

# COMOKIT: a brief synthesis of the Gama supported agent-based framework to study NPI against Covid-19

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## Abstract

Since its emergence in China late 2019, the COVID-19 pandemic has spread rapidly around the world. Faced with this unknown disease, public health authorities were forced to experiment, in a short period of time, with various combinations of interventions at different scales. The scientific community has quickly emerged as a centerpiece to resolve the various puzzles the virus was the origin of, including how to flatten the curve of infection, limit the spread of the pandemic, create and dispatch the vaccines, and what could be the treatments. One of the main expectations from policy makers was to be able to help them build an appropriate response and forecast the consequences: this has put lights upon epidemiological models like never before. To meet this demand, we have developed an agent-based modeling framework called COVID-19 Modeling Kit (COMOKIT), designed to be generic, scalable and thus portable in a variety of social and geographical contexts. COMOKIT combines models of person-to-person and environmental transmission, a model of individual epidemiological status evolution, an agenda-based 1-h time step model of human mobility, and an intervention model. It is designed to be modular and flexible enough to allow modelers and users to represent different strategies and study their impacts in multiple social, epidemiological or economic scenarios. Since its first version (COMOKIT 1.0 - presented in (Gaudou et al., 2020)), COMOKIT has deeply evolved, through different related projects such as the ANRS COMOKIT project, COMOKIT Camps on the transmission of covid in refugee camps, COMOKIT Azur on the impact of morpho-functional characteristics of cities or neighborhoods on the spread of the disease, COMOKIT Albatross on a large-scale application of COMOKIT in the Netherlands using data for the construction of individuals' agendas: enrichment of the population generation process, better consideration of the link between the simulated territory and the outside area, accounting of variants and new types of interventions (e.g. vaccination), dashboard to better visualize data, multilevel modeling, etc.

In this presentation, we propose to go back over COMOKIT, its evolutions, but also to look at the impact of COMOKIT on the development of the GAMA platform. Indeed, all the efforts put in COMOKIT have greatly shaped ideas for the future development of GAMA, mostly questioning the link between the platform, data and decision-making process.

## References

Gaudou, B., Huynh, N. Q., Philippon, D., Brugière, A., Chapuis, K., Taillandier, P., ... & Drogoul, A. (2020). Comokit: A modeling kit to understand, analyze, and compare the impacts of mitigation policies against the covid-19 epidemic at the scale of a city. *Frontiers in public health*, 8.

## Additional material

COMOKIT project website: <https://comokit.org>