

GeoS4S Module Geodesign

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Abstract

Geodesign is a framework that brings together design professionals, information technologies, geographical sciences and people of the place to address local problems through spatial planning. By involving people from all different disciplines, different levels of knowledge and familiarity with geospatial data or design tools are a reality that needs to be addressed. This module teaches students to identify the different stakeholders and to assess their level of knowledge. After this, it teaches the students what types of data, software and interactions can be applied to allow each stakeholder to partake in the planning process. The current paper summarizes the learning objectives, lesson content, learning activities and evaluation scheme for this module.

1. Introduction

Bringing about changes to an existing landscape can prove difficult from a spatial planning perspective. The “technocratic” vision of experts is not always accepted by the people who live or work in the landscape, which can cause friction. Geodesign offers a planning framework, which involves all stakeholders from an early stage and addresses them in a way they find understandable and thereby decreases friction in the decision-making stage. The key concept of Geodesign is the combining of four separate domains: People of the place, Design professionals, Spatial scientists and Information technology experts. This module will help GIS practitioners recognize the different stakeholders in a planning process, and include their views in the planning process. Furthermore, it teaches different (geospatial) technologies and methodologies to facilitate the planning process.

1.1 Module Description

“Geodesign [is] an iterative design and planning method whereby an emerging solution is influenced by (scientific) geospatial knowledge derived from geospatial technologies.” (Lee, Dias and Scholten 2014). The concept of Geodesign enables us to harness the power of GIS to design and develop with nature and geography in mind to create a better and more sustainable world (Miller, 2010). Geodesign does not only apply to landscape architects and spatial planners, but all stakeholders that are involved in shaping the future environment. The Geodesign framework supports the effective collaboration between four groups of participants in community-based spatial planning and design: People of the place, Design professionals, Spatial scientists and Information technology experts.

GIS has the capabilities to support the Geodesign team to collaboratively develop the best sustainable spatial outcome, taking all available aspects and values into account. GIS professionals can build on the geospatial data that can be gathered for a particular Geodesign study area and the data management, analysis, visualisation and sketching capabilities of geospatial technologies. The module on Geodesign seeks to train GIS professionals, to act as the information technology experts in the Geodesign process. The module encompasses an explanation of the concept and the framework and their origins, highlighting the four domains that are involved. Subsequently all aspects of Geodesign are discussed with a specific focus on how geospatial technology and methods can support the process.

1.2 Learning Outcomes

- Explain the origins of the Geodesign framework and reflect on the degree to which its current conception makes it fit to address complex design problems in the 21st century.
- Discuss, critically, the systems approach and how the latest geospatial technologies can support spatial data management, analysis and visualisation of system performance and system interactions;
- Analyze, critically, the power relations in the Geodesign process and how geospatial technologies can support the capturing of different cultural, political and technical perspectives of the stakeholders on the spatial problem at hand;

- Process in a reflective manner the feedback derived from both quantitative impact modelling and qualitative cultural, disciplinary and technological knowledge and prepare appropriate visualisations as input for multi-stakeholder design and decision making;
- Operate collaborative software and web services to facilitate multi-stakeholder design and decision making with quantitative and qualitative spatial information;
- Explain the legal, sustainability, ethical and professional issues that using Geodesign methods provoke.

2. Module Structure

2.1 Module Overview

The module consists of 12 lessons, with 2-4 extra readings per lesson, 4 hands-on exercises and 4 assignments. The combination of these teaching and learning systems should amount to approximately 150-180 hours of student learning effort, and provides credit to the equivalence of 6 ECTS. Each lesson consists of a core lecture, consisting of approximately 25 slides.

2.2 Summary of Lesson Content

This section briefly presents the content and goals of each lesson.

- *Lesson 1: Geodesign Introduction.* This lesson deals with definitions that are crucial for the proper understanding of Geodesign (spatial thinking, context awareness, creating solutions). Furthermore, it addresses the building blocks that make up Geodesign and provides examples of Geodesign in practice.
- *Lesson 2: Geodesign Origins and Domains.* This lesson provides the origins of Geodesign. Furthermore, it describes the four domains of Geodesign and gives an introduction specifically to People of the Place.
- *Lesson 3: Geodesign Framework.* This lesson introduces the 6-step iterative Geodesign workflow. It uses exemplary case studies to show how the 6 steps can be applied in different case studies.
- *Lesson 4: Case Study.* This lesson gives an introduction to the elaborate case study that will be discussed and practiced on during the remainder of the course.
- *Lesson 5: Systems thinking.* This lesson introduces the concept of systems thinking and the methodologies for working with this type of thinking. It discusses how spatial data management plays a role in systems thinking. Finally, the role of systems thinking in the Geodesign work flow is introduced.
- *Lesson 6: People of the place.* This lesson introduces the different groups of People of the Place that one can encounter during a Geodesign process.
- *Lesson 7: Stakeholder analysis.* This lesson builds upon lesson 6 and discusses how one can analyze the stakeholder groups that were identified. This starts from the stakeholder values. These values are then translated into performance indicators and wrapped in required boundary conditions.
- *Lesson 8: Pictorial approach to Geodesign.* This lesson discusses a low-technology application that can be used in the Geodesign process.
- *Lesson 9: Value Maps.* This lesson introduces the concept of value maps. These can be used to synchronize the analysis of multiple stakeholder viewpoints.
- *Lesson 10: Value maps and impact modelling for Geodesign.* This lesson describes a Geodesign tool that integrates value maps and impact assessment.
- *Lesson 11: Impact modelling.* This lesson discusses the difference between qualitative evaluation and quantitative impact modelling and suggests methodologies for each.
- *Lesson 12: Decision Making.* This lesson discusses methodologies to facilitate decision making. Methodologies that are discussed are e.g. graphic analysis, multi-criteria analysis, Cost-benefit analysis, etc.

3. Hands-On Sessions

The module provides the students with many hands-on learning sessions, through ungraded exercises and through graded assignments. The 4 exercises are designed to allow students to practice with concepts that they have learned in a lesson. An example is the exercise after lesson 2, where the students are asked to design 10 solutions to a common planning issue (an apartment building, a playground with a car road separating the two, causing children to be hit by cars), based on the Geodesign principles. Apart from the ungraded exercises, the students will be set 4 graded assignments. Of these, two are targeted at teaching the students

how to evaluate scientific literature discussing Geodesign and integrate these ideas into their own knowledge of Geodesign. Furthermore, two assignments are focused on designing, preparing and implementing an application that can be used for a specific Geodesign aspect for an actual case study.

4. Teaching and Learning System

The learning and teaching strategies are student-centered and based on e-learning, though can also be applied in a classroom setting. They aim is to encourage a deep-learning approach by using reflection and self-evaluation. Each lesson on the e-learning platform will comprise an introductory text identifying the lesson's learning objectives and its contributions to the module learning outcomes, a short video lecture setting the context and introducing the core concepts and links to academic and professional readings. Students will be required to reflect on their learning as part of self-assessment exercises and assignments assessed by the teaching staff. Online interactions with teaching staff and fellow students, including peer-review exercises will provide opportunities for deepening learning and reflection.

5. Evaluation System

The performance of the students is assigned based on four assignments that can be grouped as two assignment groups. Each of these two groups accounts for 50% of the final grade and should contain 3000 words (2 x 1500 words). The first group of assignments is based on a practical assignment. The students are asked to design, prepare and implement an application for two different independent aspects of the Geodesign process for an actual case study. They will hand in two separate reports for each application in combination with a case study. The second group of assignments is a theoretical assignment. The students are asked to write two essays based on a recently reported and implemented spatial planning and design project that was supported by geospatial technologies. For this project, they are to select two aspects of the design process and the geospatial technologies in particular and reflect on how they were applied in the project. Furthermore, the students are offered exercises with answers available that they can use to test and evaluate their own knowledge.

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