

Project Description:

The TU Delft is one of the biggest university in the Netherlands. A university that is often in publicity because of their renovated products. Still it seems that the University isn't taking an 'active' attitude towards sustainability.

Close to the high-rise faculty of Electronics, Math and Informatics there is a green field of grass. The site of my project. Wind generated by EWI blows hard on the cyclist, pedestrians and future tram level. The wind can be usufull for generating energy. But first in this project the network of movement (cyclist, tram pedestrians) is analysed, because this has caused problems (death and damage) in the past (even when the tram stop is not there). Solving this is the first step in my project.

After generating a more efficient network, a 3d-solar analysis and 3d-visabilty analysis is done. Based on this the functions (restaurant, exhition, supermarket, cyclist park and offices are placed). The solar analysis is done with LadyBug. Instead of only measuring on ground floor level, I lifted the measuring zone. Creating a 3d-map. For the visability map, I used the same position of the points of the solar analysis, so every point in space has two values (sun radiation and visability. The visability value has been computed with a python script, that checks whether you can see certain points (entrances of faculties and the TU-Delft logo

on EWI on my Site) or not. A high score in this case means you can see a lot (preferable for a restaurant) and a low score (preferable for a bycicle shed) means you can't.

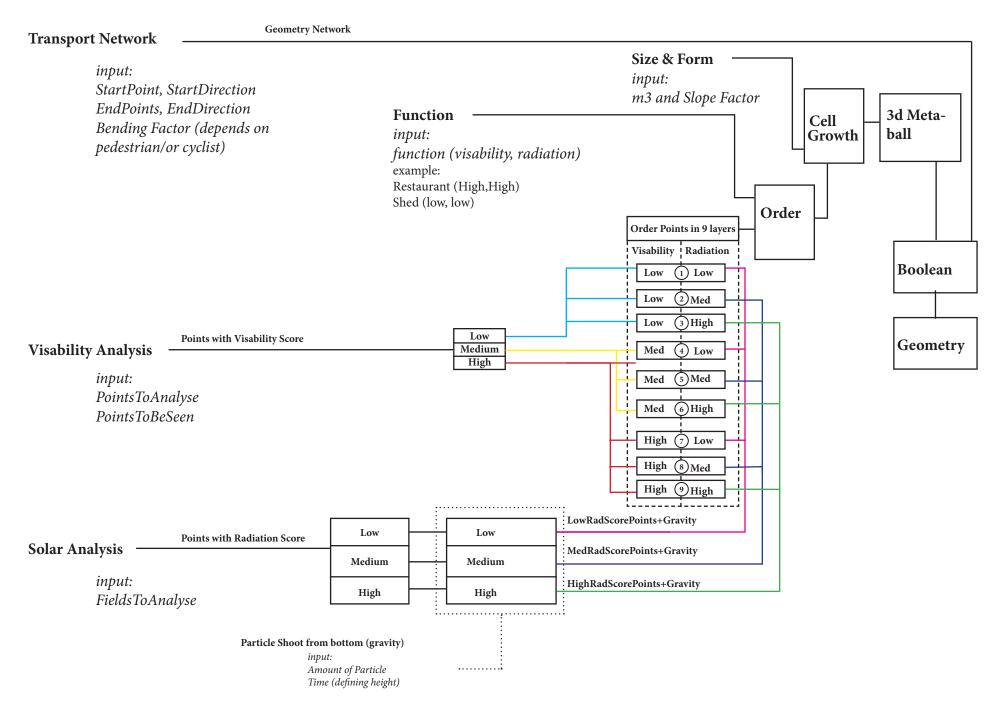
The field of points has the same height as EWI (around 70 meter). It does not make sense to build on this height, if you have the points with the same charasteristics (visability/sun) on the ground floor level. Therefore I 'added' a gravity component. By shooting particles on the different solar maps (low radiation, medium radiation, high radiation) from the bottom in Blender. I was able to have a random selection of points with different radiation and some play of height (the longer I shoot particles, the higher the points get). When returning these 3 point-files (low-med-high radiation) in Rhino, I used Hoopsnake to check in which visability field they were. At this moment I have points in 9 layers (low radation: low visability, low radation: med visability, low radation: high visability, med radation: low visability etc.)

Still there has been no component of Wind attached). At the phase of P2 I wasn't sure which programme to use (vasari: not able to simulate the biggest problem of EWI: the standing vortex -> not realistic enough, CFD: Good calculations, but not easy to use, due to import/export and modelling posibilities). I also tried scripting a particle system in Processing.

Now I made big steps by connecting a MWaya particle system to grasshopper. Which is shown at the end.

At the P2 I chose to write a particle growth system (from the 9 layers of points created earlier). By only letting the particles grow down, I wanted to create mountain-shapes(which are kind of earodynamic). I was able to fully control the amount of particles growth and the set a random 'slope' factor. What the system does is: checking all the points positions, generate two points around the particles (randomly and downwards(slope factor)), check weather the new points aren't conflicting/to close to other points, if the point is not to close to others, it will be part of the next generation of points. If it does conflict, it is deleted.

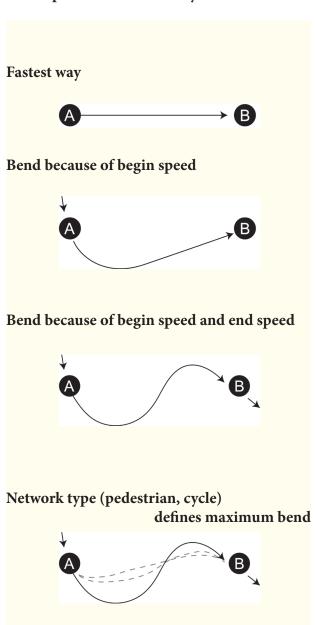
From these point I used 3d-metaballs to generated geometry. Which was the last step at p2.

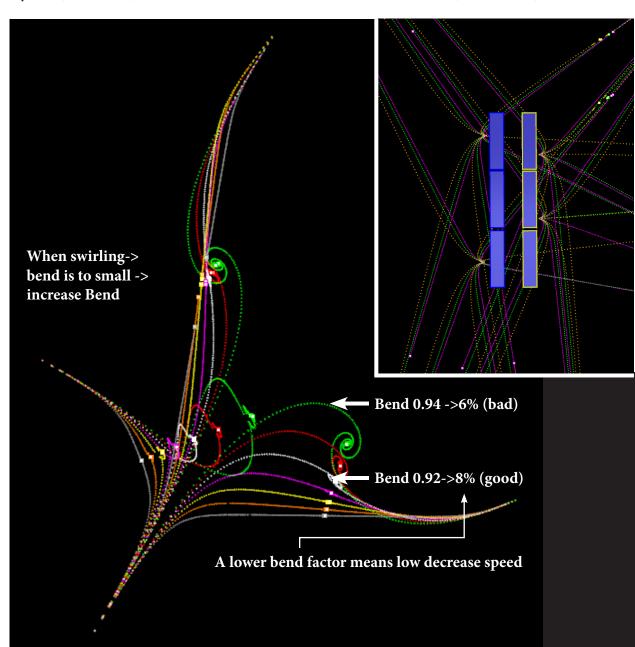


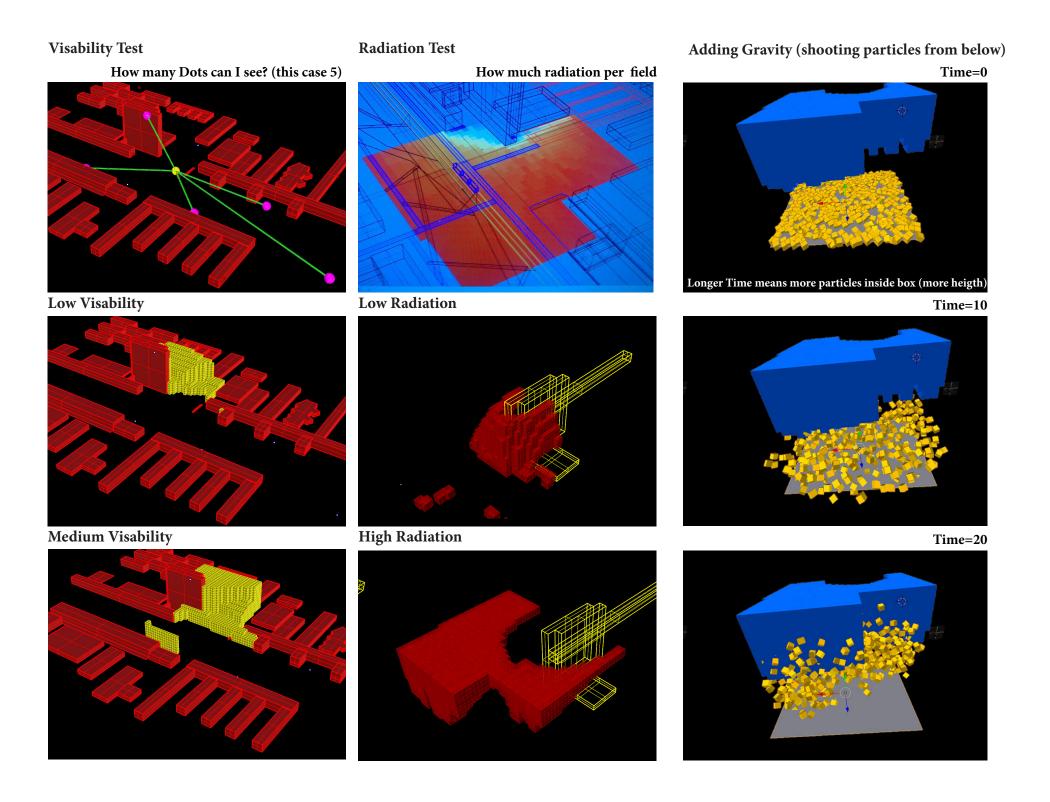
Transport Network: Theory

Cyclist (hard bend)

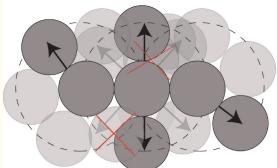
Pedestrian (easier bend)



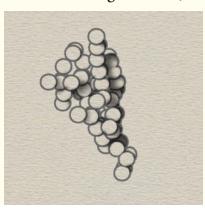


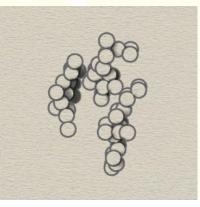


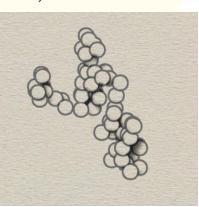
Programme Placement User input MedRad-HighVis MedRad-MedVis LowRad-MedVis Visability Sun Restaurant High High **Exhibition** Medium · High Medium Supermarket Medium-low Medium Offices Shed Low Low-Medium **Cell Split: theory** 1. A Starting Cell 2. Can split in every direction HighVis-MedRad HighVis-HighRad HighVis-MedRad LowVis-MedRad Three different generation, while input (points and m3 stays the same) 3. Can't split everywhere

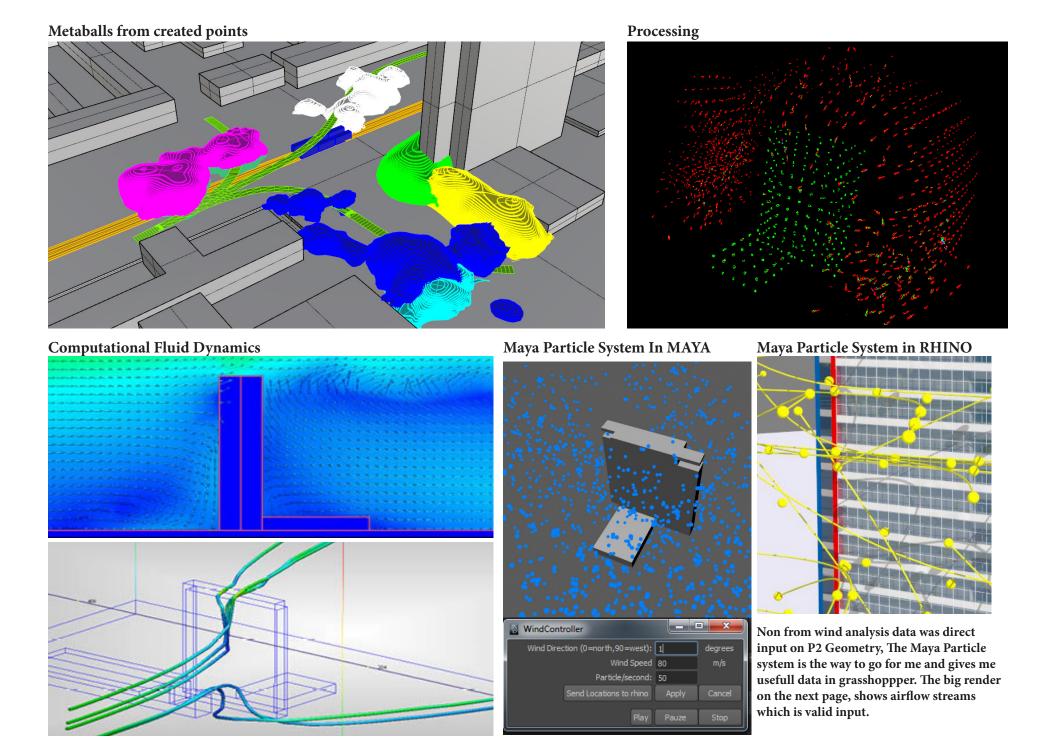


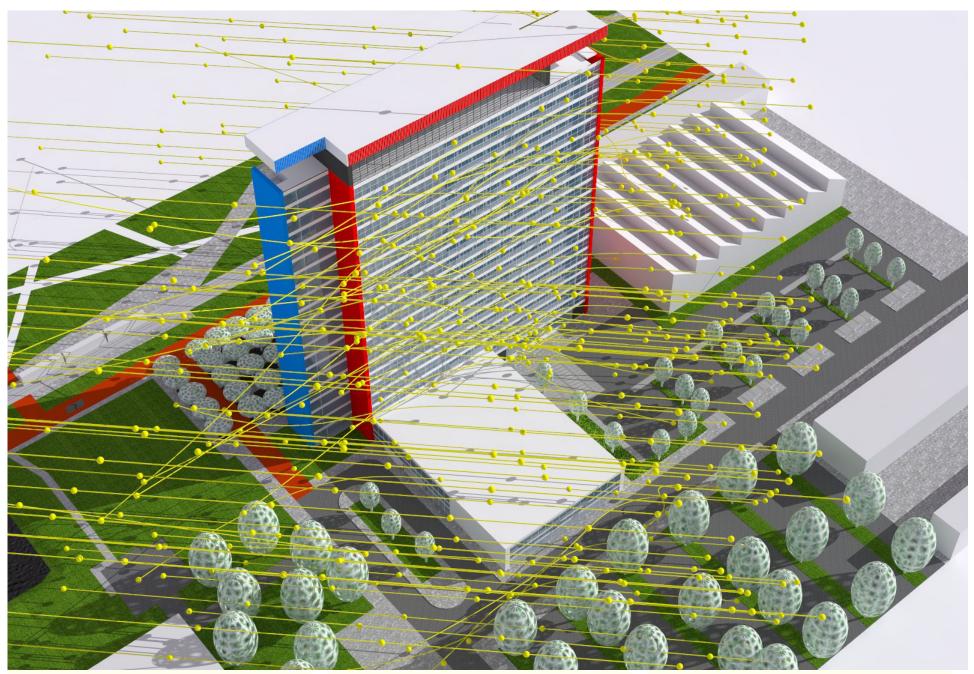
Keeps on splitting till amount of m3 is reached



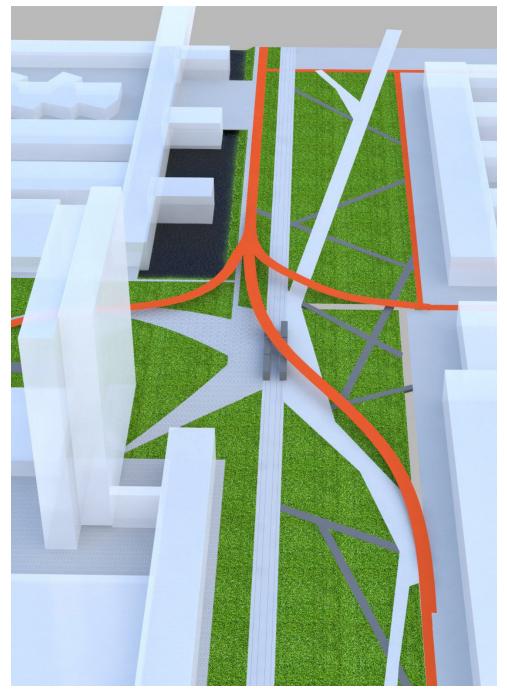


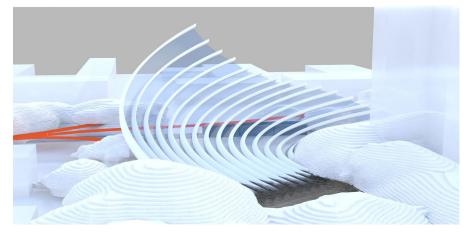




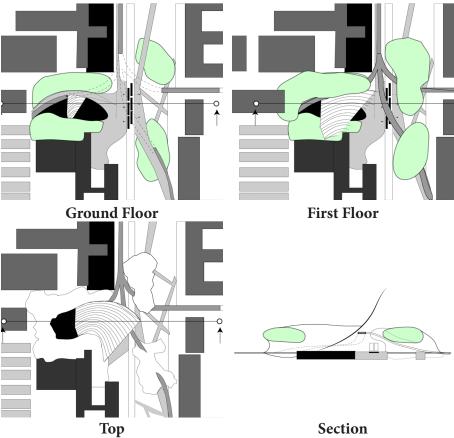


WIND FLOW LINES FROM MAYA AROUND EWI





Grown Volumes with Wind collider and central water collection



Result of Network simulation (cycle-pedestrian)