Change Management in Agriculture to Achieve Smallholder Impact at Scale

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Touch points for smallholder impact at scale

Technology
Seeds, crop protection, mechanization

Risk management
Agronomy, crop mgt, weather solutions, index insurance

Sustainability
Livelihood, grow more with less, climate-smart

Health & Nutrition

Credit
Agri-finance

Youth
Jobs, opportunity, technology

Gender
Equity, access to technology/resources

Community
Cohesion, reciprocity, cooperation

Governance
Law & order, property rights, outlook

Market access
Storage, logistics, information

Services
Extension, credit, connectivity

Enablers of smallholder impact at scale

(... or disablers, as the case may be ...)

Macro-economy

Fiscal, inflation, real exchange rate, business climate

Oil export & Dutch disease

Quality of governance

Input subsidy

Commodity price

Trade & price policy

Incentive distortions, market failures

Public investment

Public goods

Food demand growth

Economic growth

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Framework for thinking about scaling up (1/3)

What is 'scaling up'?

- Uptake of innovations by large numbers of farmers, ultimately through market mechanisms and commercial channels
- Adaptation and expansion of successful policies, programs, approaches or projects in different places and over time to reach a greater number of people

Dimensions of scaling up:

- Quantitative (replication or 'scaling out')
- Functional (broadening scope of activity)
- Institutional (building capacity)
- Political (influencing political processes)
- Partnership based
- Tipping points

Drivers and methods for scaling up:

- Relevant products, solutions
- Leadership and vision of scale
- External catalysts and 'time is ripe'
- Incentives and accountability
- Demo effects (lead farmer, off-taker, etc)
- Sound metrics and M&E (slide 6)

From 'feel-good' successes to recognized, large scale effects:

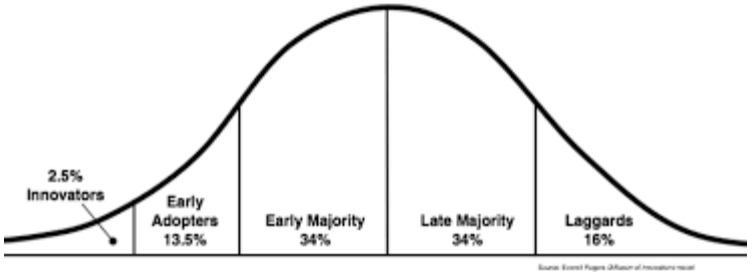
Evaluation of exactly how things scaled or failed to is rare

Adapted from Hartmann and Linn, 2008

Framework for thinking about scaling up (2/3)

Theories:

- Diffusion of innovation
- Induced innovation
- Directed technical change
- Path dependency
- D-driven vs S-driven models
- Role of policy, institutions



Diffusion of innovation theory as an assumed mechanism of scaling up (following Rogers, 2003)

Common determinants of tech adoption by farmers:

- Relevance of product, technology, solution
- Access to
  - Knowledge about it
  - Market opportunities
  - Necessary purchased inputs
  - Financial resources
- Riskiness of technology
- Property rights over natural resources
- Ability to organize collective action
- Household characteristics:
  - Age, gender, farm size
  - Educational level

Is the innovation

- *Credible?*
- *Observable?*
- *Relevant?*
- *Better than current practice?*
- *Easy to transfer and adopt?*
- *Compatible with user's context?*
- *Testable or tried?*

Adapted from Wigboldus and Leeuwis, 2013; Hazell, 2014

Framework for thinking about scaling up (3/3)

Role of metrics:

- Monitor change with reference to baseline
- Create database for following through (farm management and project input-output data; MIS; outcome and impact indicators)
- Enable decision-making, accountability, learning

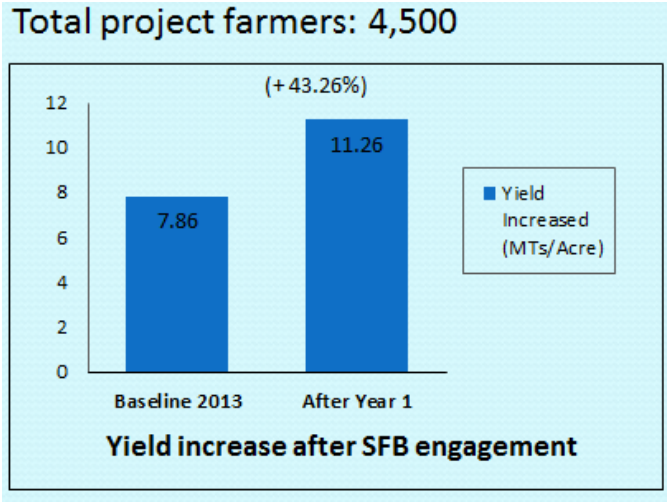
Selected farm- and hub-level indicators to track:

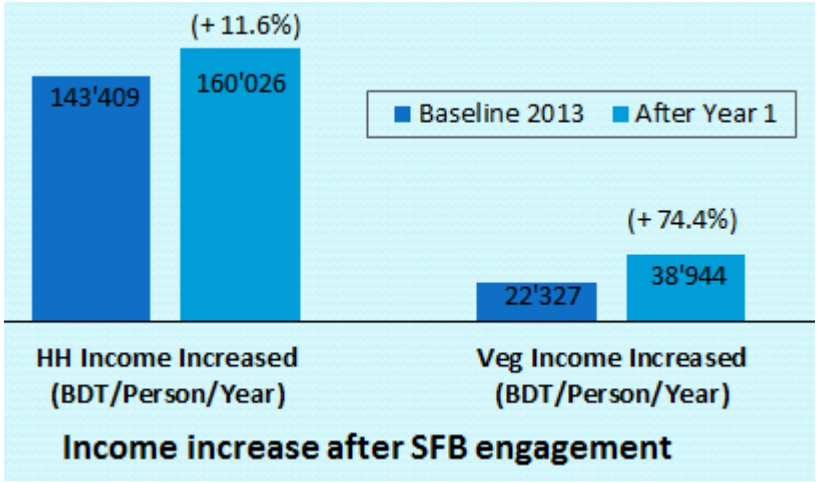
- Production cluster
- Post-harvest handling and sales cluster
- Financial data (costs, input loans, revenue streams, profitability)

SFB's 'mixed-methods' metrics program:

- Desk review; stakeholder surveys
- Household surveys; focus group discussion
- Farmer data base (incl. base line)
- Project MIS
- Monthly monitoring report
- Periodic monitoring report

Syngenta Foundation Bangladesh (SFB): Farmer hubs, veg production for domestic markets 1 year on





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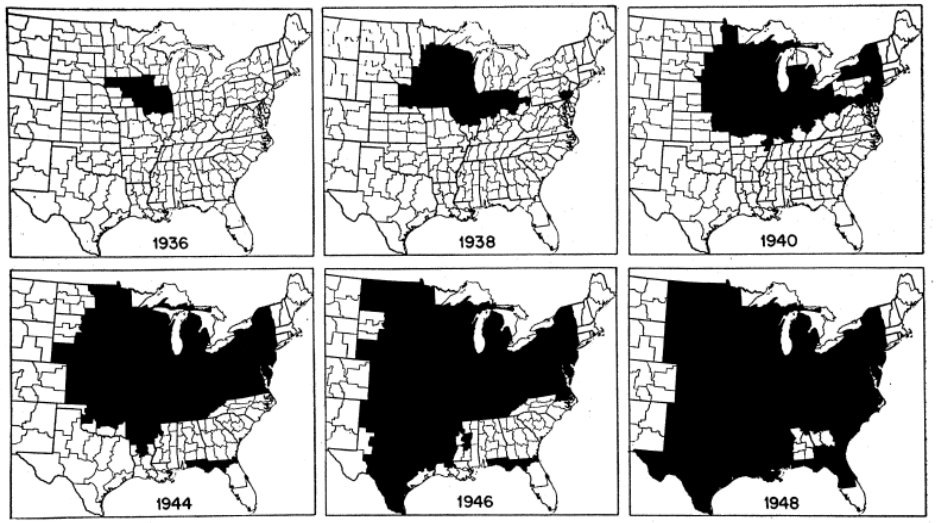
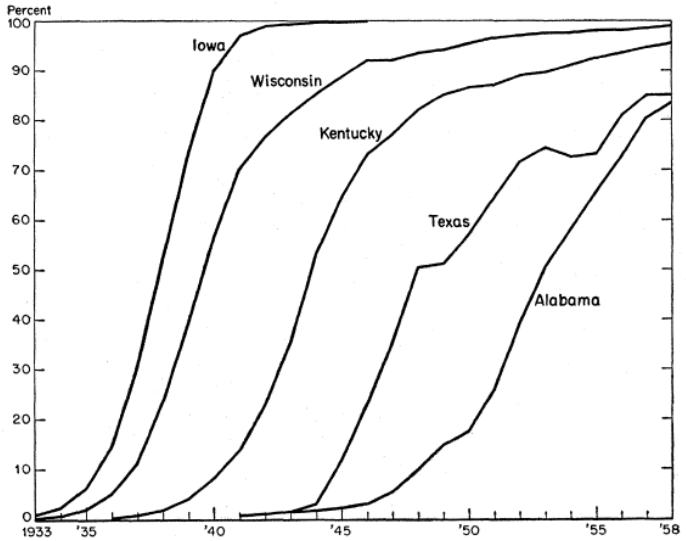
Hybrid corn and the economics of innovation

Spread of hybrid corn in the U.S., 1936-48



Areas with >10% hybrid seed of total corn acreage



Percentage of corn area planted to hybrid seed

- S-shaped pattern of diffusion (slow at first, accelerating until reaches peak, slowing down as laggards enter)
- Geographic differences in the use of hybrid corn explained by differences in the profitability of that use (adoption more profitable in 'good' areas)
- Initial supply constraint: Breeding infrastructure for locally adapted varieties and availability of seed
- Worth noting: Improved seed pulls in technology

Source: Zvi Griliches, 1960

Bt cotton as an illustration of the same phenomenon today

Cotton in India: Similar to hybrid corn in the U.S. 65 years before

Area dedicated to Bt cotton in Inda (light green) compared to total cotton area (dark green)

- First approved in 2002, heralding in a new era in Indian agriculture (S-curve)
- 2013: 7.3 million farmers growing *Bt* cotton on 11 million hectares in India
- 2014: Over 1,000 approved *Bt* cotton hybrids on the market

Farmer relevance and availability of locally adapted varieties among the keys

Source: VIB 2013

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State of adoption of modern varieties in Africa (1/2)

Farmers largely rely on old varieties

Crop	Total area (ha)	Adopted area (ha)	% MVs
Soybean	1,185,306	1,041,923	89.7
Maize–WCA*	9,972,479	6,556,762	65.7
Wheat*	1,453,820	850,121	62.5
Pigeonpea	365,901	182,452	49.9
Maize–ESA*	14,695,862	6,470,405	44.0
Cassava*	11,035,995	4,376,237	39.7
Rice*	6,787,043	2,582,317	38.0
Potato*	615,737	211,772	34.4
Barley*	970,720	317,597	32.7
Yams	4,673,300	1,409,309	30.2
Groundnut*	6,356,963	1,854,543	29.2
Bean*	2,497,209	723,544	29.0
Sorghum*	17,965,926	4,927,345	27.4
Cowpea	11,471,533	3,117,621	27.2
Pearl millet*	14,089,940	2,552,121	18.1
Chickpea	249,632	37,438	15.0
Faba bean	614,606	85,806	14.0
Lentil	94,946	9,874	10.4
Sweetpotato	1,478,086	102,143	6.9
Banana	915,877	56,784	6.2
Field pea	230,749	3,461	1.5
Total/weighted average	**107,721,630**	**37,469,577**	**34.78**

Adoption of MV in SSA in 2010 (Adapted from DIIVA report, ASTI, July 2014)
'MV' = modern variety

DIIVA (2014) research scope and design:

From science capacity (NARS) to varietal output and adoption: 20 crops, 30 countries, 1150 cultivars

Productivity and impact pathways not traced

Results:

- MVs adopted on 35% of crop-weighted area
- Asia reached this level in 1970, Latam in the 1980s
- Higher adoption in commercially oriented crops
- Huge discrepancies across countries, crops
- Varietal turnover slow; long delay from breeding to release

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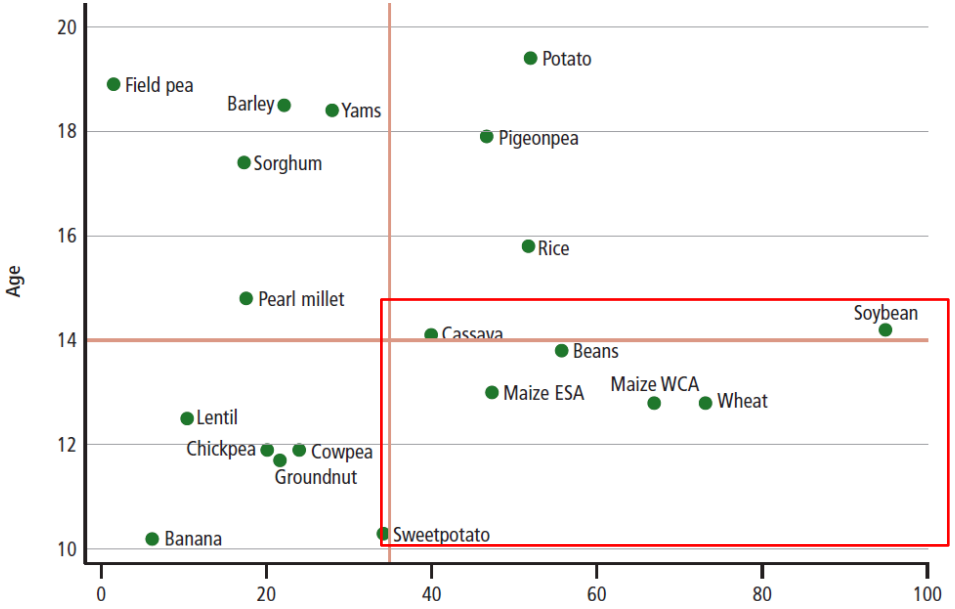
State of adoption of modern varieties in Africa (2/2)

Rate of release and adoption

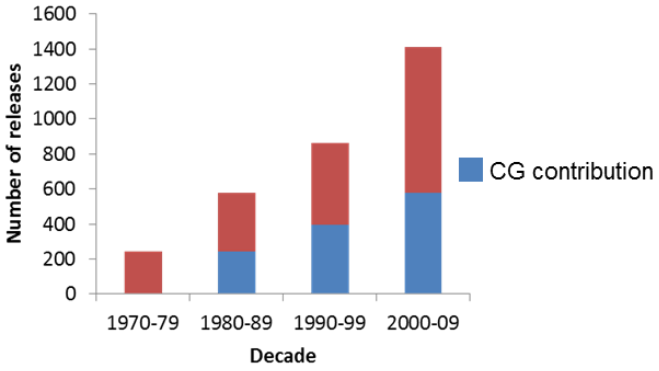
- Delineation by age and adoption indicative of comparative profitability of investments in crop improvement
- High adoption and turnover rates mostly for commercially important hybrid crops
- Commercial value drives development and adoption of new varieties (Griliches 1960)



Distribution of crops by MV adoption rate and varietal age

Varietal release over time

- Varietal release rate growing
- Direct contribution from CGIAR stable over time at 40-45% of total varieties; indirect contribution possibly 65%
- Recent yield increases of major crops underscore new dynamics in parts of African agriculture



Number of varieties released per decade in SSA since 1970

Data challenges

- Limited reliability of expert panels and on-farm surveys
- Data frequently only covering a limited number of crops per country

DIIVA report, ASTI, July 2014

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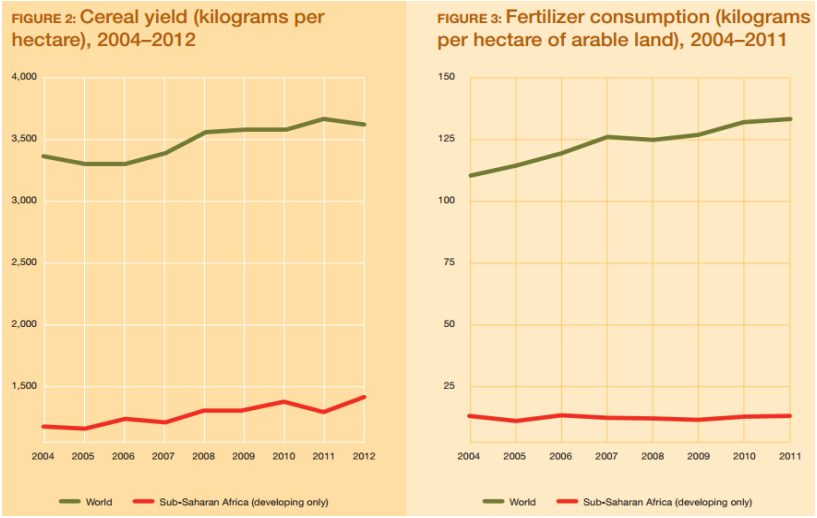
State of fertilizer use in Africa (1/2)

Fertilizer subsidy

- 1970s/80s: Fertilizer sold at subsidized prices through state enterprises >> high fiscal cost, ineffective implementation
- Subsequent structural reforms led to elimination of state monopolies and universal subsidies
- African Fertilizer Summit 2006: 'Grant targeted subsidies in favor of the fertilizer sector' >> resurgence of subsidy programs, with mixed record of success
- Good: Increased access to fertilizer; productivity gains; food security
- Less desirable: Market distortions; rent-seeking; delays in delivery; ineffectiveness in reaching remote farmers; no exit strategy



Cereal yield and fertillizer use, World and Sub-Saharan Africa (WDI, Worldbank)

'Smart subsidies'

- Targeted
- Time-bound
- Promoting market development *and* poverty reduction

Vouchers

- Best practice at this time

Following Minot, Benson (2009)

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State of fertilizer use in Africa (2/2)

Malawi

- Expanded subsidy program from 2005
- By 2009, ~ 1.5 million farmers (60%of total) received vouchers for up to two 50 kg bags of fertilizer
- Sizeable increase in maize production, food security
- Other welfare impacts more nuanced
- Benefit/cost ratio ~ 1.3

Malawi direct subsidy impact

	Current season impacts	Lagged season impacts	Wider seasonal changes
Maize production	+ve	+ve	+ve
Net crop income	+ve	X	+ve
Food consumption	+ve but limited	+ve but limited	+ve for 2006/7 & 8/9
School enrolment	?	+ve	+ve
Child health	?	+ve	+ve
Subjective well-being	Mixed (+ve, X)	X	+ve
Household income	?, +ve	?	?
Physical assets	X	Mixed (weak +ve, X)	+ve
Shocks	+ve*	+ve*	-ve

Notes: * Possible reverse causality.

+ve: evidence for positive change; X: evidence does not suggest change.

-ve: evidence of negative change; ?: lack of evidence.

Source: Chirwa & Dorward, 2013

Rwanda

- Crop Intensification Program 2007 >> procured fertilizer for sale to farmers at Kigali landing cost; decided to phase out government's traditional role in fertilizer market; introduced auction, electronic bidding and voucher system
- Performance:
  - Affordability and access gains; voucher system performing reasonably well
  - Microfinance institutions brought in (credit)
  - Private fertilizer mkting and distribution: work in progress

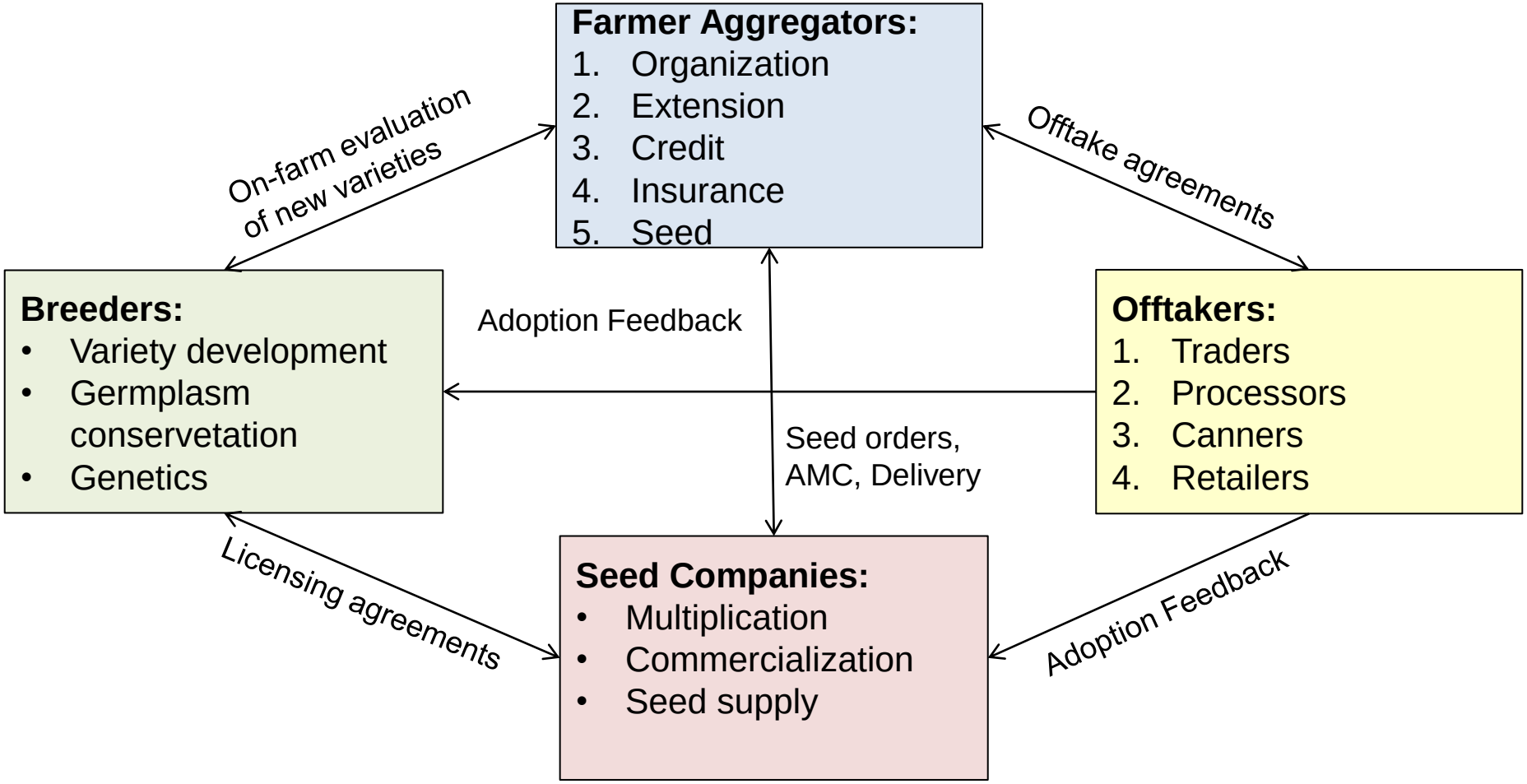
Change management for impact at scale

List of needed actions is long (cf. slides 2 and 3); I'm selecting three aspects for discussion today:

- Developing the seed market
- Breeding to meet market demand
- Rationalizing fertilizer support

Developing the seed market

Players and interactions needed for functioning seed systems



Conducive environment: Insurance, Finance, Regulatory, Policy

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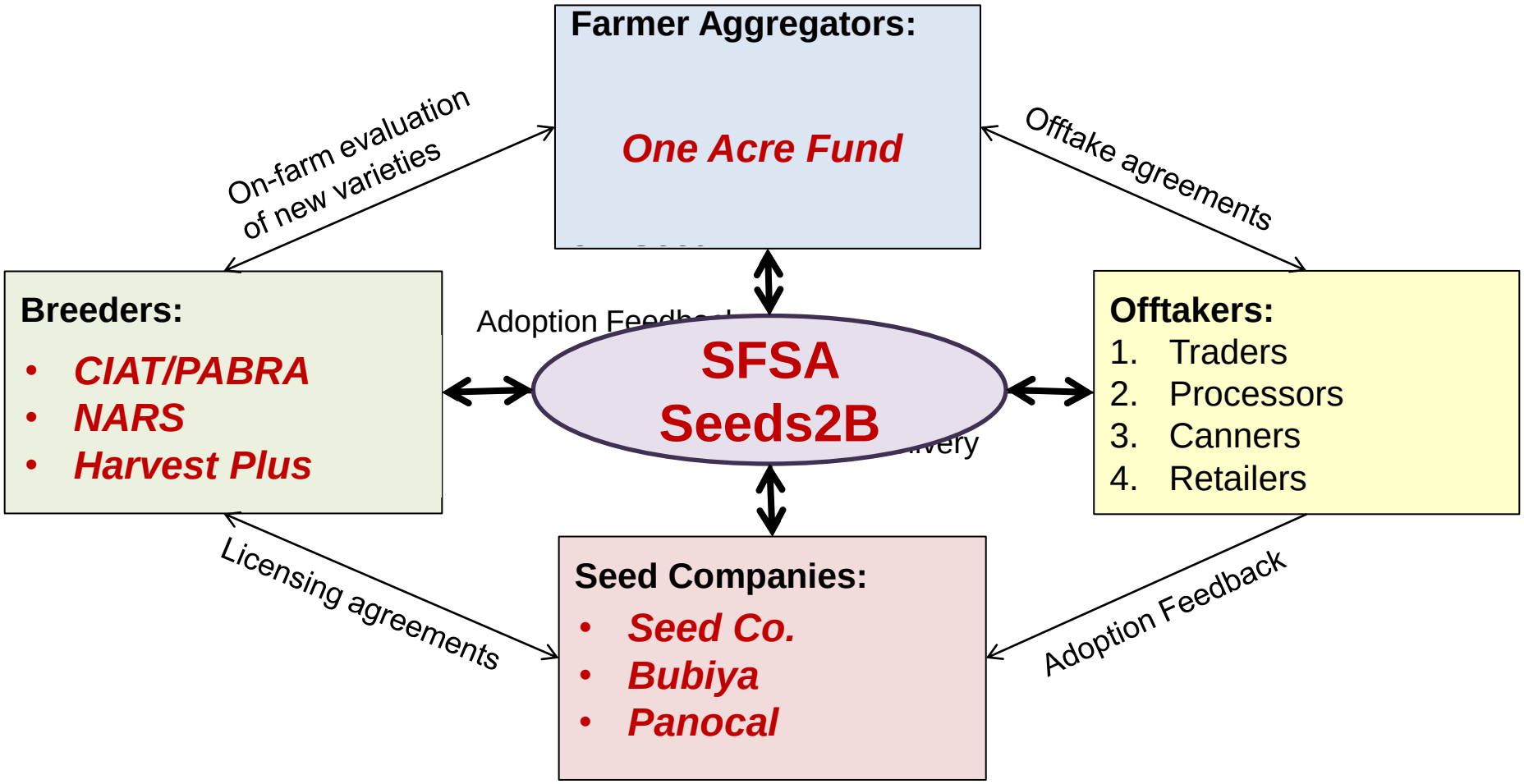
Developing the seed market

SFSA's approach in East Africa ('Seeds2B')



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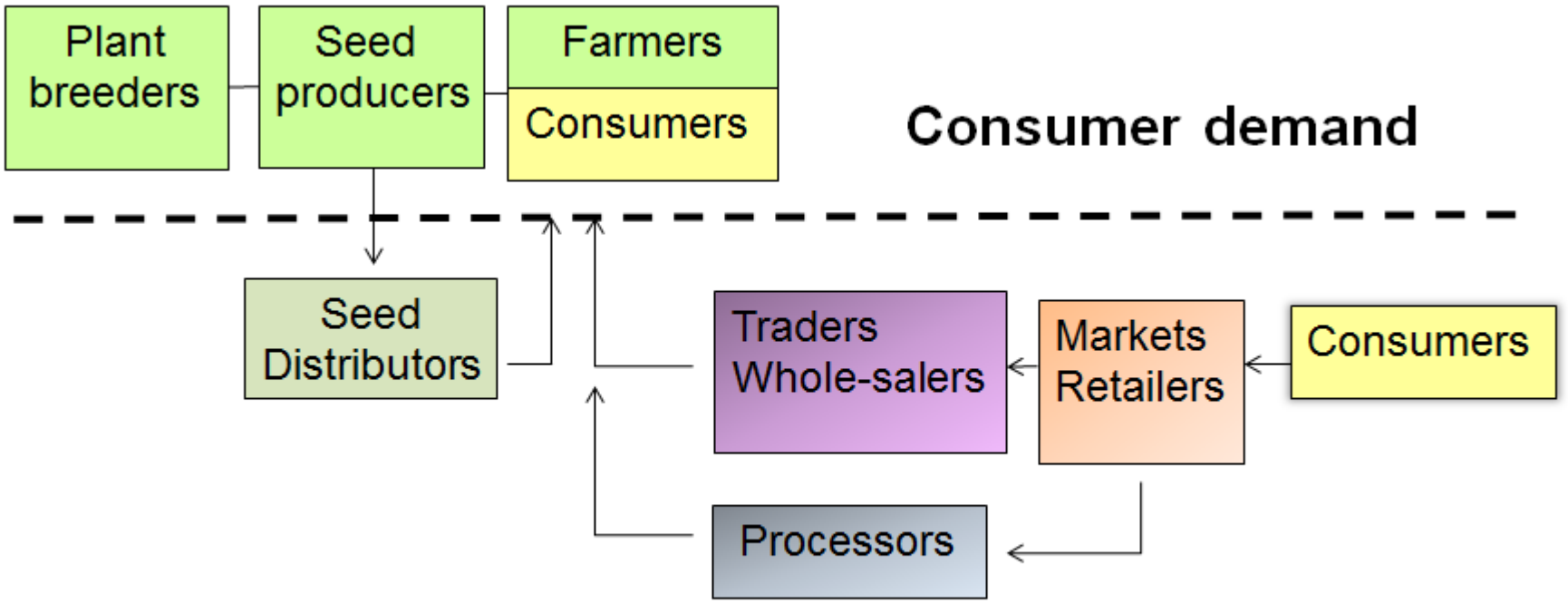
Breeding to meet market demand (1/2)

"Technology/policy/donor-push"

Crop production



"Demand-led pull"

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Breeding to meet market demand (2/2)

Farmers

Crop performance and resilience

- Yield and abiotic stresses: heat and drought etc.
- Pest and disease resistance
- Agronomic and harvesting characters
- Performance with low inputs
- Genetic diversity and climate change
- Transportation robustness

Consumers

Quality characteristics

- Taste
- Colour
- Appeal
- Nutritional value
- Cooking qualities
- Storage

Seed producers

Seed and parent production

- Fertility and scalability
- Propagation and production considerations
- Cost of production

Processors

Processing traits

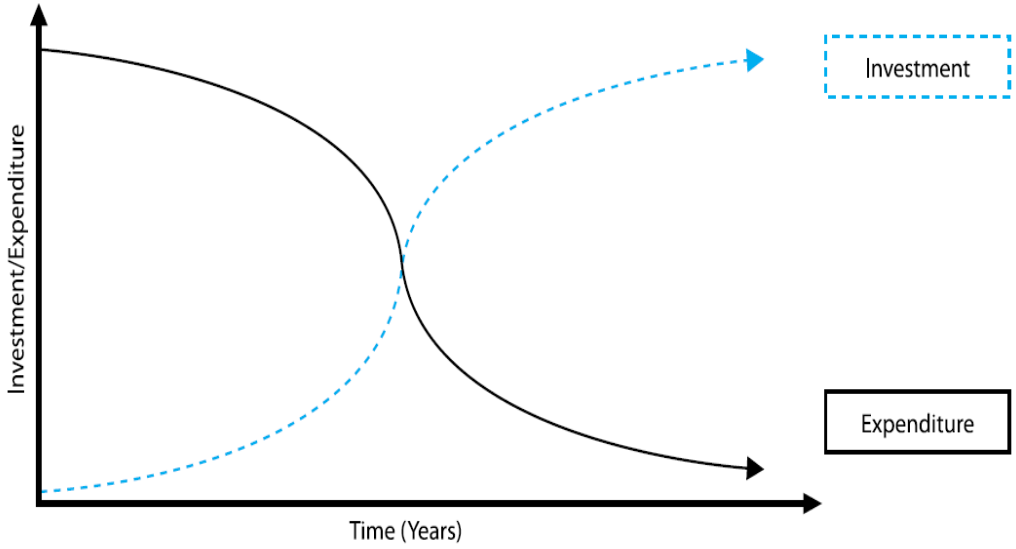
- Performance and suitability for processing
- Cost variables
- Storage

Rationalizing fertilizer support

Recommendations:

- Subsidy not to be seen as a recurrent expenditure, but an investment to raise the efficiency, effectiveness and profitability of fertilizer use
- Government to withdraw from direct involvement in importation and distribution; instead to provide purchasing power support to poor farmers
- Targeting through vouchers
- Complementary services (credit, insurance, extension, post-harvest handling and storage, value chains; link to seed supply)
- Integrate subsidy program into private fertilizer market
- Provide for exit in due course

Fertilizer support: Desired expenditure and investment trends



Source: NEPAD/IFDC 2013

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Thank you! Let's talk.

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