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## **APPWIND: DEVELOPMENT OF HIGH RESOLUTION DIGITAL TWINS TO FAST PREDICTION OF AIR POLLUTANTS DISTRIBUTION AND THE ODOUR IMPACT IN CITIES BASED ON THE APPLICATION OF ARTIFICIAL INTELLIGENCE TO CFD MODELS**

### **Description**

Pollution is one of the most significant environmental problems in modern cities, leading to disturbing odour episodes and low-air quality conditions that can be detrimental to public health. Its impact is increasing given the continuous city growth (79 % of the population worldwide live in urban areas) and the effects of climate change. Nowadays, half the cities in high-income countries do not meet WHO air quality guidelines. In that context, odour pollution becomes an important part of atmospheric pollution in cities. It is a recurring source of complaint since incidents related to olfactory pollution can cause physical discomfort. Given the magnitude of the city pollution problem, one would expect the proliferation of digital tools to help in the proper management and control of pollution levels. Surprisingly, the current state of the art is limited to using sensors to gather information about the levels of some pollutants in convenient locations in the cities. The lack of a complete pollution map and accurate predictive tools to forecast future pollution distribution strongly limit the understanding of the problem as a whole and the application of truly effective strategies.

There is general agreement that the solution to this problem must come by the hands of the Smart Cities concept, integrating the Internet of Things and the development of Urban Digital Twins capable of performing such predictions in an intuitive interface. This project aims to develop an innovative methodology to provide such a powerful tool, from tackling the complexity of the three-dimensional dispersion solver to integrating the resulting forecast as a pollution/odour layer in urban digital twins. This project fits properly in the "Digital Spain" pillar of the Spain Recovery, Transformation and Resilience Plan. The main proposal consists of developing an innovative methodology to provide a useful and fast tool to predict the dispersion of air pollutants in urban areas with a very high spatial and temporal resolution and accuracy by combining the application of CFD WMLES and artificial intelligence. This methodology shall offer very detailed micrometeorology predictions in urban areas.

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