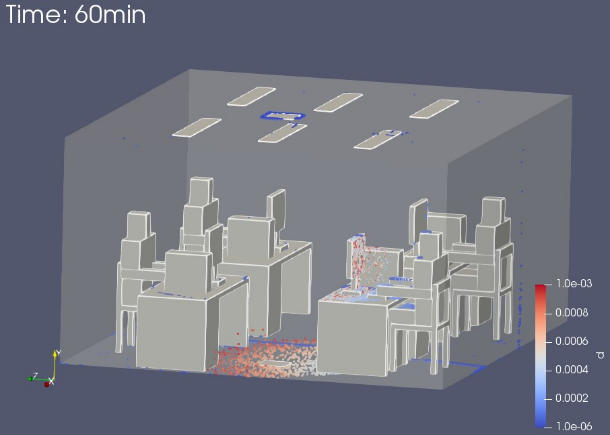
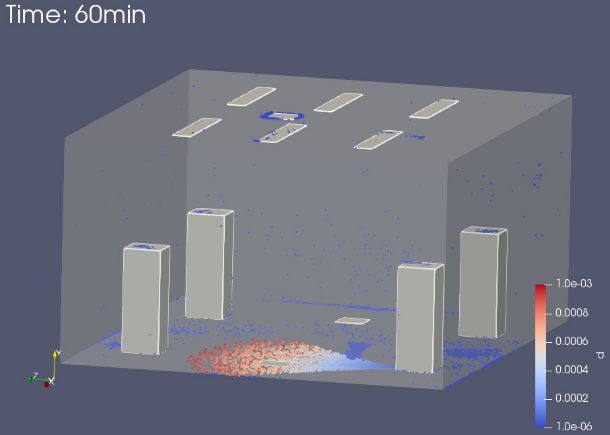
1. Considering what you just observed in the images and videos from the class 4 CFD simulations, and what you learned in classes 1 and 2, answer the following questions.
   1. Complete the scientific report in the differences observed between the simulations of class 3 and the standard case, by filling in the blanks with the correct words. (**Note:** to help you answer, there is one representative image at the end of the simulation, to each case study)..



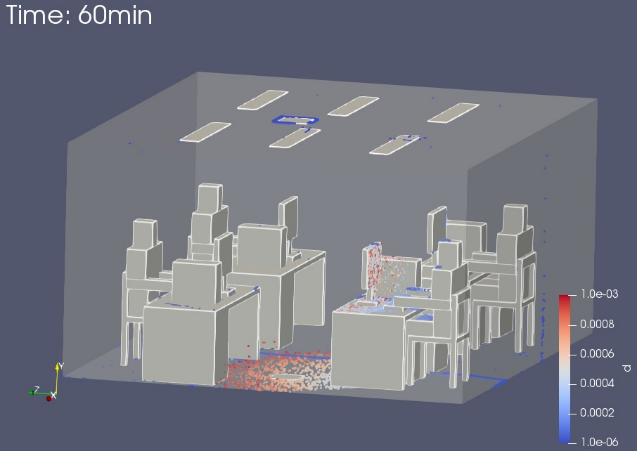
**Speaking standard case**

**Speaking Class 3**

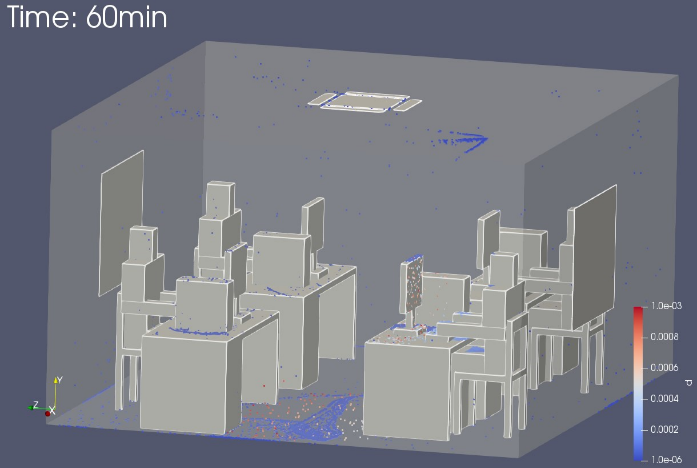


Comparing case studies where occupant 1 speaks on class 3 on the standard room, it was verified, at the beginning, that room \_\_\_\_\_\_\_ (**class 3/standard case**) presented \_\_\_\_\_\_ (**more/less**) geographical elements that room \_\_\_\_\_\_\_\_ (**class 3/standard case**). The room occupants \_\_\_\_\_\_ (**room 3/standard case)** presented \_\_\_\_\_\_ (**bigger/smaller**) geographical complexity than room occupants from \_\_\_\_\_\_ (**class 3/ standard case**). In relation to the trajectory followed by the respiratory droplets, it can be concluded that it was\_\_\_\_\_\_(**identical/different**) to both cases. Such as the case in class 3, it was verified, in the standard room, that particles with a \_\_\_\_\_(**bigger/smaller**) dimension were easily deposited in the room, and particles with a \_\_\_\_\_\_ (**bigger/smaller)** dimension were easily removed. In the standard room, since it exists \_\_\_\_\_\_ (**more/less**) geometrical elements that in case 3 lesson, it was verified, at the end of the simulation, there was \_\_ \_\_(**more/less**) respiratory droplets in the room, and, as such, the infection risk \_\_\_\_ (**direct/indirect**), due to the contact with the geometrical elements in the room, it is \_\_\_ (**bigger/smaller**) in the standard case than in the lesson 3 case. The infection risk \_\_ \_\_(**direct/indirect**) by \_\_\_\_ (**direct/indirect)** contact from the particles with the room occupants was \_\_\_\_(**significative/residual)** in both cases.

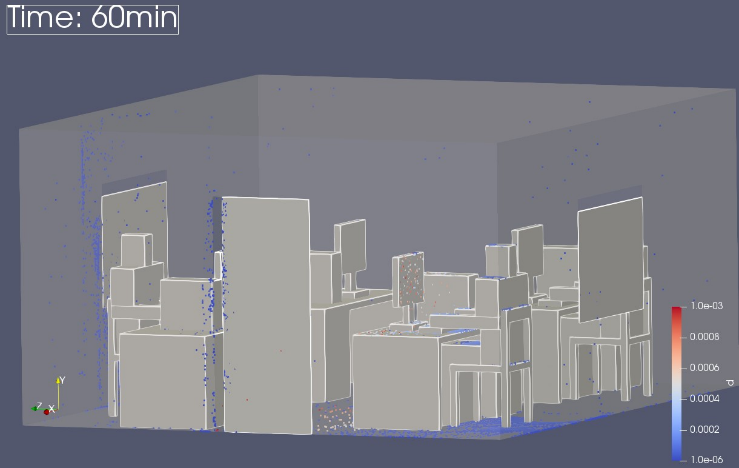
* 1. During lesson 1, it was verified that several parameters can influence the flow of the respiratory droplets. Likewise, the physical space parameters can also influence it. Based on this idea, identify the main difference between the standard case room, the room with a ventilation system on the ceiling, and the room with a natural ventilation system (open door and windows), and explain how this influences the infection risk in each room. (**Note:** to help you answer, the image below represents the end of each simulation for each case study).



**Speaking standard case**

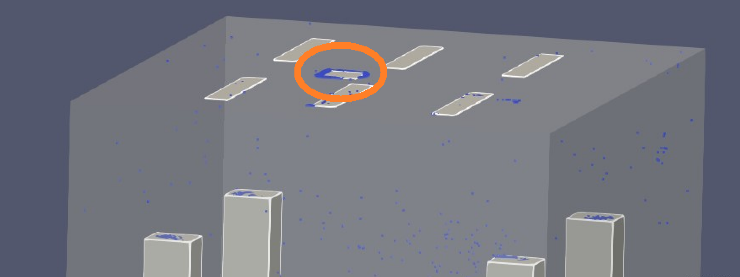
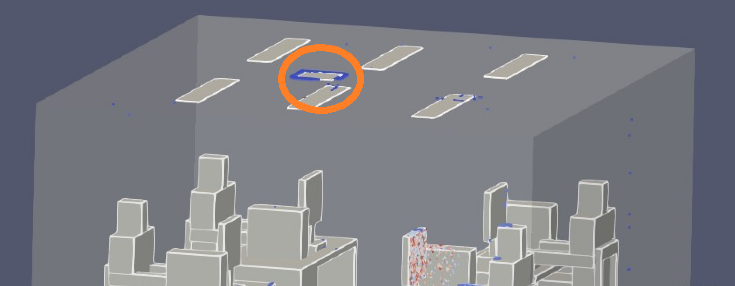
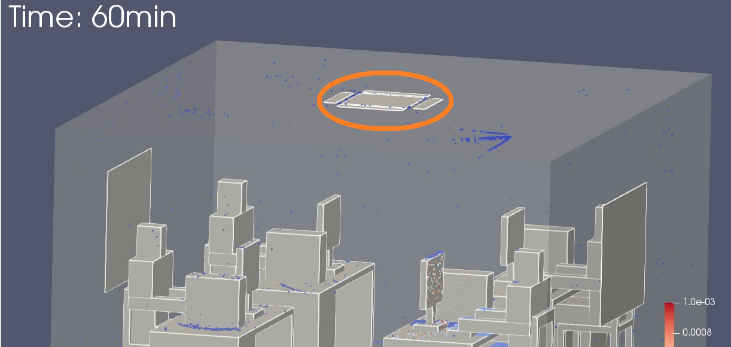


**Speaking with a ceiling ventilation system**



**Speaking with a natural ventilation system**

* 1. Identify which phenomena marked in orange in the images of this question was observed at the end of all simulations, what risks it may incur for public health and how we can solve this problem.



1. Considering what was watched during class 4, and the answers of point one, develop a small summary, highlighting the main aspects of what was analyzed: differences between the room, infection risks, among others.

**To Learn More…**

If you would like to explore further about this class theme, on the Keywords Table there are several links available, with additional information, related to each keyword. To access this information, click on the corresponding link on the section “References”.

**Keywords Table**

|  |  |
| --- | --- |
| **Keywords** | **Reference Number** |
| How to make CFD simulations with respiratory droplets  Results of CFD simulations with respiratory droplets | **[1] [2] [3]** |
| Simulation videos of CFD | **[4] [5] [6]** |

**References**

**[1]**<https://re.public.polimi.it/retrieve/handle/11311/930957/444623/Numerical%20and%20experimental%20analysis%20of%20airborne%20particles%20control%20in%20an%20operating%20theater_11311-930957_Romano.pdf>

**[2]** [Microsoft Word - 2006Atmospheric Environment \_Zhao Zhang1\_.doc (psu.edu)](https://citeseerx.ist.psu.edu/document?repid=rep1&type=pdf&doi=0fe1dae233f76168f0e0448172a28ca2d21cc952)

**[3]** [Numerical Simulation of Coughed Droplets in the Air-Conditioning Room (sciencedirectassets.com)](https://pdf.sciencedirectassets.com/278653/1-s2.0-S1877705815X00282/1-s2.0-S1877705815027599/main.pdf?X-Amz-Security-Token=IQoJb3JpZ2luX2VjEHYaCXVzLWVhc3QtMSJIMEYCIQCpllZJpZO1irDxfouaVBqqSs4sN5BImK6cqCr8BGM48AIhAOAXLn%2BUnwWRD%2F6K8TbVIXw%2FEO8Ae1zq7RfxP7KmLs6LKrsFCO7%2F%2F%2F%2F%2F%2F%2F%2F%2F%2FwEQBRoMMDU5MDAzNTQ2ODY1Igy7z%2FJF6hEcm58LqRQqjwU2zMnGUcSF26cO6LK%2F9K3u3PJHqzC1NYDnVl1T7ONGWBDJB%2FZbnGiqbnfeXTMWmsu5GQHGMvOzGeEJijlyoyIl5mPFeYSXeAaGAJTtpaVHXbFXgXDyx0UfTO9nOZSroTHHkpu8bKd7FP%2BPZ8iPN%2FkO%2BMlXcv7fRCVEXzFNzSqr0sK7TBda9%2FIFbjOLTziH9QCaTPF5rX8%2F6GGz43SDavre7MsKxTypv1jCp78zpbxzakBowOayDAPxOA6qypvDYpyIENs8zpg7OUbaR3jOup4B5bLIUAWY38eTyEEe%2BMlsUJUnnQmy27skz0i1zfmQ8qBGtYmyCsXeZ%2BZv0PhMWTIB%2BPtLjTK%2BUoC%2BTySndB%2FI1n7MB6xgn5l7%2BalnnDf%2BNjEQvJgNFnUSgK7zn2ExmXqS%2BMoFIHyMhph11mOOfAr6F6Q51%2F4%2FDLE9oBhZxGa%2BDgkMxstTv%2BzfAulqPcY59LZxogqVxvDGAwGFY3PQM%2BXmlxYK5FhnCcxV4dtjvUSTOCFOBorKpr8%2FhMiqERiliyt%2Fy7fcQ7IvHLjbF2T71QXH97PTp50DOH1PMWMkF8lVSf0bYJ%2BniCTTD%2FByUTLDULnqBqj53BKE73lVEw%2Bnp1dBg8jmA0KAQEqB7j5DqmsdNJFpGhpWvEh2lMZzWcMhfZvHXJL6ZrBynVFIDqwlZNLwn6rgbEv3hMVOdL7dCDpjvXXJoJ9d%2Fr2nXXz1wP3OS3RVj7ybFcm6tuD2Huh0vjKU%2BqLCH6082UqVzlq8bjhZ985EqcbU7lfwlQKUKV5DWI62CkooVoCez9CdhBQULVuz%2BpNy5y8U6k61%2Fb%2Fd%2Bkfg6kzvyzNx4HOSCUE4hKOE8%2B8xdeQSeoIBT13cM4CF%2FJ3eMJv0v6UGOrABpgphmfsqYGRiyr8mwehPX6Y9QT0fG3sBiKiFfD%2FjXoSLOLE7GM7lpmn8vKhkfqpSA0994yhy0E4ZpLSLlWgqjvxuyEao31Y3g6AYdFUrL997zKUmqJyEDCmqfeFiI5ojsp2ddlWXLEv%2FkemvaKoYjvhj%2F0diNpUJjwr8tjDG8H5b%2Fu0yXv1uw1KpQkUEEvEc1Y0%2B%2B8B3LRcJOoCPdC2le4bH0xmYAuclswJeQtyopyA%3D&X-Amz-Algorithm=AWS4-HMAC-SHA256&X-Amz-Date=20230713T141757Z&X-Amz-SignedHeaders=host&X-Amz-Expires=300&X-Amz-Credential=ASIAQ3PHCVTYWY4EFEP5%2F20230713%2Fus-east-1%2Fs3%2Faws4_request&X-Amz-Signature=e2f951c7815044038be353770ad5ebbfc5153662ae1f126048453cb515121fe6&hash=4d145210c06416e66ffaeacaa035d80304681b14cd8deb8282793dca322531a3&host=68042c943591013ac2b2430a89b270f6af2c76d8dfd086a07176afe7c76c2c61&pii=S1877705815027599&tid=spdf-0709b412-777d-4908-8e42-7c8e14376964&sid=0a46883649c281487e1b30f8d44e1352f241gxrqb&type=client&ts)

**[4]** [CFD simulation - YouTube](https://www.youtube.com/watch?v=GKaOGM8oIJ4)

**[5]** <https://www.youtube.com/watch?v=GKaOGM8oIJ4>

**[6]** [(11) Simulation shows droplets in human breath - YouTube](https://www.youtube.com/watch?v=JtHso9JtgSc)