Computational Thinking

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In this first mini-project, computational thinking has been used to help us analyze the results in a more rigorous and faster way. Since we did not perform the simulation ourselves, the first step was to understand the parameters at stake to be able to address these 3 requests:

- Description of the global behaviour of the flow in the tunnel
- Description of the effect of the security ventilation system on the global flow
- Analysis of whether the security ventilation system assists the evacuation of passengers

Once we had a good understanding of these questions, we have been able to produce a striking image summarizing the global situation.

A simple and repeatable method, detailed below, has been applied to produce the image. This method was built with the goal to be applicable for any similar case, even with another post-processing software.

1) Select areas of interest and key parameters based on the message we want to transmit

In our case, we chose to focus on the exit path and the area around the train, which are critical to evaluate the passenger safety. The key parameters selected were the temperature, the smoke concentration and the flow itself (velocity, shape, pressure).

2) Define the optimal way of visualizing each parameter while ensuring the clarity of the message

Knowing the message we want to convey and the important parameters, we had figure out a way to display them in the image.

In ParaView this is made using different filters that you can apply to one or many "block" (vehicle, fluid etc..) :

- Pressure: Contour
- Temperature: Slice
- Flow: Stream Tracer, Tube and Glyph
- Etc.

Because it was our first project on Paraview, there was also a part of "discovery" in the exercise so we tried methodically a maximum of filters to make sure not to miss a useful one, which would surely have happened if we had tried filters randomly.

3) Iterate until the image provides the right information clearly and aesthetically