Mapping Humanity: Leveraging AI/ML and Geospatial Data for Development Targeting, Impact, and Cost Savings

Testimony before the House Foreign Affairs Committee Subcommittee on International Development, International Organizations, and Global Corporate Social Impact

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April 16, 2021

Thank you, Chairman Castro, Ranking Member Malliotakis, and other members of the Subcommittee. I appreciate that the Subcommittee is holding this hearing on innovation in global development, particularly given the rapid pace of technological progress over the last few years. Artificial intelligence (AI), machine learning (ML), and geospatial data are rapidly transforming agencies' ability to map and regularly monitor community level poverty, access to life saving services, and a range of other development outcomes. There is an urgent need for USAID and other development agencies to update their core operational approaches in ways that ambitiously streamline and systematize these new innovations to drive improved development targeting, impact, and cost savings.

I have spent the last two decades working on global development and national security issues. This has included time in senior government policy positions at the Treasury Department and National Security Council as well as in the research and non-profit community at the Center for Global Development and the ONE Campaign. My testimony today reflects these professional experiences within the broader global development community as well as my first-hand private sector experiences pushing the frontier of how AI/ML and geospatial data can make the world a safer, more sustainable, and more prosperous place.

Today, I have five key points to make: (1) technology has advanced tremendously in the last five years driven by AI/ML, cloud computing, satellite imagery, and the availability of large population survey datasets; (2) companies like Fraym are already applying these new technologies to revolutionize how development agencies can target and monitor programs; (3) USAID remains largely focused on incentivizing ad hoc and non-commercial innovations that do not scale across its global program portfolio; (4) USAID and the global development community should learn from how the defense community is ambitiously funding and streamlining innovation to address new or existing mission requirements; and (5) USAID also should systematically incorporate new technological approaches in its multi-year program and project contracting processes.

First, technological innovation has advanced tremendously in the last five years driven by AI/ML, satellite imagery, and cloud computing. Even more specifically, the geospatial data and analytics market has been transformed by these three factors in a very brief period of time. Satellite imagery is now widely available, whereas it was previously only attainable for military and intelligence agencies with very deep pockets. Remotely sensed data from

satellites (e.g., measuring vegetation, surface temperature, rainfall, etc.) is now available as well from public sources with a weekly or bi-weekly refresh rate. Services like Microsoft Azure and Amazon Web Services have reduced computing costs to a mere fraction of what they were a decade ago. Now even the smallest of organizations can rent access to server farms instead of having to buy and maintain racks and racks of expensive servers. Collectively, these enabling factors has spawned a geospatial and technological revolution.

In the past, development agencies have faced highly constrained data and information challenges when trying to develop, target, and monitor billions of dollars' worth of country programs. Typically, they would rely on national-level or at best, regional-level statistics from host governments, the World Bank, or the UN for things like educational attainment, poverty, child marriage prevalence, malaria, vaccination rates, or access to electricity. Yet, this approach assumes that all communities look the same across the target country, which we know is wildly incorrect. A bit closer to home, we only need to compare the town of Cooper and the suburbs of Dallas and Fort Worth. These two areas are amongst the poorest and wealthiest places in Texas but are only an hour's drive apart from each other. The same dynamics exist throughout the world where poverty and wealth vary hugely over very short distances making national or state/region averages meaningless for policy or programmatic purposes.

Alternatively, if the national or regional statistics are out of date, then development agencies may spend millions of dollars to field new surveys and wait up to a year (or more) for the results to come back. This likely will be very high-quality information, but it is still far too slow to allow for near real-time programmatic design and iteration and also far too geographically aggregated to identify concentrations of target beneficiaries down to the community-level. As a result, hard-working and highly committed development professionals are forced to make extremely consequential decisions about people's lives as well as U.S. treasure with outdated or highly incomplete information.

Powered by the combination of AI/ML, satellite imagery, and cloud computing, it is now possible to map these same development indicators – like educational attainment, poverty, child marriage prevalence, malaria, vaccination rates, or access to electricity – down to the $1km^2$ level across an entire country or region. *In a matter of days, not months or years.*

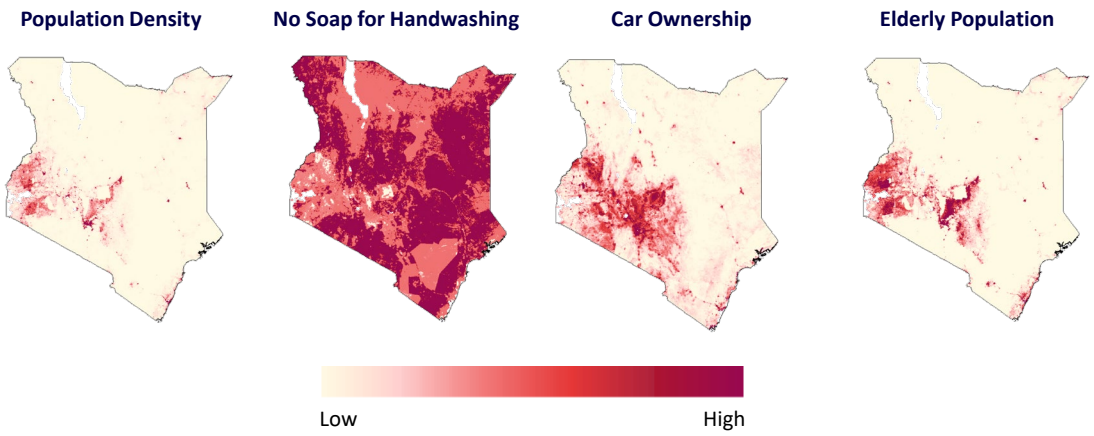
For instance, my company Fraym has spent years and invested millions of dollars building and refining software that deploys AI/ML models that combine satellite imagery, remotely sensed data, and geotagged household surveys to produce data about what people look like, how they behave, and even what they believe down to this $1km^2$ resolution. We also measure how these distinct human characteristics and conditions change over time. Powered by this software and the 'data layer' outputs, Fraym is mapping humanity and revolutionizing how organizations make decisions and drive results. All while strictly protecting individuals' data and privacy through deliberate design.

Figure 1 – Fraym's Data Production Methodology

Second, companies like Fraym are already applying these new technologies and capabilities to drive improved programmatic targeting, monitoring, and resource efficiency in ways that were previously unimaginable. We collectively are building transformational information solutions that are at the core of what USAID's and other development agencies' missions aim to accomplish. A few recent examples help to paint a more concrete picture.

In response to the global pandemic, Fraym produced hundreds of data layers spanning several dozen countries in Africa, Asia, and Latin America that mapped COVID-19 risk factors down to the sub-neighborhood level. This multi-country effort included data like the availability of soap for handwashing, forms of transportation, and concentrations of elderly population. We delivered these free of charge within a few weeks to over one-hundred government ministries, NGOs, and development agencies to ensure that frontline responders had the best data possible to fight the world's greatest health crisis in over a century. This was among the first localized data available to the president's office in Kenya as policymakers scrambled to develop a national action plan. In Ghana, the government used these maps to deliver water and handwashing soap to under-served communities with particularly acute COVID-19 risks.

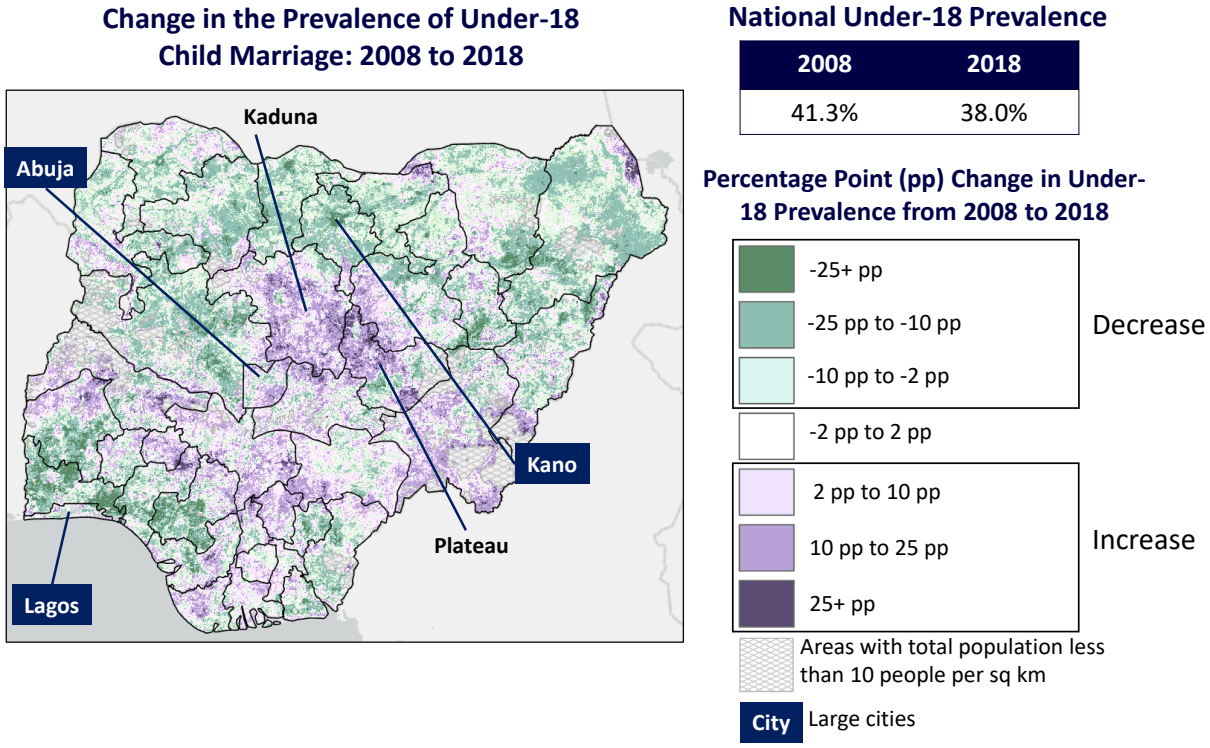
Figure 2 – COVID-19 Risk Factor Maps, Kenya



Source: Fraym

Fraym also recently analyzed the community-level prevalence of child marriage across a portfolio of eight countries in Africa and South Asia and explored how patterns have changed over the last decade or so. This cutting-edge mapping and analysis uncovered important and highly actionable results about this longstanding tragedy. For instance, in countries like Kenya, Nigeria, and Senegal, national child marriage prevalence rates decreased only slightly over time, but there were *significant community-level changes* suggesting that prevalence shifted from some communities to others. This localized prevalence data across multiple countries and continents – coupled with rich contextual information about these communities such as employment and livelihood patterns, girls' educational attainment, and social norms – can help development agencies, NGOs, and advocacy organizations pinpoint where and how to channel their scarce resources for maximum effect.

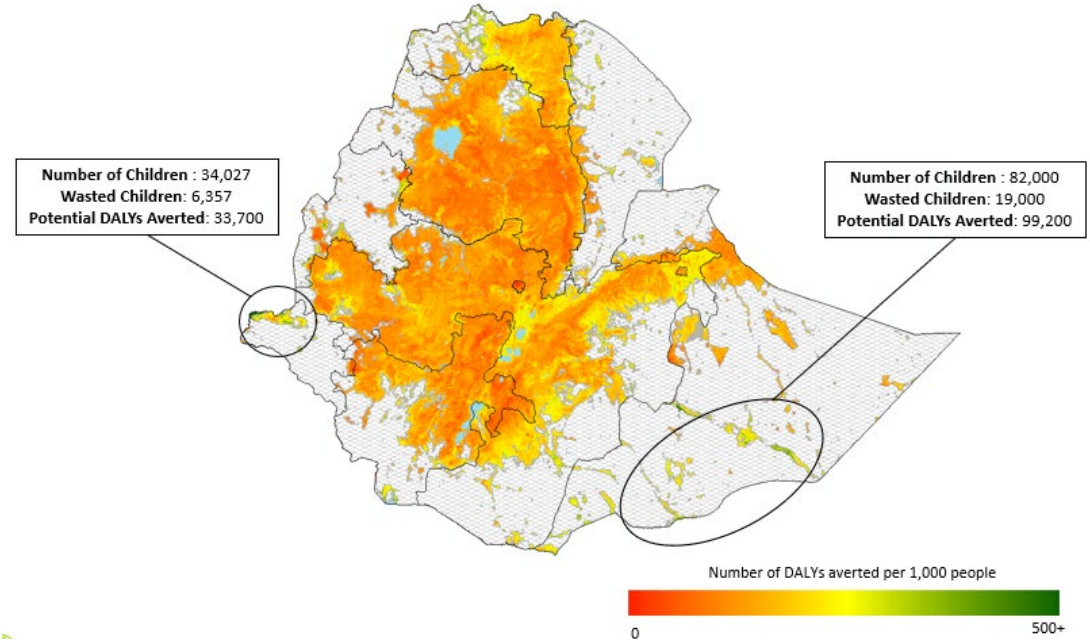
Figure 3 – Mapping Changes in Child Marriage Prevalence, Nigeria (2008-2018)



Source: Fraym, Nigeria DHS 2018 and 2008

Moreover, it is now possible to simulate the potential hyper-local impact of different program interventions, such as child nutrition and food distribution projects regardless of national boundaries. Fraym developed its Value for Impact methodology to help partners in global health, nutrition, food security, and agriculture to quantify impact and identify communities that may benefit most from specific interventions. In Ethiopia, this approach measured the potential impact of a successful child nutrition approach and highlighted individual communities for prioritized intervention, all using Fraym's existing, hyperlocal data on acute malnutrition. Modelling and comparing probable scenarios before spending millions of dollars in the field can help target specific interventions to specific areas at the level that matters most – the community.

Figure 4 – Modeling Lives Saved by a Child Malnutrition Program in Ethiopia[1]



Source: Fraym

There are many other technology companies who also are well suited for filling specific development requirements or gaps with scalable solutions. For example, Premise Data and Native are leveraging the global gig economy to deploy ordinary people with mobile phones to collect pictures and observational data of refugee camps or specific points of interest (e.g., a school or clinic). Viamo can reach hundreds of thousands of people with live-saving text messages in a matter of days. Parsyl uses low-cost sensors to remotely track transport cargo conditions like temperature, humidity, and light to ensure that vaccines are delivered appropriately and accountably.

However, USAID and other global development organizations have yet to update their traditional way of operating to *systematically* leverage these new technologies for programmatic impact and efficiency globally. Which leads me to my final three points.

Third, USAID remains largely focused on incentivizing ad hoc and non-commercial innovations that do not scale across its entire program portfolio in a systematic and efficient manner. USAID has clearly supported exciting and powerful innovations over time as well as effective partnerships with private companies, particularly in global health. However, most of these efforts have been channeled through challenge grants, academic experiments, or niche projects that only support technological innovation on the margins or

[1] *To conduct this analysis, Fraym predicted the number of DALYs lost due to acute malnutrition among under 5 children in Ethiopia, incorporated a "cure" rate – a measure of success for the program, and identified both the areas of most acute need and the potential impact of rolling out this live-saving intervention in those areas.*

for very specific product applications (e.g., more effective malaria bed nets or micronutrient supplements).

These approaches rarely scale either because they are one-off experiments that focus on a highly niche intervention or specific community (like a village in Niger) or the sponsored organization does not have the resources or incentives to build a highly scalable and efficient solution. The latter is particularly true when the challenge or research grant beneficiaries are NGOs or academic institutions that are incentivized to cover personnel costs but not the capital investments that fuel automation, software, and other tools that transform a promising prototype solution into a global capability. USAID has been far slower to recognize that technology companies have built a broad range of capabilities that can be harnessed to drive programmatic results, efficiency gains, and cost savings.

Fourth, USAID should learn from how the Defense Department and Intelligence Community are ambitiously funding and streamlining technological innovation to address new or existing mission requirements. Where development agencies have relegated technology investments to the margin, the defense community has integrated the latest technological innovations into core levels of decision-making and achieved significant success in doing so. Development agencies would similarly benefit from embedding tools like AI/ML and geospatial data analytics into programming and strategy design.

The national security community has a broad range of transformative programs and procurement vehicles that are specifically designed to adapt and match commercially viable AI/ML innovations to core mission requirements. Just a few examples include: AFWERX and SOFWERX Small Business Innovation Research programs, the Defense Innovation Unit, the Joint Artificial Intelligence Center, and In-Q-Tel.

These programs and vehicles deploy billions of dollars *each year* to find promising new private technologies and match them with warfighter or intelligence analyst requirements. Many are carefully designed to allow for the transition from an initial solution prototype to an eventual program of record for the most promising and useful new technologies. Some of these investments will pay massive dividends and make important contributions to mission requirements. Others may not move beyond the early, smaller investment phase. In this manner, defense and intelligence agencies are creating a highly strategic portfolio of technology bets that are closely aligned with Defense Department and Intelligence Community objectives.

In comparison, Development Innovation Ventures (DIV) within USAID remains a very small and niche program. DIV has only invested $149 million across 225 grants over the last decade. Moreover, the majority of this funding has been channeled to NGOs and academics who, as noted above, face significant obstacles to building truly scalable solutions. With increased scope and funding, DIV has the potential to be a foundation for ambitious technological innovation efforts in the future. But, in its current state, it is far too small and marginalized, and not commercially focused enough to systematically harness globally scalable technology innovations.

Fifth, USAID should systematically incorporate new technological approaches in its multi-year program and project contracting processes. USAID has a very well-established procurement process that awards large multi-year awards. Fraym and other referenced new technology companies are often stalled in delivering effectively within these awards due to the nature of contract and grant requirements. Our scalable and effective solutions are locked in subcontracts on bilateral programs that are often being deployed sub-optimally. This typically is because the lead contracting organizations are world-class subject matter experts in specific sectors (e.g., power sector, agriculture, or water and sanitation) but are not responsible for thinking across sectors and national boundaries in ways that systematically harness new cross-cutting technologies. To effectively address this structural obstacle, USAID needs to clearly communicate demand for these types of cross-country, portfolio-wide technologies and applications both more broadly and within individual RFPs.

USAID is pursuing some efforts to address this issue with varying success. Most notably, the Private Sector Engagement (PSE) Hub within the Bureau for Development, Democracy, and Innovation (DDI) is tasked with creating the organizational conditions, infrastructure, and capacity within USAID to effectively engage with companies like Fraym. There is a timely opportunity for them to bring systems-level thinking to innovation and creatively onboard companies in ways that accelerate development impact globally.

To conclude, there is a tremendous opportunity to systematically promote and streamline commercially viable technologies in ways that deliver improved global development targeting, impact, and cost effectiveness. USAID is at a pivotal point in its history as the leading provider of lifesaving assistance and transformative economic assistance. Particularly as it and other development agencies contribute to the COVID-19 global recovery. Recognizing and harnessing technological innovations powered by AI/ML, cloud computing, and satellite imagery will help to deliver on USAID's transformational mission to make the world a safer, more sustainable, and more prosperous place.

Thank you very much.