Marine Policy 180 (2025) 106770

Contents lists available at ScienceDirect

Marine Policy

journal homepage: www.elsevier.com/locate/marpol

Learning across borders: Establishing transboundary coordination in Maritime Spatial Planning in the North Sea Region – Lessons from the NorthSEE project

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ARTICLE INFO

Keywords:
Transboundary planning
Public policymaking
EU-Interreg
Maritime Spatial Planning
North Sea
Learning

ABSTRACT

The diversity and intensity of human activities in the North Sea region (NSR) and other maritime regions are increasing. This necessitates transboundary coordination at the sea basin level, which is required but yet insufficiently established. Through European co-funded projects, national policymakers, stakeholders, and scientists in MSP are enabled to develop transboundary coordination (TBC) mechanisms. TBC requires, alongside other factors, a form of social and policy learning between these actors in different countries. The NorthSEE project (2016–2022) was an example of such an EU-co-funded project and was aimed at enhancing coherence in MSP processes and plans across the NSR. This article examines the project's key learning outcomes, the role of the MSP Challenge Simulation Platform in supporting these outcomes, and factors that enabled or constrained learning within the project. Data was collected during the project via document analysis, questionnaires from participatory stakeholder workshops, interviews with sixteen project participants and ten workshop participants, and observations. The study highlights that project participants have gained more insight into each other's planning systems, are able to contact each other more easily, and have initiated several follow-up initiatives. Furthermore, it shows that interactive and participatory tools, such as the MSP Challenge Simulation Platform, can contribute to individual and social learning by providing participants with instant feedback on their decisions. These learning outcomes have been influenced by various enabling and constraining conditions, including time, resources, and the differing levels of expertise and knowledge among project partners and participants. Assessing the broader societal impact remains a challenge and warrants further attention.

1. Introduction

Complex policy challenges, such as pandemics, refugee migrations, and river basin droughts or flooding, often extend beyond the jurisdictional boundaries of various government levels (EU, national, provincial, and sub-national). Addressing these challenges requires transboundary coordination (TBC) in public policymaking, as effective solutions cannot be formulated within a single level of government [40, 56]. TBC involves a governance process where different public organisations, alongside private actors like economic stakeholders and environmental non-governmental organisations (NGOs), collaborate across borders [56]. The need for TBC is also particularly evident in the marine domain, where activities in one country can have unintended consequences in others [25,56], highlighting the necessity for coordinated efforts. TBC is not only relevant between individual states, but also with respect to Areas Beyond National Jurisdictions (ABNJ) [18,44]

Within the marine domain, Maritime Spatial Planning (MSP) is an example of a policy and planning instrument that can be applied to manage the marine space coherently and ensure that human activities at sea develop in an efficient, safe, and sustainable manner [14–16]. In the last decades, MSP has become a dominant approach for marine management in the European Union (EU). In 2014, the EU MSP Directive (MSPD) came into force [16]. The MSPD emphasises the need for an integrated approach to manage the marine space, and for

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https://doi.org/10.1016/j.marpol.2025.106770
Received 29 March 2024; Received in revised form 9 May 2025; Accepted 14 May 2025
Available online 28 May 2025

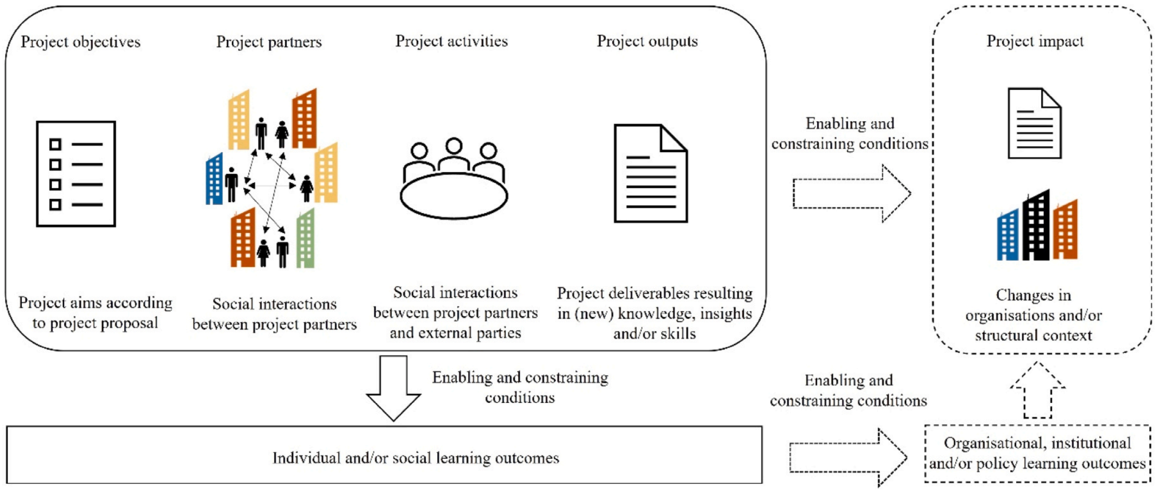

Fig. 1. Overview of linkages between project objectives, activities, outputs, outcomes, and impact, and various forms of learning.

(transboundary) cooperation between Member States (MS) to ensure the coherence and coordination of maritime spatial plans across a marine region ([16], Art. 11). However, transboundary cooperation faces several challenges, including a fragmented institutional framework [56], conflicting governance arrangements and policies at both the national and EU levels [19,56], disparities in stakeholder mobilization [2, 59], and a lack of data and information exchange [2,59]. Consequently, transboundary MSP (TMSP) is still in an experimental phase: *"Transboundary MSP is not yet an existing governance planning practice; it is in an experimental phase to explore the constraining conditions of TMSP and to develop best TMSP practices"* ([56]: 91).

Over the last decades, many experimental TMSP projects have been set up in the form of voluntary and co-funded pilot projects, including in the Baltic Sea, the Mediterranean, and Macaronesia [20,25,41,56]. These projects, often initiated and developed by researchers, are characterized by a learning-by-doing approach within a safe, informal, and controlled environment, and they aim to explore possibilities for developing institutional TMSP governance arrangements [25,39,56]. Cooperation within these projects relies on and promotes the exchange of knowledge, experiences, and information about various aspects, such as methods, practices, models, data, expertise, measures, ideas, and visions [34]. Even more, establishing coordinated efforts means participants in these transboundary projects must learn to work and think from a "transnational perspective" [24] ([34]: 19). While the need for learning is obvious, the extent to which learning within these transboundary projects actually contributes to TBC or primarily leads to symbolic outcomes remains unclear. This is influenced by various factors, including the feasibility of policy transfer [17], often constrained by institutional and structural differences between countries, as well as the extent to which the knowledge and lessons learned acquired by individual project participants are shared and effectively institutionalized within their respective organisations [10,58].

In this article, we have analysed the learning processes within the EU-Interreg NorthSEE (A North Sea Perspective on Shipping, Energy, and Environmental Aspects in Maritime Spatial Planning) project (2016–2022). The NorthSEE project is an interesting case study because it is one of the first TMSP projects in the North Sea region (NSR). It brought together authorities and research institutions with two main objectives: achieving greater coherence in maritime spatial plans and processes, and creating better conditions for sustainable development in the fields of shipping, energy, and environmental protection [36]. Additionally, the project developed and utilised interactive and participatory tools, including the MSP Challenge Simulation Platform. This platform is a multiplayer serious game, a game designed for purposes beyond pure entertainment [49]. The MSP Challenge Simulation Platform uses game technology, GIS data, simulation models, and role-play, enabling participants to collaboratively plan a sea area while receiving instant feedback from the system on certain indicators and through heatmaps [1,7]. By doing so, it aims to help participants to better understand and address the complexities of TMSP.

The main questions raised by this article are:

- What are the main project objectives and outputs, and what have participants learned within the transboundary MSP NorthSEE project?
- What role has the MSP Challenge Simulation Platform played within the NorthSEE project in general, and for learning within the project in particular?
- What are the enabling and constraining conditions for learning in the NorthSEE project, and what lessons can be drawn for future TMSP projects?

The outline of this article is as follows: Section 2 elaborates on transboundary coordination and learning and presents the concepts that serve as the basis for our analysis. Section 3 introduces our case study, the EU-Interreg NorthSEE project, and explains our research method. In Section 4, we discuss the main project objectives, outputs, and learning outcomes of the NorthSEE project, describe the experiences with the MSP Challenge Simulation Platform, and identify enabling and constraining conditions for learning. In the discussion section, the main results are discussed, and recommendations are provided for future transboundary projects. Finally, the conclusion section provides the main conclusions of this study.

2. Learning in (and through) transboundary MSP projects

Transboundary coordination in MSP can take various forms, including information sharing, the establishment of agreed-upon joint rules, and potentially even formal constitutions [32]. Currently, transboundary coordination mainly occurs through voluntary and EU-co-funded pilot TMSP projects [25,56]. These pilot TMSP projects function as temporary policy interventions, staffed by personnel from various (policy) organisations to accomplish specific tasks under time constraints [37]. The goal of these projects is to facilitate processes of joint learning, fact-finding, and analysis, which can lead to mutual understanding and trust among participants [19,25,41] and may result in a more structural form of transboundary coordination.

Although learning is often not seen as an explicit project outcome, its importance is recognized by both policymakers and scientists [30]. However, learning is multifaceted and can be defined in various ways that involve cognitive, normative, and behavioural changes at the individual level and within groups and organisations [3,4]. Hörnström et al. [24] state *"transnational learning implies that actors learn to work at new scales and in new types of networks in order to address certain issues of transnational importance better or they learn from other actors to address specific local or regional issues better"* [9,24]. This also means that actors should be able to learn across so-called *"boundaries"* [8], as actors tend to have "*different frameworks for understanding the world*" and "*different ways of thinking*" as a result of different socio-cultural and professional backgrounds ([6]: 34).

To understand learning in a transboundary MSP project, we build upon a multi-level framework developed by Vinke-de Kruijf (ibid, 2015). This framework, as shown in Fig. 1, consists of several components. First of all, it distinguishes between project objectives, project activities, project outputs, project outcomes, and project impacts. Project objectives define the overarching aims of the project, such as fostering collaboration and improving coherence in transboundary MSP. To achieve these objectives, various project activities are undertaken, including project meetings, stakeholder consultations, and field visits. These activities may result in tangible project outputs, such as reports, tools, and policy recommendations, which, in turn, contribute to broader project outcomes. These outcomes may lead to changes in knowledge, relationships, and practices among project partners and participants. Baird et al., distinguish between cognitive, normative, and relational learning outcomes [4]. Cognitive learning refers to the acquisition of new knowledge or the restructuring of existing knowledge, while normative learning involves changes in values, norms, and perspectives. Relational learning relates to a better understanding of others' thinking, relationship building, and increased trust and ability to cooperate among stakeholders [4,13]. Ultimately, these outcomes can lead to broader, long-term project impacts, such as sustained transboundary cooperation. Moreover, the knowledge exchanged or developed during the project can extend its influence beyond direct project participants, benefiting other individuals and organisations and fostering a wider societal impact [57,58].

Furthermore, within this framework, learning is conceptualised as a multidimensional process, as illustrated in the lower part of Fig. 1, distinguishing between individual, social, organisational, institutional, and policy learning. Individual learning is a process by which individuals acquire and/or develop new knowledge, skills, attitudes, or behaviours [57], while social learning can be defined as a process of iterative reflection by which individuals and groups learn from each other and can develop common values, beliefs, and practices through shared experience [3,28]. Individual and social learning can, in turn, contribute to organisational, institutional, and policy learning. Organisational learning refers to the learning that takes place within an organisation and is influenced by learning and interactions at the individual, group, and organisational levels [10,11]. Institutional learning, on the other hand, pertains to the learning processes that take place within institutions and shape their policies, structures, and practices over time [60]. Policy learning, in contrast, refers to a deliberate change in thinking about a particular policy topic [31], such as MSP.

These forms of learning are influenced by various enabling and constraining conditions, as depicted by the arrows in Fig. 1. Learning within a transboundary project does not occur automatically, and its application beyond the project is constrained by several factors. These include the knowledge and experience that different actors bring to the project [27], the willingness of actors to share this knowledge and experience, often influenced by the degree of trust [23], and the time and energy that actors are prepared to invest [35]. On the other hand, learning can be enhanced by reflective and participatory processes [13,28,40], where participants reflect on hands-on experiences through activities such as site visits, informal contacts, small group work, and frequent meetings [57,61]. Furthermore, participatory tools are essential for fostering mutual understanding among participants [13,46]. This also relates to the use of boundary objects, such as interactive maps, models, and serious games, which offer means to align different perspectives and interests [29,53] and enable learning across boundaries [5,8].

Whether individual and/or social learning leads to organisational, institutional and/or policy learning depends on factors related to both individuals and organisations, as not every organisation is equally well-equipped to adapt or learn [52]. This also depends on whether individuals have sufficient time and resources to learn, and whether they are able to share their insights effectively with others [42]. To ensure that learning has a broader societal impact in MSP, intra-organisational learning is required. Since MSP policies are often developed by multiple organisations [55], learning also has to cross different organisational boundaries [2]. Furthermore, political support and a direct link to formal decision-making processes further enhance the impact of these projects [57,58].

3. Materials and methods

3.1. Case study description: the EU-Interreg NorthSEE project

In this article, we focus on the multi-year EU Interreg NorthSEE project for transboundary coordination in MSP in the North Sea region. The objective of the NorthSEE project was to achieve greater coherence between maritime spatial plans and processes in the NSR and create better conditions for sustainable development in the field of shipping, energy, and environmental protection [36]. Furthermore, the NorthSEE project facilitated opportunities for mutual learning and aimed to initiate a long-term process of MSP coordination in the NSR [36]. Fig. 2 provides an overview of the project timeline (see Annex for dates). Below, we give a description of the project context and project approach.

NorthSEE project partners and actors

The NorthSEE project consisted of 13 project partners from seven North Sea countries, including Belgium, the Netherlands, Germany, Denmark, Sweden, Norway, and Scotland. These partners represented a mix of national and regional authorities as well as knowledge institutes. England was not formally part of the project due to Brexit. In most cases, the participating national authorities were the authorities responsible for MSP in the respective country, while in some instances, the national MSP authority was represented by another organisation. The province of North Holland in the Netherlands, a regional authority, participated on behalf of the North Sea Commission by establishing a link with regions within the North Sea region. The project management was outsourced to a consultancy agency.

Project partners joined the NorthSEE project for various reasons, as highlighted during interviews. Some national authorities indicated a strategic reason: the EU MSP Directives' obligation to cooperate at the North Sea level. Other partners highlighted instrumental reasons, such as opportunities to cooperate on transnational linear infrastructure, such as shipping, offshore wind energy, and power grid management. For some knowledge institutes, participation in the project was attractive due to the project's highly interdisciplinary and international character at the interface of science and policy, which offered opportunities for experimentation with interactive and participatory learning tools.

The composition of the project participants varied widely, partly due to the various project objectives and interests. Many project participants were not familiar with each other prior to the project, except for some who met, for instance, in European working groups. Some project participants were responsible for the national MSP process, but this was not

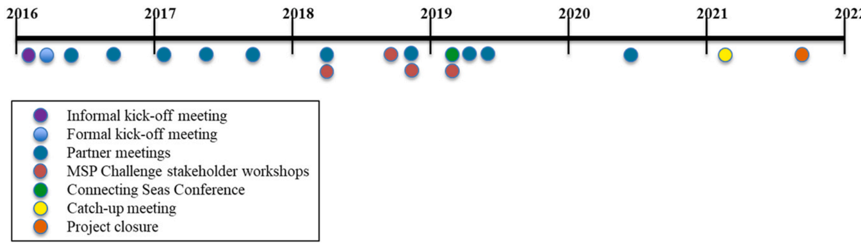

Fig. 2. NorthSEE project timeline, including project meetings and MSP Challenge workshops.

true for all participants from the national MSP authorities. Also, some individuals had extensive experience with MSP, whereas for others, this was their first introduction. The backgrounds of the participants were also diverse, ranging from technical backgrounds to social science backgrounds.

In addition to the project partners, external actors were engaged throughout the project primarily through workshops and the Connecting Seas conference.[1] These include stakeholders from the private sector (e.g., offshore wind industry and NGOs), the research sector (e.g., universities), and the public sector (e.g., government agencies and regional representatives).

Project activities and approach

The NorthSEE project was divided into several work packages (WPs) and activities; these activities were further refined during the initial project meetings. Within these WPs, project participants worked together in small groups on project outputs (e.g., deliverables), whereby the (intermediate) results were presented and discussed during the project meetings. During the project's lifespan, nine on-site partner meetings, each lasting one to three days, were held (see Table 1 in Annex). Furthermore, four interactive workshops with stakeholders were organised, each lasting one to two days, featuring the serious game MSP Challenge Simulation Platform. Finally, the project outcomes were presented at the Connecting Seas Conference.

The NorthSEE project followed a three-step approach as shown in Fig. 3. Firstly, it aimed to comprehend the existing transnational coherence, or lack thereof, among national maritime spatial plans in the North Sea countries. Secondly, future energy, shipping, and marine environment trends were identified. Lastly, the insights from the previous steps resulted in recommendations for MSP processes and suggestions for creating synergies and avoiding incompatibilities between national maritime spatial plans (see [36]).

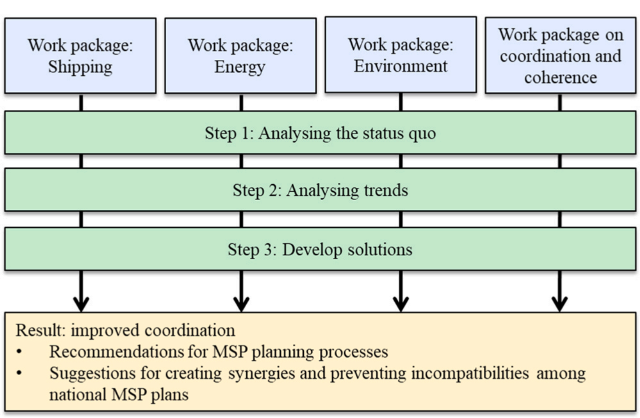

Fig. 3. Overview of NorthSEE project activities and approach (source: NorthSEE project).

Throughout the project, a variety of methods were developed and applied. These ranged from traditional approaches, such as presentations and analytical studies, to more innovative methods, including the Living Q method and the MSP Challenge serious games. Although not a formal project deliverable, the Living Q method was developed in the early stages of the project to bring actors together in a playful setting and explore differing viewpoints on MSP [50]. The MSP Challenge Simulation Platform, on the other hand, was developed by BUAS (a project partner) with input from other project partners and external stakeholders and was used to gather stakeholder input and facilitate mutual learning. In this article, we give special attention to the MSP Challenge Simulation Platform, as it was a key project deliverable, played a prominent role in the four stakeholder workshops, and is part of the lead author's PhD research.

3.2. Data collection methods

For this study, we used different methods to collect data to evaluate the project outputs and learning outcomes of the NorthSEE project. We conducted a document analysis of various outputs produced by the NorthSEE project, as well as internal meeting reports. Additionally, we conducted 16 semi-structured interviews with key project participants and 10 semi-structured interviews with participants from stakeholder workshops, each lasting approximately 1,5 hours. These interviews were mostly carried out remotely, with a few exceptions. We also analysed the pre- and post-game questionnaires completed by participants from the four MSP Challenge Simulation Platform workshops held during the project (see Annex). Furthermore, the lead author took notes during these workshops, and a brief workshop report was compiled for each of them (not published).

The questionnaires and interviews aimed to capture perceptions of learning. Workshop participants were asked to complete three questionnaires: one before the workshop, one immediately after, and another approximately six to nine months later. The questionnaires primarily consisted of statements using a 5-point Likert scale (ranging from strongly disagree to strongly agree), covering topics such as materials and facilitation, gameplay enjoyment, various MSP aspects, and adjustments made during the game (see Tables 3–6 in Annex). Several statements were combined during the analysis to form specific constructs, such as 'MSP Understanding' and 'Gameplay Enjoyment', which represent a synthesis of various related individual statements. Additionally, qualitative, semi-structured interviews were conducted with selected participants six to twelve months after the workshops to explore their views on the necessity of participatory and decision-support tools, as well as their perspectives on the MSP Challenge. By conducting these interviews at a later stage, it was also possible to ask whether they still remembered the workshop and if they found it useful (see Annex for an overview of the interviews and interview questions).

In addition to workshop participants, we also interviewed 16 project participants approximately 1.5 years after the Connecting Sea

[1] The Connecting Seas Conference was a joint conference of the EU Interreg NorthSEE project and its sister project in the Baltic Sea, named EU Interreg BalticLINes. The conference took place at 13 and 14 February 2019 in Hamburg, Germany. https://northsearegion.eu/northsee/connecting-seas-conference-2019/

Conference. The goal of these interviews was to gather their key learning outcomes, evaluate the project's impact, and capture their perspectives on the role and experiences with the MSP Challenge Simulation Platform. Various statements and questions regarding organisational learning were also posed to assess whether and how the project's results and lessons learned were shared with others, in order to evaluate the broader impact of the project (see Annex for an overview of interviews and interview questions).

4. Results: learning in the NorthSEE project

In this section, we discuss the results based on the multi-level framework in Fig. 1. We will first briefly address the project objectives, activities, outputs, outcomes, and impacts, with a particular focus on the MSP Challenge Simulation Platform workshops and various learning outcomes. Subsequently, we will discuss the enabling and constraining conditions that have been identified.

4.1. Project objectives

The NorthSEE project aimed to achieve greater coherence between maritime spatial plans and processes in the North Sea region as well as to create better conditions for sustainable development in the fields of shipping, energy, and ecology [36]. The general sentiment of the interviewed project participants is that these objectives have been partially achieved. While the NorthSEE project did not directly lead to a unified planning practice and culture, it played an instrumental role in helping project participants understand each other's planning systems, worldviews, and perspectives on MSP and in building relationships. This is particularly evident in the various follow-up projects, an informal shipping expert group, and the North Sea Region MSP Collaboration Group (see also Section 4.4). According to a project participant of a national authority, the initial informality of the project may have been necessary to foster a more structural transboundary collaboration.

4.2. Project activities – MSP Challenge Simulation Platform

Within the project, various activities were undertaken, as previously explained. Here, we focus primarily on the role and outcomes of the four MSP Challenge Simulation Platform workshops. The MSP Challenge Simulation Platform served various functions throughout the project, and the focus of these functions evolved over time. At the start of the project, the MSP Challenge Simulation Platform was used to get familiar with each other, discuss the concept of MSP, and define the role and objectives of the MSP Challenge within the project (e.g., its purpose and desired capabilities). During the development phase, it facilitated the integration of GIS data from different countries, initiating discussions about data gaps, inconsistencies, "must have" versus "nice to have" data, and terminology. Additionally, the MSP Challenge Simulation Platform was used in four stakeholder workshops (see Table 1). Participants of these workshops were tasked to jointly develop a maritime spatial plan for their country taking into account various objectives. In this process, participants had to communicate, persuade, and negotiate with each other. These interactions fostered both individual and social learning among the participants.

The findings of the stakeholder workshops show that, in general, participants gained a better understanding of MSP and enjoyed the workshops (see Figs. 4 and 5). The degree of learning, reflected in MSP understanding, varied between workshops and participants. For instance, the figures indicate that the shipping workshop scored the highest in 'MSP understanding' and 'Gameplay enjoyment,' whereas the Connecting Seas workshop received the lowest score in 'MSP understanding,' and the ecology workshop scored the lowest in 'Gameplay enjoyment.' This variation can be attributed to several factors, including the experience and background of the participants (which varied both between and within workshops), the workshop set-up (e.g., differences in facilitation, duration, and explanations), and the MSP Challenge Simulation Platform itself (e.g., credibility, easy to use, transparency). This indicates that the interplay between the tool, the workshop design, and the context in which the tool is applied determines the efficacy of the tool.

The impression of the MSP Challenge Simulation Platform was, in general, positive. According to several workshop participants, the serious game conveyed the complexity of MSP in a simple, enjoyable, and visual manner. The MSP Challenge Simulation Platform demonstrated how short-term decisions in one country can have unintended consequences in other countries, with some effects only becoming visible over time. The serious game also required participants to make joint decisions and prioritise activities due to spatial constraints, which an NGO participant highlighted as a significant advantage. To paraphrase his/her words: the MSP Challenge Simulation Platform illustrates that not all spatial demands are possible due to spatial constraints and that participants must make choices and set priorities. This is a major advantage of the serious game over more traditional workshops where everyone writes down their interests on a 'sticky note'. Another NGO participant mentioned that playing with other actors in a team, such as a policy officer, gave more insight into the views and priorities of these other actors.

However, some participants were more critical. According to some project participants, certain workshops were less well-organised due to a poor mix of participants and unclear objectives. For some participants, especially those with little or no experience with MSP or computer systems, the learning curve may have been too steep. While some participants faced challenges with the computer system, others did not encounter difficulties. This variation is also reflected in the post-game questionnaires by the statement "Navigation through the user screens (interfaces) was easy to use," while the results of the statement "As the game progressed, it became easier to navigate in the game" indicates that participant became more familiar with the system during the game (see Table 3 and 6 in Annex). Additionally, various workshop participants and project participants suggested improvements, such as incorporating additional data layers, providing more insight into the underlying models, and including other ecological indicators (such as the Marine Strategy Framework Directive (MSFD) descriptors). Some of the recommendations made seem contradictory: more data yet simpler interfaces, more detailed information yet quicker outcomes.

However, it should be noted that the workshops are difficult to compare because each workshop had a different combination of participants and a different thematic focus. In the ecology workshop, participants with high MSP involvement were joined by those with little or no experience. In the Connecting Seas workshop, the presence of participants who had attended previous workshops — and were thus already familiar with MSP — might explain the lower scores for MSP understanding compared to those of the other workshops. Furthermore, the MSP Challenge Simulation Platform was still under development, with several modules yet to be completed, and experimentation was ongoing to determine the optimal workshop design, including workshop duration and explanation length.

4.3. Project outputs

The NorthSEE project has resulted in various project outputs, such as thematic reports, infographics, the MSP Challenge Simulation Platform, scientific articles, and videos. These deliverables include both thematic-specific and cross-thematic outputs. Table 2 provides an overview of these outputs per work package. The number of outputs of ecology is lower than anticipated because of the exit of the project partner responsible for this work package (see also Section 4.6). Some outputs, such as the Living Q method and paper, were not initially foreseen, but have emerged during the project as a tool to discuss MSP in a fun and interactive way [50].

The project outputs "MSP Comparative Analysis Table" and "MSP

Table 1
Overview of NorthSEE MSP Challenge Simulation Platform workshops.

Workshop	Number of participants	Type of participants	Duration	Location	Date
NorthSEE Ecology workshop	± 30	Planning authorities, scientists/researchers, stakeholders (NGOs), North Sea Commission	One day	Texel, The Netherlands	April 2018
NorthSEE Energy workshop	± 17	Planning authorities, scientists/researchers, stakeholders (energy), North Sea Commission	Two x half-day	Aberdeen, Scotland	October 2018
NorthSEE Shipping workshop	± 11	Planning authorities, scientists/researchers, stakeholders (shipping).	Two x half-day	Malmö, Sweden	November 2018
Connecting Seas workshop	± 33[a]	Planning authorities, scientists/researchers, stakeholders.	One day	Hamburg, Germany	February 2019

[a] This was a combined workshop with the EU-Interreg BalticLINES project. Only the questionnaires from NorthSEE participants were included in the analysis.

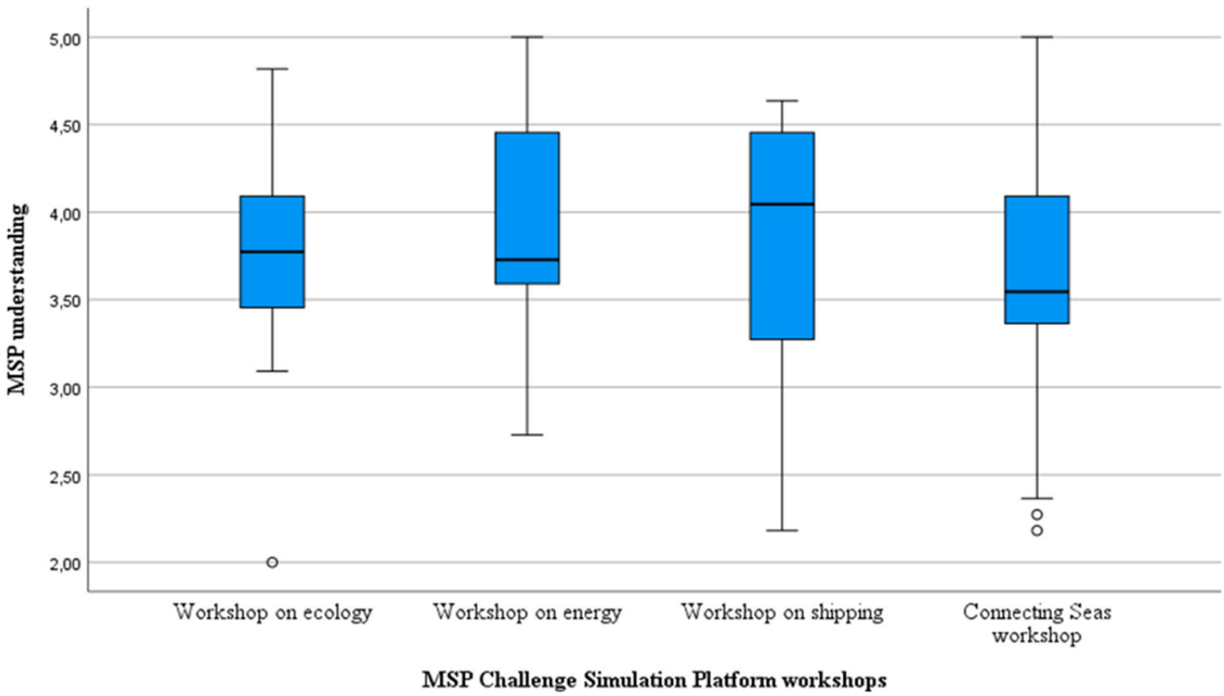

Fig. 4. Distribution of MSP understanding results per workshop.

process drawings and descriptions" revealed significant variations in MSP practices between the North Sea countries. These differences relate, among others, to governance, stakeholder engagement, the use of decision-support tools, and monitoring & evaluation. The "MSP Timeline Comparative Analysis" further shows that the North Sea countries are at different stages of the MSP process and have varying levels of experience with MSP. For instance, Denmark and Sweden were working on their first maritime spatial plan, while Belgium and the Netherlands were in their third or fourth plan cycle. Additionally, the report "The role of regions in MSP within the North Sea" demonstrates that regions are involved in the MSP process in different ways.

Furthermore, several thematic-specific studies were conducted during the project. For example, the "Marine Protected Areas: Connectivity Study" provides insights into the potential connectivity between the marine protected areas (MPAs) in the greater North Sea and Celtic Seas regions. The energy reports offer insights into national objectives, approaches, and future trends regarding energy policy in the North Sea countries, highlighting substantial renewable energy ambitions for the region. The shipping reports present insights into current shipping routes, the different approaches used regarding safety distances between shipping routes and offshore renewable energy installations, and future trends and developments. The "Transnational Maritime Spatial Planning in the North Sea: The Shipping Context" report highlighted mismatches between shipping routes and AIS data.

4.4. Project outcomes

These various project activities and outputs have contributed to individual and social learning outcomes, including examples of cognitive, normative, and relational learning. All interviewed project participants reported learning within the NorthSEE project, both individually and as a group. When asked, "What did you learn from the NorthSEE project?", they provided a range of answers. Project participants reported gaining knowledge about various MSP aspects and thematic-specific topics such as shipping, energy, and ecology. The majority of the learning outcomes described by project participants relate to cognitive learning. Table 3 provides an overview of examples mentioned. A key cognitive learning outcome frequently mentioned by project participants was gaining insights into the different planning systems used across the North Sea countries. The specific examples varied widely, demonstrating that

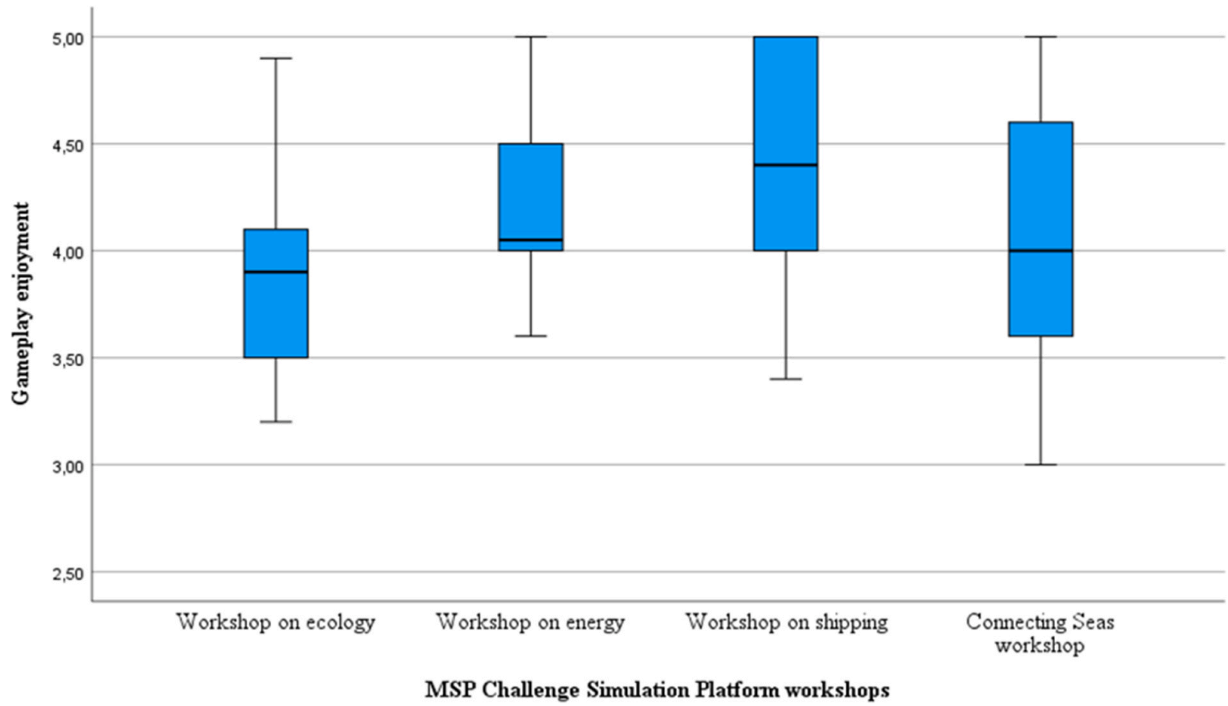

Fig. 5. Distribution of gameplay enjoyment results per workshop. Note by figures: The dark center line denotes the median value (50th percentile), while the blue box contains the 25th to 75th percentiles of the dataset. The light black whiskers mark the 5th and 95th percentiles, and values beyond these upper and lower bounds are considered outliers.

learning is both individual and context-dependent; this is not surprising given the diverse backgrounds and knowledge levels among the project participants.

While normative learning outcomes – changes in values, norms, and perspectives – were less directly observable, some project participants have expressed an increased awareness of the need for improved alignment and coordination in MSP practices. One participant noted a growing realisation that activities in one country can have cross-border implications, some of which only become visible over time. At the group level, it became evident that perceptions of what MSP is or should be differed between project participants. This diversity of perspectives was highlighted in the 'Living Q′ exercise, which revealed varying worldviews among participants, even among those working within the same organisation [50]. While some viewed MSP primarily as a social endeavour, others emphasized its technical aspects, mentioning the importance of data and information (see also [50,51]. Discussing these viewpoints allowed participants to better understand each other's priorities. The exercise also showed the value of new interactive and participatory methods developed within the project.

In some cases, cognitive insights led to concrete actions. For instance, the identified mismatches between shipping routes and AIS data (see the above-mentioned report) prompted further investigation. This has led shipping experts from various North Sea countries to come together and discuss these potential mismatches, resulting in more regular consultations among these experts. This did not exist prior to the NorthSEE project. These types of developments reflect relational learning. Several project participants also indicated that the project facilitated improved communication among participants. Many noted that they now find it easier to contact each other and maintain ongoing communication. Furthermore, one project participant mentioned that through contacts made within the NorthSEE project, their organisation was now involved in the national MSP process. These enhanced interactions have fostered lasting networks and long-term relationships among various project participants and led to the initiation of several follow-up and newly developed MSP projects, such as Knowledge Flows,[2] eMSP NBSR,[3] and NORSAIC.[4]

In addition to these individual and social learning outcomes, several project participants working at national authorities mentioned in the interviews that the NorthSEE project has, to some extent, contributed to their national MSP processes and policy learning. A participant from a national authority mentioned that the project's results and experiences unconsciously influenced the development of a new national maritime spatial plan, as insights from the project reminded them of how other countries approach MSP. Another national authority participant indicated that they now place greater emphasis on the long-term effects of their national maritime spatial plan, while the project findings regarding shipping were incorporated into the national MSP policy processes of multiple countries. However, another project participant from a national authority also expressed that the impact of the NorthSEE project on national maritime spatial processes and plans could have been greater if individuals within the project had been more directly involved in these processes. Moreover, the project contributed to the establishment of the North Sea Region MSP Collaboration Group (NSR MSP CG). This group serves as a platform for exchanging ideas and collaborating on MSP issues, acting as a permanent mechanism for transboundary

[2] The Knowledge Flows project (2019–2022) aims to further strengthen the EU higher education community's ability to meet the growing demands for knowledge, skills, and innovation in MSP (https://www.msp-education.eu).

[3] The eMSP NBSR project (2021–2024) aims to support the coherence of maritime policy and maritime spatial plans in the North and Baltic Sea regions (https://www.emspproject.eu/).

[4] The NORSAIC project (2023–2026) aims to improve cooperation and governance in MSP by adapting and advancing crucial MSP elements, establishing innovation capacity, and building joint cooperation capacity. For more information see: https://www.interregnorthsea.eu/norsaic.

Table 2
Overview of main NorthSEE project outputs.

Work packages	Project outputs
Shipping	• Infographic on the spatial planners guide to distances between shipping & offshore renewable energy installations (Nov. 2017) • Infographic on 4 shipping industry trends (in cooperation with BalticLINes) (Jan. 2018) • Report on Transnational Maritime Spatial Planning in the North Sea: The Shipping Context (March 2018) • Report on Improving the co-existence of offshore energy installations & shipping (June 2018)
Energy	• Report on Status quo report on offshore energy planning provisions in the North Sea region (March 2018) • Report on status quo report on offshore linear energy infrastructure in the North Sea region: grid cables, electricity interconnectors and pipelines (May 2019)
Ecology	• Report on Marine Protected Areas: Connectivity Study (Dec. 2018)
MSP systems	• Schematic exploratory overview of current MSPs (Feb. 2016) • Report on MSP process drawings and descriptions (Dec. 2016) • Report on MSP timeline – comparative analysis (Sept. 2018) • Planning Criteria overview tables (General MSP, Energy, Grid & Interconnectors, Shipping, and Environment) (April 2019) • Report on A comparative analysis of spatial planning designations in the North Sea countries (June 2019) • Report on Building, balancing, fitting and calibrating a simplified Ecopath with Ecosim North Sea model for the MSP Challenge Simulation Platform (Aug. 2019) • Report on The role of regions in maritime spatial planning within the North Sea (Oct. 2019) • Report on Scientific Support in the MSP process (Oct. 2021)
Other	• NorthSEE project flyer (Sept. 2016) • NorthSEE project poster (Sept. 2016) • Scientific article on Linking Marine Ecosystem Services to the North Sea's Energy Fields in Transnational Marine Spatial Planning (June, 2018) • Scientific article on The 'Living Q'—An Interactive Method for Actor Engagement in Transnational Marine Spatial Planning (July, 2018) • Brochure on NorthSEE project interim findings (Dec. 2019) • NorthSEE project results video (Oct. 2021) • MSP Challenge Simulation Platform

Note: these project outputs can be downloaded at the website: https://northsearegion.eu/northsee

cooperation in achieving functional coherence in MSP across the greater North Sea region [45].

4.5. Project impact

The societal impact of the NorthSEE project—the impact beyond the project itself (right side of Fig. 1)—is challenging to assess. These impacts typically unfold over time, and are rarely the result of one specific event or project. Nevertheless, the project has contributed to key outputs and outcomes that may serve as a foundation for longer-term effects. Notably, the aforementioned establishment of the NSR MSP Collaboration Group represents a tangible outcome with the potential to support more coherent and sustainable MSP in the North Sea region.

4.6. Enabling and constraining conditions

Based on the interviews, various enabling and constraining conditions were identified. Table 4 provides an overview, highlighting aspects that can both facilitate and hinder learning. The project's budget enabled key activities such as traveling, organizing in-person meetings, and developing specific reports and methods. These in-person meetings provided valuable social spaces for knowledge exchange among project participants and fostered a "we-feeling" (comment project participant from university). A representative from a national authority emphasised that this level of connection would not have been possible through emails or bilateral meetings alone. These in-person meetings were

Table 3
Examples of learning outcomes mentioned by project participants in interviews.

MSP process	• Gaining insight into the MSP process of the various North Sea countries. • Gaining insight into the organisations involved in the MSP process in the different North Sea countries. • Gaining insight into data mismatches and challenges for gathering North Sea-wide GIS data. • The importance of an interdisciplinary MSP team.
MSP content	• Gaining insight into the MSP planning systems of the various North Sea countries, including the challenges, solutions, and priorities of the various North Sea countries. • Gaining insight that certain decisions can have far-reaching consequences beyond the countries' own EEZ. • Gaining insight that there are significant differences between regions in terms of authority and involvement.
Thematic-specific content	• Gaining insight into the connectivity between MPA's in the North Sea region. • Gaining insight into what is needed to develop an offshore wind farm, including cables and onshore sockets. • Gaining insight into the mismatches between shipping routes and AIS data.
Other content or process-related learning	• Gaining insight into the EU Interreg program. • Gaining insight into the usefulness of serious games. • Gaining insight into the political landscape outside of the project. • Gaining insight into the role of individuals in the process. • Personal learning experiences (project management, facilitation of workshops, etc).

essential for mutual learning. However, at the same time, the variation in the time and budget of individual project partners dedicated to specific tasks or meetings can be considered a constraining factor. For instance, the NorthSEE project was influenced by (political) developments in the NSR, such as Brexit and the North Seas Energy Cooperation political declaration. These developments and other MSP-related projects launched during the same period required personnel who were initially allocated to the NorthSEE project. Furthermore, variations in the stages of national MSP processes across participating countries posed challenges. Consequently, some project partners had lower-than-anticipated capacity, and some MSP authorities were represented by other organisations. As a result, first-hand knowledge and information were not always readily available.

The participants' diverse knowledge levels and professional backgrounds enriched the project's learning process by fostering complementary expertise and facilitating mutual exchange during meetings and workshops. However, these differences also presented challenges, according to some, occasionally limiting knowledge exchange to a superficial level. This might also be inherent to the interdisciplinary nature of MSP, which requires contributions from both generalists and specialists. It can also be attributed to the various reasons project partners participated. While some organisations were more interested in shipping, others focused primarily on energy, leading to varied backgrounds and interests among the project partners and participants. To overcome these challenges, multiple individuals and/or organisations from each country should participate in the project, but this may result in other challenges, such as the manageability of the project.

The Living Q exercise and the MSP Challenge Simulation Platform provided valuable insights into the differing perspectives of project participants and facilitated individual and social learning across disciplinary and organisational boundaries. However, effectively applying these methods requires thorough preparation of the workshops. In addition, for several MSP Challenge Simulation Platform workshops, it was difficult to bring together a representative group of stakeholders; possibly due to the international nature of the project, as well as the fact

Table 4
Identified enabling and constraining learning conditions within the NorthSEE project.

Factor	Enabling and/or constraining condition	Explanation
Time and resources	Enabling	Funding allowed project participants to travel, participate in meetings, and produce outputs.
	Constraining	Not all project partners had enough time to devote to the project due to other obligations and/or priorities.
Diversity of project participants	Enabling	The variety of expertise made it possible to share knowledge with each other on various MSP aspects, allowing project participants to complement each other.
	Constraining	The varying backgrounds and expertise of project participants sometimes made knowledge exchange superficial.
Interactive and participatory tools	Enabling	The tools used contributed to individual and social learning by making the complexities of MSP visible and tangible.
	Constraining	The complexity of the MSP Challenge Simulation Platform may have hindered learning for some participants due to a too steep learning curve.
In-person meetings	Enabling	The in-person meetings enhanced the sharing of knowledge, experiences, and information among project participants.
Missing project partners	Constraining	Some countries (England) were not participating, while other MSP authorities were represented by other organisations.
Exit of a project partner	Constraining	The exit of a project partner caused delays and unfinished outputs.
Different time scales between countries	Constraining	Countries were at different stages in completing or updating their national maritime spatial plans.
Focus on project outputs	Constraining	Learning was not an explicit project objective. Instead, the focus was on achieving predefined project outputs.

that stakeholders had many national MSP commitments, resulting in stakeholder fatigue. Additionally, another project participant highlighted that finding the right format for discussions during partner meetings was sometimes challenging. He/she mentioned that it was difficult to engage participants with the right mindset, and that some individuals struggled to step out of their roles as organisation representatives.

During the project's lifespan, staff turnover and institutional changes posed further challenges. For example, the exit of the project partner responsible for the ecology work package led to delays and unfinished outputs. A project participant from a national authority pointed out that under an EU set-up, learning is often not perceived as a project output or outcome, and that the focus of these projects is mainly on achieving deliverables. This became evident during a partner meeting where various presentations were given by external parties, which took a bit more time than planned. While informative, this was not appreciated by everyone at that specific moment, as the progress of the different work packages still needed to be discussed.

In addition, the project's impact can be enhanced through the sharing of project results and lessons learned with others. Several project participants indicated the importance of learning and knowledge sharing, but the extent to which project participants were given time by their organisations for learning and reflection varies among partners (see statements on individual and organisational learning in Fig. 6). All project participants indicated that they disseminated the results and outcomes of the NorthSEE project to colleagues and/or external parties, but the methods and extent of this dissemination varied among individuals. Many project participants shared information via email, presentations at conferences, or within their respective organisations. This means that individuals both within and outside partner organisations may have benefited from the NorthSEE project. However, a participant from a national authority underscored the personal effort required for effective knowledge dissemination: *"If the project ends, and you only have a report, then you do not know if others will learn from it."*

5. Discussion

In this section, we present our main findings in light of other research and provide recommendations for future transboundary projects.

5.1. Transboundary coordination mechanism and learning

The NorthSEE project is one of several EU-co-funded TMSP projects that have been implemented over the past decades. Our results show that the project has led to various outputs and contributed to cognitive, normative, and relational learning outcomes. Although it is challenging to make quantitative statements about the extent of learning—given that learning is person-dependent and contextual—our findings align with those from other TMSP projects in different sea regions, such as Baltic Scope, Pan Baltic Scope, and SIMWESTMED [41]. According to Moodie and Sielker, these TMSP projects have successfully contributed to developing a common language, enhancing trust and understanding, and knowledge exchange between national authorities [41].

However, as previous research has shown, trust and effective collaboration require time, repeated interaction, and continuity [23,35,57]. It is therefore not surprising that the NorthSEE project's objectives were not fully achieved within the project's lifespan. In transboundary projects, depending on collaboration and trust-building among project participants, it is essential to continue efforts beyond the project's duration to make further progress in transboundary cooperation. We found that the NorthSEE project has helped to establish lasting networks and long-term relationships among various project participants, because of several follow-up projects and the creation of the North Sea Region MSP Collaboration Group.

More recently, the launch of the Greater North Sea Basin Initiative (GNSBI) represents a promising step toward strengthening transboundary coordination in the region. The GNSBI offers a platform for regular regional dialogue and the exchange of knowledge and best practices among Greater North Sea countries and across sectors [21]. In addition, the recently launched Northern European Sea Basins (NESB) project supports the GNSBI by fostering stronger collaboration both within the North Sea region and between the North Sea and Baltic Sea regions [43]. Hence, to ensure lasting impact, it is crucial that the lessons learned through these projects and initiatives are followed up and become institutionally embedded. Transboundary MSP should not remain dependent solely on temporary, project-based funding. Instead, the EU and its Member States must recognise the strategic importance of transboundary cooperation and commit to its long-term consolidation and development.

5.2. Use of participatory tools

Several participatory and decision-support tools for MSP exist [47]. However, they are often applied at the national level and are frequently criticized for being perceived as black boxes [48,54]. The findings of this study demonstrate that the MSP Challenge Simulation Platform is well-suited to providing interactive and visual insights into MSP, while also contributing to both individual and social learning. This is

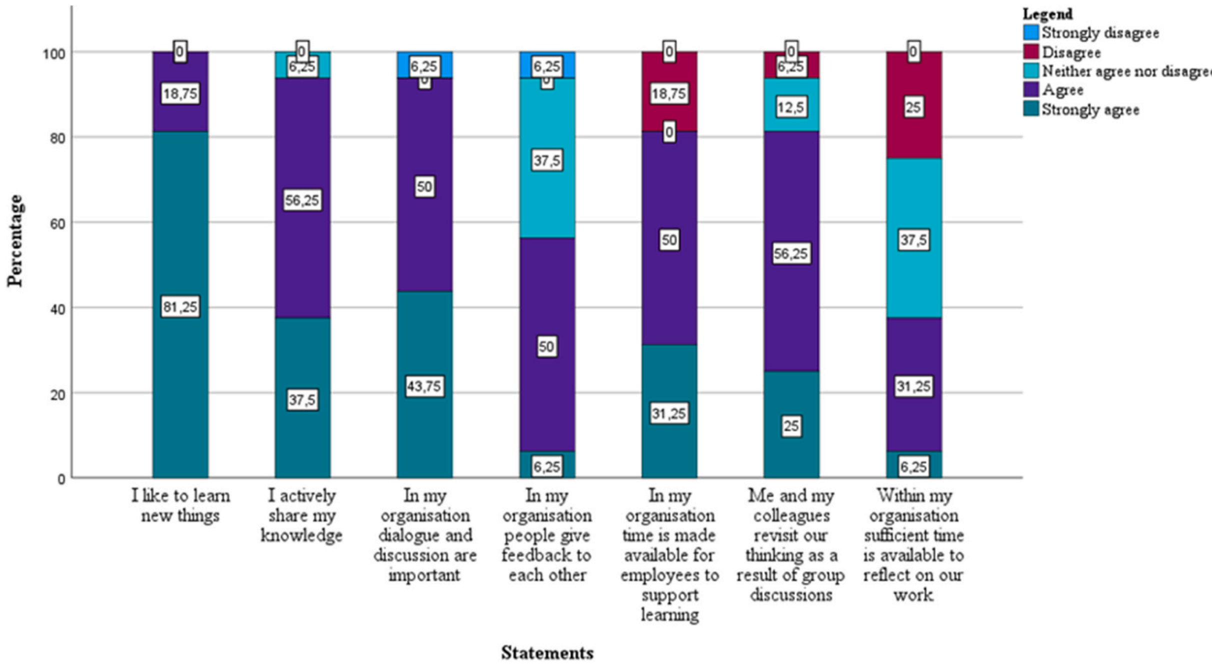

Fig. 6. Results of project participants' answers on individual and organisation learning statements.

supported by various other research on serious games [12,26,38]. However, our findings also indicate that the efficacy of these tools depends not only on their design but also on the design of the workshop and the context in which they are applied [29]. This necessitates a critical reflection on which tool to use, when to use it, and in what manner, acknowledging that there is no one-size-fits-all solution. Some challenges encountered in the NorthSEE project—such as difficulties navigating the computer system—were addressed in other projects by, for instance, assigning specific tasks to technical support staff. Furthermore, various improvements were made in follow-up projects to enhance the system's look and feel and capabilities. Since 2021, a digital version of the MSP Challenge Simulation Platform has been available, enabling the game to be played online and eliminating the need for participants to travel. However, this also limits face-to-face interaction, which is particularly important in settings where participants are not yet familiar with one another. The evaluation of these workshops, as well as the influence of game design choices, requires further research.

5.3. Future transboundary projects

This research has also identified several enabling and constraining conditions for learning in TMSP projects. One constraining factor, mentioned explicitly by a NorthSEE project participant, is that learning is not always considered a result, as the focus tends to be on delivering predefined project outputs. While this challenge can largely be addressed by allocating more time to learning activities, doing so reduces the time available for other project tasks. This underlines the importance of making strategic choices and critically considering the objectives of the project, even if this means that some project partners may not participate. This also aligns with Kull et al., who emphasize an 'issue-driven approach' over a 'one-size-fits-all' strategy, meaning that resources should be directed toward specific issues or problems that require joint action [33].

Another key consideration for future transboundary projects is how individual and social learning can be transferred into organisational, institutional, and policy learning. Guentner and Harding argue that it is too easily assumed that individual learning in co-funded projects will automatically lead to organisational learning and, subsequently, to changes in policy and practice [22]. However, for this to happen, it is important that the project outputs and lessons learned are shared beyond the immediate project partners and participants [57,58]. This study shows that while various participants have shared project results with colleagues and external parties, the extent and methods of dissemination vary. A common criticism is that project outputs are often left unused, sitting 'on the shelf.' While there may be valid reasons, the importance of dissemination and knowledge integration should not be underestimated. Both individual project participants and their organisations have a crucial role to play in addressing this challenge. Therefore, it is important for them to consider the following questions before the start of a project: What do I want to achieve from the project? What knowledge exchange do I aim to promote? Who needs to be involved? And how can the acquired insights of the project be embedded within my organisation and broader MSP processes?

6. Conclusion

Based upon the findings from the NorthSEE project, we can draw the following conclusions. Firstly, EU-funded pilot TMSP projects are an effective first step to start cooperating and exploring forms of transboundary coordination at a sea basin level. While the project objectives have not been entirely met, the NorthSEE project has resulted in various project outputs, such as reports and tools, and in individual and social learning outcomes, including cognitive, normative, and relational learning. For instance, project participants have gained a better understanding of each other's planning systems, are able to contact each other more easily, recognise the importance of transboundary coordination, and have initiated several follow-up initiatives, including the NSR MSP Collaboration Group. However, the examples provided and the extent of learning vary among project participants due to differences in background, experience, and involvement in MSP.

Secondly, there is a clear need for interactive, participatory, and reflective tools in TMSP, such as the MSP Challenge Simulation Platform. The MSP Challenge Simulation Platform played an important role in collecting and mapping relevant GIS data at the North Sea level, facilitated discussions on various MSP aspects (e.g., specifically with regard to shipping, energy, and ecology), and brought a wide variety of stakeholders together to jointly experiment with future scenarios. In addition, it contributed to individual and social learning by visually demonstrating that decisions in one country can have unintended consequences in others and that some effects only become apparent in the long term. However, the efficacy of these tools depends on various factors, such as the design of the tool (e.g., credibility, easy to use, transparency), the design of the activity (e.g., objectives, duration, number and type of participants, facilitation), and the context in which they are applied. It is important to carefully consider the interplay of these factors.

Thirdly, the current design of EU-co-funded pilot TMSP projects, such as NorthSEE, both promotes and hinders learning. The NorthSEE project budget facilitated learning by enabling in-person meetings, conducting research, and experimenting with interactive and participatory tools. However, individual and social learning were constrained by internal and external factors, including time, resources, and the differing levels of expertise and knowledge among project partners and participants. In addition, for organisational, institutional, and policy learning to take place, it is crucial that project outputs and lessons learned are adequately shared with colleagues and external stakeholders, that individuals have the time and space to learn from their partner organisations, and that organisations integrate the results into their own planning processes and practices.

Finally, while TMSP projects can enhance the exchange of knowledge, experience, and information between project participants, it is important to reflect on the project's objectives and its intended outcomes. Transboundary projects require a tailored approach and should not replace the primary responsibility of MSP authorities in ensuring the sustainable development of the sea. Achieving this goal requires a more structured approach to transboundary cooperation, where co-funded projects can serve as an initial step to explore possibilities, foster mutual understanding, and build trust among various project participants, organisations, and countries; however, it should not be regarded as a replacement.

CRediT authorship contribution statement

Xander Keijser: Writing – review & editing, Writing – original draft, Methodology, Formal analysis, Conceptualization. **Igor Mayer:** Writing – review & editing, Conceptualization. **Hilde Toonen:** Writing – review & editing, Conceptualization. **Jan P.M. van Tatenhove:** Writing – review & editing, Conceptualization.

Declaration of Competing Interest

This research is part of the PhD thesis by the first author on the use of Serious Gaming in Maritime Spatial Planning at Wageningen University, the Netherlands, with support of Rijkswaterstaat. The lead author describes his findings as a researcher on a personal title and does not do so on behalf of Rijkswaterstaat or the Ministry of Infrastructure and Water Management. On behalf of all authors, the corresponding author states that there is no conflict of interest.

Acknowledgements

This study was partly funded by the EU (Interreg North Sea Region project No. 38 –2–2–15, NorthSEE, A North Sea Perspective on Shipping, Energy and Environment Aspects in MSP). We would like to thank the NorthSEE project participants, and the participants of the MSP Challenge Simulation Platform workshops for their contribution to this study. Furthermore, we would like to thank all anonymous reviewers.

Appendix A. Supporting information

Supplementary data associated with this article can be found in the online version at doi:10.1016/j.marpol.2025.106770.

Data availability

Data will be made available on request.

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