Diffusing global policy on the exchange and use of genetic resources: Impacts on the structure and norms of scientific research

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Dr. Eric Welch
CSTEPS Center Director and Professor
School of Public Affairs
Arizona State University
EricWelch@asu.edu

ASU center for science, technology and environmental policy studies
ARIZONA STATE UNIVERSITY

Outline

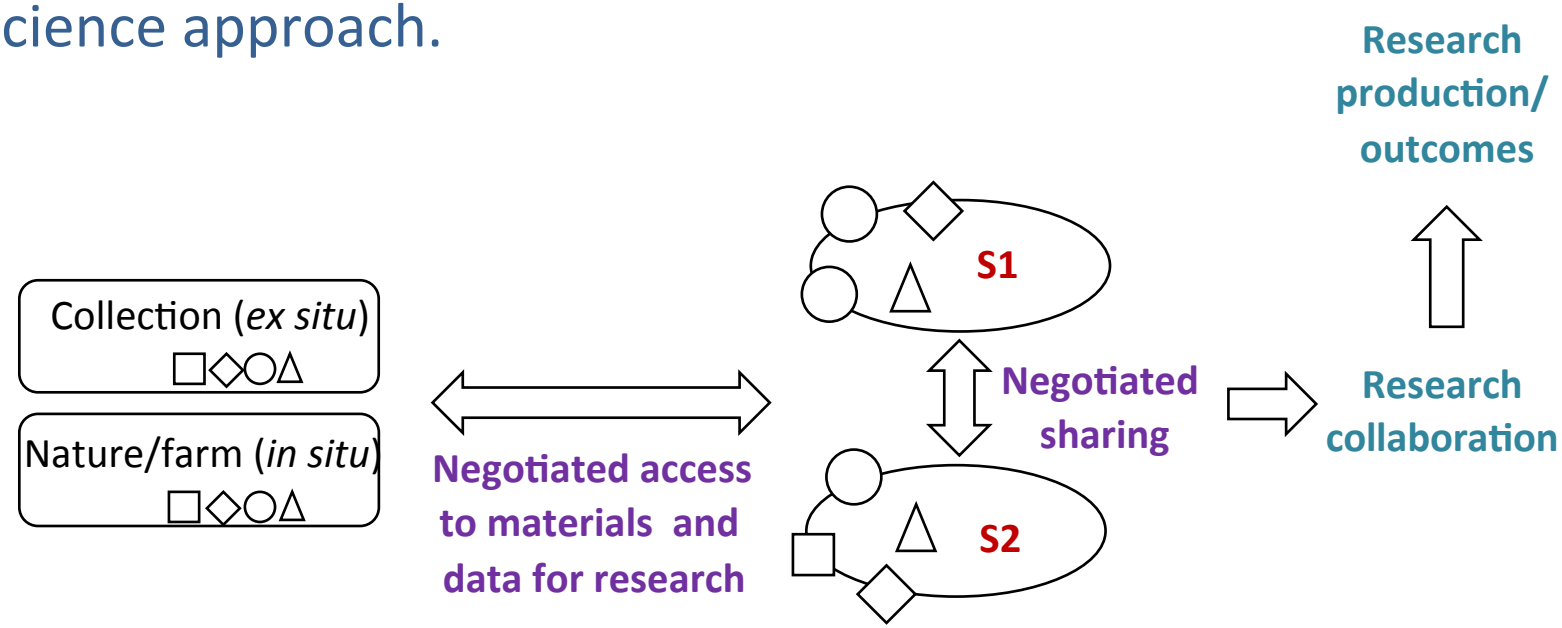
- Global policy story – genetic resources
- Contested resources framework for science
- Policy diffusion considerations
- Nagoya protocol example
  - National-level policy diffusion impacts
  - Scientist-level policy diffusion impacts
- Conclusions

Global Science Policy Story

- Global Problems – climate change, food security, disease identification and control, energy, water…
- Global Science and Technology – global collaboration, knowledge development, joint solutions
- Two different (global) policy trajectories for science
  - Openness initiatives and open science. Global and national policies have sought to encourage greater data exchange, sharing and openness.
    - G-8 Open Data Charter, 2013; Obama Open Data Executive Order, 2013; open data genomics platforms
  - Regulation, monitoring and control. Global and national policies designed to address safety and security, conservation, fairness and equity in response to biopiracy concerns, intellectual property considerations, etc.
    - Nagoya Protocol to the Convention on Biodiversity; Cartagena Protocol; International Treaty on Plant Genetic Resources for Agriculture

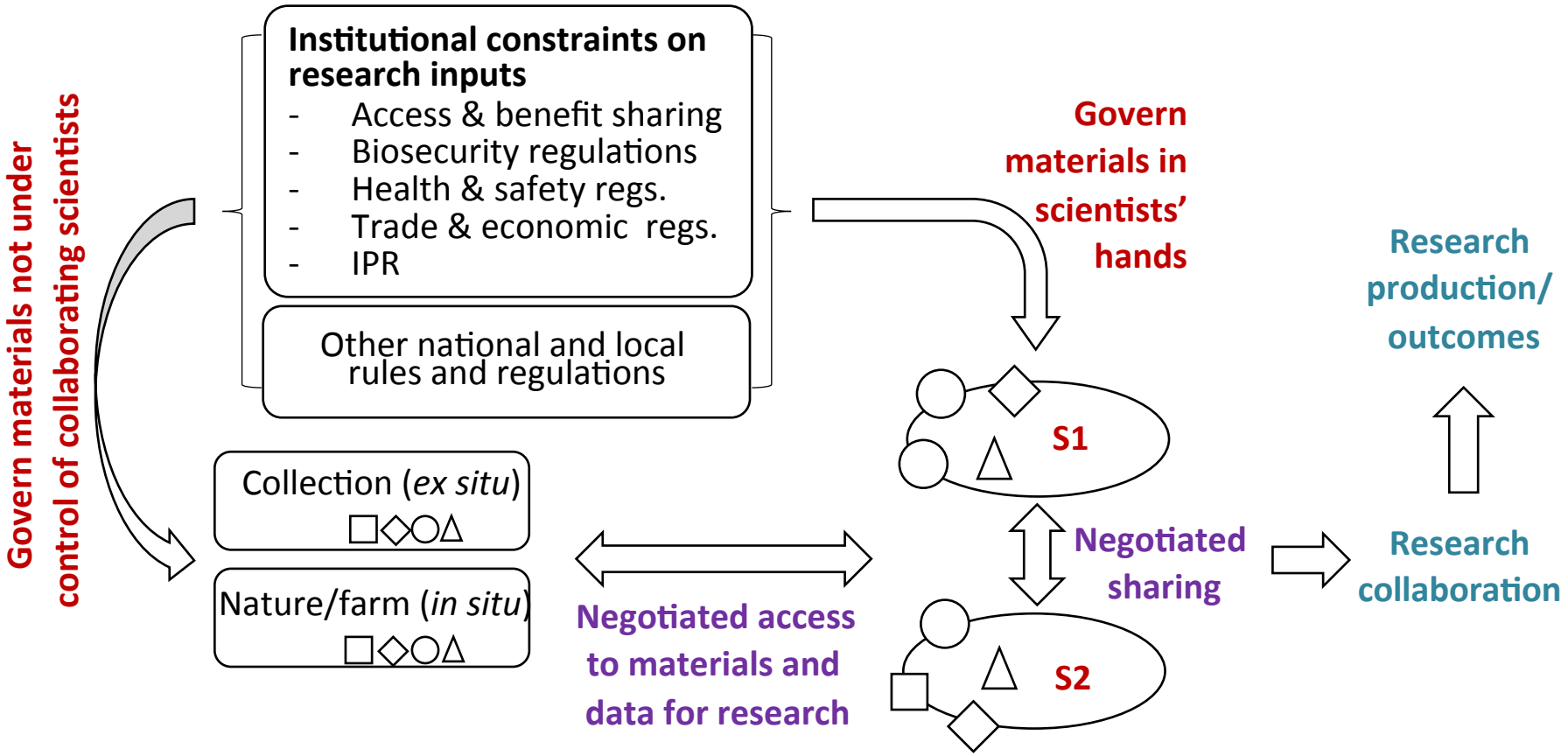
Contested resources framework

General understanding about how scientists obtain material and data inputs for research. Generally an open science approach.



Contested resources framework

Actual context of data and material access and use.



Welch and Louafi, 2015

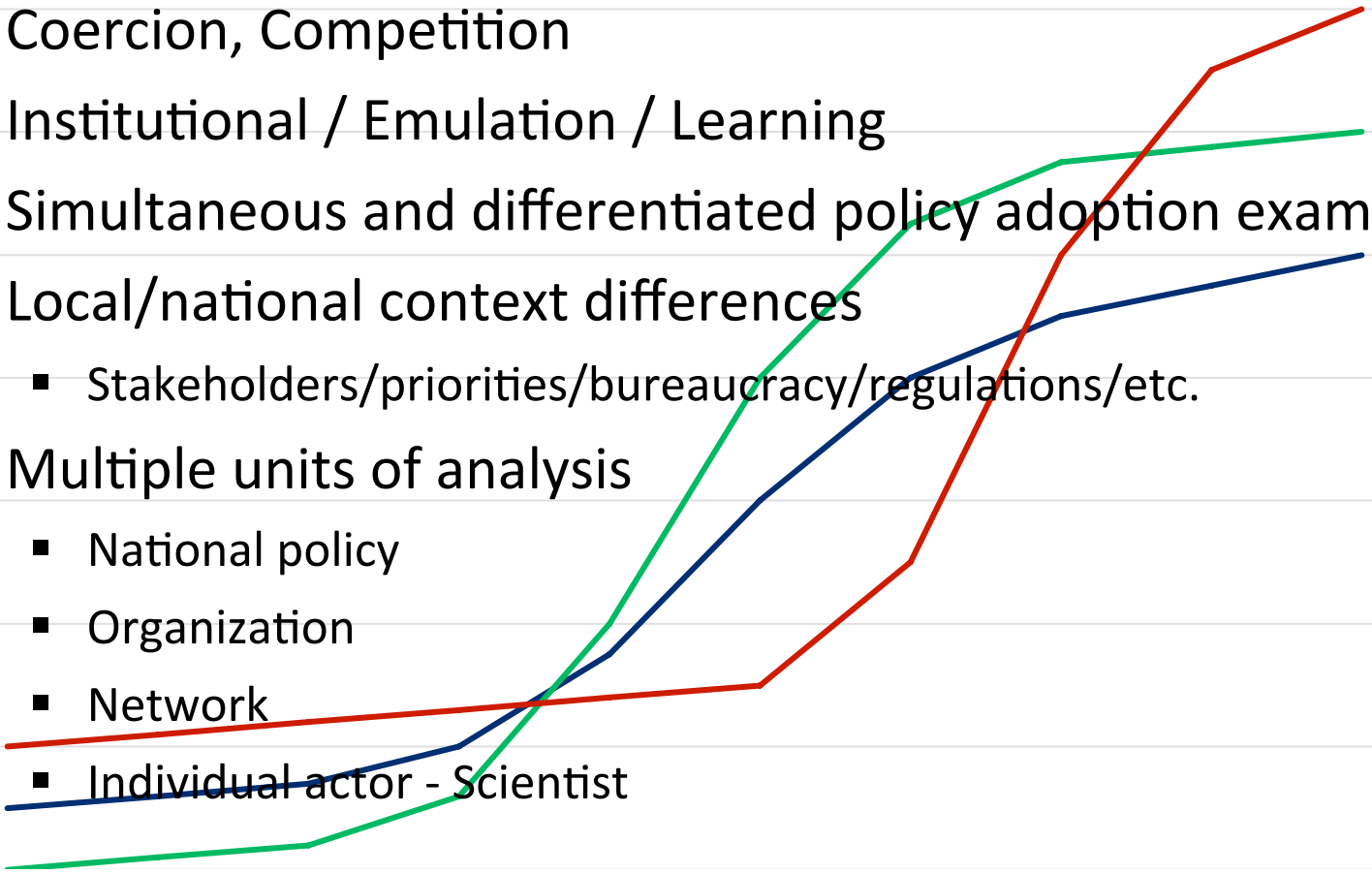
Example: Genetic resources policy

- Genetic resources are important inputs for research.
  - Genetic resource is any material of plant, animal, microbial or other origin containing functional units of heredity (CBD, 1992).
- Global Challenge for Agriculture:
  - Access to diverse genetic resources is important for developing crop/ animal resistance to disease, heat, drought, etc…or identifying alternatives…to enhance food security.
- Global Policies – e.g. Nagoya Protocol to the CBD –access, exchange, use and benefit sharing from the use of genetic resources: (October 2010; In force Oct. 12, 2014)
  - Builds on CBD, establish national rights over GR
  - Managed access to ensure fair compensation for use: equity/biopiracy, conservation of biological diversity
  - Ratification and establishment of national law
  - US is not a party; not designed with science in mind

Global Policy Diffusion

Explanations

- Coercion, Competition
- Institutional / Emulation / Learning
- Simultaneous and differentiated policy adoption examples
- Local/national context differences
  - Stakeholders/priorities/bureaucracy/regulations/etc.
- Multiple units of analysis
  - National policy
  - Organization
  - Network
  - Individual actor - Scientist



GLOBAL DIFFUSION OF GR POLICY AT THE NATIONAL LEVEL OF ANALYSIS?

National Policy Efforts

- Ratifying the Nagoya Protocol
- National policy development
- Case of Brazil
  - Early mover
  - Severely limited international movement
  - Strict enforcement
  - Research programs halted
  - GRFA collaboration difficult
  - Substantial internal debate on genetic resources
- Lesson learned? Impact on other nations?

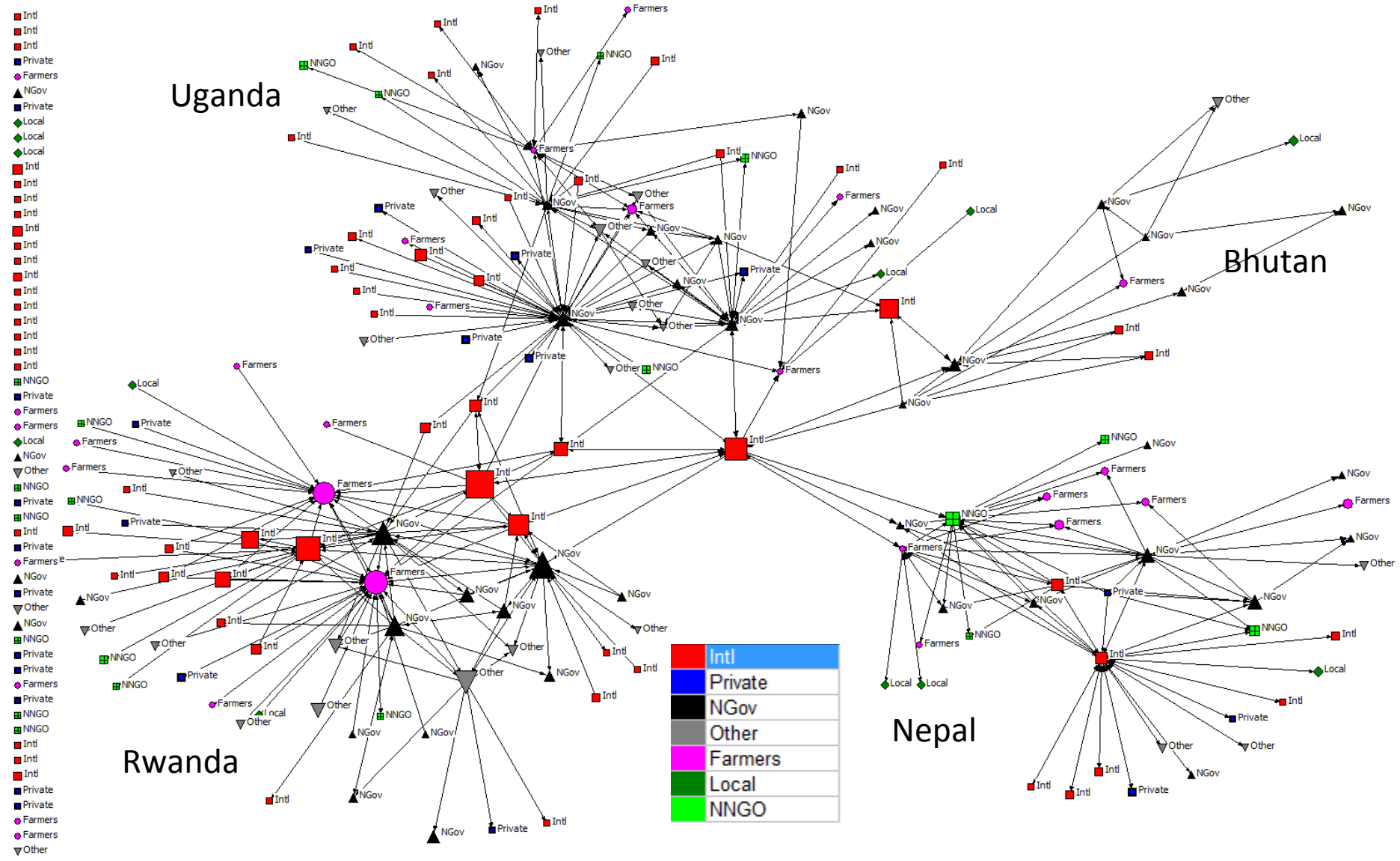
NP Implementation example

- Malaysia is about to accede to the Nagoya Protocol and is currently considering an ABS law.
- Collaboration between Malaya University, Kuala Lumpur; CIRAD, Montpellier; ASU CSTEPS
- Understand exchange and use genetic resources for scientific research.
- Empirical evidence as input to development of national GR policies for Malaysia.
  - exchange and transfer practices;
  - recording and sharing of the research results;
  - the nature of the benefits and their acquisition and sharing
- Consider Malaysian research sector needs and constraints while implementing the Nagoya Protocol

Importance of Intermediary Organizations

- Universities
  - Variation in roles and action
- International NGOs
- Others…

Policy Networks: International Treaty for Plant Genetic Resources, Receiving Policy Direction



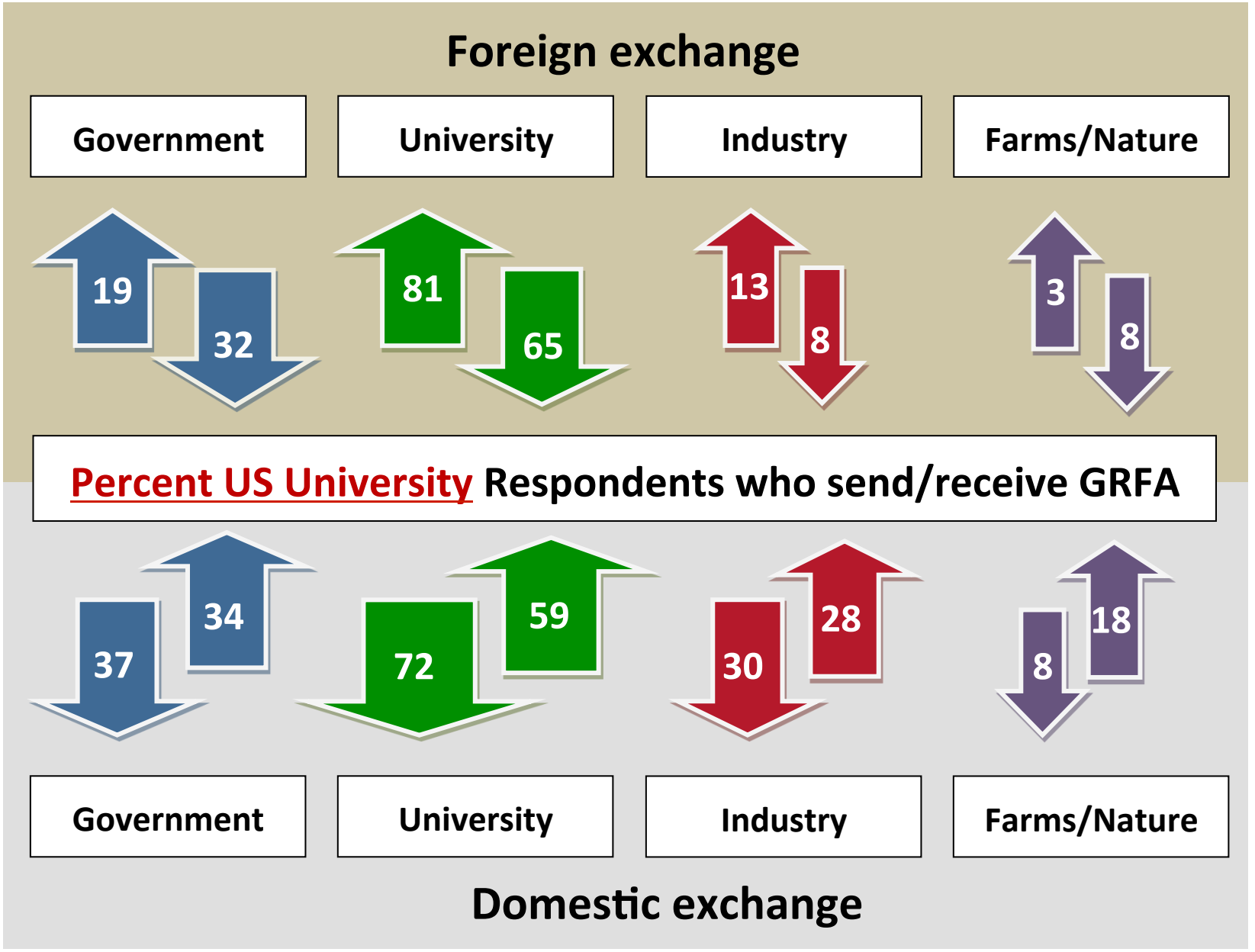
NP Policy Diffusion Expectations

- Diffusion curve for 'national ratification'
- Why? – learning? Institutional emulation? intermediation by other organizations?
- At the national level for NP implementation…
  - Institutional explanation – spreading of an accepted idea
  - Learning – revised imitation of what works
  - Networks of intermediating organizations
  - Models likely also depend on:
    - Openness of policy to empirical findings; Bargaining among stakeholders; National regulatory structures

GLOBAL DIFFUSION GR POLICY AT THE SCIENTIST LEVEL OF ANALYSIS?

Openness Norms of Science?

- Genetic Resources for Food and Agriculture (GRFA) Study, NIFA 2009, CSTEPS, ASU
- National Survey of Agriculture Researchers Industry, Government and Universities (Aquatics, Livestock, Microbes, Insects) (~2200, 35% response rate, 2010)
- Research universities, government research institutes, companies
- Topics of investigation
  - Sources
  - Exchange practices
  - Uses
  - Returns or benefits exchanged
- Welch, Shin, Long, 2013


Foreign exchange
Government
University
Industry
Farms/Nature
19
32
81
65
13
8
3
8
Percent US University Respondents who send/receive GRFA
37
34
72
59
30
28
8
18
Government
University
Industry
Farms/Nature
Domestic exchange

GRFA Survey Findings

- Use of material transfer agreements
  - 25%
- Restrictions on third party transfer
  - 18%
- Restrictions on commercial use
  - 10%
- Expectation of non-monetary benefit (training, information, storage, technical)
  - 68% (74% for international)
- Some type of regulatory barriers
  - Over 50%

Context within which NP is diffusing

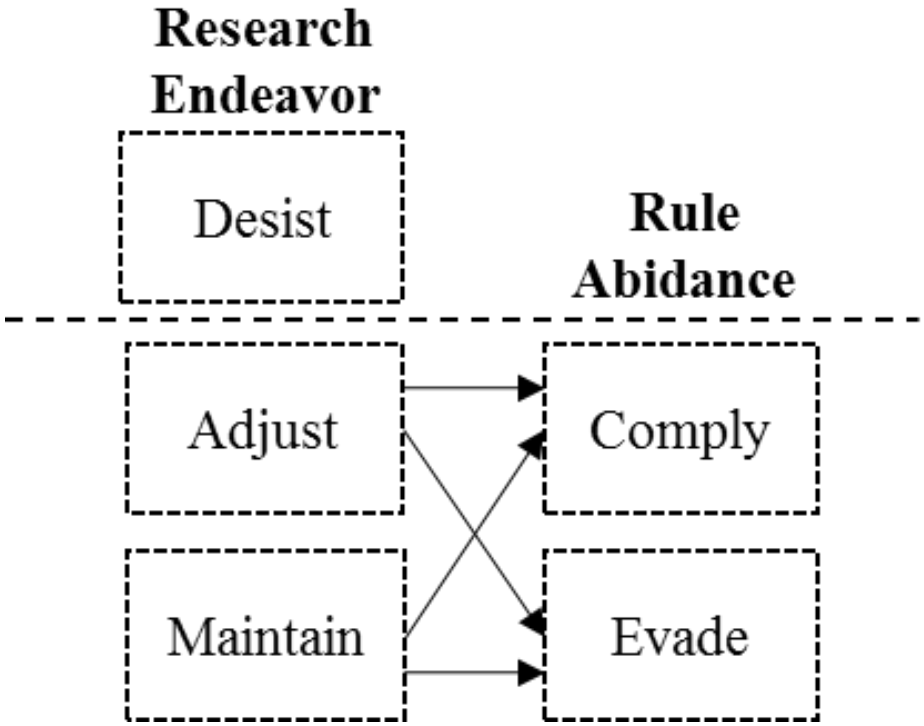
- **Multiple, decentralized actors**
- **Informal**
  - Low use of MTAs
  - Exchange with friends and colleagues
  - Varied perceptions on openness, IP, sharing
  - Formal monetary / non-monetary payment low
  - Expectations of reciprocity are high
- **Existing regulatory barriers**
- **Disciplinary, organism and sub-sector differences**

Changing Context: Restrictions in Action

Constraints on GRFA exchange and use

- Cassavabase (Cassava as a staple crop)
  - Research to coordinate research activity on cassava genomics – Africa
  - Desire to expand collaboration to Brazil
    - Material exchange with US (maybe if hybridized; not if native)
    - No sharing of material to other consortium members
    - Discussed benefit sharing for access – training, exchange of data, etc.
    - No agreement after three years of effort
- Cacao
  - Advance of virus (swollen shoot) in Africa threatening crop and economy
  - Inability (due to national regulatory restrictions) to provide germplasm from non-infected areas among consortium members for research
- US Universities
  - Kansas State University – genetic material from Bolivia ended up in Company product line; Bolivia challenged KSU; relationship at stake

Qualitative Findings: Scientist Coping Strategies



with Michael Siciliano, Mary Feeney and Gabel Taggart, NSF SciSIP project, CSTEPS, ASU

Coping strategies

Desist

“there are countries I will simply not do any work with anymore….I don't do fieldwork anymore for a variety of reasons…permitting is a big part of it.”

“And then [we] found out they didn’t want us to take anything, like, anything at all. So any organism I isolated, any material we collected, would have to stay in the country. And, you know, so that’s a turnoff.”

Coping strategies

Adjust to comply

"all of the materials stay in [location] and then we do the research - so every summer I go there, do the research there. In the meantime, I Skype...I have…publications written but in terms of the research data, you can't move them out."

"we send what we need to do to the collaborator and they do the experiment in their lab."

Coping strategies

Adjust to evade

"Yeah. It's interesting within [location] working on [material] because it's a patch work…for example a lot of colleagues I know will go collect in [location] because you don't really need permission, whereas they won't bother with [other locations] which have a required permission and have a little bit longer approval process…"

Coping strategies

Maintain to comply

“I haven’t avoided a restricted [material] and taken this one instead…I really haven’t had to say what I'm going to avoid…instead it was like, ‘This is a great model for this and it’s not a problem,’ but it wasn’t something that I ran to because it wasn’t a problem.”

Coping strategies

Maintain to evade

"I'm not carrying anything that is toxigenic. It is very, very hard for me to imagine any harm that would come from these materials to the environment. I know enough about these materials that I literally I cannot imagine any harm would come."

"I would go meet one of my buddies in [location] and essentially just look the other way… But, boy, if I had to [administrative process] every time I [research activity], I'd spend most of my life doing that. So, I got bigger problems than that with paperwork, so I don't worry about it."

Diffusion Expectations

- Norm revision
  - Development of coping strategies to integrate new ABS norms of permission/fairness and openness of science
  - Embedding of NP considerations in collaborations, particularly international collaboration using GR
- Meso-level structural Changes
  - Organizational Innovations and interorganizational relationships:
    - New organizational forms that bridge open science norms and regulatory norms; efforts to build trust
    - Role of universities as intermediaries for scientists? Across nations?
- Ultimately for science structure...
  - Reduced informality
  - Less vertical integration
  - Increased contracting
  - Greater global distribution of capacity

CONCLUSIONS

Conclusions

- Policy constraints are real.
- Diffusion of global → (national) → actor? The role of intermediary organizations and networks? Reverse process from science collaboration up?
- Regulation of materials interacts with existing 'open' norms of science to produce a wide array of models of national policy and scientist behavior.
- Given the complexity, need for new organizational and network approaches to understand (and enable?) diffusion
- Opportunities for multidisciplinary, international policy research

Thank you. Questions?

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