EPAR Portfolio Review Tools

November 10, 2016

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Purpose of Portfolio Reviews

To distill, synthesize & analyze information across a collection of investments

- **Strategy**: inform new goals or assess alignment with current strategy
- **Measurement, Evaluation & Learning**: test causal path-ways and theories of change, explain success and failure
- **Organizational**: identify synergies and gaps across teams or portfolios, map information flows
  - *(primarily internal to the organization – sharing horizontally)*
- **Communication and Accountability**: share activities and progress across teams, describe collective impact
  - *(internal, sharing vertically, and external)*

Strategy I

Inform new strategy or "refresh" existing strategy

> **Answers: What are we doing?**

- Code and summarize investment characteristics by amounts, recipients, type of organization, target beneficiaries, geographies, methods, indicators, outcomes, etc.
- "Data" provide summaries and surface patterns across grants

(2011) AgDev strategy refresh questions/requests

- Categorize the 2006-2010 portfolio by OECD DAC Purpose Code
- Map which investments address one or more market imperfections: public goods, externalities, market power and information problems
- What public goods are we investing in? At what scale (local, regional, global)?

Largely descriptive

Strategy II

Assess investment alignment with strategy & theories of change

> **Answers: How are we doing what we are doing, and why?**
  - Describe collective outputs, outcomes and impact across grants & alignment with strategy

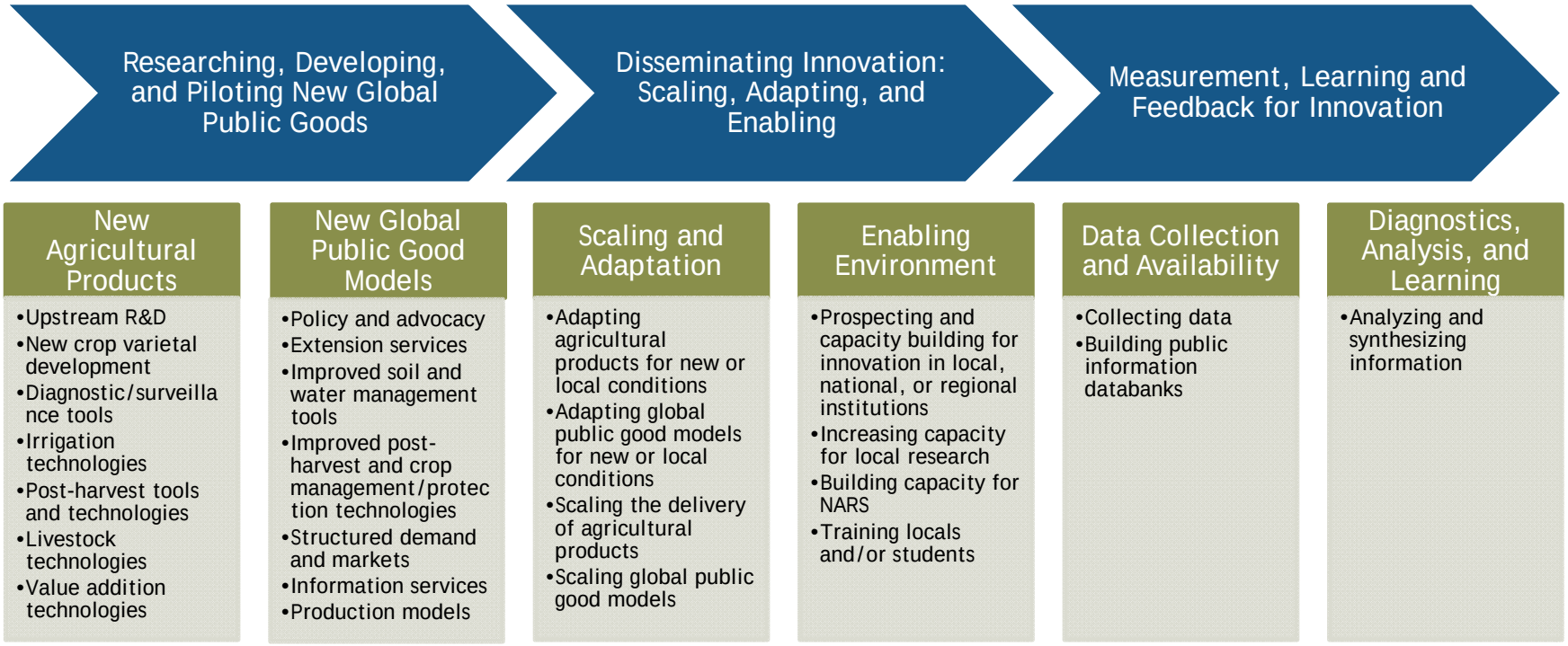
(2013) Do our investments incorporate a gender perspective?

> **Answers: What is our comparative funding advantage?**

*(2015) Describe the breadth and depth of Knowledge Exchange and Extension activities and how private sector-driven extension has been supported by BMGF investments. (**by sector**)*

*(2012) How do our investments foster innovation? (**by activity**)*

e.g. Innovation Impact Pathways



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Measurement, Learning & Evaluation

Largely analytic (requires a theoretical frame)

> **Answers: What do we track?**
  - Analyze grantee and funder capacity to measure and evaluate performance across investments through shared outcomes and common metrics

> **Answers: What can we learn?**
  - Assess the ability to learn from success and failure via underlying theories of change: are theories explicit and are data collected to test the assumptions underlying hypothesized causal pathways

(2014) Assess how grants measure the outputs, outcomes, and assumptions that inform the theory of change related to KEE activities.

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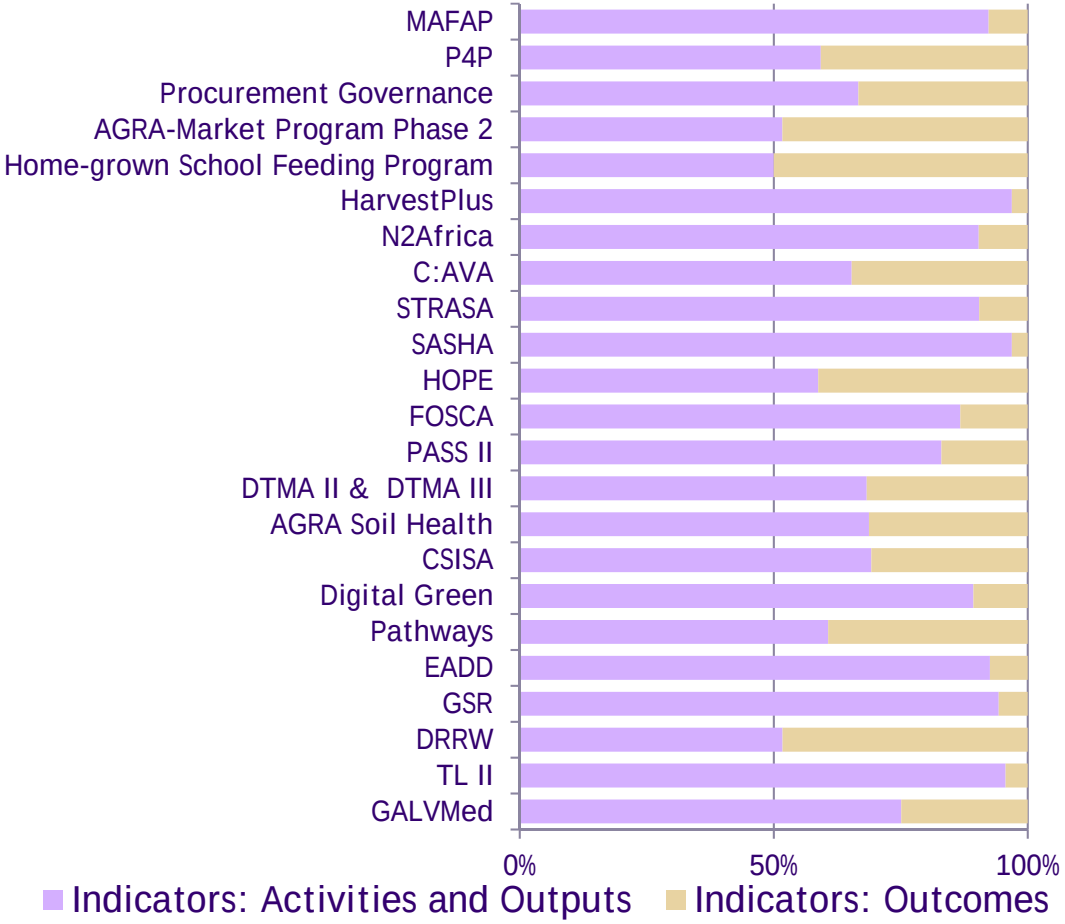
Answers what do we track: Activities and Outcomes

Organization	Grant Amount	Nutritional Indicators	Summary of Activities Related to Nutrition	Developing New Crop Varieties	Strengthening Delivery Mechanisms	Agricultural Extension	Nutrition/ Health Extension	Other Education	Data Collection	Data Analysis	Developing Informational Resources	Supporting Collective Action	Creating Institutional Partnerships	Increasing Access to Inputs	Supporting Marketing	Number of Activities Related to Nutrition	Description of Activities Related to Nutrition
IFPRI		Prevalence of deficiencies in vitamin A, zinc, and	crop varieties - Strengthening delivery mechanisms - Supporting	1	1										1	3	biofortified staple crops, targeting iron, zinc, and pro-vitamin A - Develops country-
				1	1										1	3	
				1	1										1	3	
				1	1										1	3	
				1	1										1	3	
				1	1										1	3	
				1	1										1	3	
The McKnight Foundation		Nutrients (starch and lipid	Developing new crop varieties - Data collection -	1	1	1	1		1				1		1	7	Bean, soybean, and cowpea breeding studies (Report 1.1
				1	1	1	1		1				1		1	7	
				1	1	1	1		1				1		1	7	
World Cocoa Foundation		Farm diversificatio	Nutrition/health extension				1									1	Lessons on varying nutritional needs of
The		Vitamin A-	Developing new	1	1		1		1			1	1			6	Develop safe weevil-
International Rice Research Institute		tric measures included in proposal;	institutional partnerships - Developing new crop varieties -	1		1	1	1	1	1			1		1	8	many different agricultural sectors (government, academics, research
				1		1	1	1	1	1			1		1	8	
				1		1	1	1	1	1			1		1	8	
International Bank for Reconstruction and Development		indicators discussed in grant documentati on.	Data collection						1							1	panel surveys that include modules about health and nutrition and food consumption/expen
Wageningen		Unmeasurab	Developing new	1			1		1	1			1			5	Collect and

Are Data Collected for Meeting Goals?

> *Grants had an average of 8 times as many and up to 30 times as many activities and outputs as they did outcome indicators*



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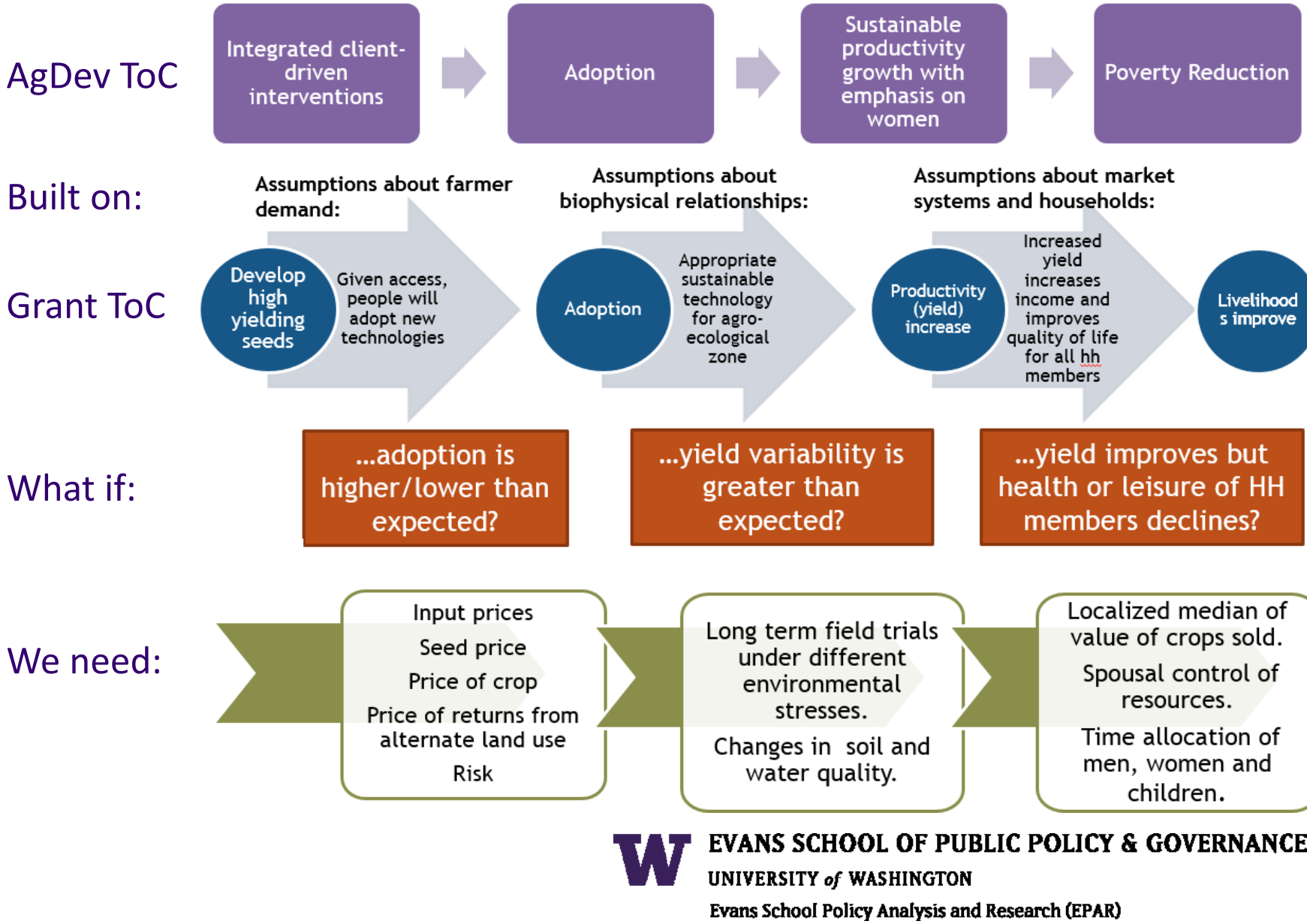
Answers: what can we learn?



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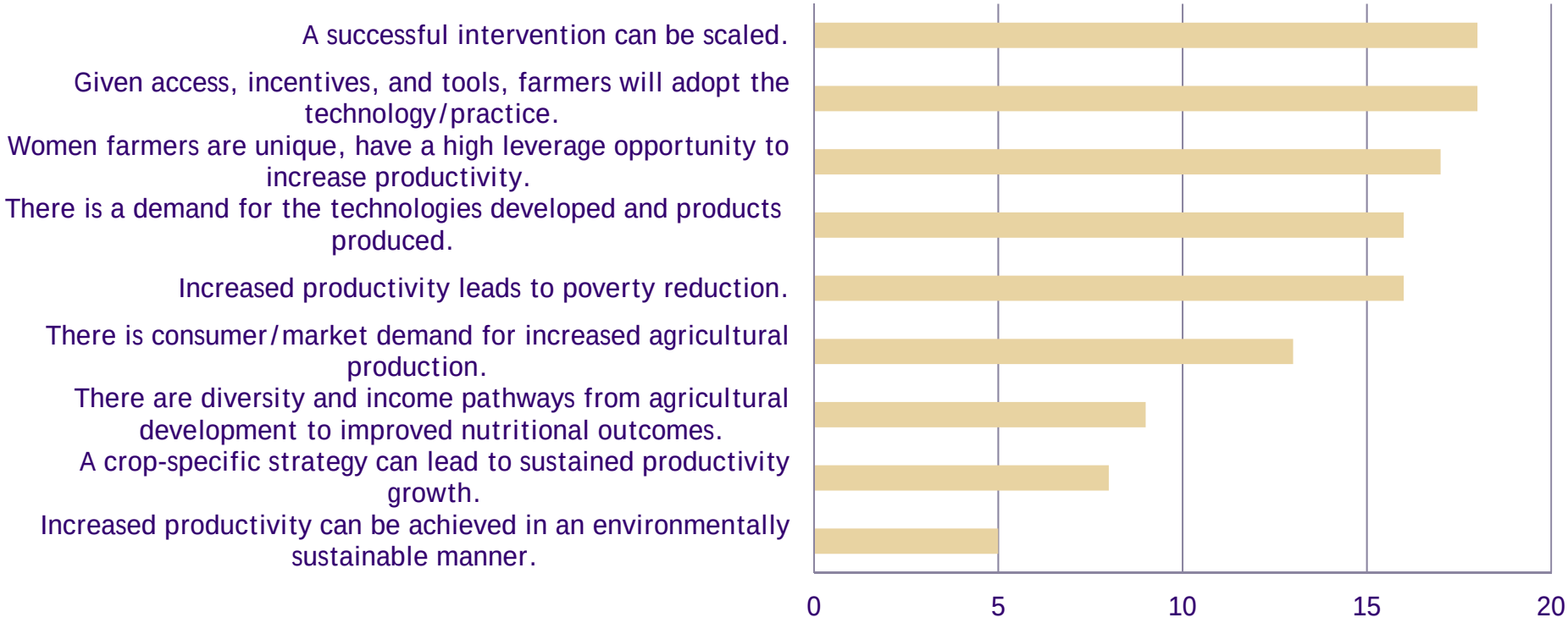
Are Data Collected for Assumptions Testing?

(2014) Finding: T he average grant collects data that could test 5 of the assumptions



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Organization I

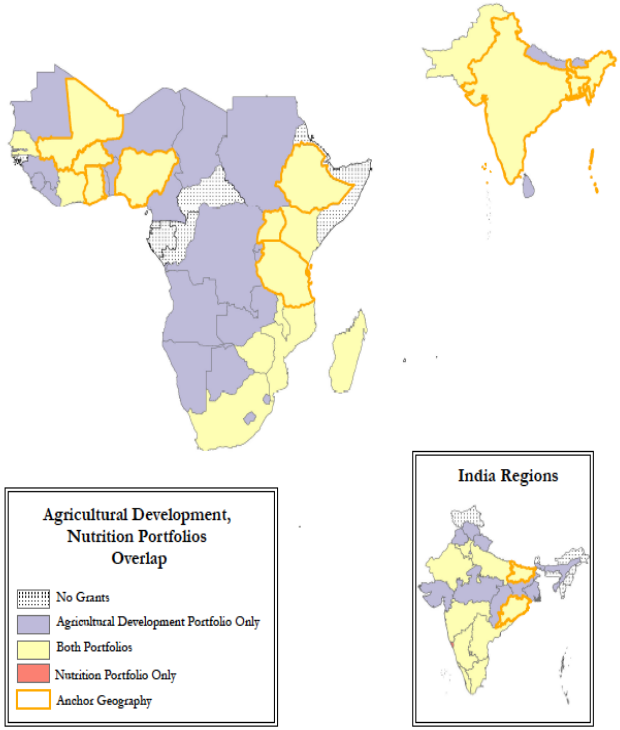
Looking across teams with different strategies

> **Answers: What are the common denominators foundation/organization-wide?**
  - The more that strategies and investments diverge, the fewer common metrics
  - But for foundations with cross-cutting themes such as ML&E or gender, some collective commentary is still possible

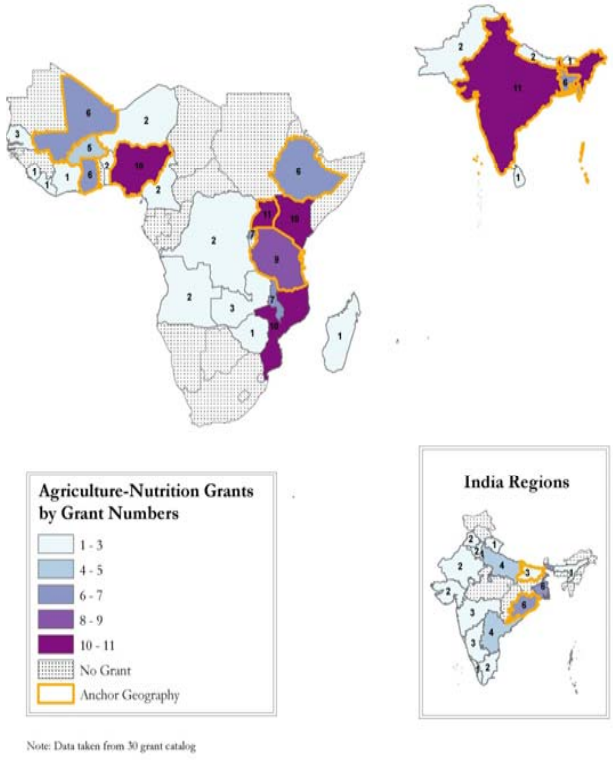
(2010) What are the M&E expectations, methods, and resources across investments within Water, Sanitation, and Hygiene, Agricultural Development, Vaccine Delivery, Nutrition, Enteric and Diarrheal Diseases, HIV, Neglected and Other Infectious Diseases, Maternal, Newborn, and Child Health

Answers: are there gaps or synergies across portfolios?

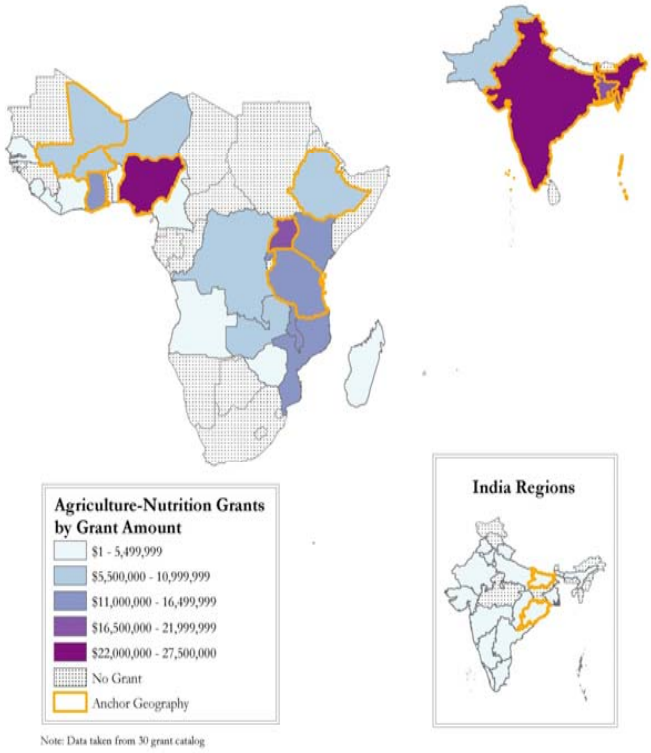
Map 1:
Agricultural Development -- Nutrition
Portfolio Overlap



Map 2: Agriculture-Nutrition
Grant Density
by Grant Numbers



Map 3: Agriculture-Nutrition
Grant Density
by Grant Amount



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Organization II

Map information sources, storage and accessibility

> **Answers: How does the reporting and documentation structure, data accessibility and storage, and the sheer number of indicators allow the most important information to surface?**

(2014) Provide an overview of monitoring and evaluation (M&E) systems used by the SGs, with a focus on 1) data flow and 2) data systems. Distinguish between data flows from the grantee to the Program Officer (grant level) and from the Program Officer through the foundation (foundation level). Data systems include the actual measurement, evaluation, and learning activities at the grantee level.

Answers: Do Consistent Reporting Formats Support Cross-Comparisons of Progress?

RESULTS FRAMEWORK – RESULTS TABLE - Soil Health Fertilizer Supply
Fertilizer supply

BILL & MELINDA GATES foundation

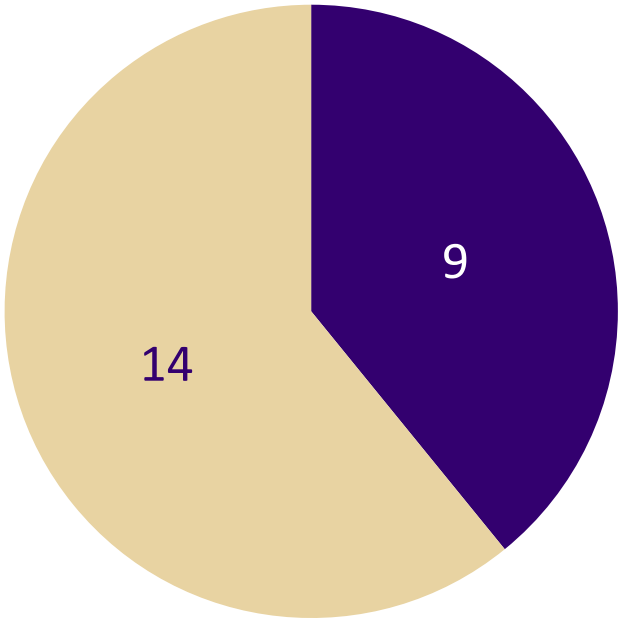
See the ***Instructions*** tab for details on how to complete this spreadsheet.

Vision of Success and the Most Significant Result of this Grant	
Connection to Relevant Foundation Strategy	

Reminder: The number of objectives can be expanded or contracted as necessary, and although there should be a logical flow under each objective, there is not necessarily a one-to-one relationship among activities, outputs, and outcomes. Add or subtract activities, outputs, or outcomes as needed.

Objective #1 — To Support Policy Implementation

	We will complete these ***Activities***	Key Milestone	*Expected to produce these* ***Outputs***	Key Milestone	*Expected to contribute to these* ***Outcomes***	Key Milestone
1.1	Facilitate the implementation of improved regulation of fertilizers under existing and revised fertilizer laws and regulations in AGRA target countries	☐	AGRA Award grants to government regulatory bodies in 7 countries GRANTEES Needs assessment reports to improve fertilizer quality control; Fertilizer and inspection equipment purchased, and supplied, installed and operationalised in AGRA target countries; 2600 fertilizer inspectors and 150 lab technicians trained in regulations and skills needed to enforce regulations	☑	National personnel are better able to enforce fertilizer regulations using improved infrastructure and skills, leading to delivery of improved quality fertilizer	☐



- USE STANDARD RESULTS FRAMEWORK
- USE A DIFFERENT INDICATOR REPORTING SYSTEM

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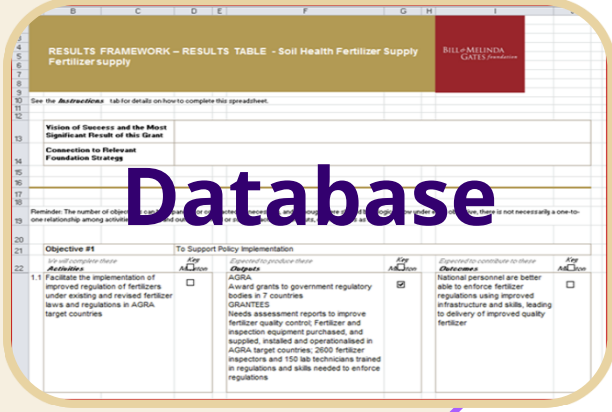
Assumed Pathway for Grantee Results Data



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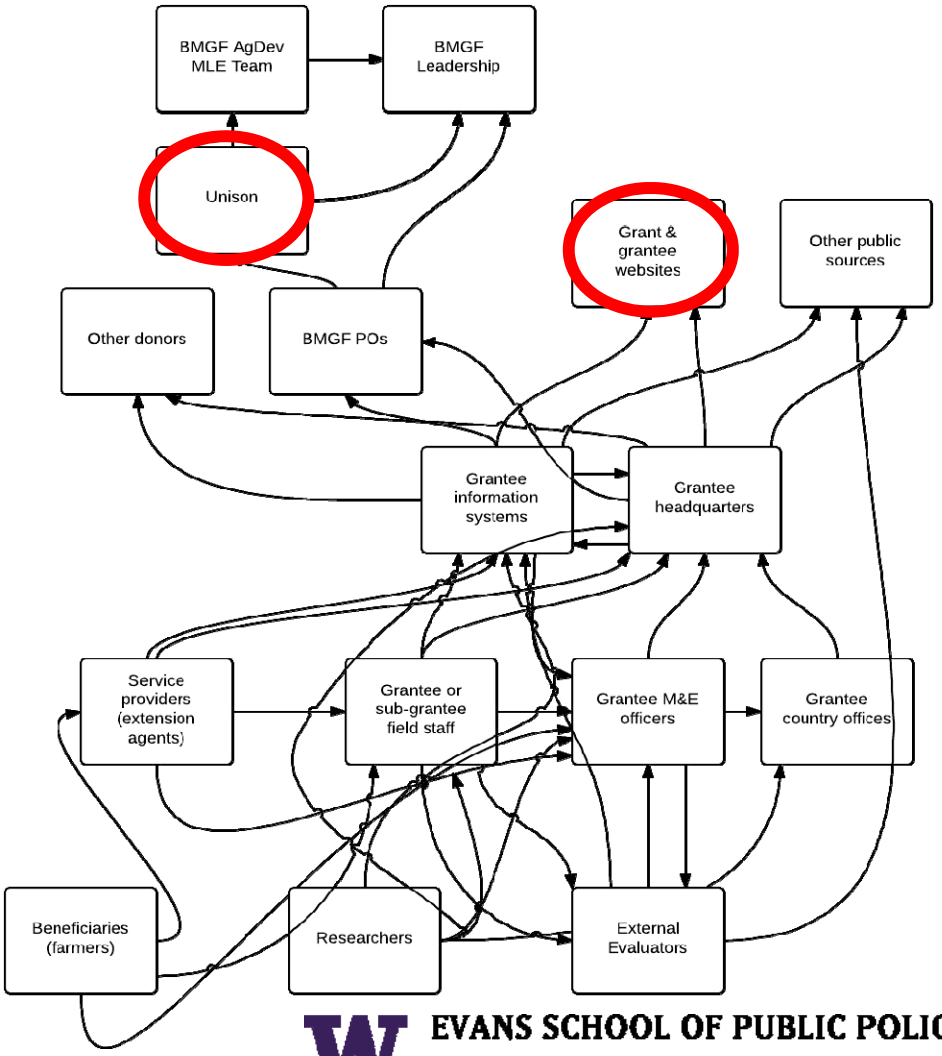
Actual Flow of Information



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Summary of Cross-Team & Strategy-Level Learning Challenges

Information storage and documentation	**Managing M&E information for multiple uses**
Reporting and measurement	**Comparing and aggregating outcomes across grants**
Evaluation & Assumption testing	**Specifying the causal pathways and assumptions underlying a theory of change**

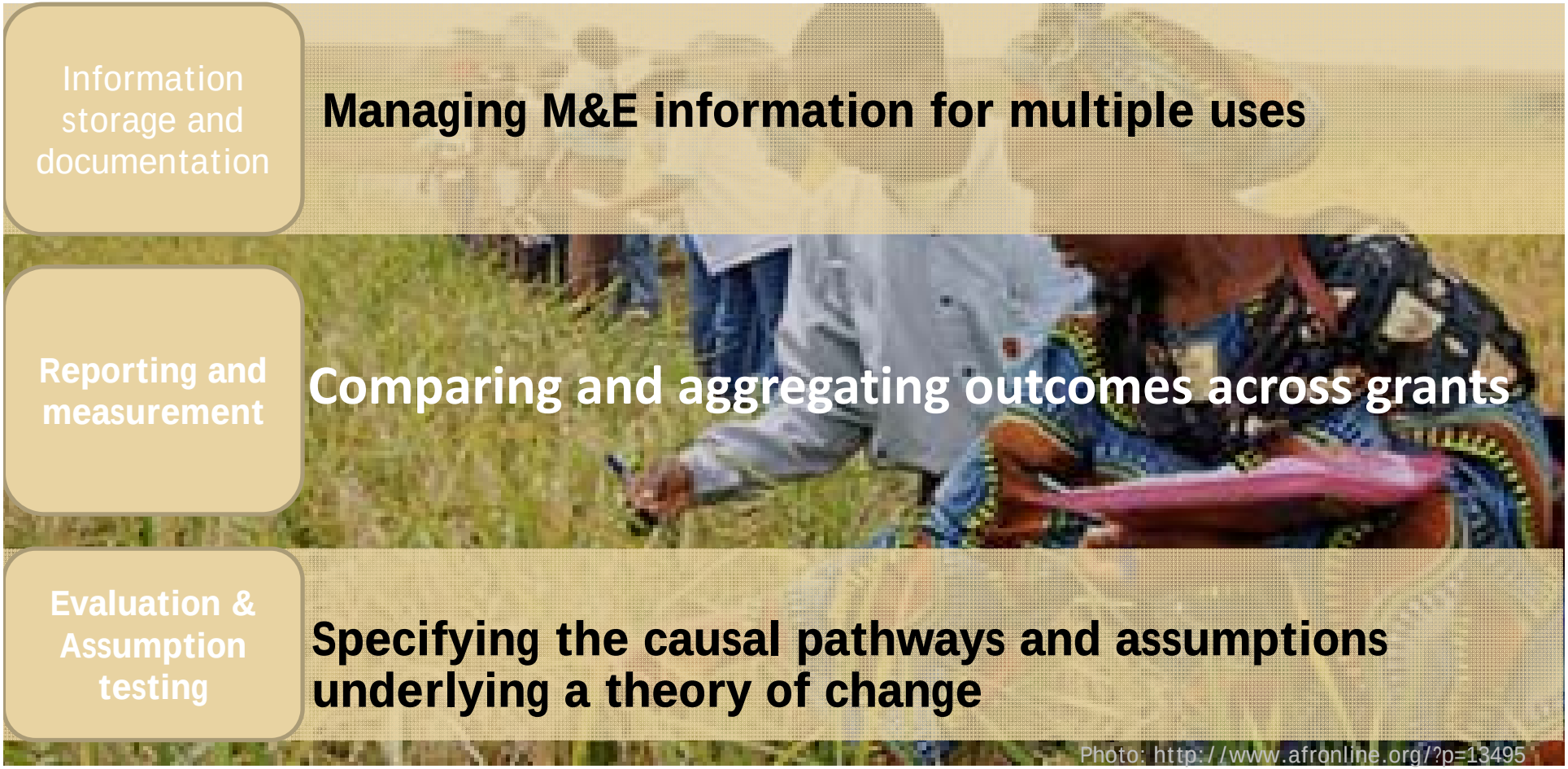

Photo: http://www.afronline.org/?p=13495

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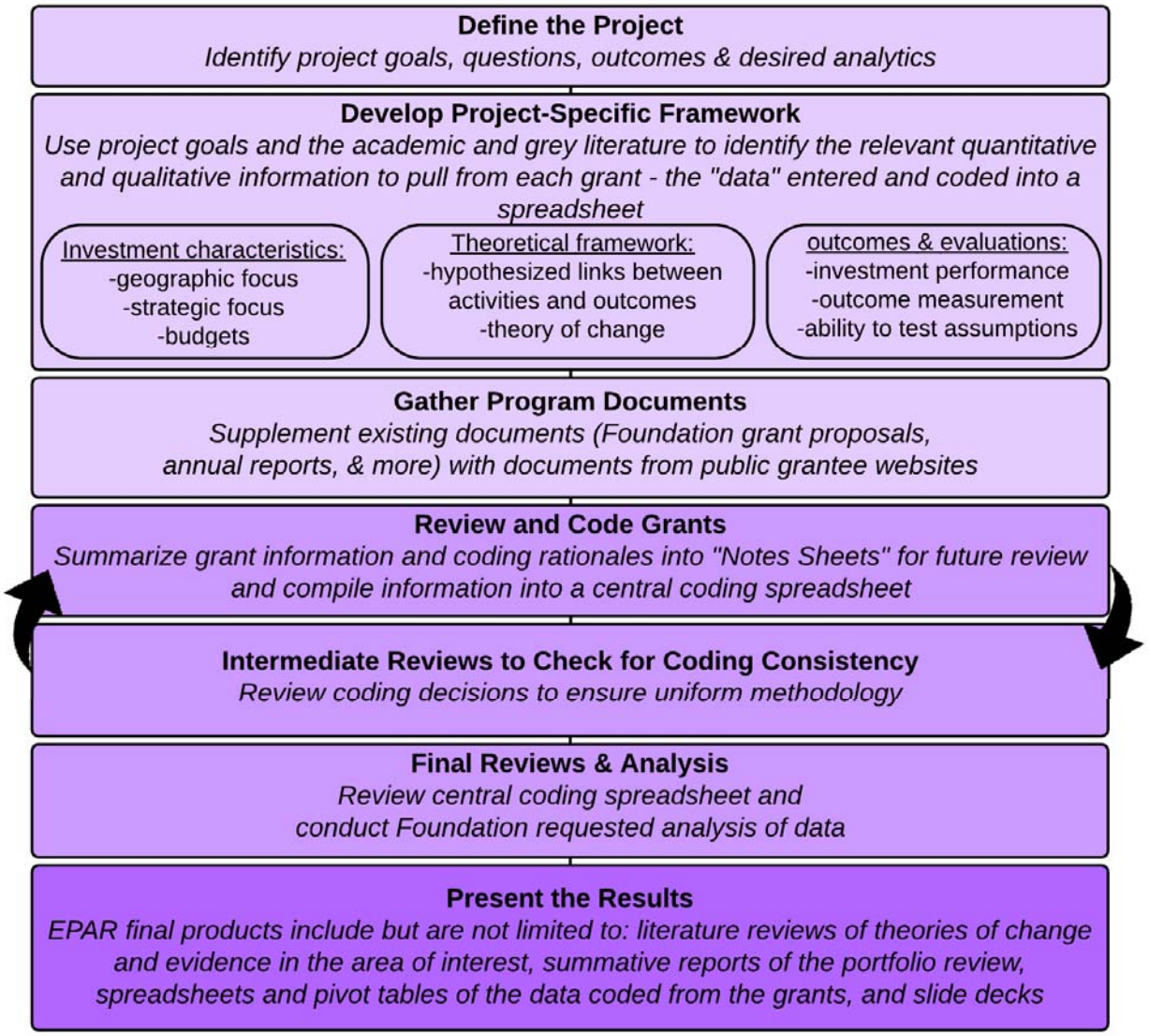
EPAR's Approach

- **Combine human and machine review**
  - Human review to define the project and develop project-specific frameworks (theory)
  - Machine review provides targets and guidance for human review

- **Dual approach makes portfolio review cost-effective, scalable, and rapidly deployable**
  - Can be used in adaptive decision-making

The Human Contributions

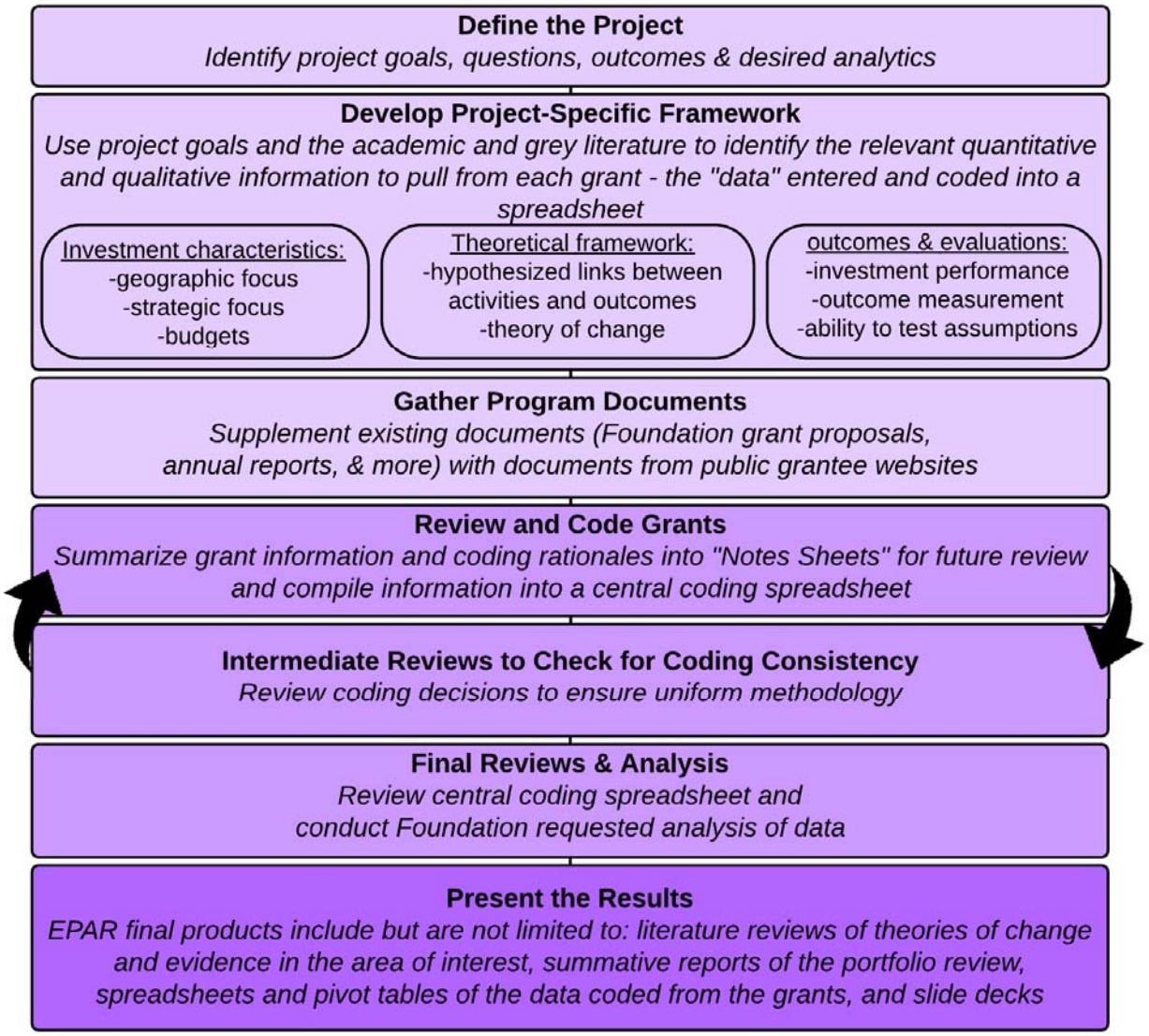


Theoretical Framework

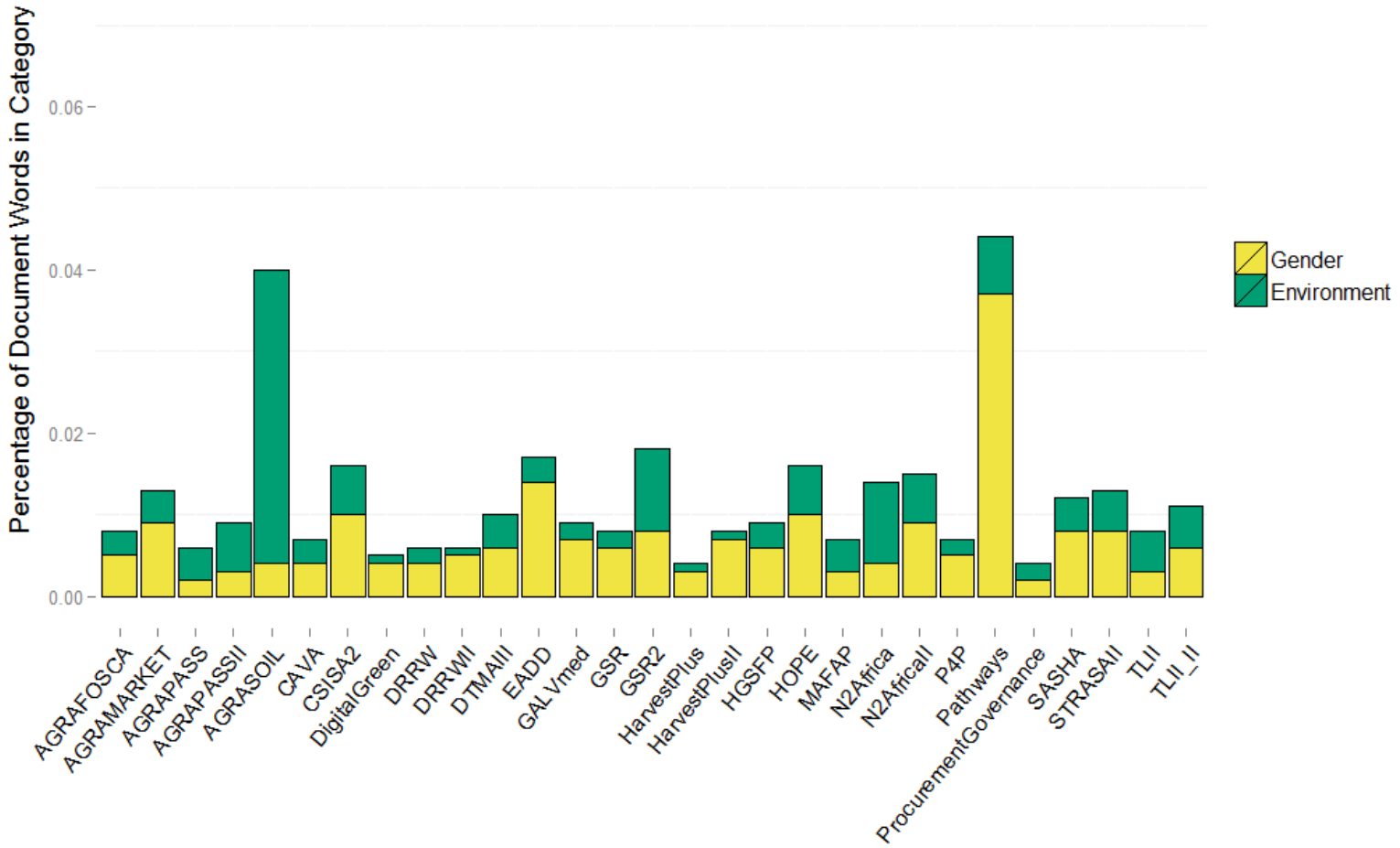
Grants	Information collection and dissemination	Collaboration	Increased nutritional purchasing ability	Own production (includes biofortification)	Direct food provision	Participant health status & knowledge	Gender Sensitive	Total Number of Pathways
Living Standards Measurement Survey (LSMS)	1						1	2
The Effects of Market Integration on the Nutritional Contributions of Traditional Foods to the Wellbeing of the Rural Poor in Africa	1						1	2
N2 Africa: Putting Nitrogen Fixation to Work for Smallholder Farmers in Africa	1	1	1	1		1	1	6
Assessment of Foundation Grantees' Gender Responsiveness	1	1					1	3
Home-Grown School Feeding	1				1		1	3
BioCassava Plus II				1			1	2
Micro-Land Ownership for India's Landless Agricultural Laborers				1		1	1	3
Cocoa Livelihoods Program			1			1	1	3
SASHA: Sweetpotato Action for Security & Health in Africa	1	1	1	1		1	1	6
Domestic Horticulture Market Development for Smallholders (DoHoMa)			1	1		1	1	4
Village Dynamics in South Asia (VDSA)	1						1	2
HarvestPlus II				1			1	2
Golden Rice				1	1	1	1	4
WFP Comprehensive Food Security and Vulnerability Analysis in 16 Sub-Saharan African Countries	1							1
Reaching Agents of Change (RAC): Catalyzing African Advocacy and Development Efforts to Achieve Broad Impact with Orange-fleshed Sweetpotato (OFSP)	1			1				2
CSISA: Cereal Systems Initiative for South Asia	1		1	1				3
A Political Economy Analysis of the Global Food Crisis 2007-2009	1							1
Ag-Nutrition Disconnect India (TANDI 1)	1	1						2
Ag-Nutrition Disconnect India (TANDI 2)	1							1
Global Futures for Agriculture	1	1						2
Biofuels and Food Security in South Asian and Sub-Saharan Africa: Pathways of Impact and Assessment of Investments	1							1
National Panel Survey Tanzania	1							1
Is Diet Quality a Good Predictor of Nutritional Outcomes? Comparing 24-hour Recall and Food Expenditure Surveys in Uganda and Mozambique	1							1
Development of Bananas with Optimized Bioavailable Micronutrients				1				1

The Human Contributions

Machine assistance



Assessing Word Frequencies Can Test Alignment with Strategy



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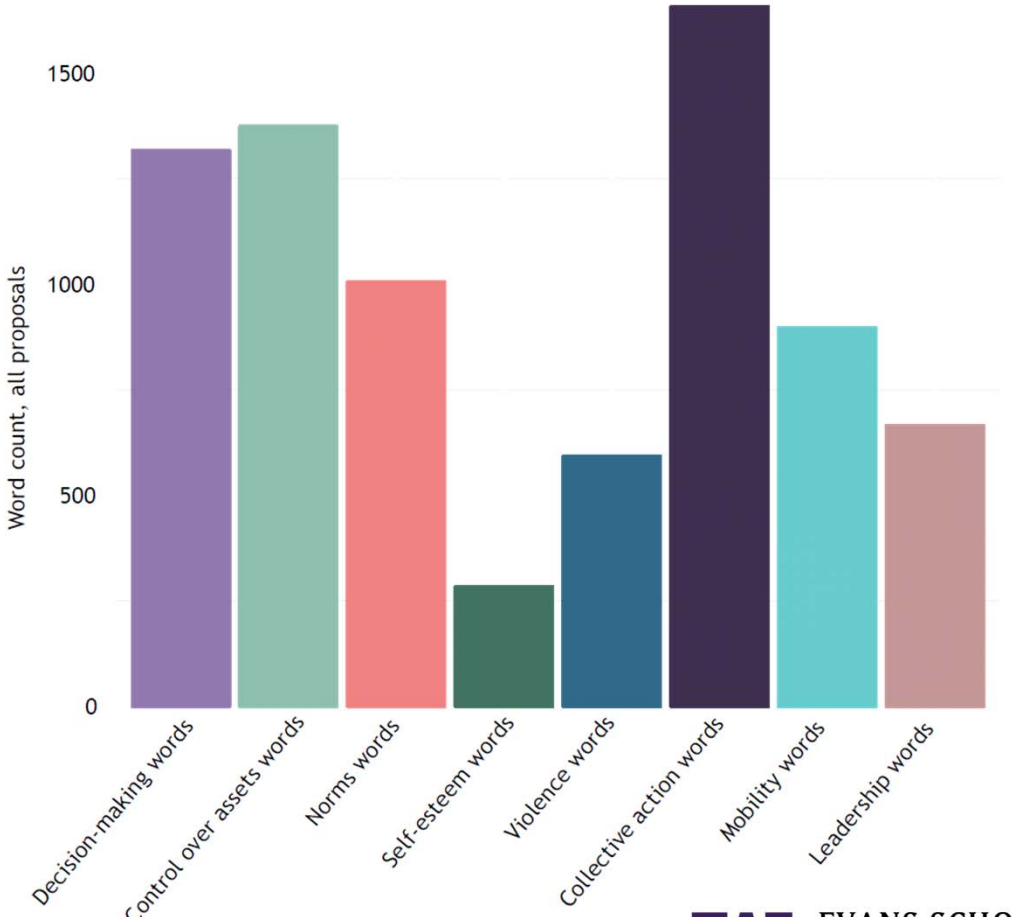
Simple Word Searches Can Help Target Human Review



Decision-Making words: decis, household, autonom, choic, power

Control over Assets words: control, asset, resourc, access, own, ownership, power

Norms words: norm, attitud, behavior, status, belief, believ, shame, cultur

Self-Esteem words: esteem, confid, dignit, respect, efficac, resili

Violence words: violenc, violent, abus, assault, rape, safe, trauma, harass

Collective Action words: dialogu, club, network, group, engag, solidar

Mobility words: move, access, space, market, free, freedom

Leadership words: leadership, role, mentor, coach, inspir

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The Machine Contributions

The role of text analysis and machine learning tools:

Developing a set of open-source resources for supplementing and automating portfolio review processes using:

- Social scientific software (e.g. Python and R)
- Basic Text Mining Approaches via R
- Supervised learning, machine learning
  - Natural language processing
    - Entity and keyword extraction
    - Geotagging
    - Relation extraction
  - Topic Modeling

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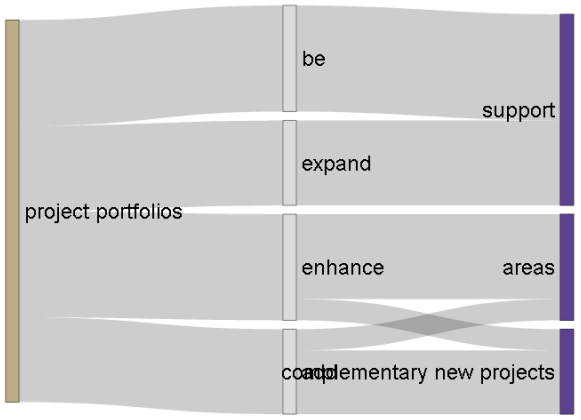
Two Approaches

> General Description

- Describe, classify, categorize automatically
  - > Provides time savings, replicability

> Exploration and Discovery

- Model, explore, discover interactively



Description

Paragraphs

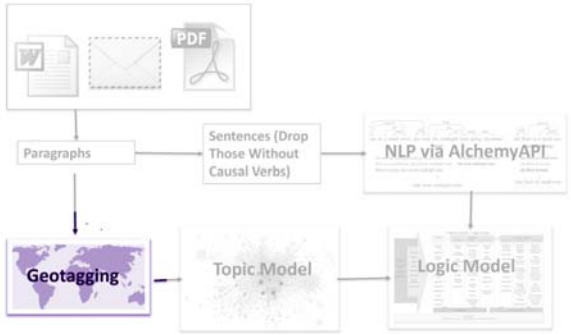
Break into sentences, words

Geotagging

Topic Model

- Categorize/classify documents
- Correlations across words/documents
- Frequencies within opportunities
- Targeted locations within documents

Example 1: Automatic Geotagging

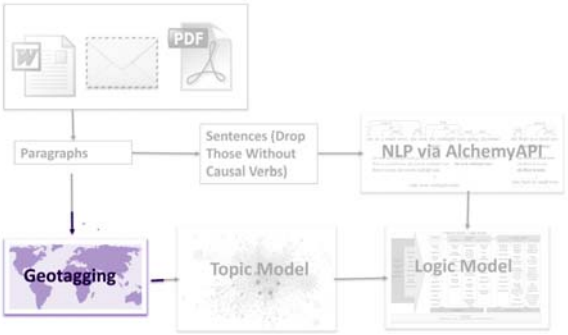


Where are agriculture and nutrition grants targeted?

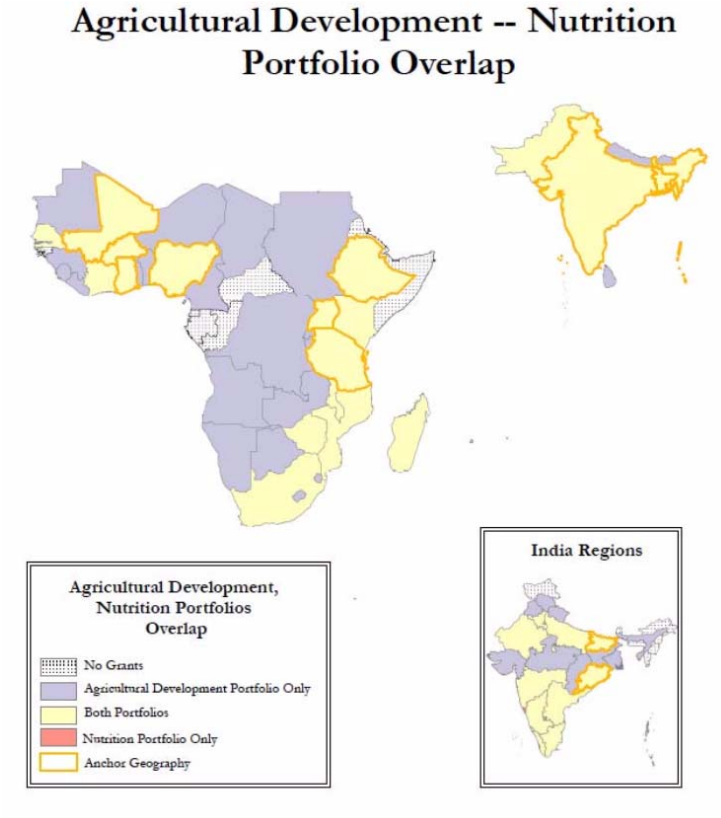
> **Rather than search for countries, with a trained geomodel, one can tag what documents discuss which countries**

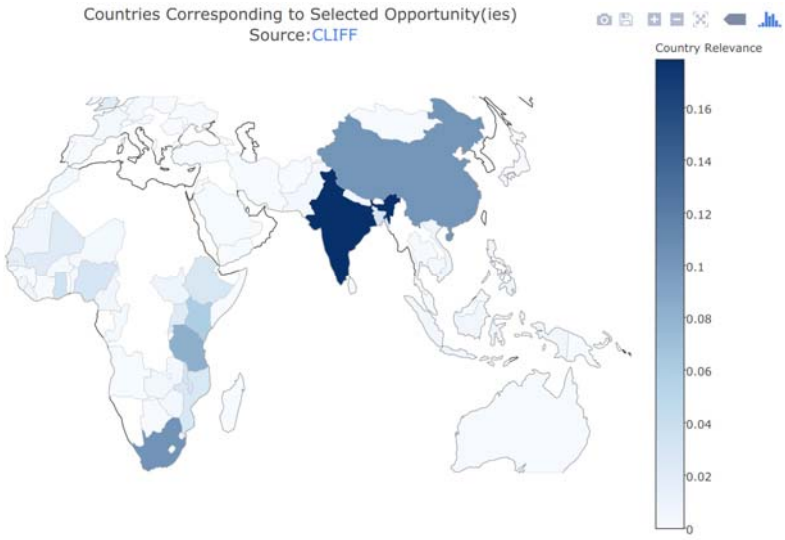
  – **We apply the Cliff geocoding application to the documents to generate a map of "relevance"**

Geographic Description



Manual versus automated coding





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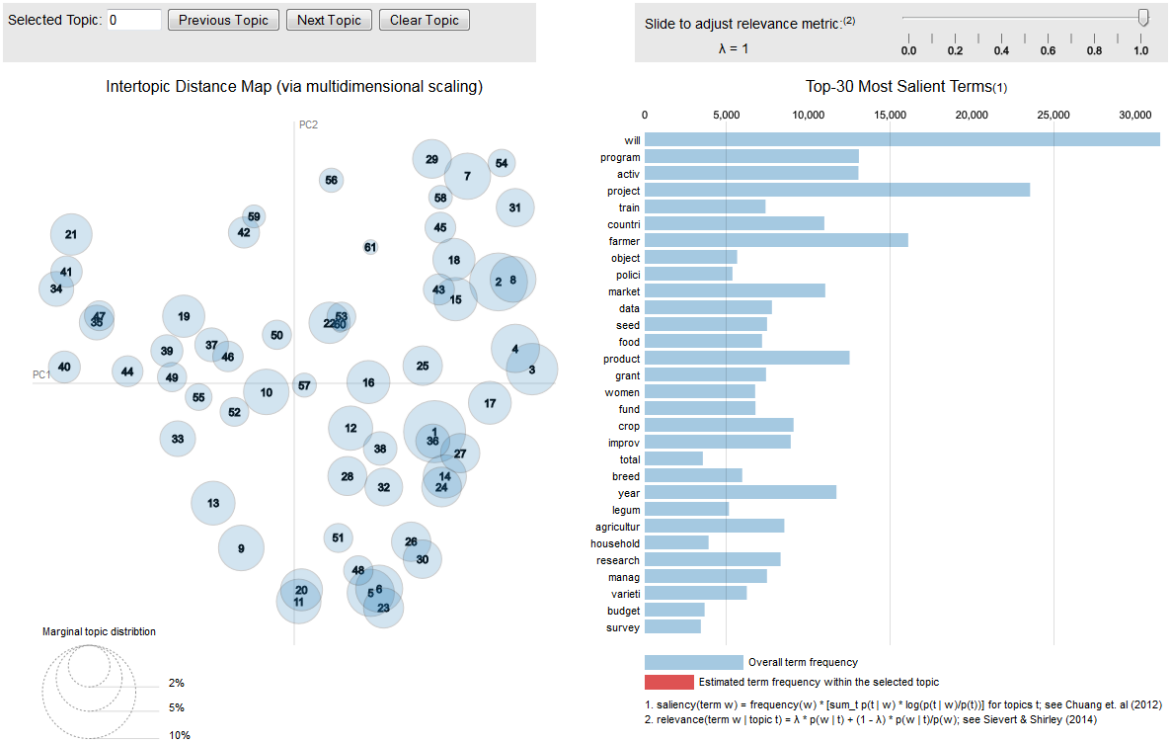
Example 2: Predicting Document Categories

- **Which documents within all agriculture and nutrition grants target agriculture or nutrition?**
  - Manual review identified 30 grants out of 257 grants.
  - Automated review can speed up the process,

Topic Model

Topic model for a body of 257 agriculture and nutrition grants.



> If we want grants related to “Agriculture,” “Nutrition,” or “Both,” then we can fit a topic model that provides keywords for topics that are extracted from data
  - Relevant grants identified via grant title in file name.

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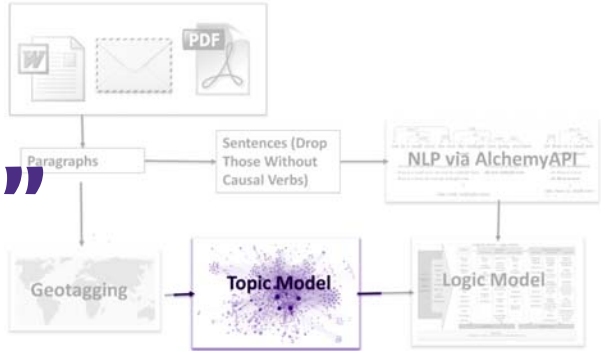
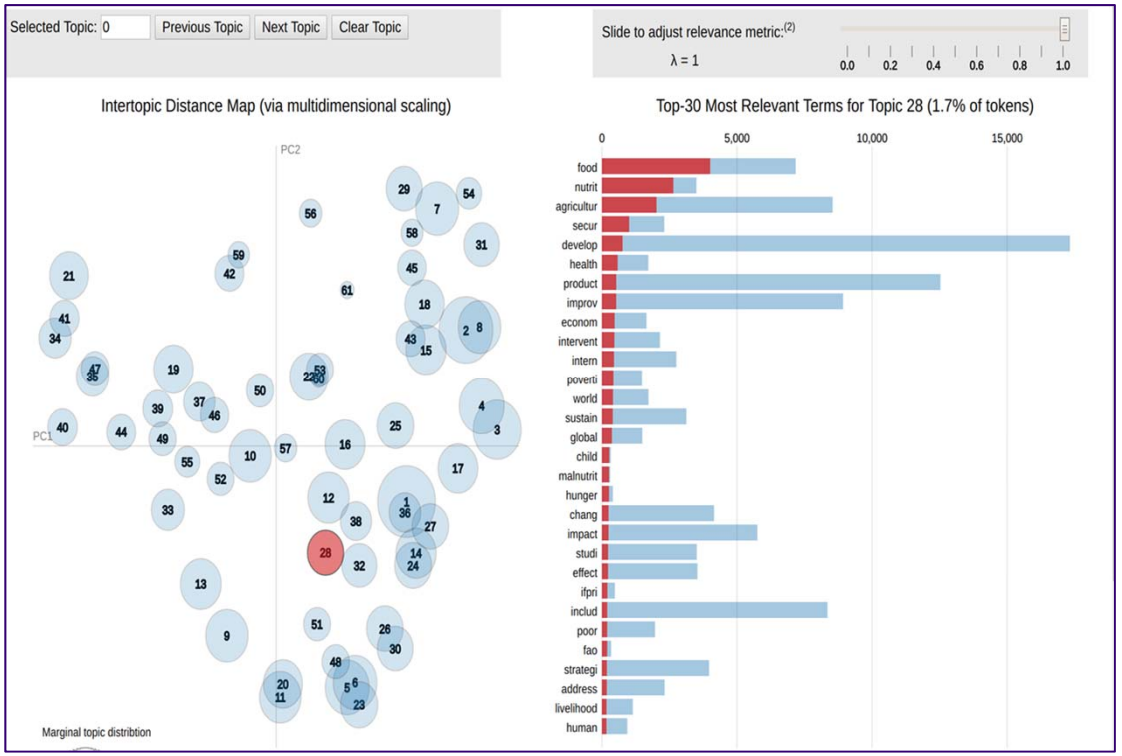
Manual Coding of "Agriculture/Nutrition"



- **Agriculture:** 5, 6, 9, 10, 13, 16, 19, 20, 21, 22, 23, 33, 34, 35, 36, 41, 42, 44, 47, 48, 50, 52, 55
- **Nutrition:** 37, 46
- **Post-Tagging:** Document On Agriculture = Union of Topic Probabilities



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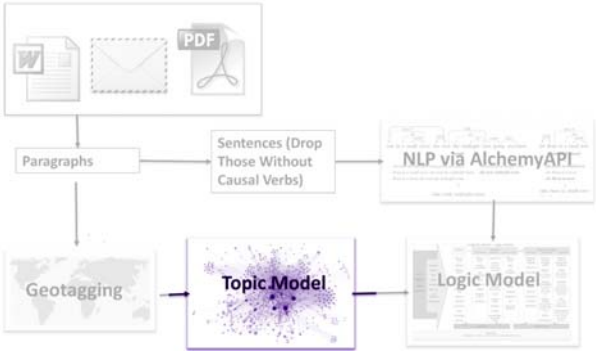
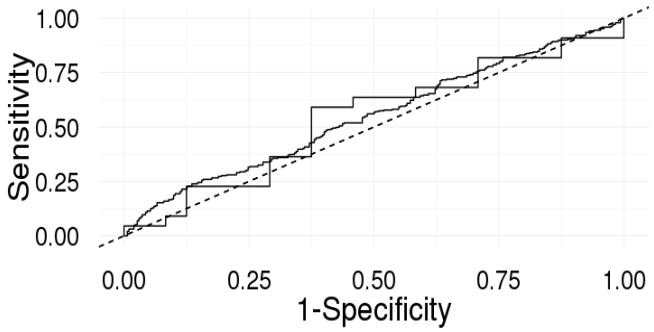
Identifying Relevant Documents/Grants

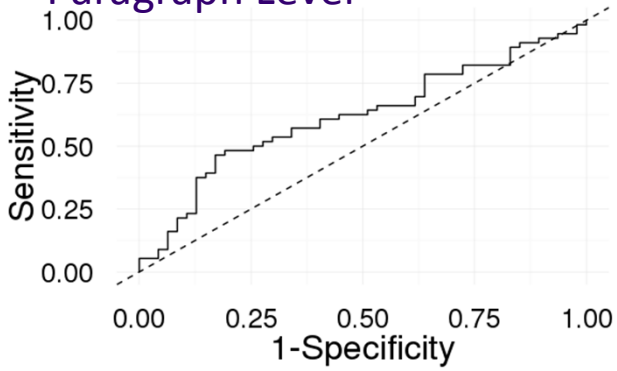


- **Probabilistic rather than discrete**
  - Goal is to be mostly right
- **Generally effective at matching manual coding**
  - What "topics" are miscategorized?
  - What differences were identified in human versus manual coding?

Document/Opportunity Level



Paragraph Level



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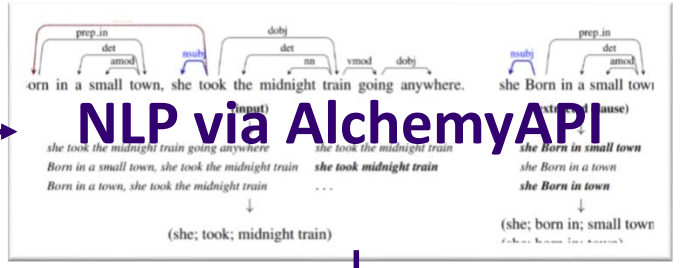
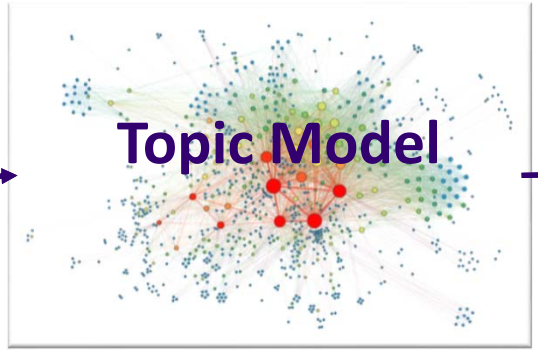
Method

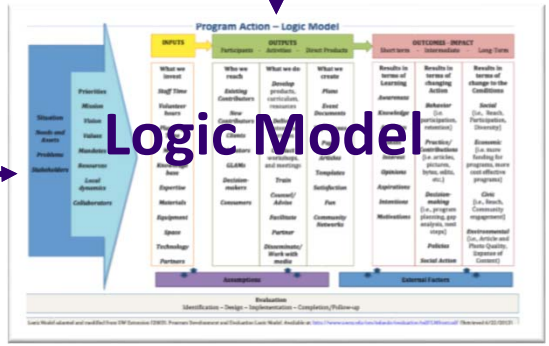
Paragraphs

Sentences, words (only keep causal verbs)



Geotagging





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Motivating a Program Theory Assessment

e.g., What are the pathways by which developing new crop varieties (R&D activities improving seeds) improves smallholder productivity and/or nutrition?

> **What:** developing new crop varieties
> **How:** What are the causal pathways?
> **Outputs**: What do R+D activities produce?
> **Outcomes:** Improved nutrition

NOTE: Tie between outputs and outcomes is often vague/unclear if there is no formal logic model

Pathways for Impact

What are the pathways by which developing new crop varieties (R&D activities improving seeds) improves smallholder productivity and/or nutrition?

1. **Identify actions**
   - Topic Model
2. **Identify how/pathways**
   - Extracting causal patterns that connect policy actions/interventions to outputs and finally outcomes
3. **Identify outcomes**
   - Can look for both outputs and outcomes
   - Identify potential indicators

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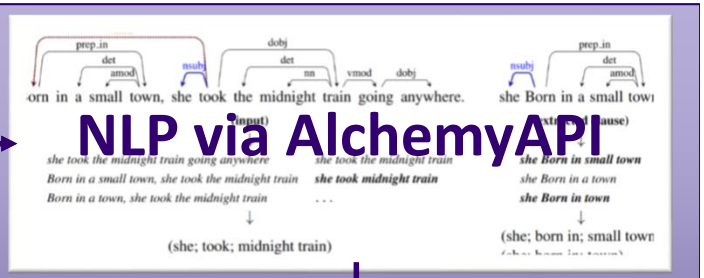
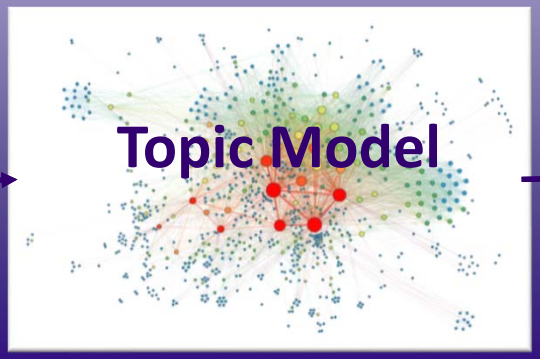
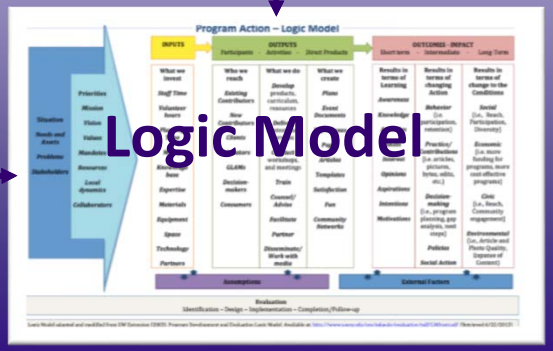
Exploration/Discovery

Paragraphs

Sentences (Drop Those Without Causal Verbs)







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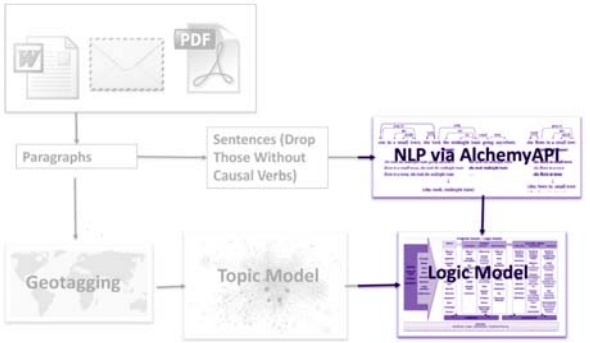
Manually Coded Activities

- **Developing new crop varieties (R&D to improve seeds)**
- **Strengthening delivery mechanisms** (value chain focused activities linking farmers to new technologies)
- **Agricultural extension** (extension activities focusing on improved technologies or crop management)
- **Nutrition/health extension** (extension activities focusing on nutritional benefits of different crops)
- **Other education** (education ranging from finances to advocacy)
- **Data collection** (crop studies and surveys on agriculture / nutrition)
- **Data analysis** (analysis of studies and surveys, publications of findings)
- **Developing informational resources** (resources ranging from web portals to extension guides to journal articles)
- **Supporting collective action** (activities establishing local groups)
- **Creating institutional partnerships** (collaborative activities promoting partnerships between institutions)

Thinking About Theory



New crop varieties **Mechanism** **Outcome**

Actions → Topics 21, 19, 42, 34

Causality → Topics 21, 19, 42, 34

Indicators → Topics 21, 19, 42, 34

Topics 21, 19, 42, 34 → Identify documents where P(21 u 19 u 42 u 34) is maximized

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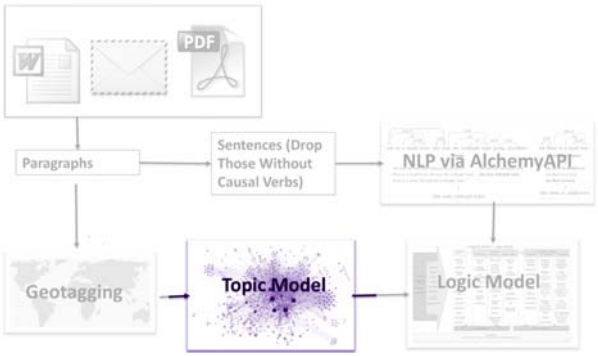
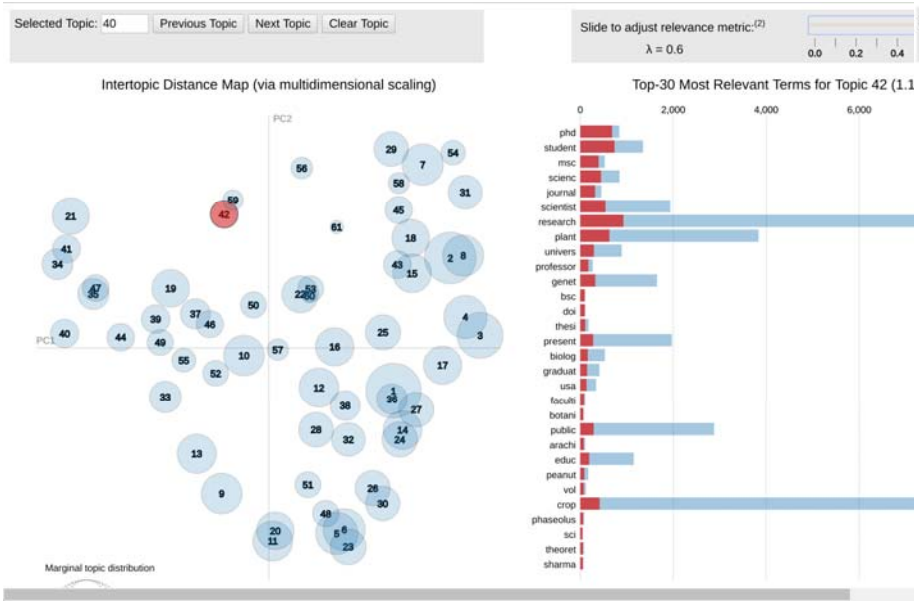
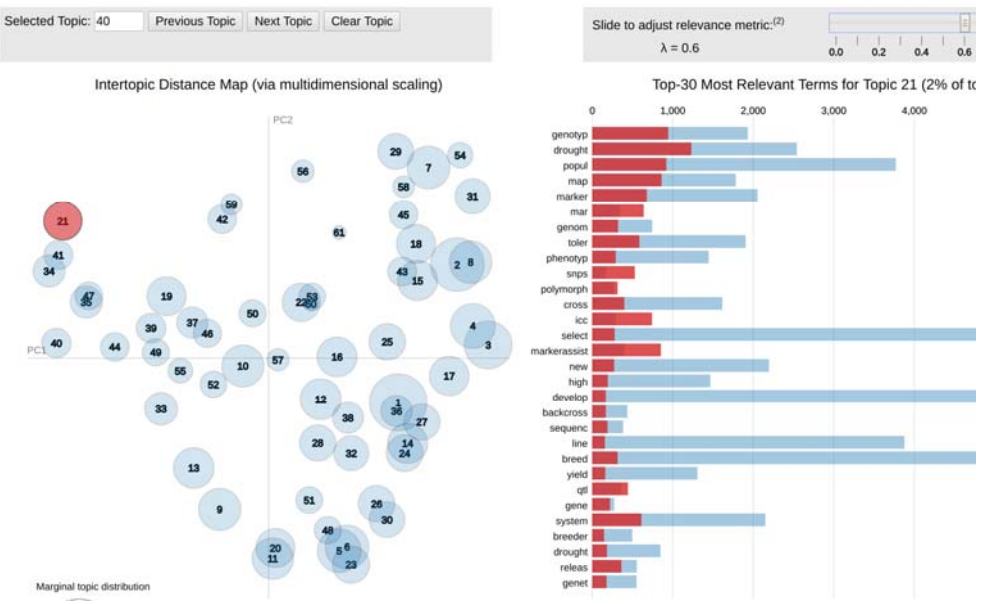
1. Identify Actions



"Developing new crop varieties (R&D to improve seeds)"





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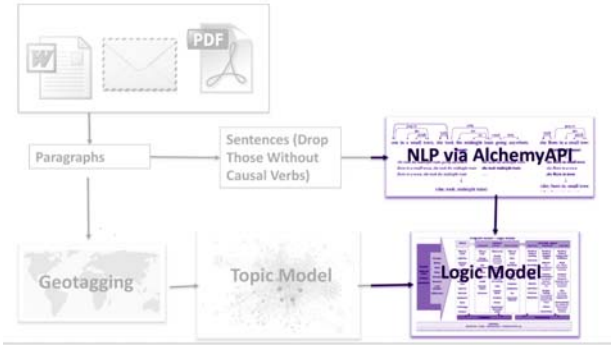
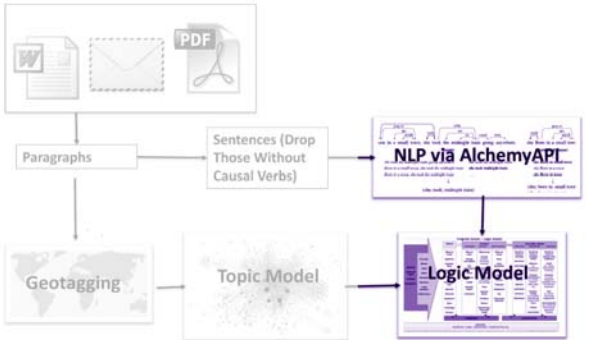
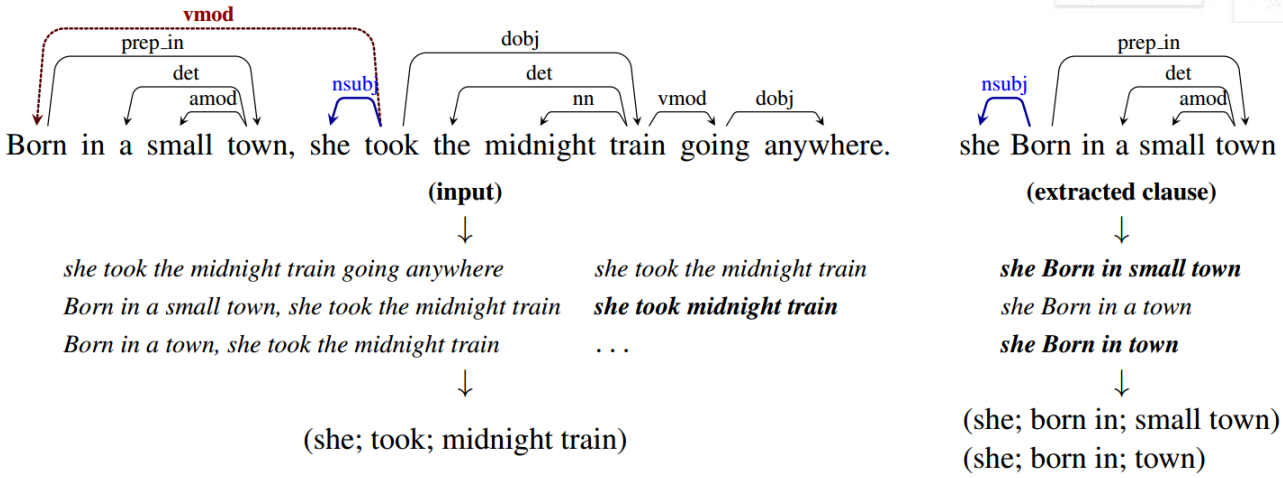
2. Identify How / Pathways



- **Causal verbs indicate pathway (theoretical)**
- **1. Extract sentences with causal verbs**
- **2. Map verbs to subjects, direct objects**
- **3. Using list of "causal" sentences:**
  - Classify all pathways within high probability of seed R+D Topics
    - Evaluate for patterns
  - Pick high probability words for topic, seek out pathways

Natural Language Processing





- Rely on Stanford NLP, OpenNLP, IBM AlchemyAPI
- Utilize structure of sentence to extract causal pathway
  - Working towards automated logic model identification

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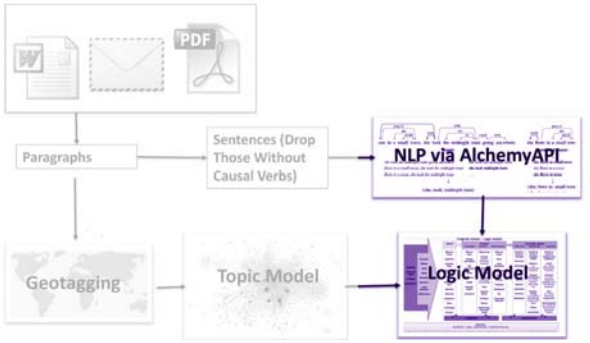
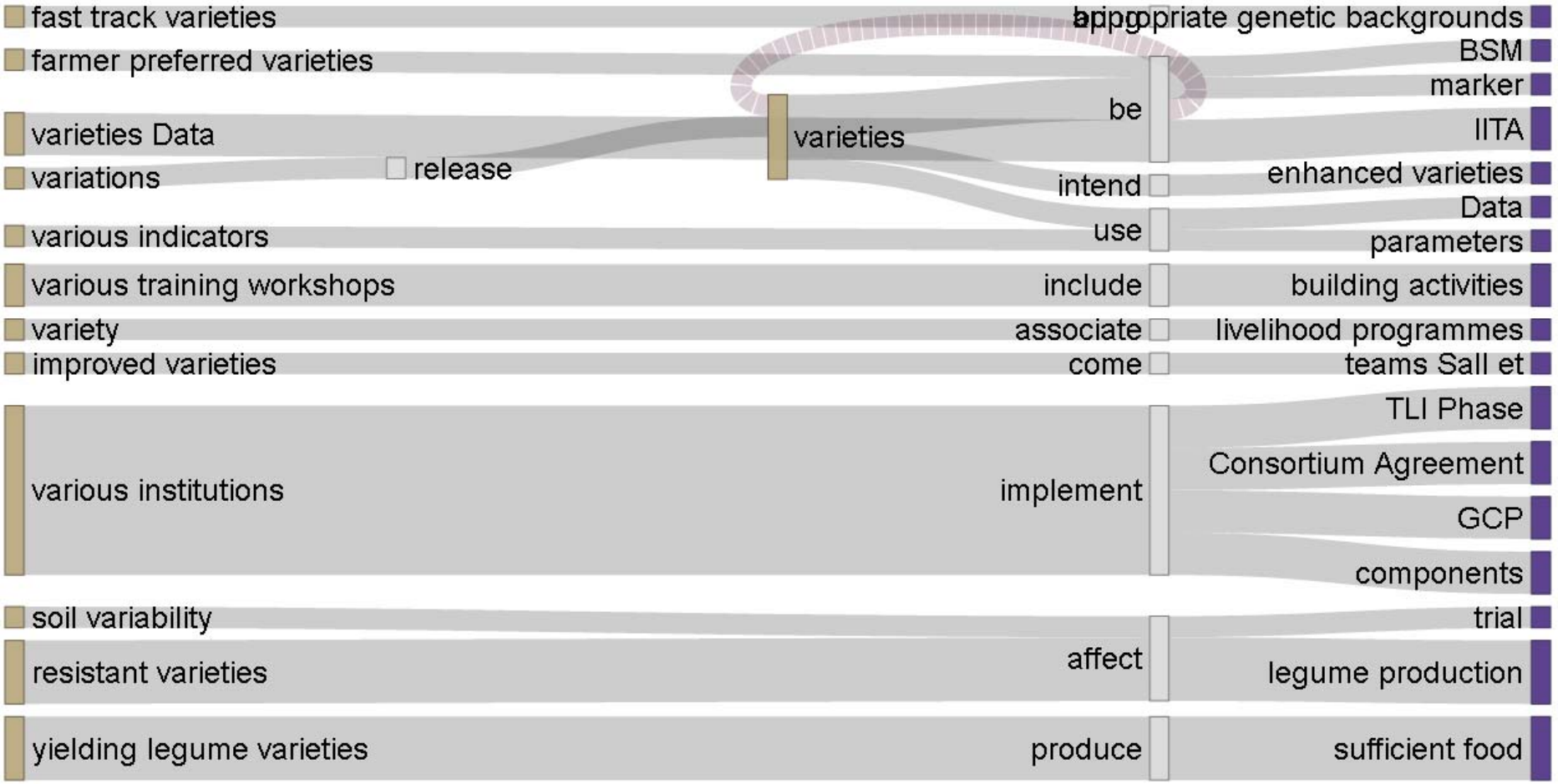
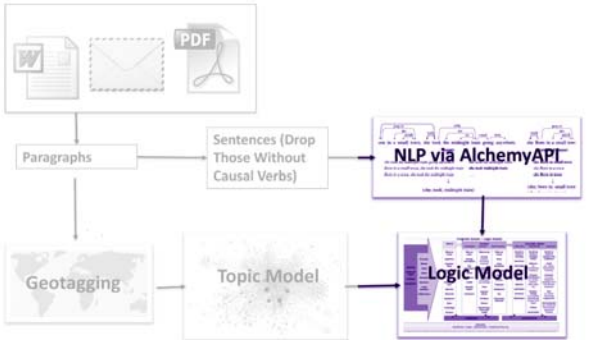
Linking Word Trees



Subject-verb-object trees for "vari" within chosen topics

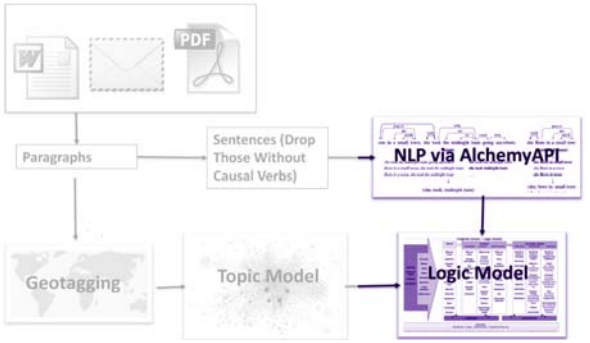


Extract Trees

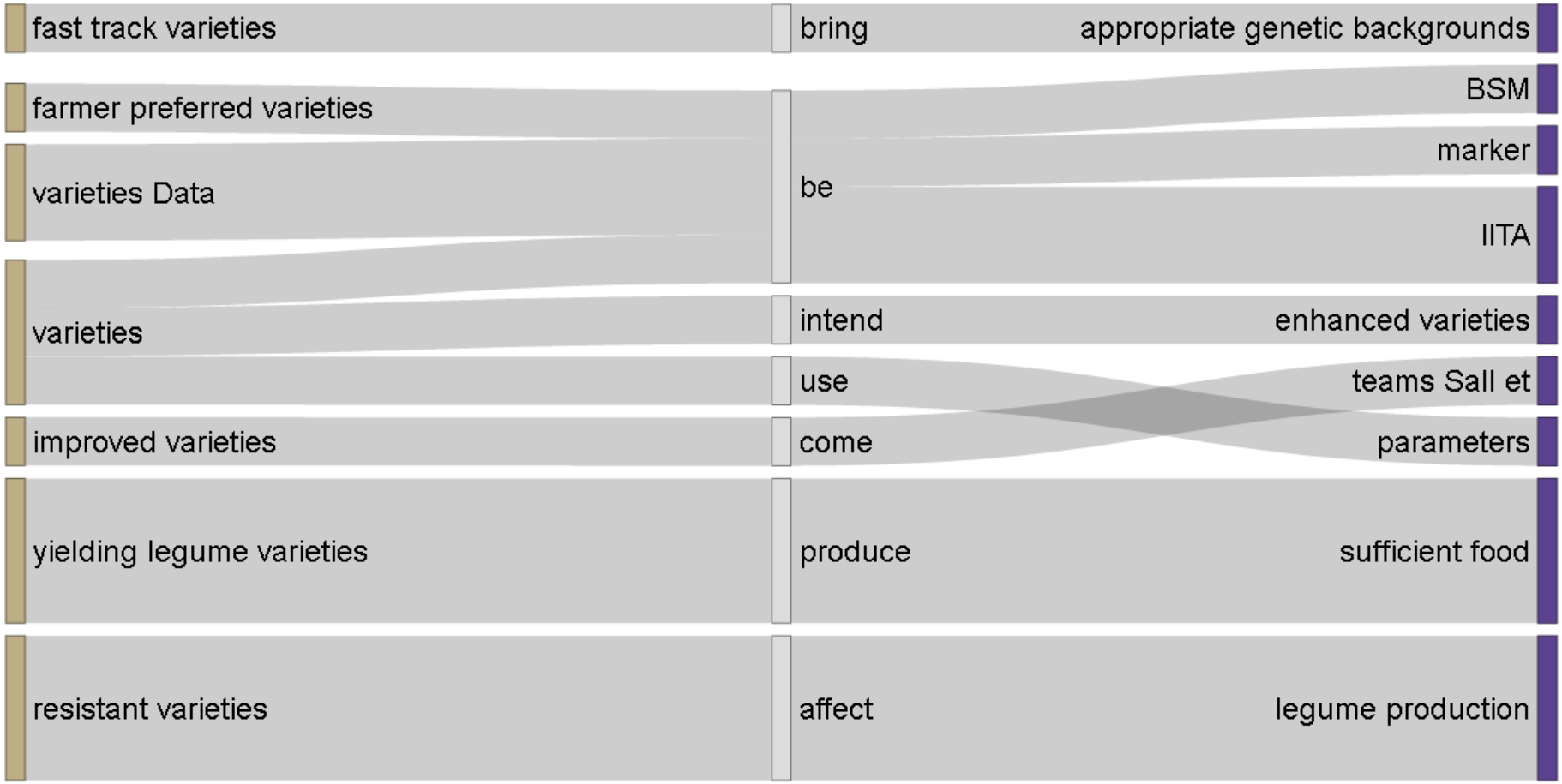


> **Purpose:**
  - Can motivate follow-up investigation
  - Can help prioritize human coding efforts
  - Can identify causal pathways rapidly
  - Can show what grants might rely on similar pathways

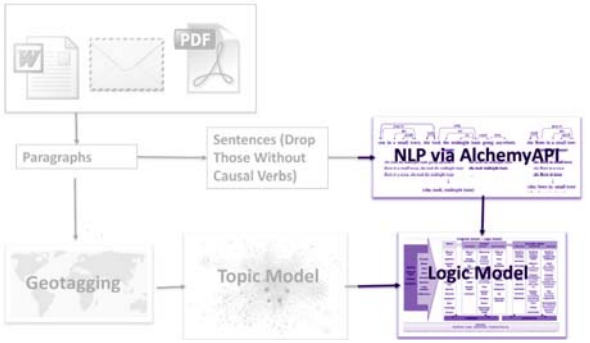
Extract Trees: Seeing Patterns



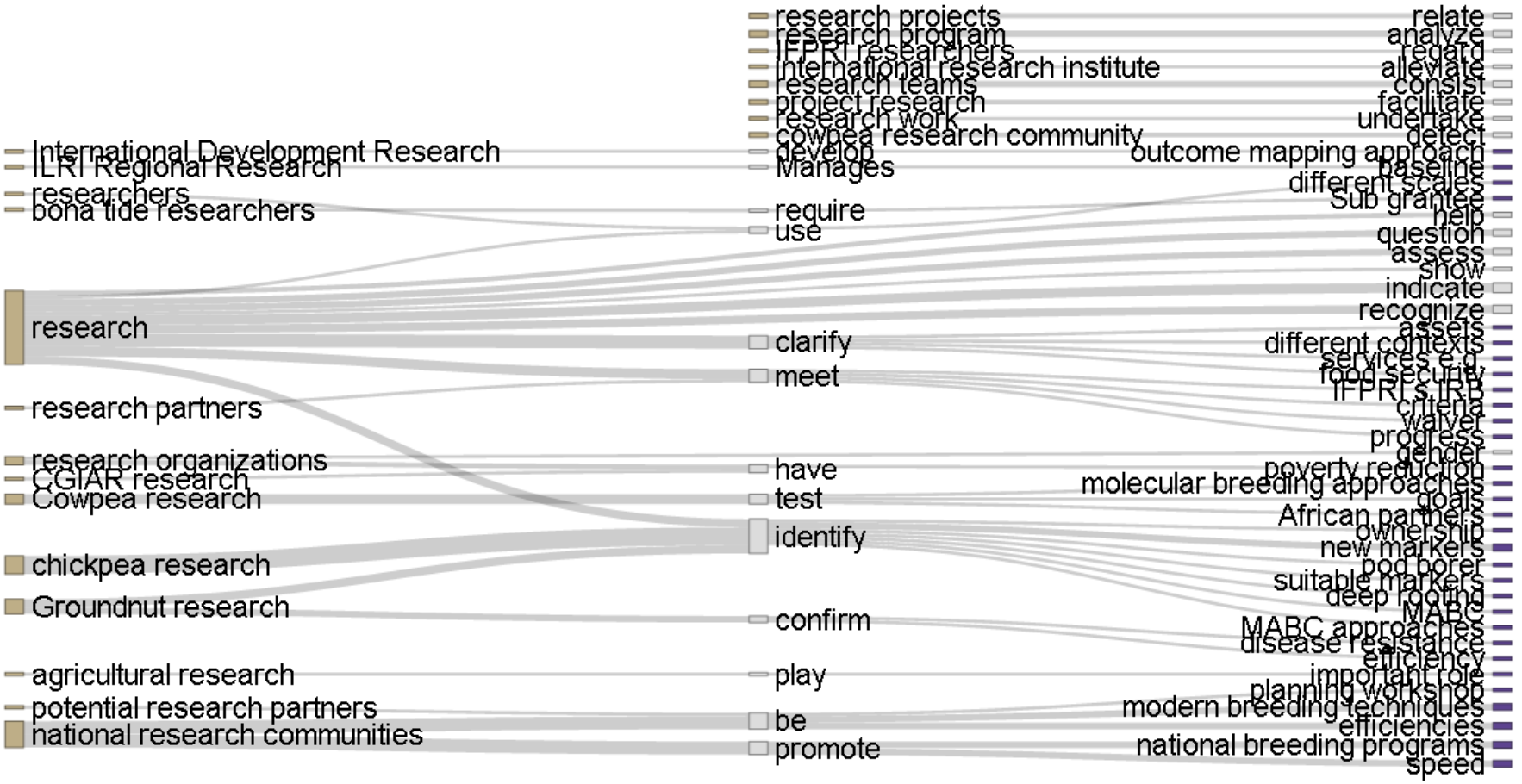
Subject-verb-object trees for "varieties" within chosen topics



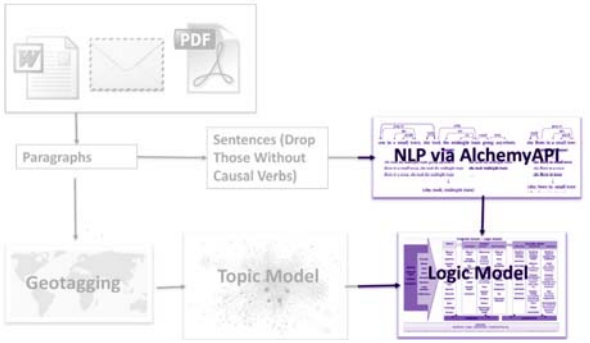
Extract Trees: Finding Pathways



Subject-verb-object trees for "research" within chosen topics

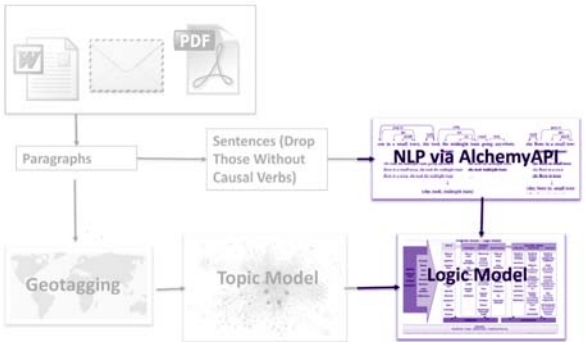


Extract Trees: Narrowing Scope

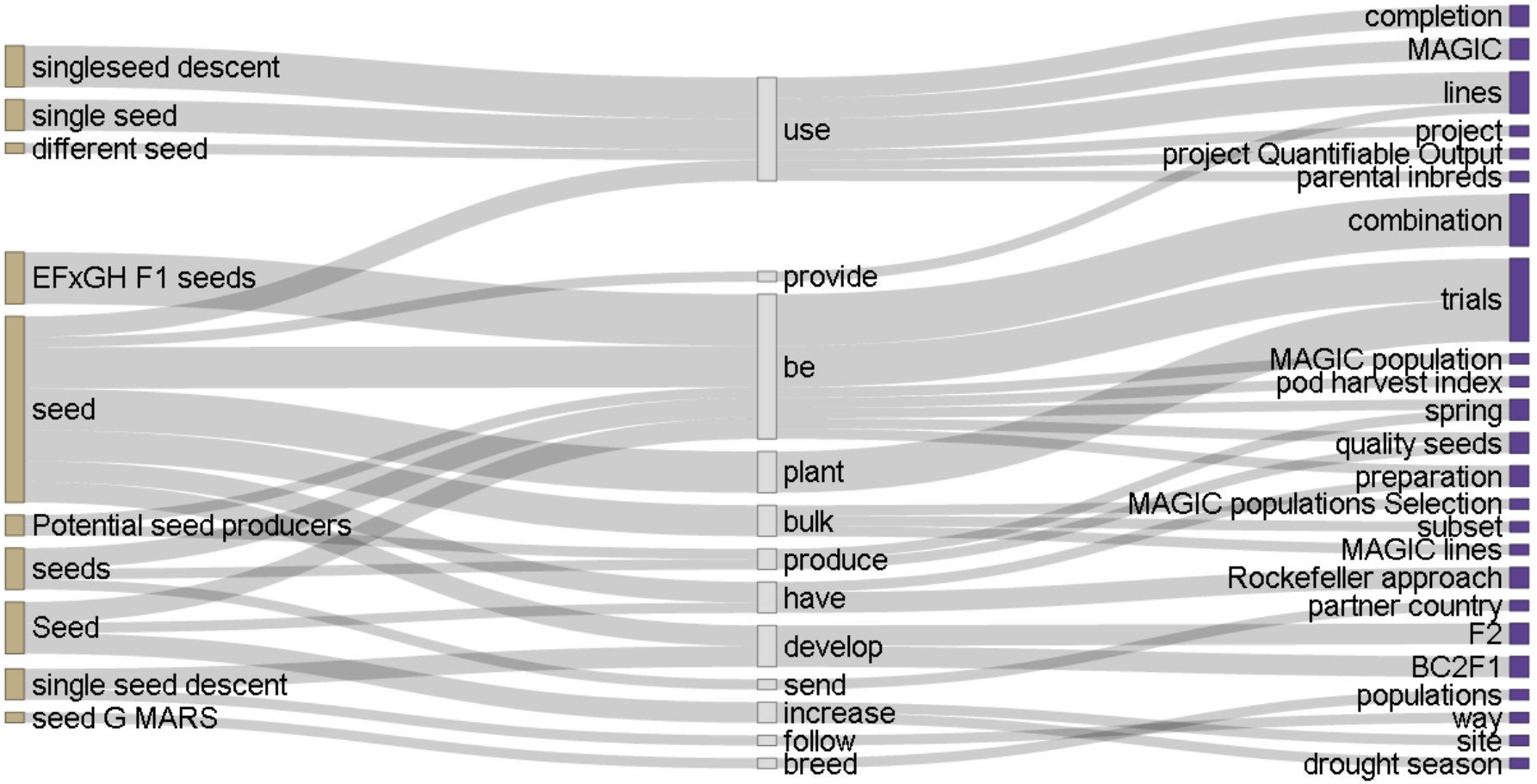


Filtering for "identify" and "research" within chosen topics

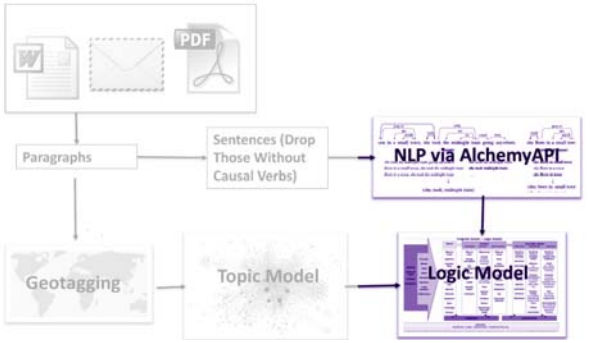
Extract Trees: Exploring Connections



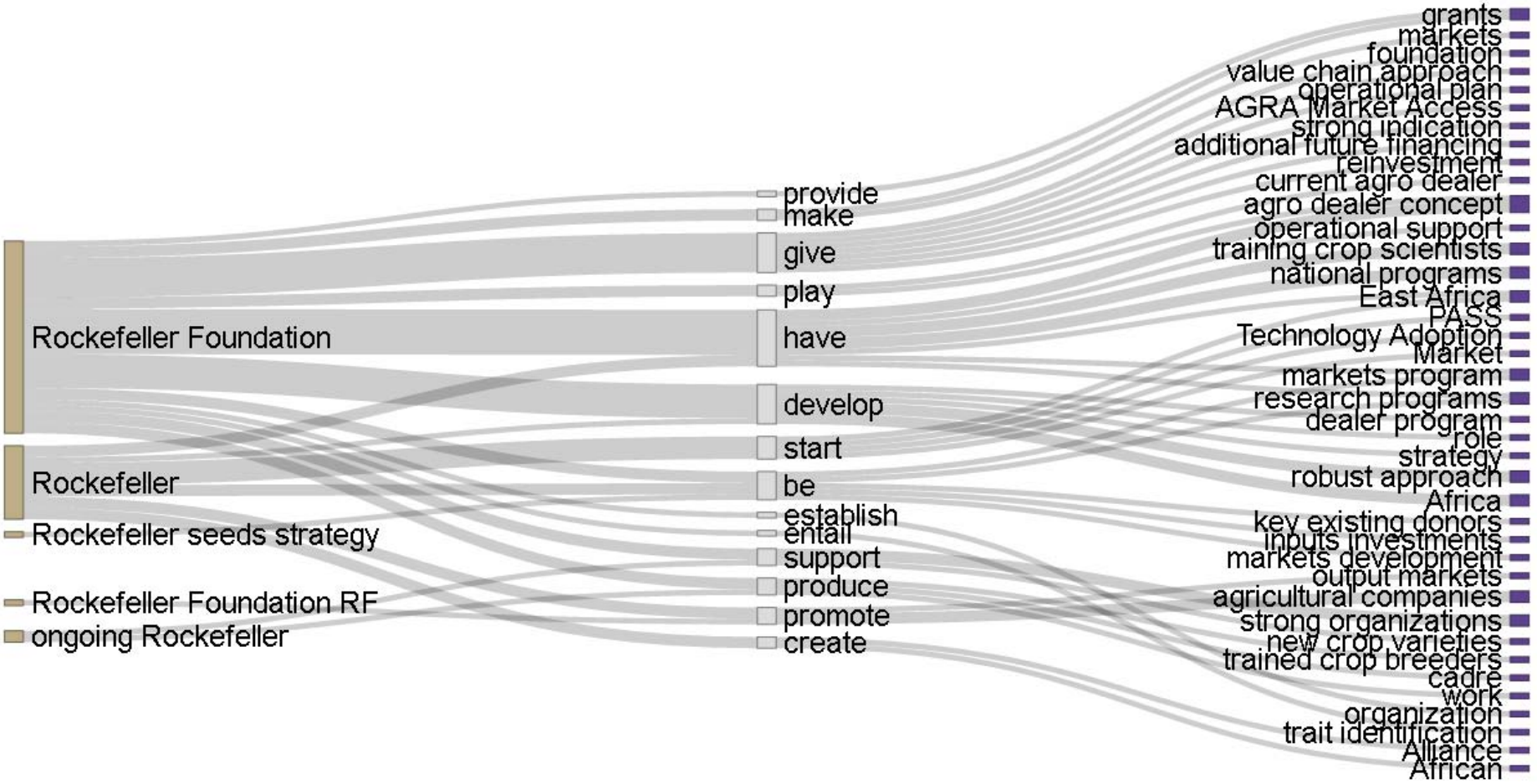
Searching for "seed"



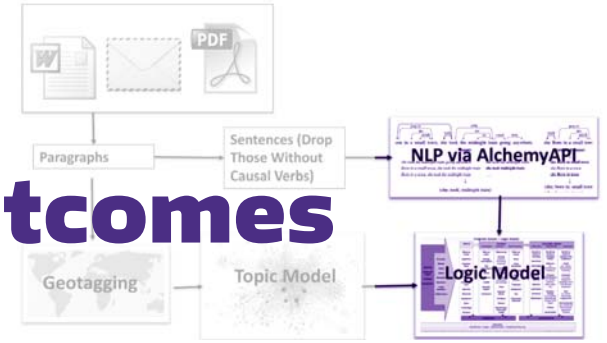
Extract Trees: Identifying Key Concepts / Players



Why "Rockefeller Approach"?



3. Mapping Actions to Outcomes



Topics

21 19 42 34

Word:

production

Filter Strength

0 20

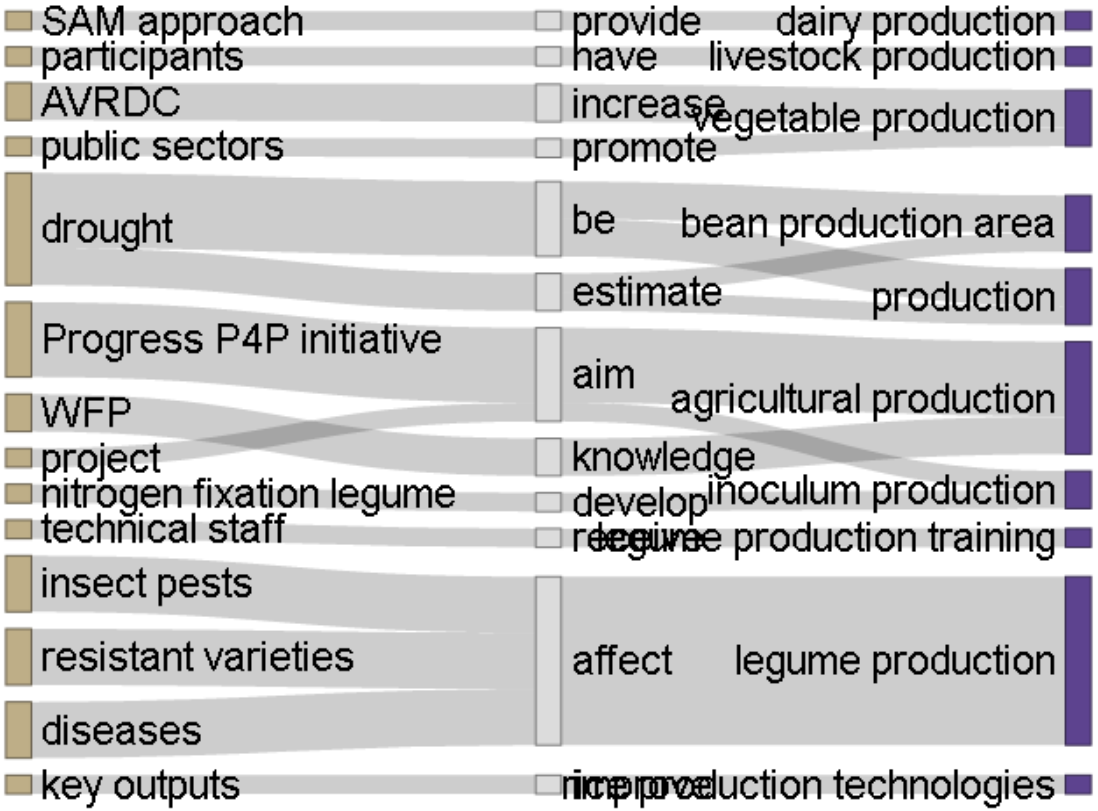
0 2 4 6 8 10 12 14 16 18 20

Subject

Links

Strict Word?

Download



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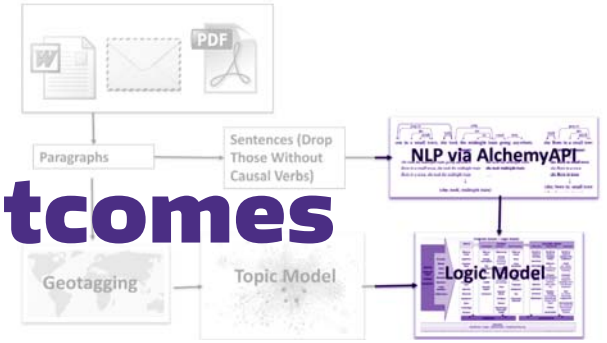
3. Mapping Actions to Outcomes



Topics

21 19 34 42

Word:

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Filter Strength

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☑ Subject

Links

☑ Strict Word?

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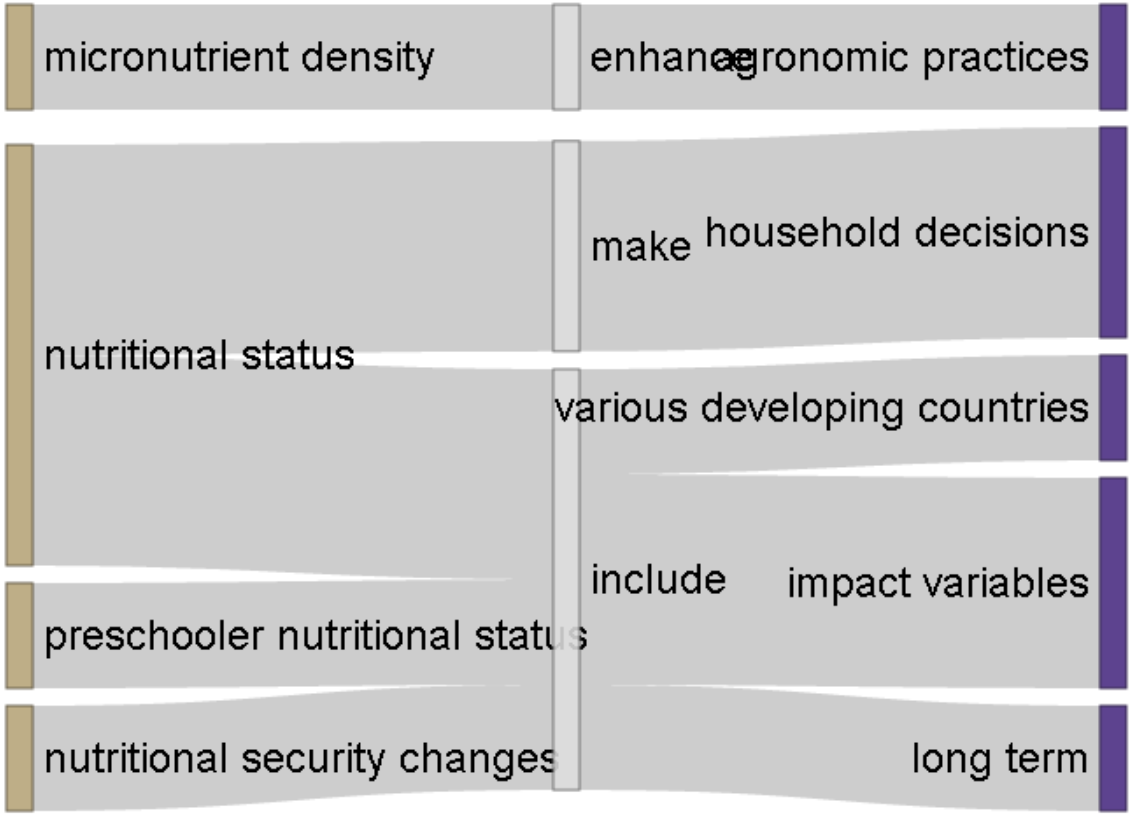

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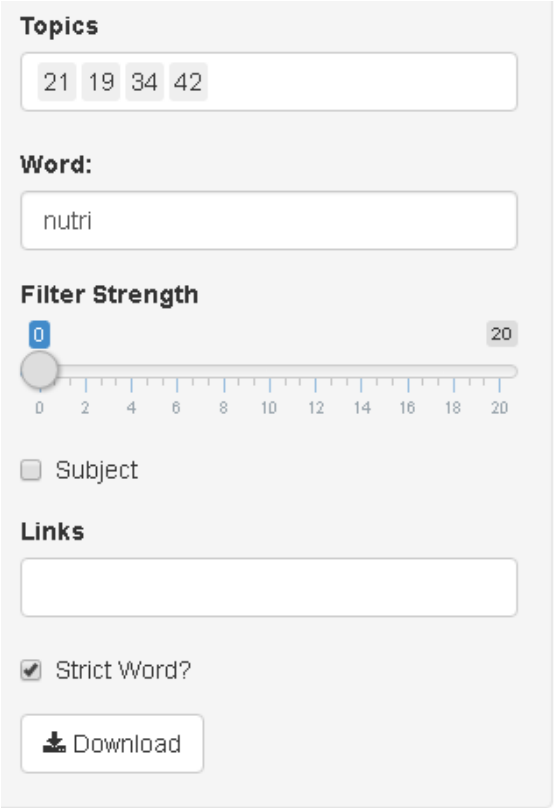
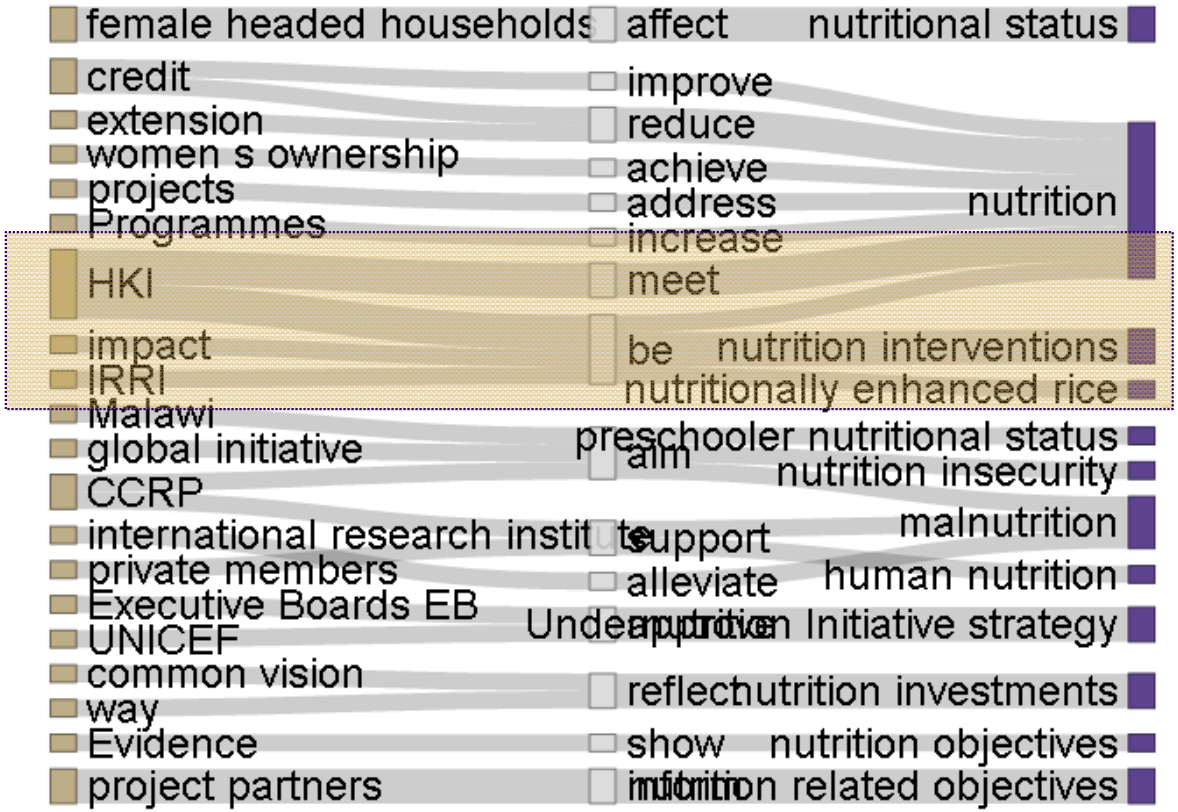
3. Mapping Actions to Outcomes: Nutrition as Outcome



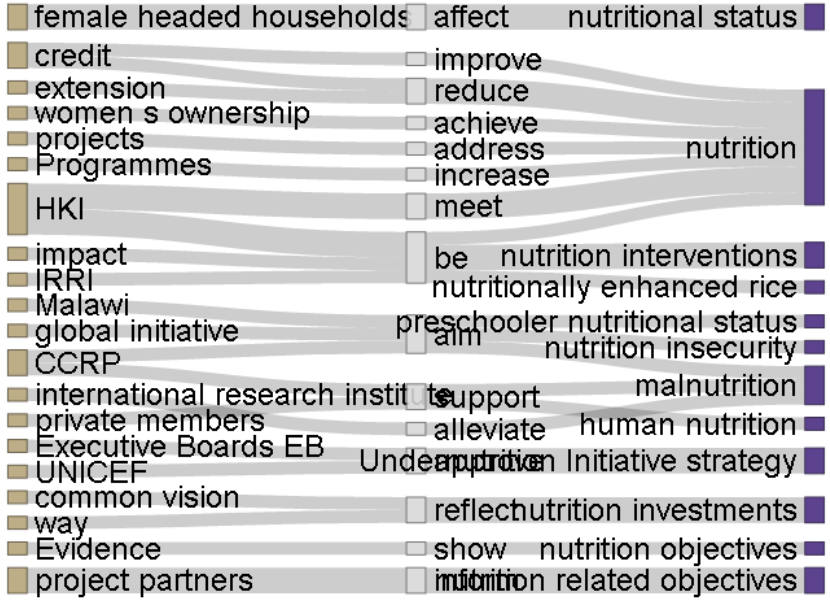


HKI is an expert in deploying nutrition interventions, while IRRI is skilled in developing nutritionally enhanced rice varieties.

Improved Seed and Nutrition?

Towards a logic model: Seed R+D can improve nutrition through partnerships between research organizations and engagement organizations

Notice prevalence of organizational partners: improved seed cant lead to improved nutrition without working with smallholders, requires different expertise



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Then Iterate Back to Descriptive Searches Based on Pathways

- What target locations?
- Which grants?
- Which program officers?
- What concepts are related?

Evans School Policy Analysis & Research Group (EPAR)

Professor C. Leigh Anderson, Principal Investigator
Professor Travis Reynolds, co-Principal Investigator

EPAR uses an innovative student-faculty team model to provide rigorous, applied research and analysis to international development stakeholders. Established in 2008, the EPAR model has since been emulated by other UW schools and programs to further enrich the international development community and enhance student learning.

Please direct comments or questions about this research to Principal Investigators C. Leigh Anderson and Travis Reynolds at epar.evans.uw@gmail.com.

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