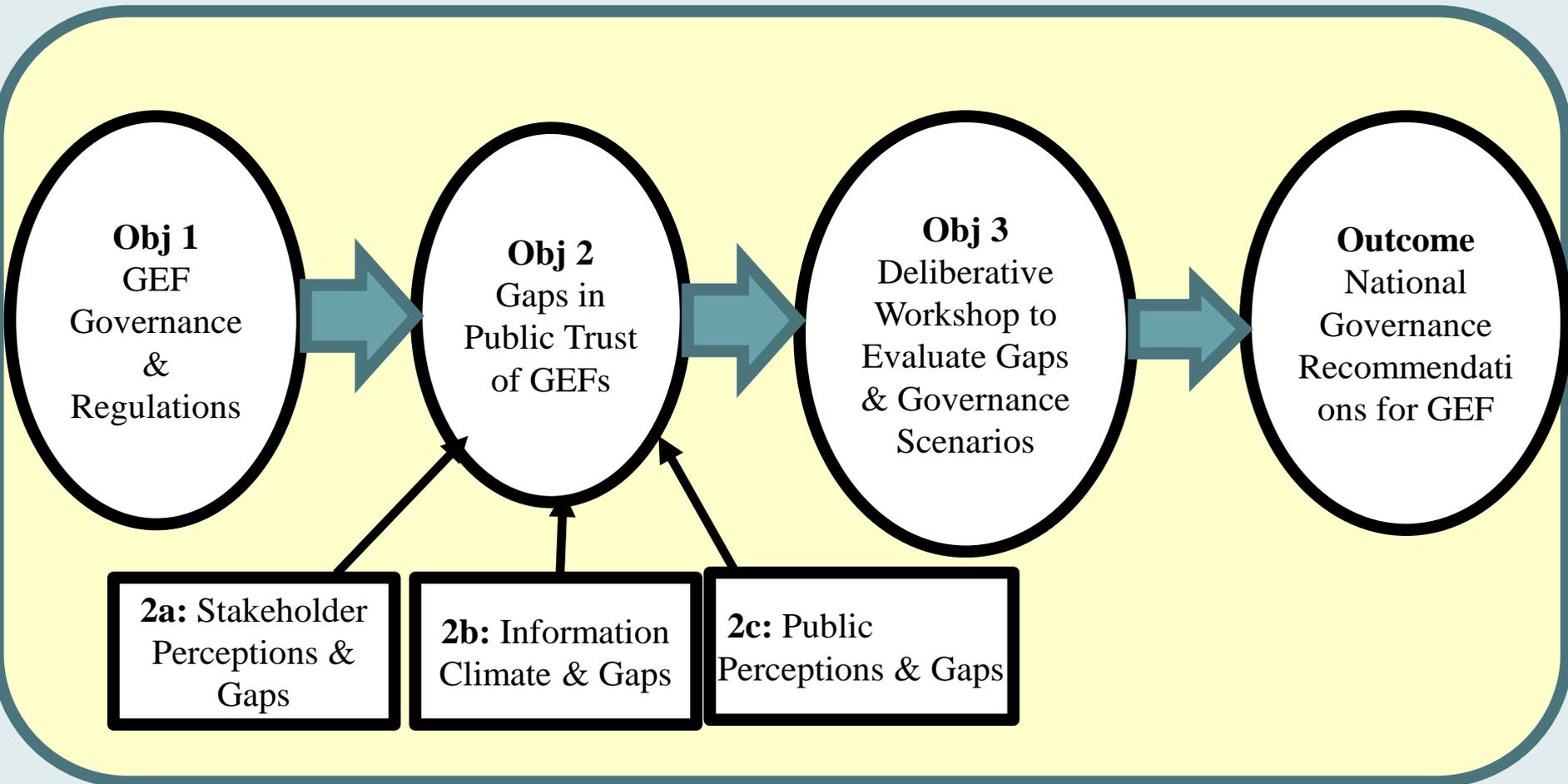


How Intellectual Property Control and Access Influence Stakeholders' Views on CRISPR use in Agriculture and Food

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Goal and Supporting Objectives

Identify key inducements and impediments to public trust of GEFs and their governance.



Introduction

“The more democratized the use [of CRISPR], the greater the chance we have of building trust”

(Gutterson, Senior VP, Chief Tech Officer, Corteva Agriscience, 2016)

- Perceived public **mistrust** seen as threat to use of CRISPR
- Publics understanding and perception of technology and science shaped by **judgement of trustworthiness** of social systems, organizations, experts involved

Introduction

- Goal: Identify key stakeholder perceptions of organization's trustworthiness in relation to CRISPR
- Stakeholders' perspectives:
 1. What is the democratization of CRISPR and does it matter?
 2. Will democratization enhance public trust?

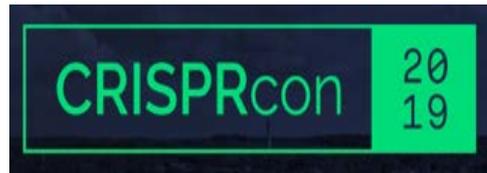
Trust in Organizations

- Trust requires evidence of **trustworthiness**
 - Assessment of **right intentions**: take our interests/welfare into account in their actions
 - Perceived **responsiveness**
 - Competence, honesty, knowledgeable, shared values, ability to predict effects and which effects important
 - **Contexts** shape our **judgements** and relevant **knowledge** of your intentions and responsiveness

(Hardin, 2006; Lang, 2013; Sapp et.al, 2009; Freudenburg 1993)

Methods

- Key stakeholder interviews: 2018-2019
- Participant observation (2019)



Organizations	US
Consumer, Food Safety, Environmental, Alternative Agriculture, Rural Advocacy	12
Agribusiness, Biotech, Seed Companies	6
Industry Trade Associations	5
Government Agencies	5
Food Companies and Retailers	3
University Scientists/ Associations/Legal Expert	4
Biotech Research Center	1
Total (49 participants)	39



RESULTS

Democratizing CRISPR? Gene Editing Proponents

Scientists, start-ups, small businesses, biotech companies

- Key proponents argue democratizing CRISPR technologies **possible** and **necessary** to deliver broad **benefits** to publics
 - consumers; environment; developing countries; scientists; business; producers;

The big potential upside of **democratization** is that there will be **more traits, more products, more potential ways especially for small companies to create products that have real benefits for people, whether they're health benefits, environmental benefits, or other benefits that the consumer recognizes.** Benefiting them, or something they care about. The environment, for example. (228: Research Center)

Will It Enhance Public Trust?

Gene Editing Proponents

- Proponents argue democratizing CRISPR technologies will increase public trust

Right Intentions

- **Responsiveness** to criticism that GMO benefits and control limited to handful companies and large-scale producers

We did some consumer analysis research and asked why people are concerned about GMOs. About half were supportive of the technology and agreed that it was safe, the other half were **opposed to it** - not because they were afraid they would get sick, **but they were opposed to the use of glyphosate, they didn't like Monsanto, they felt like it led to monoculture agriculture systems.** ...that very small faction of people led a movement that had 60+ % awareness. (203: Food Retailer)

All of those early GMO traits...there were actually some really good environmental benefits, but they were way **too far removed and abstract to the typical consumer.** It was too difficult to see what the broader benefits were and too easy to see **“oh it’s just a big company making money.”** (228: Research Center)

Democratizing CRISPR?

Gene Editing Proponents

- Other proponents argue democratization of CRISPR **limited within commodity agriculture** and unlikely to lead to substantive changes

Whoever ends up winning [the patent battle] is going to maintain a huge amount of control. (233: University researcher)

With gene editing, **people who have more resources will still have an advantage.** **Whereas we're going to focus on corn and soybeans** – mushrooms, parsley, things like that, we're not going to do. (235: Biotech company)

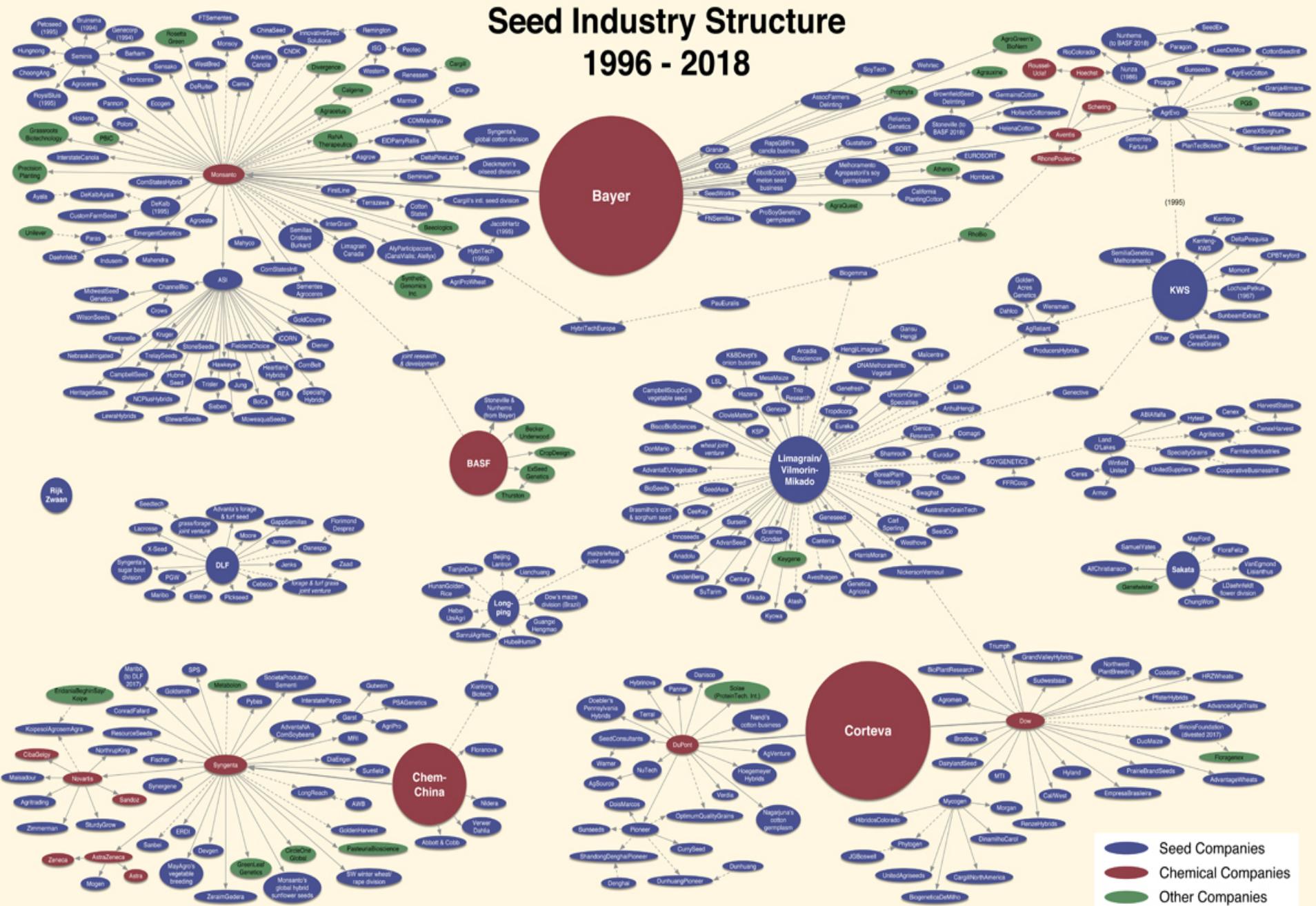
Democratizing CRISPR?

Gene Editing Critics

Consumer, food, environment, rural, advocacy

- Critics argue **structure** of agri-food system suggest weak forms of democratization with limited shifts in power and access within **commodity agriculture**
- *Growing* corporate consolidation, market power, inequity
 - Major corporations drive research agenda, technology transfer, commercialization, esp. commodity crops, for their benefit

Seed Industry Structure 1996 - 2018



Will this technology offer more widespread ownership and control as a technology? That was how the earlier rounds [of GMOs] started. But then the chemical companies bought the startups and consolidated and used the utility patents to buy 20 years in the marketplace and create that advantage. **I don't see anything that would prevent that from being the exact same model that plays out here.**

Consolidation [within agriculture] has done great harms to rural America. This is a trajectory that you dropped [gene editing] into, that you can't ignore. (232: Rural Advocacy)

We have four companies that sell all the seed. So, you might start it in your garage [but then it] is going to get sold to Bayer. Because who can get seeds to market? Bayer! You're not going to start a seed company in your garage. You might start this technology piece of altering the genome but you're going to license it to Dow-DuPont or Bayer to get it to market and they're going to jack up the price. It doesn't blow up how we distribute these inputs on farms. (210: Consumer/Environment Advocacy)

If government agencies, land-grant universities with their own **research funding** - **without tethers to the industry** - could explore these technologies as part of the full spectrum of ways in which we deal with agricultural and food system issues, **then there might be more democratic ways** in which we would both research and deploy and price the technologies. I think that is a completely possible scenario. **But the finances now are in the hands of companies that want to profit from these technologies.** (217: Food and Environment NGO)

Will It Enhance Public Trust?

Gene Editing Critics

- Critics argue current efforts to democratize CRISPR will not enhance trust

Lack of Right Intentions

- Lack of responsiveness by “big” ag/biotech companies to public concerns regarding commodity agriculture: **environment**
 - Pesticides, glyphosate resistant “superweeds”, dicamba drift

“tool in whose toolbox?”

They talk about other traits that sound friendly but the ones they're really working on are crops that can be sprayed directly with herbicides. ...this is not the way agriculture should be going.

We know through experience with GMOs what they want to do. It's mainly using these technologies to create synergies between seed divisions and pesticide divisions.

We have millions of acres of crops that are being damaged by herbicide drift associated with herbicide resistant GMOs that Monsanto introduced. It's the biggest story of 2017 and 2018. (220: Consumer NGO)

Will Democratization Enhance Public Trust? Governance

- History GMOs and GMO labeling suggest how we govern CRISPR critical to trustworthiness
- **Area where least stakeholder agreement**

Will Democratization Enhance Public Trust? Governance

- Biotech, scientific, ag proponents argue democratization CRISPR premised on limited regulatory oversight, reject food labels

I am of the opinion [that] **overregulation has serious negative consequences including suppressing that democratization....** I think that democratization is a good thing in terms of benefits. (228: Research Center)

If regulation ends up that there's less regulation...it's going to mean it's going to be more economically possible for more individuals to create improved plants using CRISPR in a wider variety of plants, and a wider variety of traits. ... Plants that are specific for one small country even..... So I think **the benefits will end up being more widespread.** (233: University Researcher)

Will Democratization Enhance Public Trust? Governance

- Food companies, advocacy stakeholders argue democratization poses novel and complex concerns about governance
 - transparency, choice, opt-out, standards, identity preservation, liability

Open access to the tools will inevitably mean that people will use it ...from a societal license perspective shouldn't have been done but the reagents are out there and people can use that. It gives having open access, gives the technology, a tainted name in some ways because there's no standards.

I don't agree that this is gene editing so there should be no premarket approval because you can use it so many different ways. ... I think a premarket approval is needed. Off-target effects are a real thing. (223: Legal expert)

If you have an **application that violates [consumers] values** - around animal welfare, health, or labor- then **you've got a real problem** to deal with.

We're still looking for some **meat around the guardrails**. I don't think we're in a place where we'll say that these new gene editing technologies need to be regulated in the same way as transgenic plants. But there **needs to be something** out there... whether it's a **watchdog approach** or some sort of **oversight into the use** of these technologies (GEF 203: Food Retailer).

Will Democratization Enhance Public Trust? Governance

- Food companies eager to avoid repeat of fight over GMO labeling that led to loss of consumer trust

...we fought from the time we heard consumers beginning to say they wanted this information [labels]... and we can argue whether they really wanted it or whether activist groups were pushing them, whatever, it doesn't matter. ... we should have provided that information. [All of the] reputational damage that we have done. And how long will it take to get that back, the consumer trust?

So we'll be strong advocates for appropriate regulatory oversight....blanket categorizations [that] these products are not GMO and they shouldn't get regulated and consumers shouldn't think they're different than any conventional product. Even if they get away with that, if they convince governments of that, we don't think they will convince consumers of that. (GEF 202: Food Conglomerate)

Conclusion

- Proponents argue that democratization of CRISPR central to building public trust
- Our findings suggest several key areas of disagreement among key stakeholders that may influence trustworthiness.
- Focus for self-reflection, deliberation, engagement
 1. What do we mean by democratization?
 2. How should democratization address structural and environmental concerns within commodity agriculture?
 3. How should CRISPR crops and foods be governed?



Thank you!

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