

Indicators and assessment systems

Caught between policy and science?

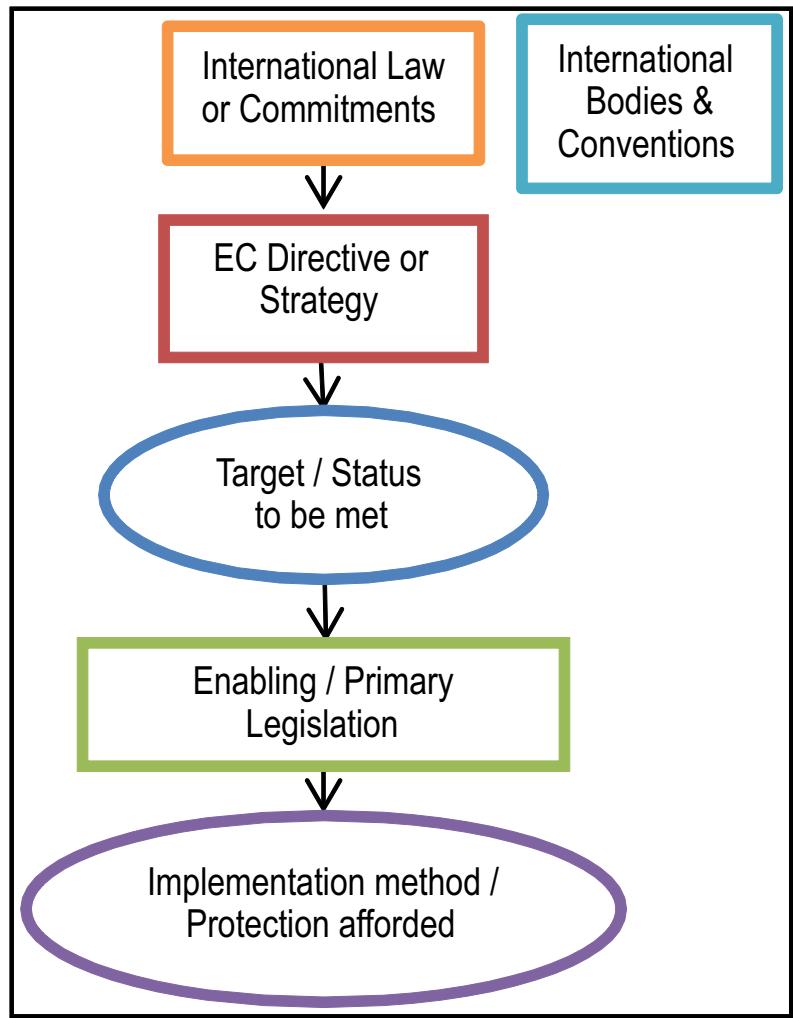
Torsten Berg

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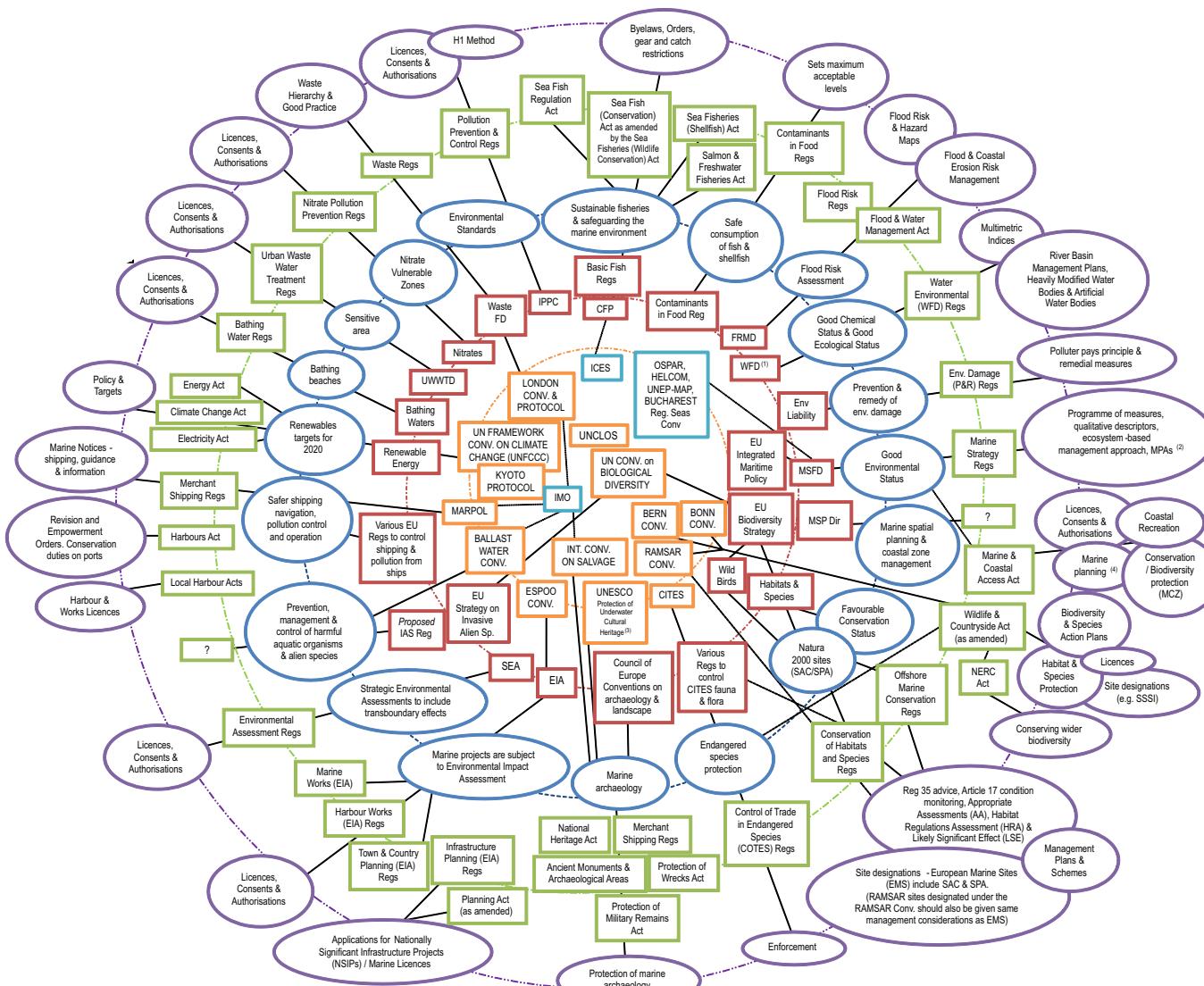
Setting the scene



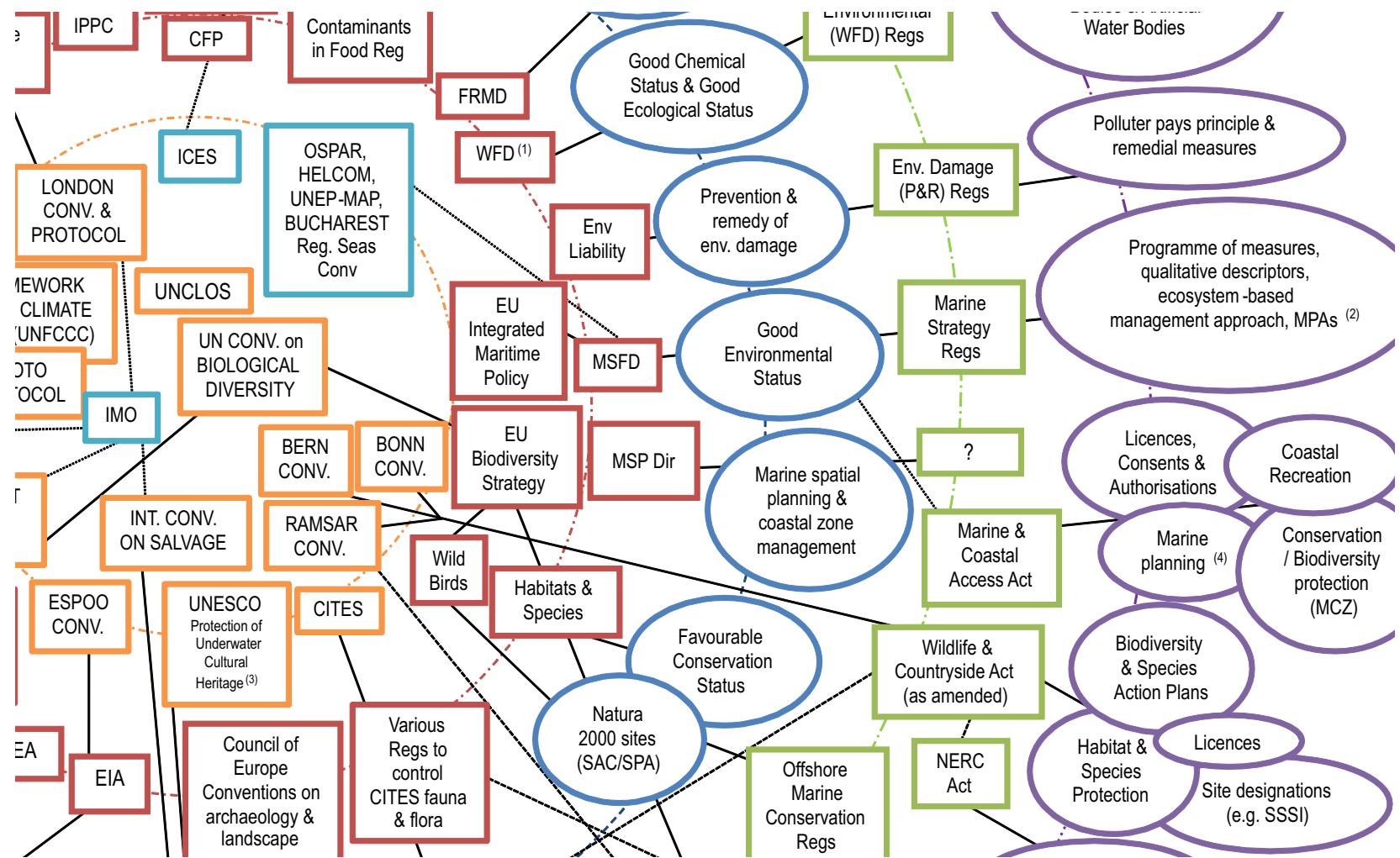
[Boyes & Elliott 2014]

Over 200 pieces of legislation with direct relationship to marine waters

Setting the scene – a horrendogram



Setting the scene – a horrendogram



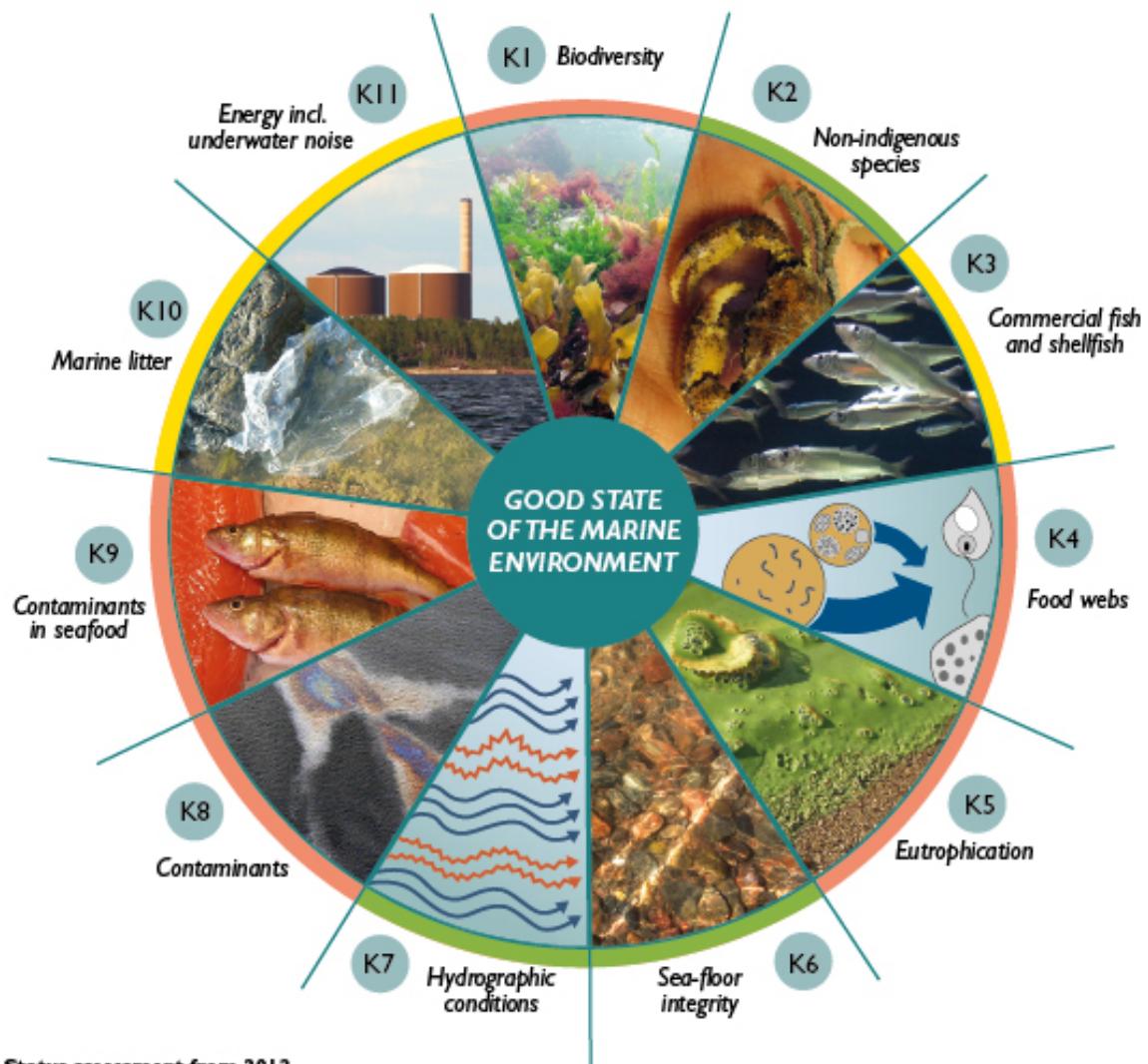
What happened to our simple world?

- Individual, independent indices
- Sectoral management



- Complex legal frameworks of indicators
- Integrative assessment, ecosystem-based approach
- Holistic management

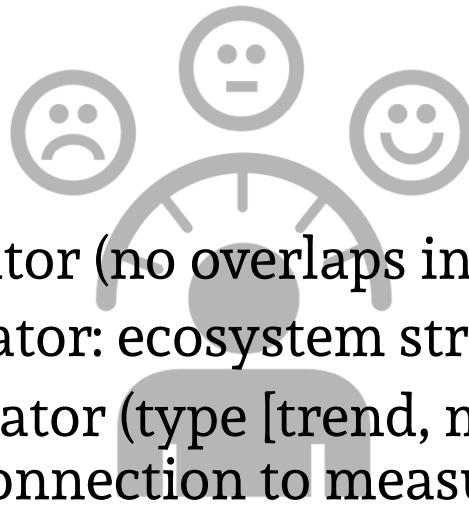
Example: MSFD – Marine Strategy Framework Directive



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Photos: Mats Westerborn,
Maiju Lehtimäki, Riku Lumiova,
the Finnish Border Guard/SYKE,
Per Mickwitz and Eija Rantajärvi

How to develop an indicator?

- Embed the indicator into the context/framework
- An indicator needs to answer management questions



- Scope of indicator (no overlaps in indicator set)
- Target of indicator: ecosystem structure or function
- Design of indicator (type [trend, multi-metric, ...], scale [time, space], connection to measures)
- Position in management cycle (pressure, state, ...)
- Implementation (algorithm, numerical scale, thresholds, references, rules for a “good indicator” [Queiros et al 2016], uncertainty)

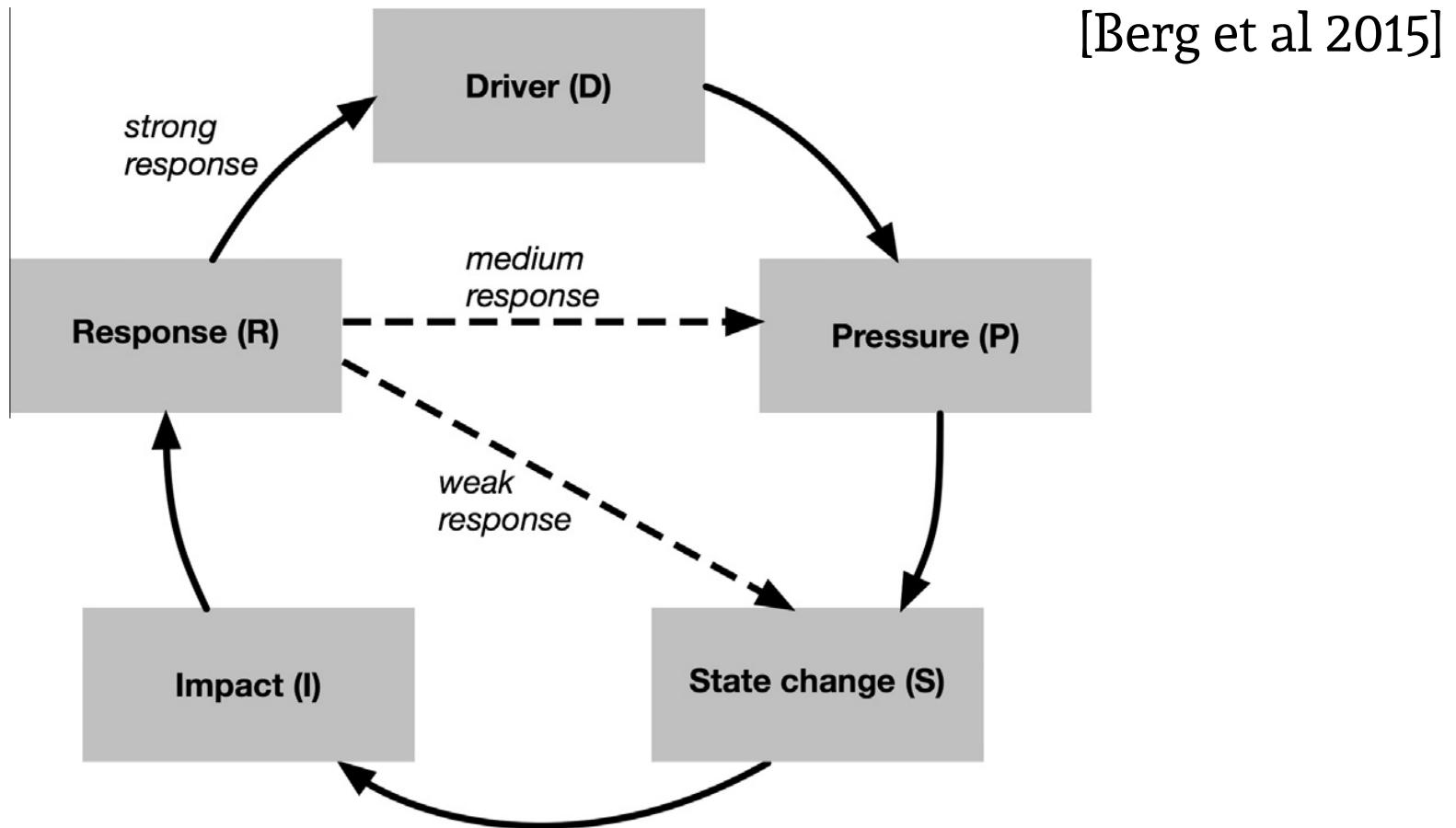
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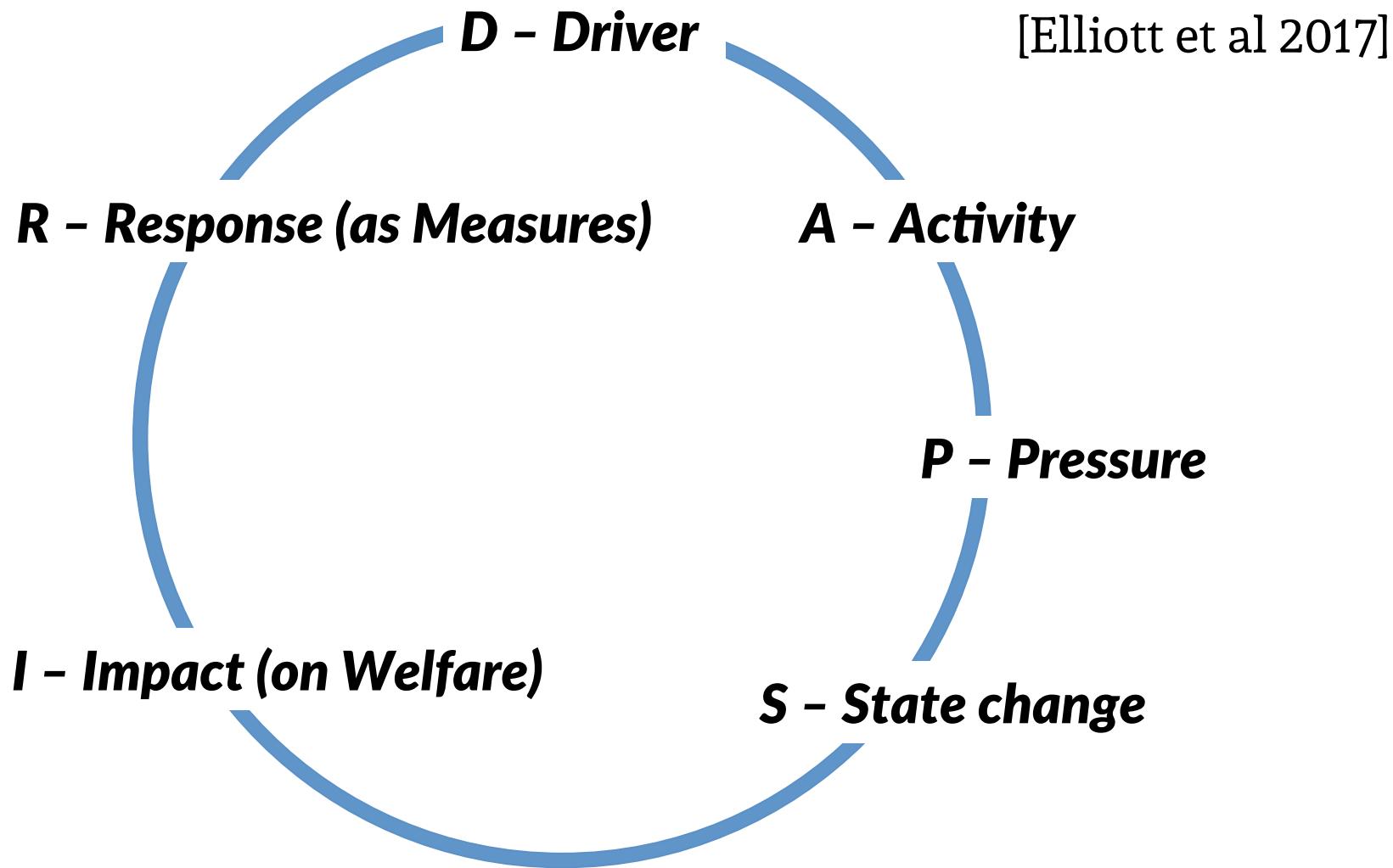


- Scope of indicator (no scope)
- Top-down (from policy needs to implementation) instead of bottom-up (from science to management)
- Pressure in management cycle (pressure, state, ...)
- Implementation (algorithm, numerical scale, thresholds, references, rules for a “good indicator” [Queiros et al 2016], uncertainty)

From DPSIR to DAPSI(W)R(M) – structuring problems



From DPSIR to DAPSI(W)R(M) – structuring problems



How to develop an assessment system?

Ecosystem health is a human invention

- Science does not define thresholds, but policy does (however, science interprets and sets them)
- Make a rough cur first (deploy early and often), refine later (management cycles)
- The more modular, the better (not just one large convoluted formula)
- Make it easy to use and easy to share

Example: NEAT

The screenshot displays the NEAT software interface. The main window title is "Nested Environmental status Assessment Tool Version 1.1". It features a sidebar with a compass rose icon and the DEVOTES logo. The main menu includes "Biodiversity assessment > Spatial assessment units ...", "Habitats ...", "Ecosystem components ...", "Indicators ...", and "Exit". Below the menu, there are configuration sections for "SAU weighting" (radio buttons for "Weight by SAU area" and "Do not weight by SAU area"), "Habitat weighting" (radio buttons for "Weight by habitat area" and "Do not weight by habitat area"), and checkboxes for "Use SAU priority factors" and "Custom SAU priority factors ...", as well as "Use habitat priority factors" and "Custom habitat priority factors ...". There are also "Descriptor filter" and "Other options" buttons. At the bottom, a table provides detailed environmental data for various areas:

SAU	Area	Total SAU weight	NEAT value	Status class	Uncertainty	Fish	Birds	Mammals	Pelagic c
Example	15060	0.000	0.485	moderate	- - -				0.485
Northern Sea	9611	0.617	0.632	good	- - -				
Big fjord	325	0.010	0.216	poor	- - -				
Big fjord, inner	147	0.005	0.632	good	- - -				
Big fjord, outer	178	0.006	0.936	high	- - -			0.936	
Western Sea	5449	0.249	0.324	poor	- - -			0.080	
South bay	247	0.006	0.080	bad	- - -				
South bay, inner	96	0.002	0.079	bad	- - -				
South bay, outer	151	0.003	0.773	good	- - -	0.773			
Little archipelago	1559	0.071	0.886	high	- - -				
Southern straits	673	0.031							

At the bottom of the main window, there are buttons for "Back to the indicator data" and "Save report (text)".

Nested Environmental status Assessment Tool

www.devotes-project.eu

A way to put sectoral indicators together in a consistent and scientifically sound way – and provide a nice software to do the work for you!

Caught between policy and science?

Yes

- Legal frameworks tend to be poorly defined
- Managers want clear answers, scientists don't give them
- Some indicators are designed to understand natural systems, not to assess them

No

- Stick to best practices and given frameworks
- Include uncertainty from the start
- Science can influence how the next management frameworks and decisions will look like
- Have a Man-in-the-Middle knowing both worlds

Thank you!

<https://github.com/torstenberg/indicators>

