WP 2.4a Project Deliverable

Updated system specification

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Abstract	This report includes the updates the project partners make to the system specification during the runtime of the project.
Keywords	Specification, Capabilities

Contents

1 Updated system specification

This deliverable includes an updated system specification refering to the formerly released WP 2.4 report. In this deliverable further details of the system capabilities are described. This report will be updated during the runtime of the project in several steps to include all new results and requirements which were elaborated by the project partners.

1.1 Interface between the database and the simulation

As discussed in the meeting in Darmstadt (04.11.02) the interface between the database and the simulation part of the Virtualfires System (VFS) has to be defined now. The syntax of the XML files describing the scene and the included objects has to be clearified. Furthermore the communication mode/protocols regarding the steering of the simulation will be defined.

At the moment it is not quite clear if the simulation can be steered directly or if a further layer (a kind of simulation controller) has to be established between the simulation and the database, which is responsible for interpreting the commands / file inputs from the data management (DM).

The project partners responsible for the simulation and the data management will define how this will be

Figure 1: Possible steering method for the simulation

realized in the corresponding work package. They also will determine the commands supported by the interface. At the moment it is planned to realize the communication between the DM and the simulation part using Corba. The corresponding IDL file will be created by the involved project partners.

1.2 Capabilities regarding fire fighting measures

There are two main nozzle application scenarios imaginable:

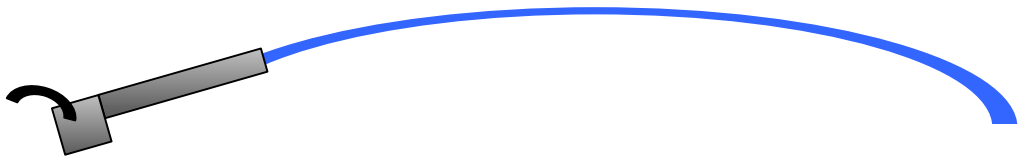

Figure 2: Nozzle spraying water or foam in mode 1

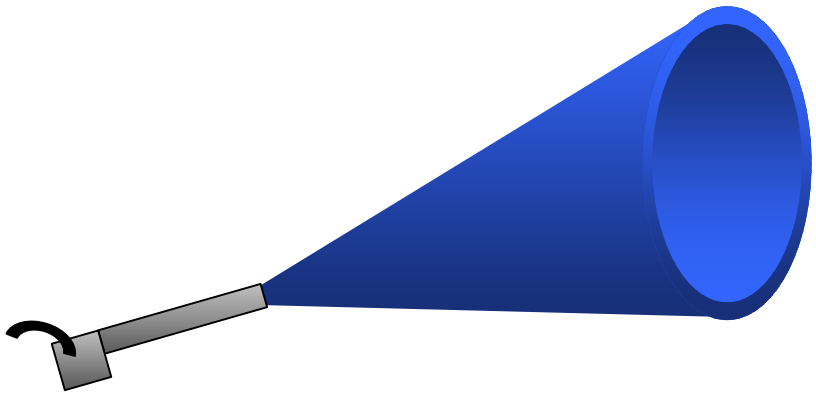

Figure 3: Nozzle spraying water or foam in mode 2

These two different nozzle modes can be realized as different boundary conditions in the simulation. The geometry of the nozzle and of the water / foam in the air will not have an influence on the simulation. Nor will the geometry of the nozzle itself.

In the same way, firemen standing in the tunnel and holding the nozzles, will be implemented by the simulation: They will only have influence on the boundary conditions. Their geometry will not be considered.

Because the system will not support moving objects, it will not be possible to realize big advancing fire fighting measures (e.g. fire fighting trucks) which approach the location of the fire needing a certain amount of time for the way there. Fire fighting trucks can be big vehicles so that they can have an non negligible influence on the air circulation in a burning tunnel. Therefore it is not realistic to reduce these trucks to functions working on the boundary conditions as well. In other words the simulation will not be able to reproduce or simulate scenarios with approaching fire fighting trucks. If it is planned to use such trucks they have to be placed in advance in the tunnel before the simulation starts. It has to be investigated how helpful such scenarios can be for the end users. As stated before, approaching firemen will be realized as non geometrical objects, because they are small enough so that their influence on the air circulation can be omitted. These kind of “small moving” fire fighting measures will be supported.

The simulation partners in the project will define how these firemen will be realized. Of course they will be controlled over the same interface (between the DM and the simulation).

1.3 Capabilities regarding visibility

At the begining of the project it was one “nice to have” feature, if the VFS could be capable to simulate the visibility in the tunnel under smoke conditions. One application scenario for this could have been to simulate how far certain (illuminated) traffic signs will still be visible in thick smoke.

Because the simulation procudes values in a 10cm resolution (compare to grid dimensions in the former deliverables) it is not possible to realize such a realistic behaviour of visibility. The signs which might be considered for such scenarios, themselves could only have dimensions far less than one of these cell sizes. Even if the signs are big enough to encapsule more than one cell of the CFD simulation grid, it will still be a basis too imprecise to work with.

The smoke concentrations, which will be produced by the simulation, will be rather imprecise as well. As the simulation partners told the consortium, the formulas for calculating smoke conentrations are rather complex and the depend mainly on the materials which are burning in the tunnel. They even can be just an estimation which is derived from the temperature distribution. So the input values for visibility caculations are not very exact as well.

Furthermore, a useful visibility study of signs in a burning tunnel full of smoke can only be guaranteed by making use of physically based light simulation algorithms. Taking the rough resolution into account, which is available for that, the consortium decided that this feature will therefore not be part of the VFS.

Nevertheless it is still a task to include realistic looking fire and smoke visualization in the VFS. Corresponding methods are under development and reported in WP 4.3 (= D4.1).