United Nations
Educational, Scientific and
Cultural Organization

Intergovernmental
Oceanographic
Commission

Organisation
des Nations Unies
pour l'éducation
la science et la culture

Commission
océanographique
intergouvernementale

Organización
de las Naciones Unidas
para la Educación
la Ciencia y la Cultura

Comisión
Oceanográfica
Intergubernamental

Организация
Объединенных Наций по
вопросам образования
науки и культуры

Межправительственная
океанографическая
комиссия

Translating insights from ocean sciences to policy

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IOC/UNESCO

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World Ocean Forum

Busan, 21/10/2015

Environmental success stories (not exhaustive)

DDT

Key dates: Rachel Carlson 1962 (Silent Spring). U.S. DDT ban in the early 1970s

Obs/monitoring network: YES

Proven Science: YES

Phaseout of substances: YES (with some exceptions

Progress in technology: YES

International protocols: YES/2001/UN

Recovery: YES

Acid rain

Key dates: The term "acid rain" was coined in 1872. Late 1960s that scientists began widely observing and studying. Clean Air Act Amendments of 1990

Obs/monitoring network: YES

Proven science: YES

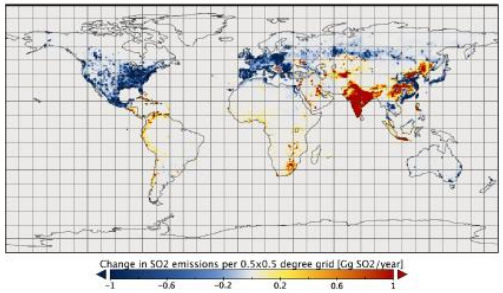
Phaseout of substances: YES

Progress in technology: YES

International protocols: YES/1979/UN

Recovery: Partially

Figure 3 from Z Klimont et al 2013 Environ. Res. Lett. 8 014003



Ozone Hole

Key dates: 1973 (detection CFC in atmosphere), 1985, 1991

Obs/monitoring network: YES

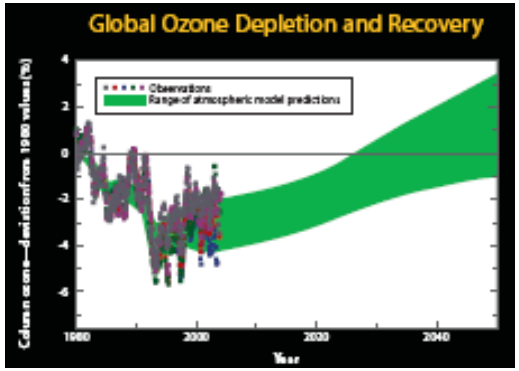
Proven Science: YES

Phaseout of substances: YES

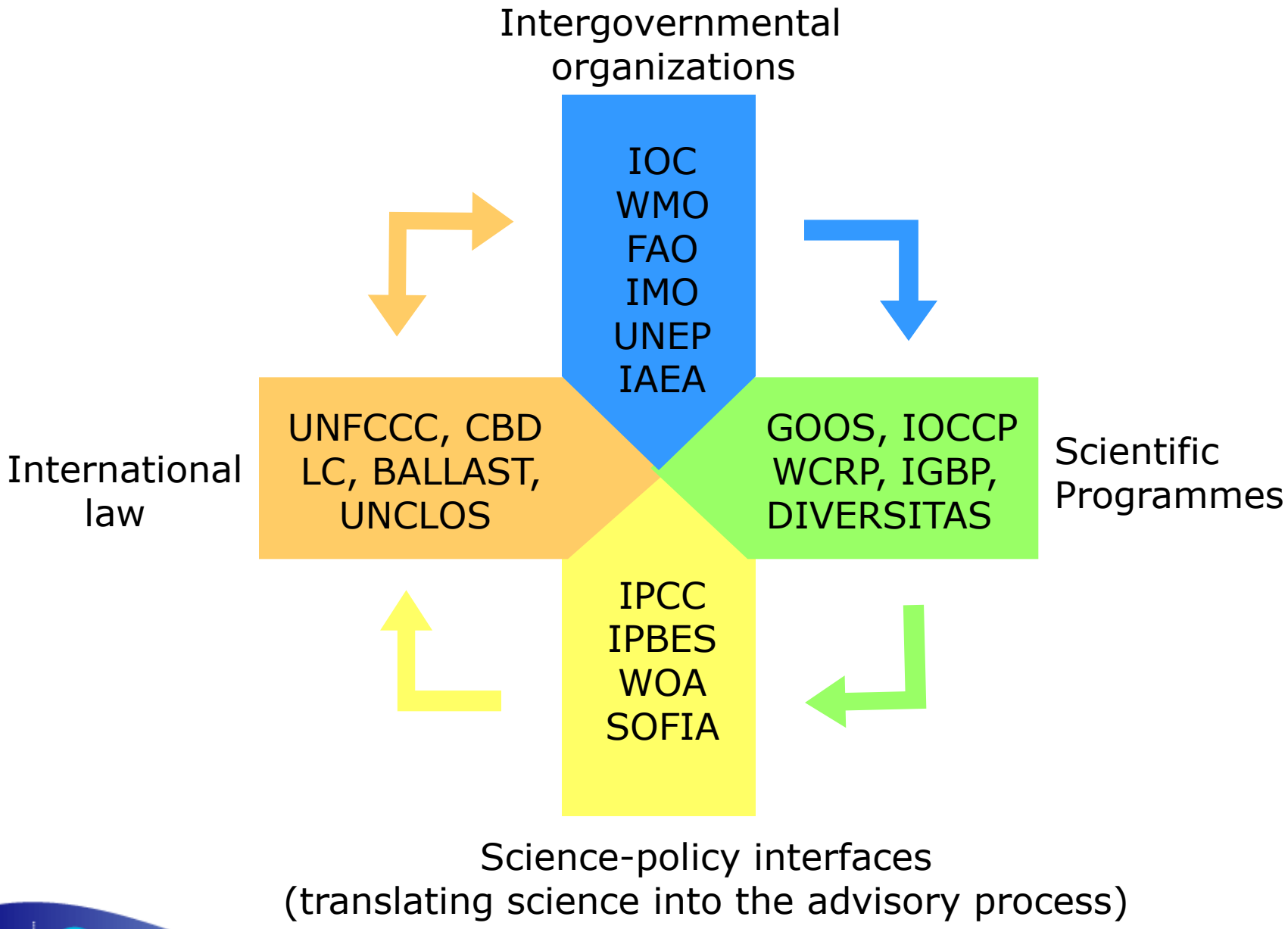
Progress in technology

International protocols: YES/1987/UN

Recovery: No yet

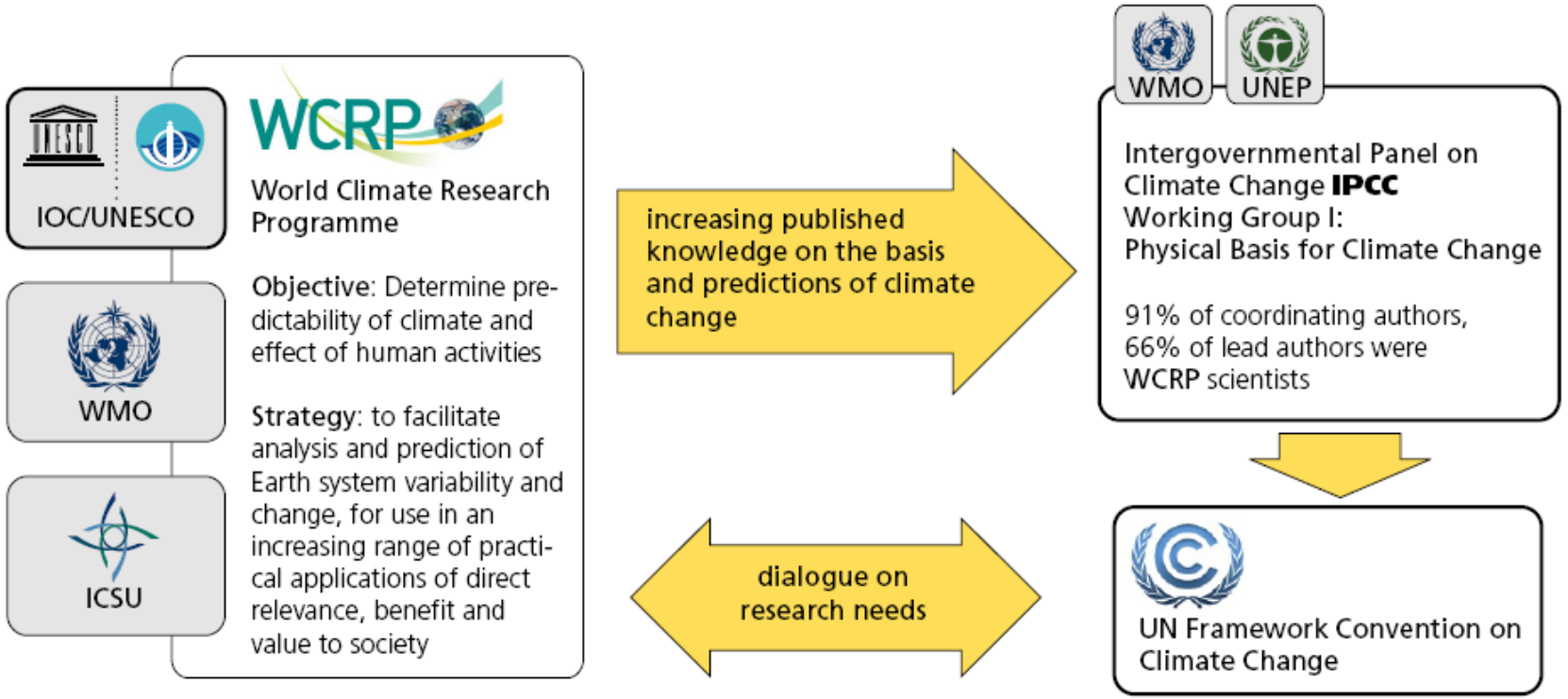


Scientific knowledge and policy interface



Scientific knowledge and policy interface

Example of Science-policy Architecture for Climate knowledge



Policy directed by science

Three characteristics converge in COPs and make them particularly complex process:

1. COP **negotiations are about sustainability**, meaning that management objectives should include social, economic and ecological concerns, requiring trade-offs. The exact needs and challenges, e.g. whether objectives and measures focus more on ecosystem/planet health, economic opportunities or human well-being (or a combination thereof), depend very much on the financial capacity, countries' priorities and political willingness.

2. COP **negotiations deals with different member states as well as institutional settings and political regimes, requiring multi-level and multilateral governance and authority** (i.e. UN system). Decision makers must understand that ecosystems are complex and often do not match existing policy scales or boundaries. A limited agreement which ignore the planetary dimension of climate change can result in policy recommendations that are not meaningful and can lead to institutional ambiguity and pose limitations to effective correction measures on CO2 (and other GHG) emissions.

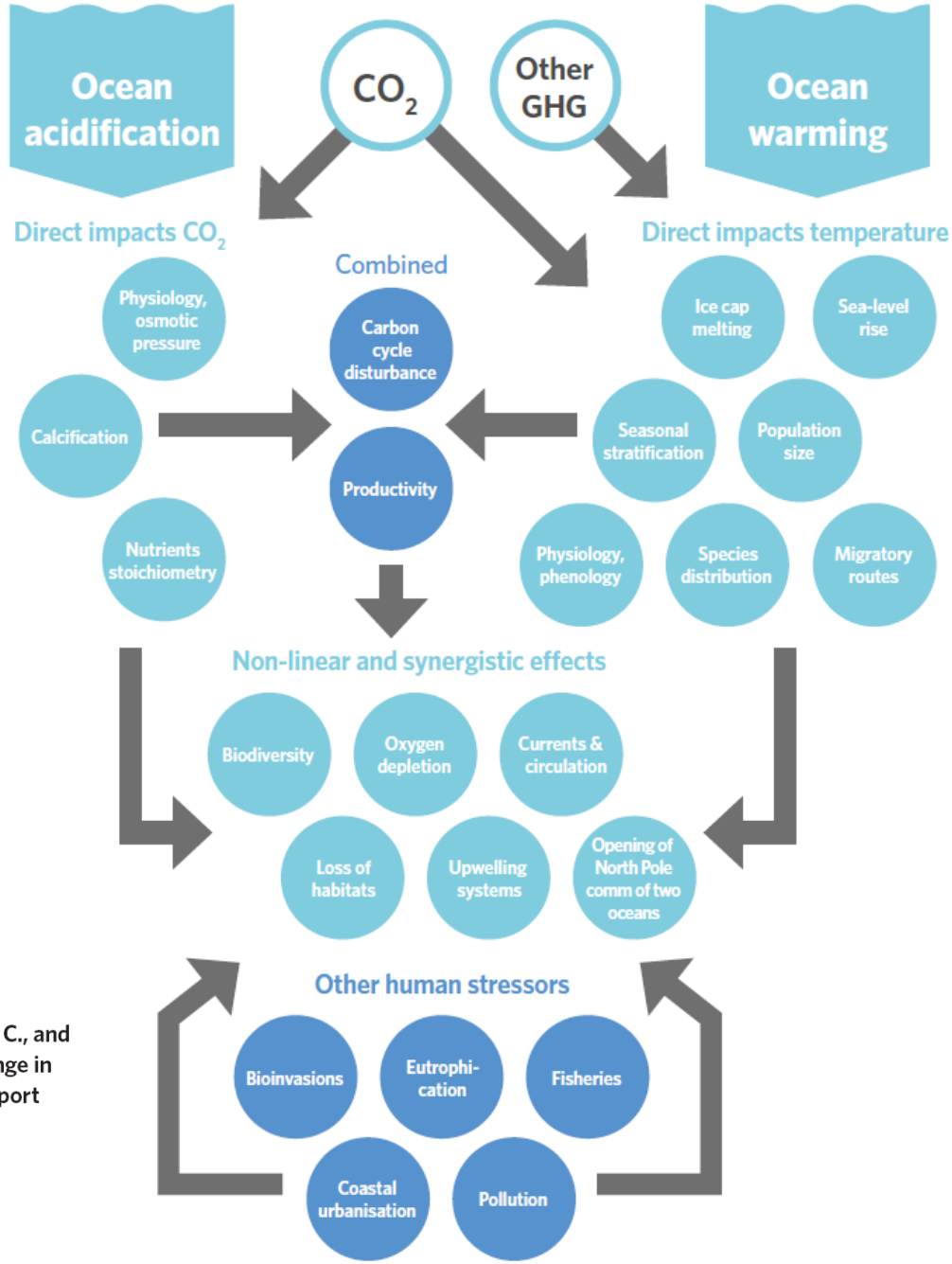
3. COP **negotiations require cross-sectoral coordination and the integration of sectoral concerns and management**. Oil and gas producers, agriculture, fisheries, ecological reserves and MPAs, tourism, etc. are all activities managed by different sectoral approaches. UNFCCC/COP agreements have to build institutional linkages with sectoral governance arrangements to avoid conflicts when implementing mitigation and adaptation measures to climate change.

The scientific uncertainty and gaps

- 95% the degree of certainty that human activity is the main cause behind the warming observed since mid 20 century.
- We do know enough today to deliver clear-cut messages to decision-makers and the general public.
- We also know enough of the major differences future emission scenarios make for the ocean with a pretty good confidence.
- Of course, uncertainties remain and gaps need to be filled but these must not be a reason for inaction (paralysis by analysis).
- The state of the art of our current knowledge (as researchers) on our understanding of the climate and what we already observe as perturbations.
- We should concentrate our efforts and proposition towards "the solutions“.

Observations, measurements and uncertainties

Climate change is affecting many ocean physical, chemical and biological processess key for the sustainability of climate, biodiversity, food security, economies, etc, at planetary scale



▲ Conceptual model of oceanic stressors (Reid, P. C., and Valdés, L. 2011. ICES status report on climate change in the North Atlantic. ICES Cooperative Research Report No. 310, 262 pp).

Key uncertainties and gaps remaining from AR5

- The extent of warming in deep water masses (below 700 m).

- While acknowledged as a critical process influencing ecosystem productivity, the likelihood of climate-induced changes to major upwelling systems was still uncertain.

- Ways in which climate-induced changes in the physiology and biogeography of an individual species may alter ecosystem structures, species interactions, and food webs.

- An improved understanding of climate sensitivity at the ecosystem level that considers multiple drivers (e.g., ocean warming, acidification, and hypoxia), multiple stressors and synergistic impacts

- The capacity for phenotypic and evolutionary adaptation over generations to respond to long-term climate change.

- Increased resolution of forecasted impacts and changes at national and ecosystem scales to fisheries food production and security, and potential adaptation responses.

- Climate-related impacts to coastal sectors, such as tourism and aquaculture and its consequences in human well-being and in regional economies

Key uncertainties and gaps remaining from Santos (Brazil)

- Measurements: what and why?
- Physical understanding: non linearity and tipping points
- Decadal climate variability underlying the signal of CC
- Climate induced changes in upwelling systems
- Deoxygenation and hypoxia
- The expansion of oligotrophic gyres
- Impacts of OA in marine biota

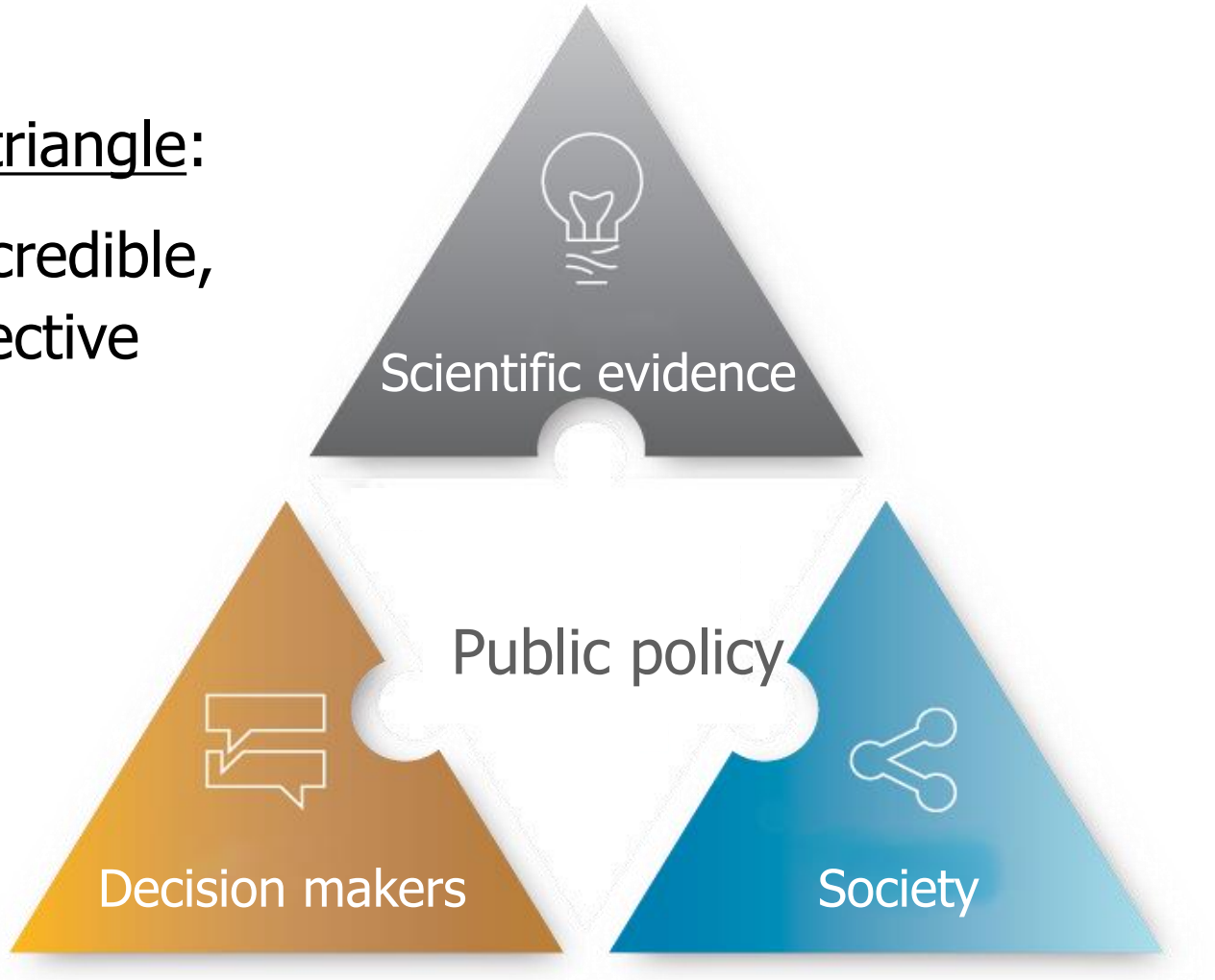
Key uncertainties and gaps remaining from Santos (Brazil)

- Seasonality, phenology and match-mismatch
- Species sensitivity and response to climate change
- Genetic and phenotypic adaptation capacity
- Scaling up to ecosystems and cumulative synergistic effects
- Blue Carbon: a natural option to mitigate climate change
- Climate Change and economy: Human Activities at Risk
- A new narrative: delivering the message right

A new narrative: delivering the message right

The interaction triangle:

Making science credible, salience and effective



Modified from Röckmann et al. 2015. Marine Policy, 52:155–162

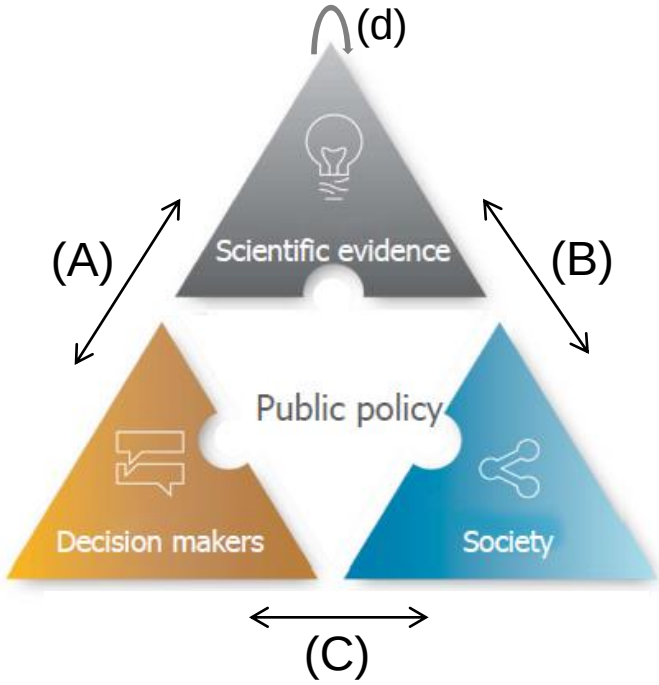
A new narrative: delivering the message right

(A) Interaction between scientists and decision makers to transform science into policy output.

(B) Interaction between scientists and public/social actors to enhance societal scientific knowledge and create mutual trust.

(C) Interaction Between decision makers and public/social actors, to shape participation processes to foster legitimacy of UNFCCC and COP processes.

(d) Interaction among scientists to foster best practices and new knowledge production



A new narrative: delivering the message right

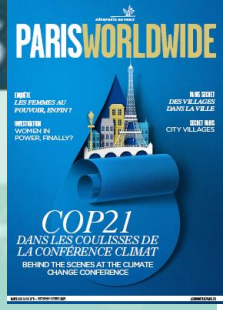
Scientific evidence

Industry

Society

Decision makers

LES OBJECTIFS DE LA COP21 COP21 OBJECTIVES



+2°C

C'est la hausse maximale des températures que vise la COP21, par rapport à l'ère préindustrielle (1850).

The maximum temperature increase that COP21 is aiming for, compared with the pre-industrial-era temperatures.

100 MILLIARDS DE DOLLARS

(soit 78 milliards d'euros environ) : c'est le montant que sont censés verser chaque année les pays développés d'ici à 2020, afin d'aider les pays en développement dans leurs efforts en faveur du climat.

$100 billion (€78 billion): The amount developed countries are supposed to pay every year, by 2020, to help developing countries combat climate change.

27%

C'est la part d'énergies renouvelables qu'entend produire l'Union européenne en 2030, contre près de 14,1 % en 2012.

The proportion of renewable energies the European Union intends to produce by 2030 compared with 14.1% in 2012.

18 CM

C'est la hausse qu'a connue le niveau de la mer entre 1870 et 2000, dont 6 cm dans les 20 dernières années. La montée des eaux pourrait atteindre 82 cm d'ici 2100, selon le scénario le plus pessimiste.

(7.1 in) The rise in sea levels between 1870 and 2000, including 6 cm (2.4 in) in the last 20 years. The rise in sea levels could attain 82 cm (32.3 in) by 2100, according to the most pessimistic scenario.

40% AU MOINS/AT LEAST

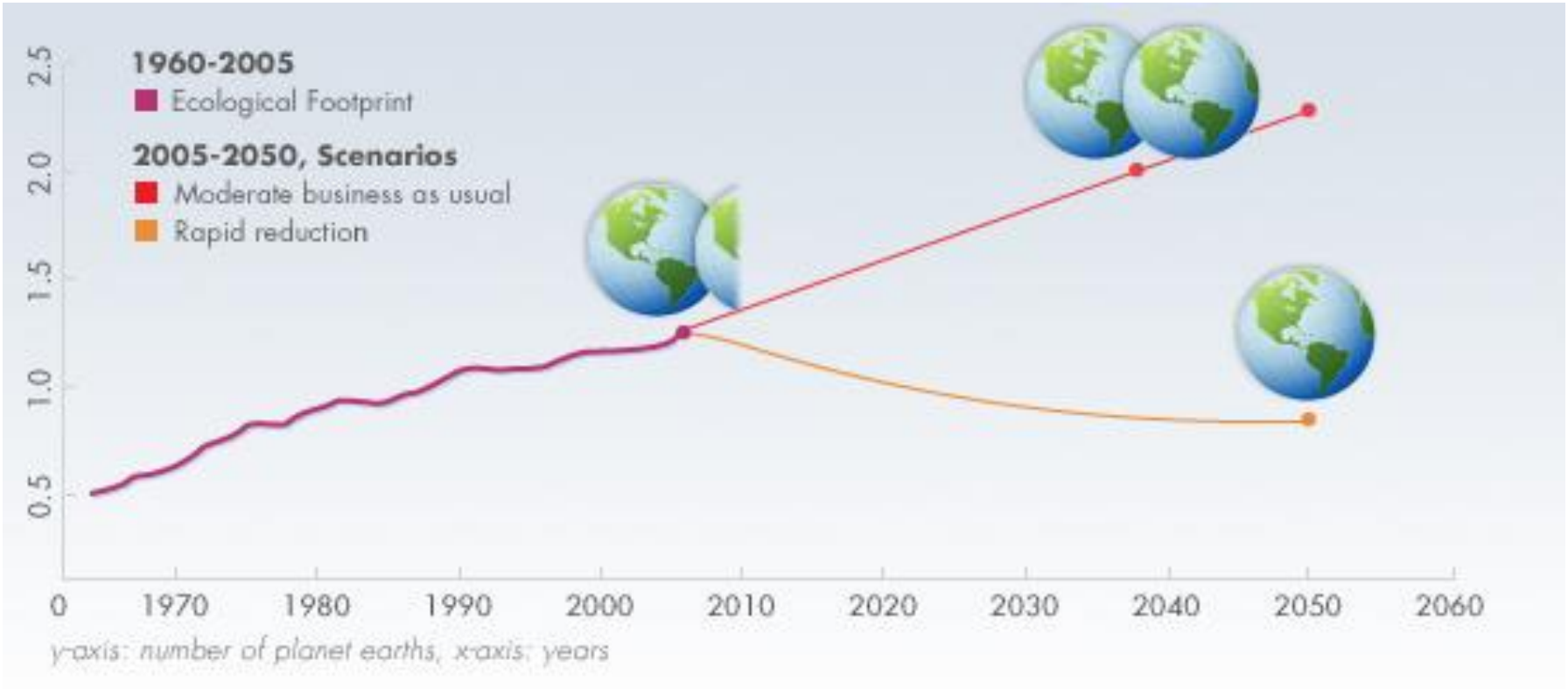
C'est la baisse à laquelle doit parvenir l'Union européenne dans les émissions de GES d'ici 2030.

The European Union's minimum targeted decrease in greenhouse gas emissions by 2030.

Source : ministère de l'Ecologie, du Développement durable et de l'Energie

SCIENCE FOR SUSTAINABILITY

Ecological footprint in 2050- need more than 2 planets



SCIENCE FOR SUSTAINABILITY

Ehrlich equation (IPAT equation) I= f (P, A, T)

The quantity of resources we use and our impact on the environment effectively depend on three main factors:

Population: how many of us there are consuming resources and creating waste

Affluence (Comsumption): the average amount of goods, energy and services we each use

Technology: to optimize the use of resources and improve management

The impact is the combination of all three factors and it can be summarised by what is known as the **Ehrlich** or IPAT equation **I= f (P, A, T)**

The **IPAT equation** shows clearly:

- We need to stabilise our **population** at sustainable levels

- We need to reduce our individual **consumption**

- Using the **best available technology** will help reduce human impact on the environment

The choice is our

Rio+20 Follow up
Document The Future we want

Decision on a set of global Sustainable Development Goals (SDGs)

Rio+20 launched an intergovernmental process to develop a set of SDGs, building upon the Millennium Development Goals, following these principles:

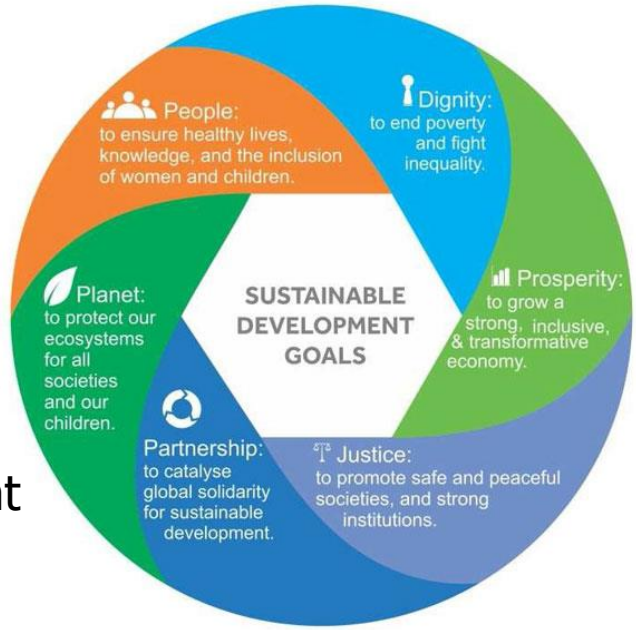
- Contribute to the full implementation of the outcomes of all major summits in the economic, social and environmental fields

- Focus on priority areas in the Rio Outcome document.

- Address in a balanced way all 3 SD dimensions

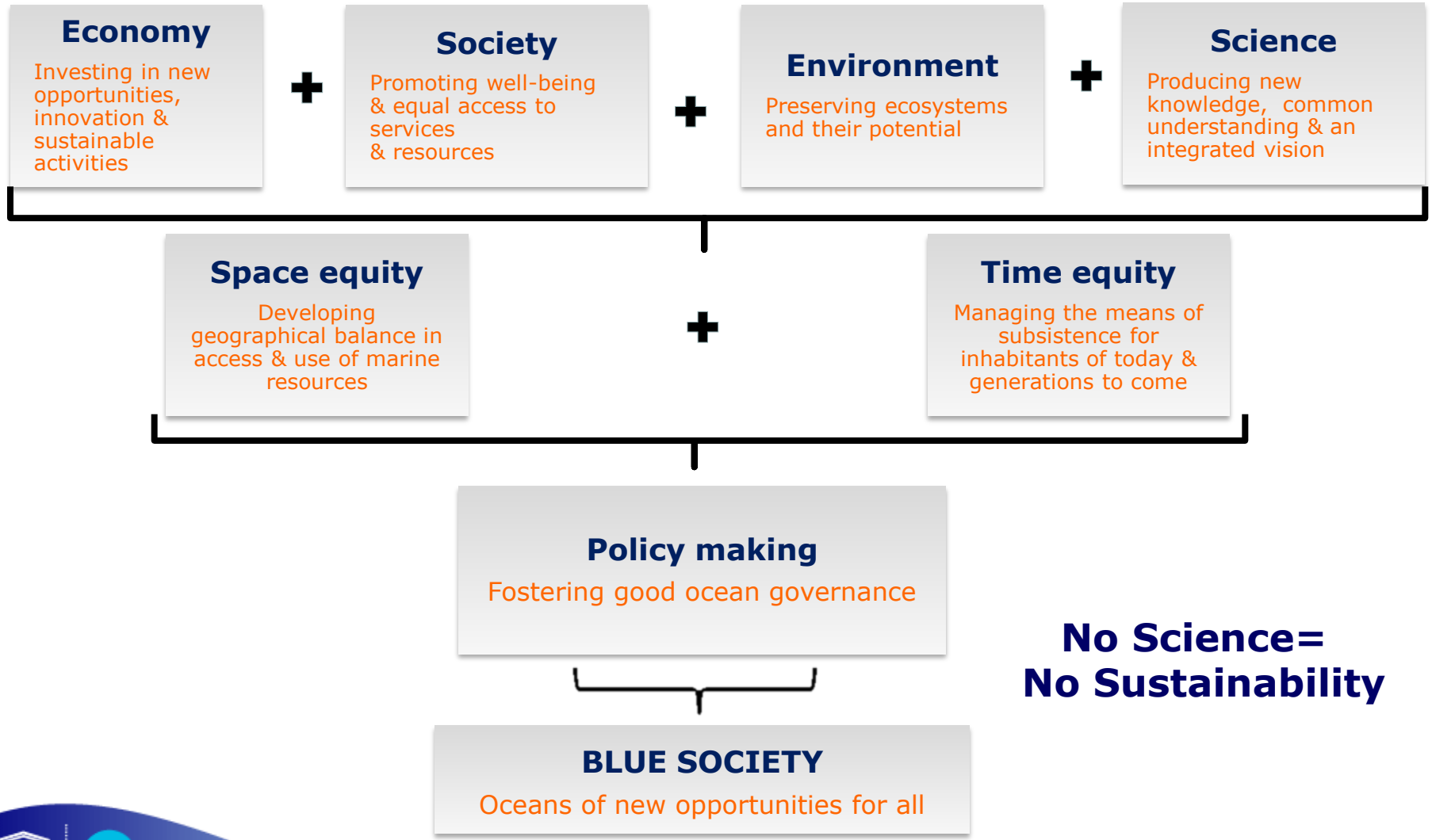
- Integrated into the United Nations development agenda beyond 2015.

- To be approved by UNGA 70th session (2015)




GOAL 14
CONSERVE AND SUSTAINABLY USE THE OCEANS, SEAS AND MARINE RESOURCES FOR SUSTAINABLE DEVELOPMENT
SUSTAINABLE DEVELOPMENT GOALS
More at sustainabledevelopment.un.org/sdgsproposal

SCIENCE FOR SUSTAINABILITY



No Science=
No Sustainability

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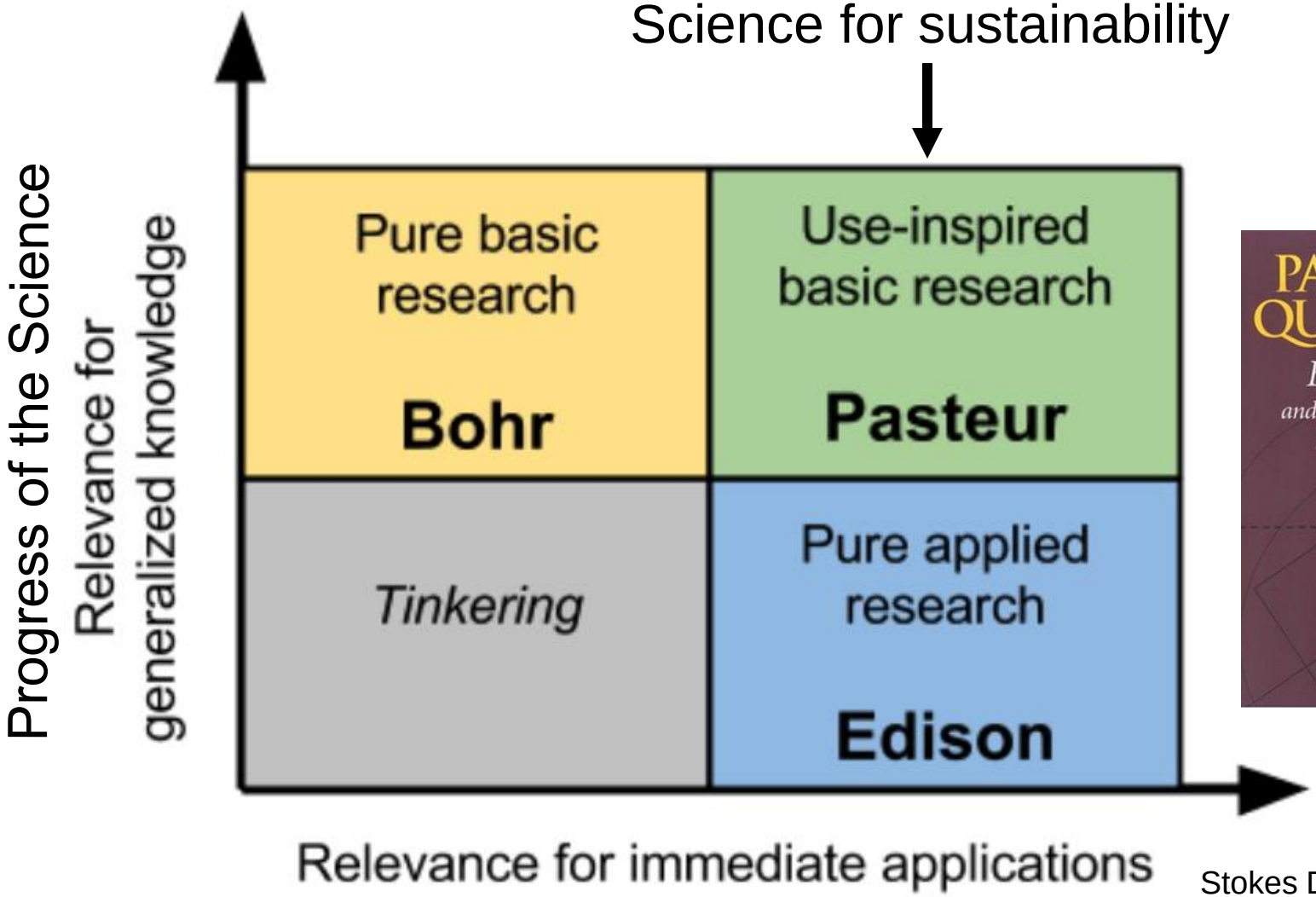
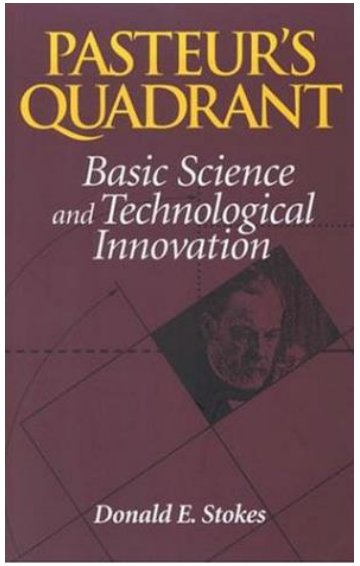
Pasteur's quadrant: Coupling knowledge to action

Science for sustainability





Stokes D. E. 1997. *Pasteur's Quadrant: Basic Science and Technological Innovation.*

Final Remarks

- There is a need for increasing translation of scientific knowledge into specific policy action (e.g. in Climate change)
- Long time gap between scientific findings and policy responses
- Scientist must follow "best practice" to ensure high quality, independent and policy relevant information, and therefore legitimate scientific knowledge and advice.
- It is necessary to continue developing strategic interfaces (e.g. IPCC, IPBES, WOA, SOFIA) to strengthening science-policy links among organisations (e.g. IOC, FAO, WMO, EC, etc.) and Convention/ multilateral environmental/sustainable development agreements (e.g. CBD, UNFCCC) at the regional and global levels.
- It is necessary to strength research and science for sustainable development and on global environmental change and support developing countries to build capacity in science and technology, as well as in science for policy processes.

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Thank you very much!
Gam sa ham nida!

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