**Specific Aims**

**INSTRUCTIONS:**

*Instructions are taken directly from the* [*NIH SF424 Application Guide*](https://grants.nih.gov/grants/how-to-apply-application-guide/forms-d/general-forms-d.pdf)*. For internal use only, do not distribute. Please delete prior to submission.*

**Format:** 1 page maximum, 11pt font or larger (suggest fonts - Arial, Garamond, Georgia, Helvetica, Palatino Linotype, Times New Roman, Verdana), at least 0.5” margins, single column formats are highly encouraged. Attach this information as a PDF file.

**Content:** State concisely the goals of the proposed research and summarize the expected outcome(s), including the impact that the results of the proposed research will have on the research field(s) involved. List succinctly the specific objectives of the research proposed (e.g., to test a stated hypothesis, create a novel design, solve a specific problem, challenge an existing paradigm or clinical practice, address a critical barrier to progress in the field, or develop new technology).

**SPECIFIC AIMS**

Honduras has one of the highest incidences of Dengue hemorrhagic fever (DHF) worldwide, with the largest outbreaks occurring in 2010 and 2013. The situation of dengue in Honduras is an example of the challenges faced in infectious disease surveillance and forecasting in low and middle income countries. Data sharing mechanisms between laboratories and clinics are fragmented, resulting in poor coordination across the healthcare system. Timely syndromic surveillance is hindered by slow communication, making disease monitoring difficult. Public health agencies are unable to predict trends from the available data because of the lack of accurate forecasting models.

The overall goal for this project is to create an open-source, integrative data platform that addresses these challenges. This platform will enable digitalization of laboratory diagnostics results and patient data at the point of care, and integration with mobile-based participatory syndromic surveillance data from the general population. These data streams will inform the development of new forecasting models that will outperform existing models that rely only on past case trends and climate data. The platform will also strengthen connection between patients and healthcare workers through mHealth technologies. Furthermore, it will allow us building a surveillance network to track DHF as it spreads and discover outbreaks as they emerge.

Our team brings together expertise from key domains to achieve this goal. Dr. Colubri has developed several mobile-optimized tools for infectious disease case report and clinical decision support, currently in use to manage Lassa fever patients in Nigeria. He has also prototyped interactive web-based epidemiological dashboards that connect to District Health Information Software, a popular open-source platform for storage and analysis of health program data. Dr. Zúniga Valeriano is the director of the Department of Health Surveillance at the University Teaching Hospital in Honduras, a member of the Honduran Society of Infectious Diseases, and has long experience in managing control campaigns of vector-transmitted and zoonotic diseases. Dr. Kacey Ernst, along with her team, has developed the *Kidenga* mobile platform for participatory syndromic surveillance of Zika, chikungunya, and dengue. Dr. Santillana and his team have developed methods using Google search patterns to predict flu and dengue activity that have consistently outperformed the original methodologies proposed by Google (Google Flu/Dengue Trends).

**Aim 1: Develop an open-source platform for collecting and integrating laboratory diagnostics results with epidemiological data from suspected dengue cases reported at the University Teaching Hospital.** This platform, called *DengueData,* will provide a novel mobile- and desktop-based data entry and visualization software for healthcare personnel, and will use DHIS2 for as the data management back-end. This platform will reduce data-entry errors, enable rapid coordination between healthcare providers and national health authorities, and help identify false positives in diagnostic results.

**Aim 2: Identify the barriers and challenges of mobile-based participatory syndromic surveillance systems in Honduras and pilot a new self-reporting app for dengue symptoms.** We will conduct an on-site study to determine factors influencing user engagement with these systems in Honduras. Based on the results from this study, we will create a self-reporting app of dengue symptoms, *DengueDoctor*, conduct a pilot rollout in Tegucigalpa, and implement alert functionality of severe dengue cases reported through the app.

**Aim 3: Integrate novel data sources into forecasting models to strengthen traditional epidemiological surveillance of dengue in Honduras.** Platforms developed in aims 1 and 2 will generate new and rapidly updating data streams. We will be combine and integrate these streams with additional sources such as weather and internet searches to construct more accurate predictive models for early warning systems.