

**Graduation Plan: All tracks**

Submit your Graduation Plan to the Board of Examiners ([Examencommissie-BK@tudelft.nl](mailto:Examencommissie-BK@tudelft.nl)), Mentors and Delegate of the Board of Examiners one week before

P2 at the latest.

The graduation plan consists of at least the following data/segments:

| **Personal information** | |
| --- | --- |
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| **Studio** | |  |
| --- | --- | --- |
| Theme | Geodata Processing | |
| Main mentor | Stelios Vitalis | PhD Candidate at the 3D geoinformation research group |
| Second mentor | Ken Arroyo Ohori | Post-doc at the 3D geoinformation research group |
| Argumentation of choice of the studio | None | |

| **Graduation project** | | |
| --- | --- | --- |
| Title of the graduation project | | Accessible geoprocessing in a browser  using WebAssembly and Visual Programming |
| **Goal** | | |
| Location: | Cyberspace / Not Applicable | |
| The posed problem, | Client-side geoprocessing (CSG) as a concept is not being adopted by geoweb applications, because it is considered technically  impractical, immature, and unnecessary. Prior studies into CSG show its potential, and if WebAssembly performs as described by Haas et al, it could theoretically be the missing link to  make client-side geoprocessing viable. However, these technologies are underresearched due to their novelty, and as a consequence, almost no existing libraries or applications exist using CSG.  Practical implementation details are absent, and guidance regarding CSG is lacking. | |
| research questions and | How to design and create a browser-based GIS environment which can effectively utilize existing geoprocessing libraries, using only the current state of standard client-side web technologies? | |
| design assignment in which these result. | Design and create a browser-based GIS environment which can effectively utilize existing geoprocessing libraries, using only the current state of standard client-side web technologies. | |
| [This should be formulated in such a way that the graduation project can answer these questions.  The definition of the problem has to be significant to a clearly defined area of research and design.] | | |

| **Process** |
| --- |
| **Method description** |
| This study will make a new, wholistic attempt at actualizing client-side geoprocessing. It will differ from previous attempts by adjusting its methodology to tackle key components of all three obstacles, in order to enable the widespread adoption of CSG. The first obstacle of CSG being impractical will be addressed by researching how well WebAssembly can host existing, industry-standard geoprocessing libraries. Both the ability of existing geoprocessing libraries to  be compiled to WebAssembly will be researched, as well as the performance of the resulting binaries. The second obstacle of CSG being novel will be addressed by developing a use case application to assist this research. This application serves to contextualize the research, and to force the research to solve the practical inhibitions of how CSG can actually be used. This use case will also be used to address the third obstacle of CSG being regarded as unnecessary. The use case will be a unique type of application, one which would be highly impractical without client-side geoprocessing. If successful, the application can demonstrate the advantages of CSG  over server-side equivalents, as well as offer guidance to other applications seeking the benefits of CSG. |
| **Literature and general practical preference**  This study’s methodology will draw from prior studies on three topics: The topic of the Geoweb, client-side geoprocessing, and WebAssembly.  Additionally, the study will rely on the authors prior experience on developing flowchart-applications, and web applications containing client-side geometry processing. |
| **Reflection** |
| 1. *What is the relation between your graduation (project) topic, the studio topic (if applicable), your master track (A,U,BT,LA,MBE), and your master programme (MSc AUBS)?*   Interactive, browser-based Geographic Information Systems (GIS) form an indispensable component of theThe Msc Geomatics for the Build Environment. 2. *What is the relevance of your graduation work in the larger social, professional and scientific framework.*   If web applications gain geoprocessing capabilities, they could grow to be just as diverse and useful as desktop GIS applications, with the added benefits of being a web application. It would allow for a new range of highly democratized, accessible and sharable geoprocessing and analysis tools, which end-users could use to post-process and analyze geodata easily, quickly, uniquely, and on demand. |