Acknowledgements to: Dr Amanda Gregory, Prof. Jonathan Atkins, Prof. Michael Elliott, and the Marine SABRES Project

Holism in Marine Management: an Integrated Systems Analysis Approach to Marine Social-Ecological Systems.

Gemma Smith

MARINE SABRES

UKRI

Human aspects within the system, e.g. fishing, tourism, and policies

SOCIAL - ECOLOGICAL SYSTEM

Human aspects within the system, e.g. fishing, tourism, and policies

SOCIAL - ECOLOGICAL SYSTEM

Natural aspects within the system, e.g. habitats, species, and marine functions.

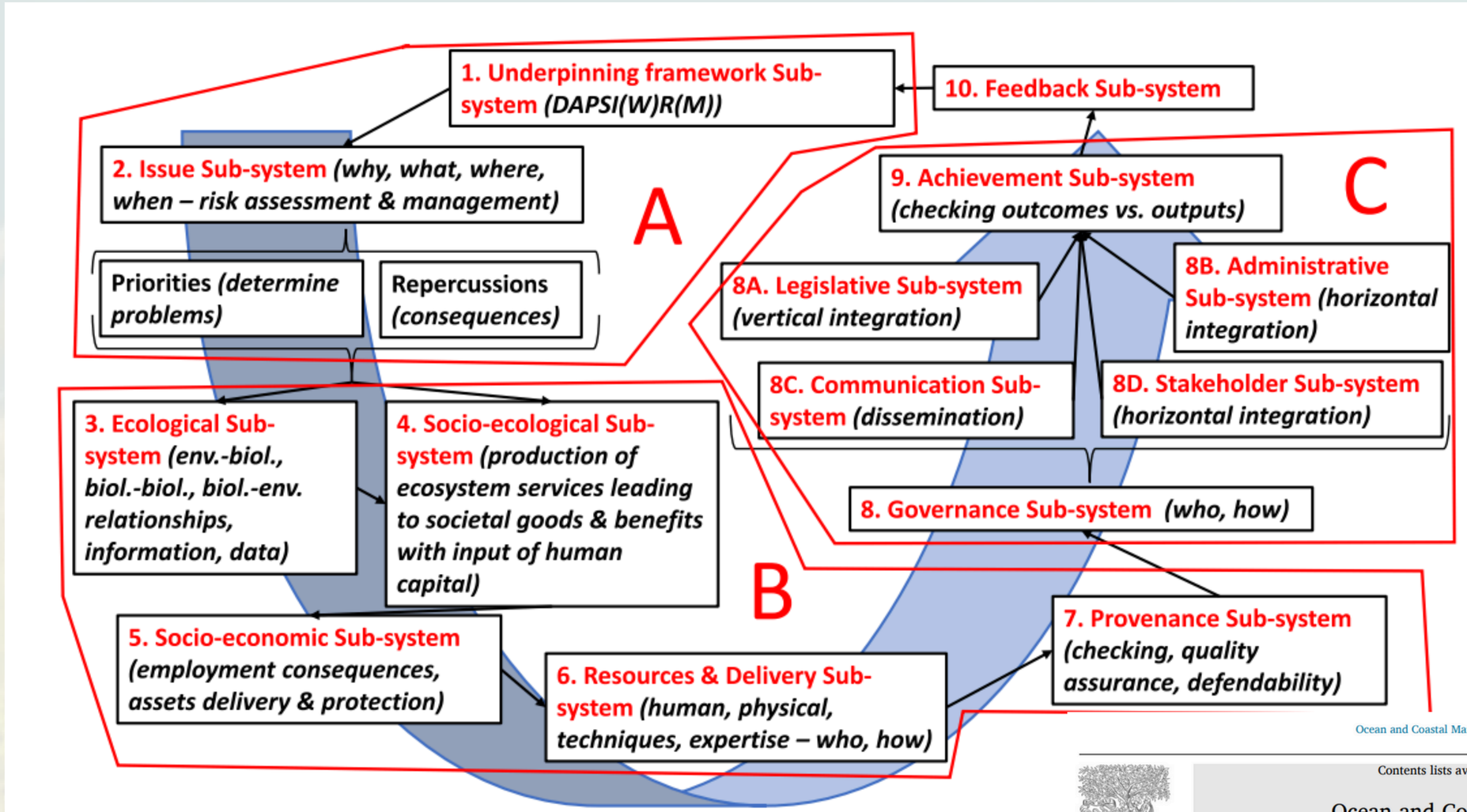
Human aspects within the system, e.g. fishing, tourism, and policies

The scope of focus where the different aspects interact, e.g. an ecosystem or a specific area

SOCIAL - ECOLOGICAL SYSTEM

Natural aspects within the system, e.g. habitats, species, and marine functions.

THE INTEGRATED SYSTEMS ANALYSIS



Ocean and Coastal Management 197 (2020) 105315

Contents lists available at ScienceDirect

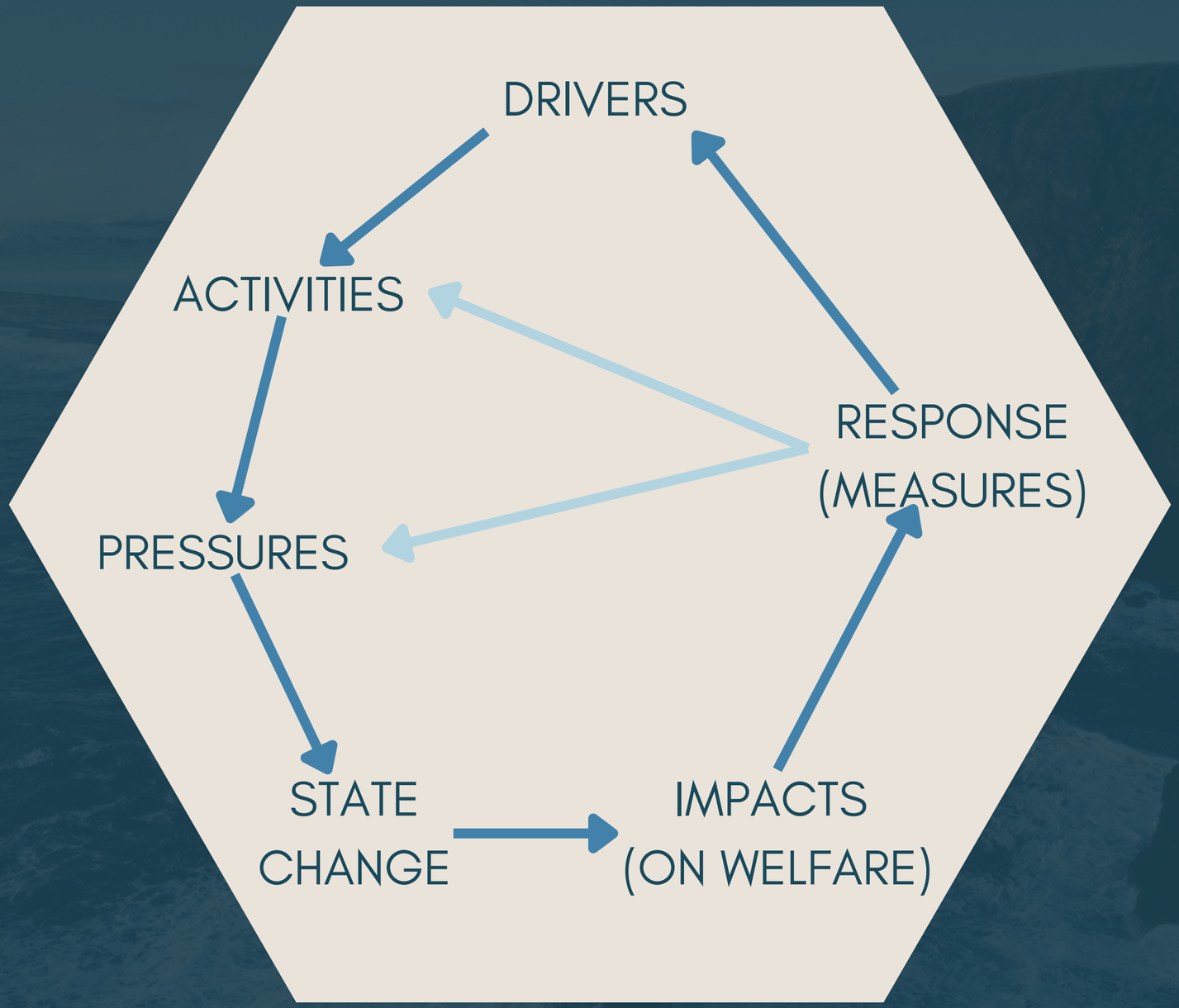
Ocean and Coastal Management

journal homepage: http://www.elsevier.com/locate/ocecoaman

Managing marine resources sustainably: A proposed integrated systems analysis approach

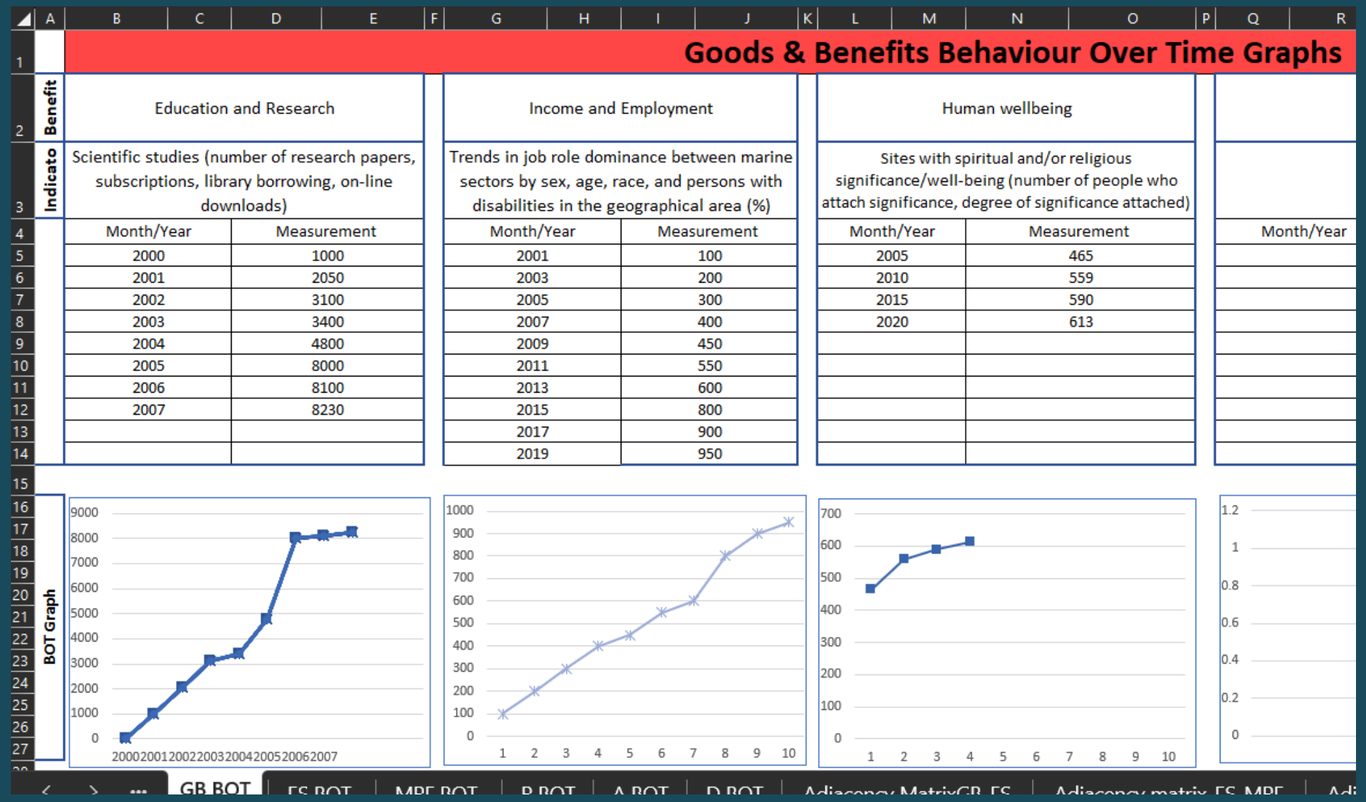
Michael Elliott [a,b,*], Ángel Borja [c], Roland Cormier [d]

[a] Department of Biological & Marine Sciences, University of Hull, Hull, HU6 7RX, UK



THE DAPSI(W)R(M) FRAMEWORK

Behaviour Over Time graphs



Goods & Benefits Behaviour Over Time Graphs

Benefit	Education and Research		Income and Employment		Human wellbeing		
Indicato	Scientific studies (number of research papers, subscriptions, library borrowing, on-line downloads)		Trends in job role dominance between marine sectors by sex, age, race, and persons with disabilities in the geographical area (%)		Sites with spiritual and/or religious significance/well-being (number of people who attach significance, degree of significance attached)		
	Month/Year	Measurement	Month/Year	Measurement	Month/Year	Measurement	Month/Year
	2000	1000	2001	100	2005	465	
	2001	2050	2003	200	2010	559	
	2002	3100	2005	300	2015	590	
	2003	3400	2007	400	2020	613	
	2004	4800	2009	450			
	2005	8000	2011	550			
	2006	8100	2013	600			
	2007	8230	2015	800			
			2017	900			
			2019	950			

BOT Graph

GB BOT | ES BOT | MPE BOT | P BOT | A BOT | D BOT | Adjacency MatrixGB_ES | Adjacency matrix_ES_MPE | Adi

Insight into individual elements behaviours

A data-driven evaluation of system behaviours

The basis to use expert opinion in determining how a system is influenced.

Adjacency and Sensitivity Matrices

Expert opinion is used to determine how elements in a system interact

The polarity is determined alongside the the strength of the relationship

Sensitivity Matrix

and Ecosystem Services

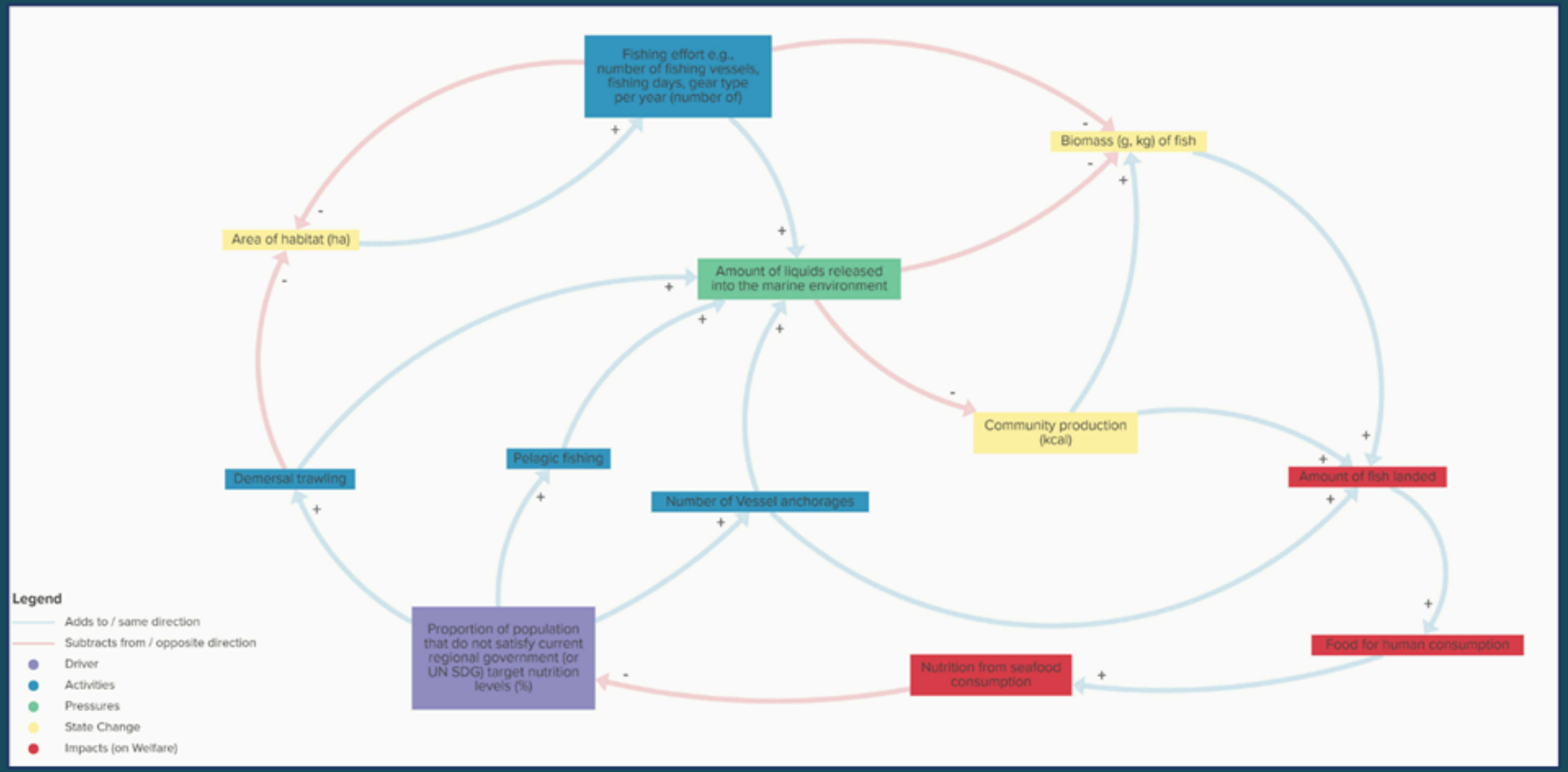
Ecosystem Services	Scientific studies (number of research papers, subscriptions, library borr… on-line downloads)
Assimilative and recycling capacity, net carbon burial (tonnes per ha per year)	Medium Positive
Width or area of saltmarsh, reed bed, mudflat, sand dunes etc. providing natural hazard protection (m, % cover, ha)	Weak Negative
Quantity of greenhouse gases fixed and/or emitted	Weak Negative
Number/area of specific seascape features (% of total natural seascape)	Weak Negative
0	Select

Adjacency Matrix

Goods & Benefi…

Ecosystem Services	Scientific studies (number of research papers, subscriptions, library borrowing, on-line downloads)	Trends in job role dominance between marine sectors by sex, age, race, and persons with disabilities in the geographical area (%)	Sites with spiritual and/or religious significance/well-being (number of people who attach significance, degree of significance attached)	0	0
Assimilative and recycling capacity, net carbon burial (tonnes per ha per year)	+	+	+	Select	Select
Width or area of saltmarsh, reed bed, mudflat, sand dunes etc. providing natural hazard protection (m, % cover, ha)	-	-	+	Select	Select
Quantity of greenhouse gases fixed and/or emitted	-	-	+	Select	Select
Number/area of specific seascape features (% of total natural seascape)	-	+	+	Select	Select
0	Select	Select	Select	Select	Select

Causal loop diagrams



Leverage Points

Causal structures

The Process and Information Management System

The overarching PIMS system operationalises the concepts pertinent to good management

Project and resource management

Stakeholders and communication

Data provenance and management

OVERVIEW OF THE ISA

DAPSI(W)R(M)

We use a problem structuring framework to define SES elements and understand their causal structures.

CLD and BOT

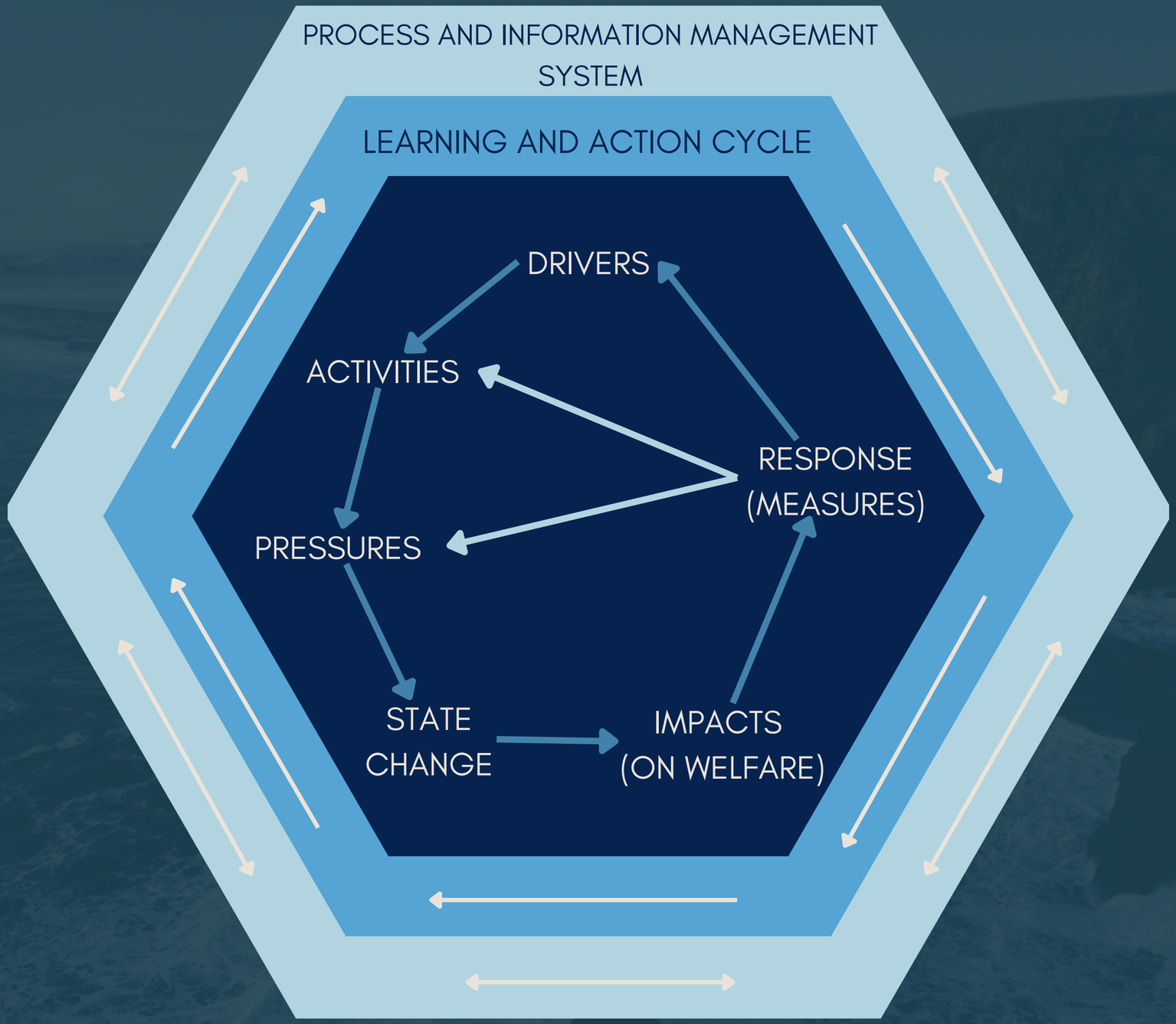
Qualitative systems tools such as Causal loop diagrams and Behaviour Over Time graphs complement the data driven approach.

Learning and action

In operationalisation, we look to promote a continuous and meaningful learning and action cycle throughout the process.

PIM System

This is a management system where we account for provenance in all social and ecological elements of the system.



THE OPERATIONALISED ISA

MARINE SABRES

Marine Systems Approaches for Biodiversity Resilience and Ecosystem Sustainability

2022 - 2026

www.marinesabres.eu

@MarineSABRES

International Estuarine and Coastal Specialists

IECS

UKRI

Simple SES

“Integrating marine biodiversity conservation with a resilient blue economy.”

CASE STUDIES

Tuscan Archepeligo

To restore Seagrass to Rock Bay and look at the effects of tourism on the islands.

Arctic

To explore the pelagic fisheries and recommend sustainable fishing outcomes for the fisheries.

Azores

Restoring the area for ecotourism, alongside promoting a biological corridor between the three islands.

MARINE SABRES

Funded by the European Union's Horizon Europe programme under grant agreement No.101058956.

Thank you!

Gemma Smith
Gemma.Smith@iecs.ltd
International Esturine and Coastal Services Ltd.

Acknowledgements to: Dr Amanda Gregory, Prof. Jonathan Atkins, Prof. Michael Elliott, and the Marine SABRES Project

@MarineSABRES