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## Climate Resilient Agriculture

Can digital technology make a  
real difference?

June 16, 2023





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## Climate Resilient Agriculture – Can digital technology make a real difference?

Industry experts discuss the role of digital technology in helping  
smallholder farmers combat climate change.



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United Nations Foundation

**June 16th, 9am EST/2pm BST**

# CGAP's Perspective

- Emilio Hernandez





## **Intro: Zooming out to frame challenges to achieve climate resilient agriculture**

**Smallholders and other actors in agricultural value chains face a double whammy:  
Increasing climate shocks in the context of a worsening food insecurity crisis**



Photo by Allison Shelly for CGAP

## Smallholder families are back in focus for good reasons...

Smallholder families' high vulnerability has made them one of the worst hit by **climate change**

For women in these families this is even more so than for men

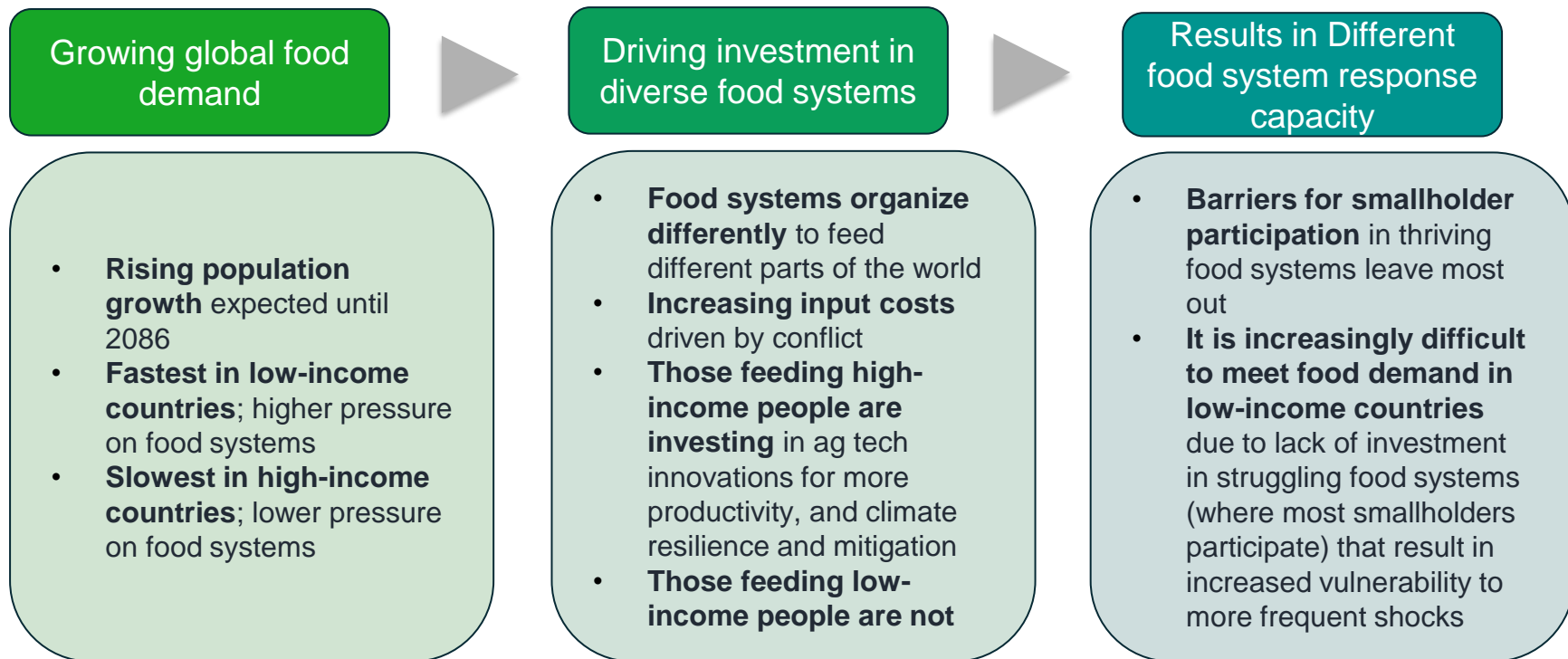
**Climate change** is disrupting food systems in general, most notably production and consequently the rest of agricultural value chains.

Smallholder families and agri-SMEs being most vulnerable while responsible for 30 to 40 % of global food production

Source: CIFAR, 2023

# Efforts to make smallholder families resilient to climate change face the compounding challenge of the need to feed a growing population

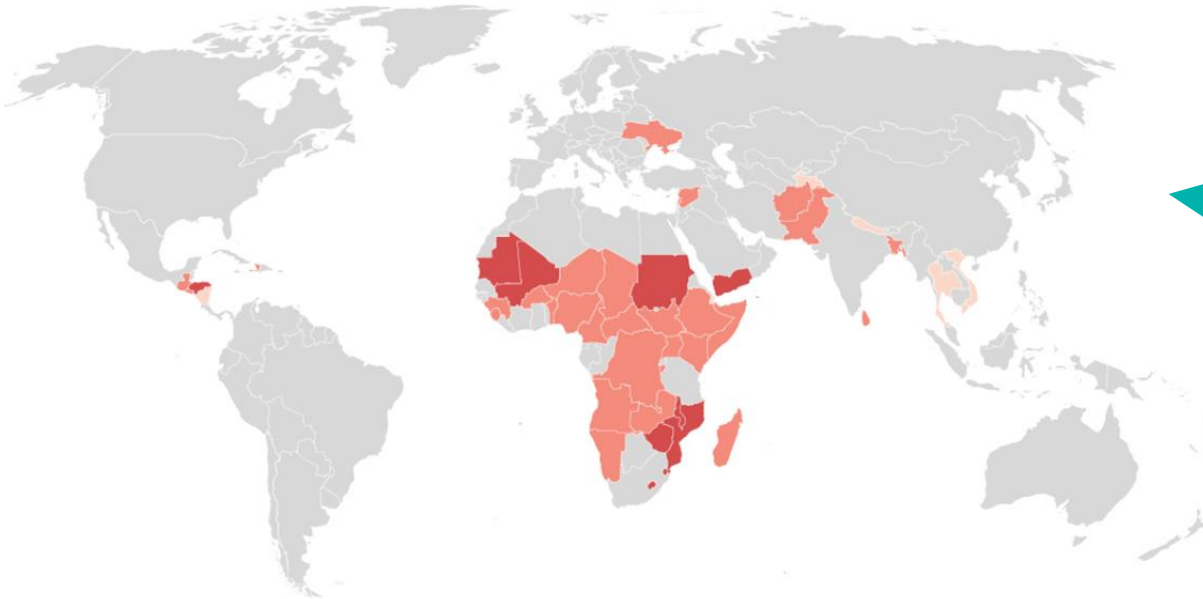
Understanding the climate-food security nexus is at the core of clarifying in which way we seek to 'transform' smallholder agriculture and what is the ultimate outcome



# The immediate effect of the double whammy on smallholders and low-income people is related to food insecurity

Vulnerable food systems affected by climate change and outpaced by local food demand are already failing in 48 countries, and the risk of this spreading increases with a worsening climate

- FAO-WFP hunger hotspot or a major food crisis by the UNGRFC
- Cereal and fertilizer price impact of >0.3% of GDP
- Meets both criteria



345 mo people are food insecure in 2023. This is more than double of 2020.

This fuels further conflict and political unrest



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# Climate resilience and greater productivity are both needed to ensure a pressing outcome: sustainable food security. What are potential pathways to get there?

- **Efforts to ensure more smallholders adopt innovations to participate in thriving food systems offer an important, yet partial solution**, as they will leave out a big share of smallholders and other consumers in low-income countries
- **We also need to invest in agtech innovations for food systems that (i) are feeding the rapidly growing low-income population, and (ii) where most smallholders currently participate**
- **Throughout, agtech innovations are being tested and scaled.** Greatest benefit happens when they allow for greater productivity and lower costs, while at the same time allowing for the mitigation of and resilience to climate change
- **There is a need to invest in adapting agtech innovations to low-income contexts**, as there is evidence those currently develop for thriving food systems are not guaranteed to work in other contexts





# How can digital finance ecosystems contribute to these pathways? Together, the financial inclusion community can deliver the promise of digital finance



The financial inclusion community has made great progress in understanding what it takes to put the building blocks in place for inclusive digital finance ecosystem

Payment system backbone, CICO networks, ID systems, customer-centric products, enabling policies and reg

Efforts to enable their viable operations in rural areas are still a prerequisite to contribute to smallholder resilience to climate change

However, there are important knowledge gaps on how to tailor retail financial services and public-private blended finance to generate, adapt and adopt agtech innovations that bring the most beneficial outcomes for smallholders in different context

CGAP is starting a learning agenda to identify which agtechs and which digital finance products hold most potential. Various examples are shown next

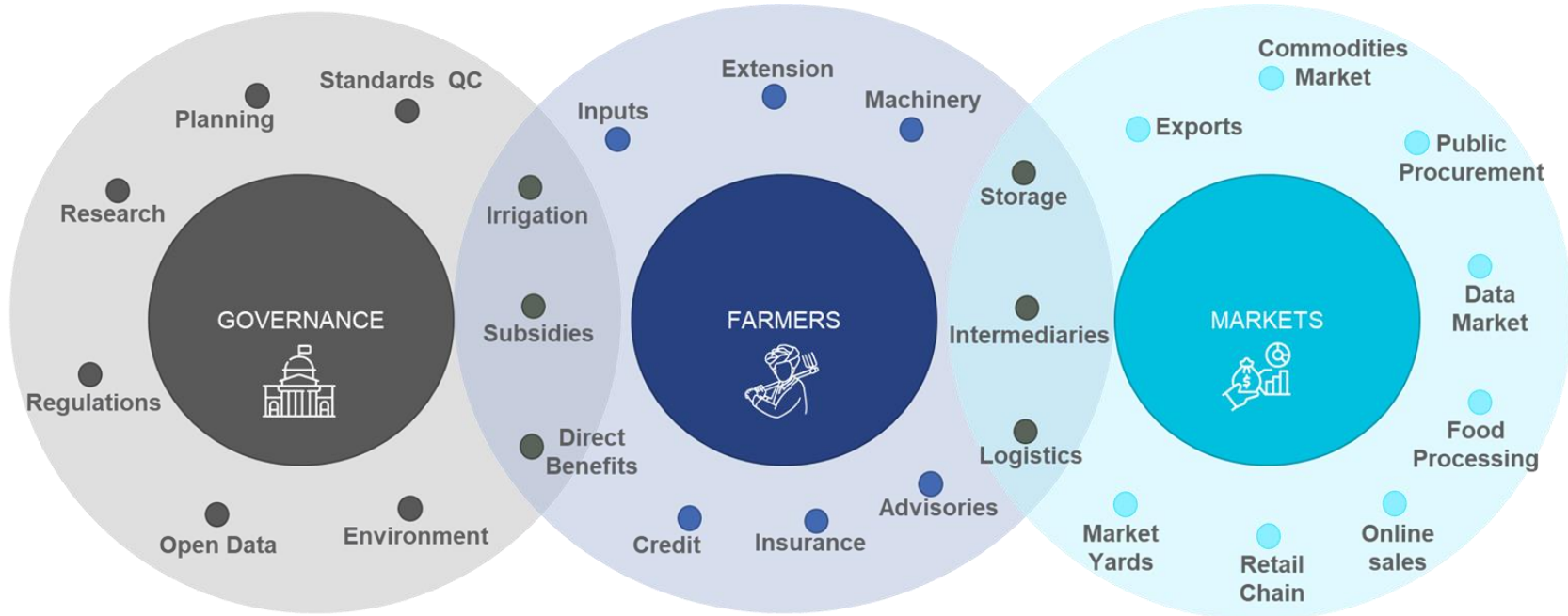
**MSC's Work  
Integrated Digital  
Agriculture in India**  
- Puneet Chopra



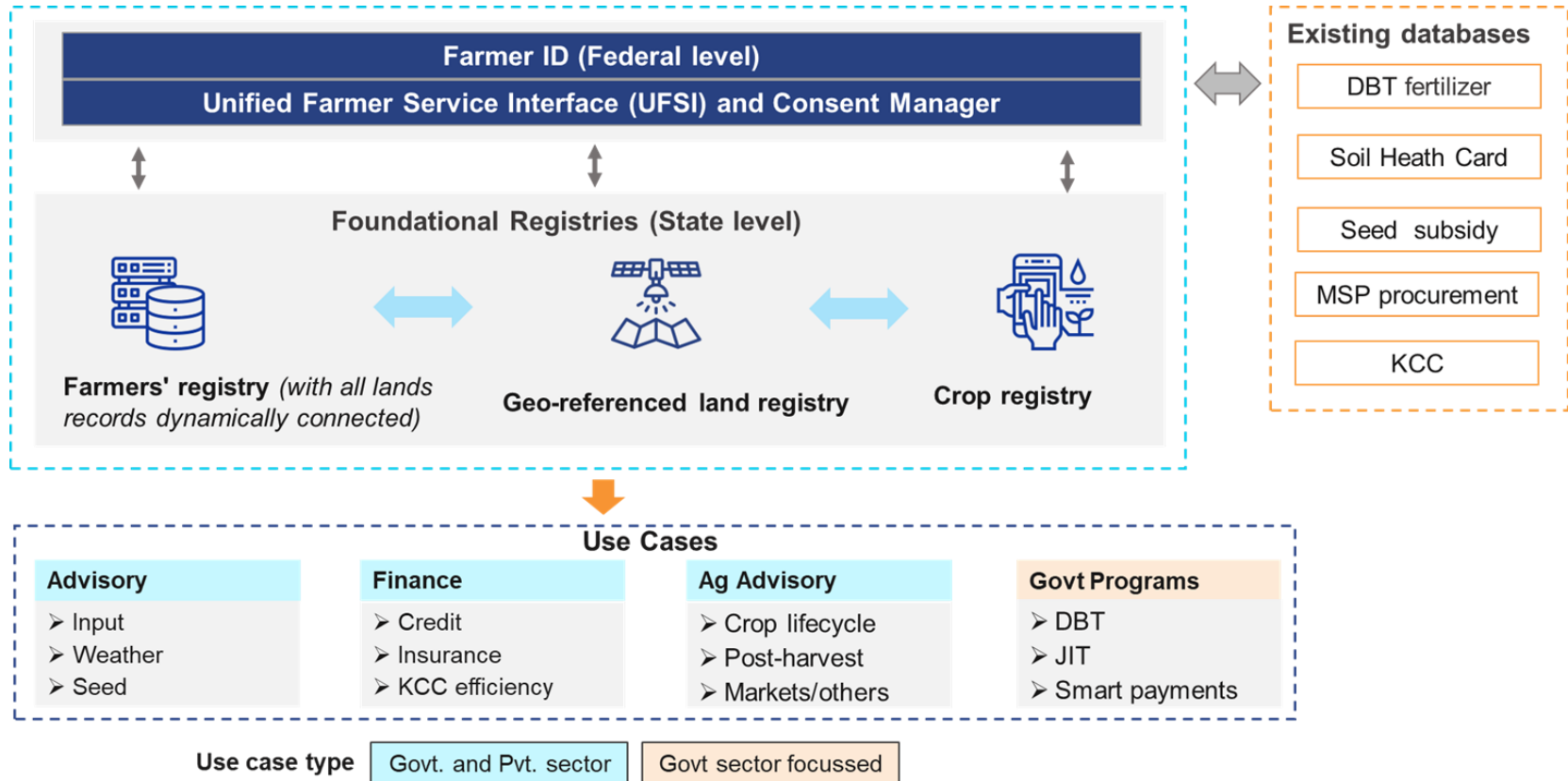
# AgriStack in India is trying to integrate agricultural value chains



- The India AgriStack is an initiative to integrate farmers, markets, providers, and government using a building block approach with open architecture.
- AgriStack, is being developed as a collection of registries, datasets, APIs, and IT systems which - enabled by a common set of policies, standards, and guidelines.




# AgriStack, leveraging exiting databases and systems, will be used to develop multiple use cases across public and private sectors



# Comparing AgriStack with the proven IndiaStack (using *Aadhaar*)



#	 AADHAAR	AgriStack
1	Database of Residents	Database of Farmers
2	Unique Aadhaar no. to each Resident	Unique Farmer ID to each Farmer
3	Contains demographic information i.e. Address, Gender, Date of Birth	<ul style="list-style-type: none"><li>• Agriculture land holding of Farmer</li><li>• GPS coordinates of each land of the Farmer</li><li>• Crops grown on each plot</li><li>• Benefits availed by farmers</li></ul>
4	Aadhaar APIs/Services for sharing data to other parties / Unified Payments Interface (UPI)	Unified Farmer Service Interface (UFSI) - API/Service layer to provide data to others
5	UIDAI as Regulator	AgriStack regulator?

# AgriStack in Action: Integrated Digital Farmer Services Platform



The Integrated Digital Farmer Service Platform will integrate and diffuse innovations, leveraging and building on **shared data and complementary services**, creating a **Digital Public Infrastructure, using open architecture**

## Ag Advisory Services

- Phygital Ag-extension
- Pest & disease management
- Soil health and agronomy
- Ag intelligence
- Precision agriculture
- Coordination & verification

## Finance

- Direct Benefit Transfers
- Credit and insurance scoring / underwriting models
- Credit products
- Insurance (agri, livestock, bundled)
- Sandbox testing of products/services

## Market Linkages

- Pricing and market intelligence
- Input aggregation & delivery
- Price discovery
- Output aggregation & delivery (+FPOs)
- Digital quality assaying & traceability

## Climate Resilience

- Climate resilience agriculture & livestock
- Carbon credits; Green finance
- Precision advisory and agronomy

## Partners with proven innovations



## The CIFAR Alliance Climate Responsive Agriculture (CRAg) white paper

- Graham A N Wright

[Link to the white paper here](#)

Special thanks to David Ferrand for his help writing the paper



## Agriculture, particularly in Africa, is in bad shape ... and climate change is beginning to bite

- 72% of the world's 570 million farmers operate on less than one hectare.
- The average smallholder farmer in Africa lives on less than USD2 per day.
- Only 13% of smallholder farmers in Sub-Saharan Africa have registered for any digital service and only 5% are active. (Chandra., R., and Collis, S., 2021)

*"We have lost our livelihood. All our belongings and cattle were swept away by cyclones. It wasn't like this when I was young. Storms have become more intense than ever. The land is shrinking, and salty water gets into our fields, making them useless. We feel very insecure now."*

- Tulsi Khara, Bangladesh





# Incremental is not enough - agriculture must transform.

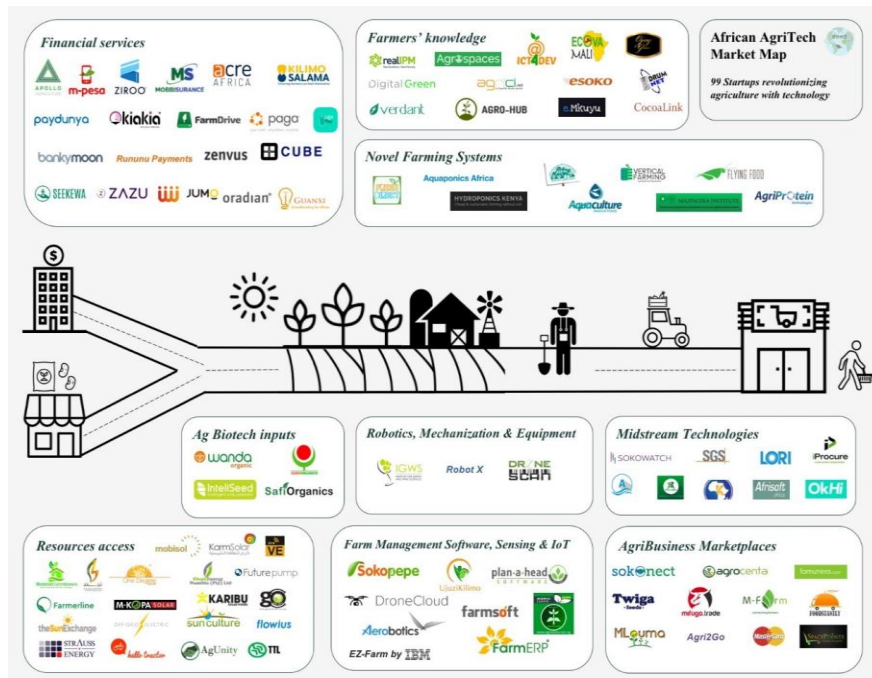
- Many agricultural livelihoods in developing economies were already fragile prior to the onset of climate change
- Adaptation to achieve resilience requires more than incremental gains in productivity and incomes
- Rapid agricultural transformation has been achieved across many countries (eg: South Korea, Brazil, South Africa, China, and Vietnam)

***How can we accelerate the transformation of agri-food systems?***



# The core conundrum ... we have the knowledge and tools ... but little action

- **Smallholder agriculture can be competitive** given prevailing factor prices (labour, land, capital) in many developing economies
- **Much** has been **known about the constraints** facing smallholder agriculture for years
- These **constraints have been overcome** in many places and sectors
- Many of the **core technologies** to adapt to climate change already exist
- **Digital technology** already promises **radically improved solutions to SHF** agriculture constraints and climate adaptation



Source: Africa Food Network (2017)

**Why are we not seeing more rapid adoption in more places leading to transformation? Can climate change catalyze that transformation?**

# OK ... so what? Three focus areas for the CIFAR CRAg WG

- The WG should build on and complement the work of its members.
- It is our belief that these three inter-related perspectives on warrant attention and should be the core focus of the CRAg WG:
  1. Integration and co-ordination in value chains
  2. Diffusion of innovations across value chain participants
  3. Financing innovation end-to-end



# Integration/coordination – along value chains using platforms



**Small-scale and diversified** farming systems can be more **resilient and productive**.

Need **resources, information,** and **capacity** for SHF and businesses to coordinate effectively.

**Market solutions for integration** face poor communication, weak infrastructure and ineffective formal institutions ('rules of the game')

**Transformation** of SHFs often requires **multiple elements to be addressed simultaneously** (there is rarely a single binding constraint)

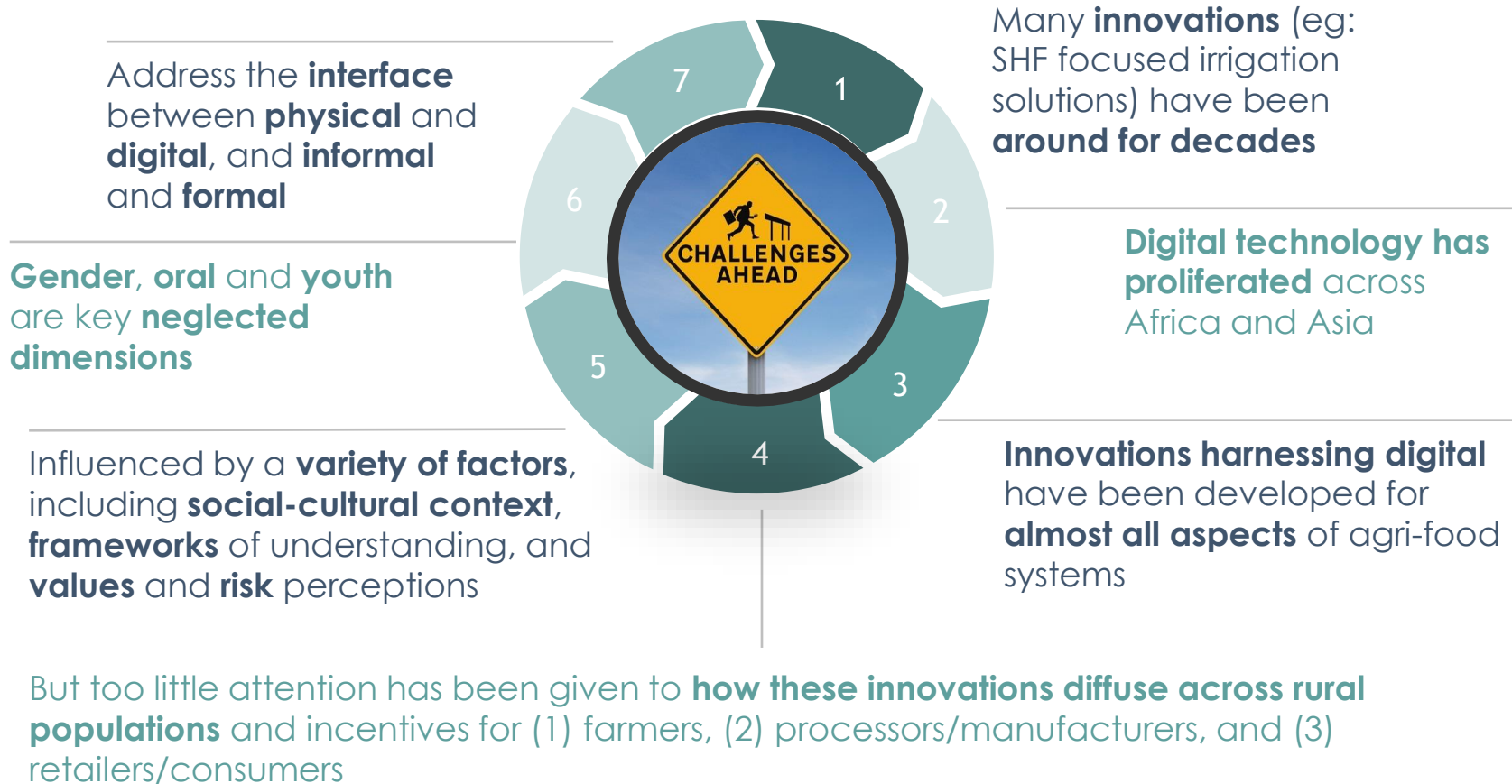


**Digital platforms** in principle offer the **potential to integrate and coordinate value chains**

But limited instances of successful digital platforms addressing SHF - **need to learn from the successful business models**

Evolve use of digital integration **beyond current dominant platform models** (often derived from very different social and economic contexts)

# Diffusion of innovations – the persistent challenge



# Financing transformation – beyond traditional instruments

1. The short-term finance needs (payments and working capital) not enough - **SHFs will need a range of financial services.**

2. **Financing transformation** is about how the necessary **co-ordinated investments** can be made **within and across firms** with risks managed throughout the change process

3. Not simply **piecemeal financial 'products'** provided by financial institutions (with limited or no strategic engagement in sector transformation)

4. **Many areas of promise** in digital agricultural finance from reducing transaction costs and risk through platform-based delivery to PAYGO financing of assets

5. **Pure market-based solutions may not be sufficient** (constraints to long-term finance, interest rate, covariant risk etc.)

6. Huge opportunity to **leverage green finance**: carbon, climate, nature-based finance alongside traditional development finance and impact investing



A systems perspective: **four major elements found in most economies**, albeit that the emphasis varies significantly: (i) the formal financial sector, (ii) embedded finance, (iii) informal/community-based finance and (iv) state finance (including international funds).



# The CIFAR Alliance's CRAg working group

Wants to:

**optimize both synergies and the flow of insights/lessons learned on the key challenges** facing **climate-resilient agri-food systems**, particularly for **women**,

and

the **potential for digital technology** to address these challenges –  
with a view to **influencing and assisting tech start-ups to focus on them**,

thus

**adding value to the WG members.**



# CRAg working group ... a chance to catalyze change

- The CRAg WG can **enable collaboration across a diverse set of actors** seeking to exploit the potential of digital and finance to accelerate resilient agricultural transformation.
- Its strength will lie in combining the diversity of specific problems, solutions, and activities in which the group is involved with **pursuing a shared learning agenda** drawing on this diversity.
- The **CRAg WG welcomes others who share its vision** and seek to build scalable, systemic solutions driven by rapid innovation. **Join us!**
- The CRAg WG will focus on **four cross-cutting themes** as it addresses integration/coordination, diffusion of innovations, and financing transformation:
  1. **Localization**
  2. **Measurement**
  3. **Information sharing**
  4. **Advocacy**





1. **Localization**
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- Cristina Rumbaltis del Rio

