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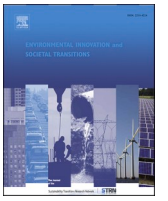

Research article

Do transformer missions redirect values of mission-oriented projects? The case of the EU mission 'Restore our Ocean and Waters'

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ABSTRACT

Transformative mission-oriented innovation policy aims to redirect innovation, but evidence of this directional ability is limited. This paper examines whether transformer missions redirect values reflected by mission-oriented projects. We study the EU Mission 'Restore our Ocean and Waters' and use probabilistic topic modelling and thematic analyses to identify, conceptualize, and compare latent values described in 17 policy documents (i.e., strategic layer), 37 mission-*oriented* projects, and 809 mission-*relevant* projects (i.e., operational layer). We map how these values changed during the mission launch. The results of this study are ambivalent. On the one hand, the mission launch corresponds with an increase of funded projects of which mission-oriented projects commonly frame efforts towards mission objectives. On the other hand, there is a misalignment between policy and project-level values while the prevalence of project-level values remained largely unaffected by the mission. These mixed results provide a more nuanced understanding of transformer missions' directional abilities.

1. Introduction

Policymakers across the globe are designing, implementing, and evaluating 'transformative' mission-oriented innovation policies (MOIP) to potentially resolve some of our grand societal challenges (Wittmann et al., 2021). Central to these policies are their ambitious, concrete, and time-bound goals that require transformative system change in order to address urgent wicked problems (Hekkert et al., 2020; Mazzucato, 2018a). Transformer missions are third-frame policy instruments that are value-laden and which can thus be understood as normative policies (Schot and Steinmueller, 2018; Uyarra et al., 2019). They are partly normative because transformative change corresponds with shifts from old value-systems to new ones (Köhler et al., 2019; Tibbs, 2011). As such, missions promise to redirect research and innovation projects in certain directions that are deemed desirable (Janssen et al., 2021; Andersson and Hellsmark, 2024).

Academic contributions from the fields of Transition Studies, Ethics of Technology, and beyond suggest that values in relation to this direction of change play a crucial role in the success of transformations (e.g., Horcea-Milcu, 2022; O'Brien, 2018; Tschakert et al., 2016; van der Hel, 2018). On the one hand, wicked problems and potential solutions are highly contested, partly due to conflicting

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stakeholder values (Head, 2008). Therefore, the values embedded in missions determine the ways and extent to which stakeholders deem missions desirable, legitimate, and responsible (Fielke et al., 2023; Wiarda et al., 2024). On the other hand, values are often viewed as "things worth striving for" (Taebi et al., 2014, p. 119). Assuming that this normativity is widely shared among stakeholders, it is crucial to understand whether transformer missions can direct and converge mission-oriented projects towards such values.

Although transformer missions presumably provide directionality, empirical evidence of this ability is limited. Studies that discuss and/or examine directionality primarily do so in terms of problem definitions and tangible solutions (e.g., Brett et al., 2023; Wanzenböck et al., 2020; Wesseling and Meijerhof, 2023; Wiarda et al., 2023). However, the underlying values that are inscribed in mission-oriented projects have so far been neglected. MOIP therefore prompts "the question of what kinds of public values are being fostered by innovation" (Uyarra et al., 2019, p. 2365). Accordingly, scholars criticized MOIP studies for not vigorously scrutinizing missions' underlying normative orientations (Kirchherr et al., 2023). We do not sufficiently understand whether the values in mission-oriented projects are redirected by transformer missions or if these projects pertain to values that are merely relevant to the missions' domains. A potential inability of missions to redirect project-level values risks giving rise to directionality failures and therefore jeopardizes maintaining the status quo (Weber and Rohracher, 2012).

In light of this knowledge gap, this paper examines to what extent, and in what ways, transformer missions redirect values embedded in mission-oriented projects. We take the EU Mission 'Restore our Ocean and Waters' as our case study, and identify, conceptualize, and compare values that are reflected in mission policy documents, mission-*oriented* project, and mission-*relevant* projects – with relevant projects acting as our domain-related benchmark, which have not been subjected to a MOIP. This study proceeds by mapping values over time to better understand whether the mission launch may have changed project-level values. Consequently, this paper provides early empirical insights into the directionality of transformer missions.

In what follows, Section 2 first reviews some of the theoretical foundations that underpin transformer missions and the values that are inscribed in them. Hereafter, Section 3 describes our method, including the selection of our case study. Section 4 then proceeds by reporting the identified values, their conceptualization, and their changes over time, after which Section 5 and 6 discuss these findings in light of this paper's aim.

2. Theory

2.1. The value-laden nature of directionality

Transformative MOIP uses a mission as "an urgent strategic goal that requires transformative systems change directed towards overcoming a wicked problem" (Hekkert et al., 2020, p. 76). MOIP is part of a broader normative policy movement of challenge-led, goal-oriented, purpose-driven, and transformative innovation policies (Diercks et al., 2019; Schot and Steinmueller, 2018) that place new demands on innovation systems (Elzinga et al., 2023; Hekkert et al., 2020; Wesseling and Meijerhof, 2023). Although there are a wide variety of MOIPs, they share their common intention of providing directionality. As Haddad et al. (2022) put it: "mission-oriented innovation policies "tilt the 'playing field' in the direction of the desired goals" (p.19). The notion of directionality largely originates from evolutionary economics (e.g., Schumpeter, 1934), which is strongly linked to the idea that advancements in science, technology, and innovation are accumulative and directional, thus giving rise to scientific paradigms (Kuhn, 1962), technological trajectories (Dosi, 1982), and technological regimes (Nelson and Winter, 1982).

Paradigms, trajectories, and regimes represent search heuristics that are grounded in "ideas and beliefs about where to go, what problems to solve and what sort of knowledge to draw on" (Kemp et al., 1998, p. 181). Such heuristics are therefore largely based on the directions, problems, and knowledge that are valued. Paradigms and trajectories tend to follow incremental forms of change, for which sociotechnical regimes function as selection and retention structures (Geels, 2002). The notion of directionality has later been taken up in transition studies and is now more broadly understood as the direction of transitional change from one sociotechnical system to another (e.g., Andersson et al., 2021; Bergek et al., 2023; Parks, 2022; Weber and Rohracher, 2012).

According to the Multi-Level Perspective, such transformations generally happen through pressures from the landscape (i.e., the context and deep structural trends of, for example, grand challenges, established policies, and societal values) and the activities of niches (i.e., protected spaces that act as incubators for radical innovations; Geels, 2002). These niches are constellations of projects that share certain values (Geels and Raven, 2006; Schot and Geels, 2008) and that act "as front runners, whose routines and practices gradually trickled down and change regime rules" (Geels and Schot, 2007, p. 406). They can transform existing value-systems (Köhler et al., 2019) by challenging dominant regime-level values that align with the interests of incumbent, encourage incremental innovation, and which maintain the status quo. Strategic niche management (Schot and Geels, 2008), transition management (Loorbach, 2007), and innovation policy (Haddad et al., 2022; Kivimaa and Kern, 2016) all have important roles in promoting and destabilizing the relatively stable regime-level values while niche-level values are 'in-the-making' (Geels and Schot, 2007). Scholars argue that niches are not dictated through top-down policies, but are rather modulated by them and other landscape pressures (Schot and Geels, 2008). This suggests that values endorsed by missions are defined in a somewhat top-down manner, but need to be adopted and operationalized through bottom-up initiatives (Haddad et al., 2022). Transformative MOIP thus introduces missions that commonly fund, support, and modulate research and innovation projects that could challenge the values of dominant regimes, and which may set in motion sociotechnical transformations.

We view these transformations as purposive transitions (Berkhout et al., 2004) because missions represents a relatively external force that are to some extent planned and vision-driven, and which are 'translated' into bite-sized pieces to make them actionable (Bergek et al., 2023). Although transformations are multi-faceted (Andersson et al., 2021), we specifically focus on whether transformer missions have the ability to change the values that are reflected by research and innovation projects.

2.2. Values, value conceptualizations, and value change

As discussed, the notion of directionality implies that certain directions of change are valued, while other directions are valued less. By providing directionality, missions promote values and represent normative visions of what futures are deemed desirable (Kok and Klerkx, 2023; Uyarra et al., 2019; Wiarda et al., 2023). Missions thus introduce and 'moralize' visions as something that is inherently good to "motivate and coordinate present action towards the future" (Berkhout, 2006, p.309). For example, one could argue that the EU Cancer Mission prioritizes 'health' as one of its pertinent values.

The legitimacy of missions thus partly depend on values because these matters are deemed important by (groups of) stakeholders (Friedman et al., 2013; van de Kaa et al., 2020). Values are "general convictions and beliefs that people should hold paramount if society is to be good" (Taebi and Kadak, 2010, p. 1343). Possible examples of other values include justice, safety, and privacy. Values are thus preferences that reflect what (groups of) stakeholders deem worth striving for (Van de Poel, 2009).

In the context of societal challenges, values are not necessarily less influential than facts (Funtowicz and Ravetz, 1993) and matters of concern can dominate discussions that seemingly revolve around matters of fact (Latour, 2004). Values play an important role in sense-making, and help determine present and future actions (Van de Poel and Kudina, 2022). Such values are intersubjective in the sense that stakeholders can relate to these, even if these values do no align with their own value-system (Taebi and Kadak, 2010). Similar to missions, values act as boundary objects because they facilitate forms of communication, negotiation and collaboration (Bechky, 2003; Janssen et al., 2023). For instance, while most stakeholders could discuss and support the notion of justice, stakeholders may hold very different ideas about what this concept means to them (Dignum et al., 2016). As a result, value considerations require a sensitivity of different value conceptualizations, by different stakeholders, and in distinct contexts (Harmáčková et al., 2022). Moreover, the wickedness associated with missions also suggests that stakeholders likely disagree on what values should be prioritized.

This is important, because as Demski et al. (2015) argue: "values are not discrete entities but are connected to each other in multiple ways" (p.67). The prioritization of one value inherently comes at the dispense of other values (Popa et al., 2023). Confronting the politics of missions therefore requires scrutiny of who's values count (Kok and Klerkx, 2023) and who is giving directions (Parks, 2022). Values can be in conflict with each other when formulating or designing solutions and policymakers will therefore need to consider value trade-offs (Parkhurst, 2016; Van de Poel, 2015), for instance, between niche-level values and regime-level values. Values and value conflicts subsequently provide insight into how policies should be designed and which values should have priority (Taebi et al., 2014).

Values are not static but can change over time (de Wildt et al., 2022) and may gain prominence over others (Van de Poel et al., 2022). The emerging debate on sustainability transitions, for instance, illustrates how the value 'sustainability' gradually gained importance and obtained different meanings. Van de Poel & Kudina (2022) point out that "[values] carry over from earlier experiences" (p.1) and may replace one another, co-exist, or be accompanied by new emerging values. Value change is therefore characterized by evolutionary processes of variation, selection, and retention, as also observed in scientific paradigms, technological trajectories, and sociotechnical regimes. This suggests that value change has a direction as well as a pace. By extension, the values reflected by problem definitions and potential solutions can diverge (i.e., multiple values gain equal importance or co-exist) or converge (i.e., a few values gain dominance over other values) and underpin stakeholder views in relation to the problem-solution spaces (Wanzenböck et al., 2020). A convergence in value-systems thus refers to a scenario in which one or a couple of values gain priority over others, which is what one could expect when observing an increase in directionality.

Only few contributions from the field of innovation studies and transition studies have specifically focused on values in transitions (with the exception of, e.g., Horcea-Milcu, 2022; Kuitert et al., 2024; Tschakert et al., 2016; van der Hel, 2018). More often, values are subsumed under the notion of legitimacy (as pointed out by Heiberg and Truffer, 2022) or studies take one specific value as their focal point (e.g., justice; Wang and Lo, 2021)). While these studies have made important contributions, values, value conceptualizations, and value changes remain overlooked in the debate on transformative MOIP.

This may partly be the case because "defining societal challenges in broad terms can be the preferred political strategy, to circumvent conflicts or contestation along core values" (Wanzenböck et al., 2020, p. 484). It is unclear to what degree MOIP prioritizes certain values, and to what extent it redirects value conceptualizations and induces value change in innovation projects. While to-be-funded projects generally try to align their values with policy agendas (van der Hel, 2018), recent insights reveal how misalignments between values in policy ambitions and funded projects are present in non-mission contexts (Novitzky et al., 2020).

3. Method

To understand whether missions redirect values of mission-oriented innovation projects, this study identifies, conceptualizes, and compares values that are reflected in mission policy documents, mission-*oriented* projects, and mission-*relevant* projects – with mission-relevant projects acting as our domain-related benchmark, which have not been subjected to a MOIP. This study proceeds by mapping project-level values over time to better understand whether the mission launch may have affected values embedded in projects. In doing so, this research uses the EU mission 'Restore our Ocean and Waters' as its illustrative case. In what follows, Section 3.1. first introduces and justifies this case study selection, after which Section 3.1. and 3.2. explain the data collection and analysis, respectively.

3.1. Case description: The EU mission 'Restore our Ocean and Waters'

Largely inspired by Mazzucato (2018b), the European Commission (EC) has developed five transfomer missions as part of its Horizon Europe research and innovation program for the period 2021 to 2027. One of these five missions is called 'Restore our Ocean

and Waters'. It was introduced by the EC in September 2021 with the aim of protecting and restoring the health of the ocean and waters connected to Europe through research and innovation, investments, and citizen engagement (European Commission, 2024a). The mission has largely been legitimised on the basis that the EU's hydrosphere is increasingly being degraded as a result of human activity, particularly due to (1) unsustainable exploitation of marine resources and land/water use, (2) pollution with (micro)plastics, nutrients, noise, chemicals, and more, (3) and human-induced climate change (grounded in work done by IPBES, 2019). The EC argues that this threatens the goods and services the water provides for the EU (European Commission, 2021c).

The mission contains a number of targets and objectives that address the three sources of degradation mentioned above (see Appendix 1). The mission targets and objectives revolve around the protection and restoration of aquatic ecosystems and biodiversity (1), the reduction of pollution across the hydrosphere (2), and the making of a carbon neutral and circular blue economy (3). In addition, the EC introduced cross-cutting enablers to support all mission targets and objectives. These include work on a digital twin of the ocean to monitor, forecast, and evaluate the health of aquatic systems, and include work that supports the mobilisation, engagement, and awareness raising of the public. The mission is implemented through funded projects that contribute to mission targets, objectives, or enablers (Fig. 1). The mission funds mission-*oriented* projects that contribute directly to the targets, and integrates past and ongoing projects from other EC funding programs that contribute indirectly, which are referred to as mission-*relevant* projects. Beginning of 2023, the EC identified 841 mission-relevant projects (European Commission, 2023d) of which 37 were specifically funded for the mission (European Commission, 2024c). The mission's geographical focus primarily lies on the Atlantic Ocean, Artic Ocean, Mediterranean Sea, Baltic Sea, North Sea, Danube River Basin, and the Black Sea, and funds projects that, for instance, prevent and eliminate pollution, or promote a climate-neutral and circular blue economy.

We selected this case for a number of reasons. First, the mission is generally recognized as an urgent and time-bound goal to initiate transformative change in response to a wicked problem (e.g., Larrue, 2021; Pedicchio, 2021; Wanzenböck et al., 2020). As such, it meets the conceptual requirements of a transformer mission (c.f., Hekkert et al., 2020). Second, it is one of the geographically and financially largest transformer missions currently being implemented globally, which indicates that it might substantially impact society. Third, a recent policy report underscores the need for 'ocean ethics' vis-à-vis the mission. This draws attention to values but these have until now been neglected (European Commission, 2023b). Fourth, the mission is still in a relatively early phase, meaning that the policy recommendations that follow from our work can still be implemented in practice.

3.2. Data collection

For our data collection (Table 1), we collected data on mission policy documents (strategic layer), and mission-oriented and mission-relevant projects (operational layer; see Fig. 1). Because of the early phase in which the mission finds itself, it is too early to analyse project outcomes. Instead, we focused our analysis on policy and project descriptions to understand values embedded in ongoing work.

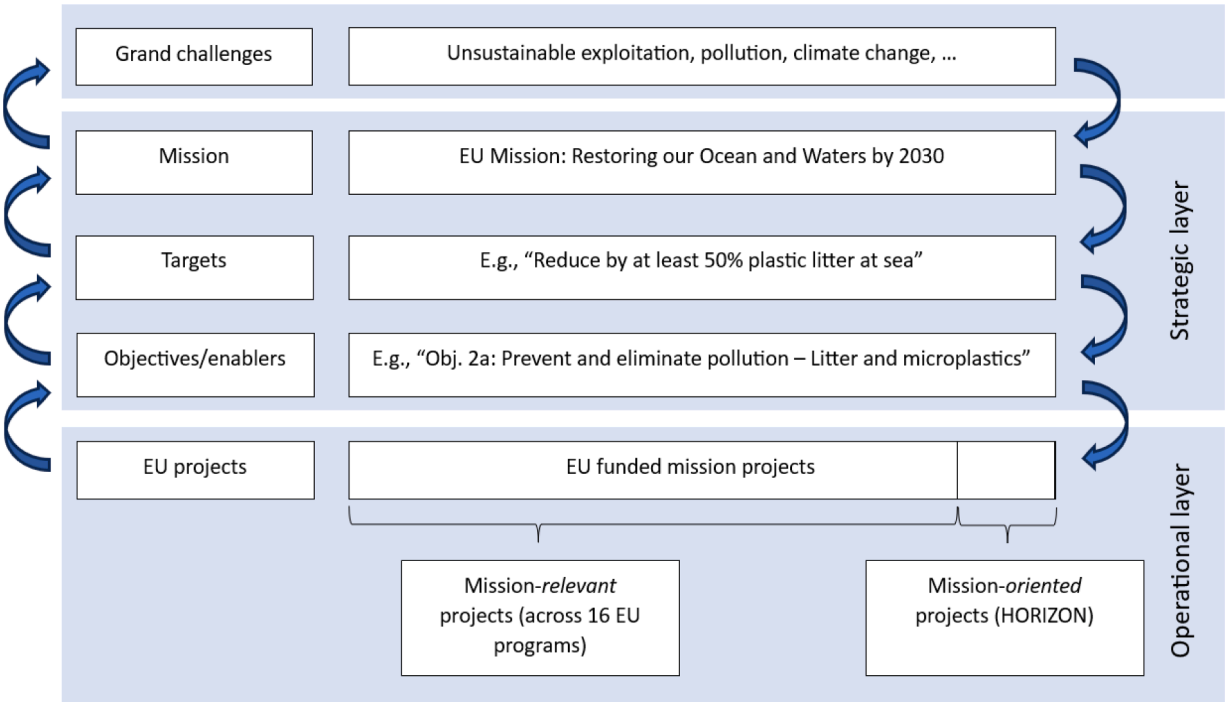

Fig. 1. Funding structure of the EU Mission: Restore our Ocean and Waters. Based on the authors' own interpretation.

For the strategic layer, we collected mission policy documents (i.e., official documents, reports and studies, communication material, and mission board reports). These documents were officially published by the EC on the mission website (European Commission, 2024a) and mission portal (European Commission, 2024b), and lay out the mission strategy and vision. This resulted in 17 policy documents. Some of these also discussed other EU missions. We omitted such parts of the documents to enhance the internal validity of our analysis.

For the operational layer, we combined different data collection methods to obtain information about mission-oriented and mission-relevant projects. The mission-oriented projects were earmarked as such and could be retrieved through the mission portal (European Commission, 2024b). This concerned 37 projects explicitly oriented towards the mission 'Restore our Ocean and Waters'. We collected all project descriptions and fact sheets using the projects' CORDIS links. CORDIS is the central database of the EC containing comprehensive information about EU-funded projects.

For the mission-relevant projects, we used an existing dataset created for the EC's mission portfolio analysis (European Commission, 2023d). This public dataset – the 'Portfolio Dashboard' – lists completed and ongoing EU projects relevant to the mission goals. The Portfolio Dashboard contains projects across 16 EU funding programs (e.g., H2020), that are working on various actions (e.g., 'research and innovation actions'), and which contribute to mission objectives/enablers (e.g., 'obj. 2b: Zero pollution – nutrients, chemicals, pesticides'). Collectively, these projects account for roughly 4.05 billion euros in EU funding and were conducted by approximately 11.320 participants. The Portfolio Dashboard was created by twelve independent analysts commissioned by the EC, who followed a two-step approach. First, from 63.902 EU-funded projects, they identified roughly 17.000 potentially relevant projects that started between October 2014 and April 2023, using 200 keywords and a program called Core TextMining (CORTEX). CORTEX simultaneously assigned a relevancy score to each potentially relevant project. Second, the relevancy of 1.430 projects with the highest relevancy scores was assessed manually, resulting in 841 mission-relevant projects. 20 of these were explicitly funded for the mission, and were already reflected in our dataset of 37 mission-oriented projects. We thus classified these as mission-oriented projects instead of mission-relevant projects, leaving 821 mission-relevant projects. For each of the projects, the Portfolio Dashboard provides the relevancy score, associated EU program, project id, CORDIS link, project title, EU funding (euros), and start/end date, amongst others. We likewise enriched this dataset by adding all project descriptions and fact sheets using CORDIS. 12 of the 821 mission-relevant projects were not archived in CORDIS or lacked a project description, leaving 809 mission-relevant projects for the analysis. The project descriptions/fact sheets and the policy document formed our primary data for our data analysis.

3.3. Data analysis

The analysis of project descriptions and policy documents consisted of a three-step-approach that combined quantitative and qualitative research. First, we identified dominant values embedded in projects and policies using probabilistic topic modelling. Second, we conducted a manual thematic analysis of the text to understand the conceptualization of the identified values. Third, and lastly, we mapped the values over time, to understand how the launch of the EU mission may have changed project-level values.

3.3.1. Identifying values using probabilistic topic modelling

Identifying values from texts is challenging because they tend to be discussed in a latent manner (de Wildt et al., 2018). When referring to the value of safety, for example, one might not necessary use the word 'safety'. Rather, a broader range of words may be used that, together, describe to the idea of safety (e.g., 'protection', 'safe', 'security'). Therefore, only using the word 'safety' as search query can lead to omitting documents that nevertheless discuss this value. Capturing latent concepts by means of a keyword-based approach is subsequently challenging. Adding additional keywords can help capture these documents, but generally adds a range of irrelevant documents that are not about safety (de Wildt et al., 2022). For example, the word 'safe' may also refer to the vaults that are used in banking.

To identify values, we used a software package called ValueMonitor.[c] ValueMonitor is designed to identify latent values from documents, and relies on probabilistic topic models. Topic modelling is a type of text-mining that can be used to capture latent ideas (Blei and Lafferty, 2009). Instead of referring to ideas by means of keywords, topic modelling uses distributions of closely related words. More specifically, ValueMonitor uses a topic modelling software called Corex (Gallagher et al., 2017). With Corex, a value is defined as a distribution of words, each word being associated with a mutual information score. The higher the mutual information score of a word, the more likely that this word is associated with a value. Corex concludes that a value is found in a text once a word with a high information score is identified (e.g., 'safety' for the value of safety). In the case that words with low mutual information scores are found in a text (e.g., 'risk' for the value of safety), a number of other words (e.g., 'harm' and 'security') will need to be found in this text before the software can conclude that this text is indeed about safety. The creation of a word distribution is done in an iterative manner, by feeding anchor words into the software to guide the creation of topics on specific values (de Wildt et al., 2022). Progressively, distributions of words can be shaped to refer to the idea of each of these values.

The language model used by the ValueMonitor software currently encompass a distribution of words for 28 values, as well as a number of other topics. ValueMonitor can be used to identify which values are being discussed in a specific dataset, understand the meaning of these values in a specific context, and provides insights into how these values have changed over time. ValueMonitor has been used in a number of studies (e.g., de Wildt et al., 2022; Van de Poel et al., 2022).

[c] https://valuemonitor.eu/.

Table 1
Data collection.

Data source	Mission layer	Unit of observation	Documents (n)
Mission website, Mission portal	Strategic layer	Policy documents	17
Mission portal, CORDIS	Operational layer	Mission-oriented projects	37
EU portfolio analysis, CORDIS	Operational layer	Mission-relevant projects	809

We used ValueMonitor to identify how many policy documents and project descriptions refer to a certain value. To enhance the validity of ValueMonitor's topic modelling, we extracted (executive) summaries, abstracts, and conclusions from the policy documents – presumably their core message – and split these sections in texts of 50–300 words. Value frequencies for policy documents, mission-oriented projects, and mission-relevant projects were compared. The results are reported in Section 4.1.

3.3.2. Conceptualizing values through thematic analysis

We proceeded by examining the conceptualization of the values identified by ValueMonitor – that is to say, their precise meaning and context. This is important, because policy documents, mission-relevant projects, and mission-oriented projects may focus on the same value (e.g., sustainability), but the actual meaning and context might differ (e.g., greenhouse gas emissions versus environmental toxicity). We examined the values' conceptualization using a manual thematic analysis at the word and sentence level (Braun et al., 2019; Braun and Clarke, 2006). Texts containing a value were analysed using open coding, and subsequently merged into themes of coherent conceptualizations, through axial coding. The themes were collectively discussed until agreement emerged on their validity. The thematic analysis was conducted for all policy documents, all mission-oriented projects, and the number of mission-relevant projects that is equal to the number of mission-oriented projects per value. We analysed the most pertinent mission-relevant projects based on their relevancy score, which was assigned by the EU portfolio analysis (see Section 3.2.). Conceptualizations across policy documents, and mission-relevant and mission-oriented projects were compared. The results are discussed in Section 4.2.

3.3.3. Tracking values over time

To explore whether the mission launch in 2021 corresponds with a change of project-level values, we tracked the identified values over time. We did so by counting the annual number of projects that discuss each value, using the projects' start date as our time-related variable. We used calendar years for this variable as most projects are funded in the same month of the respective year. The results are presented in Section 4.3.

4. Results

4.1. Value identification

Table 2 shows the number and share of policy documents, mission-oriented projects, and mission-relevant projects for each value. The table indicates that 'sustainability', 'robustness', 'innovativeness', 'access to information', and 'effectiveness' are the most pertinent values for mission-relevant and mission-oriented projects. Although there are substantial sample size differences, we observe that both project types promote comparable values. However, mission-oriented projects focus less on 'safety' than mission-relevant projects, while mission-oriented projects have a greater emphasis on 'security' and 'health'. The alignment between policy documents and mission-oriented projects is less evident. Both emphasise 'sustainability' and 'robustness', but while policy documents underscore values like 'health', 'safety' and 'responsibility', mission-oriented projects focus more on 'innovativeness', 'access to information', and 'effectiveness'.

Table 2
Number and share of policy documents, mission-oriented projects, and mission-relevant projects that mention each value.

Value	Mission-relevant projects	Mission-oriented projects	Policy documents
Sustainability	472 (58,3 %)	20 (54,1 %)	13 (76,5 %)
Robustness	329 (40,7 %)	18 (48,6 %)	10 (58,8 %)
Innovativeness	198 (24,5 %)	9 (24,3 %)	5 (29,4 %)
Access to information	144 (17,8 %)	10 (27 %)	7 (41,2 %)
Effectiveness	121 (15,0 %)	6 (16,2 %)	5 (29,4 %)
Security	111 (13,7 %)	6 (16,2 %)	6 (35,3 %)
Safety	115 (14,2 %)	2 (5,4 %)	7 (41,2 %)
Health	105 (13,0 %)	6 (16,2 %)	10 (58,8 %)
Efficiency	55 (6,8 %)	2 (5,4 %)	1 (5,9 %)
Responsibility	49 (6,1 %)	1 (2,7 %)	7 (41,2 %)
Public participation	33 (4,1 %)	2 (5,4 %)	2 (11,8 %)
Justice	25 (3,1 %)	1 (2,7 %)	3 (17,6 %)
Human dignity	20 (2,5 %)	1 (2,7 %)	2 (11,8 %)
Competitiveness	20 (2,5 %)	1 (2,7 %)	1 (5,9 %)
Privacy	19 (2,3 %)	0 (0,0 %)	1 (5,9 %)

4.2. Value conceptualization

In what follows, we will discuss the conceptualization of the five most frequent values across policy documents, mission-oriented projects and mission-relevant projects, i.e., 'sustainability', 'robustness', 'innovativeness', 'access to information', and 'effectiveness'. In addition, Appendix 2 provides a more concise overview of exemplary value conceptualizations identified in policy documents and projects.

4.2.1. Sustainability

Policy documents ($n = 13$): The EC states that "human activities and economy are nested into natural systems" and that we therefore require a healthy blue planet (European Commission, 2021d, p. 12). 'Sustainability' is conceptualized through missions objectives: protect and restore marine and freshwater ecosystems and biodiversity (objective 1); prevent and eliminate pollution (objective 2); and make the sustainable blue economy carbon neutral and circular (objective 3; European Commission, 2022, 2023a). This includes preventing chemicals, plastic waste, and other pollutants from reaching rivers and seas (European Commission, 2020a). The EC believes that the mission's sustainability efforts support the Green Deal and Sustainable Development Goals, in particular goal 14: Life below water (European Commission, 2020b, 2023c, 2023d).

Mission-oriented projects ($n = 20$): 'Sustainability' is commonly conceptualized as the eliminations of pollution through circularity (*BLueMissionMed*). Some projects refer to the detection, collection, and prevention of marine macro and micro plastics (*INSPIRE* and *SEARCULAR*), abandoned, lost or otherwise discarded fishing gear (*NETTAG+*), wasted nutrients for algae cultivation (*LOCALITY*), and chemical pollution like heavy metals, pesticides and PFAS and 'forever chemicals' (*RHE-MEDiation*). A secondary conceptualization is the restoration and protection of marine biodiversity; for example, through the development of a digital twin of the ocean, as done by *EDITO-Model Lab*. Such a digital twin simulates 'what if' scenarios to gain insights into environmental hazards. Restoration is also strived for by *C-FAARER* which supports community-driven business models for regenerative ocean farming. Similarly, *OLAMUR* and *ULTFARMS* work on multi-use and carbon-neutral low trophic aquaculture systems (e.g., seaweed). Other projects drive 'sustainability' indirectly, by promoting ocean literacy (*FLOW* and *SHORE*) and marine citizen science (*OTTERS*).

Mission-relevant projects ($n = 473$): 'Sustainability' commonly returns in the LIFE2027 EU program, and often relates to the protection and restoration of ecosystems and their threatened species (e.g., European eel) through ecosystem-based management, marine protected areas, chemical management, and the reduction of industrial discharges (e.g., *LIFE21 FPA/SE/CCB, LIFE21 NGO/BE/SAR, LIFE22 NGO-SE-CCB*). Other LIFE2027 projects conceptualize sustainability as climate resilience, ocean health, the energy transition, decarbonisation, amongst others (e.g., *LIFE21 FPA/BE/SAR, LIFE21 FPA/BE/WWF EPO*). Remaining projects mention marine biodiversity (*MSP4BIO, BIOcean5D, MarinePlan*), the circular economy (*SAFE*), climate change adaptation and prevention (*ILIAD*), blue economy (e.g., *SBEP, MSP-GREEN*), and reduction of marine litter (*LIFE21-NAT-IT-LIFE DREAM*).

4.2.2. Robustness

Policy documents ($n = 10$): 'Robustness' is reflected in the EC's argument that man-made changes (e.g., pollution) endanger the water quality, and by extension the services it provides (European Commission, 2020a, 2021b). The EC also believe that the mission will indirectly promote the resilience of communities (European Commission, 2020b). Projects are encouraged to develop solutions in specific basins, while ensuring that they are reliable in other contexts after upscaling (European Commission, 2021c). This proofs challenging due to regulatory differences (European Commission, 2023a). The EC also experiences difficulties in assessing the baseline across regions (e.g., assessments of fleets, fuels, ports, etc.) as data is unstandardized, and therefore deemed unreliable. For example, the Marine Biodiversity Monitoring study found a lack of data harmonization for the collection, storage, and exchange of biodiversity data (European Commission, 2023c).

Mission-oriented projects ($n = 18$): 'Robustness' is most prevalently conceptualized as the stability of a marine ecosystem's health and its water quality – both of which are deemed crucial for a blue economy (e.g., *BlueMissionAA, RHE-MEDiation*). *AlgaePRO BANOS*, for instance, aspires to preserve such resources, partly to meet consumer demands. This conceptualization closely relates to enhancing the resiliency of ecosystems (*A-AAgora* and *DaWetRest*). Another conceptualization refers to solutions' robustness over time and across regions, both necessary for upscaling (*OLAMUR*). Timewise, *DTO-BioFlow* will automate continuous data flows for the digital twin of the ocean, and *C-FAARER* develops 'long-lasting' business models for sustainable ocean farming. Region-wise, *ULT-FARMS* advances six low trophic aquaculture pilots in offshore wind farms across the North and Baltic Seas. To promote 'robustness', they test for their systems' resiliency against harsh offshore conditions and/or low-salinities. Similarly, *DaWetRest* works on the replication, deployment, and upscaling of their solutions.

Mission-relevant projects ($n = 329$): Projects mention how the marine ecosystems' robustness, in the sense of continuity, requires eco-system-based management (e.g., *LIFE22 NGO-SE-CCB, LIFE21 NGO/SE/CCB, LIFE21 FPA/SE/CCB*), marine spatial planning (*MarinePlan*), and marine protected areas (*MPA Europe*). Some projects help conserve water quality (e.g., *LIFE21-ENV-IT-LIFE FOUNTAIN, LIFE21 FPA/FR/SFE*). Other projects conceptualize 'robustness' more instrumentally, as a means to create a sustainable and resilient blue food economy (e.g., *SAFE, MSP-GREEN, LIFE22 NGO/BE/SAR, LIFE21 FPA/BE/SAR*). Lastly, projects describe 'robustness' as a technical requirement for observation tools (*OBAMA-NEXT*).

4.2.3. Innovativeness

Policy documents ($n = 5$): 'Innovativeness' of sectors, projects, and solutions is described as crucial for mission success (European Commission, 2023a). Innovation is needed for green shipping, offshore wind energy, aquaculture, alternative fuel/propulsion systems (e.g., hydrogen), nature-based solutions, digital twins, monitoring technologies, and biodegradable plastics (European Commission,

2020a, 2021c, 2023a, 2023e). The EU also calls for innovative business models and circular and carbon neutral technologies. Multi-purpose platforms could play a space-efficient role in hosting such innovations (European Commission, 2023a). Innovations may benefit from previous mission-relevant projects, described by the portfolio analysis (European Commission, 2023d).

Mission-oriented projects ($n = 9$): 'Innovativeness' frequently refers to a quality of solutions that are being developed, tested, or used. These include, but are not limited to, eco-friendly and resilient low trophic aquaculture systems (*OLAMUR* and *ULTFARMS*), algae-based consumer products (*AlgaePro BANOS),* the digital twin of the ocean (*EDITO-Model Lab, DTO-BioFlow* and *EFFECTIVE*), and pollution monitoring and remediation technologies (*RHE-MEDiation* and *SeaClear2.0*). Not all innovations are technological in nature such as harmonization roadmaps for aquatic environmental DNA monitoring tools (*EDNAqua-Plan),* business models for regenerative ocean farming (*C-FAARER*), and nature-based solutions for ecosystem resiliency (*A-Aagora*). Other projects mention 'cutting-edge' technologies (*REMEDIES*) and 'concrete' and 'innovative solutions' (*DaWetRest*), but the exact nature of these remains largely unspecified. Projects also support 'innovativeness' indirectly. For instance, *BlueMissionAA* provides a hub for knowledge exchange, *OTTERS* connects citizen-generated data to other EU-funded projects, while *EcoDaLLi* provides a digital portal linked to the Mission Implementation Platform. Moreover, *REMEDIES* and SHORE both launched open calls for innovative solutions, through EUR 500.000,- and EUR 10.000,- cascading grants, respectively

Mission-relevant projects ($n = 198$): Mission-relevant projects also refer to 'innovativeness' as a quality of solutions. The *LIFE21-ENV-IT-LIFE FOUNTAIN* project, for example, works on PFAS remediation technologies for groundwaters and aquifers using magnetic nanoparticles. *LIFE21-NAT-IT-LIFE DREAM* develops a solution to combat marine litter in deep reefs. *BIOcean5D* develops technologies to explore marine biodiversity. *MSP-OR, Blue Cloud*, and *BlueRemediomics* develop an ocean governance platform, cyber platform, and bioinformatics platform, respectively. *NECCTON* and *GES4SEAS* both focus on solutions that support ecosystem management. Different is the *SIS.net 3* project, which refers to 'innovativeness' in their aim to "increase society's appetite for innovation".

4.2.4. Access to information

Policy documents ($n = 7$): The value 'access to information' is referred to as a lack of centrally collected, harmonized, and detailed data on port facilities, green shipping, and offshore wind farms (European Commission, 2023a). The EU particularly lacks data for Southern and Eastern European waters and deep sea areas (European Commission, 2023c). Data is advocated to follow the FAIR principles (i.e., Findable, Accessible, Interoperable, and Reusable; European Commission, 2023c). Another conceptualization relates to the finding that the mission is not well-known outside academia. The EC calls for new forms of stakeholder communication and citizen engagement to promote mission awareness and enhance ocean literacy (European Commission, 2022, 2023a, 2023d).

Mission-oriented projects ($n = 10$): 'Access to information' is conceptualized as collecting and aggregating marine data through monitoring systems, simulation systems, or service systems that support data-driven decision-making (e.g., *PROTECT BALTIC* and *OLUMUR*). For example, *EDITO-Infra* and *DTO-BioFlow* integrate data flows for the digital twin of the ocean. *EDNAqua-plan* collects information on initiatives, infrastructure, and standardization activities related to aquatic monitoring for a digital DNA-based ecosystem of aquatic species, which will follow FAIR principles. 'Access to information' also refers to knowledge transfer across actors (e.g., *CLIMAREST*). Accordingly, *BLue4ALL* promotes knowledge transfer across 25 information sites and living labs connected to the Mediterranean Sea.

Mission-relevant projects ($n = 144$): Similar to mission-oriented projects, mission-relevant projects also refer to data collection and aggregation. Projects generate, store, or exchange data via an open-access data hub (*BIOcean5D*), ocean governance platform (*MSP-OR*), online atlas (*MPA Europe*), and an online market place (*ILIAD*). Other projects promote 'access to information' through media communication (*LIFE21 FPA/ES/Oceana in Europe*) and training activities (*LIFE21 FPA/FR/MedPAN*). Remaining projects discuss good relationships with European regions to promote 'access to information' on local issues (*REGINA-MSP*).

4.3.5. Effectiveness

Policy documents ($n = 5$): 'Effectiveness' relates to the mission's success, for which mission enablers are crucial. On the one hand, this is said to require stakeholder engagement (e.g., citizens) to enhance "public awareness and a sense of ownership" (European Commission, 2021a, p. 4, 2023a). On the other hand, the digital twin of the ocean may help as a knowledge system (European Commission, 2021b). The European Commission also reports how a lack of governance coherence across regions challenges the mission's effectiveness (European Commission, 2023a).

Mission-oriented projects ($n = 6$): In mission-oriented projects, 'effectiveness' can be conceptualized as the effectiveness of solutions, e.g., of marine litter management (*SeaClear2.0*) or low trophic aquaculture (*OLAMUR*). In other cases, the value refers to the project's ability to achieve a particular objective. *PROTECT BALTIC* discusses the effectiveness of their marine protection and restoration efforts, *DTO-BioFlow* explains that it aims to effectively replicate the ocean's ecology in their digital twin of the ocean, while *FLOW* tries to empower youths in order for them, as stakeholders, to co-create effective blueprints for interactions with the hydrosphere.

Mission-relevant projects ($n = 121$): Many projects in the LIFE2027 program enhance the effectiveness of EU regulations through various objectives (e.g., tackling marine litter at its source; *LIFE21 FPA/BE/SAR, LIFE21 NGO/BE/SAR, LIFE22 NGO/BE/SAR*). Other projects discuss how they promote effective restoration efforts (*MERCES*), support management of marine activities (*MarinePlan*), or develop cost-effectiveness remediation technologies (*LIFE21-ENV-IT-LIFE FOUNTAIN*).

4.3. Value change

Fig. 2 displays the number of launched projects per year, and indicates that the number of mission-relevant projects have gradually

increased and stabilized between 2014 and 2020. It also shows that in 2022, after the Mission launch in 2021, a substantial number of new projects were funded. 2023 contains fewer projects than 2022, which may be the result of an incomplete dataset due to still-to-be-indexed projects in the Mission Portal and CORDIS (Section 5.4. provides a brief reflection on this).

Fig. 3 and 4 present the number and share of annual projects for each of the five most prevalent values, respectively. In Fig. 4, 2014 provides extreme values – either 0 % or 100 % – because the year contains one project. While the annual number of projects per value has surged over the years (Fig. 3), the proportion of projects containing these values has remained rather consistent (Fig. 4). As such, the mission launch seems to correspond with an increase in projects, but not an increase in the relative importance of values. For example, while Fig. 3 shows that the number of projects revolving around 'sustainability' has increased from $n = 52$ (2020) to $n = 124$ (2022), Fig. 4 indicates that the proportion of projects has remained roughly the same; 55 % (2020) to 63 % (2022).

5. Discussion

This study took the EU mission 'Restore our Ocean and Waters' to examine whether a mission launch corresponds with value change in mission-oriented projects. It did so by identifying, conceptualizing, and comparing the values that are reflected in mission policy documents (i.e., strategic layer), mission-*oriented* project, and mission *relevant*-projects (i.e., operational layer). The mission-relevant projects formed the domain-related benchmark that has not been subjected to a MOIP. This study additionally mapped values over time to explore whether the mission launch may have affected project-level values. In what follows, we will briefly discuss the main findings of this study (Section 5.1). We proceed by highlighting this study's practical and theoretical contributions (Section 5.2. and Section 5.3.), after which we reflect on some of the main limitations and avenues for future research (Section 5.4.).

5.1. Findings

Our results suggest that mission-oriented and mission-relevant projects for the EU mission 'Restore our Ocean and Waters' promote similar values, emphasizing 'sustainability', 'robustness', 'innovativeness', 'access to information', and 'effectiveness' (Fig. 2). However, this alignment is less evident for mission policy documents and mission-oriented projects. In our case, both the strategic and operational layer emphasised 'sustainability' and 'robustness', but distinctively emphasised other values. Policy documents encouraged 'health', 'safety', and 'responsibility', while such values were less prominent in mission-oriented projects. Instead, these projects promoted 'innovativeness', 'access to information', and 'effectiveness'. Given these values, one may perceive these projects as relatively techno-centric and the EU Mission as relatively eco-centric (Heiberg and Truffer, 2022). Fig. 3 indicates that the mission launch corresponds with more mission-relevant and mission-oriented projects, but that this launch marginally increased the relative importance of values. In other words, the mission led to the funding of more mission-relevant and mission-oriented projects, but did not converge or redirect the values found in projects.

When we look closer at the conceptualization of the five most prevalent values across policy documents, mission-oriented projects, and mission-relevant projects, we find a greater alignment between the strategic and operational layer. For example, when we consider the value 'sustainability', projects generally support mission objectives explicitly, i.e., a focus on the protection and restoration of marine ecosystems and biodiversity (objective 1); pollution prevention and elimination (objective 2); and the decarbonisation and circularity of a blue economy (objective 3; European Commission, 2022, 2023a). Projects conceptualized 'sustainability' more narrowly, with smaller scopes in terms of problems and solutions (e.g., preventing and mitigating harmful impacts of fishing gear as done by *NETTAG+*). Although not subjected to the mission, mission-relevant projects likewise relate to these three objectives but have a more diverse conceptualization of 'sustainability' than mission-oriented projects. Furthermore, mission-oriented projects differ from mission-relevant projects in the sense that mission-oriented projects tend to conceptualize values explicitly in service of the mission. For instance, mission-oriented and mission-relevant projects both promote the value 'access to information' through their development of digital platforms, but mission-oriented projects generally use this value in the context of the digital twin of the ocean – one of two mission enablers.

In addition, our study found a number misalignments between policy and projects. Policy documents encouraged 'innovativeness', for example, through green shipping, offshore wind energy, and alternative fuel/propulsion systems, but these are generally not an object of concern for projects. Policy documents moreover highlight the lack of data ('access to information') on deep seas and Southern and Eastern European waters, but it remains unclear how mission-oriented projects address this need.

5.2. Practical contribution

This study has a number of practical implications. First, the results hint at a misalignment between the values that are prioritized in policy and mission-oriented projects. If values like 'health', 'safety', and 'responsibility' are indeed important for the EU Mission, then it is crucial that the EC more strongly funds projects that promote such values. For instance, this could include funding projects that focus on responsible innovation as a way of promoting the value 'responsibility' (Stilgoe et al., 2013).

Second, we also find a few misalignments between the conceptualization of values across policy and mission-oriented projects. For the values 'robustness' and 'access to information', policy document argue that the collection, storage, and exchange of mission data should be harmonized across regions to improve the reliability of monitoring efforts (European Commission, 2023c). This would support baseline studies and help monitor the missions' progress over time. While projects consider the harmonization of marine biodiversity data, future projects could work on the standardization of data on ports, shipping, and offshore infrastructures.

Third, policy documents often refer to 'robustness' as the consistency of mission efforts across regions. However, reports highlight

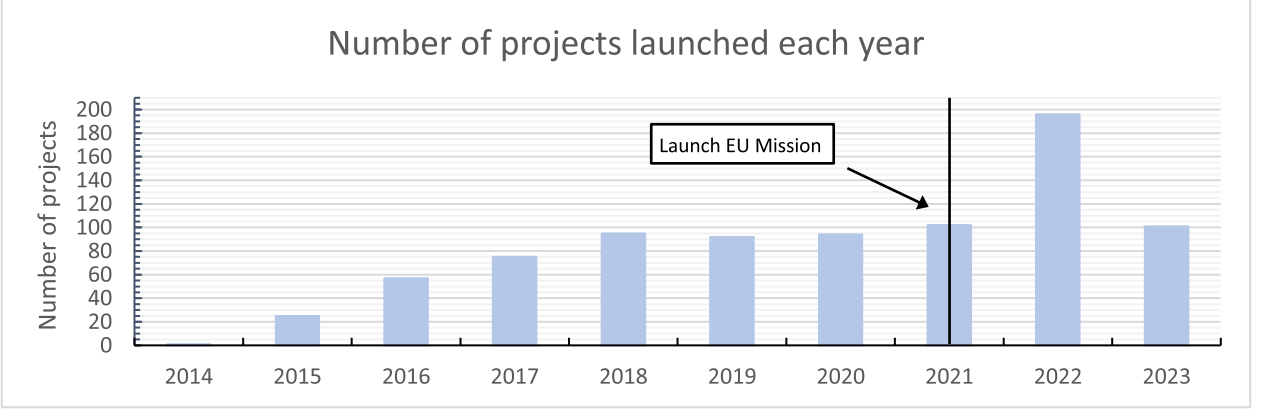

Fig. 2. Number of project launched each year. NOTE: 2023 shows fewer projects than 2022, which might be the result of still-to-be-indexed projects on the Mission Portal and CORDIS database (Section 5.4 provides a reflection on this).

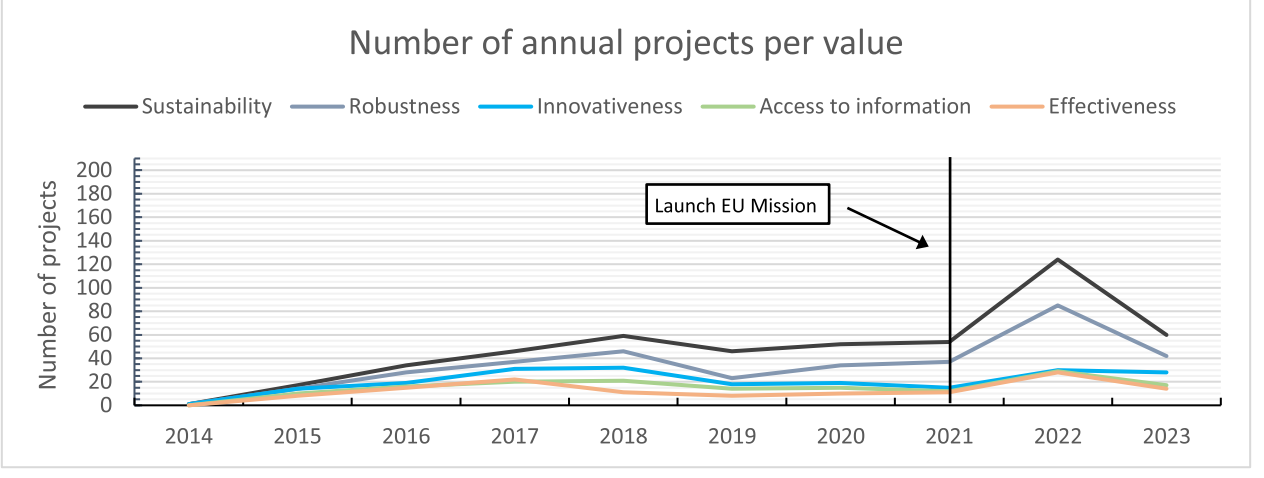

Fig. 3. Number of annual projects for each of the five most prevalent values. NOTE: Annual data is centered between tick marks.

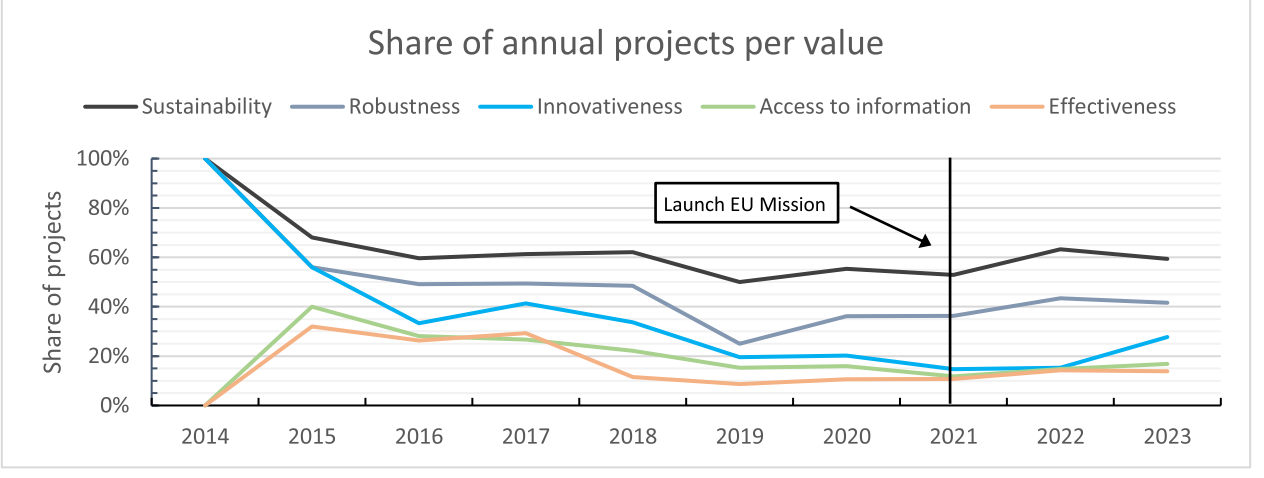

Fig. 4. Share of annual projects for each of the five most prevalent values. NOTE: Annual data is centered between tick marks. 2014 shows extreme values (i.e., 0 % and 100 %) because the respective year contains one project.

regulatory and governance differences across regions, which may lead to horizontal coordination failures (Weber and Rohracher, 2012). Dealing with this will require a greater horizontal integration. How this may be done best remains an open question (Turnheim et al., 2020), but recent studies point toward the usefulness of cross-regional working groups and workshops in stimulating horizontal coordination (Hassler et al., 2018).

Fourth, policy documents conclude that "the Mission is not very well known outside the research community, and awareness of citizens about the Mission and its potential contribution to sustainable Blue Economy is very low" (European Commission, 2023a, p. 23). To promote the value of 'access to information' and to further support mission enabler 2 (i.e., stakeholder mobilization, engagement, and awareness raising), it appears important to more actively promote participatory practices. This is especially helpful once policymakers look beyond the so-called 'deficit model' and ocean literacy fix, and engage citizens with the aim of promoting the mission's ethical acceptability as opposed to solely its social acceptance (Stilgoe and Cohen, 2021). This would require an openness to bottom-up problem definitions and solutions, and a greater responsiveness to societal values and worldviews (Wiarda et al., 2024).

5.3. Theoretical contribution

In addition, this study advances academic debates that discuss the promises surrounding MOIP as a policy type that potentially breaks with the past and effectively redirects innovation (as reviewed by, e.g., Andersson and Hellsmark, 2024; Bergek et al., 2023; Diercks et al., 2019; Haddad et al., 2022; Janssen et al., 2021; Parks, 2022). Other scholars, however, critically questioned such promises (e.g., Henrekson et al., 2024; Kirchherr et al., 2023). Our results contribute to this debate by challenging the notion that MOIP redirects (values of) innovation, and thus provide a more nuanced and ambivalent picture. We find that missions can correspond with an increased number of funded projects, and that mission-oriented projects commonly frame their efforts towards mission objectives. However, we also find that there is a misalignment between which values are prioritized by MOIP and those that are prioritized by mission-oriented projects. In addition, the mission launch does not seem to correspond with a substantial shift in values over time. While some policy and project-level values were conceptualized similarly, we show that this does not necessarily need to be so. As a result, these observations question whether missions are able to converge values of mission-oriented projects that operate in the solution-space (Wanzenböck et al., 2020; Wiarda et al., 2023; Wojtynia et al., 2021), or whether missions maintain room for diversity of values. As Kok & Klerkx (2023) state "a challenge here obviously is determining what 'optimal diversity' is, also given that a mission-oriented approach requires focus" (p.3).

Our research also questions whether mission-oriented projects differ from mission-relevant projects that are not subjected to MOIP. Both project types seem to prioritize similar values and conceptualize these in comparable ways. We therefore wonder whether MOIP funds relevant projects that are framed in service of the mission without necessarily affecting the values of these projects. Put differently, these projects may simply pertain to the missions' policy domains (e.g., ocean and waters) instead of the mission itself. Part of this answer could also lie in the flexible interpretation of missions as boundary objects (Janssen et al., 2023). While a missions' plasticity allows projects to implement missions in context-specific ways, this adaptability may also lead to the funding of projects that operate business-as-usual. Admittedly, transformative change does not only depend on mission-oriented projects, but also on the social and political systems that challenge existing values and the status quo (Duncan et al., 2022; Elzinga et al., 2023). However, If MOIP indeed struggles to influence project-level values, then this raises important questions about whether mission-oriented projects can challenge existing value-systems of socio-technical regimes and thus help transform socio-technical systems at large.

5.4. Limitations and future research

It is important to highlight a few limitations that should guide the interpretation of our work, and which could motivate future research. First, we have identified values using topic modelling and conceptualized these values through a thematic analysis. It is important to emphasise the inherent limitations that come with such methods. While both approaches are helpful in identifying and understanding latent concepts, they both yield results that represent constructs, and which themselves are value-laden (de Wildt et al., 2022). This inherent limitation should be taken into account when interpretating our results.

Second, we examined how project-level values changed around the time of the mission launch. Although we have drawn from both quantitative and qualitative research methods, and while we have argued why missions could influence values in mission-oriented projects, we should be cautious in assuming causality between policy efforts and projects activities. The EU mission still finds itself in an early phase, and it may be too soon to definitively conclude whether missions have a directional capacity in terms of values. The emergence and prevalence of values may still change in the coming years, and future summative analyses of end-results could more conclusively determine whether transformer missions redirect values of mission-oriented projects.

Third, although we conducted our data collection in 2024, it is important to point out that the list of identified projects for previous years, in particular 2023, may be incomplete due to indexation delays of the EU Mission Portal and CORDIS database. This is a common limitation of formative assessments, but we have tried to account for this by studying value change proportionally. That is to say, consider the number of projects per value as a share of the total number of projects (c.f., Fig. 4).

Fourth, our work presents some preliminary, empirical, and ambivalent evidence of the directional abilities of transformer missions in relation to the values found in mission-oriented projects. As such, our work opens up avenues for future research. For instance, missions are dependent on broad societal support. It would therefore be important to understand whether values in missions and projects align with stakeholder values. The wicked nature of societal challenges suggest that this is not necessarily the case, which could undermine the missions' legitimacy and ethical acceptability (Head, 2022; Wanzenböck et al., 2020). This inherently calls for a responsible research and innovation or ethics perspective on missions, as also suggested by various other scholars (e.g., Fielke et al.,

2023; Uyarra et al., 2019; Wiarda et al., 2024). This research line could moreover study how values support or conflict with one another. In our case, the values 'access to information', 'robustness', and 'effectiveness' were commonly conceptualized through innovative solutions – and thus the value of 'innovativeness' – which subsequently promote 'sustainability'. While such values may thus complement each other (as 'instrumental values'; van de Poel, 2021), we also speculate that mission values may be in conflict with each other. 'Effectiveness' could conflict with 'sustainability' if, suppose, the digital twin of the ocean would require vast amounts of energy. What value conflicts are present, and how these can be navigated are matters of future research.

6. Conclusion

This paper examines whether transformer missions redirect the values found in mission-oriented projects. As our case study, we have taken the EU Mission 'Restore our Ocean and Waters', and used probabilistic topic modelling and thematic analyses to identify and conceptualize values across 17 policy documents (i.e., strategic layer), 37 mission-*oriented* project, and 809 mission-*relevant* projects (i.e., operational layer). Subsequently, we traced how these values have changed during and after the implementation of the EU mission. This study thus provides early empirical and large-scale evidence of a mission's potential to redirect projects.

The results suggest that the directionality of this EU missions is ambivalent in terms of values. The mission led to the funding of more mission-relevant and mission-oriented projects, of which mission-oriented projects generally frame efforts in line with mission objectives. However, the results hint at a misalignment between values prioritized in these funded projects and the mission policy to which they are subjected. In addition, the values and value conceptualizations in mission-oriented and mission-relevant projects were highly comparable, which hints that missions-oriented innovation policy may fail to challenge existing value-systems of socio-technical regimes. Our analysis of value change shows that the mission launch marginally affected the relative importance of values in projects, pointing towards a limited directional ability.

These insights underscore the value-laden character of transformer missions and provide a rather conservative picture of a mission's directional abilities. If transformer missions are indeed limited in their ability to redirect mission-oriented projects and challenge socio-technical regimes, then this consequently questions their ability to transform socio-technical systems at large. Similar to the EU mission, many missions across the globe have recently been launched. Future research is therefore needed to better understand the directional and normative aspects of these missions.

CRediT authorship contribution statement

Martijn Wiarda: Writing – original draft, Visualization, Project administration, Investigation, Formal analysis, Conceptualization. **Tristan de Wildt:** Writing – review & editing, Software, Resources, Methodology, Data curation, Conceptualization. **Neelke Doorn:** Writing – review & editing, Supervision, Funding acquisition.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

Data will be made available on request.

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Appendix 1 – Mission specific targets, objectives, and enablers as formulated *in verbatim* by EC

Mission targets to be achieved by 2030:

1) Protect and restore marine and freshwater ecosystems and biodiversity, in line with the EU Biodiversity Strategy 2030:
   a) Protect a minimum of 30 % of the EU's sea area and integrate ecological corridors, as part of a true Trans-European Nature Network.
   b) Strictly protect at least 10 % of the EU's sea area.
   c) Restore at least 25,000 km of free-flowing rivers.
   d) Contribute to relevant upcoming marine nature restoration targets including degraded seabed habitats and coastal ecosystems.

2) Prevent and eliminate pollution of our ocean, seas and waters, in line with the EU Action Plan Towards Zero Pollution for Air, Water and Soil:
   a) Reduce by at least 50 % plastic litter at sea.
   b) Reduce by at least 30 % microplastics released into the environment.
   c) Reduce by at least 50 % nutrient losses, the use and risk of chemical pesticides.
3) Make the sustainable blue economy carbon-neutral and circular, in line with the proposed European Climate Law and the holistic vision enshrined in the Sustainable Blue Economy Strategy:
   a) Eliminate greenhouse gas emissions from maritime economic activities in the EU and sequester those emissions that cannot be avoided (net zero maritime emissions).
   b) Develop zero-carbon and low-impact aquaculture, and promote circular, low- carbon multi-purpose use of marine and water space.

The mission objectives and enablers to which funded projects can contribute:

- Enabler 1: Ocean digital knowledge systems
- Enabler 2a: Mobilization and engagement
- Enabler 2b: Raising awareness
- Objective 1a: Protect and restore marine and coastal ecosystems and biodiversity
- Objective 1b: Protect and restore marine and freshwater ecosystems and biodiversity
- Objective 2a: Prevent and eliminate pollution – Litter and microplastics
- Objective 2b: Prevent and eliminate pollution – Nutrients, chemicals, and pesticides
- Objective 3a: Blue economy – Multiuse of water space
- Objective 3b: Blue economy – Carbon-neutral and circular fisheries and aquaculture
- Objective 3c: Blue economy – Decarbonisation and ecosystem perspectives in maritime industries

Appendix 2 – Exemplary value conceptualizations

Sustainability

	Examples of value conceptualizations
Policy documents	• Ecosystems and biodiversity protection and restoration • Prevention and elimination pollution • Making a carbon neutral and circular blue economy
Mission-oriented projects	• Marine biodiversity restoration and protection • Elimination of pollution through circularity
Mission-relevant projects	• Protection and restoration of aquatic ecosystems and biodiversity • Climate resilience • Circular economy and blue economy

Robustness

	Examples of value conceptualizations
Policy documents	• Resilience of communities • Reliability and upscale-ability solutions • Standardization of data
Mission-oriented projects	• Stability of marine ecosystem's and water quality • Reliability and upscale-ability of solutions and business models, over time, and across regions
Mission-relevant projects	• Resiliency of ecosystems • Consistency of water quality • Resilient blue economy • Reliability of observation tools

Innovativeness

	Examples of value conceptualizations
Policy documents	• Innovations (e.g., green shipping, offshore wind energy) • Innovative business models

(*continued on next page*)

(*continued*)

	Examples of value conceptualizations
Mission-oriented projects	• Multi-purpose platforms that can host innovation • Quality of the solutions being developed, tested, or used • Innovative business models • Hub for knowledge exchange • Cascading grants for innovation
Mission-relevant projects	• Quality of the solutions being developed, tested, or used • Digital platforms • Promoting the demand for innovation in society

Access to information

	Examples of value conceptualizations
Policy documents	• The need for centrally collected and standardized data on regions • FAIR principles (i.e., Findable, Accessible, Interoperable, and Reusable) • Stakeholders' awareness of the mission
Mission-oriented projects	• Data collection and aggregation • FAIR principles • Knowledge transfer
Mission-relevant projects	• Data collection and aggregation • Data platforms • Media communication and training activities

Effectiveness

	Examples of value conceptualizations
Policy documents	• The success of the mission • Mission enablers (i.e., stakeholder engagement and digital twin of the ocean) • Effective inter-regional governance
Mission-oriented projects	• The effectiveness of solutions • The success of projects
Mission-relevant projects	• Effective protection and restoration efforts • Cost-effectiveness

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