

MARCH 2019

# DIGITALISATION FOR AGRICULTURE REPORT - AFRICA



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# Outline

- 1. Context of the D4Ag Report – Director of CTA**
- 2. Framing**
- 3. Methodology**
- 4. Preliminary Findings**
- 5. Timeline & Follow up**

# CTA and Report Context





# WHAT IS CTA?

TECHNICAL CENTRE FOR AGRICULTURAL  
AND RURAL COOPERATION



FOUNDED IN 1984

JOINT INSTITUTION OF



**FOCUS ON INFORMATION  
AND COMMUNICATION  
FOR AGRICULTURAL AND  
RURAL DEVELOPMENT**

**FUNDED BY EU UNDER THE EUROPEAN  
DEVELOPMENT FUND**



# Framing the D4Ag opportunity







# Key Agricultural Challenges

**LOW YIELD**

**LOW INCOME**

**CLIMATE  
RESILIENCE**

**YOUTH  
UNEMPLOYMENT**

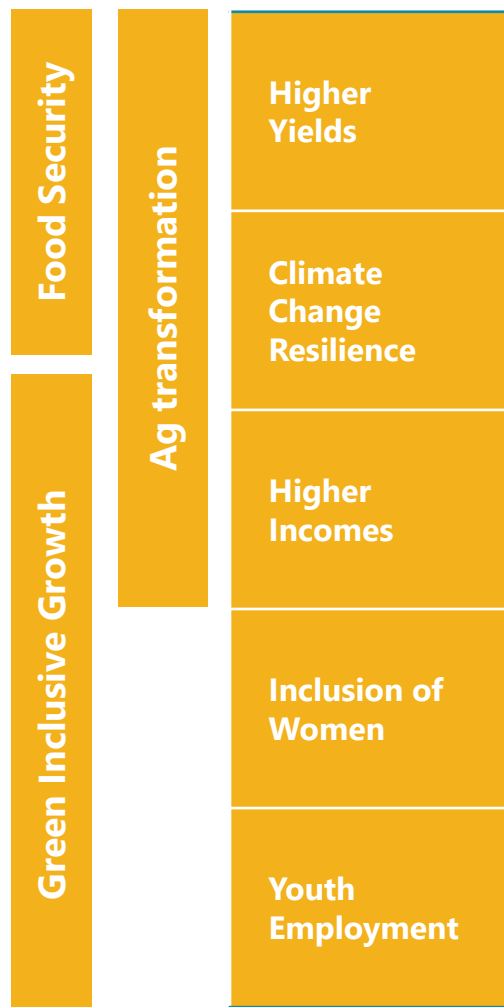
**EXCLUSION OF  
WOMEN**

**BROADER CHALLENGES LINKED TO AG SECTOR**  
Green Inclusive Growth, Food Security & Nutrition



# D4Ag Links Directly to Ag Transformation and Broader Green Inclusive Growth and Food Security Agendas

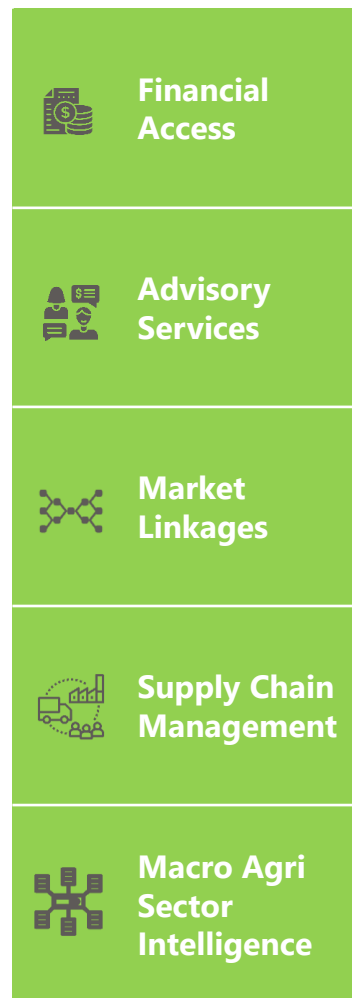
## Macro & SHF-level impacts



### Drivers of impact

- Lower delivery costs
- Scalable models
- Improved transparency
- Better data/insights

## D4Ag use cases



## Examples

- Digital smallholder finance (SHF) providers for payments, credit, insurance products
- Crowdfunding platforms
- B2B SHF data analytics intermediaries
- Agronomic practice and market info services
- Weather surveillance/advisory services
- Precision advisory services at level of farmer or field
- Participatory advisory platforms (e.g., peer to peer)
- Farm management software
- Digital linkage to agri inputs and/or off-takers
- End-to-end integrated digital market linkage models
- Ag buyer-seller digital marketplaces/exchanges
- Mechanization linkage platforms (e.g., shared economy, PAYG irrigation and machinery access)
- Traceability solutions
- Supply chain management ERP systems
- Logistics mgmt solutions
- Government agriculture sector dashboards
- Agriculture extension system mgmt. tools
- Agribusiness intelligence
- Agronomy / R&D agenda setting tools



# The D4Ag Ecosystem

## Macro D4Ag Impacts:



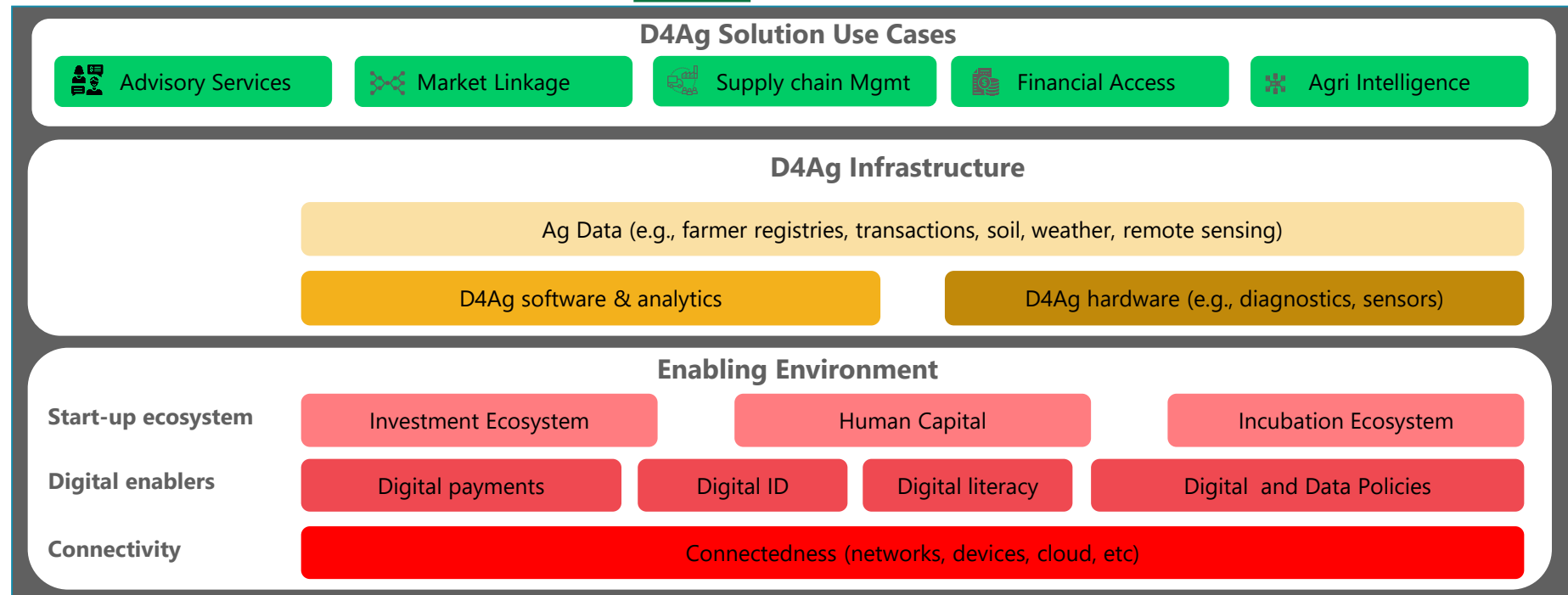
## Other Ag Transformation drivers:



## Smallholder Farmer D4Ag Impacts:



## D4Ag Ecosystem:





# Report methodology



# Overview of Methodology

Source	Update
<b>Survey</b>	Surveyed > <b>400 players</b> and have obtained <b>175 survey responses</b>
<b>Database</b>	We have developed a database that is tracking ~ <b>370 active</b> D4Ag solutions focused on Sub-Saharan Africa. This contains detailed information on each, country presence, revenue, impact, and business model details.
<b>Interviews</b>	We have conducted more than <b>120 interviews</b> of agribusiness leaders, tech experts, D4Ag solution providers, academics, and policymakers.
<b>Country field visits</b>	Deep dive field visits and country case studies in <b>Ethiopia, Nigeria, Senegal</b> and <b>Rwanda</b> have been completed. <b>Kenya &amp; Sahel Region</b> lighter touch review. <b>Ghana</b> country case study research ongoing.
<b>Desk Research</b>	Detailed review of D4Ag literature on market assessments, business models, end-user needs and feedback, and impact evidence



# CTA Report Advisory Council: Leading Experts and Practitioners in the D4Ag Sector

Organization	Council Representatives
1. AfDB	<b>Martin Fregene</b> , Ed Mabaya, Kemi Afun-Ogidan
2. AGRA	<b>Vanessa Adams</b>
3. BMGF	<b>Enock Chikava</b> , Stewart Collis
4. CTA	<b>Michael Hailu</b> , Caroline Figueres, Ben Addom
5. CIAT	<b>Debisi Araba</b>
6. Dutch Ministry of Foreign Affairs	<b>Carola van Rijnsoever</b> , Mariska Lammers, Paul van de Logt
7. EC/DEVCO	<b>Christophe Larose</b> , Milena Pirolli
8. GIZ	<b>Christian Merz</b>
9. GSMA	<b>Natalia Pshenichnaya</b>
10. IBM	<b>Anita Gardeva</b> , Selina Kim
11. RAFL	<b>Mikael Hook</b> , Clara Colina
12. M-Pesa	
Foundation Academy Board	<b>Su Kahumbu</b>
13. OCP	<b>Marouane Ameziane</b>
14. SACAU	<b>Ishmael Sunga</b>
15. Syngenta Foundation	<b>Simon Winter</b> , Robert Berlin
16. University of Michigan	<b>Kentaro Toyama</b>
17. World Bank	<b>Samia Melhem</b>

## ADVISORY COUNCIL RESPONSIBILITIES

1. Expert editorial input into report scoping/objectives, key findings, and key recommendations
2. Leveraging networks to maximize data points for study (e.g., survey non-respondent follow up, access to datasets on investments or funding flows)
3. Suggestions on innovative and interesting case study candidates for tech and business model innovations
4. Support on report dissemination -- e.g., opportunities to profile report at your events and/or promotion of report and its findings when final documents are released



# D4Ag Technology Trend Deep Dives

## Thematic Lens

### Cutting-edge technology solutions

## Layers of the “Digital State”

## Technologies (examples)

### Central Question

*How can governments, donors, and the private sector best ensure that cutting-edge technology solutions will support Digitalization for Ag development among Africa’s smallholder farmers?*

### Hardware

Drones  
IoT and Sensors  
Robotics/automation  
Agri diagnostics

### Points of Exploration

- **PAST:** What progress has been made in incorporating these technologies into D4Ag today? Which technologies have already been introduced? What have been the main drivers of failures/successes?
- **PRESENT:** What companies are currently engaging with this the most? What is needed for companies to pilot and scale new solutions? Which solutions are showing greatest potential?
- **FUTURE:** Where do we see this moving forward? In which use cases? Providing what value?

### Software & analytics

Blockchain  
Big data  
Machine learning/AI  
ERP  
PAYG platforms

### Data assets

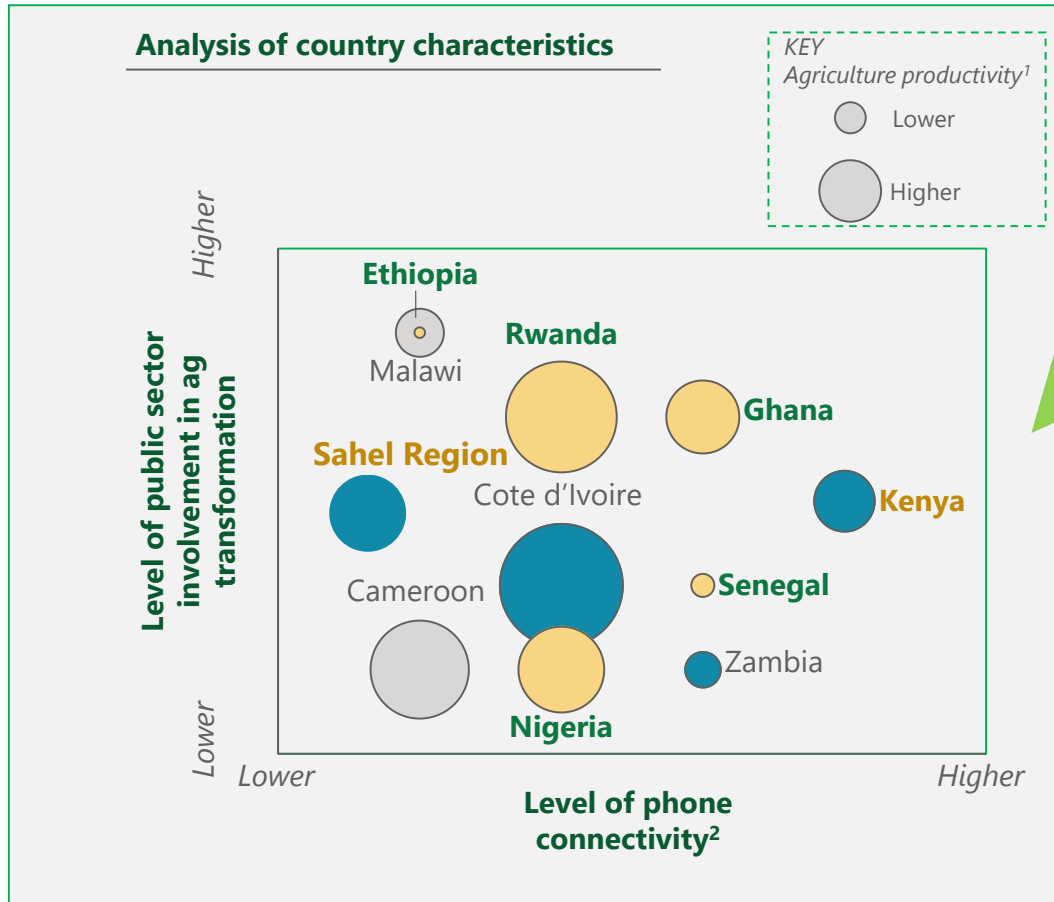
Farmer registries  
Transaction registries  
Soil maps  
Weather / climate data  
Remote sensing data sets (satellite, drone)  
Pest & disease surveillance data  
Field agronomy (e.g., field trial) data

### Proposed Approach

- Primary literature review
- Deep dive interviews with sector experts (E.g. Microsoft, IBM, Digital Impact Alliance)
- Deep dive in 2-3 tools leveraging cutting-edge solutions



# Country Cases Deep Dives



This selection allows us to examine the deployment landscape across a variety of characteristics:

1. **Challenges:** Experiences a diverse set of barriers limiting the development of the digital ag sector
2. **Digitalization:** Covers different stages along the digitalization and digital ag development trajectory
3. **Ag development:** Have passed through different stages of agricultural transformation
4. **Private- or public sector led:** Are supported by either a strong private sector, a strong public sector, or a mix between the two





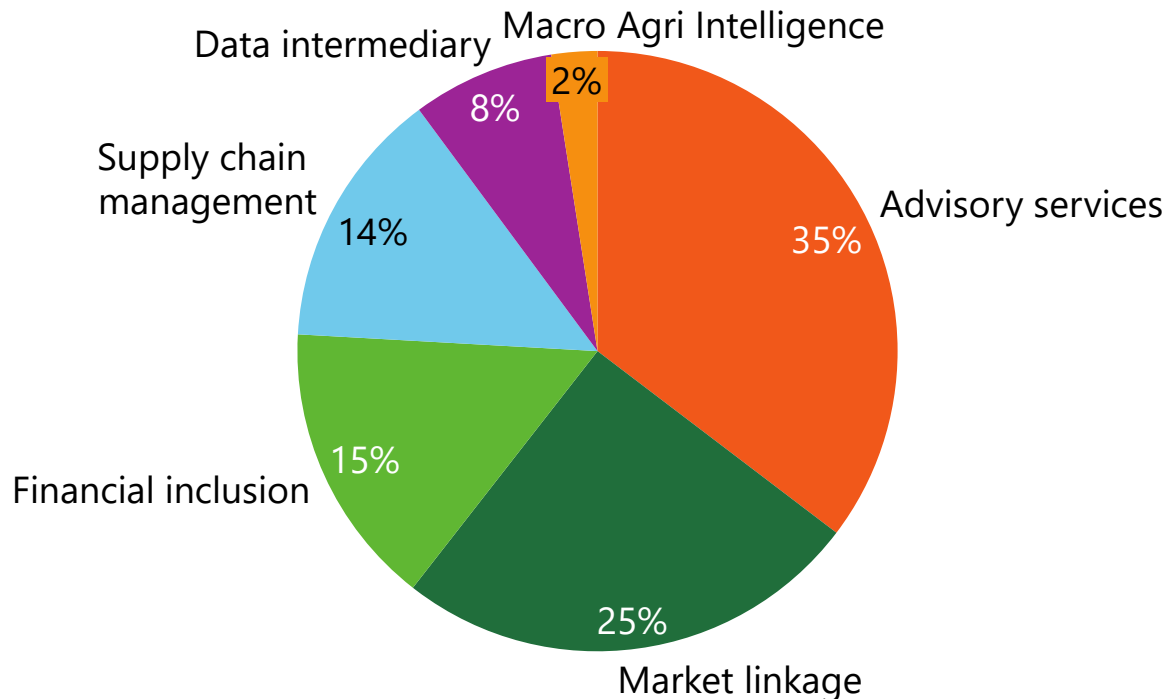
# Preliminary findings – Current State of D4Ag Sector



# We identified 365 D4Ag solutions operating across the 5 key use cases

**Preliminary For  
Discussion Only**

365 operational D4Ag solutions, by primary use case  
EOY 2018



## INCLUDED D4Ag SOLUTIONS

- This excludes 60+ defunct D4Ag solutions also tracked in our database
- Includes data intermediaries (e.g., soil data, weather data, satellite data) that focus on multiple downstream use cases

## ACROSS FIVE KEY USE CASES

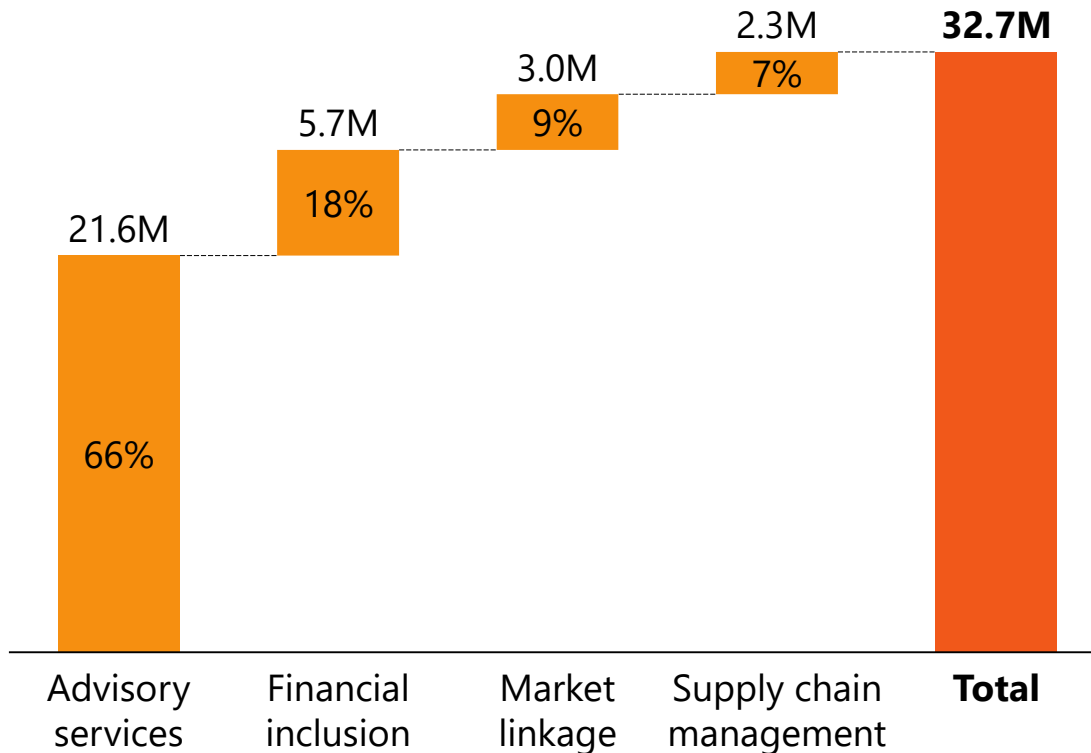
- Bundling across use cases has become increasingly popular
- Advisory services remain most prevalent, with market linkage catching up
- Data intermediary is not a use case; it includes data collection, curation, and analytics—which enables D4Ag application layer



# D4Ag touches ~33M smallholders, a 13-35% market penetration

**Preliminary For  
Discussion Only**

Smallholders registered, by primary use case  
*Millions of smallholders, EOY 2018*



**Note:** This count excludes solutions with indirect reach, such as FarmRadio and Agribusiness TV which reach tens of millions of farmers as well as government-to-farmer or business-to-farmer digital payment solutions



## METHODOLOGICAL CONSIDERATIONS

- This estimate counts users that may be households or individuals using the same device
- It may include duplicated users (e.g. one farmer using two distinct solutions)
- It includes users of passive solutions (savings accounts) and active solutions (market linkage apps) though use has different implications in these cases

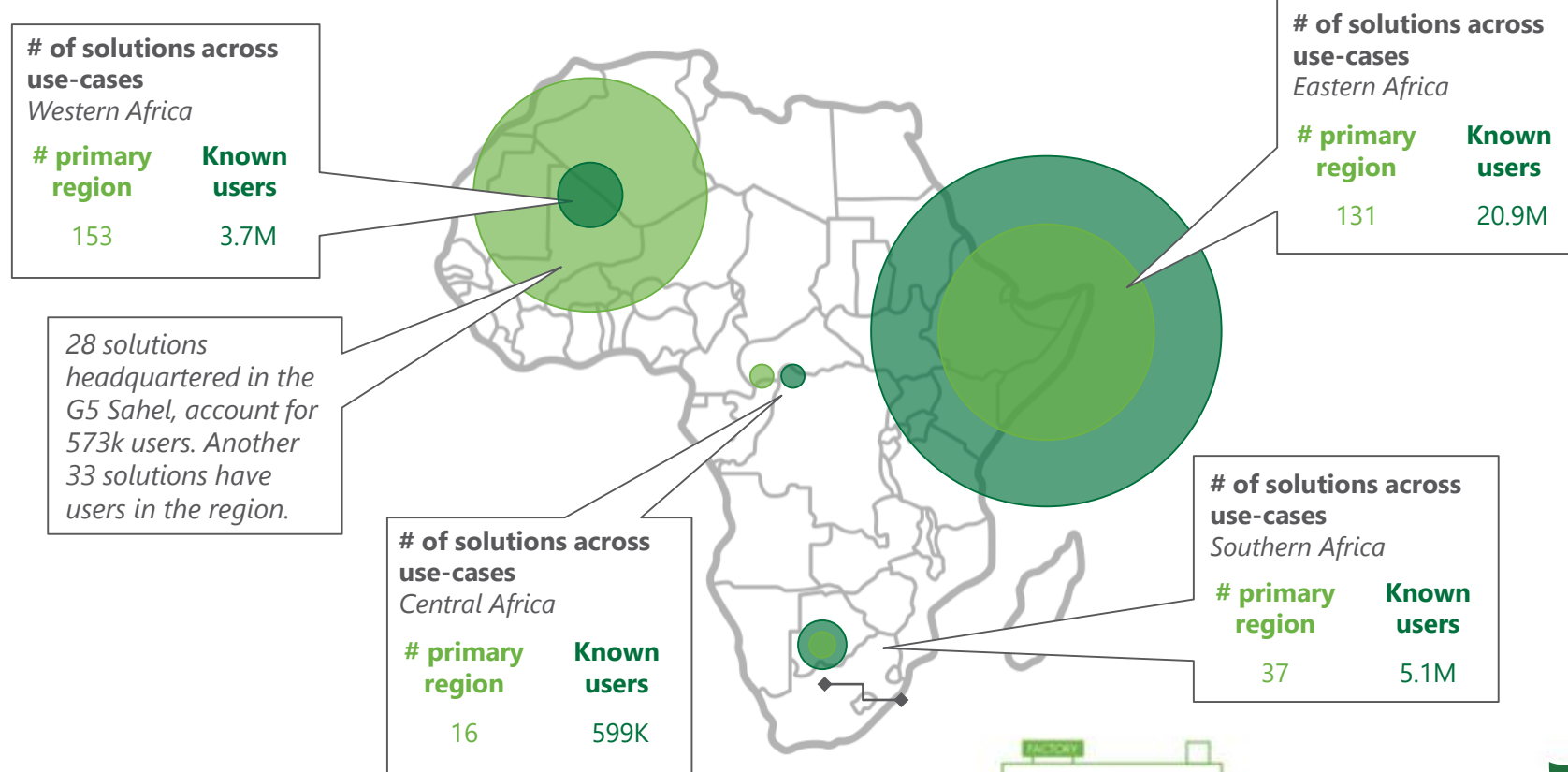
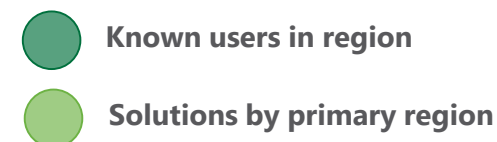
## TO APPROXIMATE PENETRATION

- Total addressable user base could range from 92M (42M SHF households plus 50M pastoralists) to 250M (190M SHF individuals plus 60M pastoralists)<sup>1</sup>
- Therefore, D4Ag penetration could range from 13% to 35%



# Solutions span the continent, but East Africa has largest user base

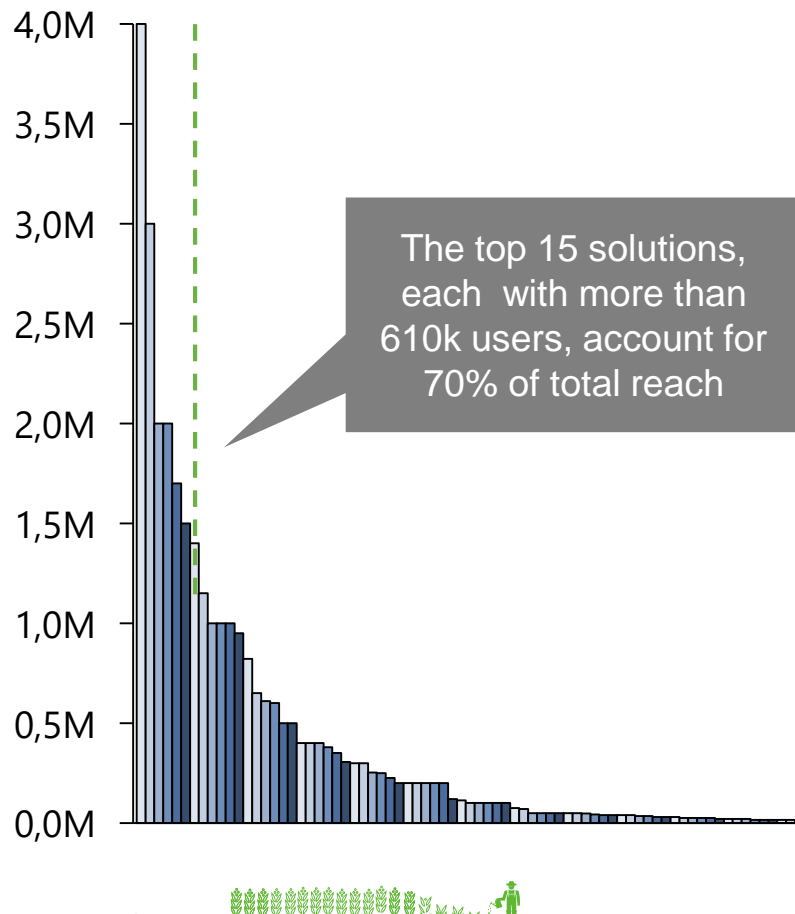
## Solutions and users by region EOY 2018



# Solutions range widely in size; top 15 solutions reach 70% of users

**Preliminary For Discussion Only**

Smallholders registered, by solution  
Millions of smallholders, EOY 2018



## TOP 15 SOLUTIONS, BY REGISTERED USERS

	Solutions	Registered users	Primary use case
1	Ethiopia 80-28 hotline	4,000,000	Advisory services
2	MNO focused player	3,000,000	Advisory services
3	Agribus. Digital Framing Platform	2,000,000	Advisory services
4	Farmer connectivity platform	2,000,000	Advisory services
5	AcreAfrica	1,700,000	Financial inclusion
6	Bank of Kigali / Ethiopia Gov't	1,500,000	Financial inclusion
7	WeFarm	1,400,000	Advisory services
8	ZIAMIS	1,150,000	Advisory services
9	Digital Farmer Service	1,000,000	Advisory services
10	Econet EcoFarmer (Zimbabwe)	1,000,000	Advisory services
11	Safaricom Digifarm (Kenya)	950,000	Market linkage
12	iCow	821,800	Advisory services
13	Precision Agriculture for Development (PAD)	650,000	Advisory services
14	Pula	611,000	Financial inclusion
15	Digital Green	500,000	Advisory Services

Solutions



Note: This slide excludes solutions with indirect reach as well as intermediary solution providers whose reach is duplicated by their farmer-facing delivery partners. Source: CTA database; Dalberg analysis

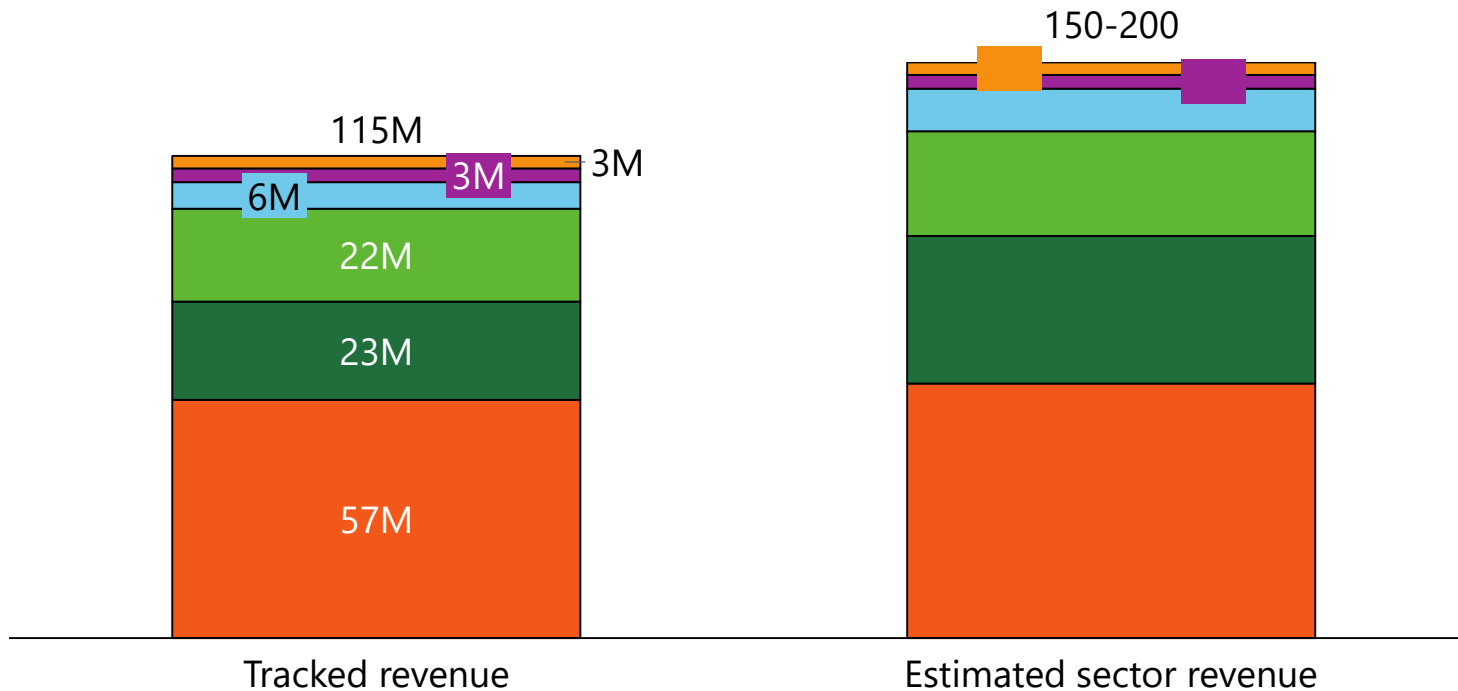


# Annual D4Ag sector revenues in Africa are near USD ~140M ...

**Preliminary For Discussion Only**

## Solutions and users by region USD, EOY 2018

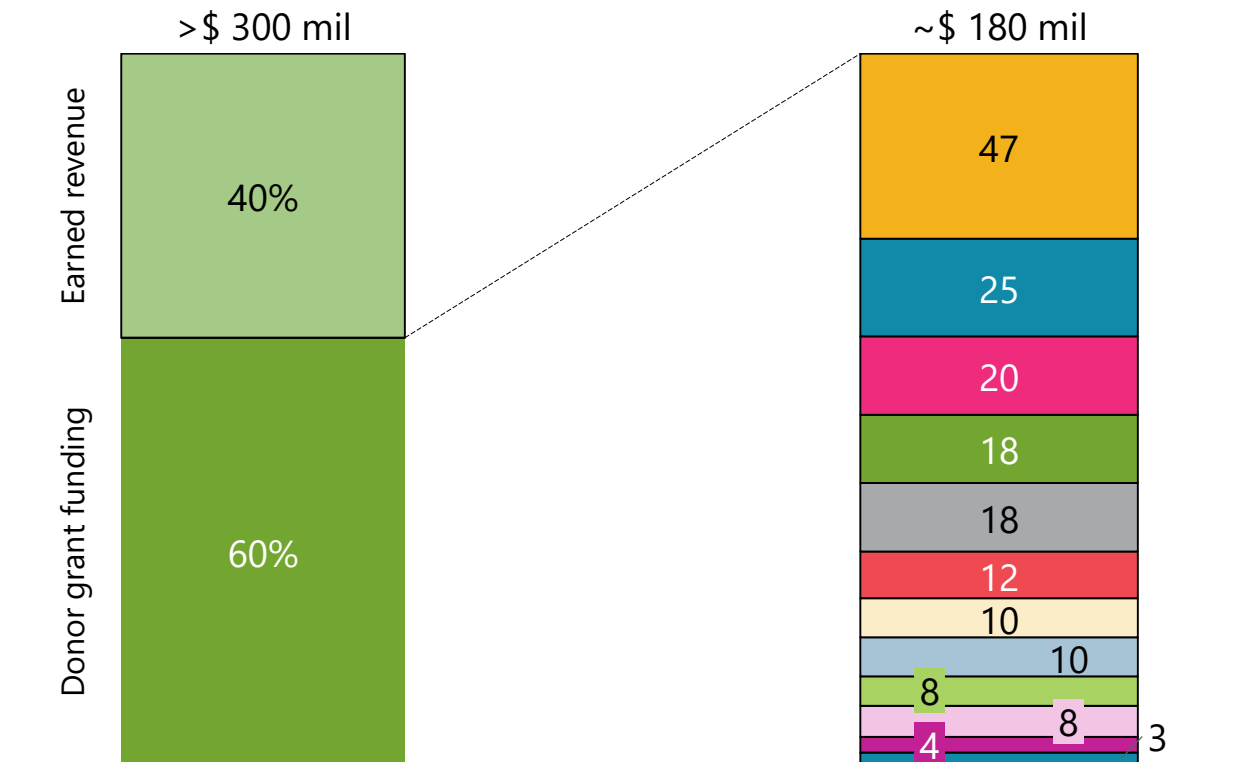
- Advisory services
- Macro Agri Intelligence
- Data intermediary
- Market linkage
- Financial inclusion
- Supply chain management



# ... paired with substantial grant funding from donors

**Preliminary For Discussion Only**

## Estimated annual D4Ag funding USD, Sub-Saharan Africa, 2018

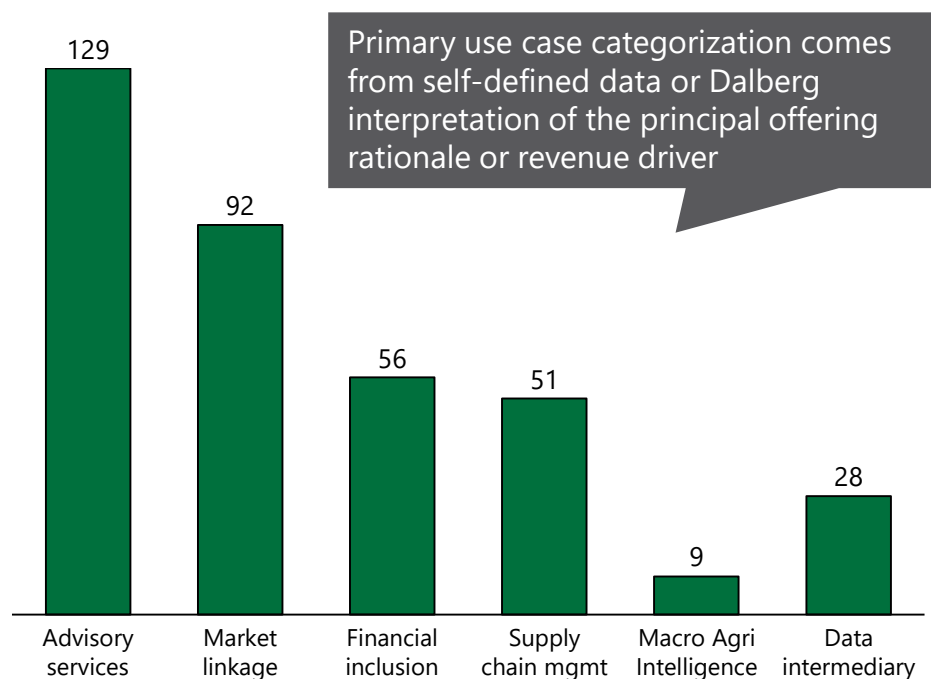


### Top global D4Ag funders

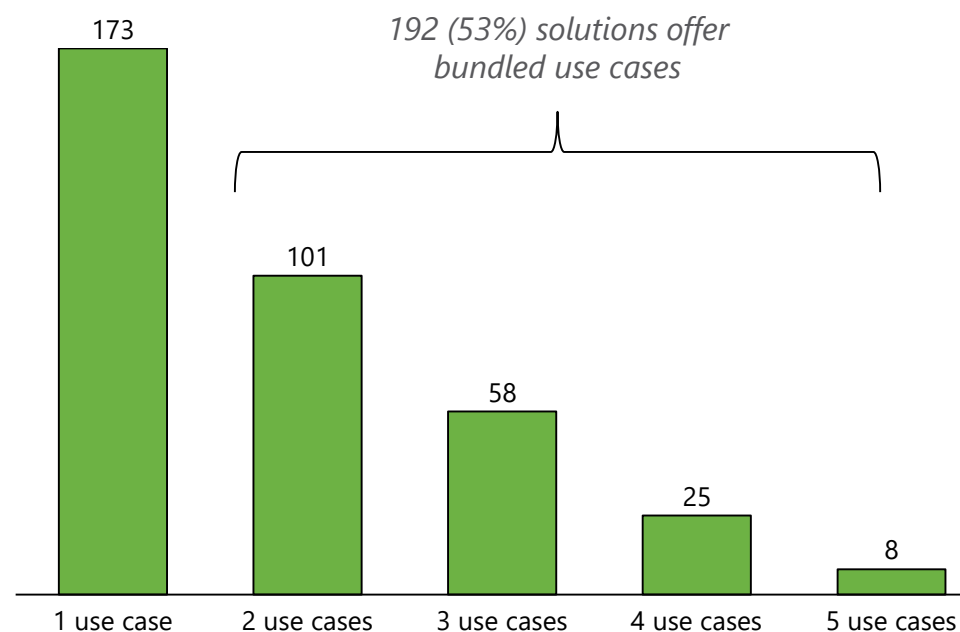


# Most solutions appear to focus on advisory services, but this belies bundling across use cases

**D4Ag Solutions by primary use case**  
*# of solutions, EOY 2018*

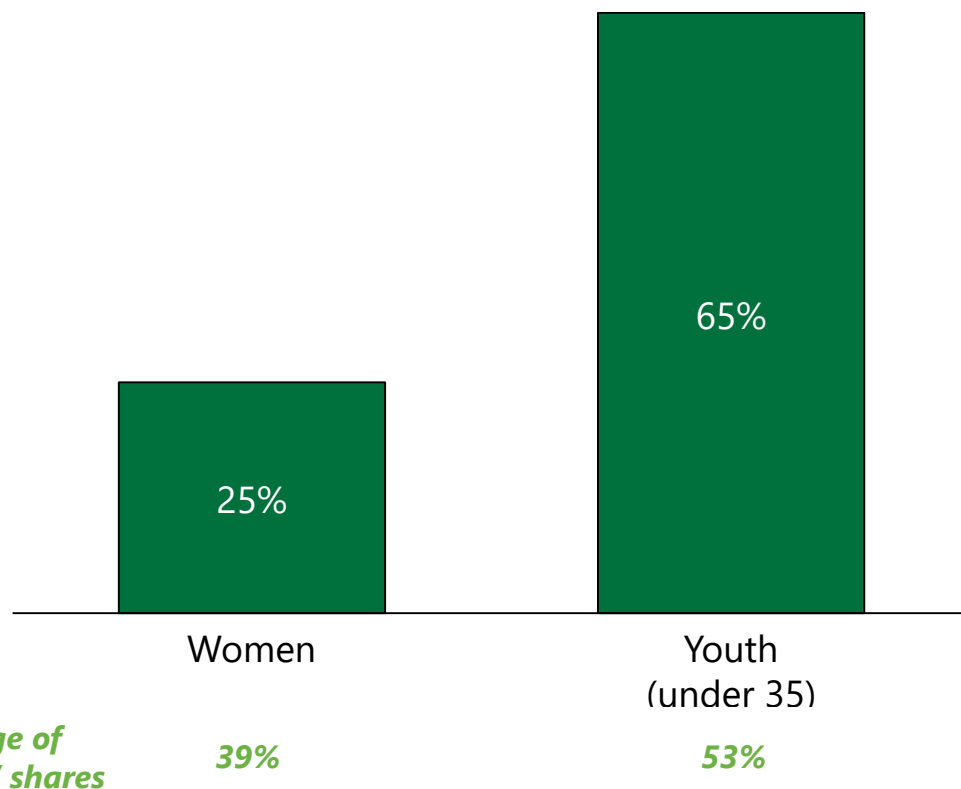


**D4Ag Solutions by # of use cases offered**  
*# of solutions, EOY 2018*



# While women are underrepresented among users, solutions succeed in attracting youth

## Share of users that are women and youth EOY 2018



## Considerations

### Women:

- 25% share is consistent with data from large solutions indicating lower reach to women versus 40-50% of women who are SHFs in SSA
- Larger solutions, particularly those deployed by MNOs, may struggle to register women; by contrast, smaller, women-focused solutions can succeed in bucking the trend

### Youth:

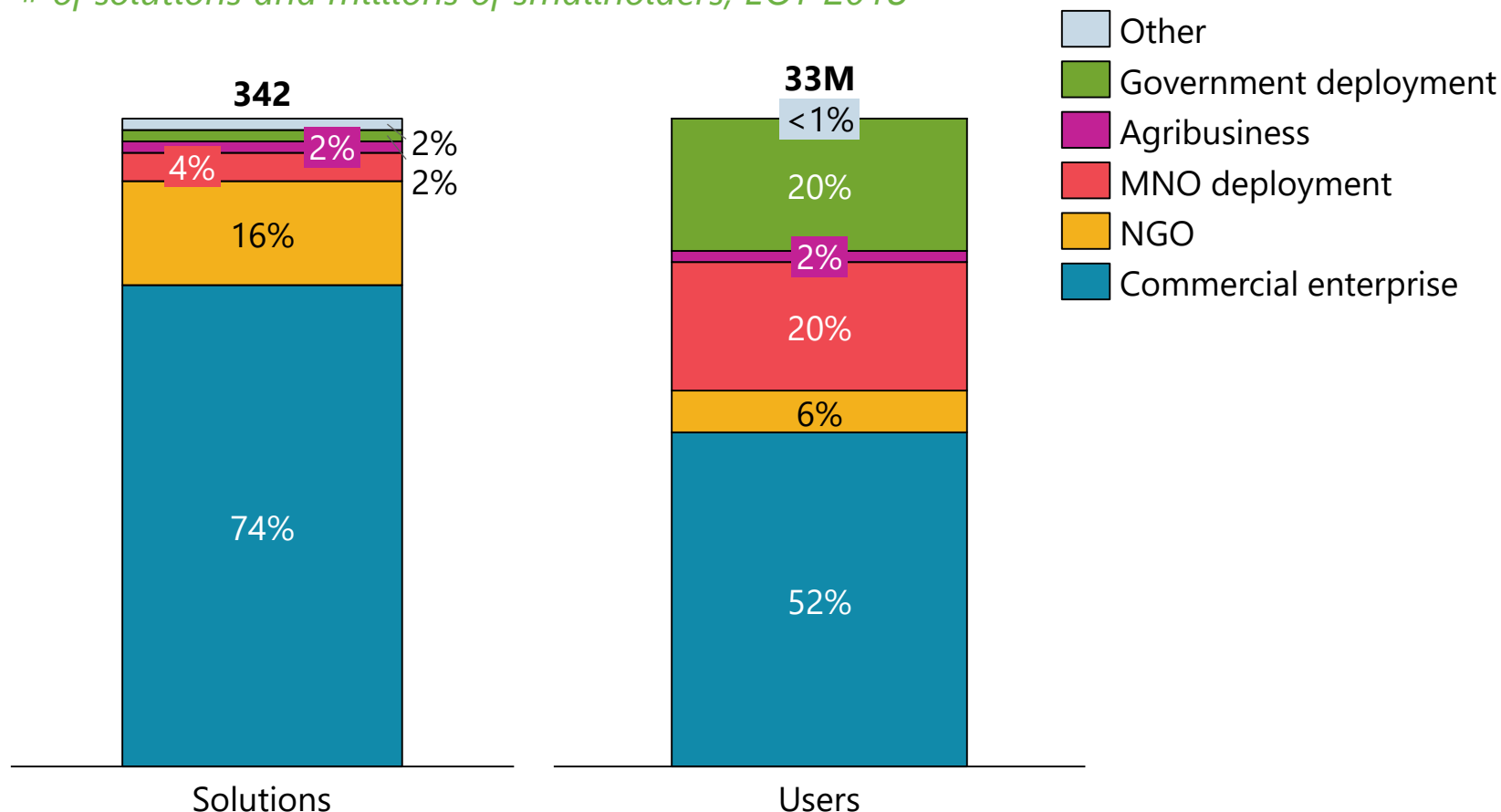
- Solutions generally succeed in engaging young people
- The high share of youth may indicate that solution access and use proves difficult for the average SSA farmer (aged ~60)



# Though small in number, government and MNO deployments demonstrate significant reach

## Smallholders registered by D4Ag solutions, by solution type

*# of solutions and millions of smallholders, EOY 2018*



**Note:** Viamo here is considered as part of MNO calculation

Source: Dalberg analysis



# Users are concentrated among top solutions

## USER SHARE OF TOP 5 SOLUTIONS, BY USE CASE

<b>Advisory services</b>	57%
<b>Financial inclusion</b>	87%
<b>Market linkage</b>	64%
<b>Supply chain management</b>	73%

## METHODOLOGICAL CONSIDERATIONS

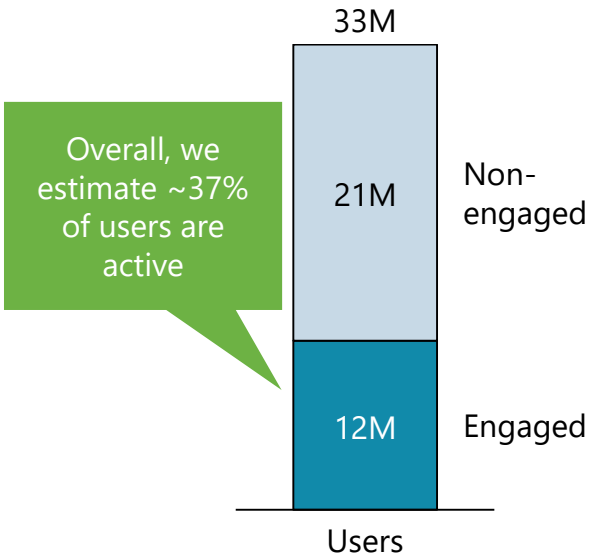
- Solutions range widely in size of user base, with long tail seen on slide 9
- We also see this concentration of users among top solutions within each use case
- Financial inclusion has the biggest skew—likely due to regulatory hurdles enterprises must jump to enter market



# Broad use ranges suggest model variance and measurement challenges

## Estimated share of engaged users, by use case EOY 2018

Use Case	Average of shares	Average share	Minimum	Maximum
Advisory services	55%	35%	2%	100%
Financial inclusion	44%	11%	10%	95%
Market linkage	63%	41%	15%	100%
Supply chain management	69%	96%	5%	100%



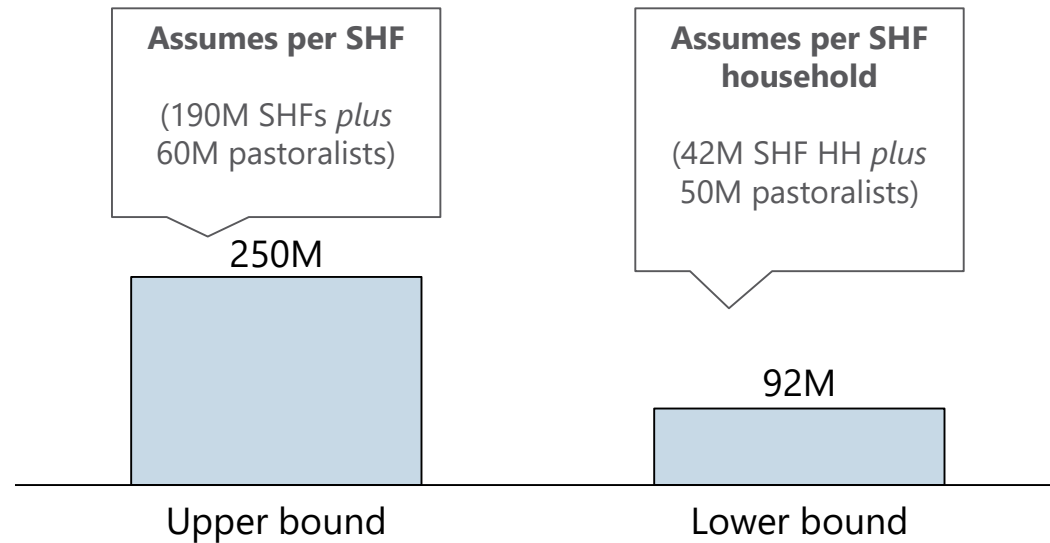
### Methodological considerations

- Definitions of “active” or “engaged” users lack standardization or consistency across use cases and they are not transparent or comparable; an “active” financial user might have money in a savings account while an “active” market linkages user might report prices each day
- Surveyed solutions reported both self-defined “active users” and “users active at least once a month”; the self-defined figure was *less* than the monthly figure, suggesting that solutions define “active” reasonably
- Accepting the ambiguity in definition and meaning, we estimate that ~37% of users are “**engaged**,”; they are more than names in solutions’ registries, and actually engage with the tool, product, or service



# Overall D4Ag penetration of SHFs ranges from 13% to 35% depending on definition of the market

D4Ag Penetration by assumption, for total and each primary use case  
EOY 2018



Total reach	32.7M	13%	35%
Advisory services	21.6M	9%	23%
Financial access	5.7M	2%	6%
Market linkages	3.0M	1%	3%
Supply chain	2.3M	1%	3%



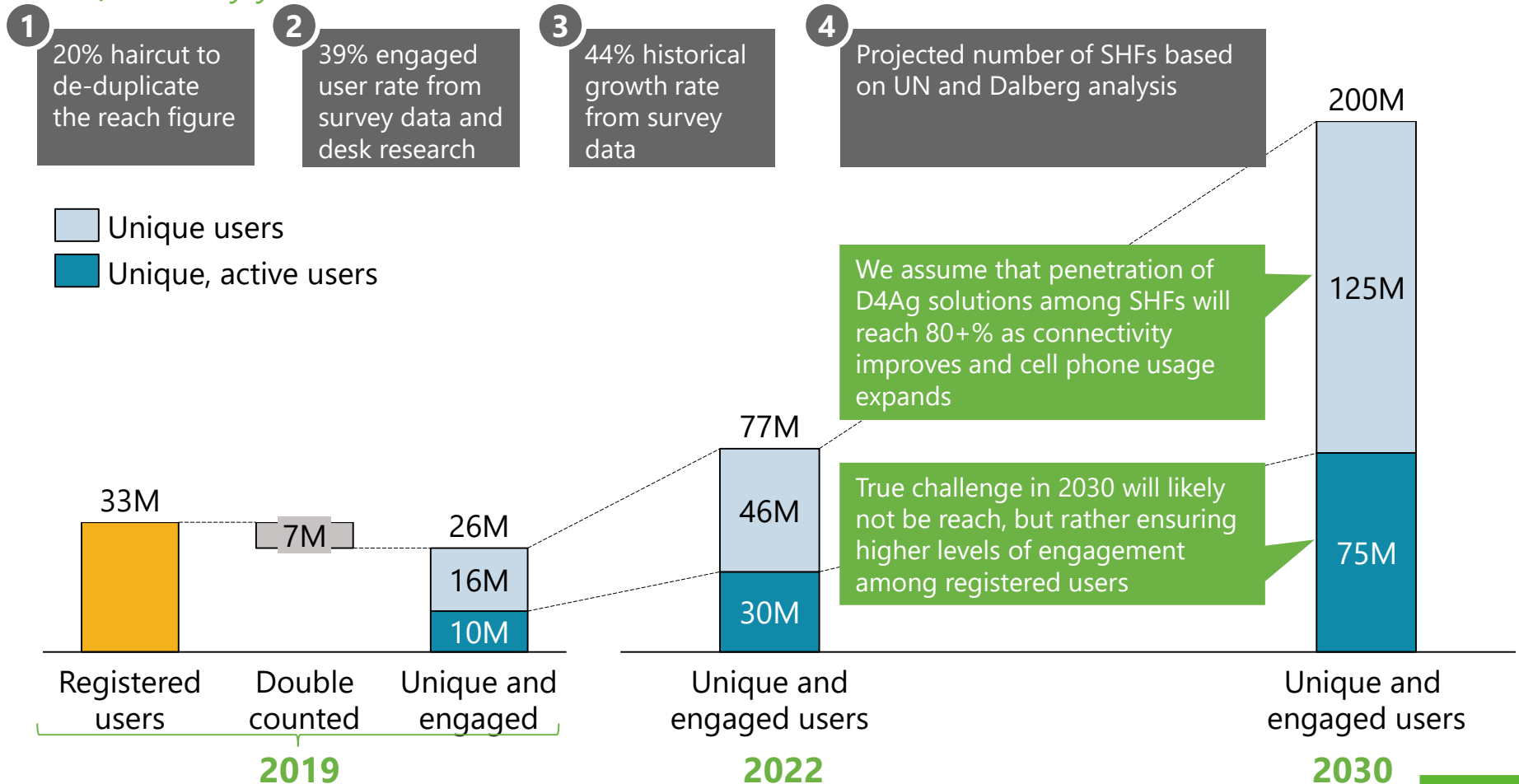
# Preliminary findings – Looking forward (5-10 years)



# Where is the sector heading?

## Projected unique and active users in 2022 and 2030

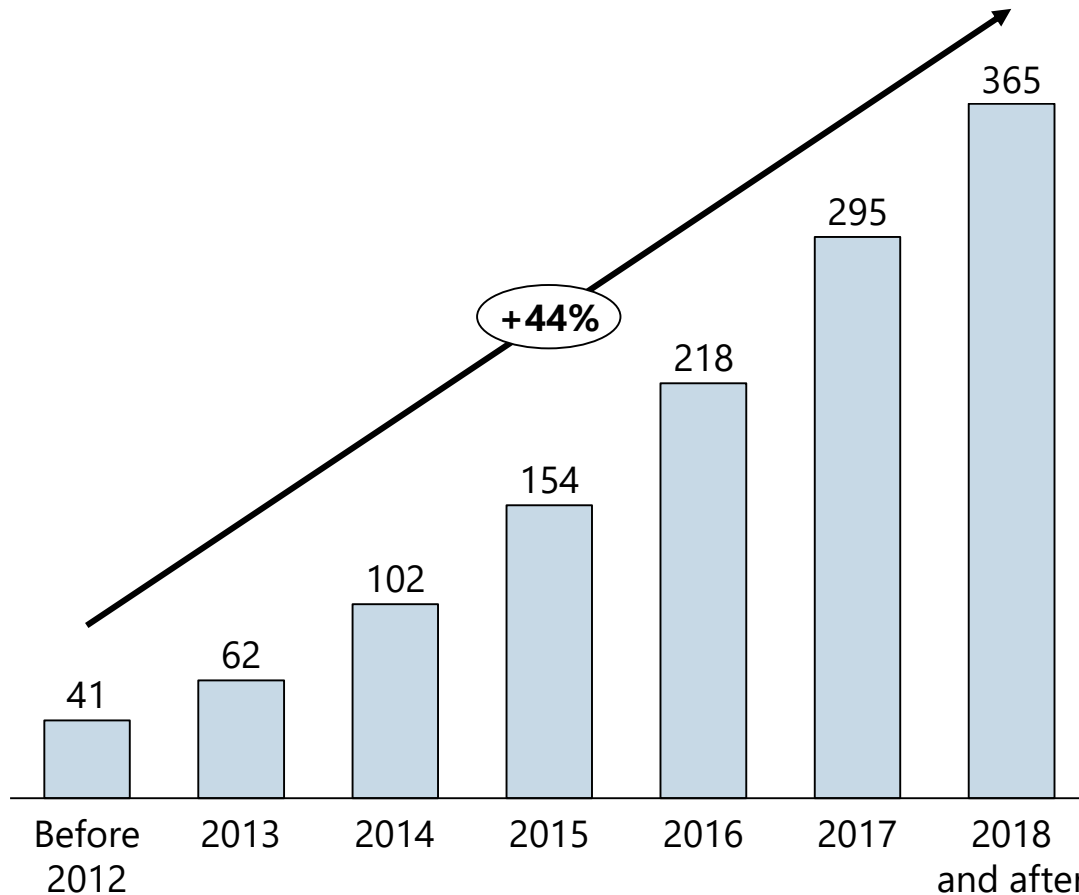
*# of users, by year*





# Industry growth is dynamic: number of solutions has increased at a 44% CAGR over the last 6 years

## Number of solutions, by year *# of solutions*



### Considerations

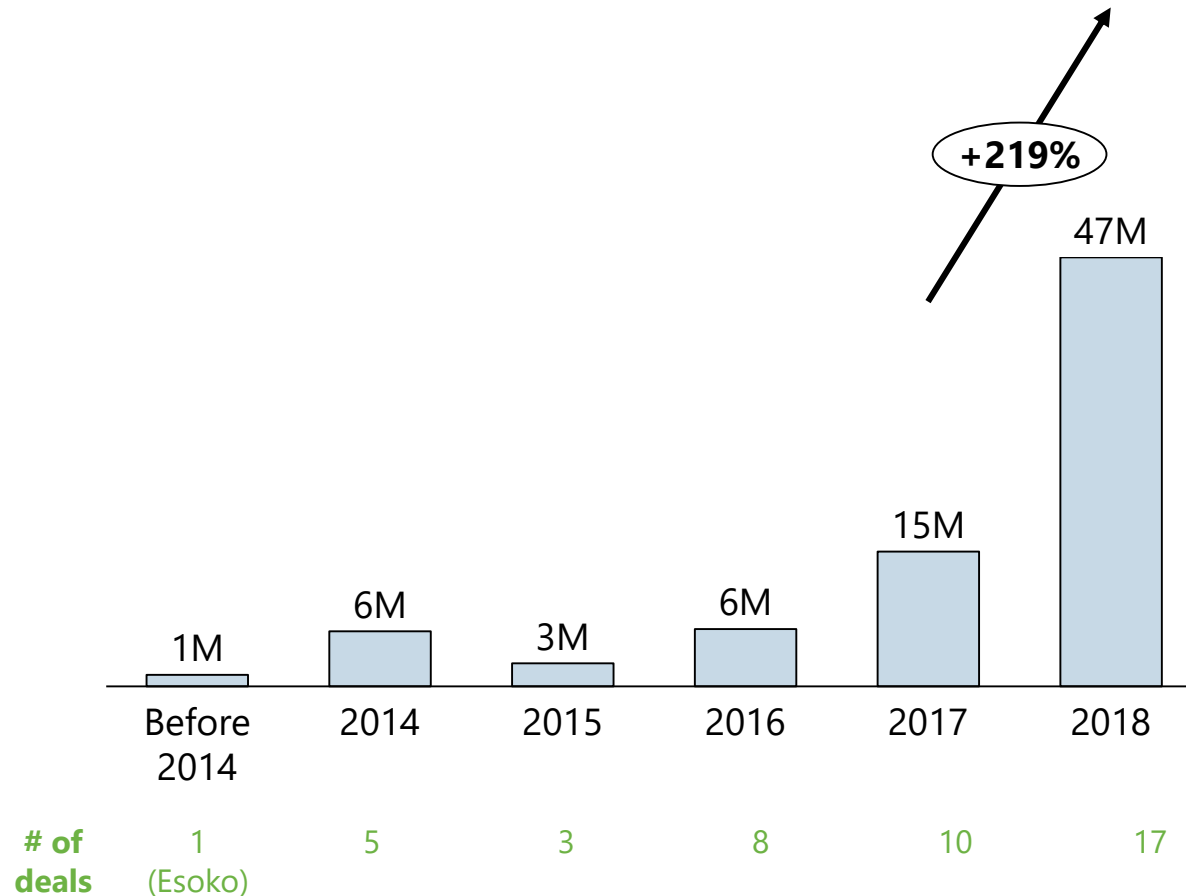
- Surveyed solutions operational since 2015 reported 44% annual growth in registered users over the past three years
- Surveyed solutions projected 54% user growth annually over the next three years



# The industry's dynamism is also reflected in rapidly growing investment into the space

## Value and volume of VC and PE agtech deals in sub-Saharan D4Ag

USD M and # of solutions

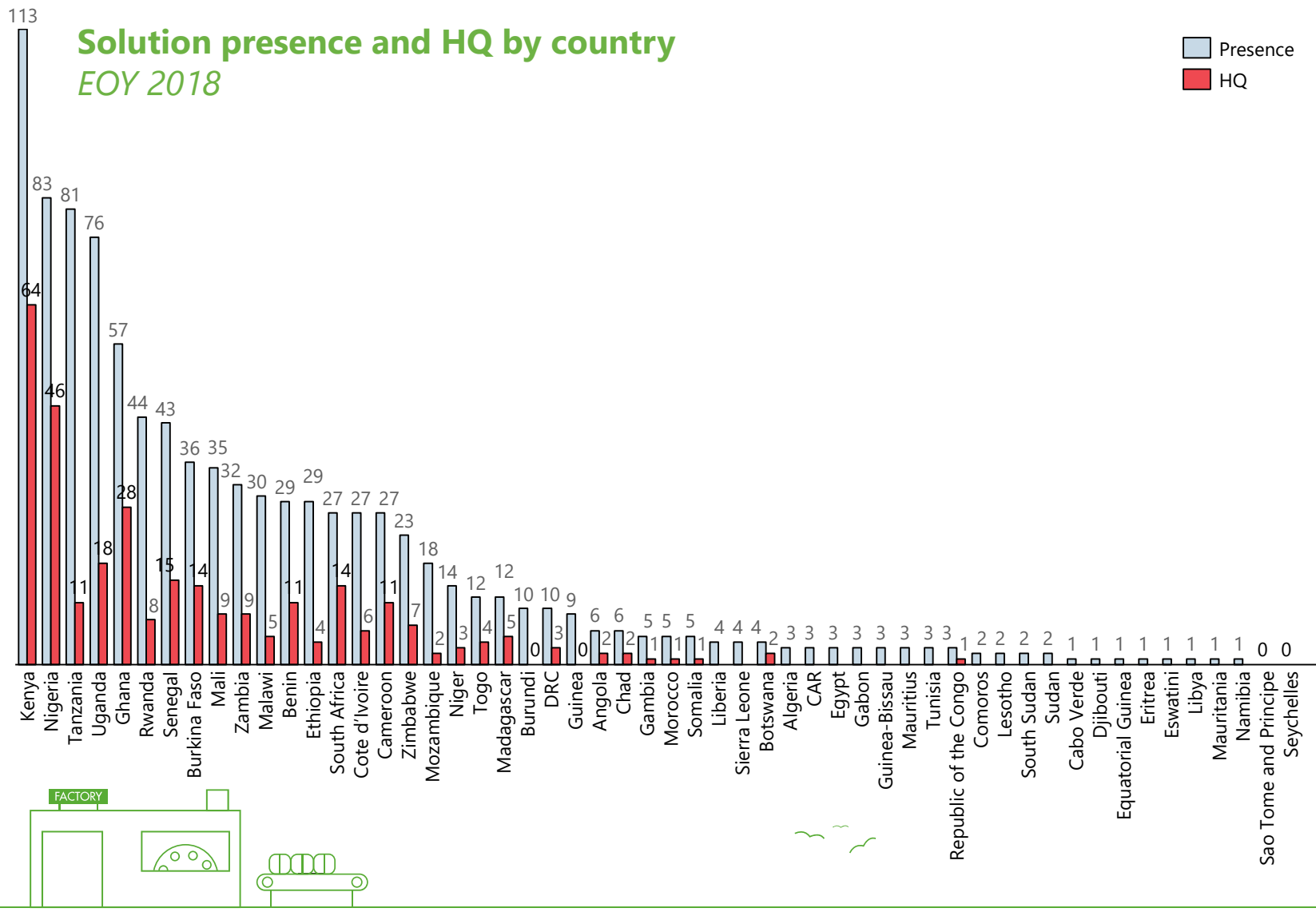


### Considerations

- D4Ag investments represented ~14% of the 335M+ invested in African tech startups in 2018\*
- African D4Ag investments represented only ~2-7% of the ~700M - 2.3B invested in agtech startups globally in 2018\*\*



# There are several countries that represent growing hubs of activities



# Preliminary findings – Implications for Ag transformation



# Some identified gaps (I/I)

## TRANSLATING POTENTIAL OF D4Ag INTO REALITY EQUITABLY



### Middleware and human capital development

- Functional middleware (e.g., ag data platforms, farmer IDs) include marginalized groups, facilitate modular construction, and enable solutions to scale
- Strong local ICT skills provide foundation for D4Ag launch and growth



### Aggregator networks

- Aggregator networks integrate women, youth, smallholders, and climate-vulnerable people — the conduit to D4Ag
- 'Regional blocs' accelerate D4Ag in nascent countries



### Enterprise business models and value add

- 'Data revolution' increases value add for farmers, as solutions better understand users
- Sustainable business models continue to prefer charging value chain actors to farmers



### Impact orientation

- Impact evaluations inform solution design and improvement
- Needs of marginalized groups receive unique consideration



### Data stewardship

- Robust rules and policies center on user privacy, security, and consumer protection



# Gaps and opportunities for path forward (1/2)



Funding by donors  
and private sector  
to scale D4Ag  
successes



Middleware  
ecosystem,  
particularly agri  
data infrastructure



Human agent  
networks to  
support digital  
impact



Bundling of D4Ag  
capabilities via  
platforms



Diversity of  
channels (B2B and  
B2F) to get to  
D4Ag impacts



Ag data policy &  
regulation  
(privacy, security)



# Gaps and opportunities for path forward (2/2)



**Impact  
measurement  
(large scale,  
standardized  
impact data  
collection)**



**D4Ag startup  
ecosystem  
(incubation,  
acceleration,  
VC/PE)**



**Digital Dev't & Data  
Analytics Skills  
(education &  
training  
infrastructure)**



**D4Ag market  
intelligence  
(trackable  
baseline)**



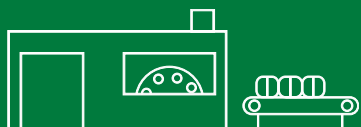
**Ecosystem  
coordination to  
avoid duplication,  
promote  
partnerships, etc.**



**Best practices and  
lessons on  
business models**



# DELIVERING IMPACT



## 30% BOOST IN INCOME

Based on self-reported data and impact studies conducted by D4Ag enterprises, advisory services see 10-70% increase in incomes and market linkages see 8-70%; both average to 30%

## 65% YOUTH

On average respondents' user bases were mostly under age 35



## 500K new jobs

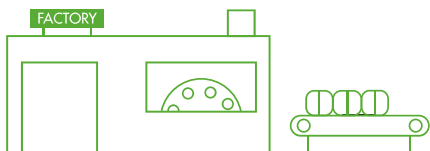
Strong D4Ag solutions enable the scaled buildout of low cost agent networks (e.g., 1:200 farmers), big new jobs driver; SHF jobs will be upskilled and higher quality

## 300% BUNDLED MODELS

Bundled models report yield increases of up to 300%<sup>1</sup> but even more achievable 30-100% yield impact with wide adoption

## <25% WOMEN

On average respondents reported women comprise only a fourth of users. Overall share of women reached is likely even lower<sup>2</sup>





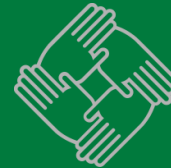
# Linking our findings to the emerging D4Ag EU framework



## Skills in digital agriculture

**49%**

Nearly half of surveyed solutions cited human resources as a challenge; agribusiness likewise identifies skills as top obstacle to integration of technology into their value chains in Africa



## Collaborative research platforms

**97**

Almost 100 partners in public and private sector across regions joined CGIAR's Platform for Big Data in Agriculture, and exemplars of data-driven ag have prioritized partnerships



## Regulatory framework

**44%**

44% of surveyed solutions reported government policy as a challenge, and countries with digital friendly regulations (e.g., mobile money) have attracted more D4Ag activity



## Integration of digital technologies in ag

**33 million**

Digital tools (360+ plus solutions) touch 13-35% of SHFs in Sub-Saharan Africa, and reach grows rapidly as enterprises expand to new geographies and leverage increased connectivity



## Access to digital solutions in business services

**80+**

80+ D4Ag solution providers in Africa focusing their work on agribusiness (e.g., supply chain management ERP solutions) with big tech increasingly engaged (MSFT, SAP, IBM, Google)



## Data collection, processing & storage

**60%**

Most surveyed solutions expect to integrate advanced technologies (e.g. drones, VR, blockchain, IoT, big data, AI) in next 3 years; we believe data will be the key to transform reach into impact



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# Wide range of underlying D4Ag models and players

## Advisory Services

Participatory



Farm mgmt. software



Farmer info services



Precision ag advisory



MNO VAS



## Market Linkage

End-to-end Integrated



E-commerce



Shared econ. / PAYGO



Offtake or input link



Mkt places



## Supply Chain Management

Traceability



Supply chain mgmt ERP



Logistics platforms



## Financial Inclusion

Payments



E-wallets



Fin analytics



Crowd-farming



Insurance



## Macro Agri Intelligence

AG OBSERVATORY



# Expert Interviews Conducted, by Category (1/2)

Category	Organization	Name	Title
Agribusiness	NUCAFE	David Muwonge	Deputy Executive Director
	Syngenta Foundation	Robert Berlin	Head Agricultural Services, digital delivery and country programs
	Tulaa	Hillary Miller-Wise	CEO
	Yara International	Elisa Minischetti	Senior Manager: Market Intelligence and Strategy, Digital Farming
Deployment	Apollo Agriculture	Eli Pollak	CEO
	Cellulant	Bolaji Akinboro	CEO
	Digital Green	Karin Lion	VP, Strategy
		Shreya Agarwal	Deputy Director, Strategy
	Farm to Market Alliance	Ananth Raj	Digital lead
	FarmCrowdy (Nigeria)	Onyeka Akumah	Co-founder and CEO
	G4AW	Ruud Grim	Senior Advisor - G4AW
	Ignitia	Liisa Smits	Founder, Managing Director
	Mareco LTD	Yaron Cohen	Founder and Director of Mareco LTD
	SigFox	Hussain Suleman	Country Director East and Southern Africa
	SourceTrace	Venkat Maraju	CEO
	SowlIt	Hamza Rkha Chaham	Found and CEO
	WaziHub	Paul Wechuli	Researcher of IoT at Strathmore University
	AfDB	Jonas Chianu	Chief Agricultural Economist
	FMO	Saskia Vossenbergh	Senior Advisor & Researcher Gender, Financial Inclusion and Women's Entrepreneurship
	GIZ	Christian Merz	Senior Advisor
		Mutembei Karakui	Make-IT in Africa (Project Lead - Digital 4 Agriculture Program)
Donor	MasterCard Foundation	Mikael Hook	Director of RAFL
		Clara Colina	Program Manager at The Global Development Incubator

# Expert Interviews Conducted, by Category (2/2)

Category	Organization	Name	Title
<b>Donor (cont.)</b>	PAD	Heiner Bauman	Managing Director
	USAID	Katie Hauser	Acting Team Lead, Digital Development for Feed the Future
		Karl Wurster	Environment and Energy Team Leader
	WFP	Bernhard Kowatsch	Global Lead of WFP Innovation Team
	World Bank	Jeehye Kim	Agricultural Economist
		Luda Bujoreanu	Senior Program Officer - Identification for Development Initiative (ID4D)
<b>Investor</b>	AgDevCo	Sandi Roberts	Head of Smallholder Development Unit
		Rob Fuller	Senior Agricultural Adviser
	REDDs Capital	Stephen Ibaraki	Managing General Partner
	VC4Africa	Ben White	Founder
<b>Technology</b>	aWhere	Stewart Collis	Former CTO
	GSMA mAgri	Natalia Pshenichnaya	Head of mAgri Programme
	IBM	Selina Kim	Blockchain marketing - IBM Foodtrust
	Microsoft	Ranveer Chandra	Principal Researcher in IoT solutions



# Completed Country Case Studies: Ethiopia & Nigeria

## Ethiopia Country Case Study

Organization	Name
Agriterra	Marco Streng
Apposit (formerly ATA)	Elias Gossaye
Arable Labs	Levon Minassian
ATA	Elias Nure
CommonSense project	Tomaso Ceccarelli
	Amare Mugoro
Digital Green	Kebede Ayele
Farm Africa ET	Asaye Asnake
Gebeya	Bekure Tamirat
Interaide	Getamesay Demeke
International Livestock Research Institute/ Index Based Livestock Insurance	Masresha Taye
Meki Batu Union	Girma
MOSS ICT/ M-BIRR	Ethan Laub
	Melat Mebratu
ScopeInsight	Marise Blom
Viamo	Brook Ashinne

## Nigeria Country Case Study

Organization	Name
AFEX	Ayodeji Balogun
Binkabi	Andrew Nevin
Cardinalstone Partners	Shirley Somuah
Cellulant	Bolaji Akinboro
Chemonics	Ilisa Gertner
Dangote	Aliyu Suleiman
DFID	Andrew Gartside
FarmCenta	Ademola Akinyemi
FarmCrowdy	Ifeanyi Anazodo
Hello Tractor	Van Jones
Releaf	Ikenna Nzewi
Technoserve	Ayokanmi Ayuba
VIAMO	Harriet Blest
Zenvus	Ndubuisi Ekekwe

# Completed Country Case Studies: Senegal & Rwanda

## Senegal Country Case Study

Organization	Name
ANIDA	Amsata Niang
APIX	Papa Samba Diop
Bayseddo	Mamadou Sall
Dimagi	Codou Ndiaye
EU Delegation	Stephane Devaux
GIS Association	Khalifababacar SARR
IFC	Anne Bastin Ndiaye Tiphaine Crenn
Institut Sénégalais de Recherches Agricoles (ISRA)	Mr MBAYE Birame Seck
PRODAC	Diouf Mamadou Coumba
Sooretul	Awa Caba
UNCDF	Waly Clement Faye Serge Mounghanou
World Bank	Farah Dib Anelyia Muller

## Rwanda Country Case Study

Organization	Name
Agriterro	Nicole Ihirwe
	Jasper Spikker
EU Delegation	Arnaud de Vanssay
FAO	Angelique Uwimana
Holland Greentech	Justine Mucyo
IDH	Sylvie Nirere
IFAD	Aimable Ntukanyagwe
IITA	Marc Schut
Kumwe	Alex Sanderson
N-frnds	Jovani Ntabgoba
NYAB	Innocent Mudenge
OneAcreFund	Belinda Bwiza
PSDAG (USAID)	Florien Habinshuti
	Jean Louis Uwitonze

*Ghana Country Case to be completed second week of March*

# Thematic Deep Dives

## Thematic Lens

### Central Question

### Points of Exploration

### Proposed Approach



#### Women in Ag

*How can Digitalization for Ag drive inclusion of women in Africa's agricultural transformation?*

- How included are women in the ag transformation and D4Ag currently?
- What are the risks of failing to include women in Africa's ag transformation?
- What is preventing more inclusion? How can these barriers be removed?
- How could D4Ag, in particular, drive a more inclusive ag transformation (e.g. which use cases, enabling factors)?
- What investments will drive D4Ag's increased inclusion of women?

- Primary literature review
- Interviews with NEPAD, IFPRI, and World Bank regarding current exclusion of women and opportunities for D4Ag to address them



#### Youth and Employment

*How can deployments create agricultural employment opportunities for Africa's large and growing youth population?*

- What are the job creation prospects for youth in Africa's ag transformation?
- What are the risks of failing to create jobs or include youth?
- What evidence exists to suggest that digitalization can create jobs for youth?
- How could D4Ag help the ag transformation address youth unemployment?
- What investments will drive D4Ag-related job creation? What investments will attract youth?

- Primary literature review
- Interviews with Rural Development Ministries, One Acre Fund, and Precision Agriculture on alignment of ag and employment strategies



#### Climate Change Resilience

*How can Digitalization for Ag increase and sustain farm productivity and income despite climate change?*

- How does climate change create or amplify farm vulnerabilities related to productivity and income in Africa?
- What are the risks of failing to address these vulnerabilities?
- How is D4Ag addressing African farms' climate change vulnerabilities?
- How could D4Ag best address these vulnerabilities ((e.g. use cases, enabling factors)?
- What investments will drive D4Ag responses to climate?

- Primary literature review
- Interviews with GODAN and Gates Foundation on existing tools to increase climate change resilience and the role of D4Ag