# Reducing the invasiveness of modelling frameworks

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## Introduction

There are several modelling frameworks available that allow for environmental models to exchange data with other models. Many efforts have been made in the past years promoting solutions aimed at integrating different numerical models with each other as well as at simplifying the way to set them up, entering the data, and running them. Meanwhile the development of many modeling frameworks concentrated on the interoperability of different model engines, several standards were introduced such as ESMF, OMS and OpenMI. One of the issues with applying modelling frameworks is the invasiveness, the more the model has to know about the framework, the more intrusive it is. In this research we show how the application of domain driven, object oriented development techniques to environmental models can reduce the invasiveness of modelling frameworks. We compare coupling of an existing model as it was to the same model adapted using the four step approach. We connect both versions of the models using two different integrated modelling frameworks. As an example of a model we use the coastal morphological model XBeach. By adapting this model it al-

## Frameworks Comparison

## Application

## XBeach + OpenMI

## XBeach + ESMF

## Introspection

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## Language interoperability

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## Model Wrapper / Domain Mapping

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## References

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