WELCOME BACK!
POLICY, GOVERNANCE & STANDARDS

Food Security and Agriculture Core Course

Photo: USAID/Robert Sauers
OBJECTIVES

• Understand and elevate attention to the importance of policy to improve effectiveness of donor, government and stakeholder investments

• Understand and apply three policy system elements to programming in achieving income and nutrition outcomes

• Increase skills to analyze the policy landscape, including identifying windows of opportunity and approaches to overcome constraints
FOOD SECURITY POLICY SYSTEM

Policy Agenda

Guiding Food Security Policy towards Impact & Scale-up

Institutional Architecture

Mutual Accountability
POLICY AGENDA
PRIORITIZING THE POLICY AGENDA

A prioritized agenda of key policy actions is needed to maximize the food security impact of agricultural programs and stimulate greater private investment in the sector. Using country policy priorities and evidence-based analysis, Feed the Future has identified seven priority areas likely to have the greatest impact on reducing hunger and poverty.
PRIORITIZING THE POLICY AGENDA

7 Priority Areas

1. Institutional Architecture for Improved Policy Formulation
2. Enabling Environment for Private Sector Investment
3. Agricultural Trade Policy
4. Agricultural Inputs Policy
5. Land and Natural Resources Tenure, Rights and Policy
6. Resilience and Agricultural Risk Management Policy
7. Nutrition Policy
PRIORITIZING THE POLICY AGENDA

Key concepts

• Country-led
• Transparent
• Inclusive
• Evidence-based
• Iterative process
• Increased effectiveness of national investments
PRIORITIZING THE POLICY AGENDA

Mission-level policy matrices embody prioritized agendas

• 2012 development of policy matrices by all Feed the Future countries
• Review of current, sample policy matrices
POLICY AGENDA

Steps and actions needed at 2 levels:

• Level 1: Develop prioritized policy agenda (already done)

• Level 2: Develop a plan to implement each priority policy agenda item to achieve purpose/goal/intent of the overall policy
ASSESSING CAPACITY FOR SETTING FOR INCLUSIVE POLICY PRIORITIZATION

POLICY DEVELOPMENT TRAINING TEACHES PARTICIPANTS HOW TO FORMULATE A POLICY POSITION BY ANALYZING

• The perceived policy problem including evidence to substantiate problem
• Policy solution options
• Impacts of different solution options
• Distribution of impacts for each option, including compliance requirements
• Consultation with stakeholders on options
• Formulation of policy position
• Advocacy on policy position
FOOD SECURITY POLICY SYSTEM

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Guiding Food Security Policy towards Impact & Scale-up

Institutional Architecture

Mutual Accountability
INSTITUTIONAL ARCHITECTURE

IAA – WHAT IS IT?

• Short Process: 1–2 weeks

• Identifies partner-country procedures and processes required for
  - policy development
  - data collection and analysis
  - consultation and dialogue
  - implementation
  - enforcement

• Useful for individual policies

• Identifies real systems changes needed to support a country’s policy change process
INSTITUTIONAL ARCHITECTURE
PROCESS

PART 1
Maps

• Key systems

• Processes

• Relationships that influence food security policy development
INSTITUTIONAL ARCHITECTURE PROCESS

PART 2: ASSESSES COUNTRY’S READINESS TO CHANGE—BASED ON 6 KEY POLICY ELEMENTS

1. Predictability of the Guiding Policy Framework
2. Policy Development & Coordination
3. Inclusivity & Stakeholder Consultation
4. Evidence-based Analysis
5. Policy Implementation
6. Mutual Accountability
<table>
<thead>
<tr>
<th>Capacity of Policy Change Indicators</th>
<th>Status</th>
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</thead>
<tbody>
<tr>
<td>Policy Element 1: Predictability of the Guiding Policy Framework</td>
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<tr>
<td>Policy Element 2: Policy Development &amp; Coordination</td>
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<tr>
<td>Policy Element 3: Inclusivity and Stakeholder Consultation</td>
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<td>Policy Element 4: Evidence-based Analysis</td>
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<tr>
<td>Policy Element 5: Policy Implementation</td>
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<tr>
<td>Policy Element 6: Mutual Accountability</td>
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</tbody>
</table>
**Readiness to Change: Assessment Framework**

**Red**: requires significant attention to ensure the component is achieved.

**Yellow**: Progress is mixed. The conditions required to achieve the component are partially achieved, but additional attention is required.

**Green**: The component is realized to a sufficient degree, and additional attention to this area is not required at this time.
INSTITUTIONAL ARCHITECTURE PROCESS

PART 3: RECOMMENDATIONS

• Draws conclusions based on findings
• Outlines recommendations for future priorities and action
• Should be supported by findings from the IAA analysis
PART 4: VALIDATION WORKSHOP

- Donors/ Development Partners
- Ministries
- Consumers
- Civil Society Organizations
- Trade Associations
- Academics and Research Institutions
- Small Holder Farmers (esp. women, youth)
- Agribusiness Leaders
- CAADP/Regional Economic Communities
RESULTS

• Maps relationships—public, private, civil society
• Identifies key institutions pivotal to making change happen
• Targets need for additional assessments
• Benchmark
INSTITUTIONAL ARCHITECTURE USES

USES

• Identifies constraints and positive impacts
• Maps complex system in a simplified manner
• Helps inform Mission engagement strategy/set reform priorities
• Can help assess readiness to initiate specific policy efforts and identify specific systems changes needed
• Great starting point for discussion on required reforms
FOOD SECURITY POLICY SYSTEM

Policy Agenda

Guiding Food Security Policy toward Impact & Scale-up

Institutional Architecture

Mutual Accountability
BACKGROUND ON MA/JSR

- **Mutual Accountability**: One of the five key principles contained in 2005 Paris Declaration on Aid Effectiveness
- CAADP adoption of MA with **2011 CAADP Mutual Accountability Framework**
- Renewed CAADP commitment to MA in 2014
  - CAADP at 10 Years and AU Year of Agriculture
  - AU Heads of State **Malabo Declaration**: July 2014
BACKGROUND ON MA/JSR

- The JSR: a structure, a process, a report, and a conference
- Centrality of “Commitments” to JSR
  - NAFSIPs, CAADP Compacts, New Alliance Commitments
  - Multi-sector inclusivity essential: Government, Donor Partners, Private Sector, Civil Society
- The JSR Tool is not new to African Countries
- The “Strong JSR Model” as a guide for JSR strengthening or JSR creation
The Strong JSR Model provides guidance on

1. **JSR Structure**: Steering Committee, Secretariat

2. **JSR Process**: TOR development, resource mobilization, multi-sector stakeholder contributions

3. **JSR Report**: five sections, strong reliable evidence needed

4. **JSR Conference**: 2–3 day event based on JSR Report with strong multi-sector stakeholder representation and involvement
WHO IS INVOLVED IN A JSR?

- Trade Associations
- Donors/Development Partners
- Ministries
- Consumers
- Civil Society Organizations
- Academics and Research Institutions
- Agribusiness Leaders
- Small Holder Farmers (esp. women, youth)
- CAADP/Regional Economic Communities
- Consumers
A STRENGTHENED JSR PROCESS

- Set up JSR steering committee (chaired by Ministry of Agriculture)
- Establish JSR secretariat
- Develop JSR terms of reference
- Mobilize resources (human and financial)
- Constitute review teams
- Undertake technical studies
- Organize the JSR meeting
- Draw implementation and follow-up plans based on recommendations from the JSR
A STRENGTHENED JSR PROCESS

**Month 1 (start of FY)**
- High-level call for mutual accountability
- **Sensitize** the JSR process
- **Inventory** existing information
- **Assess** gaps and needs
- **Plan** the JSR: inclusiveness, evidence-base, transparency, commitment

**Month 10**
- **Prepare for the JSR annual forum**
  - **Engage** non-state actors
  - **Determine** information needs
  - **Generate** data and information
  - **Analyze** data to determine what was effective, how to accelerate impact
  - **Publish** results and findings

**Hold the JSR annual forum**
- **Include** non-state actors
- **Measure** commitments, progress and impact
- **Report** on findings
  - Commitment reports
  - Impact reports
  - Special topics reports

**Follow analysis with action**
- **Government** budget actions
- **Donor** budget actions
- **Policy** actions
- **Private** sector actions
- **Civil Society** actions
- **Review** the JSR for lessons learned and call for the next JSR

**Months 10-12**
SUGGESTED FIVE SECTIONS OF JSR REPORT

1. Development results
2. Agricultural sector performance
3. Financial and non-financial commitments
4. Policies, programs, institutions and implementation processes
5. Linkages, enabling environment and assumptions

Recent Malawi Report Structure: (1) Policy Context + Institutional Context; (2) Commitments; (3) Ag Sector Perf.
AL II WORK ON MA/JSR IN 2014

Under the “cover” of AU Correspondence

- Partnership with IFPRI/ReSAKSS on JSR Assessment in 7 Countries
- Seven countries comprise 7 of 10 New Alliance Countries
- IFPRI/ReSAKSS Role: Design assessment TOR and assist countries on completing assessment report
- AL II Role: prepare for and facilitate JSR Assessment Workshops, including action plan generation for JSR strengthening (did not cover Moz)
AL II WORK ON MA/JSR IN 2014

Sample JSR Strengthening Action Plan from Malawi

1. 12 Steps to Setting Up and Operating JSR
2. Malawi’s status on each of 12 steps
3. Statement of required action to strengthen Malawian JSR practices in line with “Strong JSR”
AL II PLANS ON MA/JSR IN 2015

1. Assist seven JSR Assessment Countries from 2014 with implementing JSR strengthening action plans
   - Special AL II focus on NSA engagement to improve their JSR involvement, including establishment of commitments

2. JSR Assessment in new set of countries
   - Tentative list: Rwanda, DRC, Togo, Benin, and Mali

3. As needed, deliver training to sensitize multi-sector stakeholders to Strong JSR

4. 2015 RESAKSS Conference: Towards a Middle Income Africa
TABLE DISCUSSION

Questions to discuss

• What questions do you need to answer to develop effective programming for your element?

• What tools and resources exist to help to analyze the context and develop best fit programming?

• What activities or partnerships might you consider?

• How can you gather information on policy in a given country or region?
POLICY BREAKOUT TOPICS

Please choose from one of the following breakout groups:

• Topic
• Topic
• Topic
SUSTAINABLE INTENSIFICATION

Food Security and Agriculture Core Course

Photo: PRICE/Chemonics International
OBJECTIVES

• Confidence to use of approaches for assessing and strengthening biophysical components enabling agricultural productivity

• Integrate crop, livestock and fisheries production as a bulwark of the food system & food security

• Understand sustainable intensification framework and role of the environment for optimal choices to cope and thrive with shocks
SUSTAINABLE INTENSIFICATION

- Increased productivity on a land, labor, capital basis
- Considers whole-farm & household issues
- Efficient, prudent use of inputs
- Conserve or enhance natural resources
- Increased resilience
- “Livelihood lens” takes into account socio-economic, nutritional, gender & cultural conditions
Figure 2. Designing interventions requires a system-wide assessment of the availability of needed inputs, markets and traders, and financial and knowledge capacity. Monitoring of measurable results based on desired outputs allows for mid-course corrections (Adapted from The Montpellier Panel, 2013).
Figure 1. Improvements in socio-economic, ecological, and genetic factors can all contribute to increased productivity. To the extent that this leads to improved economic, environmental, social and human conditions, the increased productivity is more sustainable (Adapted from The Montpellier Panel, 2013).
EAST AFRICA MAIZE-LEGUME SYSTEMS: COMMON FARMER PRACTICE
EAST AFRICA MAIZE-LEGUME SYSTEMS: SUSTAINABLE INTENSIFICATION
MULTIPLE SI DIMENSIONS OR DOMAINS

Social

Productivity

Human condition

Economic

Environment
Sustainable intensification leading to reduced poverty, improved nutrition, & greater resilience
Rhoda Mang’anya

“In the past, I was growing maize for food. My husband was the one responsible for school fees for my children. Soon after he died I took over his responsibilities.”

Photo credit: Jim Richardson
She needed to produce enough maize to feed and support 5 people but her degraded land “produced only 3 bags (~300 kg per hectare) of grain … the main problem was soil infertility.”
Downward spiral

Soil degradation

Low productivity

Reduced options

Farm loss

Land abandonment

Food crisis

Photo credit: Jim Richardson
Rhoda began growing soy beans and pigeon peas to improve soil health and, “… I was assisted by a local NGO and extension services with 5 tree species which I planted in my field.”
Complementary use of resources

Extending rooting depth & use of sunlight

Greater crop productivity potential led to use of improved varieties and fertilizer
“I used to produce 3 bags of maize but now get over 40 … this field has been improved in terms of soil fertility.”
“I started keeping pigs and goats to continue support for my children in school and buy salt, sugar & soap.”
Trees improved the soil health and provide other benefits … livestock fodder
“… pigs and goats give me a lot of animal manure that I apply to my field.”

She can leave crop residues in the field because she has enough livestock feed.
Fuelwood is a significant ‘livelihood’ factor.
Increased income & crop and animal productivity (ideally) leads to improved nutrition
Virtuous cycle

Next generation opportunities

Improved livelihood conditions

Higher value enterprises

Food security

Increased cereal yields

Soil restoration

Virtuous cycle

Photo credit: Jim Richardson
ASSESSING SUSTAINABLE INTENSIFICATION

• How do we distinguish between “sustainable intensification” efforts?
• How do we consistently assess trade-offs (environment vs. economic)?
• How can we work across development projects and regions?
• How do we practically measure “sustainable intensification?”
EXAMPLES OF TRADE-OFFS

Within a domain
  Land for legumes vs. Land for maize

Across domains
  Crop residues – Fodder vs. Soil fertility
  Input use – Production vs. Pollution

Across spatial scales
  Farm profitability → agricultural expansion → habitat loss

Across time
  Near-term production sacrifice for long-term stability

Across groups in a typology
  Crop growers vs. Herders
Example from Malawi maize systems:

- Continuous unfertilized maize
- Fertilized maize – Continuous maize with 70 kg N/ha
- Maize-Pigeonpea intercrop with 35 kg N/ha fertilizer
- Doubled up legume – Groundnut-Pigeonpea intercrop rotated with maize (35 kg N/ha fertilizer in maize phase)

(Snapp et al., 2016)
TRADE-OFFS AND SYNERGIES OF DOUBLED-UP MAIZE-LEGUME ROTATION SYSTEM
TYPICAL FARMER PRACTICE
FERTILIZED CONTINUOUS MAIZE

SOCIAL
Women’s preference

HUMAN CONDITION
Probability of NO crop failure
Food sufficiency
Soil nitrogen
Soil carbon

ENVIRONMENTAL
Soil cover
Fertilizer use efficiency

PRODUCTIVITY
Maize yield
Maize residue
Legume residue
Legume yield
Net income – base maize price
Net income – high maize price

ECONOMIC
Soil nitrogen
Soil carbon

Probability of NO crop failure
Food sufficiency
Soil nitrogen
Soil carbon

Maize yield
Maize residue
Legume residue
Legume yield
Net income – base maize price
Net income – high maize price

Soil cover
Fertilizer use efficiency
TYPICAL FARMER PRACTICE
FERTILIZED CONTINUOUS MAIZE
DOUBLED-UP LEGUME INTERCROP

SOCIAL
- Maize yield
- Maize residue
- Women’s preference
- Probability of NO crop failure
- Food sufficiency
- Soil nitrogen
- Soil carbon

HUMAN CONDITION

PRODUCTIVITY
- Legume residue
- Legume yield
- Net income – base maize price
- Net income – high maize price

ENVIRONMENTAL
- Soil cover
- Fertilizer use efficiency

ECONOMIC

Maize yield
LIVESTOCK, ANIMAL SOURCE FOODS, AND SUSTAINABLE PRODUCTIVITY GROWTH

OUTLINE
• The Livestock Revolution
• Livestock Production Systems and multi-functionality
• Options to improve livestock Productivity
What is the livestock revolution?
What are the underlying drivers?
RISE IN DEMAND - AFRICA

Kg

2005-07  2030  2050

Beef       4.7    13.6    82.6
Poultry    2.9    11.8
Pork       0.8    3.5    6.0
Mutton & Sheep 2.2
Eggs       1.6    6.1
Milk       32.4

Providing leadership in the development of animal resources in Africa
HOW WILL DEMAND FOR LIVESTOCK COMMODITIES IN DEVELOPING ECONOMIES BE MET?

Scenario #1
Meeting livestock demand by
*importing livestock products*

Scenario #2
Meeting livestock demand by
*importing livestock industrial production know-how*

Scenario #3
Meeting livestock demand by
*transforming smallholder livestock systems*

1.2 Bn people rely on livestock livelihoods
42% of the worlds poor are livestock keepers
PRINCIPLES OF SUSTAINABLE FOOD AND AGRICULTURE

SUSTAINABILITY PRINCIPLES

NATURAL SYSTEM
- Protect and enhance critical resources
- Increase resource-use efficiency
- Balance human needs
- Manage Risks and build resilience
- Develop governance and institutions

ENIRONMENTAL SERVICES
- Climate
- Nutrient cycling
- Biodiversity conservation
- Oceans and water cycles
- Environmental health

NATURAL RESOURCES
- Land
- Water
- Genetic Resources
- Nutrients
- Energy

HUMAN SYSTEM
- LIVESTOCK PRODUCTS
- Food
- Manure
- Fuel
- Draft
- Power
- Leather
- Fiber

ECONOMIC and SOCIAL SERVICES
- Growth
- Poverty reduction
- Employment
- Health and nutrition
- Equity
- Landscape
- Political stability

LIVESTOCK
- Land
- Water
- Genetic Resources
- Nutrients
- Energy

MANAGEMENT

FORAGE
GROWTH
PRODUCTION
DEMAND
LIVESTOCK PRODUCTION SYSTEMS

Agro-pastoral and extensive grasslands
LIVESTOCK PRODUCTION SYSTEMS

Small holder mixed livestock – crop production
LIVESTOCK PRODUCTION SYSTEMS

Urban/Peri-urban livestock production
LIVESTOCK PRODUCTION SYSTEMS

Intensive/Industrial production
MARKET SYSTEM MAPPING FOR LIVESTOCK
## MULTI-FUNCTIONAL ROLE OF LIVESTOCK

<table>
<thead>
<tr>
<th>Provide nutrient dense ASFs within diversified diets</th>
<th>Generate income through markets for animals, ASFs and other animal products and services</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enhance crop production traction, expanding cropping area, improve soil fertility nutrient cycling via manure</td>
<td>Financial and risk management services assets that can serve as financing for expansion and diversification of production activities and non-livestock livelihoods, that spread risks, promote savings and can secure informal credit</td>
</tr>
<tr>
<td>Provide transportation (water, people, goods); Labor saving</td>
<td>Build social capital and informal safety nets Formal and informal networks, producer groups and linkages</td>
</tr>
</tbody>
</table>
FRAMEWORK: COMPONENTS CONTRIBUTING TO INCREASED AGRICULTURAL PRODUCTIVITY

- Market Systems + Value Chains
- SUSTAINABLE INTENSIFICATION
- Extension
- Scaling
- Policy
- AG Innovation Systems

Inputs and Input Markets → Environment → Management → Yields, off-take or equivalent → Production → Output markets

Increased Output Value / Input Costs = Sustainable Agricultural Productivity Growth
HOW CAN LIVESTOCK PRODUCTIVITY BE INCREASED?

Inputs and services
• Animal Health
• Animal Feeds (including integration with crop byproducts)
• Research and Extension

Improved farm management
• Animal husbandry and good production practices (including agro-ecology)
• Productivity improvements in crop agriculture and integration of crop-livestock production systems: linked to gains in animal nutrition

Improved genetics and breeding products and services
• Cross-breeding and Artificial Insemination (AI): promote hybrid vigor, and greater genetic production potential
• Selective breeding and genetic modification: enhancing desirable traits for disease resistance and tolerance of climatic extremes
HOW CAN LIVESTOCK PRODUCTIVITY BE INCREASED?

Supportive enabling environment

- **Efficient market systems** (link to market systems session)
- Stakeholder relationships/interactions, coordination and collaboration
- **Supportive Policy Framework**
- **Labor and capital** returns on investments need to be considered
- **Secure land tenure** and access to other natural resources, appropriate land-use planning and management: encourages investments in improving productivity, ensures equity of benefits
- **Socio-economic factors** including equity, cultural acceptance, building social capital (e.g., through producer groups)
EXAMPLE: INCREASED USE OF CROP RESIDUES AS ANIMAL FEED INPUT

**Social**
- Women's labor increased
- Women control of assets - empowerment
- Increased milk consumption

**Productivity**
- Improved milk production and animal growth
- Improved animal nutrition
- Supplemental nutrition BCC
- Increased use of crop residues: supporting milk production and small scale fattening

**Economic**
- Employment
- Increased livestock sales
- Market for crop residues/animal feed
- Decreased nutrient cycling – removal of residues from fields

**Human Condition**
- Animal waste, sanitation and food safety issues

**Environment**
- Soil quality and water retention reduced
- Land degradation

**Environment**
- Increased peri-urban livestock population
- Employment

**Market for crop residues/animal feed**
- Economic

**Supplemental nutrition BCC**
- Productivity

**Increased use of crop residues: supporting milk production and small scale fattening**
- Economic

**Soil quality and water retention reduced**
- Environment
ANTICIPATED IMPACT OF INTENSIFIED USE OF CROP BYPRODUCTS

1 PRODUCTIVITY
- Livestock productivity—milk and growth rates
- Stimulate fodder market
- Yield gap reduced

2 ECONOMIC
- Profitability
- Market participation, i.e., spill-over to crops

3 ENVIRONMENTAL
- Livestock density >>> land degradation
- -ve nutrient balance
- Soil physical properties

4 HUMAN CONDITION
- Nutrition improved
- Food Security
- Food Safety?

5 SOCIAL
- Equity (gender & marginalized groups)
- Level of collective action
- Positive and negative time impacts

SCALE
- Landscape+
- Field/Household Scale
- Field/Animal Herd Scale

Do No Harm
Baseline
KEY TAKEAWAYS

• There is increasing demand for ASF (Livestock Revolution)—meeting this demand will require increases in sustainable productivity and narrowing the yield gap
• Adopt a systems approach: describe system characteristics, comparative advantages and constraints
• Consider important interactions between livestock and crops
• Keep in mind the multi-functional nature of livestock systems
• Consider interactions between domains to facilitate analysis, design and monitoring and to foster an inter-disciplinary approach—aim for a balanced impact across the domains
• Natural resources, inputs and markets provide the engine for productivity growth. Policy and governance provide the direction to ensure equity and sustainability
• Achieving optimum solutions in complex systems requires multi-stakeholder analysis and collaboration
AQUACULTURE AND FISHERIES

• How fish production for income and nutrition can be enhanced while maintaining environment and social

• Importance of fish in attaining GFSS
WHERE IS FISH DEMAND?
GROWTH IN OVERALL REQUIREMENTS FOR FISH

**Fish Demand Growth**
-2% - 9%
10% - 17%
18% - 24%
25% - 35%
26% - 48%

Source: Cai (2011)
WHAT IS THE GLOBAL FISH SUPPLY?

200mt in 2015

Capture production
Aquaculture

94mt
106mt
GLOBAL TRADE IN FISH

Net exports of selected agricultural commodities by developing countries

US$ billions

-20 -10 0 10 20 30 40

Milk Meat Rice Tobacco Tea Bananas Sugar Cocoa Natural rubber Coffee Fish

1991 2001 2011
REGIONAL FISH TRADE SUPPORTS FOOD SECURITY AND NUTRITION

• In West Africa, the informal artisanal fish trade is often undertaken by disadvantaged populations, particularly women, and provides important social and economic benefits.

• More research is needed on informal fish trade routes and their contributions to local food security, household nutrition and livelihoods.

AQUACULTURE IS A HIGHLY DIVERSE SECTOR

• Many species
• All environments
• Multitude of systems
• Array of practices
• Different scales of operation
HEALTH BENEFITS OF EATING FISH

• FAO estimates that fish provide almost 20% of average per capita animal protein intake for more than 3 billion people.
• Fish, particularly when eaten whole, is a significant source of essential vitamins, minerals and fats.
• In several African and Asian countries, including Bangladesh, Ghana, Senegal, Sierra Leone and Indonesia, fish contributes at least 50% of animal protein intake.

Fish is a primary source of essential nutrients—such as DHA, an omega-3 fatty acid that is critical for early brain development for pregnant mothers and children. A large study in Denmark demonstrated that maternal fish consumption during pregnancy and throughout breastfeeding is associated with better early child development.

Sources: FAO 2016, Swanson et al. 2012, Oken et al. 2008
LIVELIHOODS

- Fisheries and aquaculture sector supports the livelihoods of 12% of the world’s population.
- 60 million people are employed as fishers and fish farmers.
- Approximately 50% of seafood workers are women, often engaged in post-harvest processing.
- Approximately 90% of all people directly dependent on capture fisheries work in the small-scale fisheries sector.

Source: State of World Fisheries and Aquaculture, 2016.
FISHERIES DECLINE CAN LEAD TO NUTRIENT DEFICIENCY

Projected percentage change in maximum marine catch potential by 2050 relative to 2000 levels

Legend:
- Most reliant on fish and most vulnerable to micronutrient malnutrition
- Reliant on fish and vulnerable to micronutrient malnutrition
- Less reliant and less vulnerable
- No data

Source: Golden et al. 2016
Researchers analyzed data from over 4,700 fisheries worldwide to project the impacts of different management regimes. They estimated that applying the rights-based fisheries management regime—which emphasizes conservation approaches coupled with community/individual access rights to the fishery—to global fisheries could result in a $83 billion increase in profit and a 16 million metric ton increase in catch, annually.

Source: Costello et al. 2016
SI INDICATORS BY DOMAIN AND SCALE

5 SOCIAL
- Equity (gender & marginalized groups)
- Level of collective action
- Conflicts over resources

4 HUMAN CONDITION
- Nutrition improved
- Food Security
- Food Safety?

3 ENVIRONMENTAL
- Biodiversity
- Nutrient balance
- Coastal soil & water physical properties

2 ECONOMIC
- Profitability
- Market participation
- Variability of profitability

1 PRODUCTIVITY
- Livestock productivity
- Feed management
- Yield variability
- Yield gap

SCALE
- Seascape+
- Pond/fishers
- Community
ASSESSING SUSTAINABLE INTENSIFICATION WITH CASE STUDY VALUE CHAIN

• Sustainable Intensification framework is a tool to help assess the system. On page ____ in your participant manual is a Sustainable Intensification diagram for you to use.

• Using your case studies, consider relationship and effect on other domains based on a decision in one.

• In your case study groups, apply the Productivity Domain and the Environment Domain of the Sustainable Intensification framework.
Sustainable Intensification Indicators by Domain

**Social**
- Equity (gender & marginalized groups)
- Level of collective action
- Conflicts over resources

**Productivity**
- Livestock productivity
- Feed management
- Yield variability
- Yield gap

**Economic**
- Profitability
- Market participation
- Variability of profitability

**Environmental**
- Biodiversity
- Nutrient balance
- Coastal soil & water physical properties

**Human**
- Nutrition
- Food security
- Food safety
SOME GUIDING PRINCIPLES OF SUSTAINABLE INTENSIFICATION

• Assess constraints and limiting factors which influence productivity
• Facilitate regenerative natural resource management—sustain and improve the quality of the natural resource base (soils, water, vegetation, bio-diversity)
• Maximize nutrient cycling (particularly nitrogen, water and carbon cycles)
• Promote local food production and nutritional security
• Integrate local and scientific knowledge to leverage good practices and technologies
• Adopt a do no harm approach—anticipate and address unintended consequences
• Recognize labor as a core constraint and seek to improve labor productivity (note significant gender issues around labor)
Digital Opportunities in Agriculture

Food Security and Agriculture Core Course
EVIDENCE OF DIGITAL APPLICATIONS FOR AGRICULTURE
OBJECTIVES

• Identify challenges in applying digital tools in agricultural programs
• Evaluate evidence of success in applying digital tools in agricultural programs
• Analyze when, how and why to integrate tools for greatest benefit and outcomes
**DIGITIZING THE AGRICULTURAL VALUE CHAIN/EVIDENCE**

<table>
<thead>
<tr>
<th>Planning</th>
<th>Inputs</th>
<th>On-Farm Production</th>
<th>Storage</th>
<th>Post-Harvest Processing</th>
<th>Transport</th>
<th>Access to Markets</th>
</tr>
</thead>
</table>

**THERE ARE AT LEAST 40 QUANTITATIVE STUDIES PROVING THE IMPACT OF DIGITIZING THE VALUE CHAIN. FOR EXAMPLE:**

- **CIAT** used multiple sources of big data to predict when to plant, what to plant. Farmers who listened avoided losing US$3,000.
- **CHAI** reduced crop loss by 40-65% by getting timely localized weather information.
- In a one-year pilot of using satellite imagery to support pastoral resource management in Ethiopia, herd deaths fell by half.

<table>
<thead>
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<th>Source</th>
<th>Impact Description</th>
</tr>
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<tbody>
<tr>
<td><strong>Yelp for Cows:</strong></td>
<td>Crowd-sourced reviews led to 26% better service</td>
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<td></td>
<td>18,000 farmers in Mali/Senegal use mobile layaway via <strong>myAgro</strong> to save for seeds and fertilizer.</td>
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<td>They’re seeing yield increases of 50% to 100%. That translates into around $150 more income a year.</td>
</tr>
<tr>
<td><strong>Digital Green:</strong></td>
<td>Low cost video helped increase cost effectiveness, adoption of new technologies</td>
</tr>
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<td><strong>FRI</strong></td>
<td>Participatory radio led to 5-fold increase in adoption</td>
</tr>
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<td><strong>Livestock Insurance</strong></td>
<td>Meant households were 36% less likely to anticipate relying on distress sales of livestock and 25% less likely to reduce meals.</td>
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<td><strong>One Acre Fund:</strong></td>
<td>Loan led to significant increases in farmer storage and subsequent farm profits.</td>
</tr>
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<td><strong>Naatal Mbay,</strong></td>
<td>The farmer-owned cloud database, resulted in better prices for higher quality fertilizer, more sharing of better agricultural practices, and ultimately a 25 percent increase in maize yields.</td>
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<td><strong>IDEO.org</strong> prototyped <strong>Spoilage Sensor,</strong> a $4 temperature and humidity sensor, which allows farmers time to act to prevent spoilage.</td>
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<td><strong>CHAI</strong> reduced crop loss by 40-65% by getting timely localized weather information.</td>
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<td><strong>CHAI</strong></td>
<td><strong>Yelp for Cows:</strong> Crowd-sourced reviews led to 26% better service.</td>
</tr>
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<td><strong>With Esoko,</strong></td>
<td>All farmers get 8-9% price increase (not just subscribers), increasing income by $170.</td>
</tr>
<tr>
<td><strong>RUDI’s mobile ordering</strong> has allowed 3,000 women retailers to increase their income by up to 300%, and farmers receive prices 20-30% higher.</td>
<td></td>
</tr>
<tr>
<td><strong>In Haiti,</strong></td>
<td>A mango exporter saved more than $1,600 per year by shifting purchases from cash to mobile.</td>
</tr>
</tbody>
</table>

*Illustrative only, for more details see [https://docs.google.com/spreadsheets/d/1g_ze_yJQUE7zUB4JeNn7JxEBdxrP8yYrP6J78Xyq2U/edit?gid=0](https://docs.google.com/spreadsheets/d/1g_ze_yJQUE7zUB4JeNn7JxEBdxrP8yYrP6J78Xyq2U/edit?gid=0)*
Digital Technologies in Agriculture
DIGITAL OPPORTUNITIES IN AGRICULTURE

- **75%**
  - Increase in unique mobile phone subscribership in Feed the Future countries (2010–2015)

- **800%**
  - Growth in smartphone adoption in Feed the Future countries (2010–2015)

- **400%**
“AFRICAN FARMERS IN THE DIGITAL AGE”
Special February 2016 Issue of Foreign Affairs

- Reshape farmer growth models
- Revolutionize farmer organizations
- Put African smallholder farmers squarely as part of the solution and not just as part of the problem
- Lower barriers and distance to markets for isolate smallholders
- Revamp tradition extension models
- Foster better, two-way and real time feedback loops
- Improve farmer decision-making and competitive advantage
GLOBAL FOOD SECURITY STRATEGY
FY 2017 – FY 2021

Considerable focus on mobile and digital technologies including:

• Financial inclusion
• Real time data collection, analysis and use
• Greater agricultural productivity
• Women and youth empowerment
• Access to markets
• Value chain efficiencies
• Better information flow
WHAT DOES THIS OFTEN LOOK LIKE IN PRACTICE?
## DIGITIZING THE AGRICULTURAL VALUE CHAIN/EVIDENCE

<table>
<thead>
<tr>
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<tbody>
<tr>
<td><strong>Data Collection</strong></td>
<td><strong>Collection</strong></td>
<td><strong>Collection</strong></td>
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<td><strong>Collection</strong></td>
<td><strong>Collection</strong></td>
<td><strong>Collection</strong></td>
</tr>
<tr>
<td>• Farm mapping</td>
<td>• Seeds</td>
<td>• Pesticides / Fertilizers</td>
<td>• Warehousing</td>
<td>• Crop varieties, quantities planted</td>
<td>• Preservation</td>
<td>• Sales</td>
</tr>
<tr>
<td>• Climate change predictive models</td>
<td>• Pesticides / Fertilizers</td>
<td>• Weeding</td>
<td>• Pests</td>
<td>• Climate Control</td>
<td>• Payments</td>
<td>• Payments</td>
</tr>
<tr>
<td>• Farm/farm group financial management</td>
<td>• Payments</td>
<td>• Soil / Water</td>
<td>• Preservation</td>
<td>• On-demand transport/selling services</td>
<td>• Quality control</td>
<td>• Quality control</td>
</tr>
<tr>
<td></td>
<td>• Rating service quality</td>
<td>• Sharing Machinery</td>
<td></td>
<td>• Market prices</td>
<td></td>
<td>• Market prices</td>
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<tr>
<td><strong>Transactions</strong></td>
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<tr>
<td>• Savings</td>
<td>• Merchant payments</td>
<td>• Payments for Info services</td>
<td>• Warehouse receipts</td>
<td>• Payments</td>
<td>• Transport fees</td>
<td>• Payments from buyers to producers</td>
</tr>
<tr>
<td>• Basic credit</td>
<td>• Subsidies</td>
<td>• - Vaccinations</td>
<td>• Certifications</td>
<td>• Insurance Payouts</td>
<td>• Coop fees</td>
<td>• Savings</td>
</tr>
<tr>
<td>• Insurance premiums</td>
<td>• Savings and layaway plans</td>
<td>• - Certifications</td>
<td>• Additional Inputs</td>
<td>• Loans</td>
<td></td>
<td>• Layaway</td>
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<tr>
<td></td>
<td>• Basic credit</td>
<td>• Salary Payments</td>
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<td></td>
<td>• Leasing</td>
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<tr>
<td></td>
<td>&lt;------------------------ Extension Delivery ----------------------------&gt;</td>
<td>&lt;------------------------ Market prices -------------------------------&gt;</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>&lt;-------------------------------- Farmer Profiles to Enable Custom Info to be Delivered --------------------------------&gt;</td>
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<tr>
<td></td>
<td></td>
<td>&lt;-------------------------------- Feedback to/from farmers, other stakeholders --------------------------------&gt;</td>
<td></td>
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<tr>
<td></td>
<td>• Seeds</td>
<td>• Weather insurance</td>
<td>• Traceability</td>
<td>• Traceability</td>
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<tr>
<td></td>
<td>• Fertilizers</td>
<td>• Better agriculture practices</td>
<td></td>
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<tr>
<td></td>
<td>• Counterfeiting</td>
<td>• Market Prices</td>
<td></td>
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</tr>
</tbody>
</table>

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**USAID**

FROM THE AMERICAN PEOPLE

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## Digitizing the Agricultural Value Chain/Why?

<table>
<thead>
<tr>
<th>Planning</th>
<th>Inputs</th>
<th>On-Farm Production</th>
<th>Storage</th>
<th>Post-Harvest Processing</th>
<th>Transport</th>
<th>Access to Markets</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Help farmers plan what, when to plant</td>
<td>• Help extension services reach more farmers</td>
<td>• Help planning when to plant</td>
<td>• Improve links between farmers, processors</td>
<td>• Increase farmer negotiating power by providing market prices</td>
<td>• Reduce costs of transport</td>
<td>• Increase ability of smallholder farmers to sell to larger markets by allowing buyers to track crops to source (certification and provenance)</td>
</tr>
<tr>
<td>• Tighten relationship with buyers, processors</td>
<td>• Reduce counterfeits</td>
<td>• Tighten relationship with buyers, processors</td>
<td>• Reduce post harvest loss with digitally-enabled loans and digital warehouse receipts</td>
<td>• Increase choice of different types of transport for farmers</td>
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<td>• Increase market information available to farmers so that they have more choices</td>
</tr>
<tr>
<td>• Adapt to climate change</td>
<td>• Reduce costs and risks for buyers</td>
<td>• Adapt to climate change</td>
<td>• Reduce post harvest loss with digitally-enabled loans and digital warehouse receipts</td>
<td>• Increase access to timely information so that farmers know if and when transport is arriving</td>
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<tr>
<td>• Provide data for farmers to make business decisions on cash flow and maximizing profit</td>
<td>• Increase access to quality inputs</td>
<td>• Provide present and secure ways for farmers to purchase, save, and receive credit inputs</td>
<td>• Increase access to quality inputs</td>
<td>• Track provenance for supply chain optimization and grading</td>
<td>• Increase access to quality inputs</td>
<td>• Increase market information available to farmers so that they have more choices</td>
</tr>
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<td>• Provide data for farmers to make business decisions on cash flow and maximizing profit</td>
<td>• Enable sellers to know demand in advance</td>
<td>• Increase precision and/or adaptability of farming interventions and crop choices through applied data</td>
<td>• Increase access to quality inputs</td>
<td>• Monitor storage conditions</td>
<td>• Increase access to quality inputs</td>
<td>• Increase market information available to farmers so that they have more choices</td>
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<tr>
<td>• Provide convenient and secure ways for farmers to purchase, save, and receive credit inputs</td>
<td>• Provide timely reminders</td>
<td>• Increase precision and/or adaptability of farming interventions and crop choices through applied data</td>
<td>• Inform harvest practices to reduce post harvest losses</td>
<td>• Increase access to timely information so that farmers know if and when transport is arriving</td>
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<td>• Provide convenient and secure ways for farmers to purchase, save, and receive credit inputs</td>
<td>• Use behavior change media to promote best practices among farmers</td>
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**Using connected digital tools to better integrate the entire market system**

---
DIGITIZING THE AGRICULTURAL VALUE CHAIN/HOW?

--- RELEVANT DIGITAL TOOLS ACROSS THE VALUE CHAIN ---

**DATA COLLECTION**
- Mobile Surveys
- Sensors (ground, aerial, aquatic)
- Low-Orbit Satellite Imagery
- UAVs (Drones)
- Farmer Profiles
- Big Data Analytics

**TRANSACTIONS**
- Mobile Money Payments/Storage
- Bulk Payments
- Savings Groups
- Digital credit
- E-Vouchers
- POS Devices
- Savings, Basic credit
- Insurance premiums

**INFORMATION EXCHANGE**
- Video
- Mobile (voice, text; push pull; IVR)
- Radio/TV

**RISK MANAGEMENT**
- Insurance
- Satellite Imagery
- Sensors
- Digital Payments

**VERIFICATION**
- RFID Tags
- Bar Codes
- QR Codes
- SMS/ USSD
AN INCLUSIVE DIGITAL ECONOMY
“Agricultural development is rightly recognized as a key pathway out of poverty for countries in which millions of people live off their labor on the land. But for agriculture to succeed in sowing prosperity across Africa, we need to look at the industry holistically. Without solving the most important components of the supply chain, powerful technology and communications tools and solutions will flounder.”

– Jamila Abass, CEO and founder of m-Farm
Mobile services for improved regional fish farming in Indonesia
Integrating digital tools throughout the value chain

MARKETS & TRADE
ADVANCE II’s Mobile-Based Survey Component

DATA COLLECTION
MONITORING & EVALUATION

Sharing Data from Farm Management and Traceability Software
Digital Conditional Cash Transfers
OVERVIEW OF DIGITAL DEVELOPMENT
Knowing about the availability of digital tools is important for designing an intervention:

- Mobile Subscribers
- Broadband Connectivity
- 3G/4G/Smartphone Penetration

Gaps:
- Gender
- Income
- Urban/Rural
- Age
MOBILE ADOPTION IN FEED THE FUTURE COUNTRIES VARIES BY REGION ...

![Bar chart showing unique subscribers, percent of population for Feed the Future countries, Q2 2017. The regions shown are Latin America, Asia, East Africa, Southern Africa, and West Africa.]
… AMONG SOCIO-ECONOMIC CATEGORIES…
... AND THE GENDER DIVIDE IS SIGNIFICANT
AVAILABILITY:
IS THERE NETWORK COVERAGE?
AFFORDABILITY ALSO AFFECTS MOBILE USE
TOOLS FOR IDENTIFYING AVAILABILITY AND ADOPTION GAPS

- mAccess Diagnostic Tool
- Gender and ICT Assessment Toolkit
- Lab Connectivity Assessments
- National Regulators
- GSMA Intelligence
- EIU’s Digital Inclusion Index
- Research ICT Africa
DIGITAL FINANCIAL SERVICES

- Tool for Digital Inclusion
  - % in Feed the Future countries with access to bank accounts
  - % of unbanked with mobile access

- Digital Financial Services provide
  - improved price transparency
  - increased smallholder farmer income
  - access to weather-indexed crop insurance
  - decreased transaction costs
THE MAJORITY OF THE UNBANKED ARE IN THE DEVELOPING WORLD

Source: World Bank Findex
Suri and Jack found that access to the Kenyan mobile money system M-PESA increased per capita consumption levels and lifted 194,000 households, or 2% of Kenyan households, out of poverty by increasing the ability to save and receive money in order to better withstand shocks. This effect was more pronounced in female-headed households. (Science Magazine, 2016)
Of the 2 Billion adults without a financial account, 1.6 billion have a mobile device.
ADVANCING DIGITAL FINANCIAL INCLUSION FOR SMALLHOLDER FARMERS

ROADBLOCK
Smallholder farmers not competitive in commercial supply chains

*DFS can enable:* Digitizing payments throughout the value chain to lower costs for buyers (and farmers) and increase price transparency

ROADBLOCK
Women disempowered in decision-making in agriculture

*DFS can enable:* Improved access to markets and better control of funds

ROADBLOCK
Cost of buying quality and quantity inputs is prohibitive and risky

*DFS can enable:* Increased purchasing power, reduced risk, decreased transaction costs

ROADBLOCK
Limited ability to manage post-harvest loss and speculate for higher prices for harvests

*DFS can enable:* Access to storage facilities with inventory-based credit

ROADBLOCK
Smallholder farmers cannot save for long-term investments

*DFS can enable:* Savings products and services

ROADBLOCK
Managing and mitigating weather risks to crops

*DFS can enable:* Weather-indexed microinsurance, purchase of weather risk-mitigating farm equipment (i.e., drip irrigation, climate resilient seeds)

SUSTAINABLY REDUCE GLOBAL POVERTY AND HUNGER

ROADBLOCK
Appropriate credit products don’t exist for smallholder farmers

*DFS can enable:* Lower transaction costs to lend to smallholder farmers, making credit more available
DEVELOPMENT INFORMATICS

- Data Life Cycle
- Responsible Data Practices
- Mobile Data Collection
DATA GROWTH IS EXPONENTIAL, BUT NOT ALL OF IT IS USABLE

90 percent of the world’s data today has been created in the last 2 years alone.

1 exabyte (EB) = 1,000,000,000,000,000,000 bytes

Source: IBM
MOBILE DATA WILL BE KEY FOR DEVELOPING COUNTRIES
THE DATA LIFE CYCLE

**DEFINITION**
What information is needed? Why is the information needed?

**COLLECTION**
How will data be collected? (Who, where, method, frequency, storage, etc.)

**USE**
Cleaning and synthesis
Adaptation & decision making
Sharing, release, distribution
BEING RESPONSIBLE THROUGH THE DATA LIFE CYCLE

• Assess risks and benefits of collecting and sharing different types of data on individuals and groups, especially for those who are vulnerable.

• Develop a strategy or process to mitigate harms to individuals or groups if there is a data breach.

DEFINITION
What information is needed?
Why is the information needed?

COLLECTION
How will data be collected?
(Who, where, method, frequency, storage, etc.)

USE
Cleaning and synthesis
Adaptation & decision making
Sharing, release, distribution
SCENARIO: GEOGRAPHIC CROP AND YIELD DATA

• What concerns could releasing a farmer’s crop and yield information cause?

• What unintended harms might be caused by publishing the GPS coordinates of these farms? How could this data be shared in a way that doesn’t put smallholder farmers at risk?

• Key takeaway: Take an in-depth look at benefits and risks throughout project life cycle, starting from planning.

Key takeaway: Take an in-depth look at benefits and risks throughout project life cycle, starting from planning.
COMPONENTS OF A MOBILE DATA SYSTEM

- Mobile Devices
- Mobile Data Collection Client
- Data Transfer Method
- Server Side Components
RESULTS FROM THE FIELD

SAFETY AND REACH IN AFGHANISTAN

3000+
registered teachers are interested in being paid via mobile money.

Across countries where USAID works, sending staff to the field is difficult, expensive, and can raise safety concerns. This challenge requires USAID to deploy a variety of tools including new uses of mobile devices. To reach Afghan teachers, USAID is working with the Afghan Ministry of Education to survey teachers using their mobile phones. In less than six months, the initiative has already registered 6,000+ teachers in five provinces. The data is helping to quickly assess the viability of mobile money salary payments. It is also creating an avenue by which USAID can monitor the success of the intervention and receive feedback from citizens directly.
Principles for Digital Development

- Design with the User
- Understand the Existing Ecosystem
- Design For Scale
- Build For Sustainability
- Be Data Driven
- Use Open Standards, Open Data, Open Source and Open Innovation
- Reuse and Improve
- Address Privacy and Security
- Be Collaborative

Stewarding by dial - Digital Impact Alliance | digitalprinciples.org | #DigitalPrinciples
SCENARIO 1: COFFEE ALLIANCE PAYMENTS

THINK ABOUT:
- Smallholder Farmers & Coffee Alliance
- Digital Ecosystem
SCENARIO 2: EXTENSION SERVICES IN VARYING ENVIRONMENTS

THINK ABOUT:
• The digital ecosystem
• Forms of ICT-enabled extension services
SCENARIO 3: TECHNOLOGY APPLICATION IN BANGLADESH

THINK ABOUT:
• Cellular Coverage
• Knowledge Exchange
To contact the digital ag for Feed the Future team, email us at: digitalag@usaid.gov
“THE ILLITERATE OF THE 21ST CENTURY WILL NOT BE THOSE WHO CANNOT READ AND WRITE, BUT THOSE WHO CANNOT LEARN, UNLEARN AND RELEARN.”

– Alvin Toffler
EVALUATIONS
U.S. GOVERNMENT PARTNERS