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Earlier this year, the number of mobile phone users exceeded 4 billion – with the majority of users living in the developing world. The implications of this fact are profound: most people on Earth are currently carrying computers that continually transmit information about their relationships, movements, and even financial decisions to closed databases distributed throughout the world. While the privacy implications of this data should not be understated, I believe this ubiquitous infrastructure of wearable computers can be repurposed in ways that better serve both the billions of individuals who carry them and ultimately the societies in which they live.

I moved to East Africa over three years ago, where I have been working with mobile phone operators and launching EPROM (Entrepreneurial Programming and Research on Mobiles) programs, an initiative I began in 2006 to teach mobile phone programming within local computer science departments in order to develop applications specifically for local users. Customized mobile phone applications could dramatically accelerate economic development in even the poorest communities in Africa, yet despite the incredible growth of mobile phone usage, these applications are rare. Furthermore, the computer science curricula of universities across the continent still focus on traditional desktop computer programming. As a result, African computer science graduates are poorly equipped to address the computing needs of African people. To date, EPROM courses are being taught in over a dozen countries in Sub-Saharan Africa, empowering thousands of African computer science students with the skills needed to program phones, leading to hundreds of applications designed specifically for the African market, as well as several start-up ventures based in Nairobi, Addis Ababa, and beyond. One such EPROM start-up is SMSMedia Rwanda; its founder, Jeff Gasana, realized that prepaid scratch cards could be used not only for buying airtime, but also any commodity. Instead of traveling to the capital and waiting in line to top-up their electricity balance, over 30% of Rwandans purchase electricity using their mobile phones through Jeff's system. At the University of Nairobi, another of my former students, Eric Magutu, developed SMS Bloodbank to connect rural district hospitals with centralized blood banks using text messages. Nurses were compensated via automatic airtime transfers to provide updates about the blood supply levels in effort to halt an alarming increase of blood shortages in rural hospitals across Kenya. This ability to automatically compensate rural nurses led to the creation of *txteagle* – a company that enables people to earn small amounts of money on their phones by completing simple tasks such as translations and surveys for corporations who pay them either in airtime or mPesa (mobile money). The txteagle service went live this spring in Kenya and Rwanda, transforming the phones of 15 million East Africans into a platform for income generation.

Launching txteagle has required working closely with many mobile phone operators. Through my research at the Santa Fe Institute and NSF-funded start-up NDM Labs, I have developed relationships with dozens of mobile phone operators from around the world, helping them analyze the petabytes of data being generated by their subscribers. Through these analyses, I have access to data about what we believe to be the largest social network ever analyzed – a network that may exceed one billion people by the end of this year. While most analyses of this type of data have focused on understanding Western societies, mobile phone subscribers from under-studied populations within the developing world are generating data that hold even greater potential. Working with epidemiologists, we are attempting to identify behavioral signatures associated with potential regional disease-outbreaks and concurrently modeling human movement in East Africa to support informed decisions about allocation of malaria eradication resources. Using data from every mobile phone in Rwanda over the last four years, we are working with the city planners of Kigali to understand the dynamics of slums and the impact of policy decisions ranging from road construction to the placement of latrines. With developmental economists, we are attempting to quantify a society's reactions to exogenous events, such as the collapse of crop prices in local markets or natural disasters, such as droughts and earthquakes.

However, collaborating with mobile operators is not the only way to study mobile phone data. My doctoral work involved deploying specially programmed phones that continuously collected even more in-depth behavioral data. This original "Reality Mining" study generated an unprecedented dataset of individual and group behavior. This data has been downloaded by thousands of researchers and used in over 75 publications. I am currently running similar ongoing studies involving subjects ranging from office workers in Helsinki, smokers in New York, teenagers in Delhi, and male prostitutes in East Africa.

As our sample size inevitably expands into the billions, it is important to consider the implications of planetary behavioral data and comparisons across cultures and continents. At first glance, it appears that some information spreads through a village in Kenya in a very similar way it spreads through Greater London. Mobility patterns in the Dominican Republic are comparable to how Rwandans move within their country, which bear striking parallels to movement in San Francisco. While we may be nearing the point of making claims about universal laws of human behavior, I believe the harder questions occur after we fit the distribution and declare an understanding of a complex social system: how can we use these data and insights to improve life? While I'm thrilled to be broadening the impact of one of the most influential technologies of our time, there is much more to be done.