# PanCommunity: Leveraging Data and Models for Understanding and Improving Community Response in Pandemics

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IRG JST FY2021

**Multi-scale social impact of decision making across communities** We look at communities at local, federal, and international (US and Japan) scales and investigate impact of testing, preventative measures and vaccines, when used in combination, to improve community response and resilience at different scales:

- What are the critical features of communities -- at different local, state, national scales, socio-economic contexts, categories, and across geographies-- impacting their response to interventions and their overall resilience?
- Can we assess outbreak risks as well as community response (to the epidemic as well as to the intervention strategies) across community scales?
- Can we develop multi-fidelity testing strategies for prevention and learning and to improve intervention efficiency across heterogeneous communities?
- Can we quantify and account for impact of different delivery strategies on community response?
- Can we predict social and economic impacts of the pandemic and interventions across diverse communities?
- Can we optimize vaccine distribution and testing?

**Our community partners in the US, Japan, and EU include**

- micro-scale: ASU AZBioDesign Institute, Kyoto Univ. S. Public Health,
- city/state/regional-scale: City of Tempe, NSF West Regional Big Data Innovation Hub, Kyoto Public Health Authority, Nagasaki Prefectural Institute of Public Health
- national-scale: Centers for Disease Control (US), EvoGamesPlus (multi-country EU consortium), National Institute of Infectious Diseases (Japan)

**What has been achieved so far?:**

- DataStorm/PanCommunity integration – highly modular, non-monolotihic modeling and ensemble simulation of pandemics through cloud-based reusable components
- A new high-dimensional optimization framework
- A SIRTEM COVID-19 model integrating testing, quarantine, and hospitalization with spatial context
- Analysis of COVID-19 transmission patterns in Japan
- A novel monkeypox forecasting framework
- A novel ensemble sub-epidemic modelling framework which can be used to forecast biological and social growth processes

We design new data and model informed methods to develop large scale testing, vaccination, and intervention policies, considering interactions (e.g. information exchange, coordination, collaboration, and competition) across communities at multiple scales. We are also developing an operating framework for shared PanCommunity resources leading to a data and model repository,

The results of the work will directly benefit and be immediately available to not just academic researchers, but also domain experts in the private sector and within the government and communities at large. The framework will unify unprecedented amounts of data and models from disparate systems and, by weaving systems, data, and people, will enable experiments that fundamentally change the way in which scientific research is conducted.

- Workshop #1: Community: This workshop will set the charter for the community outreach efforts, determine critical attributes, and will focus on, among others, the following questions and challenges: Who are the key academic, industrial, governmental, and NGO stakeholders and what are the best mechanisms to engage them? What are the key services we can provide to the community to provide for maximal impact? How should the community network be expanded?
- V1 of Pancommunity prototype will be made public



Award ID#: 2125246