This research project aims to create a detailed and precise map of the Vistula Lagoon's seabed. The current map lacks precision and high-resolution, and the seabed has undergone significant changes over the recent times, including the creation of navigational channels and an artificial island. This highlights the need for an updated map to better understand the lagoon's current state. This project is a groundbreaking initiative that uses advanced technologies to map the seabed in turbid waters on a large scale. It also explores the potential of emerging technologies like Satellite-Derived Bathymetry (SDB). This project will significantly enhance our understanding and management of complex underwater environments.

The project will use a combination of airborne, hydroacoustic (underwater sound), and satellite-based remote sensing techniques, along with ground-truth sampling (collecting data on location) and machine learning algorithms for data analysis. The project's impact on scientific research and discipline development is multifaceted. It will produce high-quality datasets that will be made available in an open-access data repository, benefiting other researchers and promoting further study. The project will also detail the methodology developed for the automatic classification of underwater habitats and archaeological sites, contributing to our understanding of seabed mapping and archaeological exploration. Furthermore, the project will explore the maximum potential of emerging technologies like Airborne LiDAR Bathymetry (ALB) and SDB in seabed mapping, particularly in turbid waters. This could provide cost-effective alternatives to current methods. Lastly, the project may result in other publications of a methodical remote sensing nature, indicating its potential to impact multiple scientific disciplines, including remote sensing, environmental science, and archaeology.

The project aims to achieve specific research goals, such as generating the first high-resolution bathymetric model of the area, testing the utilization of SDB and ALB to generate a high-quality seafloor Digital Elevation Model (DEM), conducting an analysis and interpretation of the area, determining suitable processing workflows for automatic classification of underwater habitats and archaeological sites, and conducting a shallow seismic survey in the previously identified area exploring potential archaeological structures that may be buried beneath the seafloor.

The data collected will be processed using various software, machine and deep learning algorithms. These algorithms will help classify and segment the geospatial datasets, improving our understanding of the seabed. The performance of these processing methods will be evaluated using error matrices and accuracy assessment.

The research team, composed of experts from various universities worldwide, will aim to generate detailed and accurate information about the surveyed area. The insights gained will lay the groundwork for determining the processing workflow to achieve the project's main objectives. All laboratory analyses will be conducted by a seasoned research team at the Maritime Institute of Gdynia Maritime University, in accordance with international standards.

In summary, this project will use advanced technologies and methods to create a detailed and precise map of the Vistula Lagoon's seabed, contributing to our understanding of this complex aquatic environment. It will also define the limits of the application of modern remote sensing methods for mapping turbid shallow marine environments.