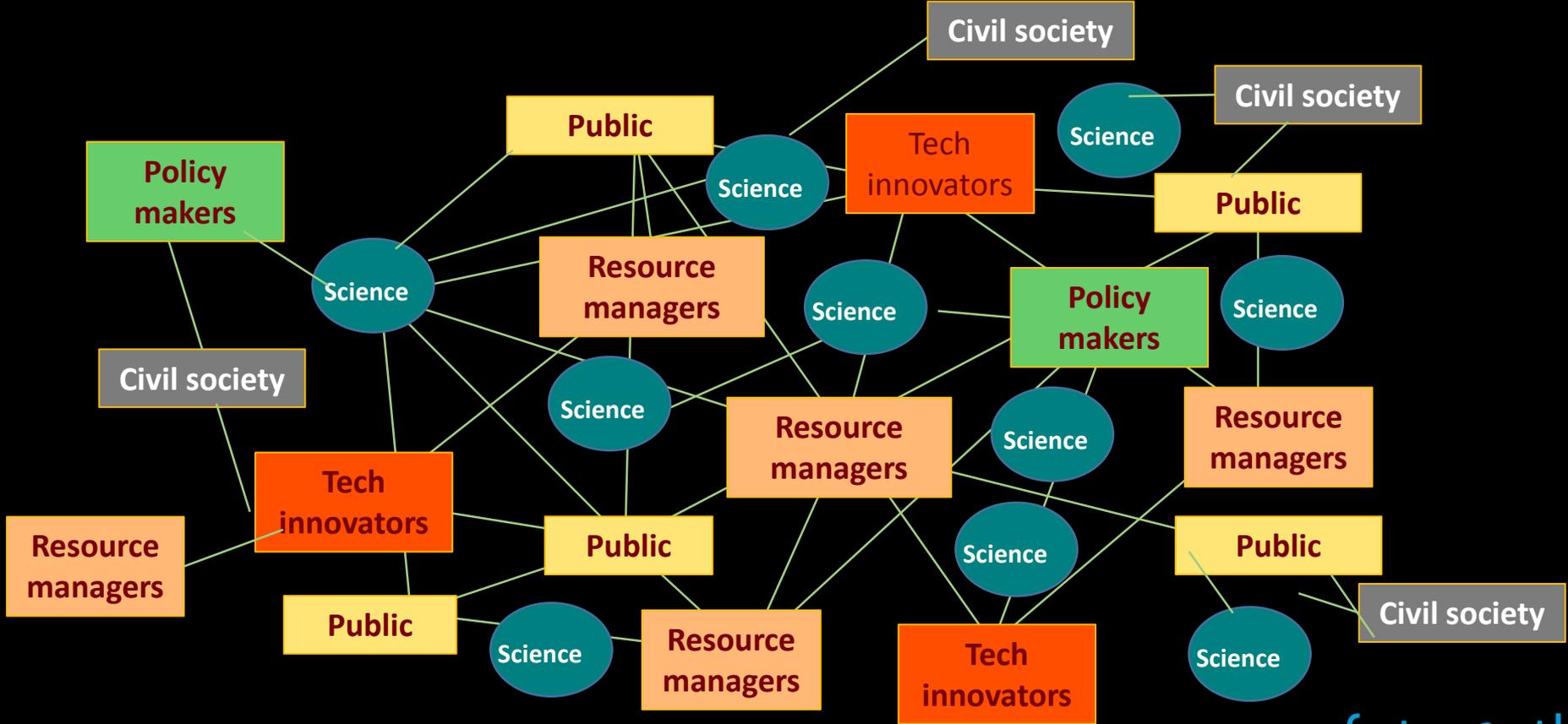
“People in this country have had enough of experts.”

– Michael Gove,
Member of Parliament, U.K.

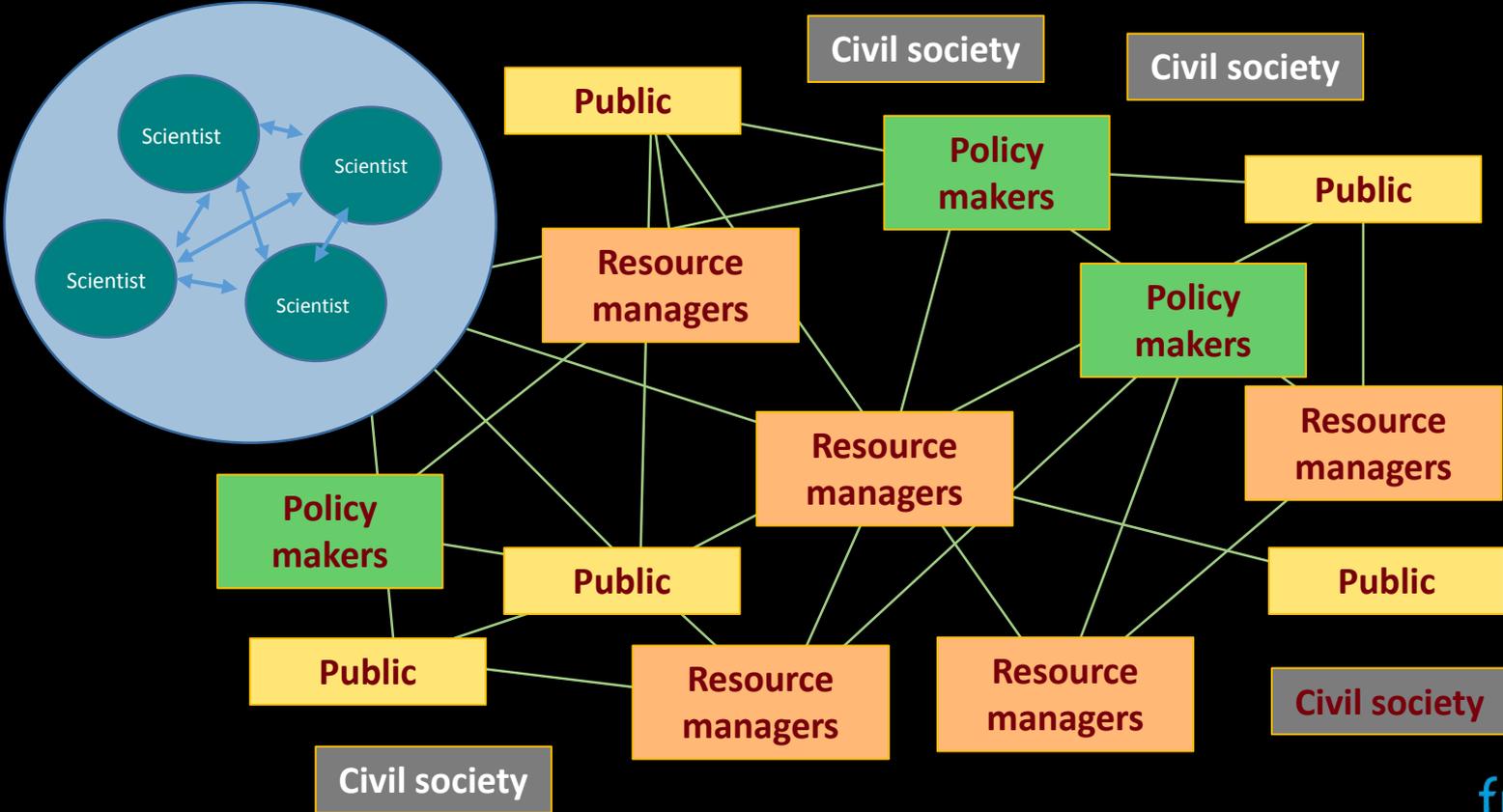


Sources: 2017 Edelman Trust Barometer Q130-747 Below is a list of people. In general, when forming an opinion of a company, if you heard information about a company from each person, how credible would the information be—extremely credible, very credible, somewhat credible, or not credible at all? (Top 2 Box, Very/Extremely Credible) General Population, 28-country global total, question asked of half the sample.

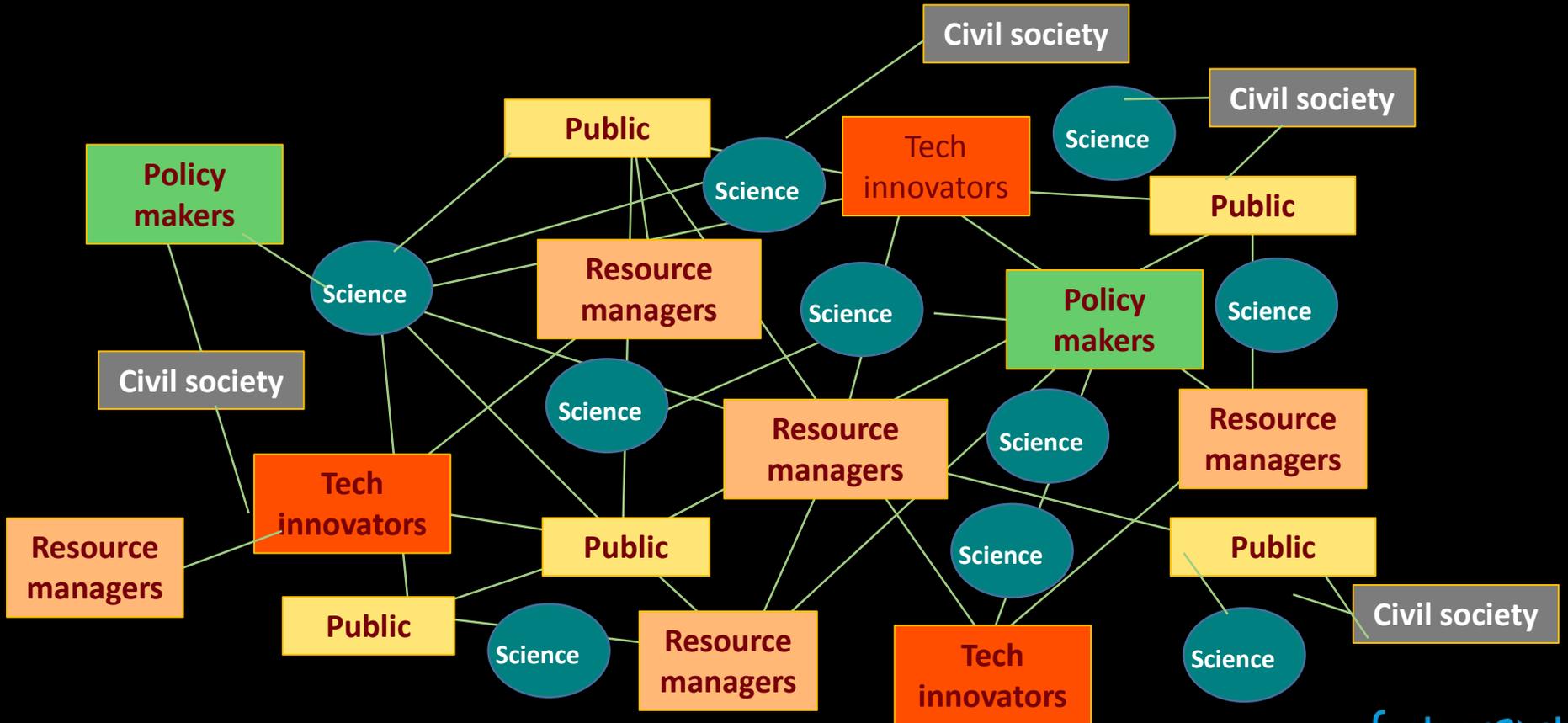
Networks are about collaboration.



So how we move from THIS..

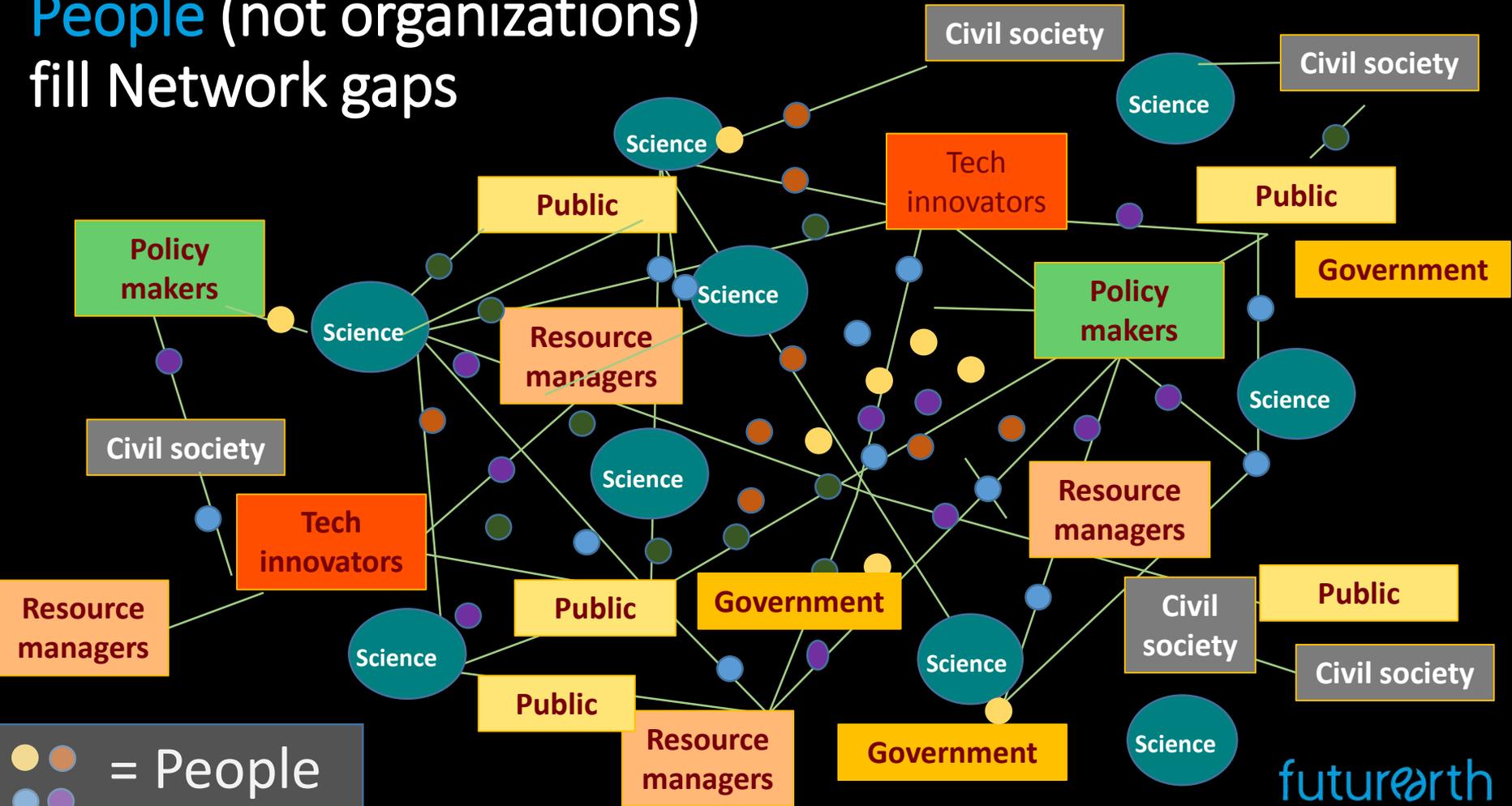


To this....

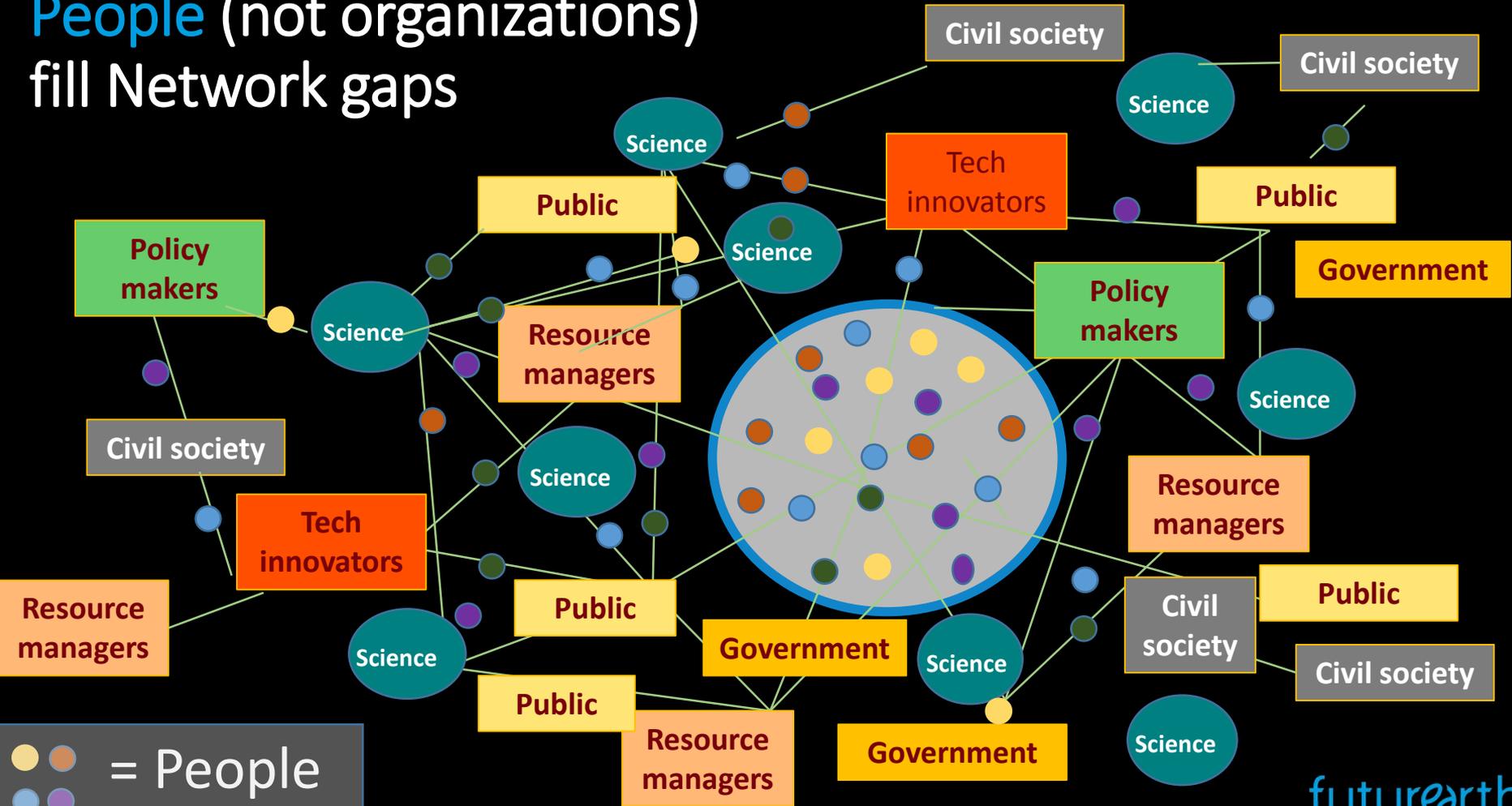


Focus on People

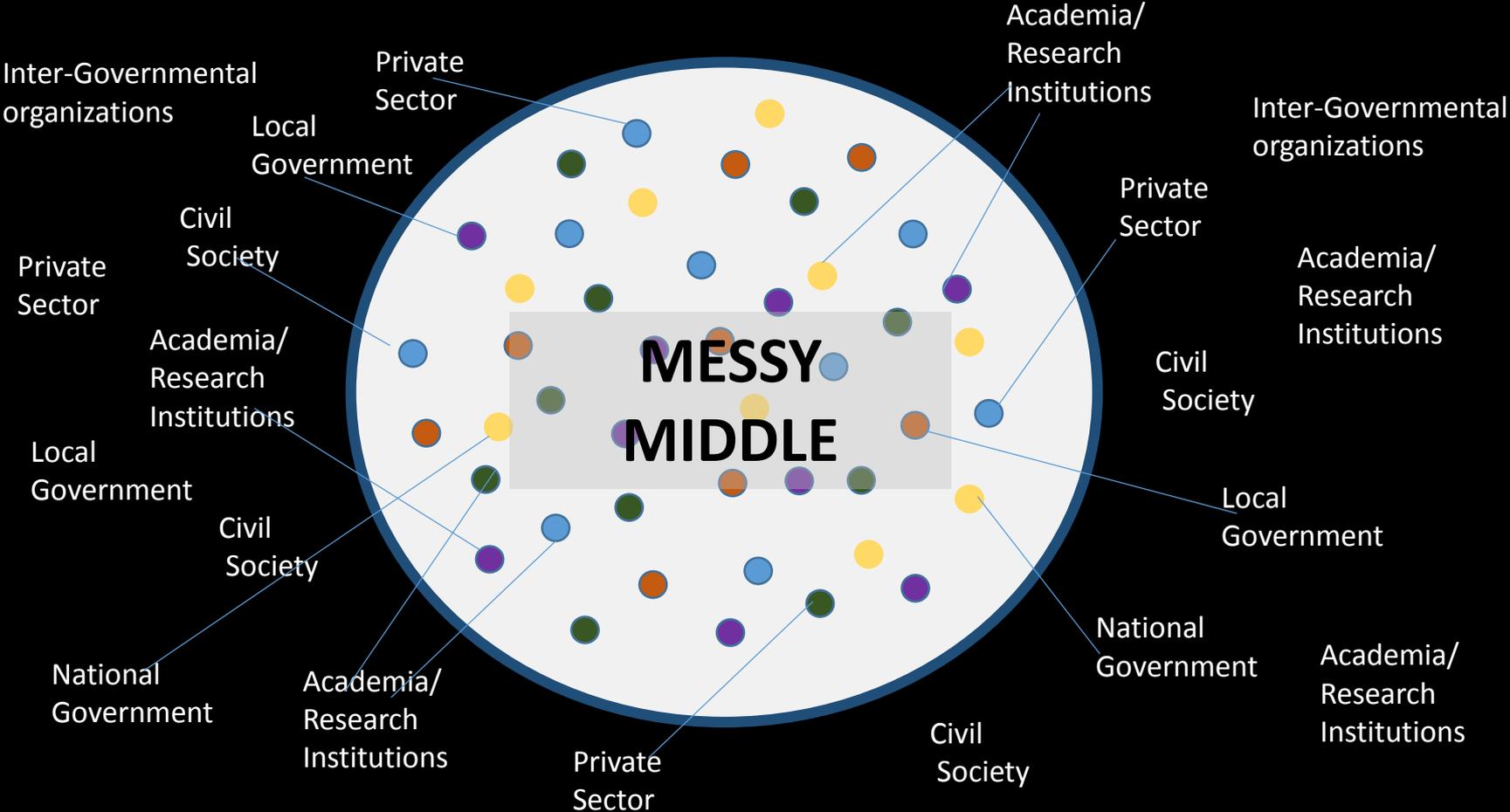
People (not organizations) fill Network gaps



People (not organizations) fill Network gaps



People fill this messy middle – not institutions



Knowledge Action Networks

building, strengthening, nurturing networks of **people** working across disciplines, sectors and regions, and scales on global sustainability



Decarbonisation



Emerging Risks
& Disasters



Natural Assets



Ocean



Finance
& Economics



Health



SDGs



Transformations



Urban

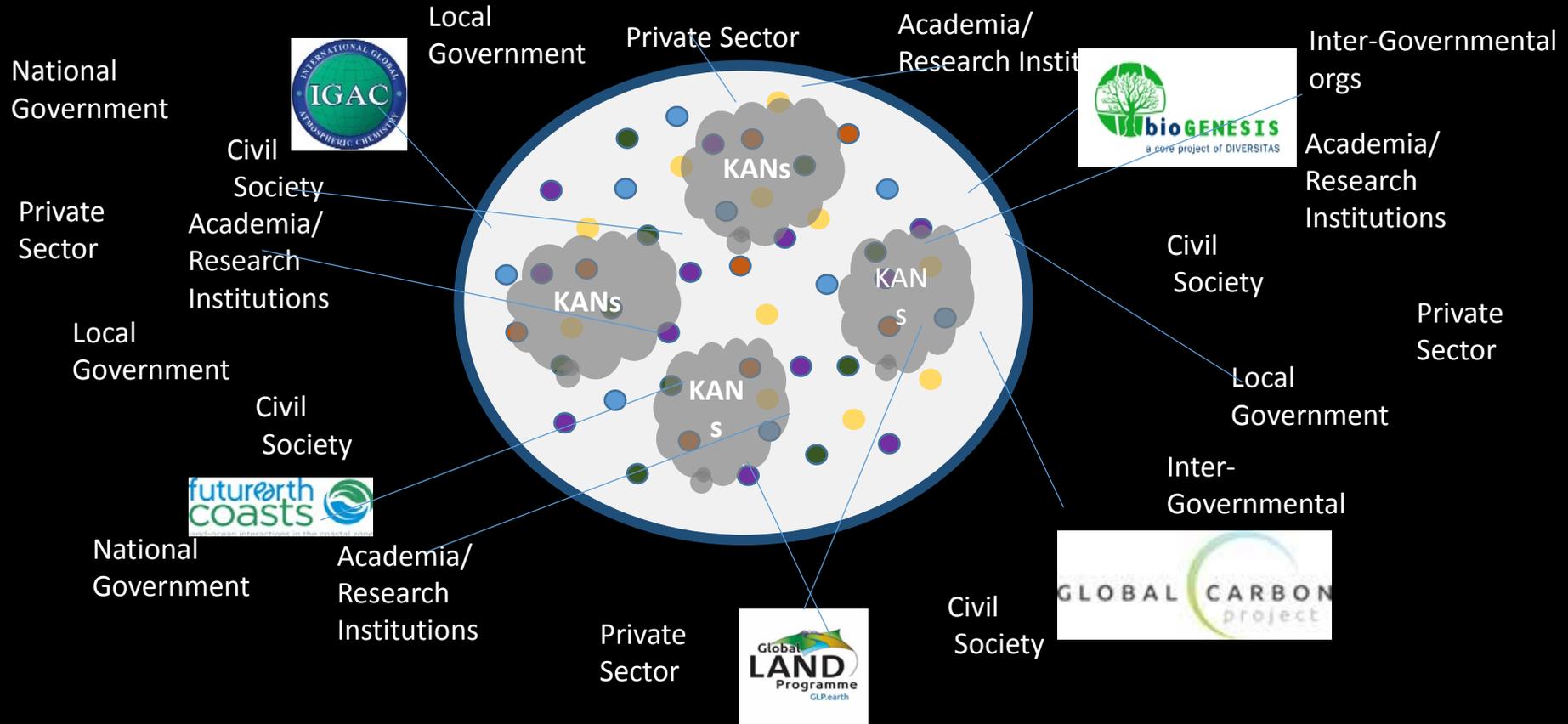


Water-Energy-Food Nexus



SSCP

KANs working in this messy middle – to build and strengthen Community among GRP and others researchers w/ society and policy



Nice idea – but how???

Co-design of research

Co-production of knowledge

Co-creation of value.

What is the role of scientists?

- *Build our fundamental understanding of linked Human-Earth systems*

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- Recognize that transformations will be driven by people not knowledge alone. People who can **imagine** transformations.
- Embrace the **non-linear** and seek out the inflections.
- Build community and space to **collaborate**
- **Experiment** – not just in our science but in how we collaborate with our societal partners and recognize that there will be some failures and through those we will learn,

We need to **experiment** on ...

Co-design

Co-production

Co-creation

Luckily we are not alone

Business's are increasingly building their business models on co-design and co-creation



Release often and awful.



“Collaboration (with stakeholders) can no longer be viewed as an optional extra, it's a strategic imperative,”
--Aline Santos, EVP Unilever



*“The tech community is more creative, more innovative, **more collaborative** and **open** to new ideas than any sector on earth. **But sometimes what’s missing is purpose....** Is there a way for us to harness this ”*

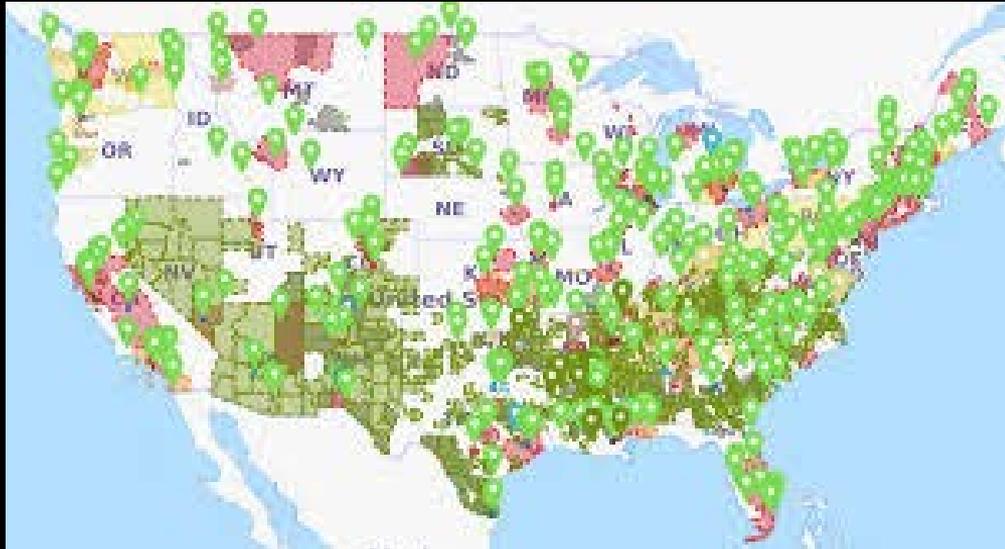
-- President Obama, 2015



“An effective **place-based policy** requires comprehensive interagency collaboration and investment that can ensure an increased impact of federal dollars and a greater return on federal investments.”



-- *White House 2012*





- Target co-creators
- Find the motivation
- Focus on sustainable payoff

Driven by

28%

curiosity and a desire to learn

26%

entertainment and social play

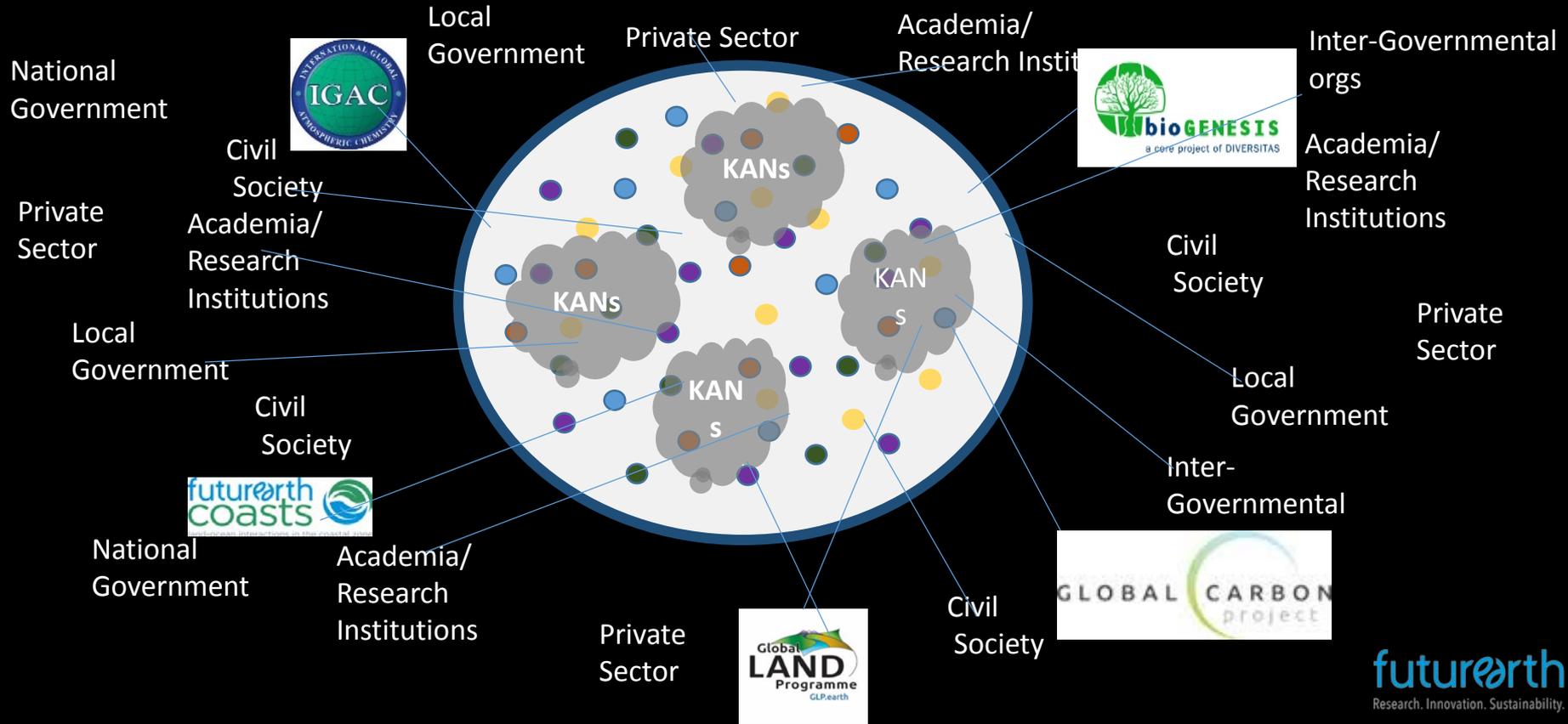
26%

an interest in building skills

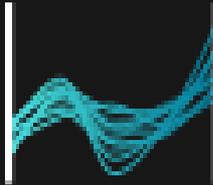
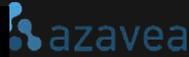


- **Target co-creators**
 - who do you want to co-design with and why
- **Find the motivation**
 - why might they want to collaborate with you
- **Focus on sustainable payoff**
 - why would they stay engaged

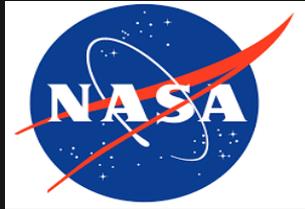
We are asking these questions and **experimenting** to build community with the build Knowledge-Action Networks?



Experimenting with problem-focused public-private partnerships



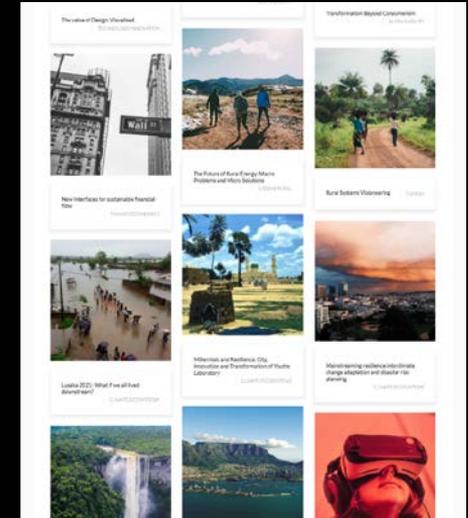
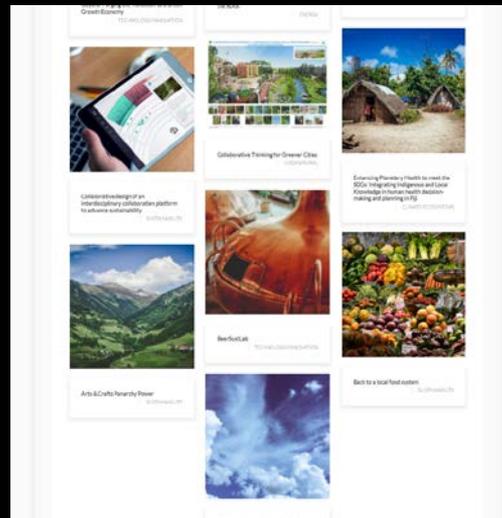
PARTNERSHIP FOR
RESILIENCE
& PREPAREDNESS



Experimenting incentivizing problem-focused collaborations

Multi-stakeholder and Multi-disciplinary
processes to catalyze transformations.

300+ applicants
20 selected



Experimenting with Collective Intelligence to Imagine the Unpredictable

BETA



About

Categories

Community



SEARCH

Analytics

80 participants

15 countries
Academia
Government
Private Sector



Phase 1: Technological Drivers

Which technological drivers could shape the world over the next 3-5 years?

40 contributions 7 comments

Completed



Phase 1: Economic Drivers

Which economic drivers could shape the world over the next 3-5 years?

28 contributions 3 comments

Completed



Phase 1: Political Drivers

Which political drivers could shape the world over the next 3-5 years?

29 contributions 2 comments

Completed

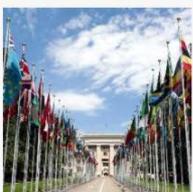


Phase 1: Societal Drivers

Which societal drivers could shape the world over the next 3-5 years?

27 contributions 3 comments

Completed



Phase 1: International Relations Drivers

Which international relations drivers could shape the world over the next 3-5 years?

37 contributions 4 comments

Completed

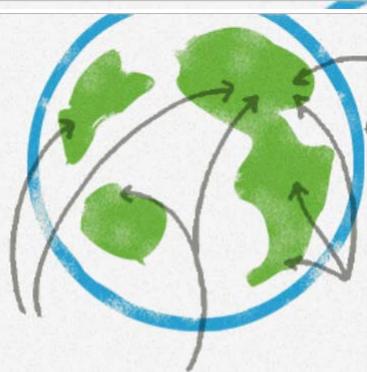


Phase 3: Effects

What effects could arise from combinations of previously submitted drivers and stressors?

0 contributions 0 comments

Opens October 23



Contact Help Sign Out My Profile



Experimenting with co-designing sectoral transformational Pathways

Fourth Industrial Revolution is transforming the way we live.

Need to put **De-carbonization at the center** of this transformation.



What is the role of scientists?

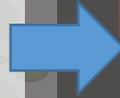
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- **Transgress**- go beyond the bounds of established standard norms of research.

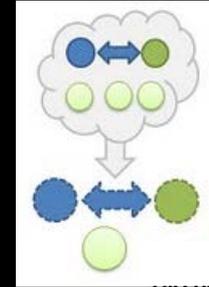
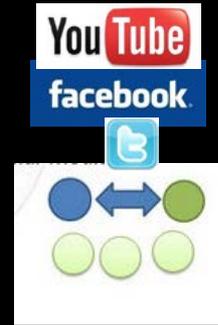
The credential “Expert”

Transgressing to
the world beyond
“experts” is hard

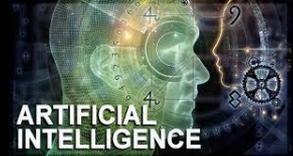


Beyond credentialed “Experts”

The Crowd



The Algorithm



one-to-one
telegraph,
phone

one-to-many
Broadcast:
TV, Radio,
Newspaper

one-to-many;
many-to-one
Email, Blogs

One among
many
Social media

Many among
many
Conversation
discovery

Machine
generated and
Interpreted

Challenges to crossing the line to beyond credentialed “expert” world

- **Closed community model** – need a PhD degree to participate, credibility defined by degrees and publications.
- **Insulated reward structure** – rewards do not include work beyond the walls of academia.
- **Ambiguous evaluation for multi and cross-sector research.** – does not encourage collaboration and solutions focused research.

By why do it.?

It is hard, it will take time,
and the rewards will not be immediate.

But if we want our science to help drive transformations
global sustainability we need to.

And if we don't I worry the relevance of global Earth
and social systems science will dwindle.

Summary

Fundamental research of linked Human-Earth systems is the *necessary foundation for global sustainability.*

To drive for transformation we must also:

- Seek out visionary leaders – and **imagine** transformations.
- Invest in building cross-sectoral communities to **collaborate**.
- Co-design transformations pathways and look for **inflection points** .
- **Experiment** in how to engage and drive change, and expect some failures
- Recognize everyone is **co-creating**– and we need to join in.
- **Transgress** a bit..and recognize rewards will take time.
- And *avoid the phrase “transdisciplinary research”* beyond academics – “co-design”, “co-development” works better with those outside of academia.

