Ethics, Diversity, and Inclusivity in G2P Research
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Overview
Sustainably supporting worldwide food production is a 'wicked problem' of immense scale and complexity. As such, there is an urgent need for novel ideas and technological innovations in the agricultural research. One strategy for rapidly infusing new ideas into existing knowledge networks is by making these person-centric networks more diverse, data more accessible to relevant stakeholders, and by infusing current practices with the kinds of Ethical, Legal, Social, Ecological, and Economic (ELSEE) considerations that will transform agricultural genome and phenome research practices. Bringing underrepresented groups to the table is one way to infuse AG2PI with new ideas. Improving and expediting knowledge transfer (e.g. data sharing), more effectively communicating research findings to the general public, policy makers, and funding agencies, and developing new science practices, can also help AG2PI to achieve sustainable genetic improvements. We propose to advance the aims of the AG2PI by conducting social science research to encourage cross-fertilization of AG2P data and ideas and motivate agriculture focused analysis from an ELSEE perspective. We will also create human-centered personas to help drive more successful communication to the public and potential funders.

The Public Science Collaborative (PSC) is a team of researchers and outreach specialists from Iowa State University who are focused on promoting the use of data for executive decision making. We propose to engage both the AG2P community at large, as well as the relevant and emerging communities that are currently underrepresented in AG2P, through a series of four interactive, dialogue-based workshops that will (a) identify relevant and diverse AG2P stakeholders and develop engagement personas, (b) conduct an inventory of AG2P data and data repositories, and document data sharing practices, (c) explore AG2P's culture of data, consider the beliefs and values that influence their approach to ELSEE in genome and phenome-related research, (d) and co-design, with the AG2P community, a blueprint for building a more ethical, diverse, and inclusive AG2P research culture moving forward. Our facilitated workshops are designed to expand how groups think about their values, research priorities, data practices and strategic decision-making with the goal to accelerate innovation through more diverse, inclusive, and ethical research practices. We further anticipate that these efforts will support AG2PI to more effectively communicate the value of their research to the public and funding agencies. In aggregate, these efforts are designed to demonstrate how a social science perspective can enhance and support AG2PI research goals.

Project Description
The PSC process for engaging decision-makers around data is founded on a team science framework that utilizes iterative stakeholder feedback and relies on high quality, tested qualitative research techniques to structure meaningful dialogue among diverse groups. Team science is an intentional process to leverage group diversity and inclusion to reach goals. Because interdisciplinary research requires different perspectives, experiences, and a range of expertise and methodologies (National Academies, 2005), the application of team science to problems of genomics and phonemics is constructive and practical. Viewing results / inputs

through "other" lenses leads to questioning interpretations that can strengthen not just the research but the very way we communicate about the research to others – which is especially important when stakeholders include the public, industry, and academic groups working together. Furthermore, interdisciplinary team science is more effective at solving complex problems beyond the scope of a single discipline or field. Though diverse teams are more likely to run into challenges with communication, initially have more conflict to work through and take longer to build trust (Bennett et al, 2010), they often produce the most thoughtful and far-reaching conclusions. The proposed workshops help to identify relevant, but potentially overlooked, AG2P stakeholders and build trust and a common language/experience that can bridge communication differences and ameliorate non-constructive conflict. We then build on the synergies created to advance AG2P thinking related to data sharing in more ethical, diverse, and inclusive ways.

Furthering the Aims of AG2PI
This project furthers the aims of the AG2PI related to Topic Areas two, three, and four, as detailed in Table 1 and described in the text that follows.

Table 1. AG2P Topic Area Alignment with Proposed Activities

	Topic Areas to be Supported by AG2PI Funding	Proposed Activity to Address Concern
TA-2.2	Identifying needed phenotyping data, tools and technologies	Data Discovery, ELSEE
TA-2.3	Developing interactive workshops for community planning activities in relevant areas (e.g., data sharing.)	Data Discovery, ELSEE
TA-2.4	Engaging relevant and emerging scientific communities that are currently underrepresented in AG2P	Stakeholder Mapping & Persona Creation
TA-3.3	Develop training activities tailored to multiple scientific communities and different career stages within AG2P	Stakeholder Mapping & Persona Creation
TA-4.2	Clarifying and managing ethical, legal and social aspects of AG2P research and initiatives	Design Thinking
TA-4.3	Improving public relations and better communicating the value of G2P research to public and funding agencies	Stakeholder Mapping & Persona Creation

Expected Outcomes and Deliverables
Our plan for achieving the research aims are built around four workshops, which produce six unique research deliverables.
- In the first workshop, we will conduct a 90-120 minute stakeholder map and persona development workshop with AG2P researchers to identify key internal and external stakeholders. The results of this workshop will be used to develop personas, or ideal-type identities, that represent well-networked and central researchers to AG2P, as well as the

marginalized and less connected researchers, and the external groups that benefit from this work (e.g., public, funding agencies, policy makers). This step helps us answer the "**who**" question concerning inclusive science, meaning 'who are the well-established and central research groups and organizations' and 'who are the underrepresented groups and organizations' that should be targeted for outreach and inclusion? This enacts a more inclusive and diverse approach with underrepresented stakeholders helping to shape the approach and determine which questions to ask, rather than only being the recipients of scientific discovery. By intentionally incorporating diverse ideas, perspectives, and backgrounds, each step that follows is improved. This step also answers 'who is the target of communication efforts'? Person-centered approaches will help AG2PI humanize and empathize with the public and funders so they can more effectively communicate complex science to lay audiences (Topic Areas 2.4, 3.3, & 4.3).

- In the second workshop, we will conduct a 90 minute data discovery and sharing workshop with AG2PI researchers to inventory genome and phenome data infrastructures, identify relevant data archives and repositories, and to more broadly understand how data are collected, used, stored, and shared. In this step, we get at the heart of data culture, including the rewards and disincentives for sharing data and common practices around agricultural data. This helps answer the "**what**" question concerning data (Topic Areas 2.2 & 2.3).

- In the third workshop, we will facilitate a 90 minute ELSEE workshop with AG2P researchers to understand their knowledge, beliefs and practices about the Ethical, Legal, Social, Ecological, and Economic (ELSEE) aspects of data-driven AG2P activities. This helps us to understand "**why**" AG2PI research occurs by eliciting attitudes about ELSEE collaboration, research team composition, and data sharing (Topic Areas 2.2 & 2.3).

- In the fourth workshop, we will lead a 4-hour design thinking workshop to collaborative design ELSEE informed and inclusive data practices in the AG2P research community. Design thinking workshops get at the question of "**how**" by directly engaging in a visioning and design effort that culminates in actionable steps that participants can take to incorporate ELSEE into their research practices and to engage in more inclusive research that connects marginalized and underrepresented groups to mainline research efforts (Topic Area 4.2).

- Next, we will produce a written report that synthesizes information and learnings from steps 1-4 into a single document. The report is meant to be easily understood and action-oriented: That is, we want to ensure that our effort contributes in meaningful ways to easily understood and achievable actions by researchers interested in strengthening the ethics and inclusivity of their research practices. Expected outcomes of this research include a) identification of marginalized and underrepresented groups and organizations and an actionable inclusivity plan, and b) an actionable plan to institutionalize ELSEE dimensions into AGPI research practices. More broadly, we expect that workshop participants will learn more about themselves, their research practices, their biases, their science collaboration networks, and their data sharing motivations, and we expect that the public sharing of our research deliverables will expand knowledge and understanding beyond workshop participants.

- Finally, we will produce four cleaned and anonymized datasets containing workshop transcripts (one for each workshop), and one or more trace datasets containing cleaned and anonymized trace data collected from the workshops.

Evaluation Plan

We will measure the success of the project using evaluation tools within the *A-E-I-O-U* evaluation framework (Kemis and Walker, 2000). The acronym stands for "Accountability, Effectiveness, Impact, Organizational context, Unexpected outcomes", and will be used to develop the evaluation framework of all aspects of our activities to measure success towards goals and objectives. Regular assessments will inform and improve daily activities and workshop planning towards the goals of developing capability and capacity. Examples of items to be assessed include the number of underrepresented groups identified and included in discussions, number of attendees, number of interactions, number of novel educational and training activities developed, number of products/tools produced, and satisfaction ratings of tools/workshops.

Team Qualifications

The core team has extensive experience in translational research and using facilitated discussion to inform executive decision making. Together, they form part of the core of ISU's Public Science Collaborative, which is an interdisciplinary team of researchers and outreach coordinators focused on improving Evidence Based Policymaking by infusing data science, community outreach, and social perspectives to address grand challenges of our day.

Proposed Timeline

Our timeline for conducting the proposed research is May 2021-May 2022. For each of the four workshops, we will customize materials for deployment in a virtual setting, tailor instruments to specifically meet the needs of the AG2P research community, provide technical set up and do advance preparations, facilitate the workshop, and write a brief summary. At the beginning and conclusion of this project we will meet with AG2PI leaders to gather information (July 2021) and discuss results and next steps for implementing the recommendations provided (June 2022).

Table 2. AG2PI Timeline: May 2021 - May 2022

Task Name	Q3			Q4			Q1			Q2		
	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Planning Meeting with AG2P Leaders	▓											
Create Workshop Materials	▓	▓										
− Workshop 1. Stakeholder & Persona Workshop			▭▭▭									
Technical Set Up & Advance Preparations			▓									
Facilitate Workshop				▓								
Write Brief Summary of Results					▓							
− Workshop 2: Data Discovery						▭▭▭						
Technical Set Up & Advance Preparations						▓						
Facilitate Workshop							▓					
Write Brief Summary of Results								▓				
− Workshop 3: ELSE Workshop						▭▭▭▭						
Technical Set Up & Advance Preparations						▓						
Facilitate Workshop								▓				
Write Brief Summary of Results									▓			
− Workshop 4: Design Thinking									▭▭▭			
Technical Set Up & Advance Preparations									▓			
Facilitate Workshop										▓		
Write Brief Summary of Results											▓	
Prepare Final Report											▓	
Meet with AG2P Leaders to Discuss Results												▓

Section 2: Bibliography/References Cited

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