One Acre Fund

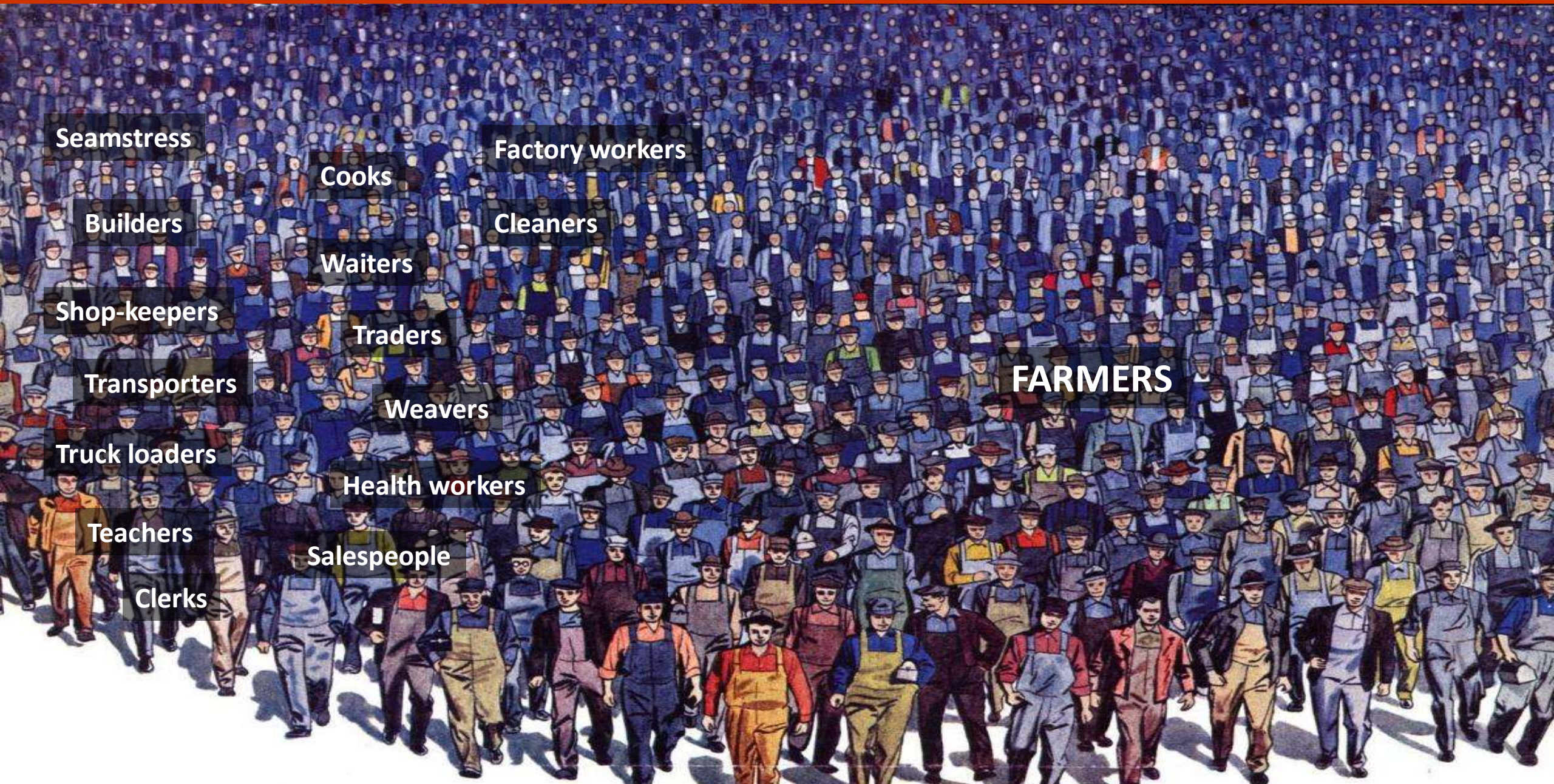
Farmers First

Summary

- **Why are we all in this room?**
  - Our shared mission and what we can learn from each other
- **The example I know best: One Acre Fund**
  - Basic background on our program
  - How we do research in the field
- **The task ahead of us**
  - Our opinion on research

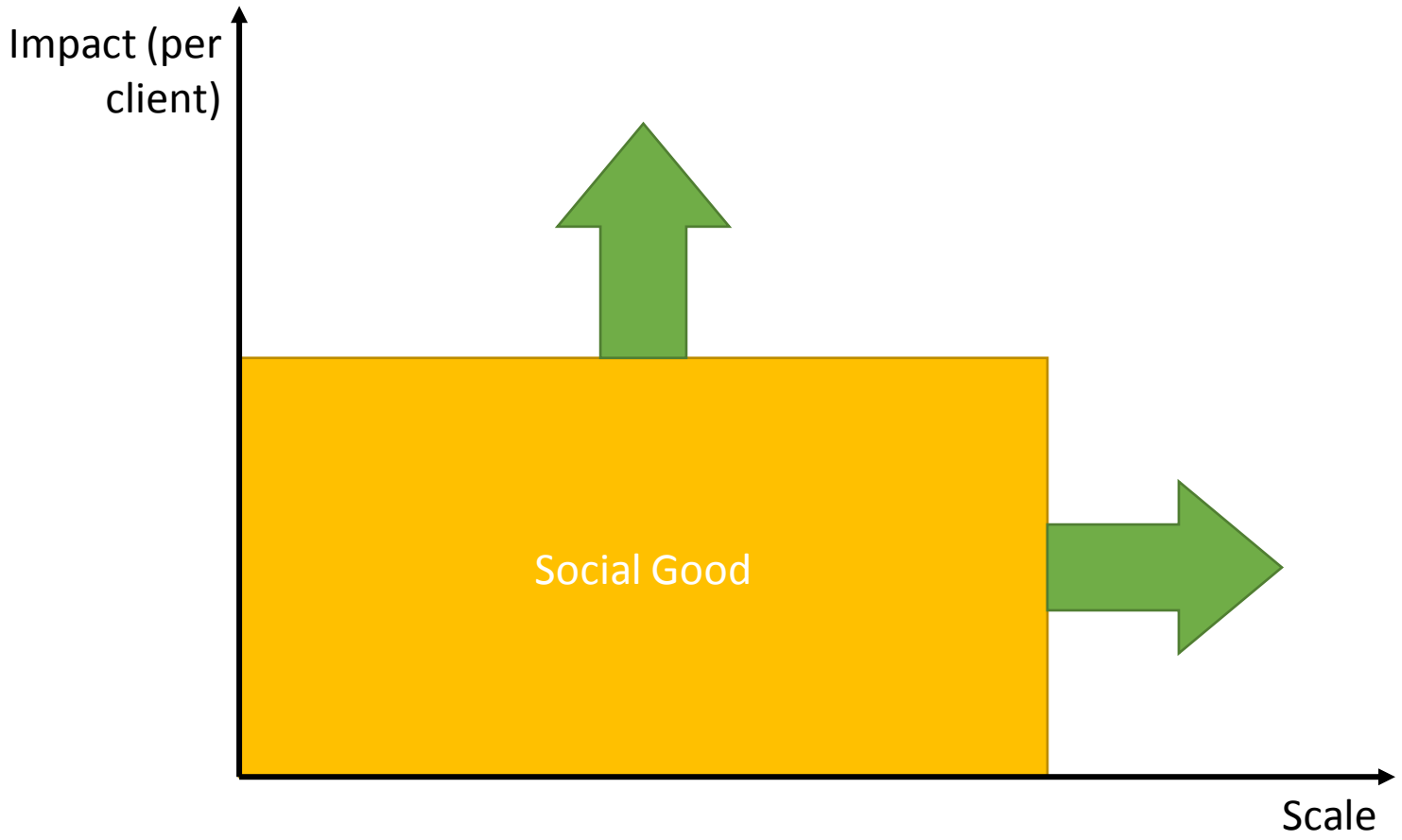
Why are we here? Our shared mission

Farming is the dominant economic activity of the world's poor



- “I make impact plays. I make game changing plays.”
  - ~Lebron James

We need to work together more to create large impact plays



Researchers: Thinking about impact but not about scale

NGOs / Businesses: Thinking about scale but not about impact

One Acre Fund

- **We serve one-acre farm families in East Africa**
  - Staple crop farmers in Kenya, Rwanda, Burundi, and Tanzania
  - Comprehensive model that provides a 100% ROI, >100$ impact / client
- **We are a non-profit, but operate like a business**
  - Farmers pay for services, largely covering field costs
- **8 years old—starting initial scale-up**
  - Currently serve 175,000 farm families with 2,000 staff—98% who live alongside our families in rural areas

Innovation 1: Complete “market in a box” for one-acre farmers

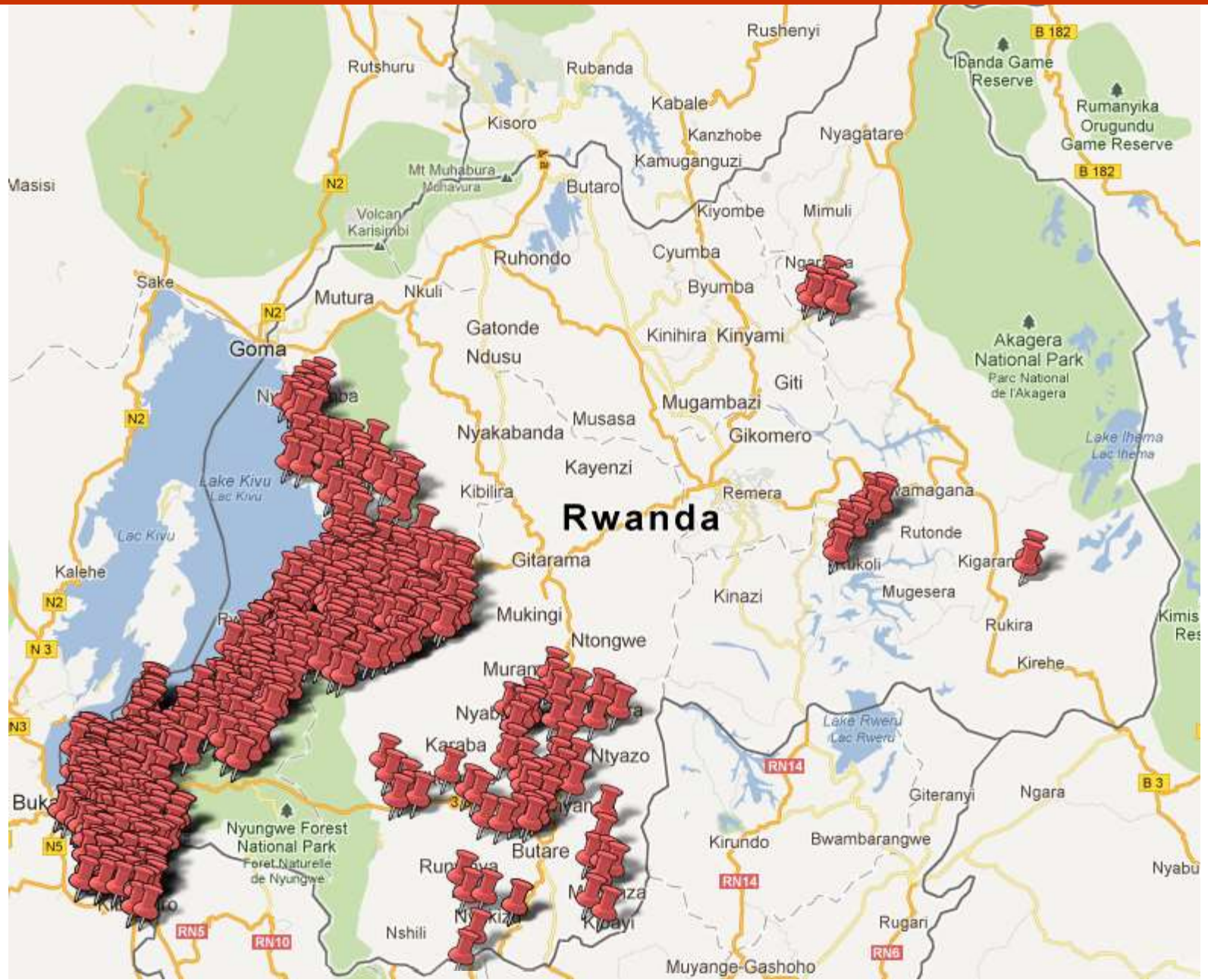
Producer groups

Productive asset loan (seed & fertilizer)

Training

Post-harvest support

Innovation 2: Rural distribution



Integrated Soil Fertility Management

- Best use of organic and mineral fertilizer together
- Clients use as much or more compost than control clients
- Used correctly, mineral fertilizer has proven impactful.

5 seasons of Farmer trials, N = 283. Local bean variety

Climbing bean	Client	Control	Difference
kg / are	20.98	14.77	6.21
Price/ kg	340	340	0
Total Income (FRw)	7,134	5,021	2,112
Cost of fertilizer	750	0	750
Profit	6,384	5,021	1,362
Impact / are	1,362		
Impact / 10 ares	13,622		
ROI	182%		

3 seasons of farmer trials, N = 192. OPV maize variety

Maize	Client	Control	Difference
kg / are	34.77	26.04	8.74
Price/ kg	240	240	0
Total Income (FRw)	8,346	6,249	2,097
Cost of fertilizer	1,065	0	1065
Profit	7,281	6,249	1,032
Impact / are	1,032		
Impact / 10 ares	10,321		
ROI	97%		

Our program is growing quickly

Core program 2013

- 180,000 farmers
- $120 income/farmer
- $30 donor cost/farmer

Core program 2016

- 450,000 farmers
- +$135 income/farmer
- $20 donor cost/farmer

~$50M direct value created for farmers

In addition to a core program, we have a large R&D operation

Direct field operation

Producer groups

Productive asset loan

Training

Post-harvest support

Research operation

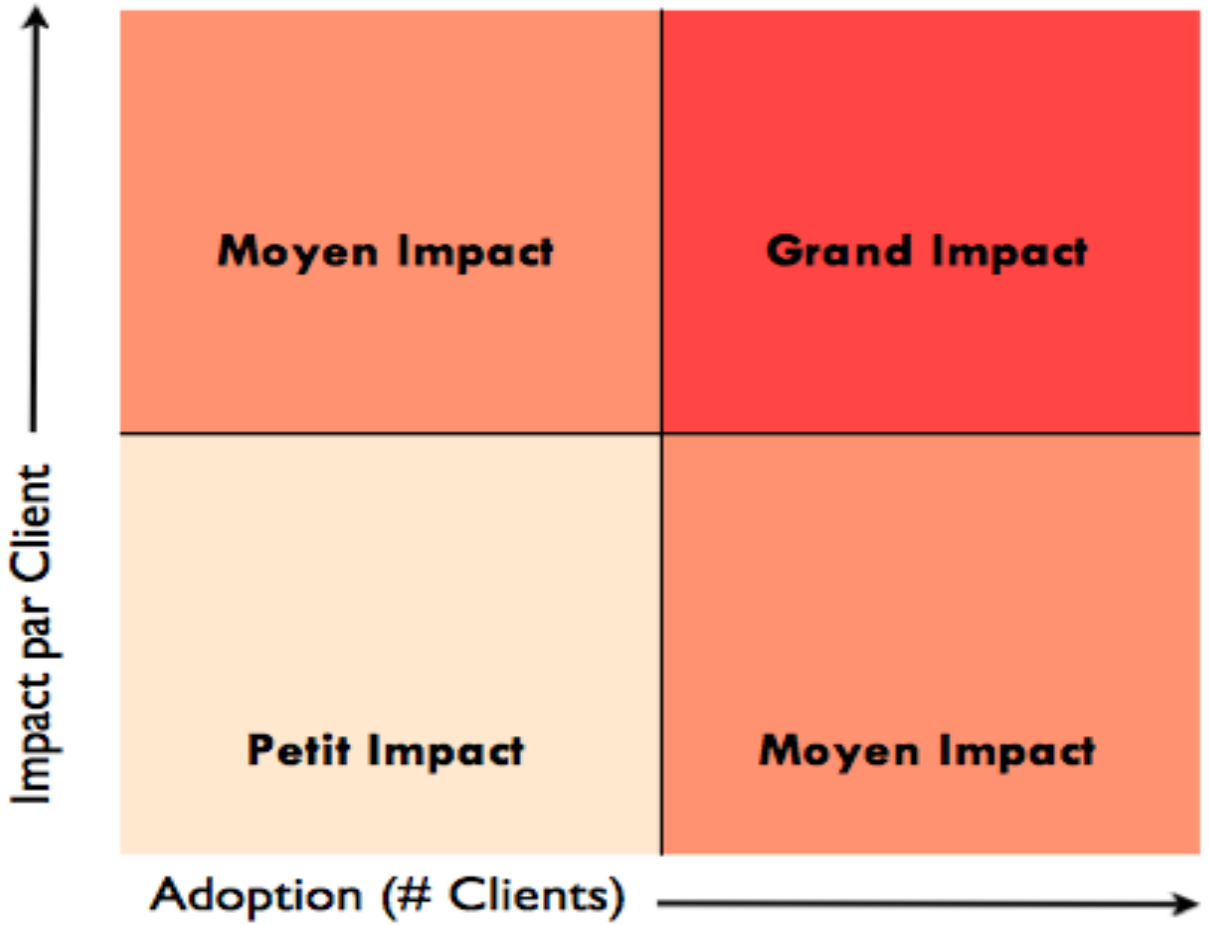
One Acre Fund's R&D approach

- **Product Selection Criteria**

Impact	Adoptability	Simplicity	Operability
Can a product significantly improve a client's income?	Are a significant number of clients willing to purchase the product?	Is the product simple enough that all clients can achieve a consistent result?	Can we scale the product with minimal increase in operational complexity?
>$20 incremental income (after repayment) per adopter	>50% of farmer network expected to adopt	Level of skill required to adopt technology successfully	Level of operational complexity at scale (FTEs or $)

Prioritize Interventions

- Impact / Adopter x % adoption = Impact / client
- Understand barriers and feasibility of scale



One Acre Fund's R&D approach

Product Testing Framework

	Phase One	Phase Two	Phase Three	Phase Four
# Farmers	0	~100 farmers	1,000+	50,000+
Trial Type	Research station	Trial District	1-2 Core Districts	Full-country rollout
Testing Priorities	Initial impact estimates, initial simplicity estimates	Confirm impact and simplicity under real farmer conditions, initial adoptability and operability estimates	Confirm adoptability and operability at scale	Finalize all four criteria

Rwanda Innovation Priorities

- **Planting / Management practices on core crops**
  - **Bean Planting**, Sorghum Planting, Intercropping practice, Maize spacing
- **Seed varieties and fertilizer blends**
  - Seed: **Maize**, Bananas – TC, Beans – Iron rich, Manioc – Disease Resistance, Sweet Potato – Orange fleshed, Soy bean, Vegetable seeds
  - Specific Fertilizer Recs: Maize topdress – Urea Briquettes / CAN, Lime, Micronutrient additions, Manioc fertilizer
- **Long term impact products**
  - **Trees (Grevellea, Calliandra), N fixation in common bean**, Conservation Ag, GMCCs, Neem based Insecticides
- **New Products and Services**
  - **Solar lights, Storage bags (PICS)**, Water treatment (Safi), Backpack sprayers, Cookstoves, Livestock package and services

Sample innovation: Grevillea trees

- **Long-term farmer income (6-15 years)**
- **Many benefits**
  - High demand for bean poles, timber
  - Household uses
  - Soil and environmental health
- **Behavior change**
  - Some farmers receive tree free from the government, but supply is unpredictable.

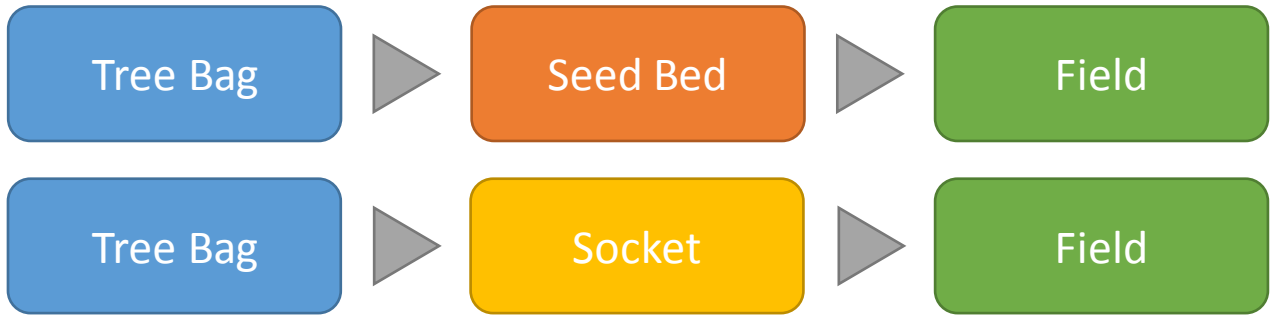
Sample innovation: Trees

- Each group receives a packet of Grevillea and Calliandra to plant a nursery together
- Each viable seedling translates into a tree worth $30 over lifespan (15 years), $4 in Present Day Value (PDV)
- 5 additional trees per farmer = 20$ of impact (10$ conservative estimate)
- 5 Million trees planted by One Acre Fund in 2014 (mostly in Kenya program)

Sample innovation: Grevillea trees

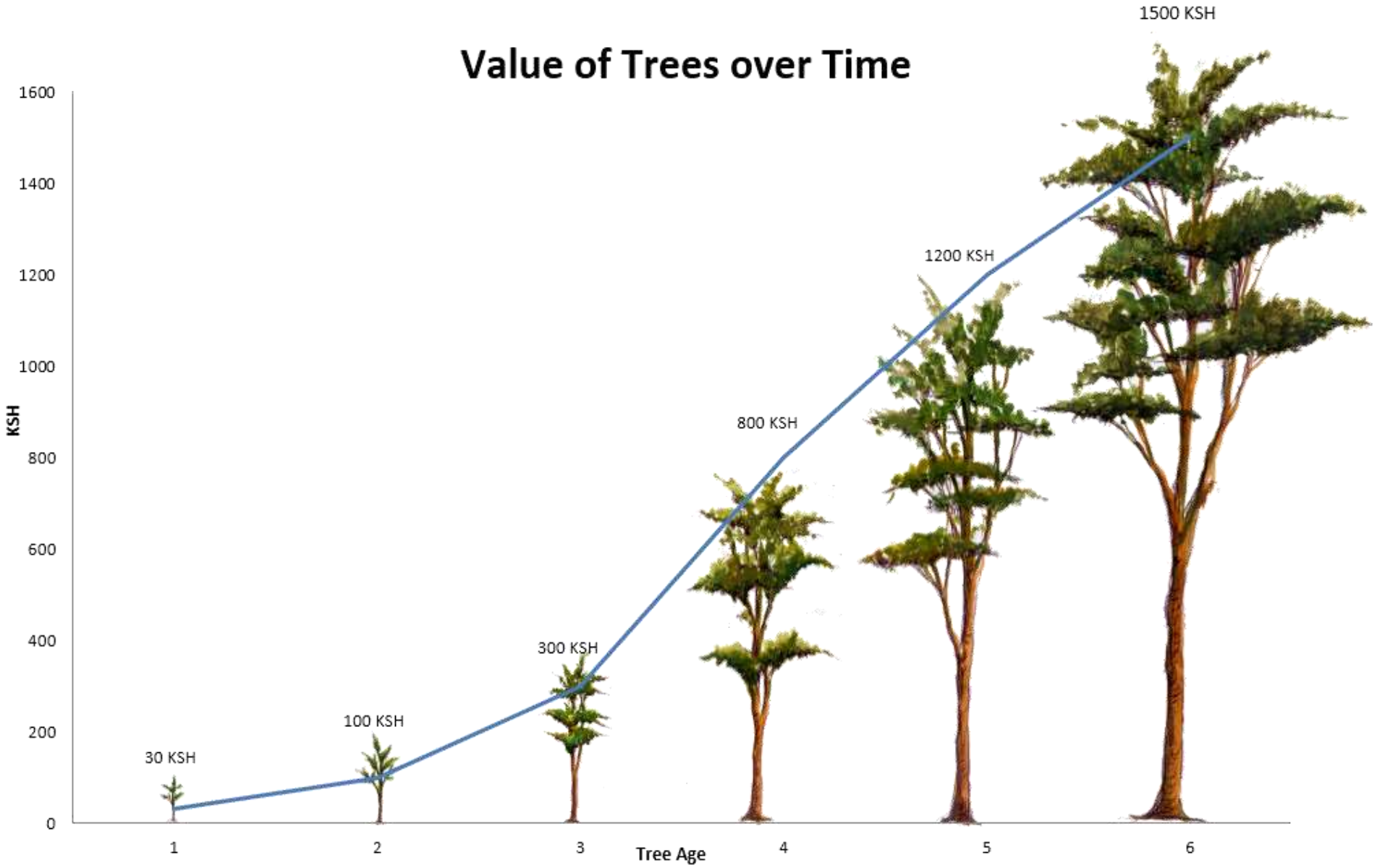
Adoptability: Planting method

- **Two critical paths:**



- **We tested both configurations with 500+ farmers**
- **Socketing (pictured) looks like the best option**

Sample innovation: Grevillea trees



Sample innovation: Grevillea trees

Adoptability: Behavior

- **High temptation to sell early**
- **Behavioral interventions**
  - Tree pledge signposts and calendars (pictured) to remind farmers to hold onto trees (“Patience Brings Success”)
  - Tree “values training” emphasizing long-term uses of trees
- **Ongoing Phase 1-2 trials**

Sample innovation: Grevillea trees

Operability

Seed testing

Warehouse operations

Seed packaging

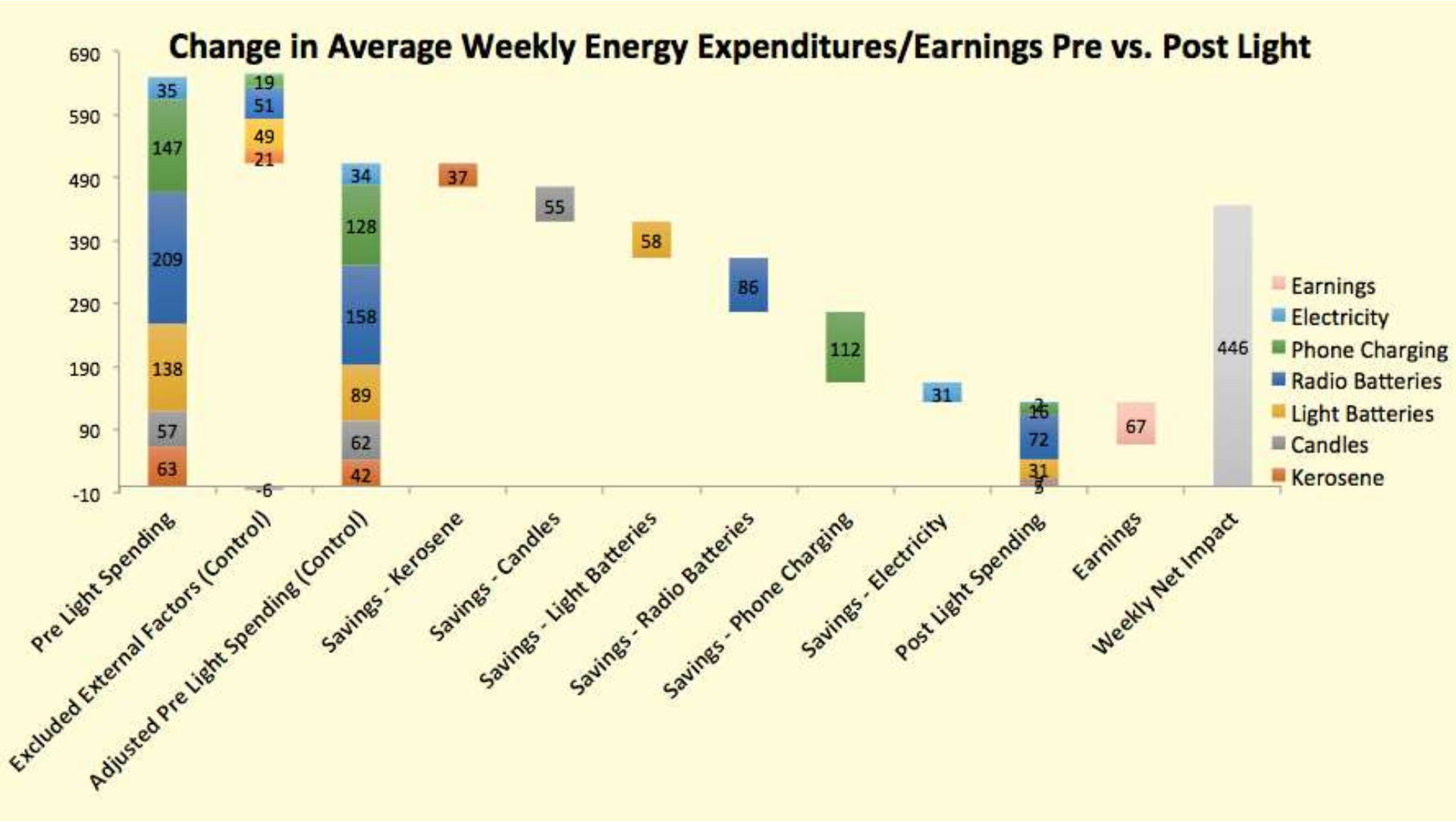
- We created the supply chain
- Not that hard—minimal inputs requirements for grevillea

Sample innovation: Sun King Pro Solar Light

- **Rigorous testing**
  - Randomly assigned one of 2 models to 200 farmers each
  - Farmers kept daily expenditure logs to enable us to measure the benefits
- **Proven impact**
  - Sun King Pro Solar Light was highest performing product, by far:
    - ~$1 saved expenses each week (kerosene, batteries, candles, cell-phone charging)
      → 7 month economic payback!
    - 3 extra study hours per child per week
    - Fewer toxic fumes in the home
- **Successful roll-out**
  - ~40% adoption in our mature countries in under two years

Sample innovation: Sun King Pro Solar Light

- Impact of the Sun King Pro Lamp
  - Impact / light - $60, ($40 PDV). Impact / client (PDV) = $20



Maize Seed (Phase 4 – Rwanda)

Rigorous testing

- Tested 18 varieties across 6 AEZs in Rwanda, in ~200 farmer fields

Proven impact

	Season A				Season B			
Seed type	kg / are	Income	Cost	Profit	kg / are	Income	Cost	Profit
Control Seed	32.26	7,420	1,265	6,155	17.99	4,138	1,265	2,873
Best Variety by zone	47.15	10,845	1,765	9,080	30.56	7,028	1,765	5,263
				Impact / are FRw **2,925**				Impact / are FRw **2,391**
				Impact / are USD **$4.30**				Impact / are USD **$3.52**

Initial roll-out

- 26% adoption in first season (1st year after free maize seed subsidy). Projecting adoption to increase in future years.
- Chose the best varieties to distribute in each ag zone (1 Hybrid and 1 OPV per zone)
  - Hope to expand variety offering in future seasons

	Season A	Season B	Total
kg Maize seed / adopter	3	1	4
% total adoption	52%	52%	**52%**
kg Maize seed / client	1.56	0.52	2.08
Impact / adopter	$32.26	$8.79	**$41.05**
Impact / client	$16.78	$4.57	**$21.35**

Bean Planting Practice (Phase 2 – Rwanda)

Bean Planting Practice (Phase 2 – Rwanda)

- Testing (phase 1 and 2)
  - Station trials
  - Farmer trials

	Best management Practice	Current planting method
# hrs to plant / are	5	2.4
Seed (kg / are)	0.7	1.5
Harvest (kg / are)	15.6	12
Bean Price (Frw / kg)	360	360
Total Cost (Labor + Seed)	917	859
Total Income (Frw / are)	5,616	4,320
Total Profit (Frw / are)	4,699	3,461

Climbing Bean ares / year	8
Adoption	50%
Impact per client (Frw)	4,953
Impact per client ($)	$7.28
Bush bean ares / year	12.7

Bean Rhizobium

Variation	Sample (# reps)	Yield (Kg/are)	Confidence (yield)	Profit / Are
DAP 1	44	17.8		5,064
DAP 0.5 + Rhizobium (CIAT 899)	17	17.4	Insignif.	5,352
DAP 0.5 + Rhizobium (URM 1597)	27	17	Insignif.	5,209

Districts	Sample (# reps)	Yield (Kg/are)	Confidence (yield)	Profit / Are
Maize, following no rhizobium	29	43		8,664
Maize following Rhizobium	31	46.2	Insignif.	9,421

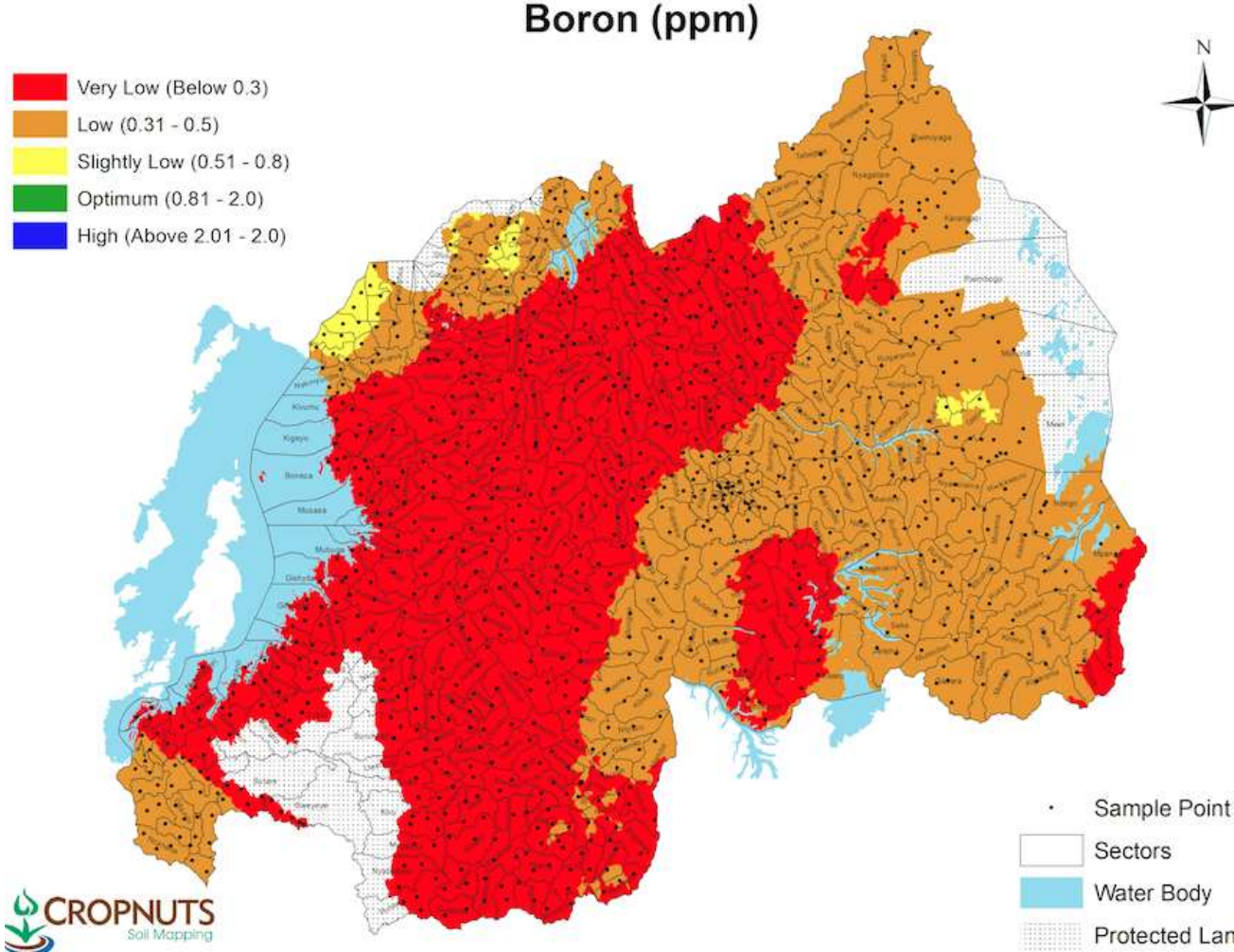
Hypothetical Impact estimate of Rhizobium

kg fixed / are (current practice)	0.1
kg fixed / are (with rhizobium)	0.4
Ares of climbing bean / year	10
Increased kg fixed / year	3
Value per kg of N	1370
Impact / Rhizobium adopter (Frw)	4110
Impact / Rhizobium adopter ($)	$6.04

Soil Sampling study

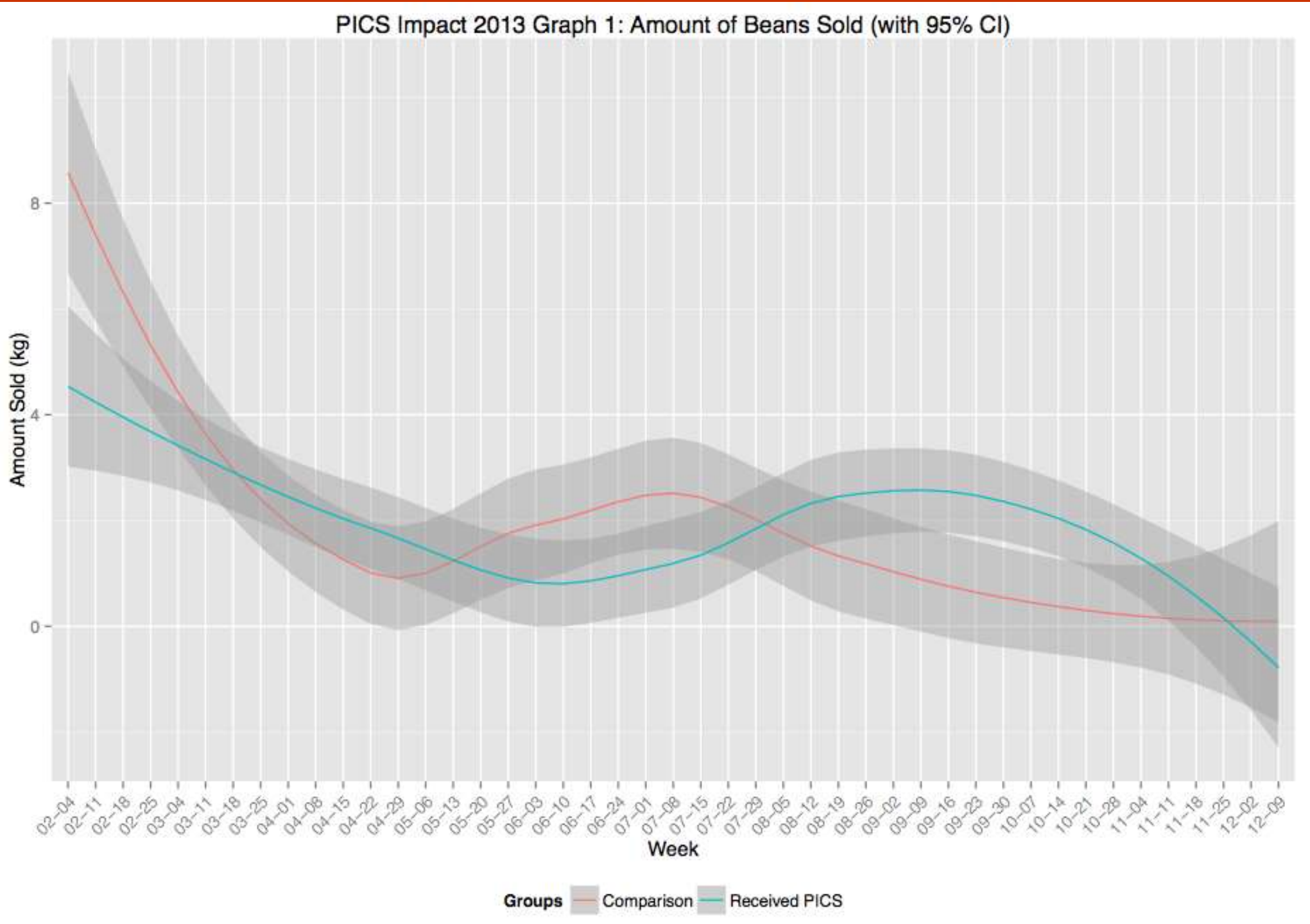
Soil Sampling study

- **Goals**
  - Understand soil composition to make the best input recommendations
  - Evaluate One Acre Fund's long term impact on soil quality
- ~1000 samples taken in Rwanda and Kenya between clients and controls
- Currently en route to ICRAF's spectral Diagnostics Lab in Nairobi



PICS Storage Bags (Phase 4 – Rwanda)

PICS Storage



PICS Storage Bags (Phase 4 – Rwanda)

- Small Monetary Impact

- High client preference as compared with other methods (insecticides)

Adoption 33% Source: Phase 3 trial

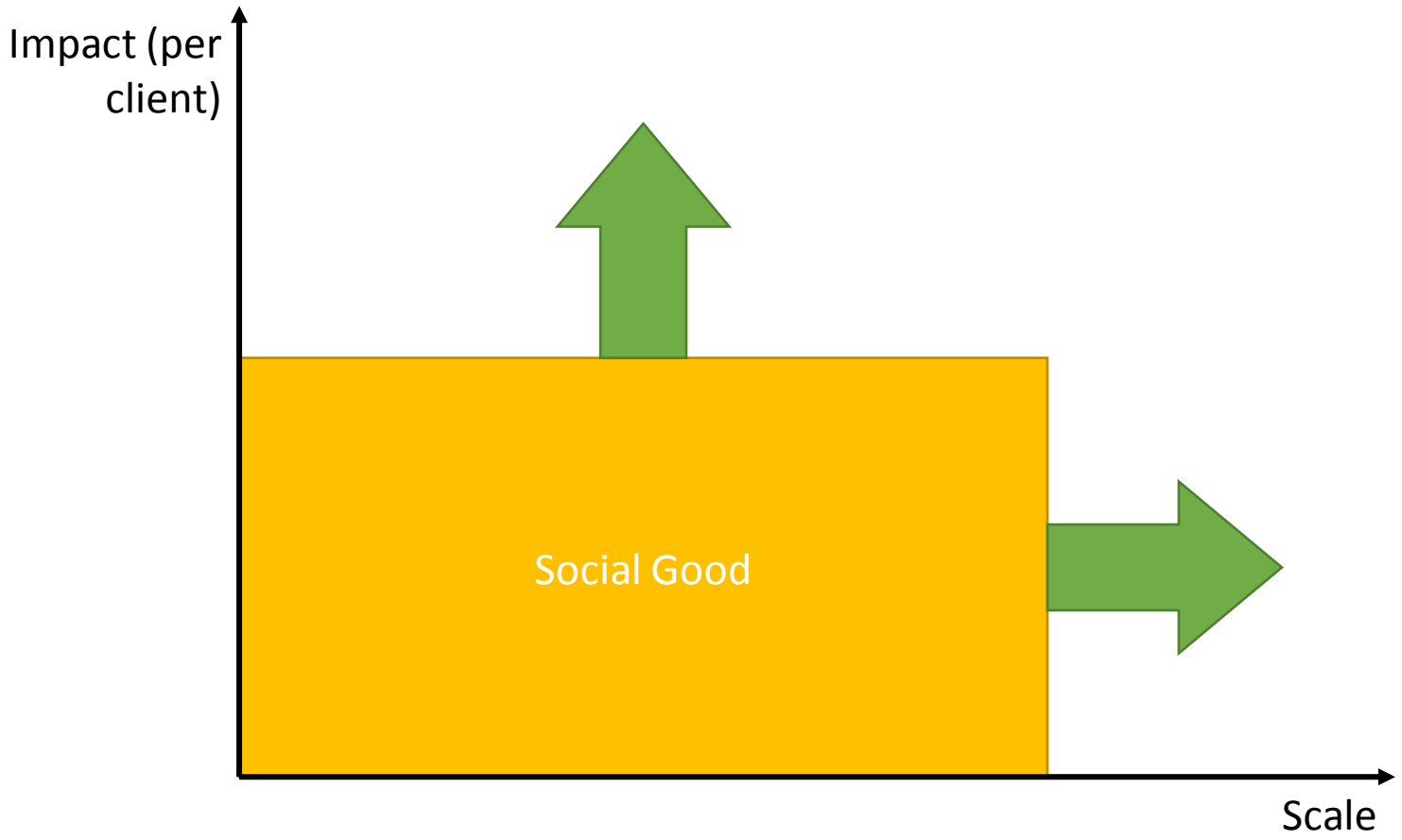
	FRw	USD
Impact / adopter	4,325	$6.36
Impact / client	1,427	$2.10

	Holes / 100 grains		
Crop	**PICS**	**Insecticide (Malathion)**	**Control**
Maize	3.48	8.48	8.25
Beans	5.5	5.28	7.46

What is next? There is a lot of work left to be done

- **Sub-Saharan Africa alone has 220m+ undernourished people**
  - The majority of undernourished people are farmers whose profession is to grow food.
  - We have a lot of work left to do.
- **NGOs are producing scale, but little impact.**
- **Researchers are producing impact, but little scale.**
- **We need to learn from each other.**
  - We see the world very differently
  - But we share the same goal

We need to work together more



Researchers: Thinking about impact but not about scale

NGOs / Businesses: Thinking about scale but not about impact

Possible lessons for each other

The NGO sector

- **Care more about impact**
  - Our organizations exist to produce impact. We need to measure it more.
- **Increase R&D capacity**
  - More trials, more people >> better results for farmers

For Researchers

- **Abandon academia!** We need you in the field.
- **Seek more realistic conditions**
  - Larger N, larger land sizes
  - Actual farmer conditions, understand impact and adoption early
- **Work with <u>scalable</u> partners**
  - Partners will help you scale your impact *after* you publish the paper

Thank you!

- Farmers
- Researchers / Inventors
- Colleagues
- Audience
- ECHO

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