What is your idea?

The idea is to leverage individual telecom data to understand the regional dynamics and impact of a local food crisis at individual or household levels. The goal is to develop and optimize a coping strategy aiming at increasing the resilience along the complete food system: (i) strategic framework addressing local food crises; (ii) tools leveraging Big Data and telecom data.

More than 100 million people have been experiencing a food crisis in 2016, which is a significant increase of more than 35% compared to 2015. Conflicts or climate changes have been causes for food crises as they have generated displacements putting pressure on host communities and refugees[1].

One overall objective of the current research is to identify the key building blocks of a sustainable food system. Considering the burning platform and questions raised by FAO on the regional impact of food crises as well as the questions raised by CGIAR in the context of its challenges, we believe that ***there is significant gap for further understanding the regional coping strategy in response to changes in domestic and regional food supply.*** For instance, food crises in South Sudan or Somalia have had profound consequences in Uganda or Kenya. Learning from past food crises, we ***aim at identifying leading Indicators of food crises and defining the optimal course of actions to launch addressing regional changes in population dynamics resulting from a local shock on the food system*** – see below for specific dimensions. Such analyses would be run leveraging telecom data. Beyond these short-term objectives, we would need to differentiate between local and global mechanisms transmitting food shocks and ***define a set of coping strategy at regional and subnational levels***. Existing research papers have shown that changes in telecom patterns are correlated with shock on food value chain.

The main underlying hypothesis are:

- Local food crises have regional effects
- We can detect early warnings of food crises from behavioral and social changes
- Food crises spread and diffuse leveraging infrastructure and human interactions
- We can develop strategies to cope with regional effects of a food crisis and build more resilient communities and food systems

Such idea is innovative and unconventional because

- Telecom data and individual behavior in agriculture – It is a unique example of using individual and granular telecom cross-population data in the context of agriculture. Such data captures human interactions, movements and behaviors through the calling patterns they create
- Open algorithms platform – The proposed approach requires to start creating a set of algorithms allowing to handle large volume of data as part of a Big Data Platform. These algorithms are at the core of a novel approach consisting of creating an ecosystem leveraging open algorithms and structuring the access
- Cost effective and near-real-time approach – The tools and data can be refreshed every 15 minutes providing insights even during food crises. Moreover, all data are collected by third parties, like telecom operators and the process is fully automated

[1] *Global Report on Food crises 2017*, FAO, March 2017

- Scalable technology – All formats are standard and algorithms could be deployed across multiple geographies. Moreover, developed algorithms and telecom data can be complemented by additional data sources (e.g. satellite data) or other pieces of software

How will you pilot it?

We would focus on Uganda where we have had access to the data from both Airtel and MTN, which are the major operators in the country, covering approximately 70% of the population. Such telecom data are proxies for identifying e.g. mobility patterns, distribution of populations, household expenditures. DDI has been collecting approximately 2 years of telecom data in Uganda.

Telecom data cover individual "consumption" of telecom services and provide information about:

- Individual calls, including calling number, called number, GPS coordinates, duration of the call
- Recharges
- Mobile money transactions

All data are anonymized and remain within the premises of the telecom operators to ensure privacy and avoid any leakage.

Strategic framework and analyses will go along the following lines:

- What is the regional impact of a food crisis?
    - What are the changes in social relations?
    - How is the distribution of populations affected?
    - What are the changes on mobility of populations and communities?
    - What are the shock on expenditures?
    - What are the economic centers and activities affected?
- How does such impact diffuse over time?
    - How to limit such impact and better address food crises?
    - What is the radius of impact from a given food crisis? How does such impact diffuse over other geographies?
    - How does the road network and other infrastructure affect the diffusion of the crises?
- What would be the optimal strategy to limit the negative impact, support populations affected by food crises and improve food resilience of local communities?

The end-products are: (i) a strategic framework structuring key questions to address to increase regional resilience following local food crises; (ii) visualization tools leveraging telecom data and providing insights to feed a coping strategy, potentially across countries.

DDI has been building a 7-year track record of developing Big Data tools in emerging countries using telecom data. Our team consists of 1 manager + 1 front-end person + 1 backend person. The 3 stages of the project over 9 months are: (i) identify local end-user and list key metrics and tool requirements; (ii) develop algorithms to measure selected metrics; (iii) collect feedback and adjust the tool through a piloting phase with end-user (e.g. FAO, WFP). Such approach could be further tested and implemented over multiple geographies.