PERMAGOV

D4.1 deliverable: Developing the Multi-layered Collaborative Marine Governance Model

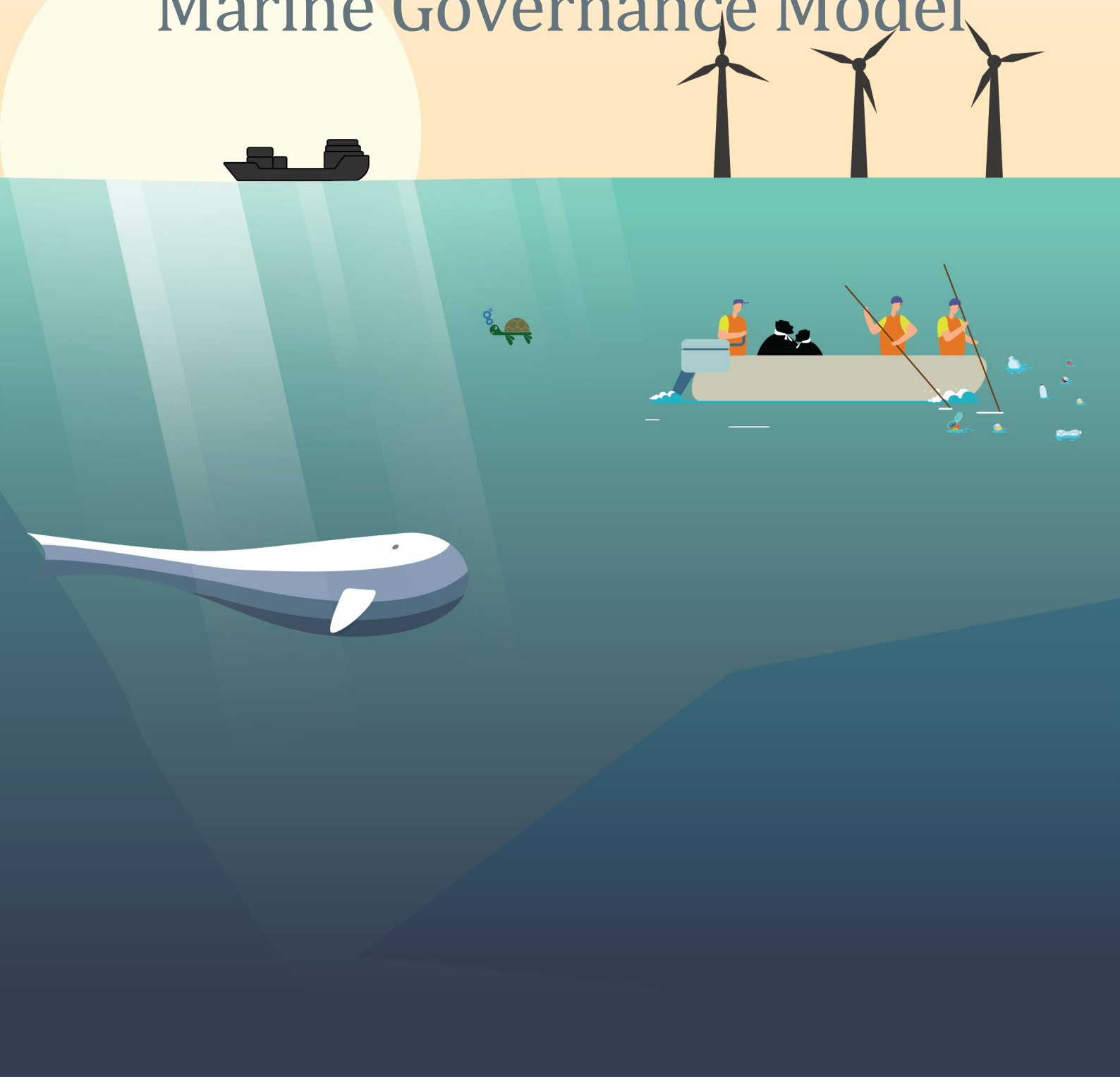

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Table of Contents

List of Figures

List of Tables

Glossary

Acronyms

Collaborative governance (CG)

Governance Arrangement (GA)

Green Deal (GD)

European Union (EU)

Information and Communication Technology (ICT)

Marine Governance Arrangements (MGAs)

Multi-layered collaborative marine governance arrangement (MLCMGA)

Multi-layered collaborative marine governance model (MLCMG model)

Network Governance (NG)

New Public Governance (NPG)

Key words

Collaborative governance

Collaborative governance is a form of governance in which public and private actors work together on a goal that requires collective decision-making processes and structures.

Discourse

Discourses entail the norms and values, as well as the definitions of problems and approaches to solutions by the actors involved.

Governance arrangement

A governance arrangement refers to the way a policy domain is temporarily shaped in terms of substance and organization.

Governance capabilities

Governance capabilities refer to governing actors' abilities to observe complex problems and develop and employ strategies to deal with them.

Institutions

Institutions are understood as “the cluster of rights, rules, and decision-making procedures that give rise to social practices, assign roles to participants in the practice, and guide interactions among occupants of these roles” (Young, 2008 xxii).

Institutional barrier

An institutional barrier is an institutional obstacle to public policy performance.

Marine e-Governance

The development and application of digital processes or technologies aimed at improving the governance and/or management of marine activities and resources, including within and across sectors and governance levels.

Model

A model is a simplified representation of a given object. A model is a useful tool to describe and explain change and performance in a specific policy domain because it makes assumptions using a specific set of variables and dimensions.

Multilayered Governance

Multi-layered governance comprises both multi-level and multi-actor governance.

Performance

Performance is understood as the capacity of a governance arrangement to solve societal problems and create societal opportunities. Performance is both the process and the outcome of collaborative governance.

Regime complex

The overlap and interaction of multiple international institutions and agreements to govern a particular sector.

Rules of the game

Rules of the game in marine policies and politics refer to the formal rules and procedures in the different stages of the policy-making process and the informal rules and routines of interaction within marine practices and the relevant institutions of marine politics and policymaking. Rules of the game are a subset of institutions.

Executive Summary

This deliverable presents the Multi-layered Collaborative Marine Governance model (MLCMG model). It is an analytical model that brings together different components to understand the enabling and constraining conditions for a successful implementation of the EU Green Deal (GD) objectives for the 4 PERMAGOV regime complexes (Maritime Transport, Marine Life, Marine Energy and Marine Plastics). The MLCMG model, together with the indicators for assessing governance capabilities (WP5), will result in PERMAGOV's Marine Governance Performance Assessment Framework.

The MLCMG model is developed from existing social scientific approaches and theories (including Sociology, Political Science, Public Policy and Governance, and Planning) and includes several components that affect change, innovation, and performance of marine governance arrangements:

- the institutional context/setting and structural conditions affecting collaborative processes;
- the multi-level dynamics of marine decision making and implementation of marine policies;
- marine governance arrangements (comprising actors/coalitions, rules of the game, resources and discourses);
- the characteristics of the collaborative process in which governmental actors (public agencies) in deliberation with non-state actors (e.g., representatives of maritime sectors, non-governmental organizations) are engaged in decision-making of marine policies;
- the governance capabilities of state and non-state actors to attain societal goals; and
- the role of e-governance to enable the effective implementation of the Green Deal.

In practical terms for implementing the EU GD, the MLCMG model offers a simplified representation of how marine governance arrangements change and innovate over time. We conceive marine decision-making and implementation of marine policies as a collaborative process structured by institutions, constrained by institutional barriers, enabled by governance capabilities of actors, and facilitated by marine e-governance. We consider performance as the capacity of marine governance arrangements to solve societal problems and create societal opportunities.

1. Introduction

1.1. Problem Statement

Marine ecosystems are currently facing substantial stress due to a series of global challenges that have escalated in both magnitude and impact. These challenges include but are not limited to climate change, which is leading to an increase in sea temperatures and sea-level rise; biodiversity loss, leading to disbalance in marine ecosystems; and pollution particularly from plastics, which is causing pervasive harm not only to marine species and habitats but also to human activities such as fishing and tourism. The individual and cumulative effects of these pressures illustrate the triple planetary crisis that impact marine and coastal environments, potentially irreversibly damaging the ecological balance of the planet and undermining livelihoods, particularly for communities that most rely on marine resources (IPBES 2019; UNEP 2022).

The global scale combined with the complexities of these challenges requires a transformative approach to governance (Rudolph et al. 2020). However, current marine governance approaches are marked by fragmentation across jurisdictional and sectoral lines, resulting in incoherent and ineffective policies and practices that fail to achieve ocean conservation and sustainability use objectives (see e.g., Fanning and Mahon 2020; Mahon and Fanning 2019; Raakjaer et al. 2014). The fragmented nature of governance, where different actors operate with varying goals and regulations is further exacerbated by a lack of coordination among the various actors involved in marine governance, including governmental bodies, non-governmental organizations, industry stakeholders and civil society.

The European Union established the Green Deal (GD) as a strategic vision and overarching framework that aims to foster sustainable practices and drive a transition towards a climate neutral and sustainable economy. It encompasses a range of objectives, including cutting emissions, investing in renewable energy, fostering biodiversity, and reducing pollution (Fetting 2020). A central component of the GD's approach to governance is the incorporation of e-governance and digital strategies, such as the development of digital twins – virtual representations of marine environments that can be used for monitoring, simulation, multi-party marine spatial planning, and decision-making. These technological innovations offer the promise to enhance governance capabilities by providing real-time data and predictive analytics, thus allowing for more informed and agile policy responses (Tzachor, Hendel, and Richards 2023).

Unlocking the GD's digital, and its broader potential, depends however on its implementation of the GD which is complex as it requires not only the translation of various objectives into national policies affecting different actors and sectors but also ensuring compliance with these policies. This holds also true for the marine domain, where this process involves the transposition of EU directives into national laws and regulations, as well as the on-the-ground implementation activities, such as the designation and management of marine protected areas and offshore wind energy parks.

The dynamics of multi-layered governance introduce additional layers of complexity to this process, as decision-making and implementation involve a multitude of actors operating across various governance levels –local, national, regional, EU, and global. This then requires coherent policy integration and coordination across all scales, particularly in the marine domain which is managed by various governance structures responsible for different sectors (Fanning and Mahon 2020; Mahon and Fanning 2019). This is especially true for the governance of maritime

transport, marine life, marine energy, and marine plastics. These sectors are each governed by their own specialized frameworks, often referred to as 'regime complexes', which present their own set of institutional barriers and policy challenges. These barriers include for example bureaucratic challenges, conflicting policies between different governance levels, and challenges in stakeholder engagement.

The PERMAGOV project introduces a model that will help understand how marine governance arrangements change and innovate over time, and how their performance can influence the implementation of the EU GD's objectives. The problem that the MLCMG model tries to address is multifaceted: it involves navigating the complexity and fragmentation of marine governance, understanding, and responding to the global environmental challenges facing our seas and oceans, implementing the EU GD's ambitious objectives in a sector-specific and context-sensitive manner, and overcoming institutional barriers within diverse marine regime complexes.

1.2. Purpose of the Report

The purpose of the report is to present a governance model developed to understand the enabling and constraining conditions for the successful implementation of the EU GD objectives. The model presented in this report is named the "Multi-layered Collaborative Marine Governance (MLCMG) model", which is an analytical tool to describe and explain how marine governance arrangements change, and innovate, and how to assess their performance in relation to the EU's GD targets and vision.

A model is instructive because it can "*make precise assumptions about a limited set of parameters and variables*" (Ostrom 2011, 8). Moreover, models "*are useful in policy analysis when they are well-tailored to the particular problem at hand*" (Ibid, 9). The MLCMG allows us to study 1) the different governance processes that affect change and innovation; 2) process performance of marine governance arrangements; 3) and joint outcomes of MGAs against the EU GD targets.

With this model, we intend to advance scholarly understandings of marine governance by interrogating their arrangements as collaborative and essentially shaped by multiple levels and multiple actors (e.g., interactions between governments, international organizations, industry, society). Moreover, by having evaluated the model through focus groups with relevant stakeholders in the marine domain, it is our intention that the model can be used as an analytical tool to evaluate the implementation of EU GD goals.

The MGCMG model and this deliverable is the outcome of Task 4.1 of the PERMAGOV project. The model contributes to a core objective of the PERMAGOV project, which is to co-develop and apply a "Marine Governance Performance Assessment Framework to assess how institutional barriers, (informal and informal) collaborations and e-governance tools enable and constrain the capability of actors to implement EU marine policies within the regime complexes of Marine Energy, Maritime Transport, Marine Life and Marine Litter". The model will be used to analyze the nine PERMAGOV case studies within the regime complexes Marine Energy, Maritime Transport, Marine Life and Marine Litter. The application of the model will be done in Task 4.2.

1.3. The Importance of Governance and Collaboration for the Marine Domain

The European GD promotes the development of and strengthening of collaboration between public and private actors. According to the European Commission, "*The EU has the **collective ability** to transform its economy and society to put it on a more sustainable path*" (Fetting 2020, 2), "***Promoting new forms of collaboration** with industry and investments in strategic value chains are essential*" (Ibid, 9), and "T*he EU will engage more intensely with all partners **to increase the collective effort** and help them to revise and implement their nationally determined contributions and devise ambitious long-term strategies*" (Ibid, 20). Collaboration is according to the European Commission, a preferred structure and process.

In the PERMAGOV project, we understand marine governance as structures and processes that are inherently collaborative. Progress towards the vision set forth in the EU GD requires collective efforts and collaboration from actors situated across different institutional levels and actors operating across multiple economic sectors.

In this report, we utilize the definitions of governing and governance developed by Jan Kooiman:

> Governing can be considered as the totality of interactions, in which public as well as private actors participate, aimed at solving societal problems or creating societal opportunities; attending to the institutions as contexts for these governing interactions; and establishing a normative foundation for all those activities.
>
> Governance can be seen as the totality of theoretical conceptions on governing. (Kooiman 2003)

Kooiman (2016) proposed the concept of 'interactive governance', meaning that societies are governed by a combination of governing efforts (Kooiman 2016). These mixed approaches are solutions to an "ever growing societal diversity, dynamics and complexity, and responses to major societal issues such as poverty and climate change" (Kooiman 2009, 73). Analytically, this concept assumes dynamic interactions across networks and between governments, international organizations, industry, and civil society. According to Kooiman (2016) interactivity has become a key determinant in how state and non-state actors enact their roles and responsibilities within social and political processes. These actors "continuously change these structures, while at the same time being subjected to their influence" (Kooiman 2016, 30).

Mutual interdependencies between actors is a reason for "*collaborative or co-operative interactions*" (Kooiman 2009, 82). Since the turn of the century, collaborative interactions, between governments and industry (public private partnerships), as well as between industry and NGO's, have gained relevance and importance in governing. The concept of collaborative governance builds on the concept of interactive governance. Collaborative governance refers to "*the processes and structures of public policy decision-making and management that engage people across the boundaries of public agencies, levels of government and/or the public, private and civic spheres in order to carry out a public purpose that could not otherwise be accomplished*" (Emerson, Nabatchi, and Balogh 2012, 2). As per Emerson, Nabatchi, and Balogh's (2012) definition, we understand collaborative governance as both processes and structures. To capture and understand the way and extent to which actors can make changes to these processes and structures, we draw on the concept of governance capabilities, defined as the ability of public and private actors to govern, that is, (in line with interactive governance

theory) to observe complex social problems and to solve these or to create societal opportunities, by developing and employing strategies aimed at overcoming institutional barriers, enhancing collaborations, and using digital tools or e-governance approaches to achieve societal goals.

So far, we have established the critical role of governance actors, structures, and processes for the implementation of the EU GD objectives in the marine domain. Moreover, we explained that the purpose of the report is to present a Multi-layered Collaborative Marine Governance (MLCMG) model, which is an analytical tool to describe and explain how marine governance arrangements change and innovate and to assess their performance.

1.4. Structure of the Report

This report has been divided into a **methodology** (Chapter 2) and **results section** (Chapter 3), and an elaborate **background of the model's components** (Chapters 4 – 9) referencing state-of-the-art literature. In the **methodology** section, we describe how we co-developed the MLCMG model, providing details about the collaborative writing process and the focus groups that we held at a stakeholder meeting in Brussels in 2024. Then we move to the main **results section** (Chapter 3) where we introduce the MLCMG model and explain each of the components. We offer guidance on how to use the model to study change and performance and highlight the model's novelty in relationship to the literature.

The **remainder of the report** (Chapters 4 – 9) provides detailed information about each of the components. We first elaborate on the concept of marine governance arrangements. We subsequently discuss structure and agency in marine governance and explain how marine governance arrangements are subject to change because of structuration and stabilization processes. This section also discusses drivers and forms of institutional change. We then define five governance capabilities that affect actors in marine governance arrangements to change and innovate. The next chapter elaborates on change in the context of institutional barriers. We then provide more background on collaborative governance, explaining its dimensions and functions. We also clarify how collaborative governance is distinctive from other circulating governance definitions. In chapter 9, we explore the role of marine e-governance for the implementation of the EU GD.

In the **conclusion** (Chapter 10), we reiterate the purpose of the report, and the use value of the MLCMG model in the context of the implementation of the EU GD objectives.

2. Building the MLCMG model - Methodology

The report of the Multi-layered Collaborative Marine Governance Model is written by a team of Social Scientists working on a range of marine issues. The model was developed based on existing literature, including state-of-the-art definitions and models of collaborative governance, governance arrangements, institutional barriers, e-governance, and capabilities research. This chapter explains the process of co-developing the MLCMG model.

2.1. D4.1 Writing Team

We used a step-change approach to develop the first draft. We started with initial conversations about the purpose of the deliverable, and how to build the model. These initial brainstorming sessions resulted in a first outline of D4.1. We later developed the concept of the model by visualizing its building blocks to capture the processes and structures of collaborative marine

governance. We subsequently consolidated the different visual building blocks into one model. We constantly reminded ourselves that the model is to be used as a tool to describe and explain performance of the marine governance arrangements.

To develop a draft of D4.1, we identified writing assignments on specific topics. The writing topics corresponded with the D4.1 outline. The distribution of the assignments was linked with other ongoing work package tasks to maximize cross-pollination of information and ideas. We discussed the initial outcome of these writing assignments on a full-day digital brainstorming session. Building on our separate outputs, we further developed the model as well as our conception of change and performance. We used an online collaboration tool (Miro Whiteboard) to capture our ideas regarding change and performance of marine governance arrangements.

The next step in the development of D4.1 focused on updating the document, by addressing its structure and coherency, and by integrating our ideas on change, innovation, and performance. A list of questions was designed and distributed to prompt the writing team to consolidate our ideas into the latest draft. This draft was subsequently discussed in another focused half-day digital brainstorming session. We subsequently updated the latest draft and developed it further in a focus group with stakeholders.

2.2. Focus Groups at Stakeholder Meeting

The PERMAGOV project set out to co-develop and further refine the model with stakeholders at a meeting in Brussels on February 15th, 2024. The stakeholders participated in a Workshop Day through focus group work, with introductions and a set of tasks to the PERMAGOV project's elements. Representatives from all four regime complexes (Marine Life, Maritime Transport, Marine Energy and Marine Plastics) as well as governmental actors from different institutional layers participated.

In the dynamic landscape of marine governance, stakeholder participation stands as a critical element in navigating the complexities of an ever-changing environment (Chilvers and Kearnes 2015). As the PERMAGOV project partners embarked on a journey to reimagine stakeholder engagement into the development of the model, we drew inspiration from design research, which seeks to provide methodologies, methods, tools, and recommendations to cope with the challenges inherent in complex and dynamic settings.

Design research, with its focus on supporting industry in the face of global competition, shifting market dynamics, and evolving user needs (Gericke and Blessing 2011), offers valuable insights for redefining stakeholder participation in marine governance. By applying the principles of design thinking to the realm of governance, we developed an innovative approach that had the goal of fostering collaboration, creativity, and adaptability. At its core, design research emphasizes a human-centered approach, placing the needs and experiences of stakeholders at the forefront of decision-making processes (Ibid). In the context of marine governance, this means actively engaging with diverse stakeholders, including fishers' organizations, scientists, and policymakers, to co-create solutions that address their unique challenges and aspirations. Moreover, design research encourages iterative experimentation and prototyping, allowing for continuous refinement and improvement of participatory processes (Chilvers and Kearnes 2015).

With the model being the sum-of-the-parts of the WP2 and WP3 outputs, we designed the day to reflect this interrelationship. The Workshop Day started with a warm welcome and introduction to PERMAGOV and was further structured in five sessions. Each of the sessions

corresponded with a particular Work Package task (task 2.2, 2.3, 3.2, and 4.1). Insights from each of the sessions fed into the last session, thus consolidating insights, and linking them with the MLCMG model.

The stakeholders worked together on a regime-complex level, optimizing knowledge-sharing on policy-specific governance arrangements. We used a range of methods and tools fit-for-purpose for the workshop's objectives. Incorporating principles of design research into marine governance also required us to use a multidisciplinary approach, drawing upon insights from fields such as ecology, economics, sociology, and anthropology. By integrating diverse perspectives and expertise, we developed a solution that accounted for the complex interactions between a divers set of stakeholders. Furthermore, our approach emphasized the importance of empowerment and capacity-building on-site, equipping stakeholders with the knowledge, skills, and tools they needed to actively participate in the Workshop Day. Overall, the focus groups affirmed that the model captured multiple dimensions that enable and constrain the implementation of the EU Green Deal.

In reimagining stakeholder participation through the lens of design research, we had the opportunity to transform part of the PERMAGOV project into a more inclusive, adaptive, and resilient process. By embracing principles of human-centered design, multidisciplinary collaboration, and continuous experimentation, we tried to unlock the full potential of stakeholder engagement to address the complex challenges facing our oceans and coastal communities.

2.3. Building a Model: Choice of Dimensions and Variables

When building a governance model, we need to interrogate the choice of components, specify which theories underpin this choice and state the broad assumptions we are making about the components. The choice of components needs to be relevant to understanding change and performance in marine governance arrangements. We recognize that the marine governance arrangements are shaped by specific social-ecological systems. This means that some variables are more relevant in one case study than in others. Ostrom (2007) argues that the "*key is assessing which variables at multiple tiers across the biophysical and social domains affect human behavior and social-ecological outcomes over time*" (Ostrom 2007, 15183). Moreover, Ostrom explains how the "*development and use of theories enable the analyst to specify which components of a framework are relevant for certain kinds of questions and to make broad working assumptions about these elements*" (Ostrom 2009, 28).

We have identified components and variables relevant to the marine domain, including multi-layered marine governance arrangements, institutional attributes, collaboration dynamics, governance capabilities, e-governance, and performance. Next, we present our results section, integrating these different components into a comprehensive model. We will provide broad assumptions about these components. The remainder of the report (Chapters 4 – 9) offer a detailed explanation of the theories that underpin these components.

3. Results Section: Multi-layered Collaborative Marine Governance Model

This chapter introduces the innovative Multi-layered Collaborative Marine Governance Model (MLCMG model). Figure 1 provides a breakdown of how Multi-layered Marine Governance Arrangements **change** and **innovate** over time as actors seek to overcome **institutional barriers** and pursue joint outcomes through **collaboration**. Change and innovation are

facilitated through **e-governance** and underpinned by **governance capabilities**. As a result, new **Multi-layered Marine Governance Arrangements** are created to achieve the **EU Green Deal vision and targets**.

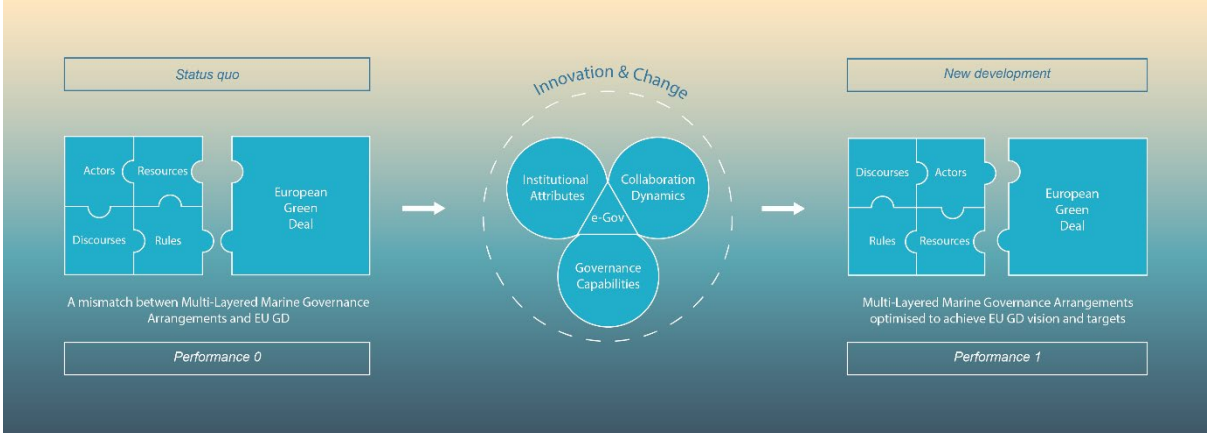

FIGURE 1: THE MODEL

The model is to be read from left to right. On the **left**, we start with the "status quo" of MGAs and the current performance in relation to Green Deal. The **middle part**, the 'change and innovation' is explained according to institutional attributes, collaboration dynamics, governance capabilities, and e-governance. MGAs change and innovate over time due to the driving force of the EU GD and other policies that promote sustainable economies. Evidently, MGAs are always in a process of becoming, with change and innovation being a constant. On the **right** side of the model, we study the new multilayered marine governance arrangements which have optimized to address the EU GD vision and targets. Both process performance and cumulative performance are important to understand change and innovation.

The MLCMG model is a conceptual model that integrates core dimensions that enable and constrain the implementation of the EU GD. The MLCMG model can be used as an analytical tool to map how marine governance arrangements in specific case studies are implementing/responding to the EU GD vision and goals, and to identify ways to enhance this. Next, we will provide broad assumptions about each of these components. Subsequently, we will explain the relationship between these components. Chapters 4 to 9 provide extensive theoretical background on each of these components.

3.1. Multi-layered Marine Governance Arrangements

A governance arrangement refers to the way a policy domain is temporarily shaped in terms of substance and organization. There are four dimensions that structure governance arrangements (see figure 2): actors and their coalitions (actors in figure 2), power resources (resources in figure 2), rules of the game (organization) (rules in figure 2), and discourses (substance) (see figure 2). In the PERMAGOV project, we are particularly interested in marine governance arrangements (MGAs). MGAs try to improve their ability to address the EU GD vision and targets. Figure 2 identifies the mismatch between the current MGAs and the EU GD vision and targets.

Multi-layered Collaborative Marine Governance Arrangements (MLCMGAs) refer to the way marine governance arrangements are essentially shaped by actors operating on multiple

institutional levels and across multiple sectors. Multi-layered governance is the combination of both multi-level and multi-actor governance. Kohler-Koch and Eising (1999), describe the "*entrance of 'new' private and societal actors in public policy-making, also conceptualized as multi-actor governance or network governance*". Marks and Hooghe (2003) explain multi-level governance as the "*public decision making [that] is diffused across multiple territorial levels or contexts*" (Marks and Hooghe 2003, 2). This means that coalitions of governmental and non-governmental actors of different governance levels (subnational, national, supranational, international) try to influence activities and developments within a specific regime complex.

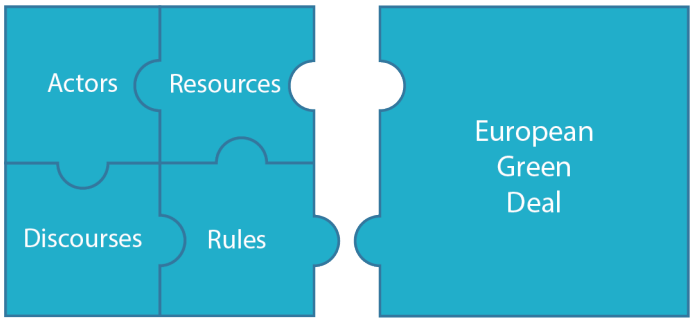

FIGURE 2: A MISMATCH BETWEEN MULTI-LAYERED MARINE GOVERNANCE ARRANGEMENTS AND THE EU GD

3.2. Change and Innovation

The multi-layered marine governance arrangements change and innovate over time to adapt to environmental problems and EU GD targets. Change and innovation in the model are processes of *structuration* and *stabilization*. Structuration is the gradual formation and production of structural properties (rules, resources, and discourses) of a marine governance arrangement in interactions between actors.

This means that in this process of structuration, actors apply their governance capabilities to try to navigate and overcome institutional barriers, collaborate to advance change and innovation, and use e-governance tools to facilitate communication, access to knowledge, and to comply with regulations (among other reasons). In the process of doing so, these actors change the rules of the game, redistribute resources, and adopt new discourses.

Stabilization refers to the process in which already formed marine governance arrangements constrain the agency of involved actors, while actors also defend the existing governance arrangements based on their interests (van Tatenhove 2022; Arts and van Tatenhove 2006). Stabilization can present itself as inertia or path dependency, which can represent a barrier to change. Drift and layering may represent processes of institutional adaptation. At the same time, too much drift causes instability which is a barrier to innovation.

The development of the *New* MLMGA is the outcome of the interplay between structuration and stabilization (Figure 3). Noticeably, change and innovation is ongoing and governance arrangements are always in a process of becoming (in flux).

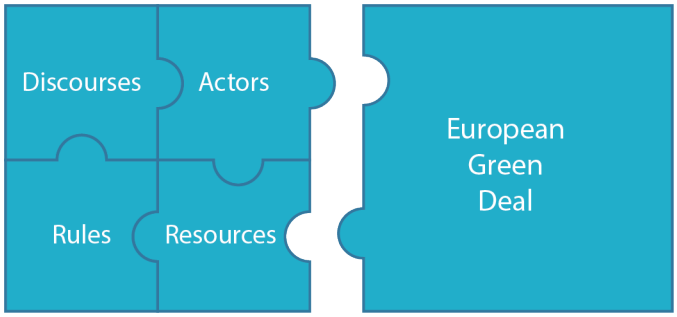

FIGURE 3: OPTIMIZED MULTI-LAYERED MARINE GOVERNANCE ARRANGEMENTS

3.3. Institutional Attributes: Barriers and Enablers of Adaptation

Institutions are embedded "systems of established and prevalent social rules that structure social interactions" (Hogdson 2006). Institutions play a double role in relation to adaptation of governance arrangements as they may both constrain and enable the adaptation of these arrangements. Institutions enable change processes through establishing shared expectations about interactions. Without this, it would be difficult for actors to cooperate to identify needs for change and initiate adaptations. However, institutions are rather stable entities, and institutional change tends to be incremental, which also limits the scope for adaptation.

It is worth noting that institutional change does not always lead to improvements in the performance. Institutions may change in ways that make governance ineffective. For example, an existing institution takes on governance tasks that it does not have the competency to deliver. Mahoney and Thelen (2010, 15–18) distinguish four forms of institutional changes that may lead to ineffective governance arrangements: displacement (removal of existing rules and the introduction of new ones), layering (introduction of new rules on top of or alongside existing ones), drift (the changes impact of existing rules due to shifts in the environment), and conversion (the changed enactment of existing rules due to their strategic redeployment).

Following Oberlack (2017), institutional attributes that provide for adaptation can be termed "institutional enablers" of adaptation, while institutional attributes that limit the scope for adaptation are termed "institutional barriers" to adaptation. Taking a structural approach, Oberlack (2017) identified generic types of institutional attributes. In the PERMAGOV project, we have built on and extended this list of institutional attributes based on a systematic scoping review of institutional barriers to marine policy performance (see Table 1, based on Deliverable 3.1). Institutional attributes are central to the process of change and innovation (figure 4).

The recognition of an institutional barrier may motivate actors to invest in institutional adaptation to improve the performance of governance arrangements. However, certain types of institutional barriers limit the potential for adaptation, at least in the short term. Such types of barriers include path dependence (Rixen and Anne 2015, institutional arthritis (Young 2010), and bounded rationality (Kyriazis and Metaxas 2010).

In sum, institutions can either catalyze or impede change and are thus important to consider in processes of changing governance arrangements. When identifying and addressing institutional barriers, it is important to understand the governance features that propagated them. For example, path dependency may arise from institutional rigidity, or it may be due to the intransigence of powerful stakeholders.

Institutional Attribute	Description of barriers pertaining to institutional attributes	Governance Issues
Actor eligibility	Lack of (appropriate) boundary rules that regulate the set of eligible actors in action situations.	Lack of clarity about actor eligibility Key actors excluded Too many non-key actors involved
Actor roles and responsibilities	Inappropriate rules that regulate the positions available to participants and the set of required, prohibited and allowed actions assigned to positions.	Lack of clarity about positions and roles of actors Limits on actors' capacity to act in specific times, or to specific issues Competence creep (actors taking an institutional role for which they are not authorized)
Actor control (power distribution)	Lack of (appropriate) rules that establish the kind of control actors have over outcomes of action situations.	Powerful actors (or coalitions) inappropriately control action situations Weak actors cannot influence institutions or policy outcomes Tokenistic participation Weak institutional provisions for leadership* Unclear distribution of power and responsibilities*
Actor accountability	Inappropriate institutional provisions for monitoring, evaluating, rewarding, and enforcing responsibilities.	Lack of transparency in decision making processes Absence of feedback mechanisms Ineffective compliance and enforcement mechanisms (i.e. institutions not facing consequences when not fulfilling responsibilities).
Actor connectivity	Inappropriate structures that connect actors within and across multiple tiers of social organization.	Poorly networked actors within and/or across tiers of social organization
Conflict mechanisms	Lack of (appropriate) institutional provisions for regulating, preventing or resolving conflicting values, preferences and actions among actors.	Conflicts among actors Disputes over rules-in-use Dispute settlement mechanisms lacking or ineffective
Development and use of knowledge	Inappropriate institutional attributes that shape how information, knowledge claims and values are constructed, communicated, accepted, and used.	Weak process(es) for reflexivity and institutional learning Inappropriate science-policy interfaces Exclusion or marginalization of relevant knowledge providers Too many, too diverse, or not sufficiently relevant knowledge providers# Data fragmentation: lack of coordination and organisation of data processes resulting in a lack of harmonisation and interoperability of data causing inefficiencies and gaps in knowledge production and use*

Scale of institutions	Inappropriate spatial and temporal implications of institutions.	Mismatch between temporal and/or spatial scale of issue and institution Fragmentation: Disintegration or lack of coordination among different institutions or levels of governance, leading to inefficiencies and gaps Insufficient division of institutions into manageable problem areas, leading to inefficiencies[#]
Rigidity of institutions	Change in the rules-in-use is inappropriately constrained by higher-order rules, transaction costs and path dependence.	Stickiness of institutions Path dependency Institutional drift
Formality of institutions	Inappropriate degree to which rules-in-use are embedded in written laws, plans, documents.	Over-formalized institutions Under-formalized institutions
Institutionalized incentives	Inappropriate provision for institutionalized incentives for actors.	A lack of incentives of actors to take engage in governance processes. Mis-alignment between incentives and objectives. Over-ambitious policy goals* Poorly specified objectives*

TABLE 1: LIST OF INSTITUTIONAL ATTRIBUTES, DESCRIPTION OF BARRIERS AND GOVERNANCE ISSUES

(Table based on Deliverable 3.1)

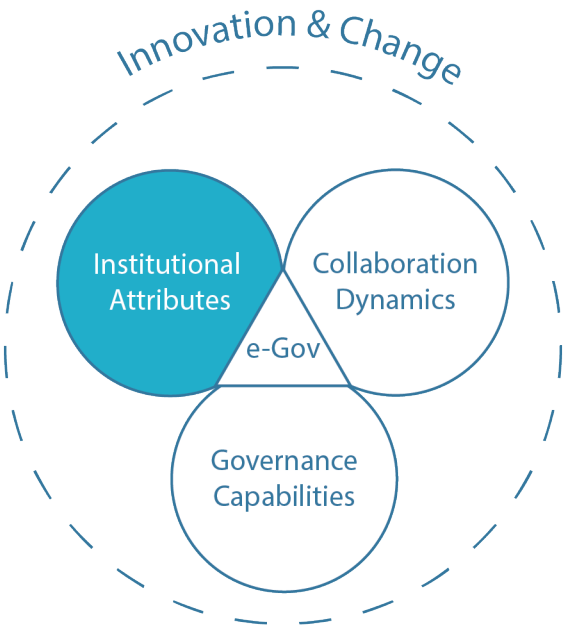

FIGURE 4: INSTITUTIONAL ATTRIBUTES

3.4. Collaboration Dynamics

Collaboration dynamics consists of three components: principled engagement, shared motivation, and capacity for joint action (Emerson, Nabatchi, and Balogh 2012). These components allow us to explain how actors in governance arrangements jointly discuss problems and opportunities and come to an agreement on joint action (figure 5). These components also shed light on the conditions (e.g., trust, mutual understanding) and resources that enable effective relationships (e.g., leadership and knowledge).

Through *principled engagement*, actors work across boundaries to solve problems by adhering to fair and open communication about all relevant interests and being informed by the viewpoints and knowledge of all participants. Principled engagement includes four iterative process elements (discovery, definition, deliberation, and determination) that produce **social learning** and facilitate the agreement of shared aims or a purpose and a shared theory of action for achieving the aims or the purpose.

Shared motivation refers to a self-reinforcing cycle that consists of four inter-personal or relational elements (trust, mutual understanding, internal legitimacy, and commitment) contributing to **social capital**.

Capacity for joint action is the pool of functional elements (procedural and institutional arrangements, leadership, knowledge, and resources) that creates the potential for taking collective actions and provides a link between strategy and performance. Actions can be undertaken by all participants in concert, by individual partners, or by external entities and they can lead to both internal (within the collaborative regime) and external outcomes. The functional elements represent together the actor/group's **problem-solving capacity**.

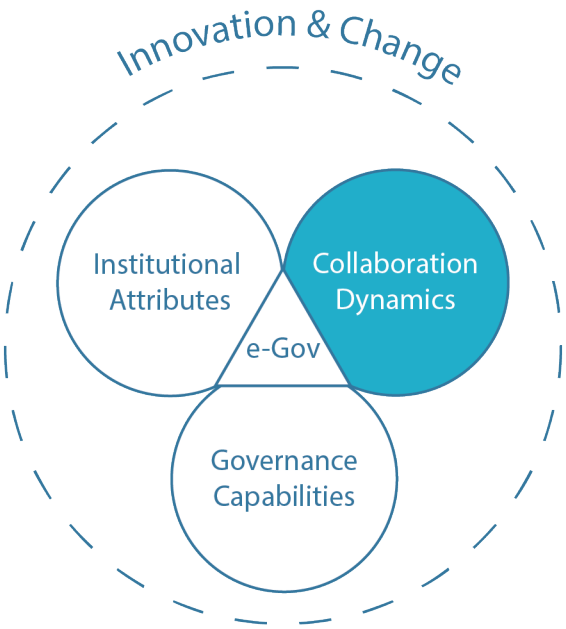

FIGURE 5: COLLABORATION DYNAMICS

3.5. Governance Capabilities

We examine the capacity of governance arrangements to solve problems and create opportunities to achieve EU GD objectives. In the PERMAGOV project, the governance capabilities of key actors in collaborative governance arrangements take center stage (figure 6). This draws attention to the abilities of actors in MGAs to observe and act upon EU GD objectives.

Governance capabilities refer to governing actors' abilities to observe complex problems and develop and employ strategies to deal with them (Termeer et al. 2015; 2016; Termeer and Dewulf 2014; Candel, Breeman, and Termeer 2016). The capability-concept foregrounds agency of actors. Governing actors enact, through their abilities, a certain degree of freedom to choose strategies they see fit well considering their background, ambitions, or context-specific position in a governance landscape (Toonen et al. 2021) following (Sen 2005; Robeyns 2005).

Governance capabilities are operationalized in five abilities: (1) reflexivity, meaning the ability to deal with multiple frames in society and policy; (2) resilience (or agility), referring to flexible adaptation to frequently occurring and uncertain changes; (3) revitalization (or innovation drive), that is, unblocking deadlocks and stagnations in policy processes; (4) rescaling, which is the ability to address mismatches between the scale of a problem and the scale at which it is governed; and (5) responsiveness, that is, responding wisely to changing agendas and public demand.

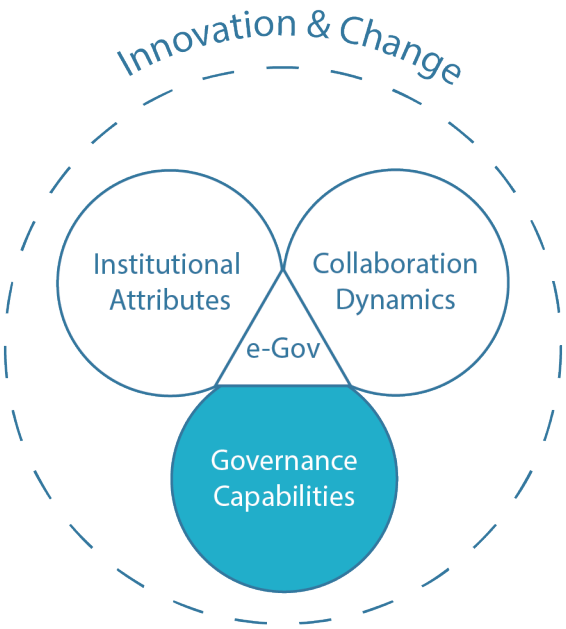

FIGURE 6: GOVERNANCE CAPABILITIES

3.6. e-Governance

The EU has advanced environmental e-governance as a key enabler of economic recovery, sustainable development, and the EU Green Deal. The EU's Recovery and Resilience Facility emphasized the interconnectedness of the green transition and the digital transformation. The EU also developed specific e-governance initiatives to address the interplay between the European Digital Strategy and the objectives of the EU GD. For example, the EC's European Digital Twin of the Ocean "*aims to model the ocean's multiple components, provide knowledge and understanding of the past and present and create trustable predictions of its future behavior*" (European Digital Twin of the Ocean ((European DTO)). It is envisioned by the EU that the European Digital Twin of the Ocean will facilitate the most effective ways to restore habitats, facilitate the development of a sustainable blue economy, and address climate change.

In the PERMAGOV project, we conceptualize e-governance as the development and application of digital processes or technologies aimed at improving the governance and/or management of marine activities and resources, within and across sectors and governance levels (figure 7). There are multiple ways that e-governance arrangements enable the effective implementation of the Green Deal. Specifically, some digital tools can help actors in MGAs with seeing and knowing governance issues, engagement, and participation in addressing issues, as well as designing interventions and actions. Depending on the institutional barriers, the collaboration dynamics and the governance capabilities of actors, digital tools can help these actors overcome institutional barriers and strengthen collaborations by communication interests, values, and concerns, and building up relationships with organizations across different institutional levels and economic sectors.

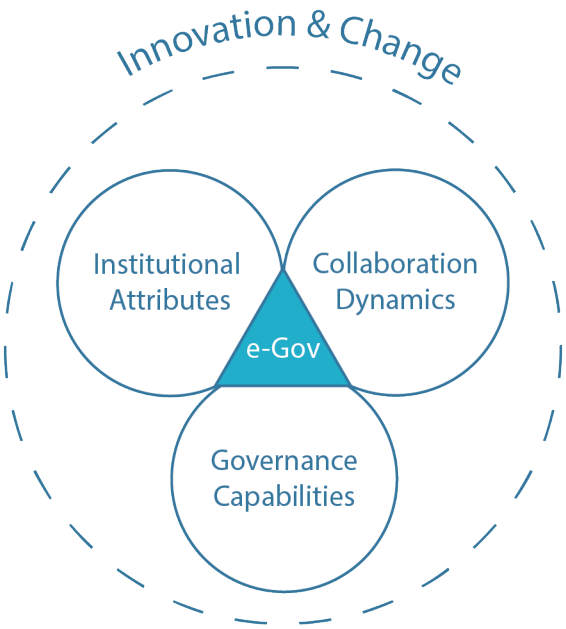

FIGURE 7: E-GOVERNANCE

3.7. Performance

The EU recognises that the performance of marine governance is insufficient to achieve existing goals. The EU GD establishes a new level of expectation by establishing ambitious policy goals and targets, fostering change and innovation. In PERMAGOV, performance is understood as improvements in both the process and outputs of MGAs that result from change and innovation. In turn, performance leads to new outcomes and impacts with positive benefits for society. Measuring performance either focuses on the status quo and the new MLCMGA (i.e., from Performance 0 to Performance 1), and/or focuses on the process when change and innovation occurs.

3.7.1. Process performance

Process performance focuses on the decision-making abilities and **social learning** potential of the public and private actors active in marine governance arrangements. Process performance assumes a deficiency in **social capital** and **problem-solving capacity**. Social learning, social capital, and problem-solving capacity correspond with the goals of collaboration dynamics (e.g., principled engagement, shared motivation, and capacity for joint action).

Governance arrangements change and innovate when their capacity is insufficient to meet established goals or when societal goals are shifting. For instance, the governance arrangement in place to address marine biodiversity degradation may be found to be insufficient when biodiversity levels continue to decline or when new ambitions for biodiversity protection are put forth.

Process performance can be studied from three perspectives. Social performance is based on how well MGAs collaborate. System performance relates to the MGA's capacity for joint action which is based on institutional attributes and collaboration dynamics. Technological performance measures the effectiveness of e-governance (e.g., digital tools) to facilitate MGAs to overcome institutional barriers and pursue joint outcomes through collaboration dynamics.

Social performance

- Actors within MGAs to communicate successfully their interests, concerns and values;
- Actors within MGAs to come to a shared agreement about the problems and solutions;
- Actors within MGAs to build relationships that have internal legitimacy:
- Actors within MGAs to agree to shared commitments to change and innovate;
- Actors within MGAs to have the abilities to respond to social problems effectively.

System performance

- Actors within MGAs to have the governance capabilities to navigate/overcome institutional barriers;
- Actors within MGAs to collaborate effectively to manage institutional barriers;
- Actors within MGAs to collaborate effectively to promote institutional change.

Technological performance

- Actors within MGAs to use e-governance for rules compliance, communication purposes, and building relationships;
- Actors within MGAs to have the abilities to apply digital tools to observe complex problems and develop and employ strategies to deal with them.

3.7.2. Performance (cumulative)

Drawing on earlier work by Helm and Sprinz (2000) and Young (2001) proposed that the effectiveness of an environmental regimes can be conceptualized as policy performance compared to an imagined collective optimum, where the performance of a no-regime counterfactual is considered. Based on this, and for this report's purposes, an outcome-oriented notion of performance can hence be defined as the problem-solving capacity of a governance arrangement at a given point of time. As Young's work draws attention to, it is exceedingly difficult to measure performance in terms of outcomes. Young (2001, 14) presents a pragmatic approach which distinguishes between **outputs**, **outcomes**, and **impacts**. Following this approach, the cumulative effects of change and innovation can be identified respectively as follows:

Outputs

- Outputs are developed and delivered by marine governance arrangements and are expected to contribute to outcomes. Examples are new policies, regulations, strategies, and well as monitoring and enforcement mechanisms.

Outcomes

- Outcomes refer to positive changes in terms of new or improved policies, plans and practices implemented by marine governance arrangements. Outcomes contribute to longer-term, high-level impacts. Examples include behavioral changes within marine governance arrangements, changes in the regulatory environment, and the establishment of joint working groups or other new measures for collaboration, and improved communication platforms.

Impact

- Impacts refer to an improvement in the social, environmental, and economic state and is broader in scope than outcomes. Within the PERMAGOV project, impact generally relates to environmental protection in the form of reduced emissions and plastic pollution or

increased biological diversity and improved ecosystems. Impact is when MGAs achieve social and/or biophysical progress with solving societal problems and creating societal opportunities (e.g., actual progress on CC through CO2 reduction).

3.8. Guidance on how to use the MLCMG Model

Using the EU GD objectives as a normative reference point against which governance performance can be assessed, the model offers an evaluative tool to verify change, innovation, and performance in specific case studies. This means that by reading the model from left to right, we identified the relevant components that influence the governance process and outcome. In the **Annex** of this report, we have listed general questions that researchers can ask stakeholders to verify each of the model components.

Structuration and stabilization processes are central mechanisms in this institutionalization process. Importantly, change and innovation is ongoing, with institutionalization always being in flux. Thus, the development of a *New* Multi-layered Marine Governance Arrangement is not the ultimate outcome and achievement of the GD vision and targets. Instead, performance is rather a **forward step-change within the Green Transition**.

The middle part of the **model is dynamic**, meaning that change and innovation occur due to actor's agency within a relatively stable structure. This means that actors within MGAs utilize their **governance capabilities** to overcome **institutional barriers** and do this effectively through **participation in collaborative governance regimes**. Some actors within this dynamic process apply digital tools to improve the management of marine activities and resources.

Process **performance** is conceptualized with three variables: social performance, system performance, and technological performance. We subsequently differentiate between outputs, outcomes, and impact (e.g., performance of the MGAs to realize or work towards the EU GD vision and targets).

3.9. Novelty of the MLCMG model

The MLCMG model integrates concepts and definitions of governance arrangement, institutionalization, collaborative governance, and e-governance, offering a comprehensive approach to the enabling and constraining conditions for multi-layered MGAs to implement the EU GD vision and targets. In this regard, change and innovation is not one-dimensional, and is advanced through agency, institutional structures, and repeated interactions.

Here, we conclude the **results section** in which we introduced the MLCMG model and explained the components. The rest of the report (Chapters 4 – 9) provides a background for each component referencing state-of-the-art literature.

4. Marine Governance Arrangements

The first component of the MLCMG model is Marine Governance Arrangements (MGAs). This chapter will define and explore the four dimensions of MGAs: Actors, Discourses, Rules of the Game and Power resources. Multiple MGAs together can form regime complexes.

4.1. Governance Arrangement and its four Dimensions

A governance arrangement refers to the way a policy domain is temporarily shaped in terms of substance and organization (Liefferink 2006; van Tatenhove 2013; Van Tatenhove, Arts, and Leroy 2000). A policy domain refers to a configuration of actors interacting to develop and

implement collective goals and measures. A policy domain can be linked to a particular governance level, but can also span multiple levels, e.g., fisheries activities within an MPA in Italian waters or decarbonization of shipping within Europe respectively. Substance refers to discourses, resulting in distinct policy and regulatory goals and objectives, whereas organization refers to the coalitions established by the actors involved, the rules of the game (instruments, procedures, division of tasks), and the available resources. There are thus four dimensions that structure governance arrangements: actors and their coalitions, resources, rules of the game, and discourses.

Actors and their coalitions are public and private actors, organization and agencies involved in the development and implementation of collective goals and measures within for example a marine regime complex. Actors can range from local to international governmental actors and from business to civil society groups. Such actors and coalitions can shape decision making processes, both in terms of process and content (discourses). Moreover, actors and coalitions can shape the implementation of both formal and informal norms and standards. Actors therefore span from those who regulate/govern to those who are regulated/ governed or affected by the decision-making processes within the governance arrangement (van Leeuwen 2010).

Power Resources refer to the unequal division of resources among these actors, which leads to differences in power and influence. Examples of resources are money, information, knowledge, or expertise, but also formal responsibilities. (Arts and van Tatenhove 2005) identify three types of power: relational power, dispositional power, and structural power. Relational power refers to actors' capability of achieving policy output through interactions. This could manifest through actors being able to achieve policy output or outcomes against the will of others. Dispositional power is the result of an actor being positioned vis-à-vis other actors through either the institutional structure (rules of the game) of a governance arrangement or because of an uneven distribution of power resources. Structural power refers to power based on a macro societal institutional structure that transcends the organizational level of a governance arrangement. This type of power thus comes from an asymmetric distribution of resources from structural orders of signification, legitimization and domination within society (Arts, Tatenhove, and Leroy 2000; Arts and van Tatenhove 2005).

Rules of the game in marine policies and politics refer to the formal rules and procedures in the different stages of the policy-making process (agenda setting, policy formulation, decision-making, implementation, enforcement and evaluation) and the informal rules and routines of interaction within marine practices and the relevant institutions of marine politics and policymaking (van Tatenhove 2022). However, rules of the game also refer to those regulatory framework and measures which have an impact on the norms, expectations, and the behavior of the relevant actors within the regulated issue area (Dingwerth and Pattberg 2006; Leeuwen 2010).

Discourses entail the norms and values, as well as the definitions of problems and approaches to solutions by the actors involved. A discourse is the specific ensemble of ideas, concepts and categorizations through which meaning is given to physical and social realities (Hajer 1995). Marine and maritime discourses refer to ideas about the character and definitions of problems related to marine ecosystems and/or defined by maritime sectors, their causes, and perceived solutions.

The four dimensions of governance arrangements can be studied individually and in relationship to each other (Van Tatenhove, Arts, and Leroy 2000). As Van Tatenhove Arts, and Leroy (2000) explain "*coalitions of governmental and non-governmental maritime actors try to influence activities and developments (in an anticipatory and reflexive way) within a specific*

maritime domain or sector" and in these interactions, "*actors negotiate, develop and design legitimate initiatives, institutions and solutions, based on specific discourses, the ability to mobilize and use resources to define the rules of the game on different levels*" (13). It is vital to study how these dimensions and their interaction change over time because they are only temporarily stable and in a continuous process of becoming (Van Leeuwen 2010).

4.2. Marine Governance Arrangements and Regime Complexes

To understand the role of nation states at sea in its multi-level, multiple actor, and multilayered institutional setting we build on the idea of a regime complex (Van Tatenhove 2016). A regime complex is "*an array of partially overlapping and non-hierarchical institutions governing a particular issue area*" (Raustiala and Victor 2004) and is thus closely linked to the concept of a MGA. A regime complex falls in the middle of a continuum running from fully integrated institutional arrangements at one extreme to highly fragmented collection of arrangements at the other (Keohane and Victor 2011).

Regime complexes emerge because of interdependencies between governance institutions of multiple governance arrangements that shape how a particular issue area is governed. It pays particular attention to how the governing institutions of a policy domain are interlinked to institutions of associated policy domains within the same issue area, that is in terms of economic, environmental, and social factors that together govern an issue (or sector) (see e.g., Alter and Raustiala 2018). Such interaction can also be multi-level in nature between governing institutions of different domains at different governance levels.

In the PERMAGOV project, we understand regime complexes as the institutional setting that hosts multiple MGAs which are associated with one or more EU GD target areas, including Maritime Transport, Marine Life, Marine Energy and Marine Plastics. The multi-layered institutional setting across policy domains shapes the interaction of actors within a MGAs and thus also its discourses, rules of the game, actor coalitions, available resources, and power relations.

5. Marine Governance Arrangement: Stability and Change

Marine governance arrangements change and innovate over time to adapt to environmental problems and adopted EU GD objectives. This chapter explores institutionalization, by referring the duality of structure and agency, and processes of structuration and stabilizations.

5.1. The Green Deal and Policy Change

The GD is an example of major policy change, with far reaching implications across a range of sector policies. The GD represents a case of "policy layering", as it comes in on top of a range of existing policies. It is also an orchestrating policy, that takes on a coordinating role with the goal of facilitating sustainability transformations across a range of policy domains.

The GD establishes a complex policy context which requires careful reflection about what is entailed with institutional barriers and enablers of public policy performance. From the perspective of the GD, prior policies and governance arrangements are important means to achievement of the objectives of the GD, for instance within the marine regime complexes that are in focus of the PERMAGOV project. However, these existing policies and governance arrangements may also be misfitted to the new policy context of the GD. In this perspective,

the ability to adapt governance arrangements becomes important. Conversely, the GD may constrain policy achievement in certain sectors, as it established new objectives and priorities. However, it may also support the achievement of sector policies to the extent that the objectives and priorities of the GD and sector policies are aligned.

5.2. Structure and Agency in Marine Governance Arrangements

The structure – agency question is a core theoretical issue in the social sciences. Agency refers to the abilities of actors of groups to influence or change their environment. Structure refers to the (institutional) context, which are the material and ideational conditions that define the range of actions available to actors (Arts and Van Tatenhove 2006). In the 1970s and 1980s, Anthony Giddens (1981) developed his structuration theory as a reaction to the dualism in the social sciences between structuralist theories and voluntarist/intentionalist theories. According to structuration theory, structures constrain and enable the activities and behavior of actors in social practices, but at the same time actors (re)produce structures in their actions and interactions. In the words of Giddens (1981) "*the duality of structure*" refers to the essentially recursive character of social life: the structural properties of social systems are both medium and outcome of the practices that constitute those systems.

The structure – agency debate consists of different positions. On the one hand there is the duality of structure, which assumes that structure and agency are mutually constitutive. On the other hand, there are theories that emphasize analytical dualism, which make a clear analytical distinction between structure and agency (McAnulla 2002; Arts and Van Tatenhove 2006).

The relation between structure and agency in marine governance arrangements can be described as follows. Governance arrangements change due to processes of political modernization as well as interactions in policy practices. Political modernization are structural transformation processes that result in specific structural orders of domination, signification, and legitimation. These processes affect the structural properties of governance arrangements (rules, resources, and discourses). Structural properties enable and constrain the collaborations and interactions between coalitions of actors within the marine governance arrangement. In interactions, as argued by Kooiman and Maarten (2005, 18), "*actors are continuously making changes to these structures while at the same time being subjected to their influence*". Thus, actors make use of rules, resources, and discourse to get things done, that is to improve performance. At the same time, actors reproduce the structural properties of these governance arrangements, opening space for change and innovation.

5.3. Structuration and Stabilization of Marine Governance Arrangements

Institutionalization is a core concept in the social sciences to understand the dynamics of stability and change in organizations, political systems, and societies in general (van Tatenhove 2022). In general, institutionalization is an ongoing process of patterning, preservation, construction, organization and deconstruction of day-to-day activities and interactions in institutions (van Tatenhove and Leroy 2000). Specifically, institutionalization is the process of production and reproduction of marine governance arrangements, in which public and private actors produce and reproduce the rules, resources and discourses in interactions within the context of long-term processes of societal and political transformation (also described as 'Political Modernization').

To understand change and stability, institutionalization consists of two processes; structuration and stabilization, which are a result of the interplay of agency and structure. Structuration is the gradual formation and production of structural properties (rules, resources, and discourses)

of a marine governance arrangement in interactions between actors. Stabilization refers to the process in which already formed marine governance arrangements constrain and enable the agency of involved actors, while actors also defend the existing governance arrangements based on their interests (van Tatenhove 2022; Arts and van Tatenhove 2006).

6. Change and Governance Capabilities of Actors

Actors within MGAs can change and innovate due to governance capabilities. In this chapter, we explain what governance capabilities are, what we mean with the capability approach, and how we understand the operationalization of governance capabilities in micro and meso institutional settings.

6.1. Agency of Actors in MGAs

Following our grounding in structuration theory, how and the extent to which marine governance arrangements change depends on the interplay between structure and agency. The latter often remains underspecified in theoretical terms, loosely defined as human action or the individual capacity to act independently, to be empirically observed. In the MLCMG framework, the notion of governance capabilities of actors is used to conceptualize agency of actors in marine governance. By actors, we refer to human actors, who can be individual people. However, the term will in most cases point to public and private organizations in the development and implementation of societal goals, who operate within a marine regime complex.

In defining governance capabilities, we combine the capability approach, as introduced by Nobel prize winner Amartya Sen (1999, 2005), embedded in development sociology and economics (Sen 1999; Robeyns 2017) with work within public administration scholarship (Termeer et a. 2015, 2016; Termeer and Dewulf, 2014; Candell et al. 2016) While the capability approach (as introduced by Sen (1999)) connects ability to performance, the notion by Termeer and colleagues provides a clear definition, and guidance to operationalization. According to Termeer et al. (2015, 683) governance capability is the "*ability of policy makers to observe wicked problems and to act accordingly, and the ability of the governance system to enable such observing and acting".*

The EU GD addresses the wicked problem of sustainable development. Wicked problems are "*Ill-defined, ambiguous, and contested, and featur[ing] multilayered interdependencies and complex social dynamics*" (Termeer et al. 2015; Head 2008). Termeer and colleagues argue that, due to the nature of wicked problems, there is no one single capability to observe, act and enable. Rather, policy makers will need to have or develop a set of capabilities. In their work on aquaculture governance, Toonen et al. (2021) have argued that governing capabilities are not just what policy makers do and can do but should refer to the abilities of the *range* of actors including industry, civil society, and supportive institutions like research organizations, that is the extent they (jointly) steer towards broader societal and environmental goals.

6.2. Governance Capabilities

Drawing on governance studies and public administration scholarship, Termeer et al. (2015: 2016) identified five capabilities to be crucial: (1) reflexivity, or the capacity to deal with multiple frames in society and policy; (2) resilience, or the capacity to flexibly adapt to frequently occurring and uncertain changes; (3) revitalization, or the capacity to unblock deadlocks and stagnations in policy processes; (4) rescaling, or the capacity to address

mismatches between the scale of a problem and the scale at which it is governed; and (5) responsiveness, or the capacity to respond wisely to changing agendas and public demand.

In operational terms, these abilities are expressed by skills, repertoires, capacities, commitments, and readiness of a policy actor (Termeer et al. 2015). Toonen et al. (2021) have operationalized governance capabilities in an indicator set, wherein each indicator consists of 3 aspects (linked to observing, acting, and enabling). We will use the indicator work by Toonen et al. (2021) as a starting point for linking the MLCMG model to WP5 of the PERMAGOV project.

In their work, Toonen et al. (2021) draw also on capability scholarship is particularly associated with development sociology and economics, (Sen 1999; Robeyns 2017) to capture how actors employ their abilities to achieve their goals. Sen (1999) introduced capability thinking to emphasize the significance of people's capability of achieving a life they have reason to value; an idea that forms the basis for "the capability approach" (Robeyns 2017). The capability approach is deemed to be open-ended and modulable, leading to different sub-approaches. However, two key concepts are non-optional: capability (the effective freedom or real opportunities one has) and functioning (the actual achievement - being or doing - one has reason to value). The latter is in the context of PERMAGOV the ability of a governing actor to achieve their specific societal and political goals related to realizing GD objectives.

The distinct conceptualization of functioning fits in well with PERMAGOV's objective to assess the performance of MGAs, which remains implicit in Termeer et al.'s (2016) work. When combined, the concept of (governance) capabilities highlights the extent to which one is able to be or do something, that is following Termeer and colleagues, to reflect, be resilient, revitalize, rescale, and be responsive (Termeer et al. (2015: 2016)). The concept of functioning refers to process performance and performance outcome - allowing for exploration of whether specific opportunities an actor has or develops (capabilities) are indicative of a changing performance (functioning) in a marine governance arrangement. For example, if an actor is well-able to communicate actively and to a targeted audience (part of its ability to respond wisely), change might be observed in collaborative dynamics within an arrangement (performance outcome). This is however not just dependent on the structural conditions and interactivity on arrangement level, but also on the governance capabilities of other actors (like receptibility as part of their ability to respond wisely).

6.3. Micro and Meso Levels and Governance Capabilities

Given the multi-layered nature of MGAs, the ability of actors to (jointly) achieve a specified goal can be conceptualized at micro, meso and macro levels (Willems and Baumert 2003, Trang 2023). Following Willems and Baumert (2003) and Robens (2017), we define micro as the level at which individuals (are able to) act in terms of skills, repertoires, capacities, commitments, and readiness. Willems stresses that these individuals often perform within their function/job and thus within an organizational environment which forms the meso institutional environment. Actors are not faceless organizations but are represented by individuals. However, in the understanding of Termeer and colleagues (Termeer et al. 2015; 2016; Candell et al. 20), the organizations themselves also have the capacity to perform, beyond individual action, representing a meso level set of governance capabilities (also in terms of observable skills, repertoires, capacities, commitments, and readiness). This meso level thus refers to the interactivity of joint efforts between public and private organizations which are generally identified by governance scholars as 'actors', working towards a specified goal based on their mission and specific position within the governance landscape. At the macro level, institutional

capacity refers to the ability held by networks of organizations that collectively work towards a common goal (Willems and Baumert 2003; Trang 2023).

In the PERMAGOV project, we focus on the micro and the meso levels for understanding and analyzing governance capabilities of actors. We leave out the macro-level for three main reasons. First, in Sen's (1999) take of the capability approach, capabilities are mostly conceptualized at the individual level (Sen 1999, Robeyns 2017). There is room for framing governance capabilities as a specific type of collective capabilities or group capabilities (Stewart 2005; Robeyns 2017), allowing a combination of governance capabilities and the capabilities approach. However, there is a clear warning from capability scholars against overstretching the concept and moving too far from the abilities of individual humans. Robeyns (2017) explains how We should "[...] *be clear when something is a social structure that is shaping our capabilities rather than a capability itself"* (Robeyns 2017, 117). Excluding the macro-level makes this distinction clearer, and it is also in line with structuration scholars like Archer, Hay and Jessop who argue for analytical dualism (McAnulla 2002; Arts and Van Tatenhove 2006; Archer 1996; see also Toonen 2013 and Toonen and van Tatenhove 2020).

The second argument is related to the choice for analytical dualism, in reference to the analytical distinction between structure and agency. Institutional barriers and collaboration dynamics which are other key components in the MLCMG model capture the (in-)capacity for change on a meso and macro level. As such, the MLCMG model as a whole acknowledges the interlinkages of the three different levels (as argued by Willems and Baumert (2003) and Trang (2023). The individual capability is constrained and enabled by meso and macro institutions, while capabilities on the meso level is dependent on macro-level institutions and trends, as well as action taken at the micro level (by individuals within the organizations).

Thirdly, focusing on micro- and meso-level puts governance capabilities close to human agency in empirical practice, which is of key importance to make the link between the MLCMG model and on-the-ground actions, which complements the co-design and testing of e-governance tools in WP6 of the PERMAGOV project.

7. Change and Institutional Attributes in Marine Governance

In this section we address institutional barriers in the context of policy change. We subsequently outline main drivers of institutional change, and forms of institutional change.

7.1. Institutional Barriers in the Context of Marine Policies

Oberlack (2017) provides a useful categorisation of key governance features, which he calls institutional attributes, that can give rise to institutional barriers. Oberlack (2017) defined institutional barriers as "*adverse manifestations of adaptation parameters which are attributed to particular properties of institutions*". As this definition makes clear, there is an inverse relationship between 'institutional adaptation' and 'institutional barrier'. This is notably the case with certain types of institutional barriers that limit the potential for adaptation, at least in the short term. Such types of barriers include path dependence (Rixen and Lora Anne 2015), institutional arthritis (Young 2010), and bounded rationality (Kyriazis and Metaxas 2010). However, the recognition of the institutional barriers may also catalyse institutional adaptation, as it motivates actors to invest in adaptation to enhance policy performance.

Many studies, including the Oberlack (2017) study, have reported on barriers to policy implementation in marine European contexts. However, the cumulative learning from this body of literature is impaired by terminological and conceptual diversity, and because the literature is dispersed across scientific fields and specialized journals.

Drawing on Oberlack's (2017) work, we developed a list of 11 institutional attributes, related barriers, and issues they may cause (see Table 1). A total of 82 articles were analyzed systematically in terms of the information they provide on up to three institutional barriers in a European marine and maritime context. This resulted in about 80 pages of structured contextualized information about 165 analyzed institutional barriers and their interlinkages, as well as a data base for integrated analysis (Deliverable 3.1).

From the analyzed articles, institutional barriers identified under the institutional attributes *Scale of Institutions* (H), *Development and Use of Knowledge* (G) and *Actor Contro*l (C) were most frequent. These barriers were frequently characterized by specific indicators. For instance, the indicator of fragmentation was very common to *Scale of Institutions*, and data fragmentation was common for *Development and Use of Knowledge*. Specific combinations of indicators were observed with a high frequency for these most prevalent types of barriers/attributes.

7.2. Drivers of Institutional Change

There are different drivers of institutional change, including (conflicting) ideas and discourse (Béland 2007), elite activity, trust, and power dynamics (Beunen and Patterson 2019, 18). Conflicting values, interests, and rules can be a catalyst for change by providing opportunities to challenge institutional arrangements (Tafon et al. 2023). Policy entrepreneurs and change agents are important motivators for action. While conflict is often ignored or depoliticized, contestation can sometimes offer actors possibilities to use their governance capabilities to enact change (Ibid). However, asymmetric power, knowledge, and influence impact actor's behavior in seeking institutional change. More power can translate into resisting change, or the advocacy of a preferred direction of institutional change.

There is a conceptual overlap between governance arrangements and drivers of institutional change. Actors in GA who have asymmetric power and resources, and who are bound by the rules of the game are partly enabled and constrained by the institutional structure, and partly contribute to their production and reproduction. It is in this structuration process that actors contribute to stability, maintenance, and institutional change (Hacker, Pierson, and Thelen 2015; Mahoney and Thelen 2010; van Tatenhove 2022).

7.3. Forms of Institutional Changes

Institutions change over time due to the interplay between actors and institutional structures. We see institutions "*as the formal and informal rules and norms that guide human and organizational behavior and that provide a degree of stability and predictability in social interactions*" (Beunen and Patterson 2019, 13). These new rules can come into place through institutional work, which are the "*actions through which actors create, maintain, or disrupt institutional structures*" (Ibid, 12) (Lawrence, Suddaby, and Leca 2009).

Scholars have focused on stability and radical change, meaning two ends of the spectrum of stabilization and structuration. Institutional stability is conceptually linked to "*path-dependence, reproduction, and inertia*" (Beunen and Patterson 2019, 14). According to Mahoney (2000, 507), path-dependence "*[C]haracterizes specifically those historical sequences in which contingent events set into motion institutional patterns or event chains that*

have deterministic properties." Path-dependency is linked to 'critical junctures', which assume a new direction in the institutional structure (Capoccia 2015). Mahoney (2000) reasoned that institutional reproduction occurs due to utilitarian, functional, power, and legitimation reasons (Capano 2019; Mahoney 2000). Radical change is often conceptualized through the approach of punctuated equilibrium, assuming periods of stability with sudden, rapid change (Baumgartner and Jones 2010). These rapid changes are a response to exogenous conditions.

Other scholars have focused instead on gradual institutional changes because of endogenous pressures. According to Mahoney and Thelen (2010, 8), institutional change occurs "*when problems of rule interpretation and enforcement open up space for actors to implement existing rules in a new way*". They see ambiguity as a permanent feature of rules interpretation. Thus, institutional rules and their interpretation are open to change.

Mahoney and Thelen (2010, 15-18) distinguish four forms of institutional change: displacement (removal of existing rules and the introduction of new ones), layering (introduction of new rules on top of or alongside existing ones), drift (the changes impact of existing rules due to shifts in the environment), and conversion (the changed enactment of existing rules due to their strategic redeployment). Displacement and layering take place frontstage.

Layering is associated with incremental changes and involves "*the grafting of new elements onto an otherwise stable institutional framework. Such amendments can alter the overall trajectory of an institution's development*" (Thelen 2004, 35). Capano (2019, 59) emphasizes the need to identify types and outputs of layering. This means that we need to specify what is layered (e.g., the adding of new actors, new instruments, or new arrangements to policymaking), and with what outcome (stability or change). While layering tends to be associated with change, Capano (2019, 593) explains how policymakers can add "*something new*" to the existing institutional arrangement, not only to pursue change but also specifically to maintain equilibrium in terms of political legitimation or effectiveness in delivering the expected policy results. Capano (2019) also advocates for clarity around layering as an institutional and/or policy change.

Drift and conversion are neglected modes of change (Hacker, Pierson, and Thelen 2015). In both instances, the formal rules embodied in institutions remain constant but either the outcomes of these rules (drift) or the ways in which they are interpreted and used (conversion) change in politically consequential ways. This means that, "[D]rift occurs when institutions or policies are deliberately held in place while their context shifts in ways that alter their effects" (Hacker, Pierson, and Thelen 2015, 180). Conversion "*occurs when political actors are able to redirect institutions or policies toward purposes beyond their original intent*" (Ibid). It involves the "*transformation of an already-existing institution or policy through its authoritative redirection, reinterpretation, or reappropriation*" (Ibid, 185). In the case of drift, the trigger for change is context discontinuity, while in the case of conversion, the trigger is actor discontinuity. Drift and conversion take place when it is difficult to change formal rules.

Directions of institutional change can be conservative, dynamic, transformative, or radical. There is a difference between actors' intentions for change, and their outcomes, which might be less progressive. Moreover, not all institutional change is intentional – some changes emerge due to a combination of endogenous and exogeneous factors.

8. Change and Collaborative Marine Governance

In this chapter, we will provide an overview of what collaborative governance is, its dimensions, characteristics, functions, and challenges. Then we compare the concept of collaborative governance from other relevant concepts, including e-governance, network governance, new public governance, co-creation, and collaborative innovation.

8.1. Collaborative Governance

Collaborative governance could be defined in a narrow and a diffuse. A narrow definition of collaborative governance "*implies processes and actions driven by government (agencies) that involve non-governmental organizations in a specific stage of the policy-process with the aim of achieving a pre-determined public policy objective – where each of these categories are filled with substantive content"* way (Batory and Svensson 2019, 30). Diffuse notions of collaborative governance are less restrictive regarding its analytical dimensions (Ibid). For this report, we apply a narrow definition, given the role of non-state actors in addition to government agencies in marine governance arrangements in Europe, as well as the specific policy innovations accelerated by the pre-determined targets of the EU GD.

There are multiple functions of collaborative governance. Emerson and Murchie (2011, 2) explain how stakeholders "*will be able to share their diverse interests, become better informed, and become more invested in mutually beneficial joint solutions*". Anticipated benefits are made explicit in the process or are implicit to the process and structure.

8.2. Dimensions of Collaborative Governance

Scholars use different analytical dimensions to conceptualize collaborative governance. Based on a literature review of 700 articles on the topic of collaborative governance, Batory and Svensson distinguish 5 key analytical dimensions (Batory and Svensson 2019):

1. A collaboration that brings together governmental and non-governmental actors. Alternatively, public actors take the roles of leaders, encouragers, followers, or network brokers (Koontz et al. 2004; Scott and Thomas 2017).
2. Public actors either initiate the collaborative process or oversee it.
3. Collaborative governance conceptualized as (a) multi-organizational process (restricted to organized interests, and public bodies, or (b) a broad public involvement of citizens.
4. Scope of collaboration: durability (permanent versus task-oriented) within the policy process (policy design, decision-making, service delivery).
5. Normative assumptions: objective of collaboration is open versus collaboration is undertaken with a public purpose.

These five analytical dimensions are useful for the PERMAGOV project because they draw attention to the bridging function of collaboration between public and private actors, with a specific scope and normative assumptions.

At the same time, the review of Batory and Svensson (2019) does not specify place (where these collaborations take place, formal or informal settings), external conditions that incentivize or drive collaboration dynamics, nor does it fully take notice of the governance capabilities of non-state actors in a collaboration. Moreover, the practice of information sharing (including through digital platforms), the complexity of collaboration across different institutional levels and cross-sectors and on transboundary issues, and processes of

accountability, trust-building, and internal and external legitimacy necessitate more detailed attention if we want to understand all the factors that affect the performance of collaboration dynamics.

In this report, we apply the dimensions as set forth in the framework of Emerson, Nabatchi, and Balogh (2012). This framework takes stock of the system context (external conditions) and drivers (factors accelerating collaboration), the collaborative dynamics between actors, and the collaborative outcomes. Giving duly notice to each of these dimensions is helpful for understanding how collaborative governance regimes function, and how changes in one or more dimensions contribute to the outcomes of marine governance. Let us now look at these dimensions in more detail.

The system context involves the external conditions in which collaboration dynamics unfold. These conditions (may) present themselves before, during, and after a collaborative process. Potential conditions in the case of EU GD implementation include policy frameworks that preceded the GD, and unsustainable human pressures on marine environments. According to Emerson, Nabatchi, and Balogh (2012, 8) "*This external system context creates opportunities and constraints and influences the general parameters within which a CGR unfolds*". In turn, the collaborative governance regime can also affect the system context through its collaborative outcomes (Ibid).

Drivers are essential, in a sense that without them, the collaborative process between the actors would not have begun. Emerson identifies four types of drivers: leadership, consequential incentives, interdependence, and uncertainty (Emerson, Nabatchi, and Balogh 2012, 9–10). In the case of the EU GD, drivers involve prominent EU leaders who have advocated for a coordinated European effort (e.g., President of the European Commission Ursula von der Leyen). Consequential incentives might involve problems with energy security, which the war in Ukraine has further exacerbated.

Both state and non-state actors can participate in collaborative governance regimes. Actors that are relevant to the PERMAGOV project are policymakers (national, regional, and supranational), and end-users (industry and NGOs) and their respective members and/or networks. These actors perform their activities on different institutional levels and across different economic sectors and policy landscapes. Combining both the multi-level and cross-sectoral dimensions of collaborative governance, we utilize the concept of multi-layered collaborative governance in this report.

Collaboration dynamics can be analyzed through three components:

- *principled engagement* (interactions between actors aiming to define targets, deliberations about the targets/objectives and determinations of objectives in processes of joint decision-making).
- *shared motivations* (the relational component of collaboration consisting of social capital, trust, mutual understanding, shared commitment, and internal legitimacy).
- *capacity for joint action* (functional component of collaboration dynamics set of cross-functional elements to create the potential for taking efficient actions through establishing procedural and institutional arrangements, leadership, knowledge, and resources).

The process of collaborative dynamics results in a (purposeful) outcome. Emerson, Nabatchi, and Balogh (2012) differentiate between actions, impacts, and adaptation. Depending on

context and charge, actions can include securing endorsements for a policy change, marshalling resources to implement GD targets, and enacting new management practices that benefit the green transition. These actions have potential impacts on the collaboration dynamics and alter the system context. For instance, new management practices might benefit resource conditions of a country or region and improve levels of trust between public and private sectors.

Taken together, collaborative governance regimes are vibrant formations that involve collaboration dynamics and lead to actions, outcomes, and adaptation (Emerson and Nabatchi 2015).

8.3. Interactions in Collaborative Governance

Much of the scholarship presents an "*idealized picture of the problem-solving and legitimacy-enhancing qualities of participatory and collaborative practices*" (Batory and Svensson 2019, 30). To further substantiate this (or provide more nuance to this assumption), scholars have studied conditions (both preceding and during collaboration dynamics) that would improve stakeholder engagement (for example, Avoyan 2022). Others identify dimensions of structural complexity that affect actor's agency in collaborative governance regimes (Huxham 2000).

Interactions between actors and coalitions in collaborative dynamics are influenced by asymmetries in power, knowledge, and resources (Ansell and Gash 2008). Potential issues that can arise from collaborative governance is the cooption of weaker participants. Stakeholder engagement can be improved by ensuring the principles of inclusivity, justice and equity, and co-production. Dobbin et al. distinguish 5 potential factors that influence the integration of equity into collaborative governance (Dobbin et al. 2023):

- Collaboration.
- Representation. Some actors are not included, increased representation to increase equity outputs.
- Elite capture. Having a voice does not necessary equate to influence. Actors with concentrated interests may capture the policy agenda. Expect elite capture by organizational interests to be associated with reduced equity.
- Stakeholder engagement. Meaningful engagement where input is not only solicited, but also addressed, to increase equity in collaborative governance.
- Problem severity/salience. Increasing problem severity and salience regarding equity challenges tied to natural resources management will positively influence equity in collaborative governance outputs.

Noticeably, achieving procedural equity in the collaborative process will not necessarily translate into equitable outcomes. This means that the green transition is only successful if both the collaborative process and the outcomes benefits all involved partners (these benefits will be different for each stakeholder corresponding to their interests, norms, and values).

8.4. Performance and Collaborative Governance

Collaborative governance is purpose driven. That means, that actors engage in collaborative governance because of necessity and because they anticipate benefits from working together. Process benefits could be social learning, the creation of trust, and the development of public values. In terms of outcomes, outputs could include formal decisions, concrete plans, or measures. Impact involves an alteration to conditions in the system context, for example, when there is a more coherent and effective approach to implementing GD objectives. The

manifestation of anticipated benefits can be explained as the performance of a collaborative governance regime. Scholars have studied approaches and causal mechanisms that improve the performance of collaborative governance regimes. In this section, we provide a brief overview of these approaches, the units of analysis, and the conceptual thinking behind these performance assessment frameworks.

The value of collaborative governance is disputed. Gerlak, Heikkila, and Lubell (2012, 414) discuss both proponents and opponents of collaborative governance. Argumentation is often linked to the performance of collaborative governance regimes "*to solve increasingly complex and uncertain environmental challenges*". Noticeably, as Ostrom (2007) emphasized, collaborative governance is not a panacea. Gerlak, Heikkila, and Lubell (2012, 414) draw attention to the lack of (or insufficient) data and evidence on the outcomes of collaborative governance regimes.

Conceptual thinking about performance focuses on the process of collaboration, the collaborative outcome, or the causal mechanism between process and outcome. Avoyan, Tatenhove, and Toonen (2017) distinguish between process and productivity performance. Noticeably, the creation of trust is part of the process and a cumulative effort and thus a productive outcome.

The productiveness of collaboration dynamics (process) fluctuates over time. Depending on the context, actors can increase their participation and integration in a collaborative governance regime over time, take breaks from the interaction, reorganize themselves and restart, or withdraw from the collaboration (Avoyan 2022; Heikkila and Gerlak 2016; Imperial et al. 2016; Ulibarri et al. 2020; Scott, Ulibarri, and Scott 2020).

Governance capabilities of actors influence individual organization's ability to participate in governance arrangements. These capabilities also affect actor's performance in CGRs. A history of conflict and competition also affects the interaction between actors in CGRs.

Emerson and Nabatchi (2015, 720) measure the performance of collaborative governance regimes by studying three levels, namely actions, outcomes, and adaptations. This approach favors a "*summative evaluation approach, which assesses performance at the end of an operating cycle*" (Emerson and Nabatchi 2015, 720). They take three units of analysis, namely participant organizations, the collaborative governance regime, and the target goals.

Newig et al. (2018) present causal mechanisms that relate participation with outputs and outcomes. In their article, they focus on participatory public decision-making, not on collaborative governance in the strictest sense (collaboration out of necessity, not of choice). Despite this analytical difference, the causal mechanisms that Newig et al. describes are useful because they link the process of working together with outputs and outcomes. The mechanisms involve the:

- Opening up of decision making to environmental concerns.
- Incorporation of environmentally relevant knowledge.
- Group interaction, learning, and mutual benefits.
- Acceptance and conflict resolution for implementation.
- Capacity building for implementation and compliance.

Each of these mechanisms has specific conditioning variables. Newig et al. (2018) also explain how context matters for causal mechanisms.

In addition to performance indicators, Douglas and Ansell (2021) draw attention to performance routines to jointly collect and review performance information. These performance routines depend on the level of partnership integration. They distinguish three units of analysis that present low to high partnership integration: an actor-centric performance regime, a network-centric regime, and a hybrid performance regime. On the vertical axis, Douglas and Ansell (2021) measure and categorize actors in performance regimes, performance goals, performance information, performance assessment, and performance actions. In the case of an actor-centric performance regime, actors only work cooperatively when they are not able to achieve it on their own, and they maintain separate goals, collect their own information, pursue their own performance review, and lessons from the review are translated into actions for themselves. In comparison, the network-centric performance regime is founded on collaborative routines, shared cross-cutting goals, regular joint information collection, joint performance reviews, and lessons from the review are collectively translated to changes that all other actors take up in their practice. Notably, Douglas and Ansell (2021) recognize that most collaborative governance regimes have a mixture of these partnership integrations in place.

8.5. Collaborative Governance and Governance Arrangement

Collaborative governance exists of multiple dimensions: system context, drivers, collaborative dynamics (that is, principled engagement, shared motivation, and capacity for joint action), and collaborative outcomes (that is, outputs, impacts, and adaptation). Moreover, we have identified the four dimensions of governance arrangements. Next, we need to understand how these dimensions are linked.

In collaborative governance arrangements, collaborations are the result of dynamic interactions between actors (within coalitions). In collaborative interactions, actors mobilize resources and use discourses and rules to have power over the process and content of decision making and implementation of rules systems that provide collective responses to marine issues such as plastic pollution, loss of biodiversity, or expanding renewable energy capacity. Collaborative governance therefore takes place within a governance arrangement. The four dimensions of a governance arrangement shape the interactions and collaborations between actors and therefore also the collaborative outcomes. A governance arrangement therefore resembles what Avoyan refers to as a Collaborative Governance Regime (CGR), which she understands as "*an institution designed for collective decision-making that has a public policy or service orientation, incorporates autonomous organizations representing different interests, has procedural norms and rules, and experiences repeated interactions*" (Avoyan 2022, 16-17; based on Emerson and Nabatchi 2015). Collaborations within the CGR lead to actions/outputs, outcomes, and adaptation.

First and foremost, rules of the game within a governance arrangement define the contextual condition of collaboration, most notably the institutional setting. It is through this institutional setting (the rules of the game and the distribution of resources) that process conditions such as leadership, trust building, face-to-face dialogue, and collaborative dynamics are shaped. However, it is not the institutional context alone, but it is through the dynamic between rules of the game and the other governance arrangement dimensions of actors and coalition, resources and power relations, and discourses that process conditions and collaborative dynamics are being formed. Collaborative governance conditions and dynamics such as trust, leadership, shared motivation, commitment, and capacity for joint action are thus an outcome of the interactions between actors within a governance arrangement which are shaped by the rules of the game, power resources and discourses.

What the literature and concepts of collaborative governance thus add to the conceptualization of a governance arrangement is the different types of outcomes that emerge from the dynamic interplay between dimensions and the resulting interactions between actors. Outcomes here then include:

- The contextual condition of facilitative leadership, but also changes in the institutional design resulting from interaction between actors that redefine rules of the game of the governance arrangement.
- Process conditions such as trust and the process through which trust is build, dialogue, shared understanding – which is also strongly related to discourses of actors, commitment, and intermediate outcomes.
- Collaborative dynamics of principles engagement and interaction to define targets and objective, of shared motivation through developing social capital, trust, mutual understanding and input, throughput, and output legitimacy, and for capacity for joint action by decision making through establishing procedural and institutional arrangements, leadership, knowledge, and resources.

8.6. Clarify Collaborative Governance from Other Governance Concepts

Governance approaches that bring together actor groups, organizations, sectors, and levels of administration are a response to the increasingly complex societal problems and the ever more fragmented institutional systems (Carlsson and Sandström 2008; Röiseland 2011; Lubell 2013; Bodin 2017). Problems extend over time, space, scale, and administrative jurisdictions, and are dealt with by a multiplicity of actors and institutions, each viewing them from a distinct perspective. The hierarchical administrative structures do not match this complexity, and instead, networking and collaboration between public, private and civil society actors and organizations is needed, to share knowledge, expertise, and resources, and to deliberate values and interests (McQuaid 2010; Provan and Kenis 2008; Bodin 2017).

The paradigm of New Public Governance (NPG) denotes a systemic reform of the public sector towards inter-organizational modes of policy making and public service delivery (Osborne 2006, 2010a; 2010b; Dickinson 2016). For NPG, societal complexity and fragmentation is the main challenge of policy making, implementation, and the effectiveness of services, and interactive forms of governance the main response to this challenge (Torfing et al. 2012; Sörensen and Torfing 2012). On the one hand, NPG is seen as a reaction to the impotence of the top-down public administration relying on laws, rules, and guidelines to solve problems in the complex world. On the other hand, it is a counteraction to the New Public Management (NPG) that deploys business principles and management techniques, and the use of private enterprises to implement public policy (Osborne 2010a; 2010b; Osborne 2006; Dickinson 2016; Klijn 2012; Sörensen and Torfing 2012). NPG builds upon a ‘plural state’ in which various interdependent actors contribute to the delivery of public services and a ‘pluralist state’ in which various processes inform the policy making system (Osborne 2010a; 2010b). Thus, NPG considers organizations in their environment and addresses the factors that enable and constrain public policy making and implementation (Osborne 2010a). It focuses on relationships between organizations and the governance of processes, stressing the development of lasting relationships based on trust, relational capital, and relational contracts (Osborne 2006, 2010a: 2010b).

NPG is considered an umbrella term for a variety of approaches in which governments interact with private and civil society actors to enhance the legitimacy and efficacy of decisions, for

example collaborative governance (CG), network governance (NG), and co-creation of public value (Torfing and Sørensen 2012; Sørensen et al. 2021). Governance is conceptually based on collaboration whereas typologically it can be depicted as networks (Wang and Ran 2023). Thus, the concepts relating to cross-boundary collaboration tend to overlap and are often interchangeably used. The variably defined term 'governance', *per se*, is often understood as policy making that instead of relying on the conventional top-down governing by government builds on interaction across administrative levels, areas, sectors, and stakeholder groups (Rhodes 1996; Kooiman 2003; Klijn 2010; Bevir 2012). Approaches such as CG, NG, or co-creation imply a specific dimension or function of governance.

As elaborated in section 8.1, CG refers to processes and structures involving public, private, and civil society actors to carry out a public purpose that could not be otherwise accomplished (Emerson et al. 2012; Emerson and Ahn 2021, 62). Similarly, the definitions of NG relate to the coordination of reciprocal relationships and exchange between autonomous organizations that work together to achieve a collective goal (Jones et al. 1997; Wachhaus 2011; Provan and Kenis 2008). Both CG and NG are based on collective action and inclusive decision-making, and highlight principles such as trust, power-sharing, diversity, consensus, inclusiveness, deliberation, and equality (Provan and Kenis 2008; Emerson et al. 2012; Wang and Ran 2023). Tensions and contradiction between actors characterize both CG and NG and require mediating, moderating, and understanding the influencing factors (Wang and Ran 2023). However, the approaches differ in their theoretical foundations. Whereas CG stems from deliberative democracy and the concern for participation of civil society in public governance, the origins of NG are in corporatism, state theory, policy network, co-implementation, and co-delivery of services (Wang and Ran 2023). Literature review conducted by Wang and Ran (2023) indicates that CG is a process concept that focuses on sharing (information, knowledge, power, belief, identity, visions, and motivations), deliberation and dialogue, joint efforts, and institutional design. NG, in contrast, is more linked to structural elements such as network properties (e.g., structure, size, diversity, centrality, relationships), network development (formation, dynamics, evolution, stability), and network management (Ibid).

'Co-creation' refers to a process in which interdependent actors engage in dispersed, cross-boundary collaboration to define common problems and to develop and implement new and better solutions (Sørensen, Bryson, and Crosby 2021). It is interested in the potential of stakeholders and citizens to contribute to the innovation of public policies and services (Sørensen, Bryson, and Crosby 2021). The related concept 'collaborative innovation' elaborated by Sørensen and Torfing (2011; 2012) and Torfing (2019) incorporates the idea of combining the contribution of public, private, and civil society actors to enhance innovation in the public sector. NPG is considered to pave way for an era of collaborative innovation in the public sector (Torfing and Sørensen 2012). Thus, in addition that NPG entails the idea of governance that balances the roles, responsibilities, accountabilities, and capabilities of administrative levels, actors, and sectors, it is also considered a favorable paradigm for innovation. Collaborative innovation is based on the argument that "*multi-actor collaboration ensures that public innovation draws upon and brings into play all relevant innovation assets in terms of knowledge, imagination, creativity, courage, resources, transformative capacities and political authority*" (Torfing and Sørensen 2012).

9. Change and Marine E-governance

This chapter addresses the digital turn within environmental governance in the EU. We discuss the emerging role of information and communication technology in governance, and the advent

of e-governance. We then present a marine e-governance typology to hypothesize about the diverse functionalities of digital tools which actors in MGAs can use to change and innovate.

9.1. The Digital Turn within (Environmental) Governance in the EU

Rising attention on combining green and digital transitions, internationally and within the EU, has led to the increased use of e-governance solutions such as geoportals, artificial intelligence, blockchain, the internet of things and cloud computing. These developments are predominantly positively framed as a way of improving environmental decision-making (Bakker and Ritts 2018) and facilitating more inclusive and sustainable growth (Barteková and Börkey 2022). It is indicated that "[*g]overnments, international organizations, and technology companies have high hopes that digital technologies can be deployed to address grand environmental challenges, such as climate change, biodiversity loss, and resource depletion*" (Kloppenburg et al. 2022, 232).

While there is (still) limited to no evidence of transformative impacts through e-governance, there are many examples of digital tools that support and foster decision-making processes. In the EU, the European Marine Observation and Data network (EMODnet) provides infrastructure for monitoring in coastal and offshore waters, and the Union Maritime Information and Exchange System (SafeSeaNet) facilitates efficient maritime transport and supports pollution preparedness. Also, given the EU's digital leadership ambitions (European Commission, 2020), it is expected that e-governance will (continue to) impact existing and future collaborative marine governance arrangements in Europe. The extent to which digitalization is or will become the key determinant of environmental transitions in the marine realm remains however an open question.

9.2. From E-government to (Marine) E-governance

The emerging role of information and communication technology (ICT) in governance processes dates to the early 1990s. Governments started to employ novel ICT opportunities to upgrade public administration and services, and to support democratic processes. 'E-participation' and 'e-voting' were examples of new forms of 'e-government' (Bannister and Connolly 2012). Also, public, and private actors alike started to rely heavily on e-mail and other applications to reorganize internal and external processes of communication and collaborations. Today's era is dubbed 'information age' (Castells, 2010; Mol, 2008) reflecting the profound impact of digital information processes on socio-cultural, economic, and political processes, including environmental governance. At the same time, the term 'e-government' has now been replaced by 'e-governance' or 'digital governance', in line with the trend of the 'new' private and societal actors entering the public arena of environmental governance (see section 3.1).

The difference between e-government and e-governance is also to be understood as a different degree of change that can attributed to digitalization. For Bannister and Connolly (2012), e-government refers to the use of ICT in and by organizations, providing communication channels and management platforms to facilitate organizational processes (see also Grant and Chau 2005 Carter, Yoon, and Liu 2022). Conversely, e-governance has been defined as "*the use of ICT […] in ways that lead to genuinely different structures or processes a consequence of which may be the greater effectuation of or changes in norms and public values*" (Bannister and Connolly 2012, 220). Following this distinction (Bannister and Connolly (2012), digitalization of, for example, a permitting process related to coastal planning is not e-governance, but just a way of making a process more efficient, and information sharing easier. Instead, adding an automatic data processing system to support planning decisions would more

drastically change the process, as this could limit human decision-makers from bending or adjusting rules, because it draws on a different set of expertise and skills needed to participate in or even to coordinate the process. An example of the latter is that with the rise of digital sustainability assurance in aquaculture value chains a new set of lead actors comes along, specifically non-chain actors like tech companies and NGOs pushing for digital solutions, as they control digital data flows within the value chain (Kruk, Toonen, and Bus 2023). Thus, the characteristic inherent to e-governance is that it changes the underlying mode of governance (Bannister and Connolly 2012), yet the question still is to what extent this change leads to improved governance performance for more inclusivity and sustainability in general, and for delivering GD objectives in particular.

In the PERMAGOV project, we use 'marine e-governance' to refer to the development and application of digital processes or technologies aimed at improving the governance and/or management of marine activities and resources, including within and across sectors and governance levels. Emphasis is on understanding and assessing both the promises as well as potential challenges of digital tools in the way they support institutional levers, hence help to overcome institutional barriers, and to the extent to which they affect collaborative dynamics. Moreover, the ability of actors to (jointly) achieve their objectives (see Chapter 6), like goals related to the GD can be strengthened or weakened (or both) by digital tools. As such, marine e-governance is at the core of the MLCMG model (see figure 1).

9.3. Marine e-governance typology

While its impact on the performance of a marine governance arrangement is mainly understood through the interplay with the three other components, the inherent characteristics of digital tools will be captured by using the typology by Kloppenburg et al. (2022). These authors defined three ways in which (marine) e-governance solutions can shape environmental governance, by supporting (and/or steering) actors 1. in seeing and knowing; 2. in participation and engagement; and/or 3. in interventions and actions.

By supporting actors in their 'seeing and knowing', e-governance solutions have the potential to make visible, often in real-time, resource use and user location, use rule infractions, and environmental health monitoring data, and the connections between these components. This may potentially reveal new insights, including hitherto unseen trends and can help build future use scenarios. These technologies may also enhance trust and transparency by making the data underpinning governance actions more accessible and transparent. They may also bring new actors into governance arrangements by making them and their data more visible. Conversely, seeing and knowing types of e-governance solutions may negatively impact collaborative arrangements by narrowly defining governance problems to what is knowable through these digital technologies (Kloppenburg et al. 2022), creating inclusion barriers for actors whose interests cannot be easily captured within visual data (e.g., intangible cultural heritage), or those without the resources or incentive to digitize their data.

The potential of digital tools to enhance 'engagement and participation' refers to strengthening the capacity of a wide range of actors to participate in and contribute to decision-making. According to Kloppenburg et al. (2022, 235), "*One of the promises of digitalized environmental governance is that it opens up new possibilities for participation in governance practices and processes across all these levels, with an assumption that this in turn would enhance the democratic character of governance.*" Using app-solutions also tends to support two-way communication, for example when citizens report on pollution or disturbance mills via an app and receive feedback on whether others also filed a complaint, and how the complaints were handled (Solman, Kirkegaard, and Kloppenburg 2023). However, since technology companies

and digital conglomerates often act as "*novel intermediaries and brokers*" (Bernards et al. 2020, 528), power balance does not automatically play out in favor of social groups whose participation should be enhanced.

Next to seeing and knowing, and engaging and participating, Kloppenburg et al. (2022) recognize the potential to 'intervene and act': "*Finally, a key promise of digital technologies is that they collect and process data to automate and optimize decision-making processes and interventions. This includes new possibilities for automating compliance and for reorienting the decision-making of actors (*from individuals to governments*) toward improving sustainability*" (Kloppenburg et al. 2022, 237). Digital twins are prime examples of automated decision-making systems. The European Digital Twin Ocean reflects the EU's ambition to move towards an innovative, integrated set of tools, that makes knowledge available, facilitates exchange and discussion, but also uses input in and feedback to the system to calculate and detect patterns, and to simulate and test solutions. Automated systems have huge benefits in terms of optimization and efficiency due to the scale and speed at which they operate. However, Kloppenburg et al. (2022, 238) warn that digital technologies have specific built-in properties and are designed with specific questions or goals in mind, meaning that "*the anticipation (or glimpse of an alternative reality or world) offered by a digital twin is thus fundamentally dependent on certain normative choices and knowledge paradigms that gear it toward certain goals and interests*".

While discussed separately here, taking the three categories together provides insight in the impact of marine e-governance. Davret, Trouillet and Toonen (2024) applied Kloppenburg et al.'s (2022, 11) typology, to build an understanding of what the diverse functionalities of digital geoportals 'do' (or can do) in processes of Marine Spatial Planning. They show that geoportals may work in all three dimensions, but primarily function as 'digital catalogs', allowing users to see and know data and information important in MSP. Many portals do not include functionalities that allow for participation and engagement, and/or intervention and action, which according to the authors "*reflects the 'illusion of participation'* [in MSP] *and does not lead to any meaningful advancement in public engagement*" (Ibid, 11). It is expected that different digital tools, developed for and used in the diverse marine governance arrangements, will show different impacts, positively or negatively. PERMAGOV will study and assess the development and use of digital technologies in the different case studies, linked to the four marine regime complexes.

10. Conclusion

The MLCMG model, as presented in this report, is a significant advancement in understanding and implementing the GD's objectives in marine governance. Developed based on various social scientific theories, the model offers a framework to analyze the complexities of marine governance, including institutional attributes, collaboration dynamics, and governance capabilities of state and non-state actors. The MLCMG model also highlights the growing importance of e-governance in enhancing governance capabilities.

The model serves as an evaluative tool for examining changes and innovations of multi-layered MGAs and their performances. The MLCMG model can be used to assess the current state of MGAs progress towards the EU GD, and as a springboard for the creation of new governance strategies. In summary, this model reiterates the need for a transformative, collaborative approach in marine governance.

Bibliography

Alter, Karen J., and Kal Raustiala. "The rise of international regime complexity." *Annual Review of Law and Social Science* 14 (2018): 329-349.

Ansell, Chris, and Alison Gash. "Collaborative governance in theory and practice." *Journal of public administration research and theory* 18, no. 4 (2008): 543-571.

Agrawal, Arun. "Common property institutions and sustainable governance of resources." *World development* 29, no. 10 (2001): 1649-1672. https://doi.org/10.1016/S0305-750X(01)00063-8.

Archer, M.S. (1996), Realist social theory: the morphogenetic approach, Cambridge University Press, Cambridge.

Arts, Bas, and Jan Van Tatenhove. "Policy and power: A conceptual framework between the 'old'and 'new'policy idioms." *Policy sciences* 37 (2005): 339-356. https://doi.org/10.1007/s11077-005-0156-9.

Arts, Bas, Pieter Leroy, and Jan Van Tatenhove. "Political modernisation and policy arrangements: a framework for understanding environmental policy change." *Public organization review* 6 (2006): 93-106.

Arts, Bas, and Jan Van Tatenhove. "Political modernisation." In *Institutional dynamics in environmental governance*, 21-43. Dordrecht: Springer Netherlands, 2006.

Avoyan, Emma. "Inside the black box of collaboration: A process-tracing study of collaborative flood risk governance in the Netherlands." *Journal of Environmental Policy & Planning* 24, no. 2 (2022): 227-241.

Avoyan, Emma, Jan van Tatenhove, and Hilde Toonen. "The performance of the Black Sea Commission as a collaborative governance regime." *Marine Policy* 81 (2017): 285-292.

Avoyan, Emma. *Understanding the Performance of Collaborative Governance: An Analysis of Conditions for Successful Collaboration in Dutch Flood Risk Management*. PhD thesis, (2022), Nijmegen.

Bakker, Karen, and Max Ritts. "Smart Earth: A meta-review and implications for environmental governance." *Global environmental change* 52 (2018): 201-211. https://doi.org/10.1016/j.gloenvcha.2018.07.011.

Bannister, Frank, and Regina Connolly. "Forward to the past: Lessons for the future of e-government from the story so far." *Information Polity* 17, no. 3-4 (2012): 211-226.

Barteková, Eva, and Peter Börkey. "Digitalisation for the transition to a resource efficient and circular economy." (2022). https://doi.org/10.1787/6f6d18e7-en.

Batory, Agnes, and Sara Svensson. "The fuzzy concept of collaborative governance: A systematic review of the state of the art." *Central European Journal of Public Policy* 13, no. 2 (2019): 28-39.

Baumgartner, Frank R., and Bryan D. Jones. *Agendas and instability in American politics*. University of Chicago Press, 2010.

Bernards, Nick, Malcolm Campbell-Verduyn, Daivi Rodima-Taylor, Jerome Duberry, Quinn DuPont, Andreas Dimmelmeier, Moritz Huetten, Laura C. Mahrenbach, Tony Porter, and Bernhard Reinsberg. "Interrogating technology-led experiments in sustainability governance." *Global Policy* 11, no. 4 (2020): 523-531.

Béland, Daniel. "Ideas and institutional change in social security: Conversion, layering, and policy drift." *Social science quarterly* 88, no. 1 (2007): 20-38.

Beunen, Raoul, and James J. Patterson. "Analysing institutional change in environmental governance: Exploring the concept of 'institutional work'." *Journal of Environmental Planning and Management* 62, no. 1 (2019): 12-29.

Bevir, Mark. *Governance: A very short introduction*. OUP Oxford, 2012.

Bodin, Örjan. "Collaborative environmental governance: Achieving collective action in social-ecological systems." *Science* 357, no. 6352 (2017): eaan1114.

Candel, Jeroen JL, Gerard E. Breeman, and Catrien JAM Termeer. "The European Commission's ability to deal with wicked problems: an in-depth case study of the governance of food security." *Journal of European Public Policy* 23, no. 6 (2016): 789-813.

Capano, Giliberto. "Reconceptualizing layering—From mode of institutional change to mode of institutional design: Types and outputs." *Public Administration* 97, no. 3 (2019): 590-604.

Capoccia, Giovanni. "Critical junctures and institutional change." *Advances in comparative-historical analysis* 147 (2015): 147-179.

Carlsson, Lars, and Annica Sandström. "Network governance of the commons." *International journal of the commons* 2, no. 1 (2008): 33-54.

Carter, Caitríona, and Andy Smith. "Revitalizing public policy approaches to the EU:'territorial institutionalism', fisheries and wine." *Journal of european public policy* 15, no. 2 (2008): 263-281.

Carter, Caitríona, and Romain Pasquier. "The europeanization of regions as 'spaces for politics': A research agenda." *Regional & Federal Studies* 20, no. 3 (2010): 295-314. https://doi.org/10.1080/13597566.2010.484565.

Carter, Lemuria, Victoria Yoon, and Dapeng Liu. "Analyzing e-government design science artifacts: A systematic literature review." *International Journal of Information Management* 62 (2022): 102430.

Castells, Manuel. "The information age: Economy, society and culture (3 volumes)." *Blackwell, Oxford* 1997 (1996): 1998.

Chilvers, Jason, and Matthew Kearnes. *Remaking participation: Science, environment and emergent publics*. Routledge, 2015.

Davret, Juliette, Brice Trouillet, and Hilde Toonen. "The digital turn of marine planning: a global analysis of ocean geoportals." *Journal of Environmental Policy & Planning* 26, no. 1 (2024): 75-90.

Dickinson, Helen. "From new public management to new public governance: The implications for a 'new public service'." *The Three Sector Solution: Delivering public policy in collaboration with not-for-profits and business* 41 (2016): 41-60.

Dobbin, Frank. "Thomas B. Lawrence, Roy Suddaby, and Bernard Leca, eds.: Institutional work: Actors and agency in institutional studies of organizations." (2010): 673-676.

Dobbin, Kristin Babson, Michael Kuo, Mark Lubell, Darcy Bostic, Jessica Mendoza, and Ernest Echeveste. "Drivers of (in) equity in collaborative environmental governance." *Policy Studies Journal* 51, no. 2 (2023): 375-395.

Dingwerth, Klaus, and Philipp Pattberg. "Global governance as a perspective on world politics." *Global governance: a review of multilateralism and international organizations* 12, no. 2 (2006): 185-204. https://doi.org/10.2307/27800609.

Douglas, Scott, and Chris Ansell. "Getting a grip on the performance of collaborations: Examining collaborative performance regimes and collaborative performance summits." *Public Administration Review* 81, no. 5 (2021): 951-961.

Emerson, Kirk and Ahn Min Woo. Collaborative Governance Regimes. Informing Practie trough Research" in: Gitterman, Daniel P., and Neil Britto, eds. *The Intersector: How the Public, Nonprofit, and Private Sectors Can Address America's Challenges*. Brookings Institution Press, 2021.

Emerson, Kirk, and Peter Murchie. "Collaborative governance and climate change." *The future of public administrafion around the world* (2011): 141.

Emerson, Kirk, Tina Nabatchi, and Stephen Balogh. "An integrative framework for collaborative governance." *Journal of public administration research and theory* 22, no. 1 (2012): 1-29. https://doi.org/10.1093/jopart/mur011.

Emerson, Kirk, and Tina Nabatchi. *Collaborative governance regimes*. Georgetown University Press, 2015.

European Commission. “A Europe Fit for the Digital Age,” February 19, 2020. https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/europe-fit-digital-age_en. Visited on 21.03.2024

Fanning, Lucia, and Robin Mahon. "Governance of the global ocean commons: hopelessly fragmented or fixable?." *Coastal Management* 48, no. 6 (2020): 527-533.

Fetting, C. (2020). “The European Green Deal”, *ESDN Report*, December 2020, ESDN Office, Vienna.

Gericke, Kilian, and Lucienne Blessing. "Comparisons of design methodologies and process models across disciplines: a literature review." *In Proceedings of the 18th International Conference on Engineering Design.* Design Society, 2011.

Gerlak, Andrea K., Tanya Heikkila, and Mark Lubell. "The promise and performance of collaborative governance." (2012). https://doi.org/10.1093/oxfordhb/9780199744671.013.0019.

Giddens, Anthony. *A contemporary critique of historical materialism*. Vol. 1. Univ of California Press, 1981.

Grant, Gerald, and Derek Chau. "Developing a generic framework for e-government." *Journal of Global Information Management (JGIM)* 13, no. 1 (2005): 1-30.

Hacker, Jacob S., Paul Pierson, and Kathleen Thelen. "Drift and conversion: Hidden faces of institutional change." *Advances in comparative-historical analysis* (2015): 180-208. https://doi.org/10.1017/CBO9781316273104.008.

Hajer, Maarten A. *The politics of environmental discourse: Ecological modernization and the policy process*. Clarendon Press, 1995.

Head, Brian. W. “Wicked problems in public policy”. *Public Policy*, 3, (2008), 101-118

Heikkila, Tanya, and Andrea K. Gerlak. "Investigating collaborative processes over time: A 10-year study of the South Florida ecosystem restoration task force." *The American Review of Public Administration* 46, no. 2 (2016): 180-200. https://doi.org/10.1177/0275074014544196.

Helm, Carsten, and Detlef Sprinz. “Measuring the Effectiveness of International Environmental Regimes.” *The Journal of Conflict Resolution* 44, no. 5 (2000): 630–52. http://www.jstor.org/stable/174647.

Huxham, Chris, Siv Vangen, Christine Huxham, and Colin Eden. "The challenge of collaborative governance." *Public Management an International Journal of Research and Theory* 2, no. 3 (2000): 337-358. https://doi.org/10.1080/14616670050123260.

Imperial, Mark T., Erik Johnston, Melinda Pruett-Jones, Kirsten Leong, and Jennifer Thomsen. "Sustaining the useful life of network governance: life cycles and developmental

challenges." *Frontiers in Ecology and the Environment* 14, no. 3 (2016): 135-144. https://doi.org/10.1002/fee.1249.

IPBES. Global assessment report on biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. Brondizio Eduardo, Settele, Josef, Diaz Sandra, and Ngo Hien T. (editors). IPBES secretariat, Bonn, Germany, 2019. https://doi.org/10.5281/zenodo.3831673.

Keohane, Robert O., and David G. Victor. "The regime complex for climate change." *Perspectives on politics* 9, no. 1 (2011): 7-23. https://doi.org/10.1017/S1537592710004068.

Klijn, Erik-Hans. "New public management and governance: A comparison." (2012).

Kloppenburg, Sanneke, Aarti Gupta, Sake RL Kruk, Stavros Makris, Robert Bergsvik, Paulan Korenhof, Helena Solman, and Hilde M. Toonen. "Scrutinizing environmental governance in a digital age: New ways of seeing, participating, and intervening." *One Earth* 5, no. 3 (2022): 232-241. https://doi.org/10.1016/j.oneear.2022.02.004.

Kooiman, Jan. *Governing as Governance*. London: SAGE Publications Ltd, 2003. https://doi.org/10.4135/9781446215012.

Kooiman, Jan. "Governance and Governability." *The New Public Governance?* Routledge, 2009. 72-86.

Kooiman, Jan. "Interactive governance and governability." In *Critical reflections on interactive governance*, 29-50. Edward Elgar Publishing, 2016.

Kooiman, Jan, and Maarten Bavinck. "The governance perspective." *Fish for life: Interactive governance for fisheries* 3 (2005): 11.

Kohler-Koch, Beate, and Rainer Eising, eds. *The transformation of governance in the European Union*. Vol. 12. Psychology Press, 1999.

Koontz, T. M., T. A. Steelman, J. Carmin, K. S. Korfmacher, C. Moseley, and C. W. Thomas. "Governmental roles in collaborative environmental management." *Collaborative environmental management: What roles for government* (2004): 1-31.

Kruk, Sake RL, Hilde M. Toonen, and Simon R. Bush. "Digital sustainability assurance governing global value chains: The case of aquaculture." *Regulation & Governance* (2023).

Kyriazis, Nikolas, and Theodore Metaxas. "Bounded rationality and institutional change." *Evolutionary and Institutional Economics Review* 7 (2010): 1-19.

Jones, Candace, William S. Hesterly, and Stephen P. Borgatti. "A general theory of network governance: Exchange conditions and social mechanisms." *Academy of management review* 22, no. 4 (1997): 911-945.

Lawrence, Thomas B., Roy Suddaby, and Bernard Leca, eds. *Institutional work: Actors and agency in institutional studies of organizations*. Cambridge university press, 2009.

Liefferink, Duncan. "The dynamics of policy arrangements: turning round the tetrahedron." In *Institutional dynamics in environmental governance*, 45-68. Dordrecht: Springer Netherlands, 2006. https://doi.org/10.1007/1-4020-5079-8_3.

Lubell, Mark. "Governing institutional complexity: The ecology of games framework." *Policy studies journal* 41, no. 3 (2013): 537-559.

Marks, Gary, and Liesbet Hooghe. National identity and support for European integration. No. SP IV 2003-202. WZB Discussion Paper, 2003.

Mahon, Robin, and Lucia Fanning. "Regional ocean governance: Integrating and coordinating mechanisms for polycentric systems." *Marine Policy* 107 (2019): 103589.

Mahoney, James. "Path dependence in historical sociology." *Theory and society* 29, no. 4 (2000): 507-548.

Mahoney, James, and Kathleen Thelen. "A theory of gradual institutional change." *Explaining institutional change: Ambiguity, agency, and power* 1, no. 1 (2010). https://doi.org/9780521134323.

Mahoney, James, and Kathleen Thelen, eds. *Explaining institutional change: Ambiguity, agency, and power*. Cambridge University Press, 2009.

Mak, Jeannette, and Jan van Tatenhove. "Introduction: Informality in a future EU." *Perspectives on European Politics and Society* 7, no. 1 (2006): 1-7. https://doi.org/10.1080/15705850600839439.

McAnulla, Stuart. (2002), Structure and agency, in: Marsh, David, and Gerry Stoker, eds. *Theory and methods in political science*. London: Macmillan, 1995, 271-291.

McQuaid, Ronald W. "Theory of organizational partnerships: partnership advantages, disadvantages and success factors." In *The new public governance?*, 143-164. Routledge, 2010.

Mol, Arthur PJ. *Environmental Reform in the Information Age. The Contours of Informational Governance*. Cambridge University Press, 2008.

Newig, Jens, Edward Challies, Nicolas W. Jager, Elisa Kochskaemper, and Ana Adzersen. "The environmental performance of participatory and collaborative governance: a framework of causal mechanisms." *Policy Studies Journal* 46, no. 2 (2018): 269-297.

Young, Oran R. "Inferences and indices: evaluating the effectiveness of international environmental regimes." *Global Environmental Politics* 1, no. 1 (2001): 99-121.

Young, O. R. 2008. "Building Regimes for Socioecological Systems: Institutional Diagnostics." In *Institutions and Environmental Change: Principal Findings, Applications, and Research Frontiers*, edited by O. R. Young, L. A. King, and H. Schroeder, 115-144. Cambridge, MA: The MIT Press.

Oberlack, Christoph. "Diagnosing institutional barriers and opportunities for adaptation to climate change." *Mitigation and adaptation strategies for global change* 22 (2017): 805-838.

Osborne, Stephen P. "The new public governance? 1." (2006): 377-387.

Osborne, Stephen P. "Delivering public services: time for a new theory?." (2010a): 1-10.

Osborne, Stephen P. "Introduction the (New) Public Governance: A Suitable Case for Treatment?" In *The New Public Governance?*, January 21, 2010b, 17–32. https://doi.org/10.4324/9780203861684-7.

Ostrom, Elinor. "A diagnostic approach for going beyond panaceas." *Proceedings of the national Academy of sciences* 104, no. 39 (2007): 15181-15187.

Ostrom, E.linor. "Background on the Institutional Analysis and Development Framework". *Policy Studies Journal* 39 (2011) 7-27. https://doi.org/10.1111/j.1541-0072.2010.00394.x

Ostrom, Elinor. *Understanding* institutional *diversity*. Princeton university press, 2009.

Peters, B. Guy. "Forms of informality: Identifying informal governance in the European Union." *Perspectives on European Politics and Society* 7, no. 1 (2006): 25-40. https://doi.org/10.1080/15705850600839538.

Peters, B. Guy, and Jon Pierre. "Developments in intergovernmental relations: towards multi-level governance." *Policy and Politics* 29, no. 2 (2001): 131. https://doi.org/10.1332/0305573012501251.

Pierson, Paul. "Increasing returns, path dependence, and the study of politics." *American political science review* 94, no. 2 (2000): 251-267. https://doi.org/10.2307/2586011.

Provan, Keith G., and Patrick Kenis. "Modes of network governance: Structure, management, and effectiveness." *Journal of public administration research and theory* 18, no. 2 (2008): 229-252.

Raakjaer, Jesper, Judith Van Leeuwen, Jan van Tatenhove, and Maria Hadjimichael. "Ecosystem-based marine management in European regional seas calls for nested governance structures and coordination—a policy brief." *Marine* Policy 50 (2014): 373-381.

Raustiala, Kal, and David G. Victor. "The regime complex for plant genetic resources." *International organization* 58, no. 2 (2004): 277-309. https://doi.org/10.1017/S0020818304582036.

Research and Innovation. “European Digital Twin of the Ocean (European DTO),” June 16, 2023. https://research-and-innovation.ec.europa.eu/funding/funding-opportunities/funding-programmes-and-open-calls/horizon-europe/eu-missions-horizon-europe/restore-our-ocean-and-waters/european-digital-twin-ocean-european-dto_en.

Rhodes, Roderick Arthur William. "The new governance: governing without government." *Political studies* 44, no. 4 (1996): 652-667.

Rixen, Thomas, and Lora Anne Viola. "Putting path dependence in its place: Toward a taxonomy of institutional change." *Journal of theoretical politics* 27, no. 2 (2015): 301-323.

Robeyns, Ingrid. "The capability approach: a theoretical survey." Journal of human development 6, no. 1 (2005): 93-117

Robeyns, Ingrid. *Wellbeing, freedom and social justice: The capability approach re-examined*. Open Book Publishers, 2017.

Brodie Rudolph, Tanya, Mary Ruckelshaus, Mark Swilling, Edward H. Allison, Henrik Österblom, Stefan Gelcich, and Philile Mbatha. "A transition to sustainable ocean governance." *Nature communications* 11, no. 1 (2020): 3600.

Røiseland, Asbjørn. "Understanding local governance: Institutional forms of collaboration." *Public Administration* 89, no. 3 (2011): 879-893.

Sen, Amartya. "*Freedom*." (1999).

Sen, Amartya. "Human rights and capabilities." *Journal of human development* 6, no. 2 (2005): 151-166.

Scott, Tyler A., Nicola Ulibarri, and Ryan P. Scott. "Stakeholder involvement in collaborative regulatory processes: Using automated coding to track attendance and actions." *Regulation & Governance* 14, no. 2 (2020): 219-237. https://doi.org/10.1111/rego.12199.

Scott, Tyler A., and Craig W. Thomas. "Unpacking the collaborative toolbox: Why and when do public managers choose collaborative governance strategies?". *Policy studies journal* 45, no. 1 (2017): 191-214. https://doi.org/10.1111/psj.12162.

Solman, Helena, Julia Kirch Kirkegaard, and Sanneke Kloppenburg. "Wind energy and noise: Forecasting the future sounds of wind energy projects and facilitating Dutch community participation." *Energy Research & Social Science* 98 (2023): 103037.

Sprinz, Detlef F., and Carsten Helm. "The effect of global environmental regimes: A measurement concept." *International Political Science Review* 20, no. 4 (1999): 359-369.

Stewart, Frances. "Groups and capabilities." Journal of human development 6, no. 2 (2005): 185-204.

Sørensen, Eva, John Bryson, and Barbara Crosby. "How public leaders can promote public value through co-creation." *Policy & Politics* 49, no. 2 (2021): 267-286.

Sørensen, Eva, and Jacob Torfing. "Enhancing collaborative innovation in the public sector." *Administration & society* 43, no. 8 (2011): 842-868.

Tafon, Ralph, Bruce Glavovic, Fred Saunders, and Michael Gilek. "Oceans of conflict: pathways to an ocean sustainability PACT." *Planning Practice & Research* 37, no. 2 (2022): 213-230.

Tzachor, Asaf, Ofir Hendel, and Catherine E. Richards. "Digital twins: a stepping stone to achieve ocean sustainability?." *npj Ocean Sustainability* 2, no. 1 (2023): 16.

Termeer, Catrien, and Art Dewulf. "Scale-Sensitivity as a Governance Capability: Observing, Acting and Enabling." *Scale*-sensitive *Governance of the Environment* (2014): 38-55.

Termeer, Catrien JAM, Art Dewulf, Gerard Breeman, and Sabina J. Stiller. "Governance capabilities for dealing wisely with wicked problems." *Administration & Society* 47, no. 6 (2015): 680-710.

Termeer, C. J. A. M., A. Dewulf, S. I. Karlsson-Vinkhuyzen, M. Vink, and M. Van Vliet. "Coping with the wicked problem of climate adaptation across scales: The Five R Governance Capabilities." Landscape and Urban Planning 154 (2016): 11-19.

Thelen, Kathleen. *How institutions evolve: The political economy of skills in Germany, Britain, the United States, and Japan*. Cambridge University Press, 2004.

Torfing, Jacob. "Collaborative innovation in the public sector: The argument." *Public management review* 21, no. 1 (2019): 1-11.

Torfing, Jacob., and Eva Sørensen. "Introduction. Collaborative innovation in the public sector." *The innovation journal: The public sector innovation journal* 17, no. 1 (2012): 1-14.

Torfing, Jacob, B. Guy Peters, Jon Pierre, and Eva Sørensen. "Power and Politics in Interactive Governance." In *Oxford University Press eBooks*, 48–70, 2012. https://doi.org/10.1093/acprof:oso/9780199596751.003.0004.

Toonen, Hilde M., and Jan PM van Tatenhove. "Uncharted territories in tropical seas? Marine scaping and the interplay of reflexivity and information." *Maritime Studies* 19 (2020): 359-374.

Toonen, Hilde M. *Sea@ shore: informational governance in marine spatial conflicts at the North Sea*. Wageningen University and Research, 2013.

Toonen, Hilde, M., Simon R. Bush, Sara Kruk R.L., and Furqan Asif. Aquaculture Governance Indicators Handbook (Version April 2021). www.aquaculturegovernance.org. (2021)

Trang, Tran Thu, Simon R. Bush, and Judith van Leeuwen. "Enhancing institutional capacity in a centralized state: The case of industrial water use efficiency in Vietnam." *Journal of Industrial Ecology* 27, no. 1 (2023): 210-222.

Ulibarri, Nicola, Kirk Emerson, Mark T. Imperial, Nicolas W. Jager, Jens Newig, and Edward Weber. "How does collaborative governance evolve? Insights from a medium-n case comparison." *Policy and Society* 39, no. 4 (2020): 617-637. https://doi.org/10.1080/14494035.2020.1769288.

UNEP. "UNEP in 2022." *United Nations Environment Programme*. 2022.

Unesco. *From Green Economies to Green Societies: UNESCO's Commitment to Sustainable Development*. UNESCO, 2011.

van De Bovenkamp, Hester M., Marleen De Mul, Julia GU Quartz, Anne Marie JWM Weggelaar-Jansen, and Roland Bal. "Institutional layering in governing healthcare quality." *Public Administration* 92, no. 1 (2014): 208-223. https://doi.org/10.1111/padm.12052.

van Leeuwen, Judith. *Who greens the waves?: Changing authority in the environmental governance of shipping and offshore oil and gas production*. Wageningen University and Research, 2010.

van Tatenhove, Jan, Bas Arts, and Pieter Leroy, eds. *Political modernisation and the environment: the renewal of environmental policy arrangements*. Vol. 24. Springer Science & Business Media, 2000. https://ci.nii.ac.jp/ncid/BA49449582.

van Tatenhove, Jan PM. "How to turn the tide: developing legitimate marine governance arrangements at the level of the regional seas." *Ocean & Coastal Management* 71 (2013): 296-304.

van Tatenhove, Jan PM. "Liquid Institutionalization." In *Liquid Institutionalization at Sea: Reflexivity and Power Dynamics of Blue Governance Arrangements*, 11-36. Cham: Springer International Publishing, 2022. https://doi.org/10.1007/978-3-031-09771-3_1.

Wachhaus, T. Aaron. "Governance as a framework to support informatics." *Innovation Journal* 16, no. 1 (2011).

Wang, Huanming, and Bing Ran. "Network governance and collaborative governance: A thematic analysis on their similarities, differences, and entanglements." *Public management review* 25, no. 6 (2023): 1187-1211.

Willems, Stéphane, and Kevin Baumert. "Institutional capacity and climate actions." (2003).

Young, Oran R. "Institutional dynamics: Resilience, vulnerability and adaptation in environmental and resource regimes." *Global environmental change* 20, no. 3 (2010): 378-385.

Annex

The annex provides questions to verify the model through case study analysis.

Governance Arrangements

1. Who are the **actors/stakeholders** involved in the decision making and implementation of regulations and/or policies?

   Explanation: Actors are one of the dimensions of a Governance Arrangement. This dimension is not only about relevant and involved actors, but also how these actors collaborate and form coalitions. This actor dimension (actors involved and their collaboration) might change because of GD related developments.

   a) Prompt: What are the coalitions (formal or informal) of collaborating actors?
   b) Prompt: Why do these coalitions of actors collaborate?
   c) Prompt: Which organizations are new within the GA because of GD/revised regulation?
   d) Prompt: Which organizations changed their role within the GA because of GD/revised regulation?

2. What are the **'rules of the game'**, meaning the decision-making procedures to revise and implement regulation at the international, EU, national or local levels?

   Explanation: Rules of the game is one of the dimensions of a Governance Arrangement. Rules can be formal and informal. Rules define who has access to policy making processes (access rules), rules of governance and shape the interaction of actors (interaction rules) within a GA. Rules might change because of the GD or related developments.

   a) Prompt: Who has access to policy making processes (including decision makers)?
   b) Prompt: Who decides about access to decision-making processes?
   c) Prompt: What rules define the interactions and collaborations between actors?
   d) Prompt: How are rules changing under influence of GD/revised regulation?

3. What are new **stories and viewpoints** that the EU GD or the revised regulation created?

   Explanation: Stories and viewpoints refer to the discourses of actors. Discourses is one of the dimensions of a Governance Arrangement. Discourses relate to how the policy domain is defined, also in terms of main causes, the exact problem, and potential solutions. Dominant discourses shape the interaction of actors, and the outcome of a GA. Discourses might change because of GD or related developments.

   a) Prompt: What are the viewpoints on core causes of the issue that the GA addresses?
   b) Prompt: What are the viewpoints on what needs to change to solve the issue?
   c) Prompt: What are the viewpoints on what feasible solutions are to the issue?
   d) Prompt: What are the dominant ideas about the character of the problem, its causes, and possible solutions?

4. What are the **power relations** between actors in terms of access to resources?

   Explanation: Power resources are one of the dimensions of a Governance Arrangement. The differences in access, distribution, and use of resources by actors shape power

relations between actors and coalitions. The access, distribution, and use of resources by actors can change because of the GD or related developments.

a) Prompt: What resources do actors have? (e.g. knowledge, financial, human, legal/formal position, lobbying/informal relations)
b) Prompt: Are there resource coalitions? If so, please describe.
c) Prompt: To what extent is there unequal distribution of resources?
d) Prompt: How are resources used strategically in the policy (power) game?
e) Prompt: What resources become (less) available for actors through revised regulation/GD?
f) Prompt: What *new* resources have become available because of the EU GD /revised regulation?
g) Prompt: How are power relations or use of resources changing because of EU GD/revised regulation?

Institutional Barriers

1. Can you tell me about how other **organizations/stakeholders/people** impede or enable [case study issue e.g. the deployment of floating wind]?

   Explanation: What we want to capture is information about how actors can be an institutional barrier, how they can also be enablers, and solutions to the 'barriers' they bring up under this question. Below are some prompts you could use to extract this information.

a) Prompt: Are there clear rules about who can participate in the governance of [this issue].
b) Prompt: Are actors' roles clear? Are they held accountable?
c) Prompt: Are there powerful actors that dominate or weak actors who are excluded?
d) Prompt: Are the necessary actors well connected? Are there clear mechanisms for resolving conflict?
e) Prompt: Are actors properly incentivized to participate in [case study issues] governance processes?

1. In what ways do **existing policies and governance procedures** inhibit [case study issue e.g. the deployment of floating wind]?

   Explanation: What we want to capture is information on the suitability of current governance institutions in relation to facilitating the change occurring in your case study. Below are some prompts you could use to extract this information.

a) Prompt: How adaptive are these procedures in terms of dealing with new issues or actors?
b) Prompt: Are there overlapping or conflicting procedures?
c) Prompt: Are the governance processes operating at the correct level (explanatory example from case study: For example, you are working on floating wind in Ireland and you have to engage with national and local planning procedures – is this working?)

2. How is **knowledge** about [case study issue e.g. the deployment of floating wind] developed and used to address this issue?

Explanation: What we want to capture here is how knowledge is developed, circulated, and used within the governance regime. This includes knowledge about what has and has not worked within governance processes. Below are some prompts you could use to extract this information.

a) Prompt: How does new research on [case study topic] find its way into governance processes?
b) Prompt: Have actors reflected on past processes (e.g from case) and how they could be improved?
c) Prompt: Are all relevant knowledge holders able to get that knowledge into decision-making arenas?
d) Prompt: Are there key knowledge gaps that need to be addressed and are there mechanisms in place to do this?

Collaboration Dynamics

1. How is **communication** supporting collaboration within your field of work? (Principled engagement)

   Explanation: We want to capture whether and how organizations can express their interests, concerns, and values in a collaborative setting. Moreover, we want to learn how organizations come to a shared understanding of what the problems and solutions are regarding the transition to a sustainable economy.

   a) Prompt: What opportunities are there to express your interests, concerns, or values regarding the transition to a sustainable economy?
   b) Prompt: What is the degree of agreement and acceptance of the problems and opportunities? Please elaborate on your answer.
   c) Prompt: What are the opportunities for candid and reasoned communication with other organizations and companies?
   d) Prompt: What mechanisms do you use to come to an agreement, and to decide on a plan of action?

2. What types of **relationships** support collaboration within your field of work? (Shared motivation)

   Explanation: We want to capture information about why organizations are motivated to work together. Here, we focus specifically on the relational dynamics of organizations. This includes knowledge about building trust, mutual understanding, and forging shared commitment to address EU Green Deal goals.

   a) Prompt: To manage the transition to a sustainable economy, who do you work with? (e.g. institutions, NGO's, industry).
   b) Prompt: How is that working relationship going?
   c) Prompt: Do you trust these other organizations? Why? Why not?
   d) Prompt: Do you feel that other organizations/institutions/companies understand your interests, concerns, or values? Why? Why not?
   e) Prompt: Do you feel that your point of view is recognized by others? Please elaborate your answer.

f) Prompt: Would you say that there is a shared commitment to achieving the EU Green Deal goals? Please elaborate your answer.

3. What makes you **capable** of collaborating effectively? (Capacity for joint action)

   Explanation: Collaborative governance assumes that collaboration is necessary to achieve the desired outcomes. Organization's understanding that collaboration is necessary does not mean that they are capable. Therefore, more information is required to identify the conditions to make joint action possible.

   a) Prompt: What venues and platforms do you use to meet other organizations and talk about the transition to a sustainable economy?
   b) Prompt: Who demonstrates leadership in these collaborative systems? What makes a good leader in this case?
   c) Prompt: What kind of knowledge do you need to collaborate effectively? Is some knowledge contested or missing?
   d) Prompt: Which resources do you use to collaborate? Are these resources shared? Do you have sufficient resources to collaborate effectively?

e-Governance

Explanation: PERMAGOV's working definition of marine e-governance is the application of digital processes or technologies aimed at improving the management of marine activities and resources, including within and across sectors and governance levels.

1. How would you evaluate the ability of existing digital tools to address various challenges facing the area you are investigating?

   a) Prompt: Do new data and analytics help you better understand the scale and severity of the problem?
   b) Prompt: Do they harmonize or simplify procedures in a way that leads to greater efficiency and better coordination or compliance?
   c) Prompt: Do they give voice or empower communities that have hitherto been sidelined by more powerful actors?

2. Regarding existing digital tools, how would you rate their ability to achieve wider European Green Deal (EGD) objectives?

   a) Prompt: Do they help stakeholders achieve specific EGD targets?
   b) Prompt: Do they improve compliance with EGD requirements?

3. Are these tools used to the full extent?

   a) Prompt: What is inhibiting adoption by relevant actors? Is it high cost? Fear of sharing sensitive data with others? Resistance to institutional change? Other?

4. What are the main factors driving development/adoption of digital tools in marine governance?

a) Prompt: Is it policies e.g. MRV, ETS, Single Window?
b) Prompt: Is it global movements and their normative discourses framed around specific challenges (e.g. ocean plastic is a serious threat; we need to act now)?
c) Prompt: Is it innovation in other areas that is making inroads into marine governance (e.g. digital twins, AI, space data, cloud computing, blockchain)?