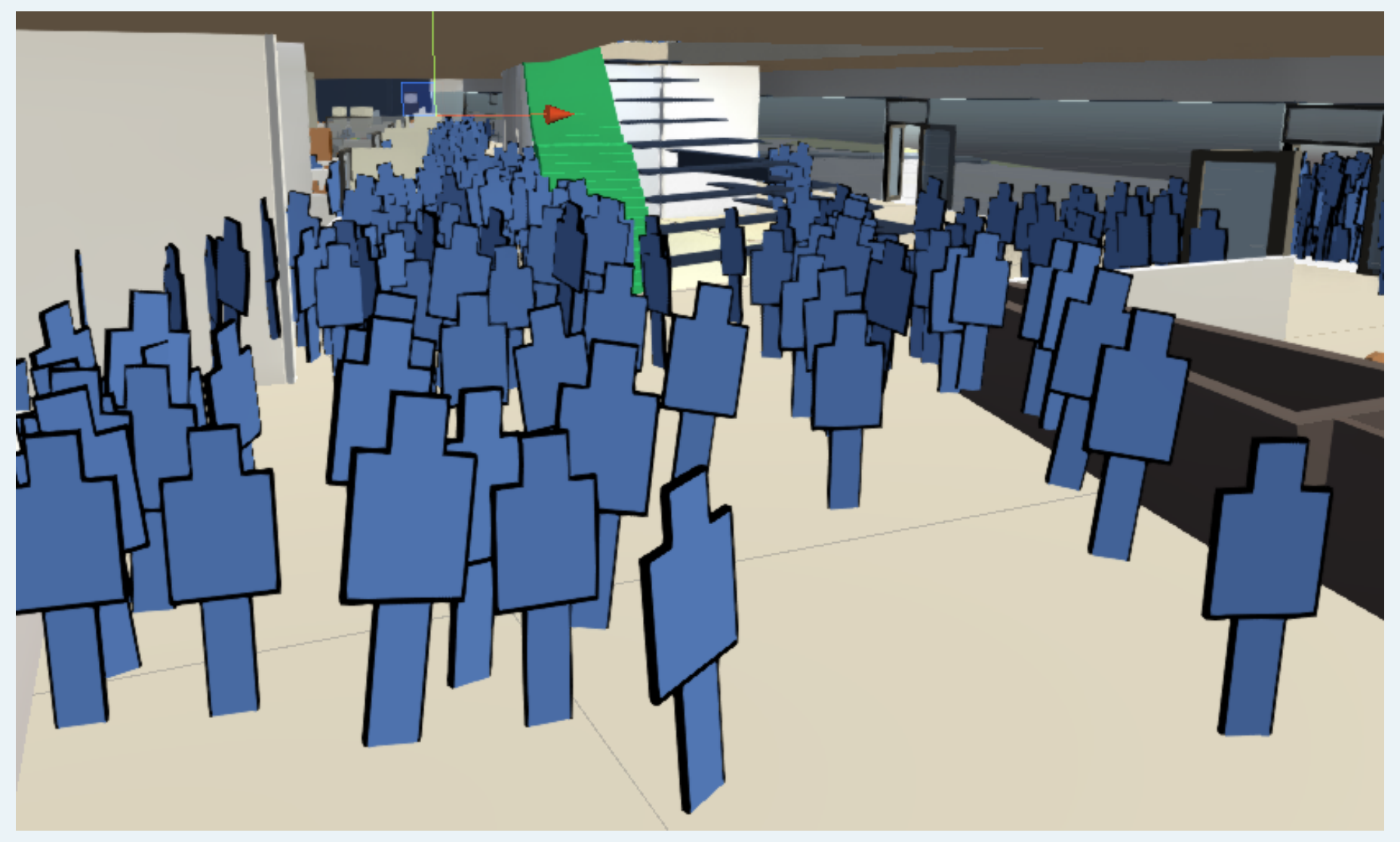
Delta Building Visualization

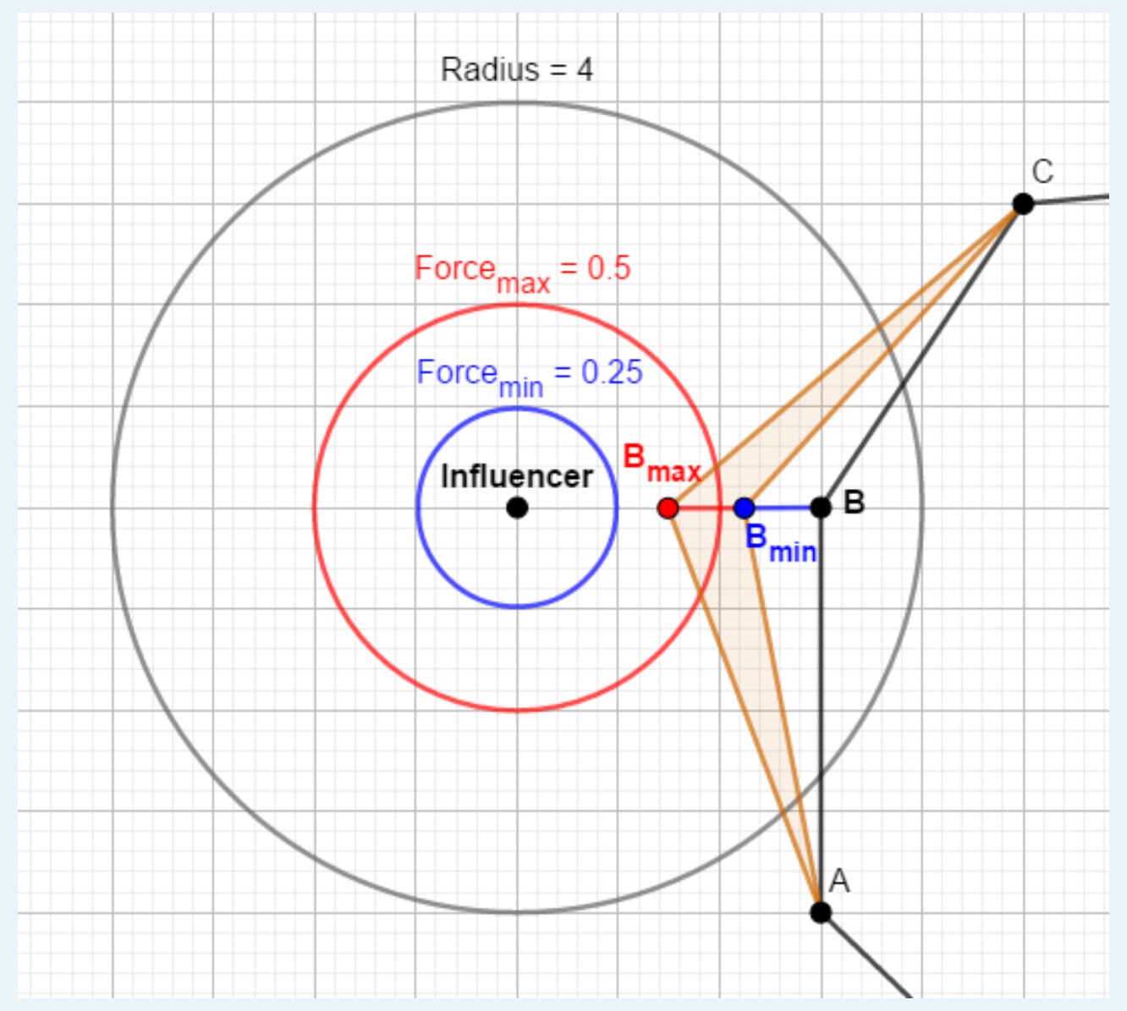
Year 2018 - 2019

Meelis Perli: Agent Logic

The agents in the Delta Building Visualization were improved this year. They were made to act more naturally while also not reducing the performance too much. This was achieved by the following methods.

Agent's obstacle avoidance radius was increased to make the agents move more **spaced out patterns**.

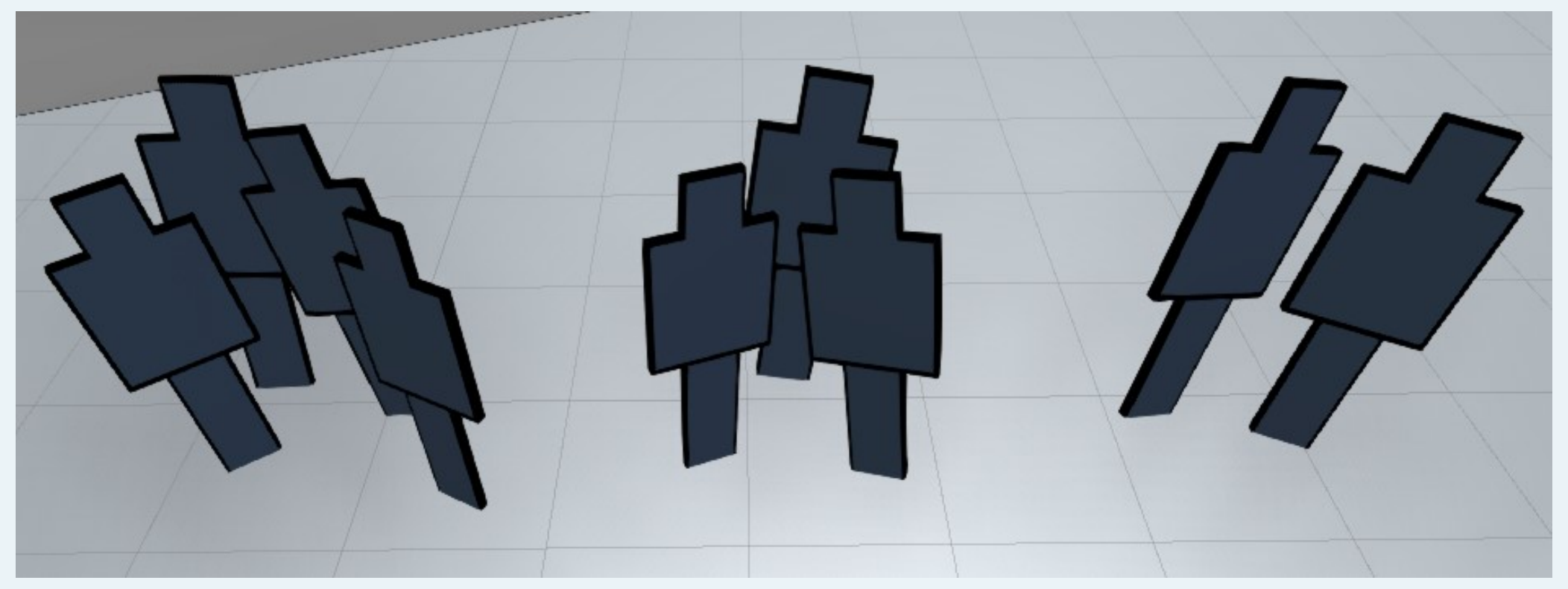




The agent's paths were made more random. Things called **path influencers** were created and placed in the visualization to achieve it. These influencers a bit randomly push or pull path vertices towards the influencer or further away from it.

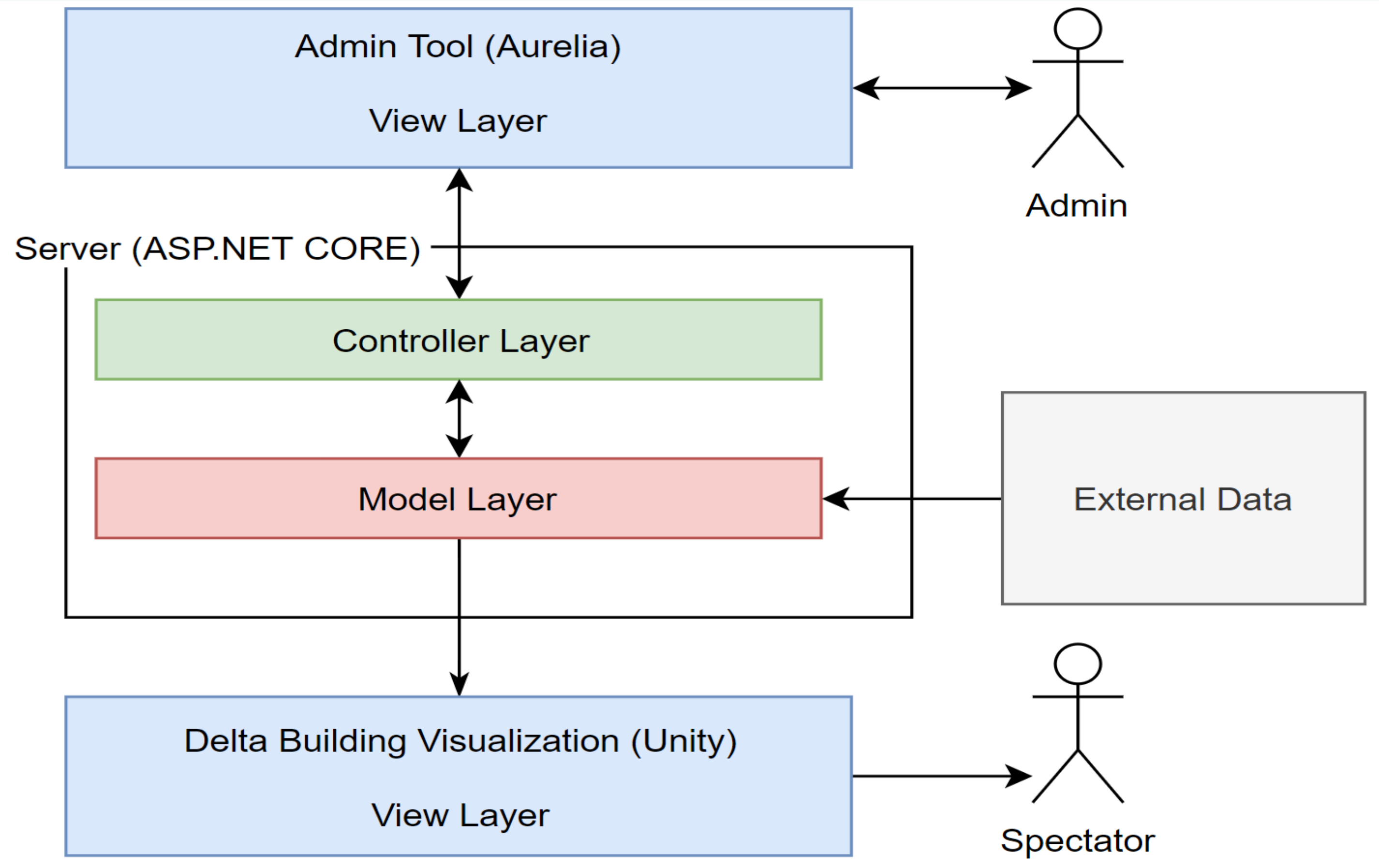
The precalculated agent's paths were divided into shorter segments by adding **waypoints**. The waypoints were used to make agent groups, to spawn and despawn agents, to optimize the changing of agent's rendering layer and door opening.

Since in real life some students move in **groups**, the agents were also made to move in groups. If some agents have the same destination, then they sometimes will move there together.

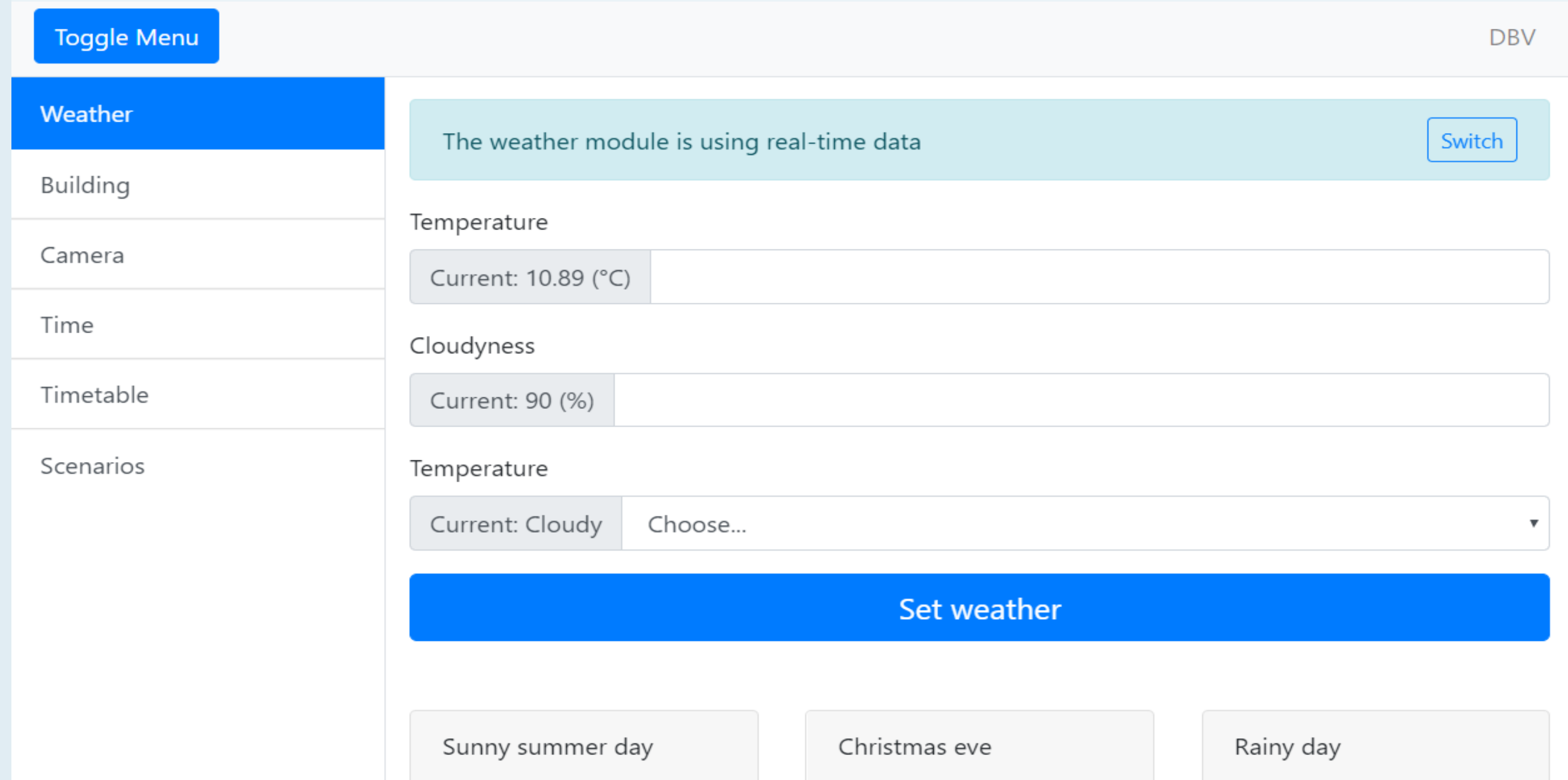


Daniel Kütt: Admin Tool

The data flow of the existing solution was refactored. Where previously the **Unity Client** was responsible for gathering the data, the **Model-View-Controller** architecture was used and two new programs were created. The **Server**, which is in charge of collecting and storing the data, and the **Admin Tool** for editing the data and thus controlling the visualization:



As a result, the Client now only has logic for visualizing the Delta Building and the data collection from different APIs is done in the Server. Since the state of the Visualization is held outside the Client, **weather, actors, time of day, timetable and cameras can be remotely controlled through the Admin Tool.**



The weather module is using real-time data

Temperature

Current: 10.89 (°C)

Cloudyness

Current: 90 (%)

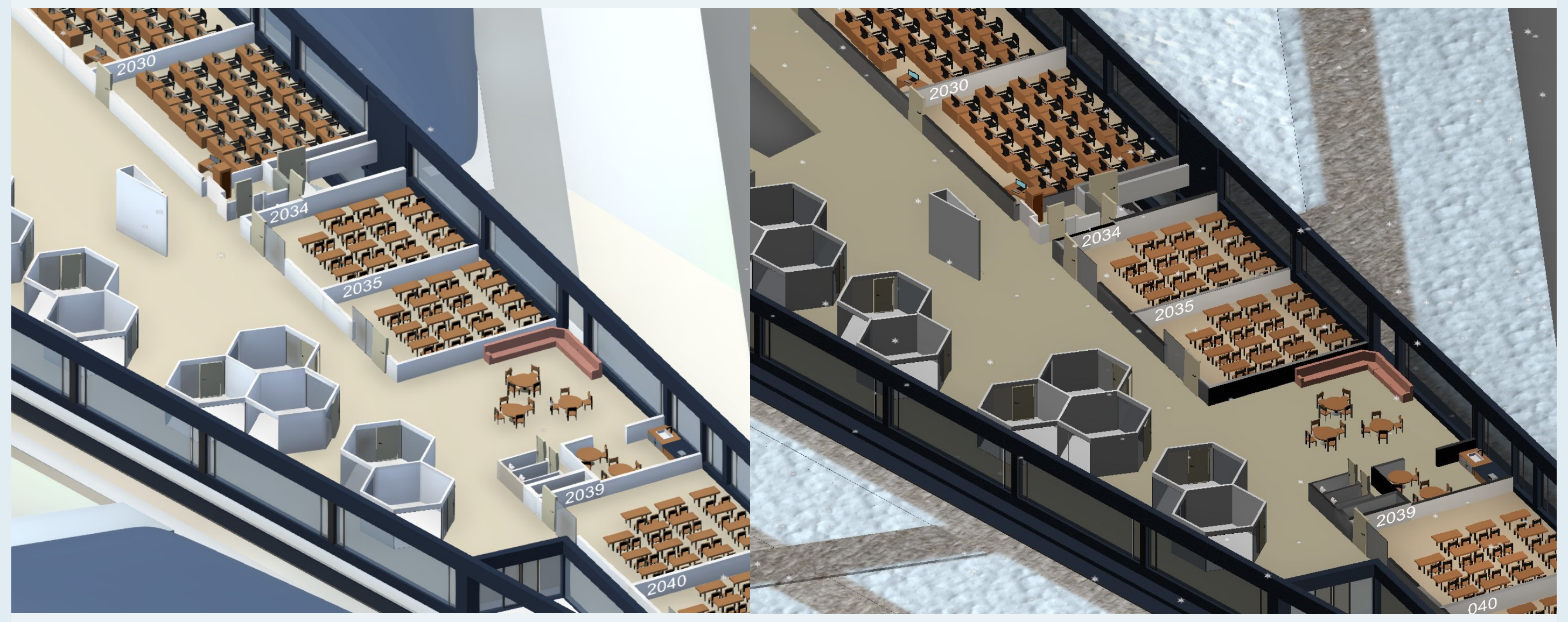
Temperature

Current: Cloudy Choose...

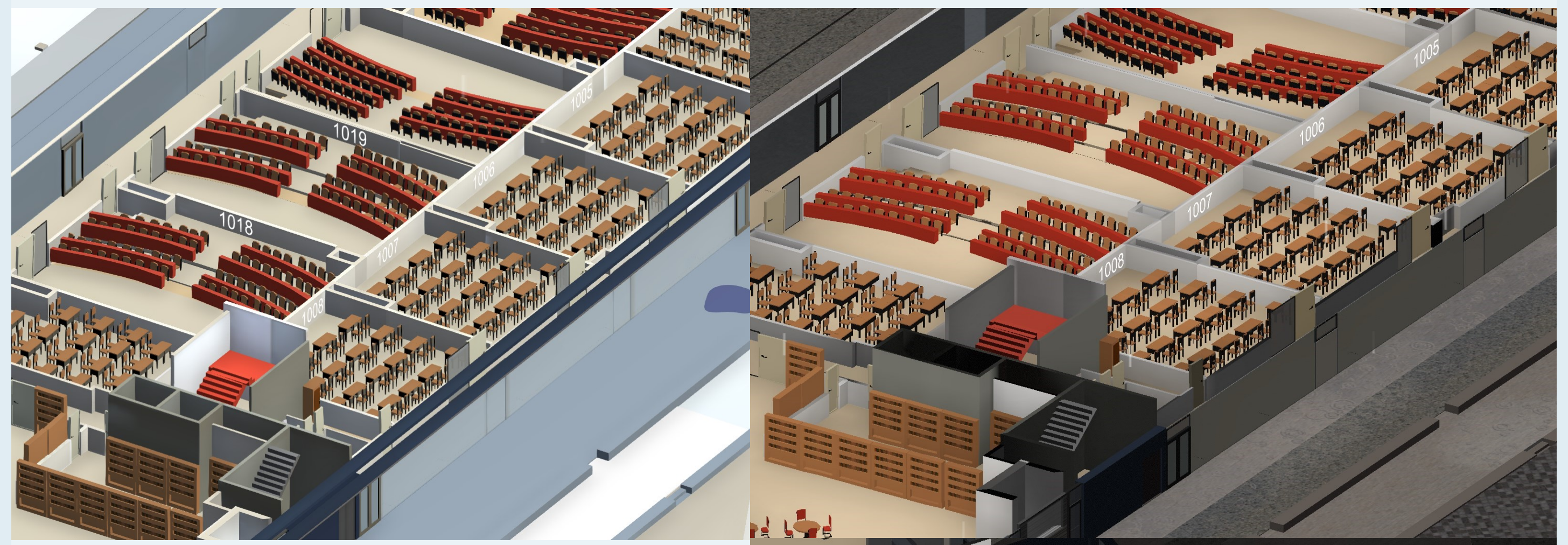
Einar Linde: Visual Effects

The visual effects in the Delta Building Visualization were also improved this year. The previous **snow and raining effects** were improved upon and **lighting** was added to the classrooms.

The snow effect was made to look more realistic using **shaders**. This makes the snowing effect highly customizable. In addition there are muddy and snowy paths. The before and after (respectively) comparison can be seen below:



In addition to the raining effect being improved upon, the **surfaces** around the building (pavements and roads) also **become wet** and puddles appear. The raining effect uses two shaders: one for wet surfaces and the other for puddles. This can be seen on the comparison pictures below:



Finally, the lights in the classrooms turn on when there are actors in the room. The lights turn off when the classroom becomes empty.

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1030-A
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Conclusions

As a result of the 3 works, the Delta Building Visualization is at least 3 steps closer to be displayed on the actual video wall in the new joint study and research building. The project received several major improvements to its visual components, a big architectural refactoring and several optimizations. Currently the project is accessible from the CGVR lab page (https://cgvr.cs.ut.ee/dbv) and from the Bachelor theses of the Authors.

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