MAINSTREAMING SCALING INITIATIVE CASE STUDIES

USAID-Funded Research Outputs from Feed the Future's Innovation Laboratories

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SCALING
COMMUNITY OF PRACTICE

Mainstreaming Scaling:
A Case Study
of the Scaling of USAID-Funded Research Outputs from Feed the Future's Innovation Laboratories

By

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Executive Summary

In Fall 2023 the Scaling Community of Practice (SCoP) launched a three-year action research initiative to study how organizations working in international development, principally funders, mainstream scaling into their operations–a "Mainstreaming Initiative". As such, this initiative and this study do not focus on scaling or how to scale innovations, interventions or projects, but on how to transform an organization to systematically support, operationalize and affect scaling, i.e. create a scaling organization. During the first year of that initiative, the SCoP and the partner organizations who agreed to participate in this effort have produced thirteen such case studies as well as an interim synthesis report and policy brief summarizing the first set of case studies.

This paper constitutes a new case study and contribution to the Mainstreaming Initiative. It covers how scaling has been integrated into Feed the Future (FTF) as an effort of the US government to combat global hunger and malnutrition: "[FTF] brings partners together to address the root causes of hunger and poverty by boosting agriculture-led growth, resilience and nutrition in countries with great need and opportunity for improvement."[1]

This case study specifically and narrowly focuses on the work of Feed the Future Agricultural Innovation Laboratories (hereafter Innovation Labs) and appropriate parts of the relevant USAID bureau. It complements an earlier case study of FTF that analyzed efforts of the US Government to integrate and coordinate its various agri-food assistance programs across federal agencies in support of a more effective approach to addressing global hunger and poverty.[2]

Innovation Labs are funded and intended to conduct research, develop and take to scale safe and effective technologies and innovations that address current and future challenges posed by changing climate, hunger, food insecurity and malnutrition. Innovation Labs are led by top U.S. universities, working in partnership with other universities, with agri-food research organizations, and particularly with research and educational institutions located in the Global South. The number of Labs has varied over the fifteen year life of FTF; there are currently seventeen Labs, including climate, fish, food safety, horticulture, livestock, peanuts and soybeans.

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[1] https://www.usaid.gov/feed-the-future#:~:text=Feed%20the%20Future%20is%20America's,need%20and%20opportunity%20for%20improvement.

[2] Julie Howard (2024). "Mainstreaming Scaling: A Case Study of Feed the Future (FTF), The US Government's Global Hunger and Food Security Initiative: Successes, Challenges, and Lessons." Scaling Community of Practice. https://scalingcommunityofpractice.com/wp-content/uploads/2024/01/Scaling-Up-at-FTF_USAID-FINAL.pdf

The study describes and analyzes USAID's journey and continuing efforts to integrate scaling into FTF Innovation Laboratories. It identifies both the progress made and the challenges faced in achieving this mission. Given its focus, **this paper is of particular interest to organizations working on or funding research and innovation in general, and especially in the agri-food sector**.

Scaling was an objective of FTF and Innovation Labs from their inception but was not initially integrated or operationalized into the way research was funded, supervised and conducted. In the first several years research efforts did not explicitly focus on generating scalable innovations nor on identifying and handing off innovations to suitable partners; Labs lacked guidance, capacity or incentives to integrate scaling into their work. They were constrained by limited financial resources and legislative limits on their activities.

Integrating scaling into research institutions requires specific institutional arrangements, skills and mindsets. Because all Innovation Labs are based in universities, their leadership and staff have historically embodied academic incentives and a culture focused more on publishing in refereed journals than hand-off to partners for commercialization, let alone achieving impact at scale. Innovation Labs have until recently lacked the institutional arrangements and approaches that guide successful public-private partnerships and technology delivery. To the extent they had partnerships with organizations in the Global South, they were other universities or national research centers. They also lacked the skills, experience and mindset to pursue scaling: transitioning from academic research (discovery) to the delivery of market-led solutions requires new skills and capacity and a change in approach, attitudes and objectives. These specific conditions and obstacles had to be recognized and addressed for the Labs to support effective scaling.

Scaling was not initially integrated into the relationship between Innovation Labs and FTF projects, FTF monitoring and evaluation indicators, nor the structure, responsibilities and capacity of the Bureau of Food Security (BFS), which leads USAID's FTF work. While innovations were supposed to be picked up and integrated into FTF projects, mechanisms to effect this were weak or lacking, so that it often did not happen. Monitoring and evaluation indicators for scaling were not part of Lab grants or supervision. Some scaling indicators existed for FTF country projects, but these tended to be limited to project duration, so that true uptake at scale, let alone sustainability, could not be tracked. BFS itself was not designed to be a "scaling organization"; the Bureau itself does not develop or fund field-level strategy or individual FTF projects; these are the responsibility of the individual country Missions in the countries the US government has designated as FTF countries.

As experience was gained with Labs, a more integrated approach to scaling was developed and included formal scaling guidance, tools and regular inventories of progress. BFS

developed specific criteria and indicators to track scaling. It introduced a regular inventory of innovations produced by Innovation Labs to track progress, the Research Rack Up, that incorporated these criteria, revealing that Labs' self-scoring of scaling progress often did not correspond to objective measures and criteria. Over the last several years the Bureau has developed a suite of tools for scaling up innovations. Most notably and much more recently, it has adopted a Product Life Cycle (PLC) approach to research management and, working with the Soybean Innovation Lab, translated that into an approach and tool called Innovation to Impact (i2i). i2i aims to integrate scaling into research projects right from the beginning, helping to track and enhance progress towards sustainable impact. It helps Labs set measurable scaling objectives, encourages them to engage local partners to identify and address scaling barriers. i2i is being piloted by several Innovation Labs, and it includes a toolkit to enhance the commercialization of research outputs. In parallel, the Bureau is working to incorporate the PLC approach into FTF procurement and project planning generally.

BFS has found that partnerships are key to scaling but require substantial efforts to create several preconditions: integrating scaling into how innovations are developed and produced, and strengthening local partners. BFS has worked to foster partnerships to facilitate scaling, such as Technologies for African Agricultural Transformation Clearinghouse, IFAD, and African Seed Trade Association, to build awareness for these innovations and attract commercial partners interested in scaling them, based on a model which has emphasized hand-off to the private sector. In the past, the data and evidence produced by Innovation Lab's data was often weak or missing on the business case for commercial actors, e.g., the size of the potential market; production costs; profit margins. BFS has been working to help Labs produce data relevant to private partners and to document costs and a business case. Moreover, BFS has found that hand-off to private partners is necessary but not sufficient.

Working with and through partners required complementing innovations with investments strengthening local actors and systems. In parallel, BFS made investments in agri-food systems in the Global South (e.g., strengthening seed systems and local seed breeders). This was a result of a shift in BFS's focus towards transformational scaling, emphasizing broader systems change rather than simply increasing beneficiary numbers. Hand-offs require: (i) a strong product-market fit, preferably with open-source designs; (ii) dedicated business development efforts, aligning expansion plans with business growth stage; and (iii) commercial partners, who require working capital financing, patience and tailored support to continually refine business strategies and investor materials.

An integrated scaling approach required changes in the organizational structure, capacity and roles and responsibilities of USAID BFS itself. The introduction of these approaches was complemented by a series of restructurings of the Bureau. The most recent transition of BFS was to be renamed and restructured as the Bureau for Resilience, Environment & Food Security

(REFS). This has brought new roles and responsibilities specifically focused on scaling technologies and commercialization. Dedicated roles for scaling efforts were established and support for scaling operations was formalized within various divisions. Divisions within the Bureau are working collaboratively to integrate scaling into their operations, ensuring that both physical technologies and accompanying knowledge and services are bundled effectively. For example, the Market Systems & Finance Division (MSF) has a Commercialization and Scaling Team whose objectives include creating effective scaling strategies and an enabling environment for partnerships and policy changes. Similarly, scaling is now being integrated into how Innovation Lab awards are made and oversight provided. Collaborative efforts have been put in place within the Bureau, such as between MSF and the research team, to align and coordinate efforts and ensure that innovations can be effectively scaled and integrated into the agricultural landscape. This has proven critical to achieving FTF's goals of providing long-term, sustainable benefits for smallholders and broader communities at scale.

In sum, this case study provides valuable insights into the various actions that USAID's FTF program has taken to mainstream scaling into its funding of agri-food innovations over the past decade. An important characteristic of this journey, and the mainstreaming actions taken, is that – as with scaling itself – mainstreaming scaling into the Innovation Labs required **an iterative learning and adaptation approach** wherein problems were identified and measured, solutions were developed and tested and then rolled out. It also shows that mainstreaming requires a multi-pronged, organization-wide approach: developing guidance and tools; revising monitoring indicators; changing mindsets and institutional arrangements both within the funding organization and recipients, coordinating research funding and oversight with work on markets and partnerships, and even restructuring the funding organization itself.

Perhaps most importantly, it emphasizes that while a partnership approach is essential to scaling for most innovation funders, there is more to it than simply expecting innovators to hand off to partners. Innovators need to target scale from the beginning and keep this front and center throughout the various stages from basic research to testing and piloting innovations, especially generating information that potential partners will require. The stage gating principle or PLC approach is one that should be considered by all innovation funders and innovating organizations for whom the characteristics of their innovations would benefit from such an approach. These efforts need to be complemented by investments to strengthen local systems and the specific partners who are expected to receive these handoffs. This very much aligns with USAID's localization vision and approach[3] of having priorities and projects locally led, inclusive of the voices of marginalized, and especially local capacity strengthening. This case study shows that all of these are key to mainstreaming and supporting scaling.

[3] USAID "Localization at USAID: The Vision and Approach August 2022", https://www.usaid.gov/sites/default/files/2022-12/USAIDs_Localization_Vision-508.pdf

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Acronyms

AFSF - African Food Systems Forum
AfSTA - African Seed Trade Association
AO - Agreement Officer
AOR - Agreement Officer Representative
ASAT - Agricultural Scalability Assessment Toolkit
BFS - Bureau for Food Security (2012-2020)
BMGF - Bill & Melinda Gates Foundation
CA - Center for Agriculture within the REFS Bureau
CAADP - Comprehensive African Agricultural Development Programme
CGIAR - Consultative Group for International Agricultural Research
CIMMYT - International Maize and Wheat Improvement Center
CIP - International Potato Center
FARA - Forum for Agricultural Research in Africa
FTF - Feed the Future (Initiative)
GAO - Government Accounting Office (U.S.)
GDA – Global Development Alliance
GFSS - Global Food Security Strategy
GFSA - Global Food Security Act (2016 & 2022)
i2i - Innovation to Impact
IITA - International Institute for Tropical Agriculture
IL - Innovation Lab
iREACH - Innovation, Research, Extension and Advisory Coordination Hub
ISP - Investment Support Program
M&E - Monitoring and Evaluation
MSF - Market System & Finance Division within the Center for Agriculture
MSI – Management Systems International
MSP - Feed the Future Market Systems and Partnerships activity
NGO - Non-Governmental Organization
PASTTA - Partnership for African Seed Technology Transfer Activity
PLC - Product Life Cycle
PFI - Partnering for Innovation
QR - Quick Response Code
R&D - Research and Development
REFS - USAID's Bureau for Resilience, Environment & Food Security (2022-Present)
RFS - USAID's Bureau for Resilience & Food Security (2020-2022)
RODS - Research Outputs Dissemination Study
RRU - Research Rack Up
RSP - Rural Solutions Portal of the International Fund for Agricultural Development (IFAD)

SFSA - Syngenta Foundation for Sustainable Agriculture
SIIL - Feed the Future Sustainable Intensification Innovation Lab
SIL – Feed the Future Soybean Innovation Lab
SME - Small and Medium sized Enterprises
SROs - Sub-Regional Organizations
TAAT - Technologies for African Agricultural Transformation Clearinghouse
USAID - United States Agency for International Development
USG - United States Government
ZOI - Zone of Influence

Case Study Summary of Lessons and Recommendations

This study describes the USAID's Bureau for Resilience, Environment & Food Security's experience of scaling research outputs within the Feed the Future Initiative encompassing lessons and areas to explore. It draws on research supported by the Bureau, public domain information, records and data from USAID Missions, implementing partners, and consultants. The study forms part of a Scaling Up Community of Practice series and builds upon another study in the series that addresses the mainstreaming of scaling in Feed the Future overall.

This case study focuses on one aspect of Feed the Future; USAID's investments in research through its Feed the Future Innovation Labs and how to get research outputs into use and then scale them up. Feed the Future Innovation Labs are a series of labs that work to address global food security and agriculture challenges. Their goal is to "Reduce global hunger, poverty, and undernutrition," through approaches that pair experts from U.S. universities with research and educational institutions in developing nations.

The case study follows a chronological approach; specific scaling themes are discussed as they emerged and have been addressed sequentially over the course of the Feed the Future Initiative.

Summary Lessons

There are several key lessons learned over the years since the inception of Feed the Future. While not all of these apply to all innovations and Innovation Labs, the lessons are:

FTF Innovation Labs and researchers generally:

- Fail to adequately consider the market and specific market segment needs at the outset, prior to discovery and design.
- Conclude discovery with a publication in hopes that an interested "buyer" will adopt and disseminate the innovation in the future, i.e., common belief that if we build it or innovate it, they will come.
- Mis-define or fail to define the size and characteristics of the user base: this matters since the user base cannot be too small to be sustainable or too large to know where to begin.
- Do not know what is, or adequately build into their process, a sustainable business model that will work best to scale their innovation (or where), e.g., B2B (Business to Business), B2C (Business to Consumer), or village-based advisors.

Other lessons include:

- Potential to scale: This depends on an innovation's characteristics.
    - Planning scaling pathways requires distinguishing if an innovation is best characterized as a private, common, club, or public good.

    - Small but significant differences in a product's profile can make or break the extent of adoption. For this reason, the profile must be designed and guided at every stage by customer needs.
    - Planning scaling pathways requires distinguishing who has an acute need for the new technology and based upon urgency and demand, is willing to put "skin in the game" to support its development. This pathway will be shaped by whether the innovation is best characterized as a private, common, club, or public good.
- Data requirements: Economic information on innovations tends to be incomplete (for fixed/variable costs, suggested pricing, potential revenue) and limits market interest.
- Marketing channels: Pushing innovations through marketing channels like events, digital platforms, and hands-on brokering can be costly and insufficient for reaching desired audiences. This insufficiency is furthered by the lack of early market research at the beginning of a technology's development. Often, a consortium of actors needs to be engaged, early in the discovery process, who can "pull" the innovation into a market system by providing various dissemination platforms (seed company distribution, agrodealers, farmer or water-user associations, outgrower networks, off takers etc.).
- Bundling: Complementary technologies or information to boost users' profitability need to be considered. Technology bundles are not yet robust, which limits adoption and returns to the users.
- Institutional arrangements: research partners need to better understand the institutional arrangements that guide successful public-private partnerships and technology delivery.
- Scaling the adoption of an innovation requires different skills and experience than those needed to research and develop the innovation. Transitioning from academic research (discovery) to the delivery of market-led solutions requires a change in mindset and, most likely, a partner to aid with delivery.
- Syncing research with scaling: Experience has shown that the likelihood of scaling increases when there is a strong collaboration between research partners and development implementing partners, but given their differing timelines, this is quite challenging to accomplish and may require long-term (10+ years) investment plans.

This accumulation of evidence and lessons learned precipitated a realization that the R&D management process required change if higher population-level impacts were to be realized. Planning for scale has to be done from the outset of R&D, informed by specific market and customer needs and supported by a broad range of skills and capacities across all design and launch stages.

Recommendations

USAID learned and borrowed from other organizations in its adoption of the Product Life Cycle approach to research management, with the intention to plan for sustained, widespread adoption at the outset. Adopting an industry standard such as the Product Life Cycle is much easier when

other pioneers have led the way. This experience contrasts starkly with USAID's own pioneering work on early generation seed systems, where a new framework of understanding had to be developed from a narrow body of prior research and extensive efforts went into socializing the resulting approach.

Donors that fund R&D are likely to have experiences similar to USAID's of getting alignment of researchers with potential downstream users, establishing a target product profile for research outputs that improve the user value proposition, and adhering to a responsive research development process that facilitates eventual hand-off to them. A Product Life Cycle approach to research management that embodies this process of research assessment, feedback and advancement, but may not be sufficient on its own. Intentional, portfolio level approaches taken by a donor to connect research activities with market-oriented programming may further aid the facilitation of technology scaling. In the case of a large, decentralized donor such as USAID, this requires more intentional effort to link the centrally programmed research activities with the bilateral non-research activities programmed by individual Missions at the country level.

Intentional efforts to link centrally funded research outputs to field programming can have impacts. Extensive collaboration on seed system development in the past decade is a case in point: new, climate-smart crop varieties are reaching ever larger numbers of farmers due to more efficient improved seed laws and regulatory frameworks, the emergence of commercially-oriented seed companies, improved capacity of early generation seed producers, and better-informed consumers.

A Case Study of Scaling Donor-Funded Research Outputs

1. Introduction

This study describes USAID's efforts to get research outputs from Feed the Future Innovation Labs into use and then scale them up. The study contributes to a growing body of knowledge on scaling of innovations and, as such, does not refer to the Feed the Future Initiative more broadly. The study follows a chronological approach versus a thematic as specific scaling themes emerged and have been addressed sequentially through the course of the Feed the Future Initiative. This study is divided into four chronological sections. The first section is from the Initiative's inception through 2017, when the first US Government's Global Food Security Strategy (GFSS) was agreed by the whole of government, as required by the Global Food Security Act of 2016. During this time frame the Bureau for Food Security (BFS) was USAID's main implementing entity of the Initiative. The second section follows the arc of the GFSS through the establishment of the Bureau for Resilience and Food Security (RFS) in 2020, which reconstituted the Bureau for Food Security to include a resilience focus. This reconstituted Bureau explicitly recognized the importance of scaling-up by establishing two teams within the new Bureau's Center for Agriculture with a scaling focus, one team in the Agricultural Inputs Division targeting scaling of new crop varieties and another team in the Market Systems & Finance Division with an Initiative-wide emphasis.[4]

2. From launch of the Feed the Future Initiative to the 2016 Global Food Security Act

Goals and Approach of FTF

The Feed the Future Initiative (FTF) was launched in 2010 as a whole-of-government[5] initiative to combat poverty and hunger, exacerbated by the global food price crisis from 2007-2009.[6] The goal of FTF has been to reduce the prevalence of poverty and chronic malnutrition in target geographies (called Zones of Influence or ZOI) within focus countries. Country selection is based on level of need, potential for programs to spur growth and improve food security and

[4] In 2022 RFS Bureau became the Bureau for Resilience, Environment & Food Security -- REFS

[5] U.S. Government agencies including USAID, U.S. Department of State, U.S.D.A, U.S. Department of Treasury, MCC, U.S. Department of Commerce, DFC, U.S. Peace Corps, U.S.ADF, U.S.G.S., US Trade Rep, US IAF.

[6] For a full discussion of FTF overall and its approach to scaling, see "A Case Study of Feed the Future, the US Government's Global Hunger and Food Security Initiative: Successes, Challenges, and Lessons," by Julie Howard

nutrition, opportunities for partnership and alignment with the host-country government and regional economic integration and resource availability.

According to a 2016 study by the Congressional Research Service, FTF emphasized a sustainable and collaborative approach. Particularly relevant for the purposes of this report were the fact that FTF emphasized: (a) reliance on measurable indicators to assess initial needs; (b) monitor progress toward targets; (c) evaluate whether corrections, adjustments, or wholesale changes are needed mid-course; and (d) coordinating and partnering with recipient-country organizations and private sector entities, as well as with other donors and international organizations.[7] The monitoring and evaluation of FTF in general and a learning and adaptive management approach helped drive operational changes to affect scaling when initial expectations were not met after several years of funding and implementation.

Country Selection and Coverage

The number of FTF countries has varied over the last fifteen years, with the current number at twenty; sixteen countries in Africa, two in Asia and two in Latin America and the Caribbean. Within each country, FTF identified a target geographic Zone of Influence (ZoI) based on (high) levels of poverty and vulnerability, especially in food insecurity and malnutrition and affecting women and children. The size of the ZoI in all FTF countries was by design much smaller than national scale, with the aim of concentrating resources to achieve the greatest changes in poverty, food insecurity and malnutrition. For example, in Kenya FTF works in 17 out of 47 counties which are found in three different regions; Western Kenya (high rainfall); Eastern Kenya (semi-arid) and Northern Kenya (arid and semi-arid).

Budget

USAID's share of the FTF's budget in its initial years -- Fiscal Year (FY) 2010 to 2014 -- was $4.7 billion, or a little less than a billion dollars annually. Annual budgets have varied but tended to be around one billion dollars; the budget request for FY2025 was $1.1 billion for USAID out of a total of $1.2 billion for US government efforts to address global food security.[8]

Operational Mechanisms

FTF works primarily through four mechanisms; USAID-funded projects developed by USAID Missions in FTF countries; investments in research through Innovation Labs and CGIAR centers; centrally funded projects; and joint investments with other partners in regional and other multilateral platforms, such as AGRA. Most projects are designed and funded by USAID country missions (Missions), with input from the Bureau for Resilience, Environment and Food Security (REFS) in Washington, DC. They directly target impact in their respective ZOIs, though there were expectations that work within the ZOI would lead to impact beyond it through

[7] http://crsps.net/wp-content/uploads/2012/05/E-FtFflyer-2012.pdf
[8] The President's Fiscal Year (FY) 2025 Budget Request. https://www.usaid.gov/CJ

diffusion.[9] This meant that efforts to scale Innovation Lab technologies through Mission projects, to the extent that occurred, were limited in terms of scaling directly, to these sub-national ZoIs. Management and oversight of the Innovation Labs, the focus of this paper, is done by REFS' research centers in USAID's Washington headquarters, including the Center for Agriculture-Led Growth, the Center for Nutrition, and other centers that have overall responsibility for transformational change of agriculture and food systems through research and thought leadership, Mission engagement, scaling of innovations and technologies and partnerships.

Impact at Scale was part of FTF's initial conception

Scaling up was an Initiative priority right from the outset.[10] At the G8 Summit in L'Aquila, Italy in July 2009, global leaders committed to "*act with the scale* and urgency needed to achieve sustainable global food security."[11] As early as the second Feed the Future newsletter in September 2011 there was discussion of scaling up nutrition in target countries.[12] The first Feed the Future Guide in May, 2010, stated that the Initiative's "overarching goal is to sustainably reduce global hunger and poverty by tackling their root causes and employing proven strategies for *achieving large scale and lasting impact*."[13]

2.1 Engaging Innovation Labs to Progress Feed the Future Research Goals

Innovation Labs: How They Work and Expected Impact

Innovation Labs were established to draw on the expertise of top U.S. colleges and universities in collaboration with developing-country research and educational institutions to tackle some of the world's greatest challenges in agriculture, food security, and nutrition. Led by U.S. universities, the FTF Innovation Labs were expected to bring cutting edge research and training to address current and future challenges, including the climate crisis and the need to feed a growing global population.

The role of Innovation Labs is to "harness science to feed the future." More specifically, the Feed the Future Innovation Labs are "multidisciplinary research and training programs that seek innovative solutions to food security, health, agricultural growth, trade expansion and sustainable use of natural resources in the developing world. The Innovation Labs seek to address not only

[9] A Zone of Influence is defined as the targeted, subnational regions/districts where the U.S. government hopes to see the greatest household- and individual-level changes in poverty, food insecurity, and malnutrition.
[10] Op. Cit., Howard, footnote 2
[11] https://cg-281711fb-71ea-422c-b02c-ef79f539e9d2.s3.us-gov-west-1.amazonaws.com/uploads/2018/03/FTF_Guide.pdf, pg. iv
[12] https://cg-281711fb-71ea-422c-b02c-ef79f539e9d2.s3.us-gov-west-1.amazonaws.com/uploads/2018/03/FTFNewsletter_September2011.pdf
[13] Op. Cit., footnote 7, pg.9

the critical research questions in its area of expertise but also the cross-cutting topics of climate change, gender, food security, nutrition, and capacity building."[14]

The key criteria that guided the selection of research priorities for the Feed the Future Initiative, reflecting early emphasis on scaling, were:

- relevance to poverty, women and children and reduced vulnerability objectives;
- likelihood of success as assessed by technical merit, clear pathways for deployment/adoption;
- cost/benefit from estimated cost to develop technology vs. potential returns in terms of impacts;
- economic sustainability for producers/adopters;
- natural resources sustainability of resources including water, soil, ecosystem and climate change;
- institutional sustainability/impact on capacity of national and regional partners;
- time frame; and
- risks to vulnerable groups, environment or breakdown in key pathways.

USAID makes Innovation Lab awards through a competitive bidding process. Awards are typically for five years with an option for up to a five-year extension and may vary considerably in size from a few million dollars to tens of millions of dollars. Usually, Innovation Labs exist for a full 10 years, but not always. Within the Bureau, oversight of the Innovation Labs is performed by US Government-certified Agreement Officer Representatives (AORs) who are assigned by the Agreement Officer (AO). An Agreement Officer has the authority to enter into, administer, or terminate grants and Cooperative Agreements, and make related determinations and findings on behalf of the Agency. Their appointed representatives monitor technical aspects of the Labs, such as the disposition of research outputs, and perform specific administrative or technical functions on behalf of the government.

Originally there were 14 Collaborative Research Support Programs that transitioned into Feed the Future Innovation Labs. Innovation Labs have come and gone over the years with as many as 24 at one time; currently there are 16. This number is set to expand in 2025.

Scaling was an intended outcome of Research investments and Innovation Labs from the beginning of FTF

While the research strategy describing the role of the Innovation Labs may not have explicitly addressed scale in these early years, FTF Strategy-level documents made it clear that scaling goals were of critical importance overall.[15] The first Feed the Future Research Strategy[16], for example, reflected over a year of analysis, technical review, and broad stakeholder consultation

[14] http://crsps.net/wp-content/uploads/2012/05/E-FtFflyer-2012.pdf
[15] See also page 4 of the Global Food Security Strategy
[16] https://cg-281711fb-71ea-422c-b02c-ef79f539e9d2.s3.us-gov-west-1.amazonaws.com/uploads/2018/03/FTF_research_strategy.pdf

and engagement. USAID conducted initial analyses to identify opportunities for research to contribute to the agricultural and nutrition goals of the Feed the Future strategy, and more than 50 experts were consulted during the strategy framing process, followed by technical expert review and external review. Research investments in the strategy centered on international public goods, which would benefit focus-country producers and consumers, especially women, as well as those in neighboring countries. Other important considerations included local adaptive research, institutional and human capacity building and strengthening of extension services. These country-level investments were central to the successful utilization of the outputs of research at scale.[17] Operational dimensions and linkages between the global research portfolio and national level programs were left to be worked out in each country in ways that fully reflected the country-led approach.

Scaling was not operationalized in the early days of Innovation Labs

Despite the overall intention of FTF and the Innovation Labs to achieve impact at scale, in the early days of FTF this was not translated into explicit guidance, incentives, targets or monitoring indicators. Historically, scaling has not been an award or extension criteria, although it was looked on favorably. Increasingly, scaling has been given more weight when the innovation(s) being scaled can be shown to have advanced the objectives of USAID bilateral Missions in their Zones of Influence and beyond.

The reporting framework that accompanies the Innovation Labs does not emphasize explicit high-level or impact targets such as expected or potential scale, or expectations to explicitly measure the impact they would have, though it is important to note that "impact" across the entire FTF initiative is a difficult thing to measure. Labs have Results Frameworks against which they report, although the extent to which these Frameworks address outcomes and impacts vary. There has always been the expectation, however, that the Labs would "tackle some of the world's greatest challenges in agriculture and food security."[18] Through the application of science, the Innovation Labs are expected to "develop and advance a pipeline of innovations, tools and approaches designed to sustainably reduce global poverty, hunger and malnutrition in the face of complex, dynamic challenges including emerging pests and diseases that affect farmers overseas and in America."[19]

This rationale has sharpened over time. An October 2023 newsletter states, "Investments in research today pay dividends tomorrow. That's the driving notion behind Feed the Future Innovation Labs, which connect researchers from top U.S. universities with their counterparts at partner country research institutions to together solve some of the world's greatest agriculture

[17] See Global Food Security Research Strategy, 2011 (pg. 13)
[18] Tagline from the Feed the Future Innovation Labs landing page, https://www.feedthefuture.gov/feed-the-future-innovation-labs
[19] See Feed the Future website: https://www.feedthefuture.gov/partnership/research-universities/#:~:text=Feed%20the%20Future%20invests%20in,farmers%20overseas%20and%20in%20America.

and food security challenges. Each of these labs and their partnerships are critical parts of a global network that is reaching smallholder farmers with the tools, technology, and information they need — now more than ever — to stay productive and resilient."[20] Since Feed the Future's inception Innovation Labs received roughly $40-$60 million a year over 13 years, or over $500 million since 2011.

Expectations that Innovation Lab technologies would contribute to Mission scaling objectives

In the early years of FTF, USAID Missions expected that Innovation Lab technologies would be available to boost farm-level productivity through innovations such as improved crop varieties and other agricultural inputs, livestock vaccines, better equipment, and better farming practices. Missions' implementing partners would then extend these innovations to companies and farmers through their projects.

These Mission expectations were often unmet for several reasons. First, the research portfolio was, and to an extent continues to be, separate from the Missions' bilateral non-research portfolios due to insufficient early co-design with missions during concept development and before solicitation. A second challenge is the length of a typical R&D pipeline, from market assessment and discovery to field validation, release, and production (e.g., seed bulking up). The time required exceeds the normal length of a mission portfolio (5-7 years) and creates a disconnect between the two operating units. Conversely, some Missions had little interest in working with Innovation Labs, even though the Labs were present in the country.

Key Mission informants reported that there is often a disconnect between the FTF research programs led by the Bureau and the FTF non-research programs led by the Missions. If the Innovation Labs ever expected Missions to do the work of scaling innovations, those Missions probably did not appreciate that this was the expectation and had not designed their programs to do the work of scaling. There was an ancillary disconnect if the innovations failed to find their way to the country or the right innovations did not appear at the right time. If the researchers were working closely with Mission staff and their implementing partners from the outset, they would be much more likely to solve this problem.

The extent to which improved crop varieties, better farming practices, and new and improved equipment were taken up is uncertain. USAID does not have a system in place to track exactly what innovations are promoted and disseminated by Mission programs. The reasons are various and will be discussed later.

Innovation Labs lack the resources and face restrictions on scaling

Finally, there were obstacles to Labs' scaling innovations themselves. A primary challenge has been their narrow funding (the average Lab award in the first round of funding in the early 2010s

[20] https://content.govdelivery.com/accounts/USAIDHQ/bulletins/378101e

was US$3-5 million). Budgets were determined largely on research objectives, and not on scaling opportunities. Similarly, neither the Labs nor bilateral programs had (or still have) sufficient resources to do full scaling, which is why there is so much reliance on the private sector for more commercial crop varieties. Most Innovation Lab research teams did not include experts in commercialization or scaling. As all Innovation Labs are located within universities and largely composed of faculty, their incentives are academic ones – primarily publications in refereed journals -- rather than uptake by large numbers of smallholder farmers or other potential end users in FTF countries. Finally, there were (and still are) legislative limitations on the Labs' ability to fund scaling-up endeavors beyond research; specifically, the limitations concern the narrow scope of research funding earmarks for activities not directly related to research. "Scaling" is not a research activity; rather, scaling is viewed as an implementation activity. Thus, these legislative earmarks limit Innovation Labs' ability to work on innovation delivery, posing a structural constraint to the Labs' reach downstream.[21]

2.2 Seed Systems Research Leads to New Insights

Operationalizing Scaling became a priority driven by pressure from senior Feed the Future leadership in BFS and Missions

In 2013 the USAID Administrator issued directions to "increase targets for scaling agricultural technologies," accompanied by "Guidance for Developing a Mission Scaling Plan" and a template issued in August 2013.[22] This mandate was a priority directive for the Bureau and the 19 Missions designated as FTF "focus countries" including via regular, transparent reporting and annual Interagency portfolio reviews. In response, in 2014 a survey of FTF Missions brought to the fore the challenges they were facing of getting the productivity-enhancing technologies that were integral to their workplans and scaling-up objectives.

Pressure for scaling quickly identified systems challenges, beginning with seed systems

Much of FTF's investment in Innovation Labs targeted development of improved crop varieties, particularly for staple cereals which are essential for food security and nutrition in most of the Global South. However, these new varieties were not achieving widespread adoption at scale; studies had been done by Syngenta Foundation for Sustainable Agriculture, BMGF, Integrated Seed Systems Development, USAID and others that identified the main seed sector constraints but none of these partners had prioritized a single constraint.[23]

Spurred on by senior leader and Missions' feedback, BFS initiated activities aimed at improving the availability for farmers of quality seeds of new crop varieties developed by the Innovation

[21] See the Foreign Assistance Act of 1961, as amended, for the mandate of USAID agricultural research, codified in 22 U.S. Code § 2151a–1

[22] See for example: http://crsps.net/wp-content/uploads/2013/07/Bertram-Scaling-Up-Update-July-7-2013.pdf

[23] See for instance: https://agrilinks.org/post/case-studies-early-generation-seed-systems-project-overview-0

Labs and CGIAR Centers, in collaboration with the Bill & Melinda Gates Foundation (BMGF), AGRA,[24] and other partners, by addressing the barriers that had been identified. They decided to start with seed systems. starting with the early generation seed segment of the seed value chain.[25] The rationale for this focus was the unavailability of early generation seeds of newly released varieties in most countries.[26] This focus was a fortuitous choice. The economics of early generation seeds had not been closely examined. Doing so led to an understanding of scaling up that has been incorporated into the Bureau's overall approach to scaling. In a statement made at that time:

> A rigorous and strategic thought process was applied to incorporate evidence pointing toward commonly identified constraints in early generation seed availability that enable success of Mission programs. This [evidence] led to identification of this portfolio as an opportunity to fund multi-country projects that would contribute to ZOI goals, drive larger impact numbers, enable forming an FTF narrative, improve the impact pathway for research investments to transfer into development outcomes, and address the need to 'get technologies off the shelf'.[27] (June 28, 2016)

Concurrent with the focus on scaling by Missions was increased attention to scaling by CGIAR Centers, which had received earmarked funding from USAID for this purpose. CIMMYT was tasked with scaling up Drought Tolerant Maize for Africa, as well as combatting Maize Lethal Necrosis Disease in East Africa. AfricaRice and other Centers were likewise tasked with scaling up innovations, especially of improved crop varieties. Innovations Labs were also called on to intensify their efforts to scale promising technologies.[28]

Partnerships with other funders and multi-lateral platforms played an important role as REFS began to operationalize scaling, especially supportive changes in seed systems. USAID's and BMGF's intensive collaboration on seed systems advanced quickly because both organizations were funding AGRA, USAID through its Scaling Seeds & Technologies Partnership. As donors, both organizations agreed that work with AGRA would be more effective if coordinated together rather than each partner having separate objectives. In conjunction with AGRA and others, and through extensive consultations across the continent with organizations such as the African Seed Trade Association over a number of years, broad agreement was reached that our shared

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[24] AGRA exists to fulfil a vision where Africa can feed itself and the world, transforming agriculture from a solitary struggle for survival into a thriving business. (https://agra.org)

[25] See Early Generation Seeds study series at https://agrilinks.org/post/case-studies-early-generation-seed-systems-project-overview-0

[26] Early generation seeds (EGS) are seeds used in the breeding and production of crops. EGS includes breeder seed, pre-basic seed, and basic seed. It's produced by maintaining improved varieties and regularly multiplying and supplying high-quality seeds.

[27] Convening Report: Promoting and Sustainable Supply of Early Generation Seed of Food Crops in Sub-Saharan Africa

[28] See the Research Strategy Fact Sheet: https://cg-281711fb-71ea-422c-b02c-ef79f539e9d2.s3.us-gov-west-1.amazonaws.com/uploads/2018/03/ftf_factsheet_research_july2015.pdf

objective would be to decrease the average age of varieties used by smallholder farmers, which would be tracked through the indicators of (i) area-weighted average age of crop varieties and (ii) genetic gain in farmers' fields.

Efforts to increase uptake of new crop varieties stumbled over the challenges of producing early generation seeds, which varied greatly by crop. Through a series of country and regional studies on early generation seed systems encompassing a dozen crops in 15 countries, the partners sought to define these constraints. These studies revealed the structural limitations to scaling-up new varieties of the selected crops. Crop-specific characteristics and traits lend themselves to scaling opportunities or, conversely, serve as constraints. As such, structural constraints are inherent in the characteristics of innovations themselves. As initially revealed through research on scaling early generation seeds and demonstrated through further studies, products and services have particular characteristics that facilitate their scalability and their viable scaling pathways. (See Appendix 1)

2.3 Assessing Scaling Up Potential

A major challenge facing the Bureau before determining how to scale innovations coming out of the Innovation Labs was to assess which innovations were the most promising, scalable and ready for scaling. To address this issue, and concurrent with the work on early generation seeds and following on from the Mission Scaling Plan approvals, the Bureau asked the E3 Analytics and Evaluation Project (led by Management Systems International (MSI)) to develop a toolkit to assess the scalability of agricultural innovations. The results were five case studies of scaling up of agricultural innovations, mostly through FTF and an Agricultural Scalability Assessment Toolkit[29] (ASAT). The ASAT drew on MSI's and BFS's experience assisting FTF project design and strengthening scaling strategies, and. The ASAT was developed because at the time there was not a reliable or systematic means for determining the disposition of an innovation, whether there could be a sustainable market, market acceptance, commercialization friction, enabling environment challenges, and other potential constraints.

The ASAT was designed to provide a qualitative appraisal of an innovation's scalability. While innovations do have some intrinsic features that may make them more or less scalable in general, most of the factors affecting scaling potential can only be assessed relative to a specific socio-economic context and the characteristics of target adopters. The ASAT provides information on the strengths and weaknesses of the innovation relative to scalability, the most promising scaling up pathways (i.e., commercial, public, or public-private partnerships), and information on the extent to which target contexts – locations and populations – and their market and public-sector capacity currently facilitate scaling.

[29] See https://pdf.usaid.gov/pdf_docs/PA00T6KX.pdf

The ASAT has gone through some revisions and adaptations over the years but has proven to be a reliable means for assessing an innovation's scaling pathway and potential for adoption, provided assessors follow the instructions on its use. In particular, it helped raise the issues of the different pathways needed for public vs. private goods. It stimulated the Bureau to think along these lines and led to a much deeper dive on and the additional distinctions of common and club goods and their respective challenges and pathways, described at length in Appendix 1. It also, in a more simplified form, helped the Bureau identify the most promising innovations for scaling, first in the context of the Research Rack-Up (an inventory of all innovations coming out of the Labs) and later targeted efforts to find scaling partners for the most promising. These are discussed below.

3. Global Food Security Strategy, 2017 - Creation of the Bureau for Resilience and Food Security, 2020

The U.S. government's Global Food Security Strategy was initiated to address global hunger and malnutrition as a humanitarian, development, and national security issue. The GFSS is a five-year framework that guides the U.S. government's support to selected countries. Congressional reauthorization of FTF and the change in Administration in 2016 resulted in a USAID leadership that was interested in what FTF had gotten for its investments in research. The GFSS was an integrated whole-of-government strategy with agency-specific implementation plans as required by the Global Food Security Act of 2016. Accompanying this Strategy was a compendium of Technical Guidance, created largely to help inform new field programming, including guidance on scaling up.[30] This was the first time such guidance was formalized within Feed the Future.

In an attempt to answer questions from senior USAID leadership about what research investment had produced, the Bureau decided to do a systematic, detailed inventory of all research produced by Innovation Labs called the Research Rack-Up (RRU). Designed to be a complementary, qualitative data collection tool, the RRU was and is intended to facilitate increased tracking of research outputs by providing a means to communicate additional details on each innovation developed by an Innovation Lab. In essence, it is an excel spreadsheet that covers a wide variety of information and categorizes innovations according to the Phases required to be monitored by the Feed the Future standard indicator EG 3.2-7. The four phases of research, development, and uptake, as defined by the indicator, are[31]:

- Phase I: Under research as a result of USG assistance
- Phase II: Under field testing as a result of USG assistance
- Phase III: Made available for uptake as a result of USG assistance

[30] See https://www.feedthefuture.gov/lp/guidance-and-tools-global-food-security-programs&sa=D&source=apps-viewer-frontend&ust=1713379478419587&usg=AOvVaw07x0dYMJOLZVeRPKu1-Q24&hl=en

[31] See the FTF Indicator Handbook, PIRS for EG 3.2-7, page 85, for detailed definitions of these phases

- Phase IV: Demonstrated uptake by the public and/or private sector

The first round of collection of RRU data was carried out in 2017; at that time there were over 900 entries in total. The largest number of research innovations by type were improved crop varieties, with nearly 200 new varieties released by the Labs, the World Vegetable Center, and the Cereal Systems Initiative for South Asia (a CIMMYT affiliate) up to 2017 (and more than 100 since). Some of the innovations happened far upstream, including research outputs such as genome sequencing, Quantitative Trait Loci[32] identification, and genetic markers characterization, which are inherently public goods. Other innovations were intended for downstream research beneficiaries such as food system SMEs and smallholder farmers. Once the breadth of innovations was accounted for the challenge became clear: What to do next to facilitate scaling? This state of affairs, and the results of the RRU in particular, precipitated the Bureau's efforts toward a more formalized approach to tracking scaling of Bureau-funded innovations and developing a systematic approach to scaling.

Private sector partners' engagement with Labs took various forms, for example:

- Multinational corporations donating genetic material or making other contributions to advance particular types of research, or in some cases in an advisory capacity;
- Local private sector actors in need of specific solutions to problems addressable by research and as hand-off partners for innovations;
- Private service providers meet specific needs, mostly through subawards.

The extent to which private partners have been engaged has largely been a function of three influences: the interests of the researcher(s), the influence of the AOR, and the country Mission's interest and engagement, especially via their implementing partners' activities.

3.1 Focus on Impact at Scale

Guidance and Definitions of Scaling

Scaling-up definitions were provided in official Technical Guidance documents that accompanied the Feed the Future 2017-2022 Strategy,[33] in particular the guidance on "scaling up" provided terms and definitions. There had been no official technical guidance until this time. Among other clarifications, the Guidance clarified that FTF focuses on measuring impacts in Zones of Influence. Attention to scaling up terminology has carried over into the Feed the Future Indicators Handbook where there are a dozen references to "scale" and to "scaling". The number of such references has steadily increased with each new Handbook release. As discussed above, ZOI boundaries were relatively fixed and set to cover districts with high levels of poverty, malnutrition and stunting, and where USAID believed it could affect agri-food systems,

[32] A specific region on a chromosome that is associated with variation in a quantitative trait.
[33] Op. Cit. footnote 17

productivity and security. Benefits had to accrue to populations within the ZOI, although commercial networks might extend impact outside the ZOI, including innovation scaling. The anticipation has always been that ZOIs would serve as springboards to other areas. Scaling of innovations beyond the ZOI has not been tracked by the FTF Initiative, as it uses the ZOI for its monitoring framework. Furthermore, benefits had to be directly attributable to FTF projects or activities, even though adoption by friends, neighbors or outside the ZOI could often be substantial.

Up until the recent efforts to develop and introduce a systematic approach to scaling innovations, discussed below, limited planning initially went into the scaling process for Innovation Lab technologies. This was evidenced by the annual influx of innovations entered into the RRU, which showed most innovations were not ready for scale. There was certainly an expectation that innovations would advance through four phases from discovery into use, but there was no explicit guidance for how this should be done, with whom to engage, or concrete incentives to do so.

An additional issue is that there has been misunderstanding of the “Phase IV” definition when Innovation Labs submit their data to the Bureau for the RRU. An innovation may be reported to have reached Phase IV, evidence of uptake; however, when examined more closely the evidence of uptake can be weak. For example, 200 villagers are reported to have taken up an innovation so, yes, there is evidence of uptake but not evidence of scale. Even innovations reported to be in Phase III, “available for uptake”, may not have gone through sufficient field trials to be justifiably classified as available for uptake, as experience with such an innovation is too limited to be certain that it is market ready.

Finally, RFS was not designed to be a "scaling organization" as the Bureau itself does not develop or fund field-level strategy; this is the responsibility of the twenty or so individual country Missions. There is actually no Agency-level operating unit that has the authority to oversee and direct whether the collaboration between headquarters and field programs are aligned, leveraged and coordinated to achieve collective impact. While the Bureau and Innovation Labs can suggest or propose that certain innovations might make sense for a given country FTF project, that decision is ultimately up to the country Mission and, once a contract is awarded, the Mission and its implementing partners.

3.2 Tracking Scaling Progress

With the RRU came a renewed effort to measure and track the impact of innovations, which had been identified as a weakness of FTF more broadly, and to develop definitions, tools and

guidelines to achieve impact at scale. A GAO assessment report of FTF (2019) found that "impact" in FTF is difficult to ascertain. [34]

From an Evaluator's perspective, assessing "impact" under Innovation Labs is even more difficult and faces numerous challenges in scaling. R&D is far upstream from the type of impact FTF measures (at the farmer, household and population levels). With a typical project time frame of five years, taking an innovation from R&D to adapting to a specific context to engaging with those that can disseminate it to passing through government regulatory trials, usually takes longer than five years. Scaling up innovations is often beyond the purview of projects to follow once the project ends. Further, FTF indicators tend to measure higher level impacts in a Zone of Influence, which may or may not capture influence of Innovation Lab innovations.[35] Given these circumstances and GAO's findings, Feed the Future instituted specific indicators to be used as "initiative level performance indicators" to assess progress in the coming years.

There are a few Feed the Future standard indicators that can be used to track scaling. The Feed the Future "research indicator" which tracks the development of specific innovations is: [EG.3.2-7] "Number of technologies, practices, and approaches under various phases of research, development, and uptake as a result of USG assistance." Scaling as a desired Innovation Lab goal was made more explicit in 2018 with the introduction of the "Phase IV" disaggregate: "demonstrated uptake by the public and/or private sector."[36] This in effect is broadening the tracking of innovations through phases from development to field testing, to being ready for scale to demonstrated uptake. Scaling is also captured under [EG.3.2-24] "Number of individuals in the agriculture and food system who have applied improved management practices or technologies with USG assistance" and [EG.3.2-25] "Number of hectares under improved management practices or technologies with USG assistance."

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[34] See https://www.gao.gov/assets/d21548.pdf, Conclusions (p.47): *"USAID, in consultation with the FTF partner agencies, has built a complex framework to guide performance monitoring for the initiative, collecting data on more than 50 indicators with the intent to inform progress across the initiative's three strategic objectives and overarching goal to sustainably reduce global hunger, malnutrition, and poverty. However, by not setting performance goals for the initiative, USAID and the FTF partner agencies have not clearly defined what the initiative is trying to achieve in a way that allows for meaningful monitoring of progress. In particular, FTF's lack of performance goals have limited USAID and the FTF partner agencies' ability to analyze how FTF projects contribute to the initiative's performance. …. As a result, USAID and the FTF partner agencies do not have clear indications of whether their efforts are contributing to these overall objectives and cannot use the data they do collect to monitor initiative performance."*

[35] For example, many indicators measure population prevalence of malnutrition and stunting in women and children; while innovations like orange-fleshed sweet potatoes may ultimately have a substantial impact on those indicators, it can take years to see that impact. In terms of FTF agricultural indicators, they often measure outputs such as the number of farmers receiving various types of assistance, only a few of which relate to improved technologies or management practices.

[36]

Feed the Future indicators could be used to convey a story related to scale, but there are still limitations. These indicators are reported by the implementing partners and cover the progress related to innovations or the extent to which innovations have been applied during the project period, but not beyond. Additionally, the information on the specific innovation is only collected in [EG.3.2-7]; in the indicators related to application [EG.3.2-24 and EG.3.2-25], information on technology type is collected but not the specific innovation or bundle. Some innovations are transferred to a private company, such as seed of an improved variety, and the dissemination data is viewed by the company as proprietary and not shared with USAID. Therefore, using these indicators to tell a cohesive scaling story is difficult from the perspective of an innovation that is developed, adapted, and handed off to multiple partners on a longer time frame than a five-year project cycle.

Another indicator tracks scale in the ZOI (by extension), which is [EG.3.2-a] "Percent of producers who have applied targeted improved management practices or technologies." [ZOI level]. Intended to be collected every four years through population-based surveys, this indicator aims to capture diffusion of mission-promoted innovations in the ZOI (and provides the essential denominator to determine the percentage of smallholder farmers who are applying the innovation and who are not). However, limitations of this indicator have made it difficult to utilize the data for tracking scale. These include difficulty in identifying "Mission promoted" innovations, low thresholds for counting farmers towards the indicator (i.e., only one or more practices or technologies), aggregation of innovations across value-chain commodities, and the lens of this indicator is the farmer and not the innovation.

Ultimately, the Feed the Future monitoring, evaluation, and learning system is focused on monitoring implementation and results within a project's lifetime, and within the responsibility of the implementing partner who is reporting the results, so there is less incentive to track beyond USAID engagement. In most cases 'applied a technology' doesn't mean adoption and continued use on an ongoing basis for several years; there is no way to measure whether use continues after the moment of measurement, let alone after project end.

3.3 Partners' Activities Shine a Light

The previous sections illustrated some of the challenges assessing progress towards whether innovations were scale ready (Phase IV) or had in fact made progress towards impact at scale given the limitations of FTF indicators and Innovation Lab reporting. Fortunately, there have been several reports and studies over the arc of the Feed the Future initiative that have contributed to the Bureau's understanding of how we might better facilitate the scale up of innovations. Between 2017 and 2020, two of the more notable of these were studies completed under the Investment Support Program (ISP) and the Research Output Dissemination Study (RODS), completed by the FTF Innovation Lab for Sustainable Intensification (SIIL). Specifically, the RODS was "designed to explore the dynamics between partners…at the critical

juncture where innovations are deemed available for uptake and are transferred to a dissemination entity."[37]

Scaling through Commercial Pathways: The Intersection of Scaling and Systems Change

Given the challenges of scaling through USAID projects, the Bureau worked with its partners to pursue commercial strategies, particularly through strengthening relevant systems. A key partner in this regard was the Syngenta Foundation for Sustainable Agriculture (SFSA). SFSA focused on enabling smallholders' access to the best technology and advice, raising their yields and linking them to markets.[38] SFSA established Seeds2B to improve smallholder farmers' access to quality seeds of improved crop varieties by providing an 'end to end' solution across crops, countries and types of breeders. USAID began working with SFSA through a pilot initiative (called Seeds2B), the Partnership for African Seed Technology Transfer Activity (PASTTA) under a Global Development Alliance (GDA) in 2017. The Theory of Change was that weaknesses in local seed systems were the major obstacle to scaling seed innovations; strengthening that system would lead to the commercialization and scale up of new varieties, particularly of less commercial crops such as various types of beans and other pulses, sorghum and millet, many which came from Innovation Lab research. Specifically, strengthening commercial seed systems can play a transformative role in scaling up less commercial crops by addressing key barriers and creating opportunities for their adoption. One of the primary ways this occurs is through improved availability and access to quality seeds. As robust distribution networks are established for high-demand crops (such as maize), these same channels can also be leveraged to make seeds for less commercial crops more accessible to farmers (see Appendix 1). Private sector players, drawn to the profitable infrastructure of commercial crops, often diversify their offerings to include fewer commercial crops, broadening the range of choices for farmers. In essence, strengthening commercial seed systems creates a foundation of infrastructure, awareness, and market dynamics that enable fewer commercial crops to thrive. This integration not only benefits farmers but also contributes to greater agricultural diversity and resilience.

The PASTTA pilot was for an initial three years and extended a further two years. Deemed a success, Seeds2B Africa has continued to work with USAID through the International Potato Center (CIP). As the Bureau's relationship with Seeds2B took the form of a GDA, there were clear targets, goals, objectives and a workplan for scaling and commercializing selected crop varieties.

Seeds2B focuses on seed sector support and creating accessible pathways to market so that all may have access to new and improved seeds, including improved nutrient-dense and stress tolerant crop varieties developed by our research partners. It has provided a strong return on

[37] Research Output Dissemination Study Interactive, https://www.k-state.edu/siil/whatwedo/pastprojects/rods/Feed%20the%20Future%20RODS%20Interactive.pdf

[38] For a look at SFSA's scaling-up mainstreaming efforts see it case study at: https://scalingcommunityofpractice.com/mainstreaming-scaling-a-case-study-of-sfsa/

investment to USAID since the beginning of the program in 2017. Cumulatively, 481,000 farmers are estimated to have planted improved varieties supported by Seeds2B, representing a value of $19 million of seeds sold by seed company partners. In the same period, Seeds2B scaled the registration and licensing of 67 varieties, shepherding these varieties through field trials, national performance trials, official varietal release procedures, and transitioning to seed producers in the last 6 years.

The Introduction of Commercial Approaches to Innovation Development and Scaling into FTF Agri-Food Research

Additional work on scaling occurred through the Bureau's multi-lateral partnerships that aimed to transform agriculture in focus countries, particularly AGRA. The BFS/RFS/REFS agreements with AGRA, Scaling Seeds & Technologies Activity from 2013-2018 and the Partnership for Inclusive Agricultural Transformation in Africa, from 2017-2027, have both been investments intended to scale work specific to the seed sector, private sector partnerships in agriculture, and policy and enabling environment transformation. Farmer-to-Farmer activities supported scaling in certain contexts. The Feed the Future Market Systems & Partnerships activity also supported scaling of commercial systems. AgResults[39] supported prize competitions to achieve scaling up of selected technologies. Partnering for Innovation helped agribusinesses sell new products and services to smallholder farmers in emerging markets. None of these activities had a mandate to work specifically with Innovation Labs, yet each of them provided learning opportunities the lessons from which were incorporated into future Innovation Lab programming. Lessons learned across these and other initiatives have been presented in many venues including the Scaling Up Community of Practice and Agrilinks.[40]

Meanwhile, an important indicator developed through another multi-stakeholder partnership, the African Seed Access Index,[41] provided a means for assessing the average age of crop varieties available in markets. This Index offers indicators that have become central metrics of the African Union, USAID, and other partners' effort to follow progress in achieving impact at scale.

3.4 Scaling Programs Versus Scaling Research Outputs

The partner activities described above spurred a re-assessment of the FTF Initiative's emphasis on scaling up programs within a system, in contrast to scaling up research outputs within a program.[42]

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[39] See AgResults for more information: https://agresults.org/

[40] Agrilinks is an online community for professionals in agriculture, food security, and development to share knowledge and learn

[41] For background see https://www.tasai.org/en

[42] The resulting shift in emphasis is evidenced in the renewal of the GFSS (2022-26), where FTF doubles down on a systems approach to agricultural development, particularly by recognizing the need for a "food systems" approach.

There are several ways to define "scale up" of programs,[43,44] as opposed to scaling use of a single innovation, but here the scaling of programs within a system refers to the broader activities[45] through which *impact* is being scaled. Rather than simply increasing the number of beneficiaries, outputs or approaches this definition focuses on an activities' overall impact. This definition resembles the "transformational scale" terminology, which is "...creating significant change by engaging with a broader and deeper number of systems to create more space for scaling…"[46]

The scope for transformational scale is important when considering the role of activities (such as pilots), the tools used to implement them, and how to facilitate their reaching scale.[47] There is also space for activities to generate evidence to support the efficacy of specific interventions (Seeds2B is an example), perfect an innovative method, or ground-truth an approach in different countries and contexts. However, much as technologies must be developed with scale in mind from the beginning, activities must be designed with a vision for impact beyond the life of a single program.[48]

In USAID, programmatic scaling may begin with pilot activities to determine the efficacy of an approach, of a technology, or to achieve certain results. For example, through the Sustainable Intensification Lab, the Innovation, Research, Extension and Advisory Coordination Hub (iREACH) program in Cambodia, this pilot coordination hub scaled up its support for agricultural research and education, and promoting innovations, to West Africa. However, not all pilots can be expected to reach scale. While USAID has had some successes such as iREACH, a significant number of cases do not scale.[49]

See Feed the Future Global Food Security Strategy -- https://www.usaid.gov/sites/default/files/documents/Global-Food-Security-Strategy-FY22-26_508C.pdf. A preference for the use of "food and agricultural systems" is used to better capture the non-food aspects of our work under the GFSS. Here, we use the term "food systems" to reflect the strategy directly but felt it was important to acknowledge the current debate. There are 94 references to food systems in the Strategy.

[43] https://www.usaid.gov/sites/default/files/documents/1864/Scaling-Up-Discussion-Paper-508.pdf -- specifically the definition of scale up: "...a process of expanding interventions with proven efficacy to more people over a wider geographic area that maintains high levels of quality, equity, and sustainability through multi-sectoral involvement."

[44] USAID Toward Transformational Impact: Synergies of Private Sector Engagement & Market Systems Development

[45] Other appropriate language here, in place of "activity" could be program, project, pilot, or initiative. We have chosen to use the term "activity" in alignment with USAID ADS 201's definition, "An implementing mechanism that carries out an intervention or set of interventions to advance identified development result(s)..."

[46] Scaling and Systems Issue Paper: https://www.scalingcommunityofpractice.com/wp-content/uploads/bp-attachments/8666/Scaling-and-Systems-Change-Issues-Paper.pdf

[47] Kohl, Richard, "Scaling and Systems: Issues Brief," May 2021. (https://www.scalingcommunityofpractice.com/scaling-and-systems-issues-paper/)

[48] Scale Up Sourcebook Ch. 1: https://docs.lib.purdue.edu/scaleup/sourcebook/book/

[49] See "The Voltage Effect: How to Make Good Ideas Great and Great Ideas Scale," by John A. List, for discussion of why pilot programs often do not scale.

In contrast to scaling up a program from a pilot to higher-level systems change, scaling up an innovation may or may not require changing a system[50]. "Innovations" here refer to products, services, or practices that are original and can be useful for adopters.

Finding ways to lay the groundwork for scaling, pivot to a new entry point, transfer an innovative pilot, adapt to push on a different lever is key, or determine when to abandon an intervention, may all be measures for achieving impact at scale. For a program to scale, it needs to be catalytic and effect sustainable change in a food or other system. Such changes take time and don't fall neatly within a five-year program cycle, where there is an incentive to focus on increasing beneficiary numbers and other easily reportable indicators. Additionally, measuring significant change and outcomes is challenging. Increased investments in consistent monitoring, impact studies, and ex-post studies can help drive change by incorporating such feedback into the program.[51]

4. Organizational transformations of USAID's agri-food bureau that supported a greater emphasis on scaling

The updated Feed the Future Global Food Security Strategy (GFSS) was released in October 2021 and reiterated the importance of scaling to reach high-level goals.[52]. This GFSS explicitly recognized that scaling up is integral to achieving its objectives of reducing poverty, hunger, and malnutrition. The Strategy's focus on scaling was largely driven by a recognition that productivity-increasing products and practices were not having broad impact as yields in many countries were stagnating and food import expenditures increasing.

In terms of how to achieve the goal of broad impact, i.e., scale, the GFSS highlights the need to strengthen the public and private delivery pathways that get cutting-edge innovations and information into the hands of producers and entrepreneurs:

> *Inclusive and sustainable agriculture-led growth requires widespread adoption of improved technologies, practices, and approaches by all system actors, including local service providers, input suppliers, smallholder producers, and processors…by developing and strengthening public and private delivery pathways to link appropriate solutions to demand.*[53]

[50] There is nuance to this point that is worth noting. Within the scaling literature (Rogers, 1983; Kohl, Foy, 2018, etc.) there is discussion of characteristics of innovations that facilitate scaling. These characteristics, namely compatibility, complexity, trialability, or collectively ease of adoption (i.e. "plug and play") are closely related to whether systems change may be required to see an innovation scale.

[51] Fowler, B., Sparkman, T., Field, M., LEO Brief: Reconsidering the Concept of Scale in Market Systems Development

[52] It had 91 references to scaling up programs or innovations

[53] Global Food Security Strategy FY22-26, pg.26

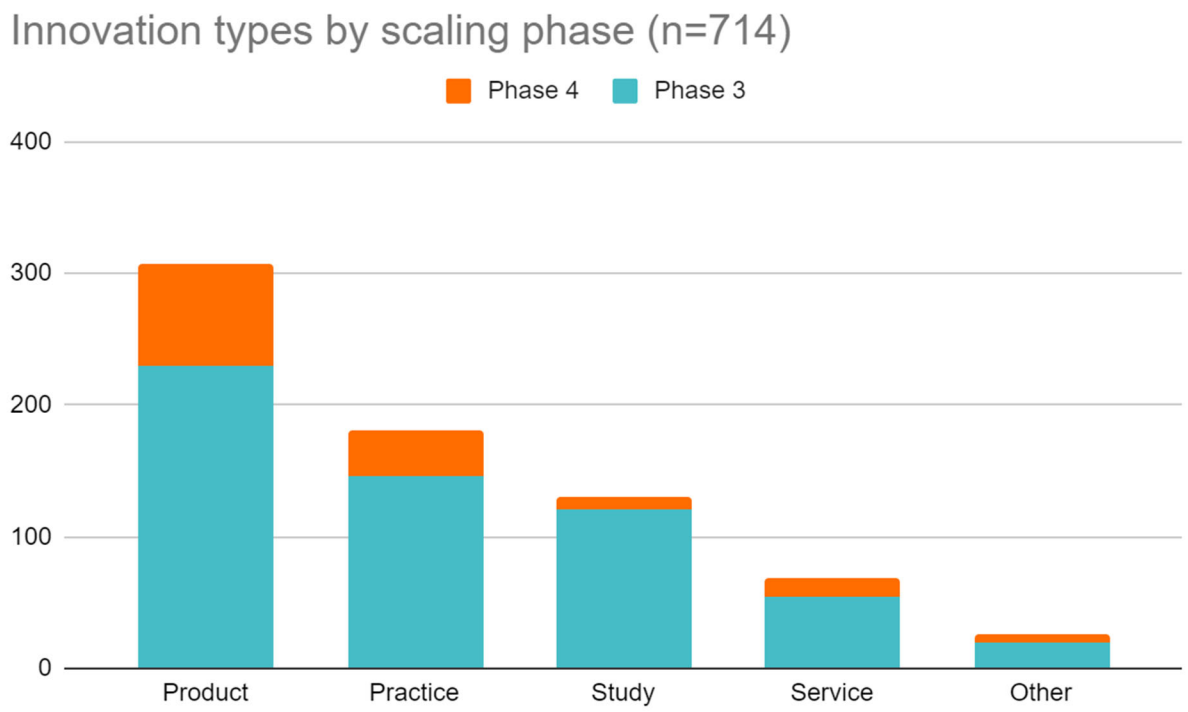
The recent GFSS defines the scaling of proven technologies and practices as, "the process of sustainably increasing the adoption and diffusion of a credible technology or practice, or a package of technologies and practices, to retain or improve upon the demonstrated positive impact of the technology or practice and achieve widespread use by stakeholders."[54] Adoption of improved technologies and practices by a small number of adopters will not accomplish our development goals. In order to yield maximum impact, we must accomplish the sustained, widespread adoption of improved technologies and practices. The GFSS Technical Guide for Scaling,[55] which is based on the recent international literature on good practices in scaling, provides guidance concerning the incorporation of scaling improved technologies and practices into development efforts aimed at reducing hunger, malnutrition, and poverty. REFS is poised to advance the principles embodied in this technical guidance on scaling through its operational structure and assignment of roles and responsibilities within the Bureau.

4.1 Leveraging Data to Facilitate Scale of FTF Research Investments

The innovations in the RRU represent a decade and a half of investment by USAID in research to solve problems across food systems in Feed the Future target countries and beyond. REFS's scaling team has analyzed Phase 3 and Phase 4 innovations entered into the RRU, assessing the innovations' characteristics, their likely pathway to scale, supply or demand constraints, and initial reports about dissemination provided by the Innovation Labs to determine the extent of their uptake. A graph depicting this high-level analysis, for data through fiscal year 2022, is below. Certain Phase 4 innovations, those reported as showing "evidence of uptake" by direct beneficiaries, are being examined to see which are reaching end users indirectly by diffusion, and for lessons learned from those that have reached larger numbers of individuals in food systems. In this context, a "direct beneficiary" is a person or entity that directly receives the benefits of an innovation, while an "indirect beneficiary" is someone who benefits from the positive effects of that innovation but does not directly receive the services or goods themselves; essentially, they benefit through the actions taken for the direct beneficiary. Note that the inclusion of direct beneficiaries represents a major and important departure from previous efforts at monitoring and evaluating progress towards impact at scale, and better aligns learning, adaptation and incentives with facts on the ground.

[54] Op Cit., "Scaling for Widespread Adoption of Improved Technologies and Practices" https://drive.google.com/file/d/1jVWBIQHyI3MzWwMrWNJh07e9LL-tYaSq/view

[55] 2017, Global Food Security Strategy Technical Guidance, "Scaling for Widespread Adoption of Improved Technologies and Practices" GFSS Technical Guidance Scaling).



Since its reformation in 2020, the Bureau's initial aim was to integrate a scaling perspective into the RRU by ordering innovations by type (product, service, practice, etc.), the potential scaling pathway (private, public, public-private partnerships), a follow up signal (green, yellow, red), and consideration of notable characteristics. This work was done in collaboration with the AORs and Innovation Labs. New crop varieties were treated separately as many lessons were already learned about scaling them from the prior decade of research on the subject (discussed above). New crop varieties were classified by their status: field trials, national performance trials, official varietal release, licensing, and if the variety was being maintained. It was relatively easy to map crop varieties' progress, other types of innovations much less so. The scaling team found that the innovations reported in the RRU covered a broad spectrum beyond new crop varieties: Some research was done for regulatory purposes such as efficacy testing, some research was to modify existing technologies for environmental reasons such as adjusting seed/root treatment or fertilizer formulas, other research was completely novel.

REFS is committed to scaling the most promising of these innovations, through ongoing and new partnership platforms and implementing partners via a three-pronged approach:

1. Using REFS resources, supporting a limited number of promising products and services with linkages to potential partners through channels to target audiences with potential interest in innovation uptake:

   a. Highlighting innovations at regional conference gatherings and online platforms, such as the African Food Systems Forum Deal Room and the African Seed Trade Association Congress, Agrilinks, and other means.
   b. Brokering selected products via the Feed the Future Market Systems & Partnerships activity, Missions and their implementing partners.
   c. Limited direct support for pilot scaling efforts under REFS research agreements including the Partnering for Innovation activity, which supported commercialization and scaling of Striga resistant maize.
2. Promote RRU crop varieties in conjunction with partners Seeds2B Africa and AGRA's Center of Excellence for Seed Systems in Africa.
3. Bundle agricultural practices strategically with prioritized products and services.

After analysis of the RRU contents, the Bureau's Center for Agriculture became more attuned to the challenges of scaling, and it became a topic of discussion during biannual Innovation Lab meetings. References to scaling began to be included in procurement documents as well via adoption of a Product Life Cycle approach to research management. Despite the attention, the innovation backlog continued to grow as every year new innovations were added to the RRU, with mixed evidence that scaling was happening except for new crop varieties that were being commercialized for scale through the work of Seeds2B (see above). Contemporary with the Bureau's reformulation, a consensus emerged that more fundamental changes were necessary to alter this situation.

4.2 The Product Life Cycle Approach Shifts Research Management

With the realization that scaling goals were not being met, Bureau staff began to explore alternative approaches to their achievement. Over time and as the Bureau learned more about points of leverage, incentivization and influence, scaling goals became increasingly explicit in the agreements negotiated with the Innovation Labs. More and more, new agreements specifically incorporate reference to the Bureau's PLC approach to research management (discussed above). This includes setting explicit, measurable scaling objectives. Recognition that certain scaling goals were not met drove these agreement changes.

Adopting a Product Life Cycle approach for Innovation Labs

Besides this impact of directly scaling new crop varieties, SFSA's work led RFS to adopt its approach to research management via the Product Life Cycle (PLC) approach:

> *The PLC process identifies the threshold criteria for technology advancement along a defined scaling pathway and the downstream partners who must be engaged at each*

> *stage. Public and private partners needed to advance a technology to the next phase to help shape the performance standards and product evaluation.*[56]

The adoption of PLC has been a seminal change to REFS's approach to research management and has become an important means for engaging the Innovation Labs. The PLC approach enables AORs and Lab researchers to plan for scale from the initial stages of innovation development.

For REFS, the PLC represents a novel approach to thinking about our research investments and engaging our research partners, particularly embedded in the increased emphasis on systems change. Designed with stage gates,[57] the PLC aims to aid technology developers in considering a pathway to market for their innovation, and includes conducting market research, identifying and solving for barriers to adoption, and connecting with downstream partners along the technology's trajectory development and scaling pathway. The PLC is not a silver bullet in scaling innovations, but should, in theory, enable REFS to assist our research partners in the journey to scale without requiring scaling programs for each innovation. As the PLC is rolled out, tracking application and use by USAID's partners and how readily innovations move through the stage gates will help to address some of the past gaps and provide essential learning to guide further refinement of the PLC.

Institutionalizing the Product Life Cycle approach for Innovation Labs

PLC management has been implemented by the Soy Innovation Lab (SIL) (since its 2013 inception) and as of late 2024 is being piloted by 12 Innovation Labs and research partners, applying it to the development of 88 technologies aided through the institutionalization of a digital platform for research management, led by a REFS investment to SIL launching an activity called Innovation to Impact (i2i).

USAID launched i2i to support the transition of researchers and stakeholders to the product life cycle framework (PLC) for its R4D portfolio. PLC management was advocated in the Global Food Security Research Strategy (2022) as an industry standard to help align new technologies with farmer, processor and customer needs and secure a pathway to market.

Firstly, i2i serves as a learning platform that utilizes a "learning by doing" instructional design approach. Project teams build their technology development plans while learning about technology management. Through the self-paced online modules, participants learn and then apply practical methods to manage R&D Assistance Activities based on analysis of

[56] For more details on the Product Life Cycle approach, see Regina Eddy and Jim Gaffney (2023) "Unlocking the Benefits of Innovation: A Product Life Cycle Approach" Agrilinks. March 2.

[57] A stage gate is a structured project management methodology where a research project is divided into distinct stages, with "gates" (decision points) between each stage where progress is reviewed and a decision is made to either proceed to the next stage, make adjustments, or terminate the project based on its viability at that point; essentially acting as a checkpoint to ensure only the most promising research ideas continue to development.

data and adaptive management. The process enables AORs to: ask rigorous questions regarding product standards, ensure partners adapt to local market conditions and verify the consortium of local actors that are being engaged in the implementation and help facilitate adoption at scale. The learning platform and its design allow researchers and stakeholders to better understand the process of moving innovation from discovery to sustainable adoption.

Secondly, i2i consists of a management system to house, organize, and present the data involved in managing technology through a product life cycle approach. Finally, i2i entails a data portal whereby teams collaborate using i2i as a "whiteboard". Fiduciaries such as AORs and other activity managers may access project sites for real-time review, discussion, and analysis. The data portal design also includes features that support the stage gating process by allowing technology reviewers access to projects and associated data when they prepare for a review.

Purpose of the PLC-aligned Stage Gate Process

Stage gating is a strategic process used to ensure that product development initiatives proceed in a structured and efficient manner, mitigating risks and maximizing chances of success. Stage gating breaks down a project into distinct phases or stages, each with its own set of deliverables and checkpoints. At the end of each stage, a gate review involves an evaluation of the project's progress, viability, and alignment with strategic goals. For USAID, of particular interest, is understanding at each stage of the R4D process the likelihood of achieving sustainable impact at scale and, if yes, when.

These gate reviews serve several crucial purposes. First, they provide an opportunity to assess whether the project is on track to meet its objectives. Second, they enable stakeholders to review and approve the continuation of the project into the next stage, based on the current situation and the anticipated outcomes. Third, they allow stakeholders to assess whether adequate resources are in place to achieve the desired outcome. Fourth, they allow for the identification and mitigation of potential risks and issues early on, reducing the likelihood of costly delays or failures later in the project lifecycle. For USAID, this helps avoid the accumulation of R4D investments that fail to move beyond PLC stages 2 & 3 (Discovery and Proof of Concept). i2i, as a management system, provides a structured set of a project's technology management data and process by which reviewers can conduct their evaluation. These data anchor the analysis by generating a common language, set of forms, and criteria,which in turn makes the analysis and guidance to the project team more focused and pragmatic. In sum, structured stage gating brings USAID greater transparency, timeliness, control, and returns from their R4D investments.

The PLC stage-gating approach is helping to flag problems earlier than happened in the past and provides AORs with proven research management tools that focus from end-to-end on the research, development, validation and adoption process. Until the introduction of the PLC,

researchers did not always appreciate the actual steps required to get an innovation from initial uptake to scale. The active pipeline from testing and selecting all the way through to commercialization and beyond delivers high quality national performance and on-farm data through a low cost, technically appropriate, and sustainable platform.

Support for the PLC framework within the Bureau originated within the Center for Agriculture, particularly as a result of findings from analysis of the Research Rack Up. Center leadership was determined to improve the prospects for, and uptake of, research outputs. Adoption of the PLC framework across the FTF research portfolio has been an intensive and time-consuming process because it had to adapt to the specific needs of a diverse group of interests and concerns about the knowledge and time required to implement.The PLC has been socialized with staff at some Missions. The PLC rollout beyond REFS Center for Agriculture to other Centers in the Bureau is planned for the future.

The PLC approach to product development should better position Innovation Labs' research management and their partners for long-term success, by ensuring that even shorter incremental research phases are designed, managed, and implemented within the strategic context of a product's full life cycle. Forging a strong partnership with appropriate public-private research, development and scaling partners is therefore planned in the earliest phase of research prioritization and design.

4.3 Mainstreaming Scaling and Implementation

The Post 2020 Bureau structure included specific offices and approaches to support scaling

In 2020 the Bureau for Food Security (BFS) transitioned to and was renamed the Bureau for Resilience & Food Security (RFS). As part of this transition, new roles and responsibilities were created to specifically mainstream scaling, especially through technology transfer and commercialization such as advancing the Center for Agriculture's (here after the Center) adoption of the PLC approach. The transition formalized scaling operationally by embedding it in several offices and staff positions. The Inputs Division has a Technology Transfer Team, and the Market Systems & Finance (MSF) Division has a Commercialization and Scaling Team. Likewise, the Production System Division has an Information, Outreach, and Training Team that supports scaling of knowledge-based technologies through extension/advisory services as well as through Farmer-to-Farmer Programs. Their work links to bundling efforts where physical technologies (products) and services (e.g., finance, insurance) are bundled with knowledge/know-how.

In 2022 the RFS Bureau was again restructured to become the Bureau for Resilience, Environment and Food Security (REFS), By the time the REFS Bureau was fully established the scaling strategy had sharpened its focus: first, ever more crop varieties in the RRU were

transitioned to Seeds2B (described above), and the Product Life Cycle approach had been introduced and was being piloted.

Changes in Bureau Structure were accompanied by specific efforts to scale promising innovations

The change in internal structure was accompanied by both the development and role of the PLC approach through i2i, described above, as well as efforts to immediately accelerate the scaling of the most promising innovations. In the latter case, a shortlist of 13 innovations were identified using a modified and simplified criteria based on the ASAT, and then prospectuses were developed that could be used for marketing purposes. The Bureau then worked with its partners (such as Technologies for African Agricultural Transformation (TAAT) Clearinghouse, an affiliate of the African Development Bank, the IFAD Rural Solutions Portal (RSP), and African Seed Trade Association (AfSTA) as well as annual conferences and trade shows to build awareness for these innovations and attract commercial partners interested in scaling them. (The details of this effort are described in detail in Appendix 2). A key learning from this process was that because of Innovation's relatively narrow focus on impacting agricultural productivity and output, data was often weak or missing on the business case for commercial actors, e.g. the size of the potential market; production costs; profit margins. This problem with legacy innovations developed between 2010 and 2020 is now being proactively addressed as part of the PLC process being rolled out.

Innovation Labs continues to innovate ways to support scaling

The strategy for scaling other innovations continued to be the responsibility of the Innovation Labs. A 2017 study[58] on innovations developed by Feed the Future Innovation Labs had "found that 81 percent of the technologies reported as ready for uptake were actually handed off to technology-scaling entities."[59] Further analysis by the newly constituted scaling team revealed that many such hand-offs were less successful than initially reported by the Labs for several reasons, as determined by deeper investigation, which found that hand-offs require: (i) dedicated business development efforts, working capital financing, and aligning expansion plans with business growth stage; (ii) a strong product-market fit, preferably with open-source designs; (iii) commercial partners, who particularly require patient capital and tailored support to continually refine business strategies and investor materials. An important lesson here is that hand-off in and of itself is necessary, but not sufficient, to achieve impact at scale, and must include these characteristics.

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[58] https://caes.ucdavis.edu/outreach/geo/projects/past/SIILRODS

[59] One such innovation, developed by the Feed the Future Innovation Lab for the Reduction of Post-Harvest Loss (PHL IL) scientists, is the GrainMate moisture-meter. See the "2019 GFSS Implementation Report" for details: (https://cg-281711fb-71ea-422c-b02c-ef79f539e9d2.s3.us-gov-west-1.amazonaws.com/uploads/2020/03/2019-GFSS-Implementation-Report.pdf)

Innovation Labs found more effective ways of working with other USAID implementing partners, such as through a USAID/Cambodia technology hub and the iREACH technology hub in West Africa.[60] These hubs' remit includes working closely with Missions, their implementing partners, and demonstration parks for Labs' innovations. Innovation Labs have taken various routes towards scaling intermediaries, which are expected to bring their innovations to market or within the public sector including by supporting start-ups, linking to commercial enterprises, and through certain types of NGOs such as agricultural cooperatives.

The Market Systems and Finance Division and Center for Agricultural Growth are continuing to develop new approaches for scaling

The MSF scaling team's remit is to seek opportunities to scale new agricultural technologies supported by the Center's large research budget with the specific purpose to increase the likelihood that USAID-supported innovations reach a sustainably high percentage of intended beneficiaries through the most appropriate, inclusive pathways. The team's objectives are to (i) mainstream scaling-up approaches into REFS investments in research and market systems; and (ii) create an enabling environment for scale encompassing partnerships, policy, behavioral change, and institutions. The team's responsibilities include:

- Develop scalable activity designs and strategies that apply lessons learned and best practices for reaching large numbers of beneficiaries;
- Advise on contracting and implementation approaches to scaling-up that provide CORs/AORs flexibility in existing, modified and new instruments;
- Establish Metrics and M&E decision support tools for planning and tracking scaling progress;
- Train staff equipped with guidelines, templates, checklists, and training programs for integrating scaling considerations into their projects and programs.

Specific metrics for the Center's scaling objectives are:

- Greater percentage of research and innovations taken up by beneficiaries;
- Use of shared tools and processes resulting in better coordination across the Center of Agriculture to improve conditions for scalability; and
- Institutional arrangements for public-private approaches within the scaling pathway.[61]

As the team's work advanced, their most important responsibility was to learn-by-doing, determining what approaches were best suited for commercializing and scaling up particular innovations in relation to their economic characteristics. The influence that the team has stems from the lessons that have been learned through the course of research, experimentation, results and other contributions. With experience, extensive documentation, and persistence, more staff

[60] https://www.k-state.edu/siil/whatwedo/initiatives/ireach/untitled.html

[61] Op.Cit., Howard, pg.1. for discussion of broader objectives within FTF concerning policy and regulatory conditions.

have actively supported the Center's scaling-up mainstreaming efforts, including Bureau leadership.

5. Scaling-Up into the Future and Summing-up Lessons Learned

Looking ahead, two challenges stand out: first, mainstreaming the PLC/i2i approach across the Feed the Future Initiative and, second, more effective tracking of innovation diffusion along with determining the most important elements of a tracking strategy. Presently, the journey toward mainstreaming scaling is on solid footing:

5.1 Mainstreaming Moving Forward

The Bureau, with other partners, has documented evidence and developed, tested, and refined a scaling-up framework for assessing pathways to scale. The framework is grounded on well-established economic theory, originating from research on the economic theory of goods, and applied in REFS to constraints to early generation seed use[62] and scaling case studies.

A suite of tools has been developed over a decade of work on scaling up, both within the Bureau and by the broader Scaling-Up Community of Practice, of which REFS staff have been active members. The tools include comprehensive studies on scaling up early generation seed systems, the Agricultural Scalability Assessment Toolkit, the Product Life Cycle research approach, and the i2i software and tools. These are available to all USAID staff and many of these tools are available in the public domain through the Agrilinks website. Use of all such tools is recommended in FTF guidelines, though very few are mandatory. The Scaling for Widespread Adoption of Improved Technologies and Practices, the U.S. Government's Global Food Security Strategy Activity Design Guidance, is a public domain document for use by Missions and their implementing partners.

A community of practice within the Bureau has been leading efforts to integrate the PLC into procurement documents so that implementing partners can plan and integrate costs of PLC management into their applications/proposals, workplans and reports.

The restructuring of the Bureau in 2020 and again in 2022 created an important organizational framework to support scaling. Adoption of the PLC and some of the other scaling approaches within the Bureau required a culture change, which was abetted by the inclusiveness of the development process. Staff mindsets and behaviors adjusted as the PLC approach was mainstreamed into research management responsibilities. Staff are held increasingly accountable for their use of the PLC. Mainstreaming the PLC as a more systematic approach to generating useful research outputs is still a young process in the Center for Agriculture. Teams are learning about tradeoffs. One clear tradeoff is the increase in up-front LOE/time requirements versus

[62] See Early Generation Seeds study series at https://agrilinks.org/post/case-studies-early-generation-seed-systems-project-overview-0

anticipated lower downstream LOE/time requirements. While some reporting responsibilities will migrate to the i2i platform, the PLC is more management intensive than previous practices. Expectations are that a consequence of this additional LOE will be greater numbers of research outputs being put into use by downstream adopters. Research outputs without good prospects will be weeded out sooner. Important cross-cutting issues (i.e., gender and climate sensitivity) are being integrated into the PLC framework as stage gate criteria at key points, in this respect another anticipated positive trade-off is that such issues are planned for in advance.

The PLC approach is being introduced to Missions through a series of webinars and is being integrated into a new agricultural core course that all new agriculture officers will be required to take before taking field assignments.

Efforts by the scaling team have demonstrated what scaling approaches may and may not work for particular types of innovations and in specific contexts. Key considerations are:

- What is the innovation: product, service, practice, something else?
- What is the pathway to scale -- private, public, PPP, club -- based on supply and demand characteristics of the good? Based on this determination, how much will it cost to scale, and what funding and investments are available?
- What business model, PPP arrangements, or public program, will scaling require? Are there opportunities for bundling to strengthen a business model's effectiveness?
- What are the channels through which a particular innovation can be extended?

These considerations must be incorporated into the PLC framework as part of the mainstreaming initiative.

Communication strategies for disseminating technology information also matter, especially within channels, for instance by using "sell sheets",[63] QR codes, prospectuses, and other materials as appropriate.

5.2 Summary Lessons for Mainstreaming Scaling

A summary of lessons learned for mainstreaming scaling-up improved practices at different organizational levels is given below.

For REFS Center for Agriculture as an operating unit

Expectations of impact at scale by FTF from senior leadership with consecutive US Administrations, USAID and Bureau leadership have been the major drivers of the decade-long effort since 2014 to improve the performance of USAID funded agri-food research in terms of achieving impact at scale. External factors have not played a significant role, reflective of the

[63] A "sell sheet" is a concise, usually one-page document that highlights the key features and benefits of a product or service, designed to quickly showcase its value proposition to potential customers, essentially acting as a visual summary of a sales pitch that can be easily shared with prospects.

supply-push orientation of the Feed the Future initiative. Other donors, NGOs, and private sector partners have had just a modest influence on setting the research agenda. To the extent that external or pull factors have had an influence, it has been mainly from feedback from the field via implementing and local government partners (e.g., National Agricultural Research and Extension Systems (NARES)). Downstream entities that could exert strong pull influences on research outputs, such as in-country processors and food retailers, have been largely at arm's length from this agenda.

Planning, preparation and intention are essential [to address the significant changes needed to optimally orient our research portfolio toward the dual task of designing innovation and doing so through a process that truly achieves the sustained widespread adoption of innovation at scale]. As implied above, hundreds of people are within USAID's agri-food Bureau, Missions, Innovation Labs and implementing and local partners are affected. Practices and processes must change, whole ways of doing business need to be recast. The lens measuring success needs to be widened, including the perspectives of researchers in the process of research, development and adaptation but also the perspectives of scaling/dissemination partners and end users. USAID has made a deliberate choice to not try and impose this by fiat from above, but to work iteratively, cooperatively and collaboratively both internally and with its partners to affect these changes. Collaboration required extensive, iterative piloting, adaptation and revision. In that regard, effective communications within the Bureau have been crucial to getting staff buy-in, especially in a bureaucracy such as USAID. A good example of this has been the ongoing dialogue between those with direct responsibilities for market outcomes and research managers. Ownership, buy-in and input from research managers was and remains essential to informing the PLC and other systems as they were being developed. This was critical given that research managers play a primary role of supervising Innovation Labs such as AORs. The mainstreaming process was reinforced by research findings about the challenges of commercializing and scaling innovations, which happened concurrently via the Market Systems & Partnerships and Seeds2B activities.

Experience from USAID/Malawi's Growth Poles Activity highlights the positive outcomes that happen when centrally funded efforts such as those when Innovation Labs collaborate effectively with Mission implementing and commercial partners[64]. In this example, challenges were identified by the commercial partners, which shaped a research agenda that responded to the private sector's need to solve their problems with science-based evidence using a PLC approach. Adoption failures can stem from a poor understanding of market demand, failure of the technology to address end-user needs, delayed regulatory approval, and insufficient incentives to motivate private sector or other value chain actors. USAID research, production and market system partners collaborated to address these challenges. A transparent and collaborative innovation process guided R&D in delivery of tangible, real-time results such as improvements

[64] Said, J., & Goldsmith, P. (2024). Technology adoption at scale: the success of USAID's agriculture diversification project in Malawi. International Food and Agribusiness Management Review (published online ahead of print 2024). https://doi.org/10.22434/ifamr1015

in yield and quality. This process has contributed to the expansion of Malawi's soy and peanut sectors, with over 30,000 outgrowers using improved varieties, input bundles and agronomic best practices. (see Appendix 3) Similar standout examples include Cambodia, Central America, and Senegal. Examples such as these happen when Mission leadership and implementing partners, AORs, and Innovation Labs mobilize joint efforts to address a specific challenge where research and innovations combine to improve outcomes for beneficiaries. Given that there is a critical need for research and science-based evidence across the entire food system, the collaboration experienced via Malawi FTF could be expanded and broadly replicated.

Providing insight into how we can improve innovation uptake at scale has been at the core of efforts in the past few years. Impediments to effectively being able to connect existing innovations with possible users include these obstacles, which largely fall into three groups: lack of identified potential ***business model(s)***, lack of strong ***economic analysis to accompany an innovation***, and lack of strategic ***engagement with appropriate channels*** for dissemination. Where there are demand-pull effects for an innovation, bundling beneficial practices can be effective. In the absence of demand-pull influences for an innovation, PPP or supply-push strategies predominate as described above.

Channels, in the context of reaching end users with new innovations, consist of the people, organizations, and activities necessary to transfer new technologies from the point of introduction for downstream use to the point of uptake by potential users. It is the way in which new innovations reach the intended users. For scaling through commercial, and even public-private, pathways there have been several key lessons: One is the important roles that market intermediaries can play by laying the groundwork for handoff from R&D to private enterprises. It can be difficult to ascertain in advance which enterprises will have the greatest potential to scale an innovation. Another is the need to identify outreach channels that reach potential innovation adopters and possible investors in these innovations.

For Similar Organizations

USAID learned and borrowed from other organizations in its adoption of the PLC approach. Working toward what is recognized as an industry standard is much easier than creating an entirely new standard from scratch. Many of the insights of earlier pioneers are common knowledge for later adopters. This experience contrasts starkly with USAID's own pioneering work on early generation seed systems, where a new framework of understanding had to be developed from a narrow body of prior research.

Donors that fund R&D will have experiences very similar to REFS of getting alignment of researchers and potential downstream users, establishing a target product profile for research outputs that improve upon current circumstances, and adhering to a responsive research development process that facilitates eventual hand-off to users. A PLC approach to research management embodies this process of research assessment, feedback and advancement.

For Organizations Working in the Agriculture Sector

The Product Life Cycle approach to innovation management is adaptable across sectors as an adjunct process for developing scalable outputs. In this respect it is sector agnostic. (In fact, large scale pharmaceutical companies often apply PLC management to align R&D processes with the important advance planning need to manufacture and then disseminate new products.) The PLC approach when applied to innovation management can help various actors—research institutions, public sector institutions, and private sector organizations—strategize and optimize their roles and contributions as follows:

Research Institutions

1. Introduction Stage
    - Focus on Innovation: Research institutions are crucial in the early stages of the product life cycle, primarily in the introduction stage. They conduct fundamental research and generate new ideas and technologies, incorporating farmers' preferences and demands.
    - Proof of Concept: Developing initial prototypes and proofs of concept.
    - Partnerships: Collaborations with private sector firms who have existing financial commitments in the sector ("skin in the game") and require solutions (aka innovation) to solve critical problems that thwart expansion. The collaboration between researcher and client defines the product criteria and guides the discovery process. The client represents demand at a certain scale and provides a platform for dissemination which launches the innovation to its first point of visibility and adoption. They may also contribute resources to support the cocreation and delivery process. Growth Stage
    - Advanced Research: As a product moves into the growth stage, research institutions engage in applied research to enhance the product's features and functionality, moving technologies from research stations to farmer field trials.
    - Scaling Innovations: Research institutions may assist in scaling the technology for broader applications by soliciting feedback from initial adopters, assessing this feedback and redesigning or reconfiguring applications as appropriate, and generally facilitate uptake by addressing design constraints as they are identified in the scaling-up process. Research can validate the economic use case, support related "system" improvements (such as improved agronomic practices or technology bundles) and address solutions to new challenges that arise.

Public Sector Institutions including Donors

1. Introduction Stage

- Funding and Support: Public sector institutions often provide grants and subsidies to support the initial research and development efforts, particularly for broader public-goods interests.
- Regulatory Framework: Establishing the necessary regulatory frameworks to enable safe and ethical innovation.

2. Growth Stage
   - Infrastructure Development: Investing in infrastructure that supports the deployment of new products (e.g., irrigation systems for seed production).
   - Policy Making: Creating policies that promote innovation and adoption, such as tax incentives or public awareness campaigns.
3. Maturity and Decline Stages:
   - Market Regulation: Ensuring fair competition and managing market dynamics to prevent monopolies.
   - Transition Support: Assisting industries and communities in transitioning from declining products to new innovations through retraining programs and other support mechanisms.

Private Sector Organizations

1. Introduction Stage
   - Market Research: Collaborating on market research to understand customer needs and potential market size.
   - Field Trials: Participate in research and on-farm trials to calibrate research development to downstream uses.
   - Commercialization: Private sector organizations take on the task of commercializing new products developed through research.
2. Growth Stage
   - Scaling Production: Scaling up production capabilities to meet growing demand.
   - Marketing and Sales: Investing in marketing and sales strategies to build brand recognition and expand market reach.
   - Feedback Loop: Implementing a feedback loop from customers to improve the product continuously.
3. Maturity Stage
   - Optimization: Optimizing production processes and supply chains to maximize efficiency and profitability.
   - Product Differentiation: Introducing variations or enhancements to the product to maintain market interest.
4. Decline Stage
   - Strategic Decision-Making: Deciding whether to rejuvenate the product through innovation or to phase it out.

- Diversification: Exploring new markets or developing new products to replace declining ones.

Cross-Sector Collaboration

- Ecosystem Building: Collaboration across sectors can build a robust innovation ecosystem. For instance, research institutions can provide cutting-edge technology, the public sector can offer regulatory and financial support, and the private sector can drive commercialization and market expansion.
- Sustainability and Longevity: Ensuring that products developed are sustainable and have a longer life cycle through joint efforts in innovation, policymaking, and market strategies.

The PLC approach helps each group—research institutions, public sector institutions, and private sector organizations—fulfill their roles and contributions at different stages of a product's lifecycle, fostering an environment conducive to sustainable innovation and growth.

Advantageously, many donors have shared in this journey in the agriculture sector through our support of the same implementing partners in One CGIAR and many universities. Evidence for such collaboration can be found in the "Accelerating the Delivery of Quality Seed from Breeding Investments Made by the Crops to End Hunger Initiative Through Economically Sustainable Seed Systems" white paper and related presentations.

For International Development as a Whole

Mainstreaming scaling into REFS Bureau is relevant to mainstreaming scaling into other organizations to the extent that a systems approach is applied to challenges of scaling research outputs. Scaling is complex and differentiated, as discussed above (see Section 2.2). Differences arise particularly from the characteristics of the goods being scaled, if that is the objective. Whether private, public, common, or club goods constraints arise predominantly from these characteristics and their relation to demand and supply challenges. Further differences arise from differences across crop varieties, animal breeds, new machinery and measuring tools, agroecological practices, agro-ecological zones and country-specific policy, institutional and cultural constraints. All of these factors influence the business models and channels that will be most adaptive for ultimate delivery.

Appendix 1

Following is a summary of the research findings from the studies on scaling up of early generation seeds, further reinforced by later studies of specific products and services developed by researchers, that describe how particular characteristics can facilitate or hinder innovations' scalability and explore viable scaling pathways.

- Private goods: Access is based on payment, or some form of remuneration and non-payers are effectively excluded from use of the good. Private enterprises are the means through which scaling is achieved. Hybrid crops exemplify such private goods characteristics
- Common goods: Access is not controlled by payment, but access to the resource is restricted to entitled users. Such goods are subject to demand constraints mainly due to issues of demand uncertainty or supply constraints because of high costs or delivery complexities. Public-Private partnerships or related institutional arrangements are necessary to address such constraints. Open pollinated varieties and self-pollinating varieties are characteristic of such goods.
- Club goods (niche private sector): Access is based on payment, but the goods can be simultaneously used by multiple consumers until congestion occurs or rationing is necessary. Private enterprises scale these goods until demand is met, at which point demand collapses, or demand must be tightly managed. Plantation crops often fall into this category of goods, e.g., cotton, sugar, etc.
- Public goods: Access is not controlled by payment and the goods can be simultaneously accessed by multiple consumers. Public goods are the responsibility of governments (or, temporarily, donors) to deliver, although with the right institutional arrangements there may be private delivery options. These are crops from which commercial early generation seed producers would generate little or no revenue, such as cassava, millet and sorghum.

Private goods are subject to demand-pull by markets; that is, there are high financial returns to individual actors, which incentivizes them to participate actively in the market. Though there may be some need for upfront risk mitigation to address some uncertainties and other constraints, once these are addressed innovations that are private goods can and do go to scale through private sector pathways. Public goods are subject to supply-push forces as there are low- to no-returns to individual actors.

Scaling up products and services follow one of the foregoing trajectories. Scaling up practices, for which often there is no demand-pull, requires a bundling strategy where a practice can be bundled with a product or service that is in demand. Otherwise, if there are no bundling opportunities, practices will have to scale through the public sector.

Public Private Partnership collaborations are often necessary to scale up innovations that have strong market demand but for which the cost of production or demand risk create barriers to private-sector investment, which necessitate public sector involvement. Public sector involvement can take many forms, including institutional arrangements such as advance purchase commitments, contracting out specific inputs to control costs, industry associations agreements, and many other examples.

There are several reasons why an innovation may have no clear commercial pathway to scale due to supply and demand constraints, including but not limited to:

1. The technology was developed for use by small farmers and includes on-farm assembly or can be reproduced with local resources - there may be substantial resources needed to educate and create awareness of the technology (e.g., clay pot coolers, silage choppers);
2. The innovation is not a technology but a production method (e.g., conservation agriculture, organic agriculture) or practice and may, or may not, directly accompany a specific technology or improved crop variety in a 'bundle' of innovations;
3. The innovation may not have demand because it has an indirect value proposition for intended users, such as innovations targeting issues related to public health or environmental quality, and this focus on public goods means an innovation would need to rely on public support that might not be available.

The Table below discusses the main categories of supply and demand constraints that are found to affect the scalability of an innovation.

Table 1. Supply and Demand Constraints to Scaling Agricultural Innovations

Supply Constraints	**Demand Constraints**
Innovations that are reliably demanded by consumers, but which are unattractive to produce due to high effort or technology intensity, risk of post-production loss, or generally low margins	*Innovations that are attractive for private sector companies to produce, but for which they cannot reliably forecast demand and so are exposed to high demand risk and high cost of capital as a result*
Production: costs incurred to obtain the factors of production such as labor, land, and capital, that are needed in the production process of a product	Demand uncertainty: not knowing what the demand for a product is due to insufficient forecasting information Ex: How much seed will farmers save in any given season? Seed companies must compete with (free) saved seed
Distribution & Logistics: costs incurred to deliver a product from the production unit to the end user (customer).	Awareness & socialization: unfamiliarity with an innovation -- what it is, why it matters to potential consumers. Includes marketing expenses that are attributable to selling to customers

Ex: handling, shipping, packing, freight, storage, data management	Ex: advertising, media production, siting logistics, branding, demonstrations, trade shows, sales commissions, promotions
Packaging: considerations of materials, printing, tagging, protection as means to move goods and provide services sometimes involving legal disclosures Ex: security, marking/logos, SKU numbers, traceability tags	Ease of adoption: the extent to which an innovation is 'plug and play,' with obvious uses; or the extent to which additional skill, knowledge or resources are needed to get optimal returns from the innovation Ex: planting a seed versus an aflatoxin control product requiring varying levels of training and maintenance
Assembly costs: putting together a new innovation or technology out of a box, by last-stage manufacturing, etc. Ex: Imported parts for assembly in-country	Business case: the means by which a business model can be profitable, generating downstream demand-pull
Coordination failures: associated with activities among partners that range from decomposing tasks among members to the level of communication and decisions related to the joint accomplishment of set objectives. Ex: seed company and outgrower planting calendars unsynchronized	Market systems case: the extent to which a market system may accept, be hostile to, or have the capacity to adopt a new innovation (including when optimizing return requires further market system improvements) Ex: an innovation saves costs for multiple actors across value chains versus competing against established monopoly/oligopoly
Transaction costs: costs of making an economic trade Ex: search and information costs, bargaining and decision costs, policing and enforcement costs	

Such constraints are often best addressed through institutional arrangements particular to public-private partnerships.

The enabling environment -- laws, regulations -- can affect both supply and demand as well. Intellectual property rights may be a particular consideration for some innovations and in some countries. Such considerations are context specific but must be understood in advance of attempting to scale up.

Appendix 2

Scaling Targeted Interventions: A Specific Effort

The scaling team began a systematic review of innovations' scaling potential using the most recent RRU, in late 2020/early 2021. The result of that first round of systematic review was a list of innovations that presented some level of commercial viability but as they had been developed and reported to USAID anywhere from two to seven years or more, it was unclear whether they had ever been put in front of a broader audience of users who might be interested in them. So, the scaling team began running systematic trials to learn how to identify and engage with potential technology adopters with the intention of scaling up innovation use. Initially we identified opportunities to reach target audiences with information about selected innovations. This is where we first worked with the Market Systems & Partnerships (MSP) activity[65] given their expertise in business advisory services and innovative models.

First, with the intention of developing prospectuses for selected innovations using a modified version of the methodology in the Agriculture Scalability Assessment Toolkit, we short-listed a manageable number of technologies for advancement. These prospectuses were developed to showcase the IL innovations during the African Food Systems Forum (AFSF)[66] Virtual Marketplace in September 2021 hosted an overview of the Innovation Showcase where the 13 technologies were housed, featuring two of these innovations in the live presentation: a multi-crop thresher and an affordable moisture detection card.

Second, developing 13 prospectuses for the shortlisted innovations turned out to be more complicated than initially planned because the information required to create an informed prospectus was largely unavailable. It took months to get the necessary information from the Innovation Labs, even with the assistance of a dedicated group of consultants from MSP, and in some cases, there was no further information available because the researchers had moved on or the Innovation Lab performance period had ended.

At AFSF 2021 the prospectuses, although lacking economic data and not sufficiently addressing the needs of prospective investors and adopters, proved invaluable to sparking audience interest. Because participation was moved to a virtual platform and attendance fees were waived, accessibility was increased and engagement across the continent, especially from local SMEs and NGOs, was much higher. Online participation for each of the two overview sessions was around 150 - 160. The number of attendees, questions raised, and technology inquiries received, all indicated a strong level of interest from participants. AFSF 2022 provided a strong comparison case as in-person participation returned. In 2022, an Innovation Lab -affiliated

[65] See the Market Systems & Partnership website: https://agrilinks.org/activities/feed-future-market-systems-and-partnerships-activity
[66] See AFSF: https://agrf.org/

regional distributor showcased a small selection of their technologies at a booth but were challenged in providing specific selling prices and available volume discount estimates.

At the same time, the team assessed other digitally based technology clearing houses that might be interested in the prospectus documents and could serve as another channel for reaching users. The Technologies for African Agricultural Transformation (TAAT) Clearinghouse, an affiliate of the African Development Bank, and the IFAD Rural Solutions Portal (RSP) were determined to be potential hosts for cataloging the IL technologies. However, as was experienced with our work with MSP to develop the first round of prospectus documents, these portals also required economic data, but in their case, it was a condition of entry. Because USAID was largely unable to obtain this information from partner Labs, most of the technologies have yet to be listed on either clearinghouse.

After experiencing AFSF 2021, and in parallel to preparation for AFSF 2022, MSP was engaged to undergo a process of deeper analysis to identify the highest potential 3-4 innovations that could be moved forward on the path to commercialization, with technical assistance from MSP, by facilitating the arrangement of partnerships and investment opportunities for the innovations (or the businesses behind them, depending on the situation). The work was broken out into two phases: Phase 1 being to filter and select the innovations for brokering support and Phase 2 being to work with those innovations to develop a pipeline of potential investment opportunities and relationships. The key outcome of Phase 1 was the solidifying of the team's hypothesis that identifying a business model and marketing channels and, subsequently, having economic data available from the earliest phases of research and development was necessary for an innovation's potential commercial success. Phase 2 had implications for individual innovations as well as at a programmatic level. Key among these findings was the recommendation to consider providing technical and business advisory support to Innovation Labs to follow a market systems approach to their R&D efforts, as well as assist with technology hand off. As discussed below, this model has worked exceptionally well with the Seeds2B activity.

As discussed earlier, the scaling team distinguished between the work done to support varietal uptake, and the work done to support all other scaling: there has been markedly more success with the former. One of the more successful efforts has been the development of seed "sell sheets' ' in partnership with other internal USAID teams, as well as engagement with the African Seed Trade Association (AfSTA) through USAID's Seeds2B activity. Working with Seeds2B, a delegation attended the 2023 AfSTA Congress in Dakar, where Seeds2B staffed a booth in the trading room and fielded inquiries from attendees. Seeds2B provided Quick Reference (QR) codes so that Congress attendees could easily gain access to new and improved variety 'sell sheets' by seed category (26 varieties were displayed across the soy, sorghum, bean, and cowpea categories). Roughly 30 new leads were generated by the Seeds2B team on both the research and commercial sides of the business, which continue to yield returns.

Appendix 3

Unlocking the benefits of innovation: Applying a product life cycle approach facilitates collaboration between USAID HQ and Malawi Mission

Collaboration between the FTF Soy Innovation Lab and USAID/Malawi's flagship FTF activities, beginning with Agriculture Diversification in 2016 and continuing with the follow-on activity Growth Poles since 2023, uses a Product Life Cycle (PLC) approach to address bottlenecks and facilitate innovation. USAID facilitates direct engagement between IL research partners and USAID Missions, to provide local producer networks with specialized expertise to facilitate evidence-based decision making. These market actors understand that discovery, science and evidence play an important role in ensuring efficient and effective program delivery to support local food systems.

Facilitating technology adoption requires a good fit between product and market and coordination between many actors. The PLC is an end-to-end management tool that advances products based on fit and identifies downstream actors who must be engaged at each stage as a product advances through these stages. Centrally funded Innovation Labs and Mission implementing partner collaboration can be wide ranging.

Using the PLC structure in Malawi helps diverse local actors -- including researchers, producers and businesses -- share knowledge and coordinate to address challenges and contribute to technology adoption.[67] This is what is happening in Malawi to support tobacco growers as they diversify into soy, peanut and other nutritious crops. With no prior soy or peanut knowledge, crops not previously part of the market system, the industry needed updated science and technology to modernize. As one example, with the support of the Soy Innovation Lab, Malawi released its first improved soy variety in 9 years in 2020, and two new varieties every year since. Then local private sector firm, Pyxus, in collaboration with the Malawi National Ag Research Service (NARS), commercialized and has sold increasing volumes of these "bespoke", industry-demanded varieties: 60 MT in 2021, 400 MT in 2022, and 1,000 MT in 2023. This means over 20,000 farmers will have access to improved seed and the promise of increased yields. In a similar vein, the Peanut Innovation Lab and NARS have collaborated with Limbe Leaf Universal and Pyxus to test 1,500 groundnut lines, resulting in the release of 5 new varieties for commercial development. The companies' have commercialized and sold 11 improved 11 varieties: 85 MT in 2021, 550 MT in 2022, and a 1,130 MT in 2023. This past agricultural season 11,500 farmers received improved seed.

[67]The Soybean Innovation Lab published an article that explains how their partnership with the Agriculture Diversification activity facilitated adoption of technology at scale and sheds light on how other USAID Missions and their implementing partners might seek to leverage partnerships with researchers. See https://brill.com/view/journals/ifam/aop/article-10.22434-ifamr1015/article-10.22434-ifamr1015.xml

Critically, USAID's Ag Diversification and Growth Poles activities are aligned with and working through private sector companies. The USAID contractor plays a facilitative role in bringing the researchers, seed companies, farmers and buyers/processors together in long-term sustainable business relationships aimed at expansion.

Defining ideal variety characteristics is often left up to breeders, with limited input from end-users (producers, processors, customers). Benchmark standards (that a new technology must exceed) are frequently not codified and/or used to guide selection. Field evaluations -- due to time, money, or convenience -- are often limited, failing to test multiple agro-ecological zones. These short-comings can result in the release of less-than-desirable varieties. Moreover, on-farm trials which test realistic growing conditions have been rare, and the qualities and attributes of new varieties are often not communicated to farmers or end-users. This becomes a barrier to adoption.

Seed companies have been historically resistant to introducing new varieties once farmers settle on a preferred variety, resulting in over-cultivation of very old, unproductive varieties as the environment changes. Private companies must absorb the risk when a new variety doesn't sell.

By using a PLC approach, USAID's partners achieved successive stages ultimately achieving their shared objectives.

Early PLC stages: A clear need was identified for increased access to protein sources to supply livestock/poultry feed markets, and for high quality oil. Demand was verified; soy processors were under-capacity. A target product profile was developed to guide breeders in collaboration with NARS, IITA, farmers, and soybean end-users. Diverse genetics (globally proven soy varieties) were gathered from the public and private sectors and evaluated and through multi-location trials, superior varieties were identified.

Intermediate PLC stages: On-farm trials of selected varieties conducted by public and private soy sector partners confirmed top varieties designated for national performance trials; they also developed enthusiasm, leading farmers and companies to support adoption. Communication to regulatory officials of trial results helped accelerate placement in national trials and eventual registration for commercial release. Pan-Africa and on-farm trials help create valuable varietal information for extensive communications efforts to seed companies, farmers and processors, demonstrating superior traits over current varieties. Early establishment of early-generation seed producers ensured supplies of breeder seed, reducing risk and establishing confidence for seed companies to market a new variety.

Later PLC stages: New varieties are well-characterized and on-farm trial networks are now the norm. The engagement of multiple stakeholders facilitates the flow of information and creates market demand. Outreach and engagement with seed companies about new and improved varieties in the pipeline creates demand and turnover of varieties. New varieties will become expected by both farmers and seed companies as demand for soybean products increases.