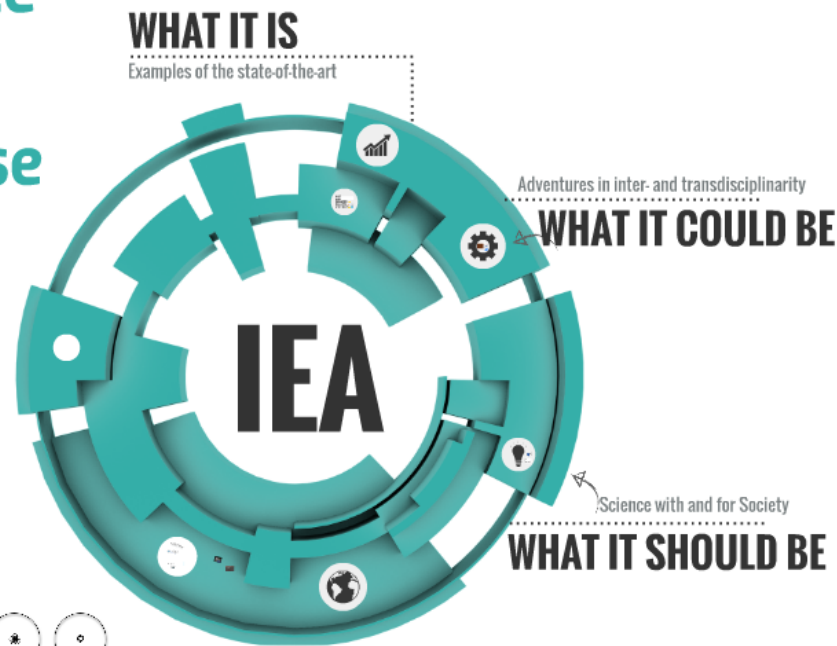


Analyze
your
purpose

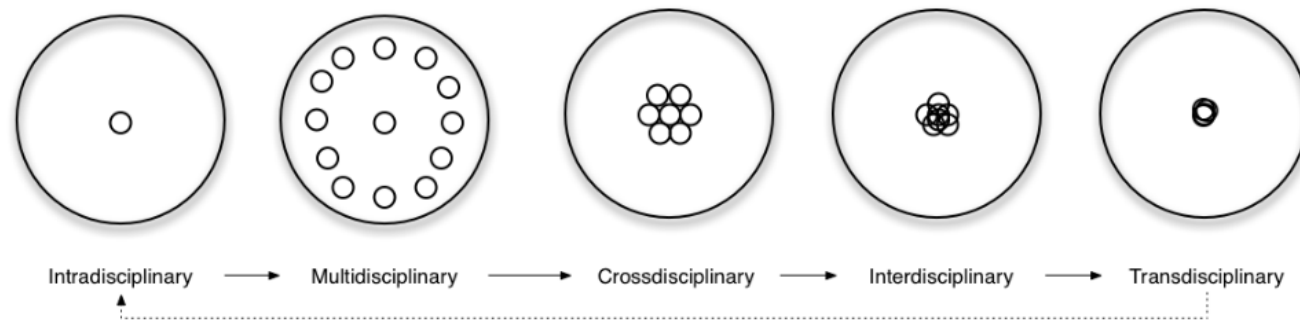


@dorothydankel
#oceanext

Hospitable, humble,
T-shaped researcher

***Transdisciplinary* Insights into Integrated Ecosystem Assessments**

What they are, what they can be, what they should be



Dorothy J. Dankel, Ph.D.
University of Bergen, Norway
Nordic Marine Think Tank



@dorothydankel
#oceanext




www.nmtt.org



**moral of the story:
innovations are
made outside your
comfort zone**





Today's **CATCH**

Integrated Ecosystem Assessments

- status quo
- different disciplines,
different perspectives
- Science with & for
Society, RRI
- DEMO (need 5
volunteers!)

Today's **CATCH**

Integrated Ecosystem Assessments

- **status quo**
- **different disciplines,
different perspectives**
- **Science with & for
Society, RRI**
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volunteers!)**

transdisciplinary?

trans-

/trans,tra:ns,-nz/ 🔊

prefix

prefix: **trans-**

1. across; beyond.
"transcontinental"
 - on or to the other side of.
"transatlantic"
2. through.
"transonic"
 - into another state or place.
"transform"
 - surpassing; transcending.
"transfinite"

mono-

multi-

cross-

inter-

trans-

disciplinary

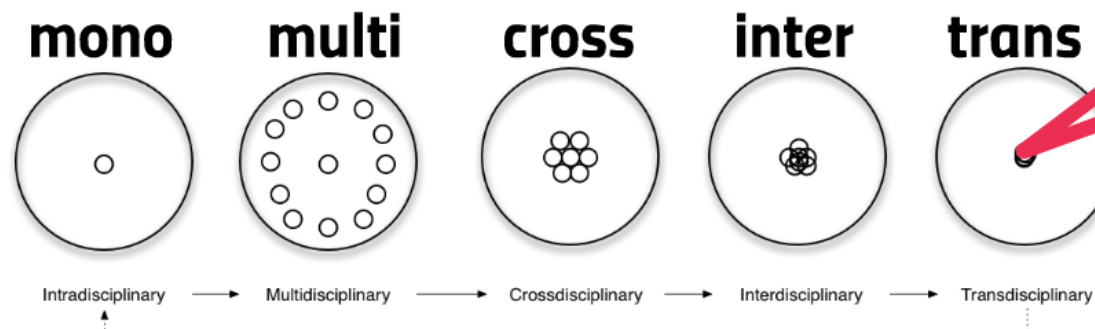


**Neuwirth -> Conchita =
non-conforming**

**& Europe
loves
her!**



Ways of Working



How do *you* work?

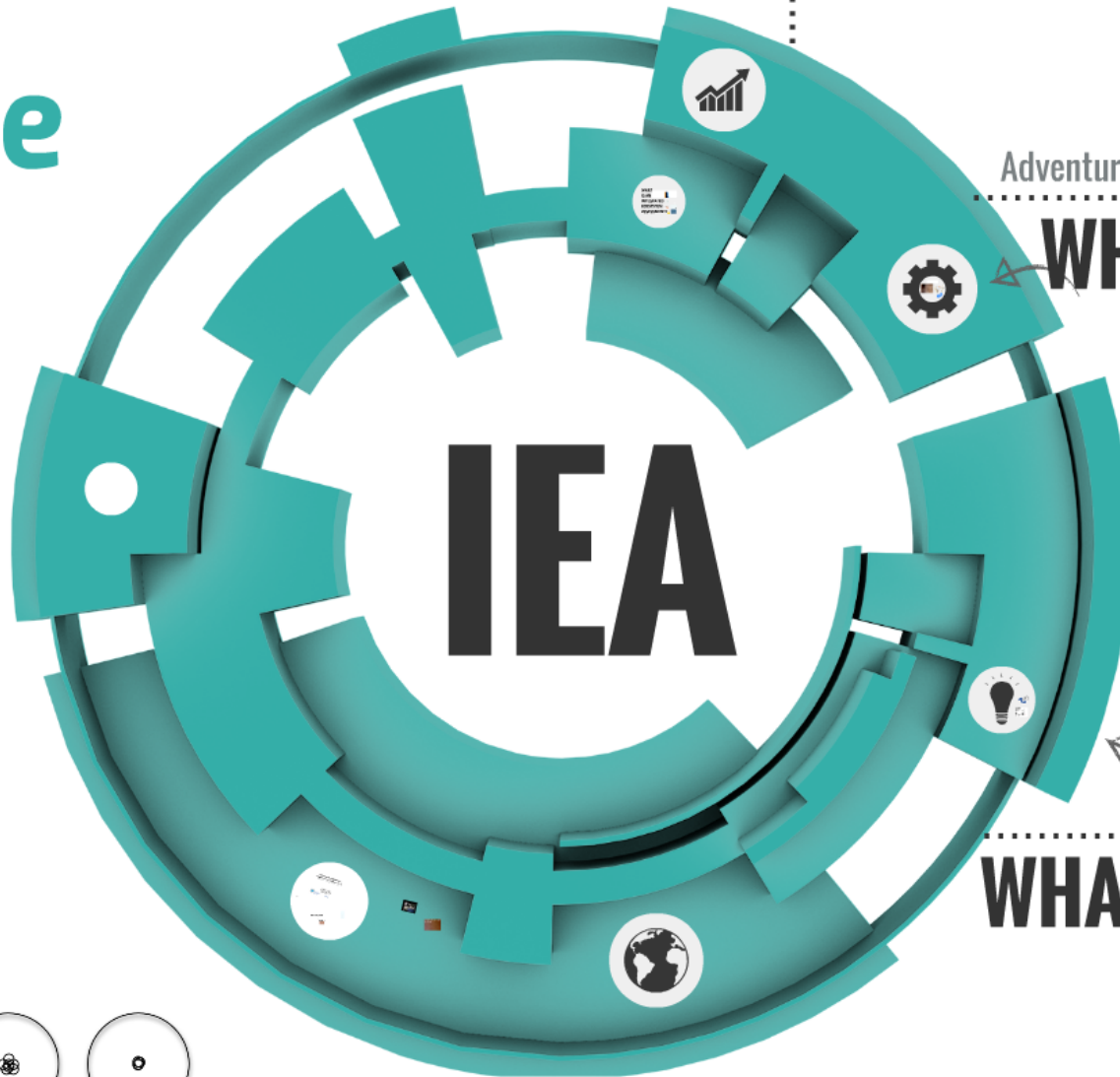
How *could* IEAs work?

How *should* IEAs work?

Analyze your purpose

WHAT IT IS

Examples of the state-of-the-art

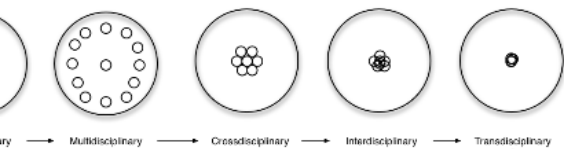


Adventures in inter- and transdisciplinarity

WHAT IT COULD BE

Science with and for Society

WHAT IT SHOULD BE



→ Multidisciplinary → Crossdisciplinary → Interdisciplinary → Transdisciplinary

WHAT IT IS

Examples of the state-of-the-art



WHAT IS AN INTEGRATED ECOSYSTEM ASSESSMENT?

When exploring IEAs in future researchers should ask themselves:

- What is the problem you want to solve?
- What resources are available?
- Who are the actors and what are their roles?
- What is an IEA (in the context of the problem to be solved)?



Millenium Development Goals (2000)
Sustainable Development Goals (2015)

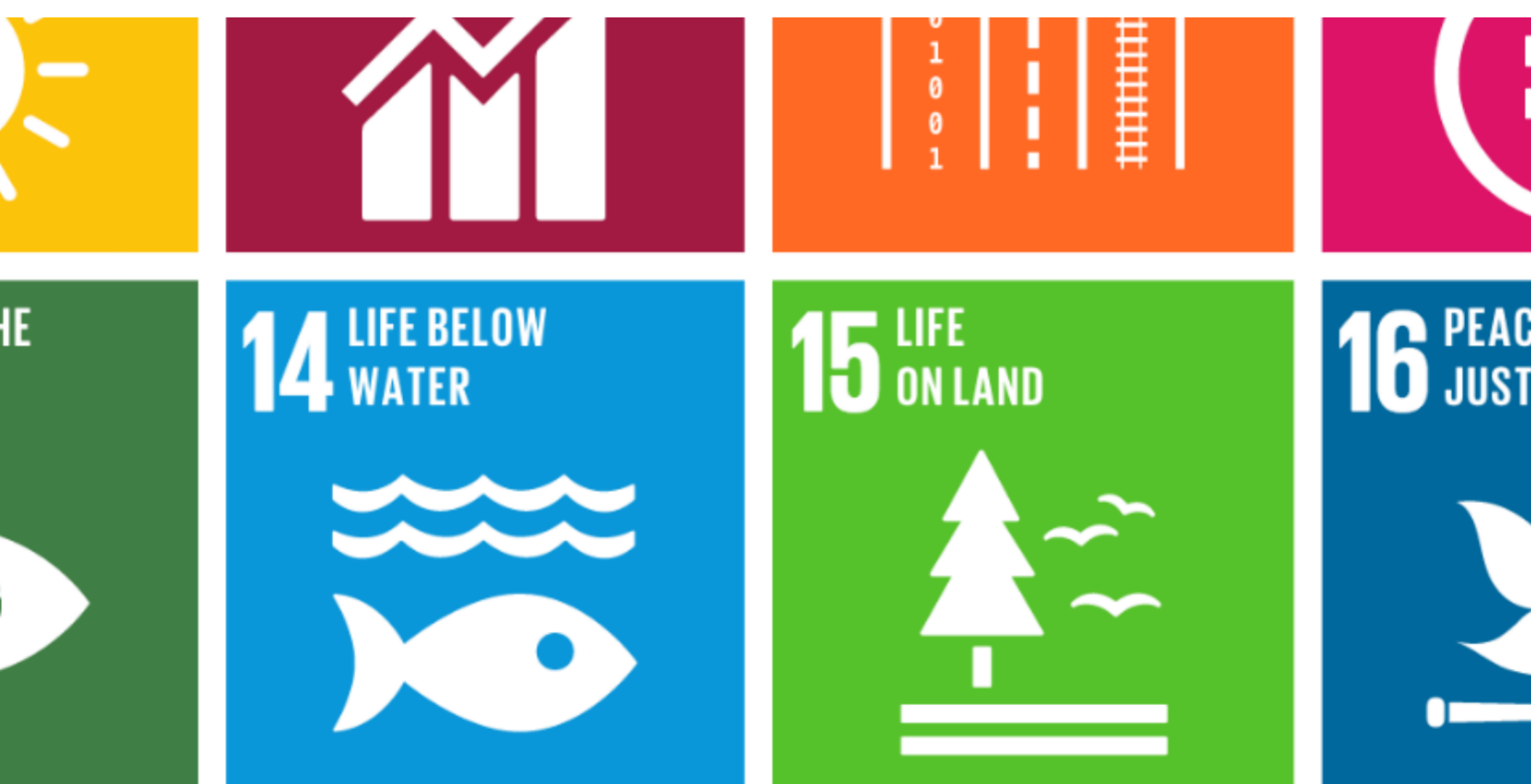


Millenium Development Goals (2000)

Sustainable Development Goals (2015)



But how to achieve sustainable use & conservation?



But how to achieve sustainable use & conservation?

Perspective

Integrated Ecosystem Assessments: Developing the Scientific Basis for Ecosystem-Based Management of the Ocean

Phillip S. Levin*, Michael J. Fogarty, Steven A. Murawski, David Fluharty

A series of prominent and controversial papers about the state of marine ecosystems has occupied the pages of high-profile journals over the last decade [1–7]. While some might quarrel with the specific conclusions of these papers, there is no dispute that managers of ocean and coastal habitats confront a growing diversity of very serious challenges [8] that, if left unattended, threaten the ability of marine ecosystems to supply the goods and services required or desired by humans [9].

The tenets of ecosystem-based management (EBM) now occupy center stage in our efforts to rebuild marine ecosystems. Indeed, over the last several decades EBM has evolved from a vague principle to a central paradigm underlying living marine resource policy in the United States [10,11]. EBM differs from conventional resource management in that it defines management strategies for entire systems, not simply individual components of the ecosystem [12]. As a consequence, EBM takes into account interactions among ecosystem components and management sectors,

point where large-scale, comprehensive EBM is broadly accepted as crucial for effective marine conservation and resource management [15].

While some policy makers clearly grasp the utility of an EBM approach, implementation of EBM in marine ecosystems is a significant hurdle, and little practical advice is available to inform management authorities on how to select specific management measures to achieve EBM goals. Here we propose “integrated ecosystem assessments” (IEAs) as a framework for organizing science in order to inform decisions in marine EBM at multiple scales and across sectors. Below we describe our view of IEAs, highlighting the ways that they will enhance the ability of resource managers to evaluate cumulative impacts of diverse human activities as well as steer management efforts to achieve multiple simultaneous ecosystem objectives. The approach we outline follows the paradigm of formal decision analysis [16], is consistent with the Millennium Ecosystem Assessment [9], and is a descendant of approaches advocated by Caddy [17], Sainsbury [18], and Smith [19]. While developed with marine ecosystems in mind, the

attaining the goals of EBM. IEAs, as we envision them, do not necessarily supplant single-sector management; instead, they inform the management of diverse, potentially conflicting ocean-use sectors. As such, we view IEAs as a necessary supplement to, and extension of, single-species and single-sector approaches.

A Five-Step Process for IEAs

Below we outline five key steps that, we contend, are necessary for IEAs and that enhance the likelihood of successful implementation of EBM. These are scoping, indicator development, risk analysis, management strategy evaluation, and ecosystem assessment (Figure 1).

Scoping. The IEA process begins with a scoping step. It is in this step that specific ecosystem objectives and threats are identified. While EBM is, by definition, more inclusive than traditional sectoral approaches, IEAs cannot evaluate all issues relevant to

Citation: Levin PS, Fogarty MJ, Murawski SA, Fluharty D (2009) Integrated ecosystem assessments: Developing the scientific basis for ecosystem-based management of the ocean. *PLoS Biol* 7(1): e1000014. doi:10.1371/journal.pbio.1000014

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IEA's: A Next Generation Tool for Ecosystem-Based Management

Once societal objectives for the collective use of different ecosystem services have been established, we require a way to assess the current state of the ecosystem (including its human and non-human dimensions) and to evaluate the implications of alternative management decisions along with associated risks. Management decisions impact the broad spectrum of services and resources provided by ecosystems (e.g. fishing, recreation, energy production, shipping, agriculture, forestry, food, and clean water) in diverse ways.

Understanding and communicating how management of one area (e.g. energy production) will impact others (e.g. fishing, shipping) is critical to effective decision-making. Integrated Ecosystem Assessments (IEAs) are intended to provide a structure to assess ecosystem status relative to objectives, account for the holistic impact of management decisions, and guide management evaluations. IEAs are intended to provide 'a *synthesis and integration of information on relevant physical, chemical, ecological, and human processes in relation to specified management objectives* (Levin et al., 2008, 2009)'. IEAs therefore

draw on both the natural and human-dimensions sciences to determine the status of these coupled Social-Ecological Systems (SESs) and to evaluate management options. This requires coordination and cooperation among different state and federal agencies and drawing on the expertise of partners in native communities, academia, and non-governmental organizations.



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holistic
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refere





ICES Integrated Ecosystem Assessments





You Tube

ICES WKRISCO REPORT 2014

ICES ACOM/SCICOM COMMITTEE

ICES CM 2014\SSGBENCH:01



ICES
CIEM

International Council for
the Exploration of the Sea

Conseil International pour
l'Exploration de la Mer

Report of the Workshop on Regional Seas Commissions and Integrated Ecosystem Assessment Scoping

17–20 November 2014

ICES Headquarters, Denmark

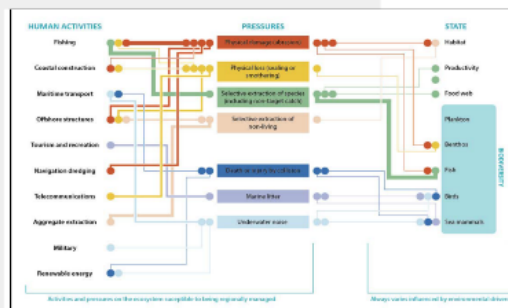


Figure 3. Example of Ecosystem Overview summary output from the Greater North Sea.

Executive Summary

The Workshop on Regional Seas Commissions and Integrated Ecosystem Assessment Scoping (WKRISCO) had two objectives: to summarize progress made across the ICES integrated ecosystem assessment (IEA) groups and to scope with OSPAR and HELCOM on the knowledge and information needs for upcoming regional assessments. WKRISCO provided a panorama of the work of the ICES IEA groups.

WKRISCO was held over 4 days with 26 participants. All ICES integrated ecosystem assessment groups contributed and Chairs from five of the groups attended in person. Representatives of the HELCOM and OSPAR secretariats and the European Environment Agency (EEA) participated. WKRISCO took place in two phases; the first synthesized the work of the IEA groups and considered how to explore governance and social issues. The second focused on a scoping exercise between ICES and RSCs.

The IEA groups highlighted:

- i. The methods being developed and the key gaps and needs.
- ii. Any prioritization of objectives and use of case studies.
- iii. Their considerations about key data/quality assurance issues.
- iv. The challenges associated with the governance and management context.

The report documents the commonalities and differences across ICES IEA groups (linked to challenges and opportunities), and the issues around the governance and legal context in the development of IEA methods in the ICES area. It explores uncertainty, credibility and legitimacy when making qualitative decisions and the knowledge requirements for the ecosystem approach of OSPAR and HELCOM. It is clear that both OSPAR and HELCOM are keen to engage with the IEA process.

There are differences in the priorities, objectives, and available expertise between the ICES IEA groups. WKRISCO felt that this diversity was important and reflected regional approaches, priorities and available expertise. There are few tangible demonstration cases as yet. The challenge is to how to operationalize methods and work towards demonstration advice on IEAs. IEAs should have a clear connection with marine governance structures in an ecoregion. Interaction between natural and social scientists on social drivers, impacts and ecosystem services is still considered relative novel. The inclusion of social scientists (e.g. from economics, political science, sociology or history) needs to be considered regionally. The issue of quality assurance of data supply and transparency of decision-making is only just beginning to be addressed. Researchers are aware of the challenges brought about by the differences in scales and resolutions of processes within each field of research. Suggested guidance for future IEA work in ICES is provided.

When exploring IEAs in future, researchers should ask themselves:

- What is the problem you want to solve?
- What resources are available?
- Who are the actors and what are their roles?
- What is an IEA in this context?

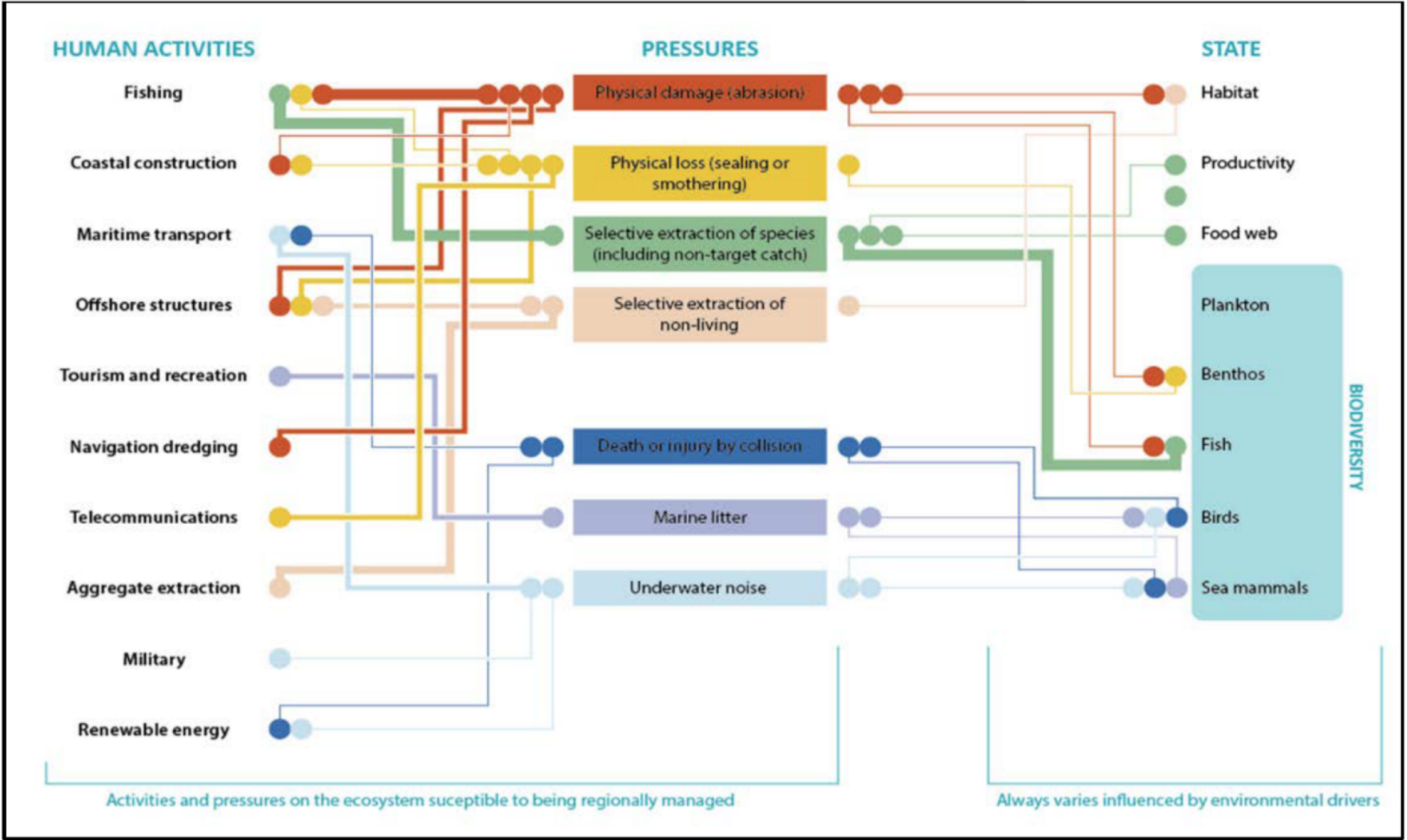


Figure 3. Example of Ecosystem Overview summary output from the Greater North Sea.

Limitations of Integrated Assessments

Kandlikar & Risbey (1995) "Uses and Limitations of Insights from Integrated Assessment Modeling" Thematic Guide to Integrated Assessment Modeling of Climate Change [online]. University Center, Mich.

- Are IAs 'truth machines' or 'forecasting tools' or '**heuristic tools**'?
- IAs should "**serve the role of an organizing framework** for directing activity in more detailed studies outside of the model" **not give specific prescriptions**

Risbey, Kandlikar and Patwardhan (1996) Assessing Integrated Assessments. Climatic Change 34: 369-395.

- not everything *can be* quantified or *should be* quantified
- damage archetypes: showing "losses"
- experts should provide caveats of their assessments
- IAs typically have **strong disciplinary biases** (*where can the humanities fit in?*)

Assessment of Assessments (2009)

"Towards a Regular Process for the Global Reporting and Assessment of the State of the Marine Environment, Including Socio-Economic Aspects"

<http://www.unga-regular-process.org/>

Findings regarding the integration of assessments



Although regional assessments often integrate results across the different sectors of human activity that cause pollution, other types of integration are rare. Assessments that integrate across ecosystem components may exist within a given sector (e.g., ecosystem approach to fisheries), but even if there are strong fisheries assessments in some regions they frequently have no linkage to other assessments covering habitat, water quality or other ecosystem features. As for economic and social aspects, at best institutions with regulatory authority may request assessments that combine the economic and social status of the activities they regulate and the state of the marine resources necessary for the activity (e.g., the state of the fishing industry and of the targeted stocks). Moreover, the interdisciplinary methodology for integrated assessment is not well developed.

WHAT IS AN INTEGRATED ECOSYSTEM ASSESSMENT?

When exploring IEAs in future researchers should ask themselves:

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Millenium Development Goals (2000)
Sustainable Development Goals (2015)



A large, stylized teal graphic on the left side of the slide. It consists of several overlapping, curved, geometric shapes that resemble a stylized 'A' or a series of interlocking plates. On one of the teal plates, there is a white circular icon containing a black gear. Inside the gear, there is a small blue square and a small globe icon. A thin, dark, hand-drawn line with an arrow points from the gear icon towards the main title text.

Adventures in inter- and transdisciplinarity

WHAT IT COULD BE

decision-making

power asymmetries

legal frameworks



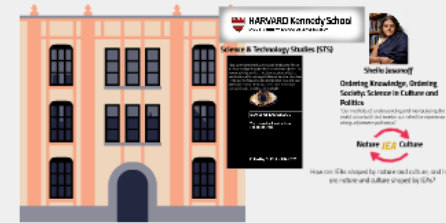
LAW



PSYCHOLOGY

*socio-
psychology*

economics



philosophy

discourse analysis

participation

SOCIAL SCIENCES

*social network
analysis*

sociology

communication

Integrated

Ecosystem

Assessment

HUMANITIES



language

anthropology

cultural consensus

analysis

modelling



MATHEMATICS &

biology

NATURAL

ecology

SCIENCES

ecotoxicology



MEDICINE

health

nutrition

human well-being



HARVARD Kennedy School

JOHN F. KENNEDY SCHOOL OF GOVERNMENT

Science & Technology Studies (STS)

"Just as environmental scientists are hard put to find on earth an ecological system that has not been affected by human activity, so it is difficult for social scientists to locate forms of human organization or behavior anywhere in the world whose structure and function have not been affected, to some extent, by science and technology."
excerpt Chapter 2: States of Knowledge



STATES OF KNOWLEDGE

The co-production of science
and social order

Edited by SHEILA JASANOFF



Sheila Jasanoff

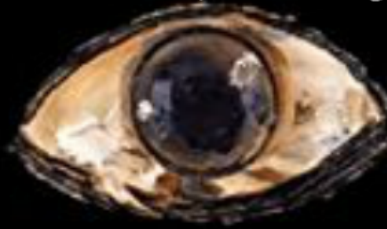
Ordering Knowledge, Ordering Society: Science in Culture and Politics

"Our methods of understanding and manipulating the world curve back and reorder our collective experience along unforeseen pathways."



How are IEAs shaped by nature and culture, and how are nature and culture shaped by IEAs?

"Just as environmental scientists are hard put to find on earth an ecological system that has not been affected by human activity, so it is difficult for social scientists to locate forms of human organization or behavior anywhere in the world whose structure and function have not been affected, to some extent, by science and technology."
excerpt Chapter 2: States of Knowledge



STATES OF KNOWLEDGE

The co-production of science
and social order

Edited by SHEILA JASANOFF

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How are IEA

Science & Technology Studies

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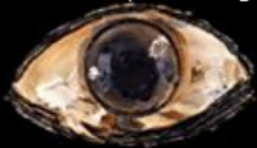


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Sheila Jasanoff

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How are IEAs shaped by nature and culture, and how are nature and culture shaped by IEAs?

legal frameworks



LAW

decision-making

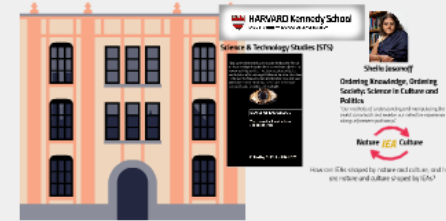
power asymmetries

*socio-
psychology*

economics



PSYCHOLOGY



philosophy

discourse analysis

participation

SOCIAL SCIENCES

language



HUMANITIES

Integrated

Ecosystem

Assessment

*social network
analysis*

sociology

communication

anthropology

cultural consensus

analysis

modelling



MATHEMATICS &

biology

NATURAL

ecology

SCIENCES

ecotoxicology

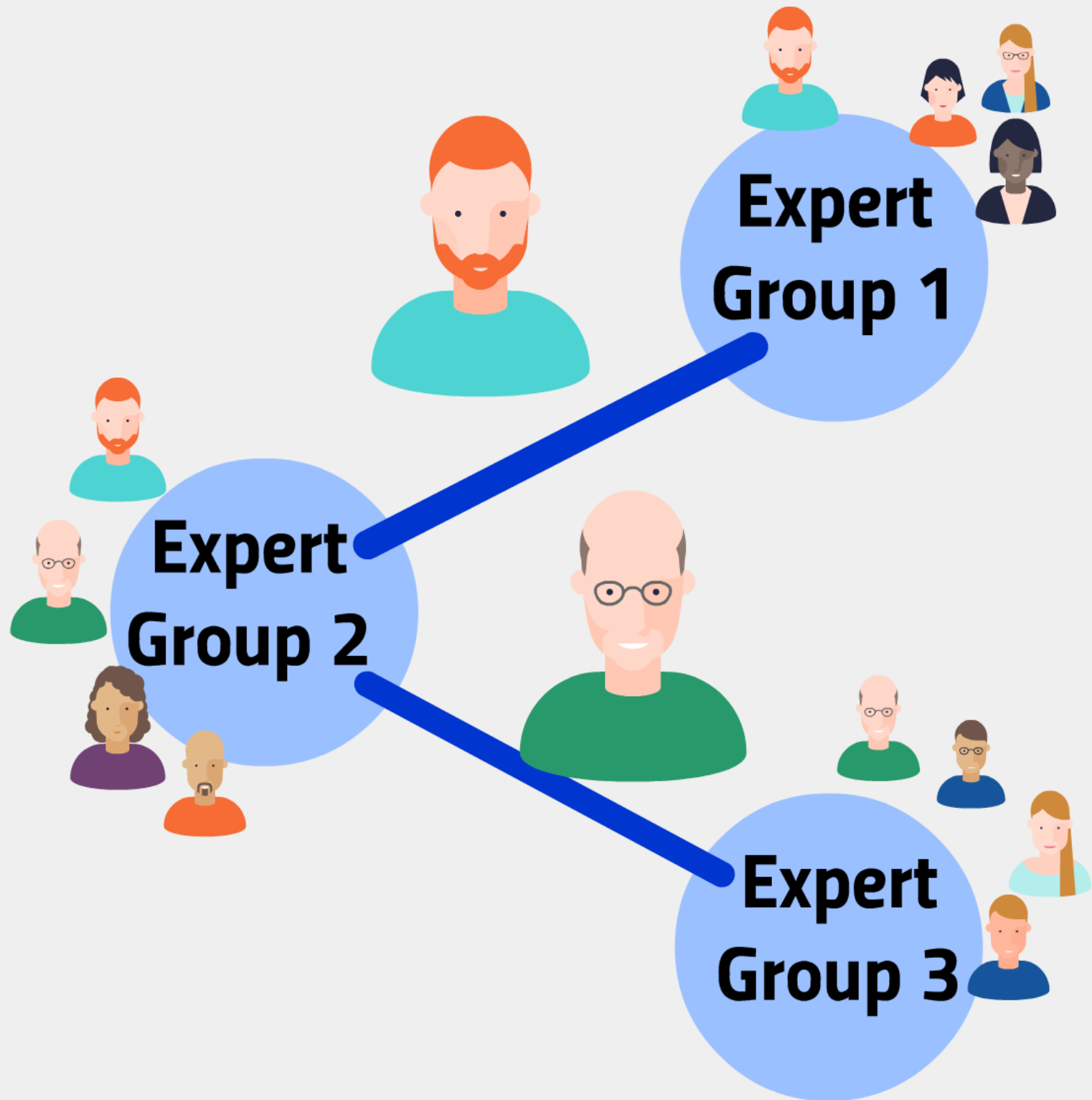


MEDICINE

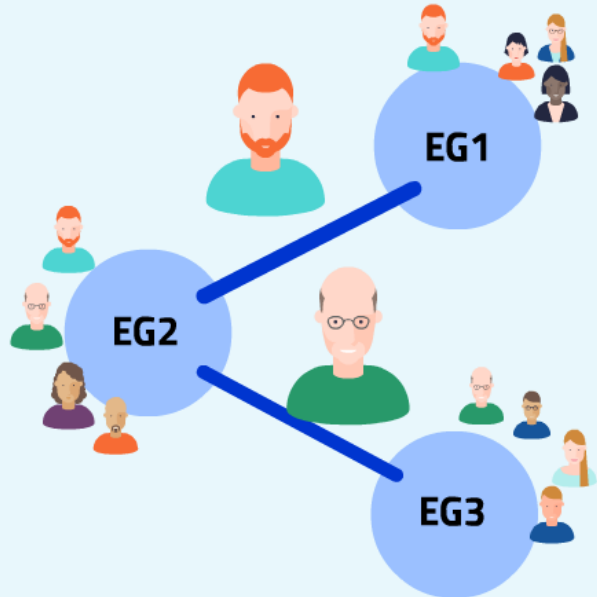
health

nutrition

human well-being



Research Questions & Methods:



What is the overall Social Network of ICES in 2011?

Use eigenvector centrality to measure the influence of an Expert Group (nodes) in the overall social network of ICES Expert Group participants in 2011

*nodes (●) are the Expert Groups
links (|) are their shared individuals*

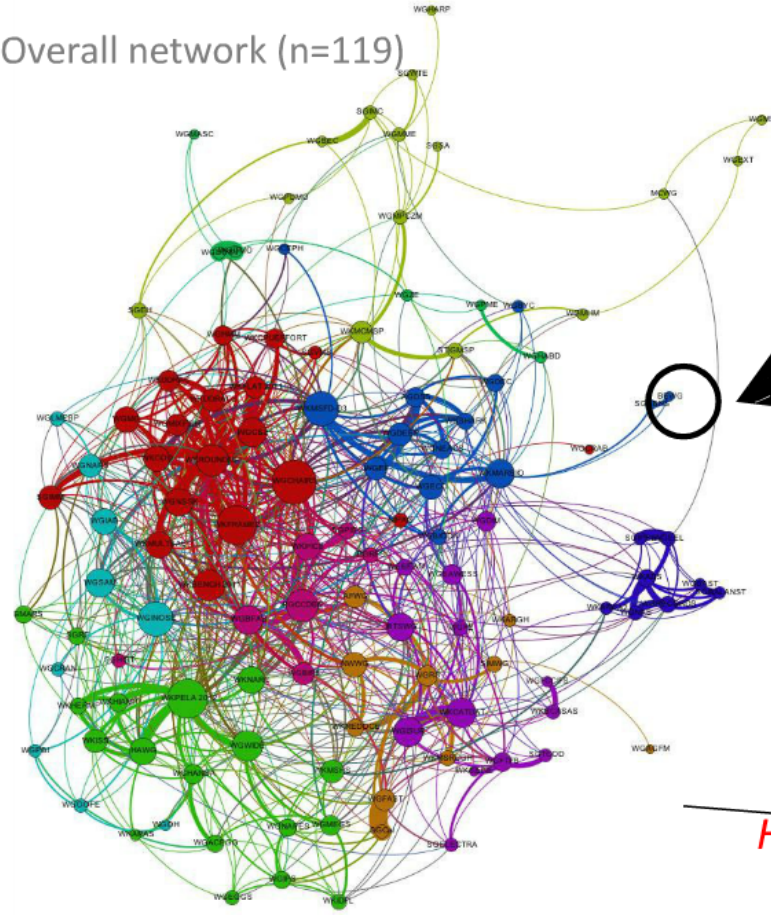
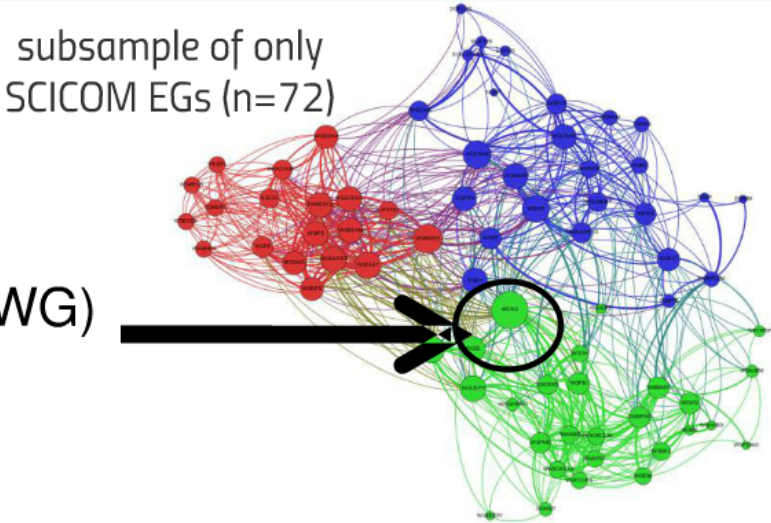
Which Expert Group is most relevant to the ICES Science Plan?

Measure the links from the Terms of Reference to the actual ICES strategic Science Plan

Hypothesis: The best connected EG will be most relevant to the Science Plan

What Expert Group is most relevant for the ICES Science Plan?

The Benthic Ecology Working Group (BEWG)



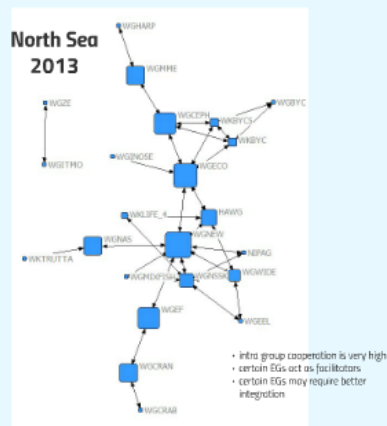
How influential is the BEWG in the overall ICES social network?

The group with the most scientific relevance is an outsider in the ICES network

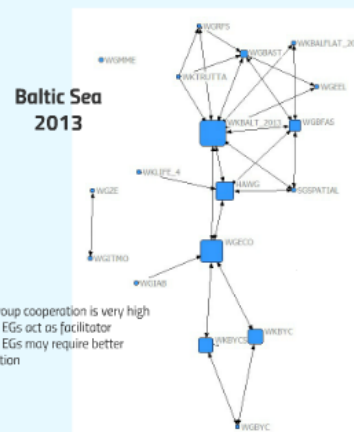
Hypothesis: the best connected Expert Group will also have the most diverse science agenda

Regional Social Network Analysis (2013 data)

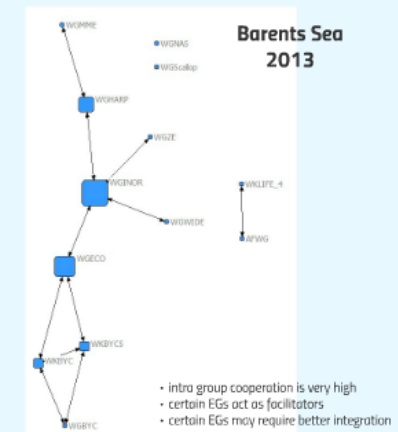
North Sea



Baltic Sea



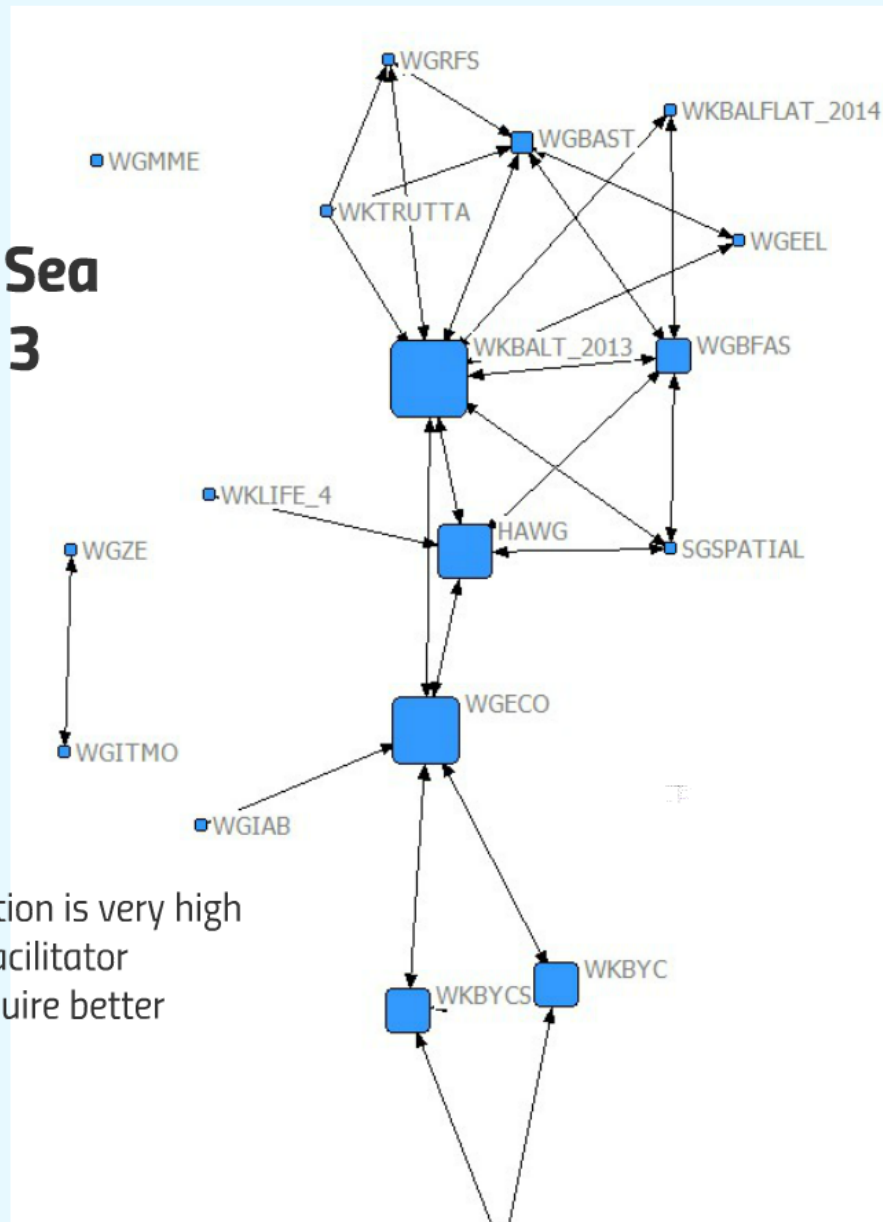
Barents Sea



Intra-group connectivity is high, but the IEA groups not well integrated (in 2013)

Baltic Sea

Baltic Sea 2013



- intra group cooperation is very high
- certain EGs act as facilitator
- certain EGs may require better integration

legal frameworks



LAW

decision-making

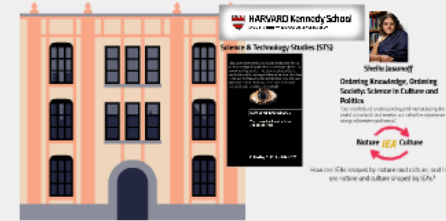
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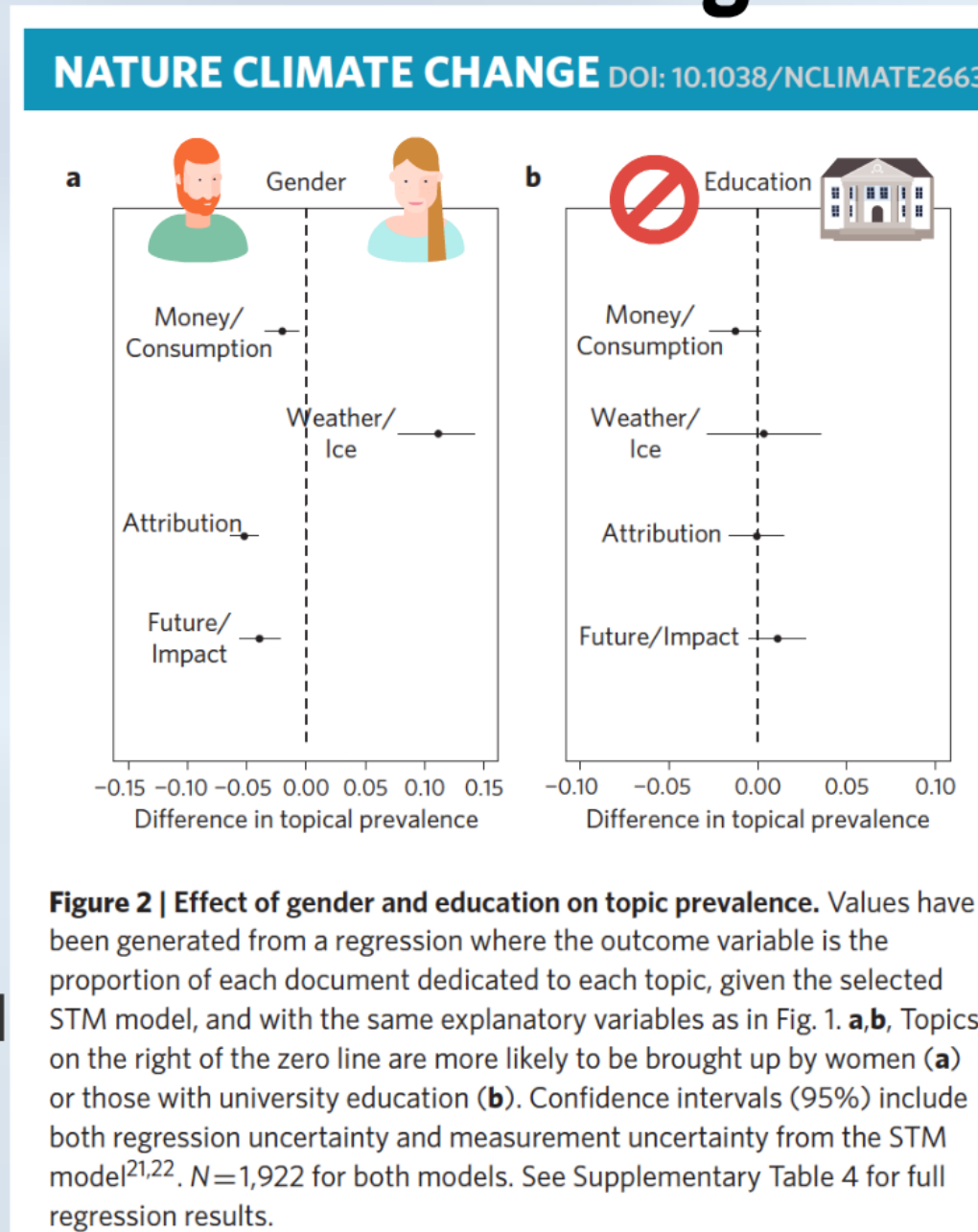
Tvinnereim & Fløttum (2015)

What do you think of when you hear the words "climate change"?

Tvinnereim & Fløttum (2015)

Older respondents associate climate with **weather & melting ice**

Younger respondents placed emphasis on the **future & personal or social issues**



A large, stylized teal graphic on the left side of the slide. It consists of several overlapping, curved, geometric shapes that resemble a stylized letter 'A' or a modern architectural element. Within one of the teal shapes is a white circle containing a black gear icon. The gear has a small blue and white square in its center. A thin, dark, hand-drawn style line extends from the right side of the gear icon towards the text 'WHAT IT COULD BE'.

Adventures in inter- and transdisciplinarity

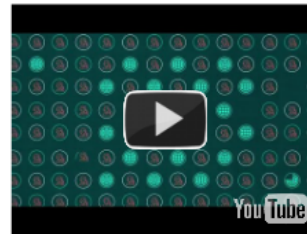
.....

WHAT IT COULD BE



Science with and for Society

.....
WHAT IT SHOULD BE



science–policy interface &
human networks
Governance

Engagement
also in the lab

Education
including the
humanities!

Gender
diversity!

Ethics
personal,
institutional,
societal

Open Access
data & methods

RRI

ards
ation
dustry
der
initiatives
careers
perspectives
recommendations
implement
know



YouTube

curiosity to connect

ined discipline

spec
but
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curiosity to connect

trained discipline

"T-shaped" researchers = specialists anchored in one field, but have the ability and intuition to search our broader ideas and concepts beyond their field
(Brown et al. 2015; "How to catalyse collaboration". *Nature* 525, 315–317)







How to include society?



EN

Horizon 2020

this is a real thing!

Work Programme 2016 - 2017

16. Science with and for Society

www.rri-tools.eu

Important notice on the second Horizon 2020 Work Programme

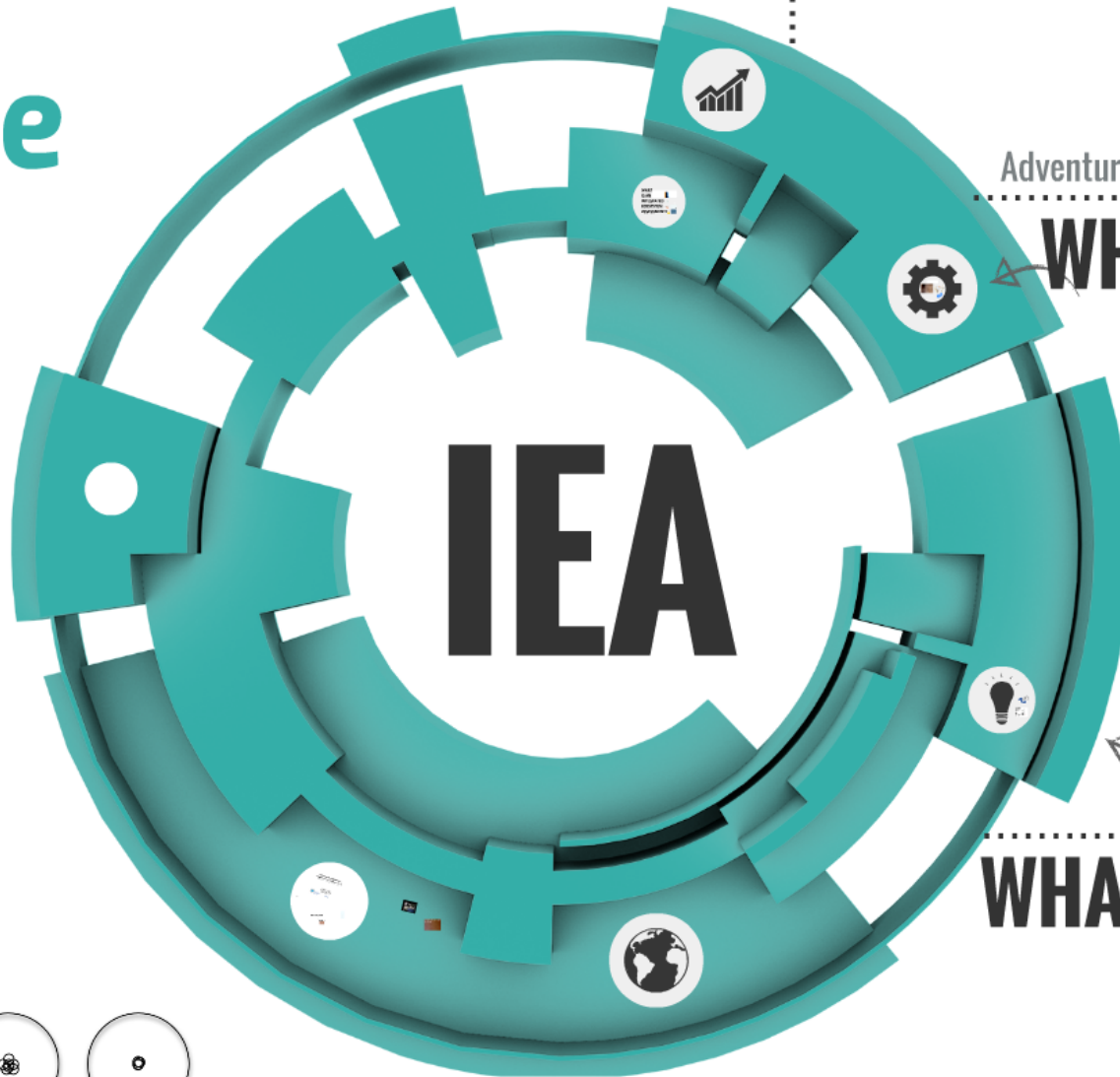
This Work Programme covers 2016 and 2017. The parts of the Work Programme that relate to 2017 are provided at this stage on an indicative basis. Such Work Programme parts will be decided during 2016.

(European Commission Decision C(2016)1349 of 9 March 2016)

Analyze your purpose

WHAT IT IS

Examples of the state-of-the-art

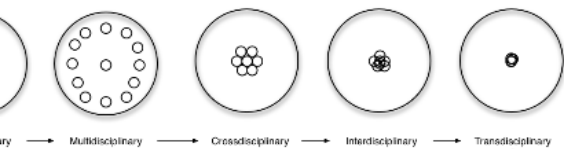


Adventures in inter- and transdisciplinarity

WHAT IT COULD BE

Science with and for Society

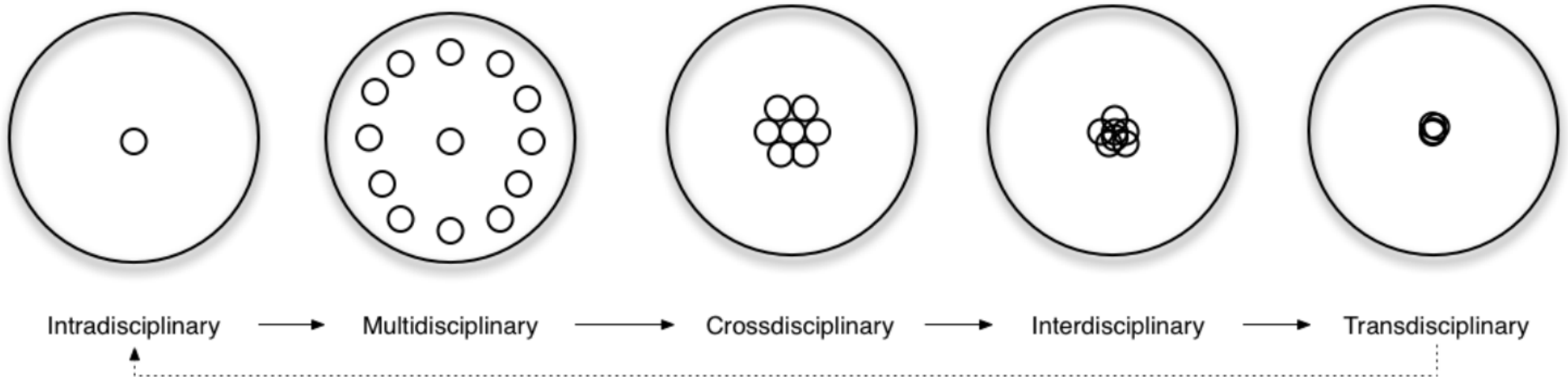
WHAT IT SHOULD BE



→ Multidisciplinary → Crossdisciplinary → Interdisciplinary → Transdisciplinary

An Interactive Demonstration of Transdisciplinarity

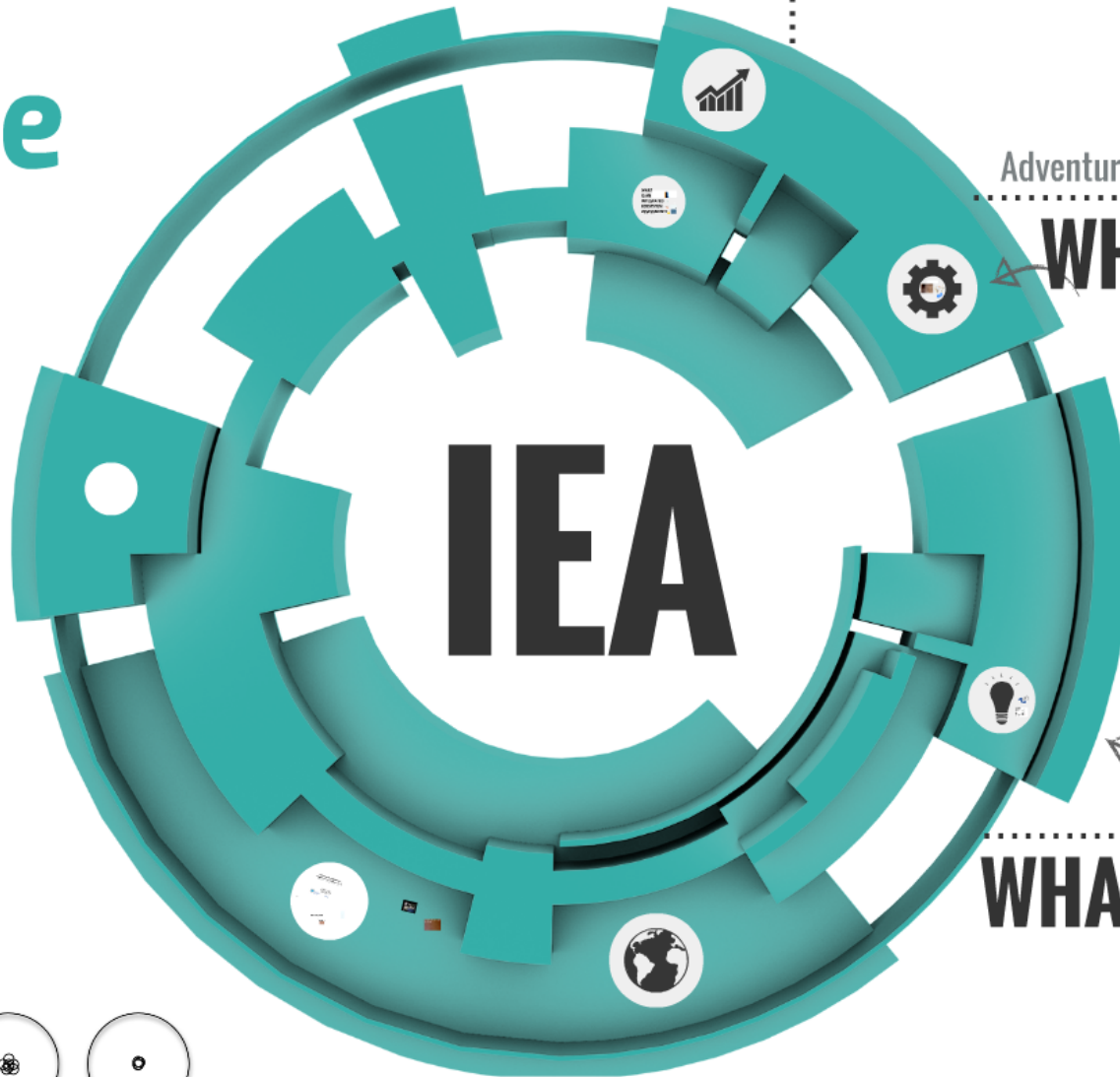
5 volunteers



Analyze your purpose

WHAT IT IS

Examples of the state-of-the-art

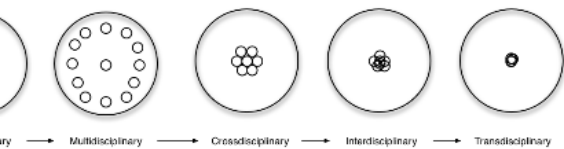


Adventures in inter- and transdisciplinarity

WHAT IT COULD BE

Science with and for Society

WHAT IT SHOULD BE



— Multidisciplinary — Crossdisciplinary — Interdisciplinary — Transdisciplinary



**moral of the story:
innovations are
made outside your
comfort zone**



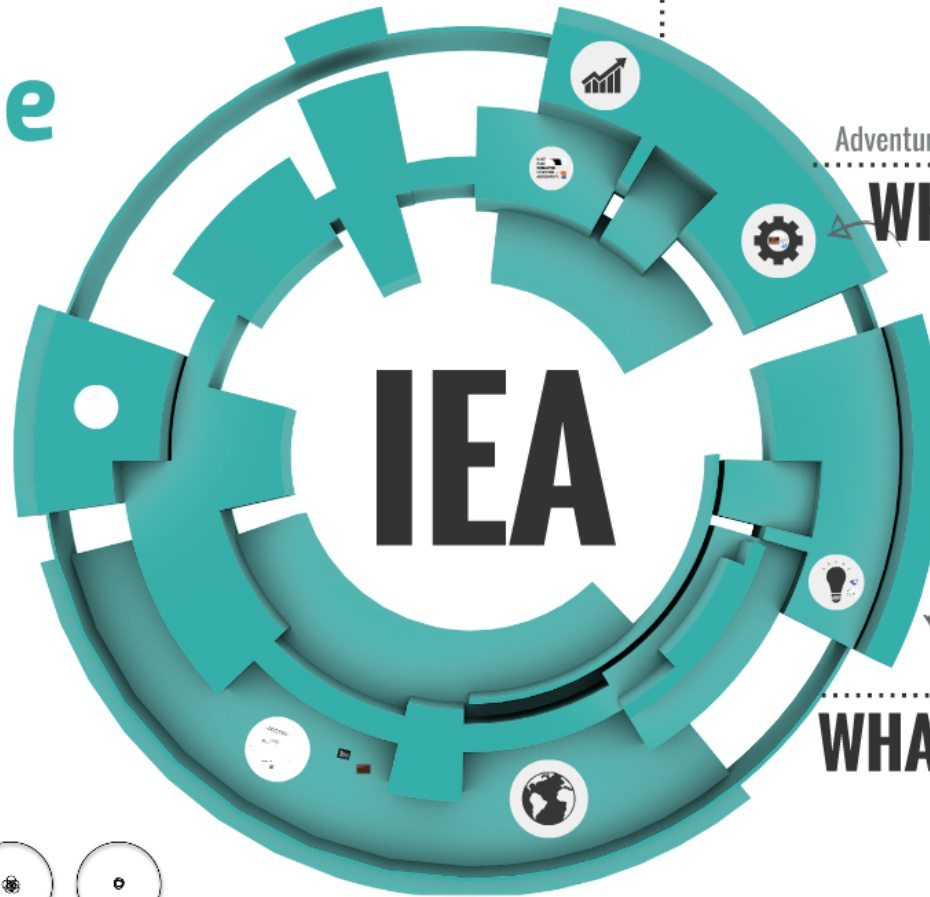
So, should we all be like Conchita?
be fit for purpose



Analyze
your
purpose

WHAT IT IS

Examples of the state-of-the-art

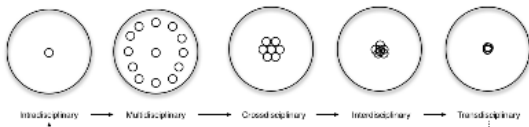


Adventures in inter- and transdisciplinarity

WHAT IT COULD BE

Science with and for Society

WHAT IT SHOULD BE



@dorothydankel
#oceanext

Hospitable, humble,
T-shaped researcher