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## **Crowd-Dx(TM): Using crowd-sourced data analytics to elucidate trends in healthcare, wellness and disease**

### Introduction:

Developments in Connectivity, Big Data and Structured Data Analytics promise significant advances in many important societal areas, including healthcare. Indeed, a number of predictions about future technological advances relate to “Smart Healthcare”, wherein the connected world and Internet of Things (IoT) will impact our understanding of disease and offer material benefits to patients and healthcare providers. A key requirement to make this happen is availability of meaningful and robust data regarding relevant biomarkers that can readily be obtained from a significant portion of the population to enable elucidation of important healthcare trends. Whereas new “wearable” technologies can provide information regarding certain indicators (activity, heart rate, sleep patterns, etc), they are not able (at least yet) to provide data regarding immunological biomarkers. This is a key unmet need that this project will address.

### Background to project:

Recent advances in immunology and diagnostics have enabled the development of a sophisticated home/self-test for a key biomarker of wellness and disease. Based on the function of neutrophils (a type of white blood cell), this rapid blood test has been shown previously to provide important health and wellness data in several applications, including: i.) athlete performance & recovery data for elite sports teams (e.g. Manchester United in the EPL, Maclaren in Formula-1 racing), ii.) data providing a direct indication of stress response for individuals suffering from clinical symptoms of psychological/emotional stress, and, iii.) important new diagnostic/prognostic data for oncologists monitoring disease progression in prostate cancer patients (this from recent clinical trials at UCLH in London). Several clinical advisors to this project have indicated that the clinical biomarker that is measured in this Leukocyte Coping Capacity(TM) (LCC) test is meaningful not only on an individual basis (especially when monitored longitudinally over time) but also potentially when analysed across groups of individuals (population groups) to understand immunological differences between groups which can vary over time. Data from a broad spectrum of the population, when analysed using sophisticated data analytics, could, for example, help healthcare providers spot trends in immunological changes related to health & wellness, stress or infectious disease (for example, in a disease outbreak). Because of its ease-of-use, its potential as a self-test, and its ability to provide key immunological data that impacts large swathes of the population, project partners are confident the LCC test could provide crucial, clinically-meaningful data that will help individuals live better and help healthcare providers spot important trends in the future.

### Project description:

In this project the teams will develop the initial data analysis tools and software-based algorithms that will enable LCC data from numerous individuals to be analysed and the data portrayed in a meaningful way. A first-generation smartphone mobile application will be developed. The team will undertake early-stage discussions with healthcare providers to ensure the data analysis results in useful outputs.

## **Signal processing, data acquisition**

## **System integration and engineering**

## **Computing**

### **Software and imaging**

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