

# Using a Collaborative GIS for Supporting Maritime Spatial Planning Courses

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## Introduction

Collaborative GIS (CGIS) are geographic information systems to facilitate thinking about spatial phenomena in collaboration (Balram and Dragicevic, 2006). Marine or maritime spatial planning (MSP) requires multiple actors, such as planners and stakeholders, to work together for planning harmonic use of marine space, often in collaborative workshops (Arciniegas and Janssen, 2012; Pınarbaşı et al. 2017). Still, according to reports from real-world MSP workshops, digital spatial tools are used sparingly, with planners and participants preferring paper maps and pens to conduct their geospatial interaction. CGIS provides benefits, such as real-time interactions, inclusiveness, social learning, and awareness about the shared challenges that need common solutions (Balram et al., 2003; Godschalk et al., 1992; Roche and Humeau, 1999) that can improve MSP workshops. In order to study the use of CGIS in realistic scenarios for advancing collaboration in MSP, we built a cross-platform CGIS based on free and open web-map technologies, called *Baltic Explorer* (Figure 1) [1]. In this paper, we present preliminary results from adapting a CGIS designed for face-to-face group use, into two online university courses on MSP. The aim of the study was to test whether the concept of *Baltic Explorer* works in MSP courses in addition to MSP workshops.

*Baltic Explorer* was studied, designed, developed, demonstrated, and evaluated following the design science research (DSR) methodological framework (Johannesson et al., 2014; Dresch et al., 2015). The aim of DSR is to make a change in the actual practice of working with real world problems while offering new scientific contributions by creating novel artefacts that solve these problems. *Baltic Explorer* was developed based on a design of online map workspaces. In these multi-user workspaces, geospatial data exploration and map feature contribution can be done collaboratively.

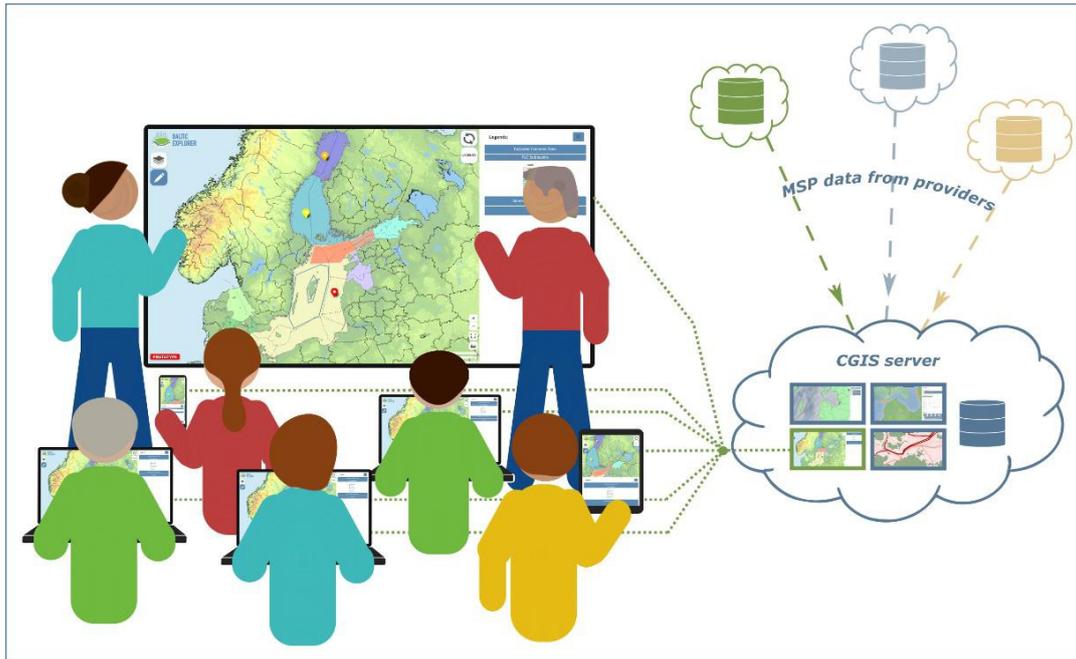


Figure 1: Baltic Explorer serves multi-user map workspaces for collaborative geospatial exploration with integrated SDIs and map drawing via customizable online workspaces.

### Evaluating *Baltic Explorer* in MSP courses

To study whether the concept of *Baltic Explorer* works in the MSP course setting in addition to MSP workshops, *Baltic Explorer* was demonstrated, used, and evaluated in two university MSP courses. In both MSP courses, the students were for the most part novice GIS users and were not too familiar with MSP before the course started. The workflow with *Baltic Explorer* started with the teachers creating workspaces for the students and then assigning each student access rights for contributing. *Baltic Explorer* offers students MSP-related geospatial data overlays to explore, provided by spatial data infrastructures (SDIs) of marine and maritime actors. This enables students to get overall and detailed insight for the course task. Students contribute by sharing features they draw on the workspace map. These features can then be viewed and edited by other students allowing repeated interaction and collaboration. *Baltic Explorer* is built using web map technologies allowing collaboration independent from time and location.

The first course on “Maritime and Coastal Spatial Planning” for Master’s and PhD students in Turku as a cooperation between the University of Turku (UTU) and Åbo Akademi University (ÅAU). The students were tasked with a planning exercise, where they were instructed to create area reservations for several different activities at a study area between the Finnish and Swedish coasts. The groups were allowed to assign a certain amount of space for each activity, backing up their decisions on the diverse background data accessed through *Baltic Explorer*. The evaluation focused on the online use and usefulness of *Baltic Explorer* in MSP. The evaluation was carried out via observations and by written feedback.

The second course was held at the University of Gothenburg (UGOT), with the students tasked to take either planners or stakeholder’s roles and develop a plan in several steps: 1) stakeholders state spatial claims on maps in the *Baltic Explorer*, 2) planners combine

the claims and make a first plan proposal they present and discuss at a digital meeting with the stakeholders, 3) due to a general policy change, stakeholder have to adapt their former claims and submit new claims that are assembled into a second plan proposal by the planners, 4) these new maps are presented and discussed in an online-meeting with the stakeholders and solutions are negotiated. The evaluation focused on how *Baltic Explorer*, labeled a SDSS for MSP, supported the participants in their task. The evaluation was carried out via observation and a questionnaire.

## Results

In general, the new way of working with spatial data via a collaborative GIS platform was well received by the participants of the MSP courses. Access to geospatial data was considered important in both courses. According to the spoken and written feedback given by the students and teachers, *Baltic Explorer* worked well for the UTU/ÅAU course even though the course was done through distance learning. The issues the participants had were related to

1. Usability: near real-time method of working was difficult to grasp at the beginning,
2. Utility: the drawing customization options were considered limited, and
3. Data: the background map offered by a SDI provider was not considered detailed enough.

*Baltic Explorer* was found flexible enough for completing complex collaboration tasks in the UGOT MSP course (Figure 2). The issues the participants had were related to:

1. Utility: automatic saving of edited features was requested,
2. Usability: editing rights were asked to be clearer, and
3. Data: limitations of the background map and comparing and overlaying complex combinations (different plan drafts to compare).

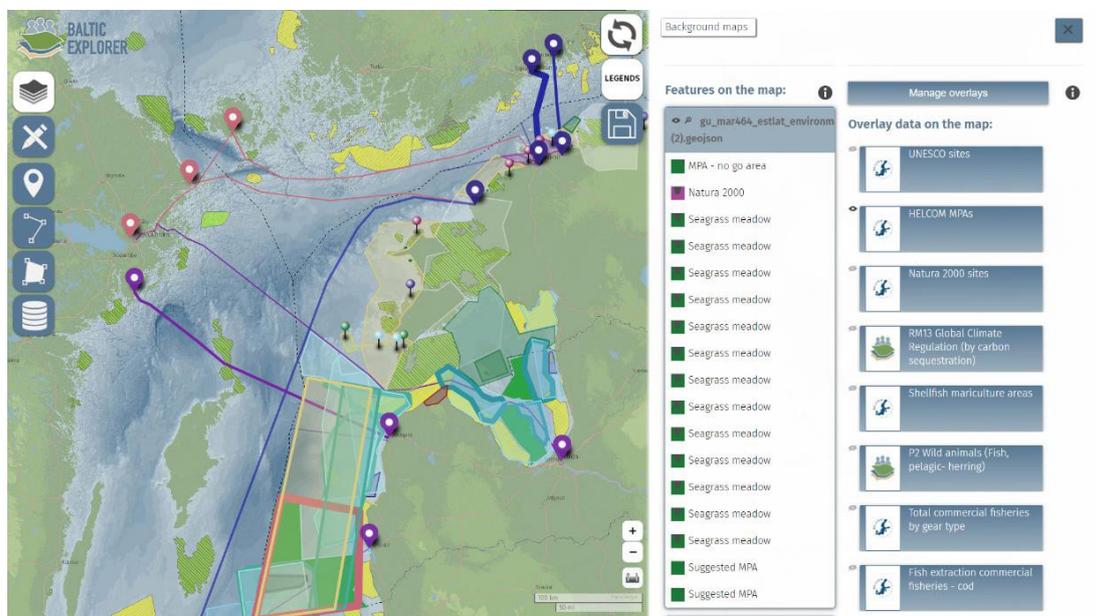


Figure 2: The resulting map workspace of a group of students collaborating in the University of Gothenburg MSP course.

When asked which tools participants would like to use in the future, SDSSs such as Baltic Explorer, were found most agreed upon (Figure 3).

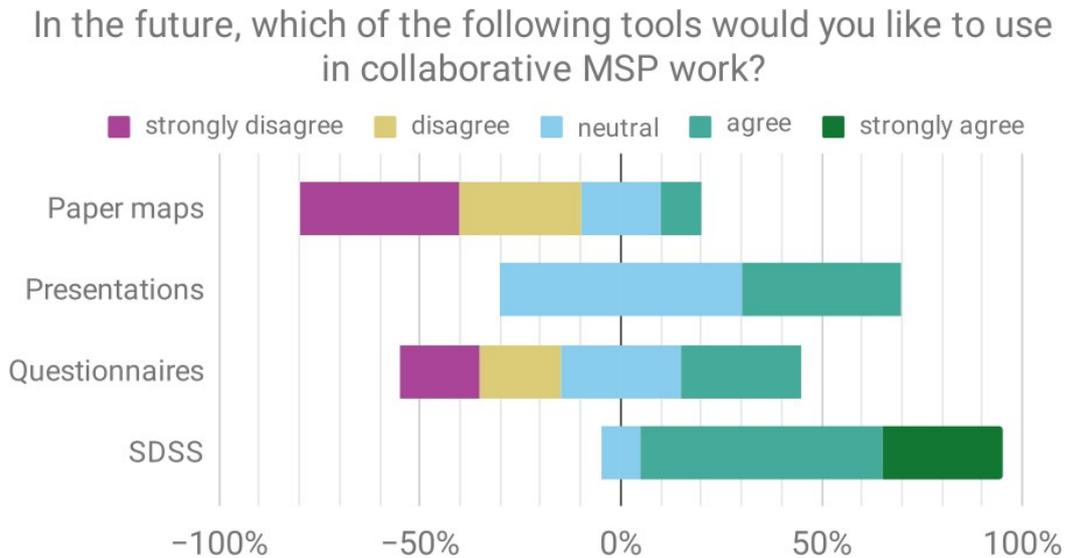


Figure 3: The University of Gothenburg MSP course participants would rather use SDSS, such as Baltic Explorer, in future MSP work rather than paper maps.

## Discussion and Conclusion

The observation, feedback, results from questionnaires and requirements from literature were used to refine the concept of Baltic Explorer, as well as to iteratively design, enhance, and add functionality to the system, such as, configuration of data access rights, user management of workspaces, and import of data. After the courses, observations on how CGIS can benefit MSP courses were gathered:

- Participants get to explore the MSP data through SDIs in as much detail as they wish.
- The interactive nature of CGIS offers participants better means to join in on the discussion and to collaborate together.
- Parts of or even a whole MSP course can be organized as distance learning.

In conclusion, despite usability, utility, and data issues, using a web CGIS in MSP courses can work well and bring flexibility for completing collaborative tasks. In the future a further look into procedures of resolving conflicts would be beneficial.

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## **Web Links**

- [1] <http://balticexplorer.eu>