UNIVERSITY OF CALIFORNIA DAVIS AGRICULTURAL SUSTAINABILITY INSTITUTE (ASI)

STRATEGIC PLAN JANUARY 2019 (DRAFT FOR DISCUSSION)

Prepared by: Thomas P. Tomich
Director, UC Davis Agricultural Sustainability Institute (ASI)
Director, UC Sustainable Agriculture Research and Education Program (UC SAREP)
Host, Inter-institutional Network on Food, Agriculture, and Sustainability (INFAS)
W.K. Kellogg Endowed Chair in Sustainable Food Systems
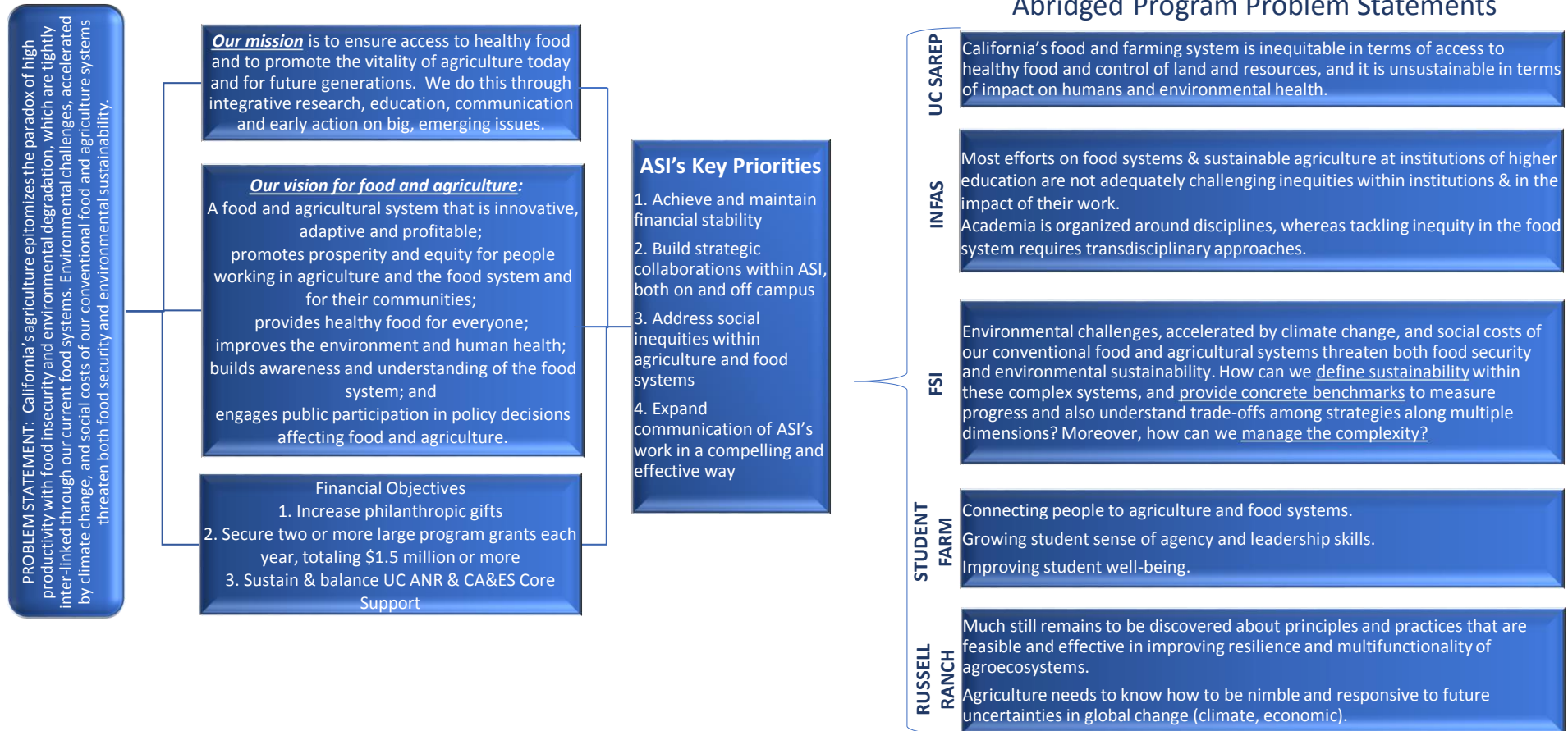Professor, Community Development, Environmental Science & Policy

With contributions from many ASI staff members

Version 2.0 of 11 January 2019
(Original Version 1.0 of 8 December 2008)

TABLE OF CONTENTS

Agricultural Sustainability Institute
Strategic-Plan-On-A-Page 2019

PROBLEM STATEMENT: California's agriculture epitomizes the paradox of high productivity with food insecurity and environmental degradation, which are tightly inter-linked through our current food systems. Environmental challenges, accelerated by climate change, and social costs of our conventional food and agriculture systems threaten both food security and environmental sustainability.

Our mission is to ensure access to healthy food and to promote the vitality of agriculture today and for future generations. We do this through integrative research, education, communication and early action on big, emerging issues.

Our vision for food and agriculture:
A food and agricultural system that is innovative, adaptive and profitable;
promotes prosperity and equity for people working in agriculture and the food system and for their communities;
provides healthy food for everyone;
improves the environment and human health;
builds awareness and understanding of the food system; and
engages public participation in policy decisions affecting food and agriculture.

Financial Objectives
1. Increase philanthropic gifts
2. Secure two or more large program grants each year, totaling $1.5 million or more
3. Sustain & balance UC ANR & CA&ES Core Support

ASI's Key Priorities

1. Achieve and maintain financial stability

2. Build strategic collaborations within ASI, both on and off campus

3. Address social inequities within agriculture and food systems

4. Expand communication of ASI's work in a compelling and effective way

Abridged Program Problem Statements

UC SAREP
California's food and farming system is inequitable in terms of access to healthy food and control of land and resources, and it is unsustainable in terms of impact on humans and environmental health.

INFAS
Most efforts on food systems & sustainable agriculture at institutions of higher education are not adequately challenging inequities within institutions & in the impact of their work.
Academia is organized around disciplines, whereas tackling inequity in the food system requires transdisciplinary approaches.

FSI
Environmental challenges, accelerated by climate change, and social costs of our conventional food and agricultural systems threaten both food security and environmental sustainability. How can we define sustainability within these complex systems, and provide concrete benchmarks to measure progress and also understand trade-offs among strategies along multiple dimensions? Moreover, how can we manage the complexity?

STUDENT FARM
Connecting people to agriculture and food systems.
Growing student sense of agency and leadership skills.
Improving student well-being.

RUSSELL RANCH
Much still remains to be discovered about principles and practices that are feasible and effective in improving resilience and multifunctionality of agroecosystems.
Agriculture needs to know how to be nimble and responsive to future uncertainties in global change (climate, economic).

I – STRATEGIC FRAMEWORK
What distinguishes ASI?

The units of ASI are held together and distinguished by a shared mission, vision, values and operational principles and a passion for excellence in sustainability science that can transform California agriculture and fully realize California's potential for global leadership in research, education, and action for agricultural sustainability. These strategic elements were developed collaboratively by ASI staff with input from advisory board members and other stakeholders. We welcome additional comments and suggestions at any time.

I.1. Our mission is to ensure access to healthy food and to promote the vitality of agriculture today and for future generations. We do this through integrative research, education, communication and early action on big, emerging issues.

I.2. Our vision for food and agriculture:
- A food and agricultural system that is innovative, adaptive and profitable;
- promotes prosperity and equity for people working in agriculture and the food system and for their communities;
- provides healthy food for everyone;
- improves the environment and human health;
- builds awareness and understanding of the food system; and
- engages public participation in policy decisions affecting food and agriculture.

I.3. Our vision for ASI:
- Convenor: engaging diverse perspectives
- Clearinghouse: synthesizing, translating, and communicating useful information
- Think tank: being the thought leader for interdisciplinary research
- Linking science with action for sustainable solutions
- Pioneer: taking early action on major issues
- Incubator: nurturing ideas, methods, programs, and leaders

I.4. Geographic scope of ASI:

- ♦ California: our primary mandate is to serve our home state, which is recognized widely as one of the largest and most dynamic agricultural sectors on the planet. The UC SAREP statewide program is an important mechanism for statewide impact through partnerships with UC Cooperative Extension specialists and county-based farm advisors, among others.

- ♦ United States: to realize ASI's potential for national impact, we host the Inter-institutional Network for Food & Agricultural Sustainability (INFAS), which was launched in 2010.

- ♦ International: we envision a gradual increase in international activities as appropriate opportunities arise, emphasizing academic exchange and scientific networking. In additional to international exchanges and global networks, our two regional priorities are linkages with programs in the Mediterranean, arid, and semi-arid agro-climatic zones (e.g., Australia, Chile, Egypt, Italy, South Africa, Spain, and the International Centre for Agricultural Research in Dry Areas) and with sub-Saharan Africa. (At this time, we do not anticipate creating capacity for international project implementation; instead ASI will collaborate with the World Food Center at UC Davis.)

I.5. Our core values: respect, creativity, inclusiveness, integrity, partnership

I.6. Our operational principles

Practicing sustainability: we strive to enact sustainability principles and practices in our own activities.

- ♦ "Walking the talk": we work to use sustainable practices in our own operations and actively strive to embody our core values: creativity, inclusiveness, integrity, partnership.

- ♦ Community: we embrace and enact the UC Davis Principles of Community in our daily work.

- ♦ Respect for all: we affirm the inherent dignity in all people and endeavor to relate to all with respect, fairness and justice.

Legitimacy: we set our priorities and design our programs in response to concerns and aspirations of stakeholders representing the diversity of California

- ♦ Spanning boundaries: we serve the entire state, and all segments of agriculture and the food system.

- ♦ Science in the public interest: we are committed to transparency in governance and priority setting; to open access to results and information; and to accountability to stakeholders.

- ♦ Historical awareness: we recognize the University's historic, current, and potential future roles in shaping agricultural and food systems and their effects on environment

and society. We strive to make informed and responsible decisions regarding research, teaching and outreach based on this knowledge.

♦ Seeking consensus, while respecting differences: our activities employ a common set of ground rules, including respect for different viewpoints.

Usefulness: responsiveness to stakeholders' needs – the broad interests of society as well as needs of specific groups – is key to the relevance of our initiatives and provides the necessary focus on real issues and opportunities.

♦ Communication for impact: we ensure that input from stakeholders consistently is sought and used effectively and that our products are translated to reach key audiences in forms they can use.

♦ Integration of knowledge: we actively seek and recognize the value of knowledge embodied in experience on farms and ranches, in communities, in industry, and in policy arenas.

♦ Commitment to experiential learning: we recognize the value of learning-by-doing and actively seek to integrate practical opportunities in our educational programs, training, and outreach activities.

♦ Creating and sustaining a learning organization: feedback, monitoring, evaluation, and impact assessment will be embedded in overall design of our activities.

Credibility: we hold ourselves to the highest standards of professional integrity and scientific rigor.

♦ Forward-looking agenda: we will create and sustain mechanisms to identify and assess emerging opportunities and threats, based on scientific analyses and stakeholder input and informed by global trends.

♦ Broad scope, with multidisciplinary balance: we integrate economic, environmental, and social dimensions of sustainability.

♦ Scientific integration and synthesis: our activities span big, inter-linked issues and multiple scales – ranging from molecular to global; past, present, future.

♦ Open inquiry: we promote critical analysis to challenge 'conventional wisdom' and to expand our understanding of technical, institutional, and policy options using the best natural and social science methods available.

II – ASI's Theory of Change
ASI Backbone

ASI Backbone Theory of Change

What is the problem you are trying to solve?	Who are your key audiences?	What is your entry point to reaching your audience?	What steps are needed to bring about change?	What is the measurable effect of your work?	What are the wider benefits of your work?	What is the long-term change you see as your goal?
California's agriculture epitomizes the paradox of high productivity with food insecurity and environmental degradation, which are tightly inter-linked through our current food systems.

Environmental challenges, accelerated by climate change, and social costs of our conventional food and agricultural systems threaten both food security and environmental sustainability. | **Farmers and ranchers**

Farm labor

Ag organizations

Environmental organizations

Community organizations

Alternative energy

Food & Ag industry

Researchers & Extensionists

Students

Educators

Health sector | **Interdisciplinary, integrative research & education programs**: to apply systems thinking to assess problems, frame questions, and act on strategic opportunities.
Leadership, collaboration, & coordination: to link knowledge(s) with action.
Communication and engagement: to engage diverse perspectives and co-create innovative solutions.
Fundraising: to achieve critical mass for interdisciplinary, integrative strategies.
Accountability: to ensure alignment with ASI values and principles. | **CONVENER**: engaging **DIVERSE** perspectives

CLEARINGHOUSE: synthesizing, translating, and communicating **USEFUL** information

THINK TANK: being the **INTERDISCIPLINARY** thought leader

PIONEER: taking **EARLY ACTION** on major issues

INCUBATOR: NURTURING IDEAS, METHODS, PROGRAMS, and LEADERS

LINKING KNOWLEDGE WITH ACTION for **SUSTAINABLE SOLUTIONS** | Peer-reviewed publications and web-site statistics to track **knowledge creation and uptake**

Translational publications, presentations, events; participants' feedback in surveys, interviews, focus groups; inquiries, downloads, media coverage to track **sharing and co-creation of knowledge and practices**

Individuals, organizations, networks participating in educational, training and | **Expansion of science-based knowledge, indicators, and data** on food systems and agricultural sustainability

Changes in awareness, understanding, attitudes and practices related to sustainable agriculture and food systems

Enhanced institutional capacity and networks of changemakers working for transformation of food and agriculture | VISION OF A SUSTAINABLE and JUST FOOD SYSTEM for California and our Planet

A food system that:

- **Is innovative, adaptive, and profitable**
- **provides healthy food for everyone**
- **promotes prosperity and equity**
- **improves the environment, and human, and community health**
- **builds awareness and** |

	Government Donors Media Consumers	**Priority setting**: to anticipate sustainability challenges, develop forward looking strategies, and marshal necessary resources for early action on emerging issues.		collaborative activities; process documentation to track **capacity building** **Funding** of **programs and core functions**	**New coalitions bringing together agricultural, environmental, and social justice interests**	**understanding of the food system** • **engages public participation in policy discussions and practices affecting food and agriculture**
Key Assumptions						
What is the problem you are trying to solve?	**Who are your key audiences?**	**What is your entry point to reaching your audience?**	**What steps are needed to bring about change?**	**What is the measurable effect of your work?**	**What are the wider benefits of your work?**	**What is the long-term change you see as your goal?**
Key Assumptions ASI's programs share a mission, vision, values, and principles.	Key Assumptions EFFECTIVELY IDENTIFYING AND ADDRESSING SUSTAINABILITY TRADEOFFS AND COCREATION OF APPROPRIATE SOLUTIONS requires ASI's programs to tackle complex problems for which context matters and many outside factors influence outcomes; and in which a range of experience is highly valuable, but doesn't guarantee success. ASI can engage these audiences collectively in ways that would not be practical for individual programs to undertake separately.	Key Assumptions DISTINCTIVE COLLABORATIVE NICHE EXITS vis-à-vis comparable organizations and that ASI provides value added for its constituent programs and external partners through integration of research, education, extension and communication spanning economic, environmental, and social aspects of agricultural production and the broader food system	Key Assumptions: NECESSARY ALIGNMENTS EXIST with key enabling institutions, inter alia: USDA Western SARE CDFA California Ag Vision UC ANR public value statements UC ANR strategic initiatives and work groups UC Davis CA&ES strategy	Key Assumptions: EFFECTS ARE MEASURABLE in cost-effective ways. Resources can be mobilized to monitor, evaluate, and assess impact of activities of ASI and its programs.	Key Assumptions ASI's mission and strategies are implemented and realized through program-specific impact pathways and partnerships.	Key Assumptions ASI provides the "backbone" to support its existing programs and to incubate new integrative initiatives, including convening influential actors from different sectors and creation of synergies in priority setting, management, accountability, communication and engagement, and fundraising.

<div align="center">

III – STRATEGIES FOR ACTION
How ASI works

</div>

III.1. Communication and engagement

- Statewide communication and engagement. Other partners in California (e.g., Roots of Change and many of the types of organizations represented on the ASI external advisory board) play complementary roles with UCCE in our efforts to assist California's policymakers and communities (both urban and rural) in understanding and implementing sustainable food and agricultural systems and sustainable resource management. Selecting, building and sustaining key relationships with this complex set of implementation partners and potential end users require a thoughtful and well-targeted strategy for communication and engagement.

- National and international leadership, networking and collaboration. California's reputation for innovation and leadership in agriculture and the environment is recognized nationally and internationally. The State's reputation in these areas is linked with the University of California. Thus, ASI is positioned to build on this recognition over time for impact that extends beyond California.

- Leadership of the Inter-institutional Network for Food and Agricultural Sustainability (INFAS). The INFAS network was endowed by the W.K. Kellogg Foundation with a $1.5 million gift in 2010. ASI hosts and coordinates INFAS, which is a national network of more than 24 academic leaders in sustainable agriculture and food systems, including directors of counterpart centers and holders of endowed chairs at land grant universities and other academic institutions across the US. A national coordinator for INFAS was recruited in 2012 and is based with ASI. With unanimous support from members of the INFAS executive committee, the half-time national coordinator position was made permanent in 2013 and is funded with INFAS endowment income.

III.2. Fundraising

Fundraising is a major preoccupation for the entire ASI team. Our Directors of Major Gifts from the CA&ES Dean's office, our Communications Coordinator, Proposal Coordinator, and Budget and Finance Officer each play indispensable roles in providing support to the ASI Director, Deputy Director, Program Manager, Academic Coordinators, and faculty affiliates in these efforts. In addition to the team effort, implementation of our fundraising strategy must be supported by a compelling, socially relevant vision and mission, a results-oriented plan of activities, and an exciting strategy for communication, public awareness and engagement. Success also will depend crucially on active involvement and support from our advisory board members, UC leadership, and other friends and partners of ASI. ASI units and programs increasingly are viewed as campus-wide assets, which has opened opportunities to gain attention from "central" campus development. The increased awareness of ASI by campus development leaders is an important development over the past several years, since success in ASI's endowment campaigns will require more than one eight- figure ($10 million or more) gifts. ASI has for several years benefited from approximately 0.3 FTE of CA&ES Director of Major Gifts Melissa Haworth's time. Melissa focuses on fundraising for the Student Farm and Experiential Learning

programs, the Russell Ranch Sustainable Agriculture Facility, and other ASI endowments including the campaign to endow an agroecology professorship.

In broad terms, ASI's needs include reliable sources of funding to revitalize SAREP grants at levels of $750,000 to $1.5 million per year, and to fully-fund essential activities of the Student Farm, the Russell Ranch Sustainable Agriculture Facility, UC SAREP, and our newest program in Food Systems Informatics, and to implement ASI's vision, mission and strategies, described above, and to continue essential core support functions that underpin ASI's role as a backbone organization (see Part II, ASI's Theory of Change). ASI is included in the pop-up menu on the "gift button" on the UC Davis Website (http://giving.ucdavis.edu/), enabling donors to make electronic donations to ASI.

IV – PROGRAMS HIGHLIGHTS, THEORIES OF CHANGE, 2019 WORKPLANS
Next Steps for ASI work

Overall status: the current thematic structure and priorities for ASI initiatives is working well, though it will be some time before ASI has resources sufficient to pursue all proposed initiatives.

1. UC SAREP

UC SAREP HIGHLIGHTS NOV 2017 – DEC 2018

We collaborate with our county UCCE partners in all of the projects and programs described below. All projects are funded by extramural grants and gifts.

BUILDING REGIONAL MARKETS AND COMMUNITY

Farm to School
- Participating in evaluating one garden-based learning/nutrition education project (Calaveras School District)
- Evaluated outcomes of ProCureWorks, a project to expand sustainable food procurement in large school districts and hospitals in California

Values-based Supply Chains
- Developed research and resources on values-based supply chains and food hubs (available on SAREP's website and in peer-reviewed journals)
- Conducting research with four other land grant universities on supporting small and medium-sized producers through values-based supply chains (specialty foods, food hubs)
- Maintained and strengthened technical assistance opportunities for food hubs via a Northern California Food Hub Network

Small, beginning, immigrant farmer marketing assistance
- Conducted wholesale tours and developed marketing, food safety resources for these farmers
- Conducting tours for beginning farmers at established farms (CRAFT) in 7 northern California counties.
- Working with Hmong farmers in Fresno to grow, process and build markets for dried Moringa. Working with UCCE to conduct outreach about moringa, including recipes and flyers.

11

Urban Agriculture
- Conducted marketing workshops for urban farmers as part of an urban ag workshop series statewide.
- Evaluating the impacts of urban ag workshops statewide.

Agritourism
- Conducting agritourism workshops for ag professionals in Northern and Southern California and developing topical resources guides.
- With local stakeholders in two regions, organized agritourism planning classes for farmers and ranchers that will be held in Winter 2019.
- Maintained UC Agritourism Directory, sharing information about agritourism activities and events with the public

FOOD SYSTEM ASSESSMENTS/ FOOD POLICY
- Partnering on a Food Policy Council research and outreach project, focusing on 10 case studies of food policy councils in California and a statewide survey of 31 FPCs. Published results in one peer-reviewed journal and a statewide report (on SAREP's website).

FARM AND FOOD SYSTEM WORKERS AND HEALTHY RURAL COMMUNITIES
- Partnered with UCCE and other researchers in CA and CO to write a grant proposal to study economic and social impacts on farmworkers of 2 social certification initiatives (Fair Trade and Equitable Food Initiative).

AGRICULTURE, RESOURCES, AND THE ENVIRONMENT
Energy and Climate Footprinting
- Processing tomato life cycle assessment: Completed final project report to Barilla, four presentations to grower/extension and academic communities, and one project project factsheet for distribution. Also started project webpage on SAREP website.

Responding to Climate Change
- Brodt contributed to several policy initiatives of the California Climate and Agriculture Network (CalCAN) by contributing scientific information as part of the Science and Technical Advisory Committee.

Harnessing Ecosystem Services to Increase Agricultural Sustainability
- Initiated a new project in collaboration with the Organic Farming Research Foundation and Cal Poly San Luis Obispo, to create a free online course for organic specialty crop farmers on the fundamentals of nutrient and irrigation management, pest, disease and weed management, and farm economics and marketing. Completed modules on soil & nutrient management, and weed management.
- Initiated a new project on the feasibility of growing and marketing California native elderberry (including assessing nutritional composition) in hedgerows on small-scale farms. Completed first season of on-farm growing trial and data collection, and nutritional composition analysis of harvested berries.

- Conducted outreach survey and website development work for a project led by ASI-affiliate Amelie Gaudin, to research the soil health, water management, and tree growth, disease and yield impacts, and life cycle emissions impacts, of whole orchard recycling in almond orchards as an alternative method to handle biomass after orchard removal.
- Brodt and Gaudin conducted a webinar on The Potential of Agroforestry as a Pathway to Sustainability in California Agriculture, attended by over 25 participants from around California and the U.S. This event generated several subsequent communications with people around California interested in agroforestry options.
- Organized and conducted the inaugural meeting of the UC ANR Agroecology and Organic Farming Systems Work Group meeting, with 8 presenters from across UC ANR, and 18 total attendees.
- Submitted academic journal manuscript on results of preliminary survey of practices, challenges, and opportunities for agroforestry in California.
- Joined partner organizations (NRCS, CA Assoc of Resource Conservation Districts) to discuss potential for development of a California Farm Demonstration Network for outreach on soil health and related agricultural conservation practices.

Western SARE Professional Development Program
- Brodt collaborated with California co-coordinator Jeff Stackhouse to implement a travel scholarship program to enable 10 agricultural professionals from around California to attend the national SARE/ATTRA conference "Our Farms Our Future" in St. Louis, MO in April 2018.
- SAREP initiated a project to create a workshop on social and racial equity in extension (see Social Equity highlights).

SAREP's Theory of Change (August, 2018)

	What is the problem you are trying to solve?	Who is your key audience?	What is your entry point to reaching your audience?	What steps are needed to bring about change?	What is the measurable effect of your work?	What are the wider benefits of your work?	What is the long-term change you see as your goal?
Economic **Environmental** **Social**	● ● ● **California's food and farming system is inequitable in terms of access to healthy food and control of land and resources, and it is unsustainable in terms of impact on human and environmental health.** ● Pollution from ag ● Unsustainable resource use: a) reliance on non-renewable resources and b) rapid depletion of renewable resources, faster than they can regenerate ● Agriculture's vulnerability to	● ● ● **California agriculture and food system stakeholders** ● ● ● Public, private, and non-profit agricultural service providers ● ● ● Policy makers and govt agencies ● ● Farmers & ranchers, including small/mid-scale and historically under-served producers ● ● UC Coop Extension ● ● Ag & environmental advocacy groups	● ● ● **Stakeholders want to participate in framing sustainability challenges and creating practical solutions** ● ● ● Stakeholders seek understanding of sustainability challenges in a rapidly changing world ● ● ● Farmers & ranchers and UC Coop Extension seek science-based solutions for means to improve sustainability and resilience ● ● ● Stakeholders seek experiential learning and opportunities to collaborate to address	● ● ● **Stakeholder-driven discovery, validation, and dissemination of knowledge, and co-creation of sustainable practices and policies.** ● ● ● Support farmers in accessing markets for sustainable products. ● ● ● Make connections to institutional buyers and distributors to expand markets for sustainable products ● ● ● Quantify and translate the practical value of ecosystem services and cost of food	● ● ● **Knowledge, attitude, intention, behavior changes** ● Increased use of sustainable practices on farms of all scales ● ● Increased awareness and social acceptability of innovative approaches (production practices, marketing, distribution, etc) ● ● ● Increased market & value-added options for small and mid-scale growers and for sustainably produced products	● ● ● **California's food and farming system provides abundant healthy food, and supports environmental and human health** ● Conserved and resilient resources (water, soil, air, biodiversity) ● Dynamic and successful small/mid-scale and historically under-resourced farmers ● Continued vitality of California's agriculture and food sector ● Improved access to healthy,	● A food system which is economically viable for food systems actors at all scales. ● A food system in which production is achieved with resource use that can be continued indefinitely, including under changing climate conditions, and which enhances environmental health. ● A food system which is characterized by structural equality such that race, class, geography and gender no

14

environmental change	● Irrigation districts/RCDs	sustainability challenges	system externalities	● ● ● Policy makers become more aware of and implement successful policy interventions within health and food systems	culturally appropriate food for all Californians	**longer determine health outcomes and access to healthy food.**
● Lack of resources/TA targeting the specific needs of small/mid-scale farmers and ranches	● Economic development agencies	● ● Environmental and social justice groups/policy makers want credible information to spur social change and policy reform	● ● ● Develop sustainability indicators and conduct participatory food system assessments		● Appreciation of California's diverse food cultures	
● Cost of production out of alignment with market prices for food (market failure, small profit margins)	● Institutional food procurement ● Regional distributors	● ● ● Stakeholders seek to engage local, regional or state-wide policy makers to influence food and farming policy	● ● ● Develop and translate relevant information to support programmatic and policy initiatives of our key audiences	● ● Policies that support payments to farmers for ecosystem services		
● Consolidation of power & wealth	● Youth ● Consumers			● ● ● Local food policies that address gaps in community food systems		
● Production of poverty in food system labor force	● Farmworkers	● ● Coop Extension & TA providers	● ● ● Network and build capacity among food system actors with common vision/values	● ● ● Consumers and other buyers willing to pay more for "true cost" of food (eg, sustainably produced)		
● Inequity/racism		● ● Farm Bureau ● ● Producers Assoc.				
● Disconnection from the source of our sustenance		● Commodity Assoc.	● ● Work with innovative farmers to design, co-create, and demonstrate cutting edge approaches to sustainability	● ● ● Coordinated efforts among food and ag		
● Lack of equitable access to healthy, culturally appropriate food		● NRCS/RCD ● Ag professionals (PCAs/consultants) ● Ag input suppliers	● ● Farmer-led research to adapt			

			● Enviro justice groups ● ● Institutional Buyers ● Schools	practices to different regions/cropping systems ● ● Work with farmers for incremental environmental improvements over large spatial scales ● Raise our awareness about social justice, incorporate a social justice lens in our research and outreach, and expand and deepen our networks and relationships so that we represent the people of CA ● Engage in research and outreach to support fair labor practices in farm and food system sectors	system stakeholders ● Occupational health improvement among farm and food system workers ● Reduced disparities in food security, health and wellbeing across California ● Increase in diversity of stakeholders engaging in ag and food system services and programs		

Assumptions:
  (1) The current food/ag system relies on inequity and does not account for externalities

16

(2) Sustainability requires addressing economic, environmental and social issues simultaneously.

Discussion points for SAREP's Theory of Change:

1. **Undertapped opportunities** to work together **to address BOTH environmental and economic viability** of farms: Examples: environmentally sound practices and work on developing markets for products produced with those practices; also, work with underserved populations/small-scale, minority-owned farms to adapt environmentally-sound farming practices for their conditions

2. **Pros and cons** of working on **incremental change** on a large-scale by working **with mainstream farmers** VS working with production and/or marketing systems that are still **at the fringe but may provide radically new models** for greater long-term improvements for sustainability

2018-2019 UC SAREP WORKPLAN

BUILDING REGIONAL MARKETS AND COMMUNITIES
- Continue working with small and mid-scale, beginning, immigrant, and urban farmers and ranchers to strengthen markets for fresh and value-added products through convenings, workshops, farm and wholesale tours and mixers with regional buyers, in collaboration with UCCE colleagues and NGOs.
- Work with UCCE and community NGOs to provide food safety trainings for small and mid-scale farmers, ranchers and food hubs.
- Continue working with regional food hubs to strengthen regional distribution options for small and mid-scale farmers and ranchers. Strengthen the CA Food Hub Network.
- Continue working with farmers and communities to strengthen agritourism opportunities for California farmers through workshops, tours and web-based resources.

FOOD SYSTEM ASSESSMENT/ FOOD POLICY
- Continue working with community groups and food policy councils to design and adopt sustainable food policies that address local economic development, food security and environmental stewardship. Share food policy council research widely.

FARM AND FOOD SYSTEM WORKER HEATLH AND COMMUNITY WELLBEING
- Engage with UCCE and community partners to address challenges for farm and food systems workers and rural communities, potentially through market-based social certification initiatives.

AGRICULTURE, RESOURCES, AND THE ENVIRONMENT
Energy and Climate Footprinting
- Continue to disseminate results on processed tomato life cycle assessment to industry stakeholders and to academics, with journal article publication.
- Create web information resources to comprehensively communicate findings from all ASI and collaborators' life cycle assessment projects to date.

Responding to Climate Change
- Continue representation on Science and Technical Advisory Committee for the California Climate and Agriculture Network (CalCAN).

Sustainable Management of Nutrients and Water in Agricultural Landscapes
- Assess need for additional outreach events on the California Nitrogen Assessment, and collaborate with external partners to conduct outreach.

Harnessing Ecosystem Services to Increase Agricultural Sustainability
- Produce technical content for modules on water management & irrigation, pest management, disease management, and farm economics & marketing for an online

course for organic specialty crop farmers, in collaboration with the Organic Farming Research Foundation and Cal Poly San Luis Obispo.

- Continue on-farm trial to assess elderberry hedgerow growth and production potential, begin market assessment, and establish an elderberry webpage on SAREP's website (also fits in *Building Regional Markets and Community* initiative).
- Complete website and outreach factsheets on whole orchard recycling in almonds (on research led by ASI affiliate Amelie Gaudin).
- Continue to build networking and web presence around diversified and perennial farming systems and agroecology on SAREP's website.
- Complete publication of California agroforestry survey journal article, and publish additional articles as relevant.
- Collaborate with members of the UC ANR Agroecology and Organic Farming Systems Work Group and the parent Program Team to plan an annual meeting.
  Farming Systems Work Group and the parent program team to hold a statewide meeting
- Collaborate with NRCS, the California Association of Resource Conservation Districts, and other statewide partners to establish a California Farm Demonstration Network for development and outreach of soil health and related agricultural conservation practices.

Western SARE Professional Development Program

- In collaboration with UCCE Advisor Jeff Stackhouse, execute a mini-grants program to solicit and fund projects to provide professional development opportunities to California-based agricultural professionals and farmers/ranchers, on one or more of a variety of topics relating to sustainable agriculture.
- Complete work on the 2018-19 funds to conduct a social equity workshop for extension professionals (for further information see Social Equity workplan).

2. STUDENT FARM

STUDENT FARM HIGHLIGHTS NOV 2017 – DEC 2018

During the 2017-18 academic school year, the Student Farm continued to provide excellent experiential learning opportunities for UC Davis undergraduate and graduate students and schoolchildren in the surrounding region. Our programming supported nearly 300 internships and 23 student employee positions where students gained hands-on experience in sustainable farming and gardening practices, cut flower and produce production and sales, food security, scale-appropriate sustainable technologies, and research. In addition, staff and students from the Student Farm presented at the California Higher Education Sustainability Conference, the Sustainable Agriculture and Education Association Conference, the Conference on World Affairs, and the UC Davis Center for Educational Effectiveness. The Student Farm continues to be a leader in sustainable agriculture and food systems education and recently published a leadership development training tool kit documenting best practices in leadership development at the UC Davis Student Farm.

Education

Internship program: We supported more internships than ever before. We hosted 279 students from multiple majors. The majority of students were housed within the College of Agricultural and Environmental Sciences.

- *Leadership Development*. We supported between 13 and 23 student employees each quarter who participated in up to 13 leadership development workshops. These workshops focused both technical and communication skills such as "Leadership Values" to "Harvesting and Handling Produce". We improved our process for supervisor check-ins with LSFs (lead student farmers, our student staff employees). With funding from Global Food Initiative, we completed our best practices toolkit about Student Farm Leadership Development entitled "When Students Lead" and posted it to the ASI website.
- *Experiential learning assessment*: Student Farm staff reported and presented on our experiential learning assessment methods at two different campus symposia. Our report of assessment methods and process was requested and included in the College of Agricultural and Environmental Sciences Western Association of Schools and Colleges accreditation process.
- *Internships by program*:

Program	Number of Interns in 2017-18
Market Garden (8 acres of organic vegetable and fruit production; food sold through CSA, farmers market, Co-Ho, and Dining Services)	93
Ecological Garden and Flower project (1 acre diverse sustainable garden growing sustainable cut flowers sold to campus events, dining and CSA)	83

Community Table Project (Student Farm gleaning program reducing food loss and student food insecurity and increasing engagement of underrepresented students)	44
S.C.O.P.E. (Student led program breeding crops for organic systems)	20
Kids in the Garden (UCD Student led tours for K-5 classes from Davis and the surrounding region)	40
School Garden (Placing UCD Students in school gardens in the surrounding region)	26

Co-curricular partnerships. We hosted more courses than ever before.
- *Visiting courses.* We hosted 30 courses from multiple Schools and Colleges, 22 of which were housed within the College of Agricultural and Environmental Sciences:
    - College of Agricultural and Environmental Sciences
        - ABT/IAD 142 Equipment and Technology for Small Farms (2 units)
        - ABT 289A-001 D-Lab I: Energy, Agriculture and Development
        - CRD 20 Food Systems (4 units)
        - ECL 216. Ecology and Agriculture (4 units)
        - ENT100L General Entomology Lab (2 units)
        - FYS-004-017 Examining the Arguments of the Local Food Movement
        - GEO 200 DN: Socio-Spatial Analysis (4 units)
        - IAD 202 Analysis and Determinants of Farming Systems (4 units)*
        - PLP 120 Plant Pathology (Student Farm plant materials collected and used in the course)
        - PLS 1 Agriculture, Nature and Society (3 units)
        - PLS 2 Botany and Physiology of Cultivated Plants (4 units)
        - PLS 5 Plants for Garden, Orchard and Landscape (2 units - professor retired, status of course unknown)
        - PLS 12 Plants and Society (4 units)
        - PLS 15 Introduction to Sustainable Agriculture (4 units)
        - PLS 49 Organic Crop Production Practices (3 units)
        - PLS 105 Concepts in Pest Management (3 units)
        - PLS 170 A and B Fruit and Nut Cropping Systems (2 units)
        - IAD/PLS 160 Agroforestry: Global and Local Perspectives (3 units)
        - PLS 171 Principles and Practices of Plant Propagation (4 units)
        - PLS 190 Seminar on Alternatives in Agriculture (2 units - does not use outdoor space)
        - PLS 193 Garden and Farm-Based Experiential Education Methods (2 units)
    - College of Engineering
        - ENG 3 Engineering Design
    - College of Letters and Sciences
        - CHI 110 Sociology of the Chicana/o Experience (4 units)
        - CHI 113 Latin American Women's Engagement in Social Movements (4 units)
        - CHI 198 Decolonizing Spirit

- SOC 195 Farm to Fork: Food, Agriculture and Society in California, Israel and Palestine
  - o School of Education
    - EDU 142 Introduction to Environmental Education (4 units)
    - EDU 209 Image-based Field Research (4 units)
    - EDU 307 Methods in Elementary Science Teaching (2 units)

- *Student Farm courses:* Courses taught by Student Farm staff, including Intro to Organic Production (PLS 49), Farm and Garden Based Experiential Learning Methods (PLS 193), and Seminar in Alternatives in Agriculture (PLS 190) continue to experience high enrollment. Last year's Spring Quarter PLS 49 course expanded to over 40 students – a 100% increase in enrollment.)

Research

Student Farm research: We expanded our research program at the Student Farm.

- The SCOPE project added an additional crop to its variety development: students associated with SCOPE are now also breeding small grains for organic systems, in addition to tomatoes, peppers, common beans and lima beans. Three additional research projects were initiated at the Student Farm: (1) a graduate student in the Dept of Entomology began a fear ecology experiment studying how the presence of parasitic wasps changes alfalfa pest behavior and herbivory, (2) a graduate student and Student Farm staff are trialing no-till systems for the farm, and (3) faculty in Chicanx studies are investigating how Chicanx course students experience the Student Farm. In addition, the Student Farm is supporting educational programming around a carrot-focused diversity and plant breeding research grant.

Service

Student Farm service: We hosted community tours, children educational programming, and presented at conferences.

- *Community Table Project*: The Community Table Project was recognized by the UC Davis Food Security Task Force as a program that should be sustained. We expanded distributions from two partners in Winter Quarter 2018 (Pantry and Fruit & Veggie Up) to three partners during 2017-18 (Pantry, Fruit & Veggie Up, and the Educational Opportunity Program). During that academic year we donated 10,000+ pounds of produce to campus to date. In addition, we hosted three courses from Ethnic Studies and led workshops on equity in outdoor education. We also received a TGIF grant to hire two undergraduates on the project.
- *Kids in the Garden and School Gardens*: Another successful year of garden and farm tours for 1500 children with 130 teachers and chaperones from 27 area schools led by 40 trained UC Davis interns. Employed 4 students as peer supervisors for the tour program during spring quarter. Developed and hosted new off-campus internship program to recruit and mentor 26 students conducting internships in school gardens in Sacramento, Woodland, and Davis.
- *Tours:* We hosted 31 tours of the farm, leading tours for over 900 people (includes farmers from the CAFF Farmers Guild Raising). Tours included visiting students and researchers from Japan, China, Germany, and regional middle schools and high

schools. We also worked closely with Aggie Ambassadors and the Dean's office undergraduate advisors to host additional tours.

- *Hosted CAFF Farmers Guild Raising:* Hosted over 200 farmers for the annual Farmers Guild Raising. Student Farm staff and students offered a farm tour and workshops on plant breeding and flower production.
- *Leadership in agricultural education:* We presented Student Farm innovations at multiple conferences: the California Higher Education Sustainability Conference, the Sustainable Agriculture and Education Association Conference, the Conference on World Affairs, and two symposia hosted by the UC Davis Center for Excellence in Education. In addition, we published our best practices in leadership development and responded to feedback requests from Student Farms at Duke University, UC Riverside, University of Delaware, Pennsylvania State University, and Michigan State University.

Infrastructure and long-term development

- *Sustainable Living and Learning Communities (SLLC):* The Student Farm continues to play a leadership role in the SLLC. This formalizes the relationship amongst several programs that study and support sustainable living and learning at UCD. Student Farm staff and students recently presented the SLLC vision plan to Dean Dillard's College Campaign Committee and received positive and helpful feedback. In addition, Student Farm staff secured 24K in foundation funding for the SLLC Vision Plan Process. This funding allowed us to support Professor David de la Pena to work with Carol Hillhouse and seven student fellows to execute a community visioning process, develop site plans and explanation for the space, and draft an academic plan for the future SLLC. With EAB member Poppy Davis and Melissa Haworth, we initiated and raised funds for the Green Fellowship to support prestigious fellowships for the next 5 years focused on student initiative and sustainable living centered on SLLC projects. Currently we have 80K pledged over the next 5 years from 30 UCD alum and other supporters.
- *Market Garden:* The Market Garden started to transition to no-till vegetable production and built a no-till sled to facilitate plantings. In addition, the Market Garden implemented a new microgreens production system in response to Dining Services markets and increased CSA subscribers to 115. There were significant equipment and infrastructure improvements associated with the Market Garden, including a new 20 ft. cooler shared with the Community Table Project and on-farm food security efforts, a new 40 ft. dry storage container, solar powered cooling fans in the greenhouse, built a lettuce washer/bubbler prototype to achieve cleaner lettuce heads, and re-fenced our perimeter food production areas to improve efficiency. The Market Garden sold roughly $129,000 in produce during 2017-18. Income was used on operations and personnel.
- *Ecological Garden and Flower Project*: Students and staff worked together to design and build a new rodent-proof chicken coop with concrete foundation and removed excess vegetation to the east of the Field House. The Flower Project completed its second successful year grossing 20K in income from clients that include 15 bouquet CSA members, dining services, campus catering, Scrubs café and numerous special events such as significant sales of bouquets for spring graduation events and arrangements

and banquet table garlands designed and created for the 2018 College Celebration. To meet increasing Flower Project demand, we expanded the ground we manage to include raised beds, green house space, and open ground to the south and west of the EG proper and are growing more than 100 varieties of flowers.

- *Funding:* Funding for Student Farm staff and programming was secure through 2018-19 as a result of self-supporting income, renewed M.O.U. with the College of Agricultural and Environmental Sciences, increased philanthropic gifts, and newly awarded grant funds.

"Theory Of Change" Analysis for The Student Farm (Dec 2018)

Broad Themes	Main problems	Key audiences	Entry points	Steps to bring change	Measurable effects	Wider benefits	Long-term changes
1) Connecting people to agriculture and food systems	College students and others have little experience with and understanding of sustainable agriculture and sustainable living systems	UCD undergraduate and graduate students	The Student Farm has land, infrastructure and talented, experienced staff and is a leader in farm and garden based education.	Maintain the Student Farm such that it demonstrates sustainable agriculture best practices. Enhance SF facilities, equipment, and staff development so SF remains an accessible and dynamic educational site.	# of internships	Awareness of SF grows	Graduates are informed and engaged life-long learners – their personal and civic decisions have positive impacts locally and globally with an understanding of sustainable agriculture and food systems.
		UCD Faculty			# of student employees	Opportunities for interdisciplinary collaboration increase	
				Provide opportunities for community-engagement and service learning (e.g. Community Table Project, SCOPE, School Garden Internships, Kids in the Garden).	# of classes		
	General population does not have the necessary educational or life experience to make reasoned decisions about sustainability in agriculture and the environment		Student interest in experiential learning about sustainable agriculture and food systems is growing rapidly in California, nationally and globally.	Provide students – who come to SF with novice to expert knowledge levels – with diverse mentored opportunities in sustainable agriculture and food systems via internships, paid positions, formal courses, to create network of engaged students.	Diversity amongst interns, employees, and class visitors	Students, faculty and staff are better at cooperative work and research	
		Experiential Learning practitioners			# majors represented		
					# involved faculty	Children and teens see place for themselves at UCD and/or in ag	There are more change-makers, representing diverse life experiences, ready to solve the sustainability challenges we face. They enter the workforce ready to lead.
2) Growing student sense of agency and leadership skills to empower change-makers	Experiential Learning and interdisciplinary learning opportunities around sustainability are limited at Land grant universities	K-12 students and teachers	Educators working in agriculture, food and sustainability increasingly recognize the need to include more experiential learning in curricula.	Provide opportunities for student-driven, mentored, undergraduate and graduate research and experimentation. Screen and test scale appropriate technology for sustainable management	# of independent projects	SF is model for other campus programs	
					Publishable research findings		
		Other student farms		Host and assist with interdisciplinary experiential learning activities for undergraduate and graduate courses – develop network of engaged students and faculty.	Primary and secondary school visitors to Student Farm (SF)	Students have direct experience with diverse cultures in the region	Experiential learning (EL) is commonly and effectively used in educational institutions. Faculty incorporate EL into courses and curricula and students participate fully and create new EL venues over time.
	Currently the leaders working in sustainable agriculture and food systems, policy, education, innovations, and programs do not reflect diversity of the CA population	Farmers	There is greater awareness of the rising human, social and economic costs of diet-related health problems.	Remove visible and invisible barriers to accessing the Student Farm. Continue to create a space where all students feel a sense of belonging and a place they can engage with land and their food system.	Positive evaluations from visitors, interns, field trip, participants	People are healthier as a result of ability to engage in their food system in positive ways	
		CSA subscribers			# community collaborators and positive contributions to community		
				Work with colleagues at UCD, other student farms, school gardens, and other institutions to support and gain better understanding of student experiential learning and share best practices for EL facilitation and assessment in farm and garden settings.	Measurable experiential learning outcomes such as critical thinking, systems understanding, or community awareness		
3) Improving student wellbeing	College students are experiencing unacceptable rates of food insecurity and some suffer from other nutrition related illnesses (e.g. diabetes)		Student food insecurity can be addressed by the food produced and the student experiences gained at Student Farms or in similar settings.	Further develop and share SF leadership development training program.		Growing collaboration amongst primary and secondary education and from public, private and non-profit organizations	Student are more successful before and after graduation as a results of improved wellbeing

Key assumptions: (1) California and the world need graduates who can help make our agriculture and food systems more sustainable and just. (2) Issues of sustainability require holistic understanding of complex systems; this understanding is difficult to attain without direct experiences in such systems that include opportunities for skill development, linking theory and practice, critical thinking, and problem solving along with interdisciplinary collaborative learning that is inquiry based and socially engaged and relevant.

2018-2019 STUDENT FARM WORKPLAN

- Maintain the Student Farm such that it demonstrates sustainable agriculture best practices. Secure staff and student employee funding for the 2019-20 academic year, purchase a second utility vehicle and a covering for packing area, replace greenhouse and Field House roofs. Submit multiple grants and secure additional foundation funding and philanthropic gifts.

- Continue to provide undergraduate and graduate students – who come to SF with novice to expert knowledge levels – with diverse mentored opportunities in sustainable agriculture and food systems via internships, paid positions, formal courses, to create a network of engaged students. Strengthen collaborations with Plant Sciences, Entomology, Food Science and Technology, Engineering, and Ethnic Studies. Host

- Provide opportunities for student-driven, mentored, undergraduate and graduate research and experimentation – especially research related to pollinators, symphylan control, citizen science, and climate change.

- Screen and test technology for sustainable management. Develop a network of faculty in design, engineering, and food science technology who can work with students to identify and test scale appropriate, sustainable technologies at the Student Farm.

- Host and assist with interdisciplinary experiential learning activities for undergraduate and graduate courses – develop network of engaged students and faculty.

- Provide opportunities for community-engagement and service learning (e.g. Community Table Project, SCOPE, School Garden Internships, Kids in the Garden). Convene groups at UCD addressing student food security

- Remove visible and invisible barriers to accessing the Student Farm. Continue to create a space where all students feel a sense of belonging and a place they can engage with land and their food system. Strengthen existing and develop additional collaborations with Chicanx Studies, Asian American Studies, African and African American Studies, and Native American Studies.

- Work with colleagues at UCD, other student farms, school gardens, and other institutions to support and gain better understanding of student experiential learning and share best practices for experiential learning facilitation and assessment in farm and garden settings. Post assessment efforts on our website.

- Further develop and share Student Farm leadership development training program through new workshops with colleagues at UC Davis and at other universities.

3. RUSSELL RANCH

RUSSELL RANCH HIGHLIGHTS NOV 2017 – DEC 2018

We are in the 25th year of our tomato-corn systems under organic, conventional, and conventional+winter cover crops management system with cover crops, and our wheat-fallow rotations. We are adding a new conventionally managed tomato-corn system with poultry manure compost, to enable isolation of the effects of incorporating compost and cover crops alone into an annual row crop rotation.

Soil C changes among irrigated maize–tomato, and rainfed and irrigated wheat–fallow, cropping systems with different fertility inputs were measured over nineteen years down to 2 meters in depth. No changes were observed in unfertilized or most fertilized wheat–fallow systems nor in the conventional maize-tomato rotation. Soil C did increase in the irrigated fertilized wheat in the deeper but not shallow soil layers. Soil C increased substantially in organic maize–tomato rotation (cover crops and compost) across the 0 to 200 cm profile. In the mixed maize-tomato rotation (conventional plus cover crops), soil C increased only in the top 30 cm but surprisingly showed a decrease in 30 to 200 cm, indicating that cover crops alone were not effective in soil carbon sequestration (Nicole Tautges, Kate Scow)

We are launching a new relational PostgreSQL database to increase the security and usability of data from the Century Experiment on Russell Ranch. The database was designed to follow global FAIR Data Principles to make data findable, accessible, interoperable and reusable (Wilkinson et al., 2016), as well as the metadata principles of the new Global Long Term Experiments Network (GLTEN), of which Russell Ranch is a member (Nicole Tautges, Kate Scow)

We investigated impacts of cover crops on nutrient cycles looking at different cover crop mixes to determine release rates of the key plant nutrients nitrogen, phosphorus, and potassium from different constituents of the cover crop mix. This knowledge will enable design of cover crop mixes to optimize subsequent availability of crop nutrients (Nicole Tautges)

We developed a guide for sampling and monitoring soil organic matter and soil carbon, designed for growers and landowners. This guide was presented and disseminated at a workshop at Russell Ranch, and will be published online available for free download, as a part of the Healthy Soils Demonstration grant we received from the California Dept. of Food and Agriculture (Nicole Tautges)

Deficit irrigation in the second half of the growing season provides opportunities to increase soluble solids concentration in processing tomatoes while decrease water inputs. In the 2018 season, four deficit treatments (25%, 50%, 75%, and 100% ET) were applied one week after the NDVI reached the plateau (56 days after transplanting) in both organic and conventional tomato systems. Water stresses as monitored by stem water potential (SWP) indicated that plants started to show differences among treatments after 2 to 3 weeks of deficit irrigation in both organic and conventional systems. Tomato plants were more resistant to water stress in the organic relative to the conventional system. After 6 weeks of deficit irrigation, SWP in the

75% and 50% ET treatments did not differ from the full irrigation in the organic systems, whereas only the 75% ET treatment maintained the same SWP level as the full irrigation treatment in the conventional system (Amelie Gaudin).

We investigated the impact of long term management on total and available micronutrients and trace elements in soils at Russell Ranch. Different systems accumulated zinc, cadmium, nickel, copper to different degrees which was a function, in part, of differences in soil organic matter. We are exploring how these soil differences affect nutritional value in tomato fruit and corn grain grown in our different systems (Devin Rippner, Sanjai Parikh, Andrew Margenot).

In a study of how agricultural management affects resistance of plants to insect pests and viruses, it was demonstrated that organic fields at Russell Ranch had lower pest populations compared to conventional fields and that differences were due partially to increased plant resistance. Beet leafhoppers preferred conventional over organic tomato plants at Russell Ranch and on commercial farms. Organic management altered plant defense hormones and rhizosphere microbial communities has a significant impact on plant attractiveness to leafhoppers. Microbiome sequencing and transgenic approaches coupled with multi-model inference indicated that changes in plant resistance were dependent on salicylic acid accumulation in the plant and rhizosphere microbial communities (Amelie Gaudin)

A new approach to estimate corn nitrogen uptake as a function of real-time and cumulative seasonal crop water demand was developed by measuring relationship between N uptake curve and cumulative ET by combining real-time canopy and leaf reflectance values from proximal sensing devices (Taylor Becker, Mark Lundy).

Long term plots of Kernza (perennial grain) were established to measure water and fertilizer interactions, carbon sequestration, rhizosphere communities and other ecosystem service parameters. Multiple potential benefits are being measured (Kalyn Diederich, Mark Lundy)

Soil biodiversity campaign—sequencing of microbial communities in different farming systems of Century Experiment at 20 years; functional analyses of microbial community responses to farming operations and inputs (Eoin Brodie, Joanne Emerson, Kate Scow)

The 2018 Annual Russell Ranch Field Day, entitled *Increasing Farm Resilience through Healthy Soils & Water Management*, featured presentations from 12 researchers conducting projects at the facility reporting findings from studies examining mycorrhizal colonization, deficit irrigation, microbial community surveys, and life cycle analysis, in processing tomato systems. The Field Day also featured a Discussion Panel with two local growers and a grower community advocate, where panel members discussed their perspectives and experiences with soil management and soil health on their croplands, and addressed the audience's questions about management practices for healthy crops and soils. The event was very favorably reviewed, especially the Grower Panel segment. (RR crew)

Russell Ranch hosted a number of field trips that are part of UCD courses, including SSC 100 (Southard, Introduction to Soil Science), SSC 109 (Horwath, Soil Nutrient Management), SSC 111 (Scow, Soil Microbiology).

DRAFT: THEORY OF CHANGE FOR RUSSELL RANCH (2018)

Main problem	Key audience	Entry points	Steps to bring change	Measurable effects	Wider benefits	Long-term change
Much still remains to be discovered about principles and practices that are feasible and effective in improving resilience and multifunctionality of agroecosystems. Agriculture needs to know how to be nimble and responsive to future uncertainties in global change (climate, economic)	Farmers and ranchers; researchers/ extension; undergraduate and graduate students; Policymakers	Growing interest among farmers in agroecological/ regenerative approaches. Farmers see greater value in university research if they can collaborate in its inception/execution. RR is right scale to do controlled research at credible physical scale to be possible to imagine applicability; questions targeted are pressing to farmers. RR has long term dataset, archived samples, and a staff proficient in farming and field experimental design. RR approach to research is highly collaborative and transdisciplinary-- the greatest innovations will come out of a diverse set of perspectives. Students are looking for opportunities for research experience on well-instrumented, commercial scale farm. Policy makers are looking for a place that will guide climate-smart and regenerative agricultural policies.	Provide demonstrations of the outcomes of sustainable practices and communicate some of the scientific behind them. Collaborative field experiments at RR and on farmers' fields Develop network of on-farm research sites for annual monitoring Surveys of farmer interests, needs, change in attitudes over time, adoption Small grant program to support collaborative student-farmer research on farmers' fields Make RR a hub for bringing together researchers across different disciplines, private-public sectors to discover new principles and practices Create a road map for on-farm transformative research in resilience and multifunctionality of agroecosystems. Create scenarios for agroecological systems for different futures for policy makers Develop fact sheets on key topics; Create case studies for lectures. Host annual field trips and projects for classes; Hold workshops on field sampling methods/measures Give presentations at agencies and relevant conferences; Host field trips and trainings for policy makers; Create relevant, targeted website for policy makers	# farmers collaborating with RR #field days and workshops--#of attendees Articles in trade magazines, press releases Number of researchers from within and outside of UCD working at RR Number of research publications, press releases, tweets, and other communications. Number of field days and other opportunities for exchange of research findings and extension messages. #visitors to RR and RR website Number of interactions with policy makers at RR and in Sac/DC Invitation to serve on government, NGO panels/committees, give talks # students doing research at RR #students participating in workshops, short courses	Maximized above- and belowground ecological diversity while maintaining economically sustainable levels of productivity Multi-pronged integrated pest management practices that place equal emphasis on prevention and reaction to decrease economically harmful pest pressure Tighter nitrogen and water cycling that maximizes crop uptake and minimizes agroecosystem leakage and downstream pollution. Networks of CA (and global) researchers extending and layering collaborations to achieve new transdisciplinary levels of scientific research New tools and methodologies developed to better measure and evaluate success of practices in terms of sustainability, regeneration, and resilience of agroecosystems. RR research supports policies that consider the perspectives and experiences of multiple players along agricultural value chains. UC Davis graduate students better equipped at designing and analyzing field experiments. RR is "go-to" place for State policy makers to learn about agroecological and climate smart research.	Agricultural systems produce diverse, ample, healthy food w/practices that are regenerative and resilient to climate change (mitigate and adaptive), and increase the multifunctionality of the agroecosystem Enabled and empowered growers feel they are key players in achieving healthy food in healthy environments. For policymakers and consumers: incentivize environmental stewardship management practices to ensure their economic sustainability and preserve grower and rural wellbeing
Assumptions --Development of new scientific knowledge is strengthened if farmers are involved in process of discovery. --There are connections between the long-term, intermediate and early outcomes.	Farmers, researchers, policy makers and students want to work with/at RR	Policy makers need the opportunity to learn about changes they are influencing RR has sufficient and consistent contact with stakeholders to identify needs	Need better application/integration of agroecological principles and practices on the farm. There are good links between our outputs and the outcomes they are anticipated to produce	Sufficient resources and staff are available to facilitate transformative research and infrastructure.	Practices might not be economically viable unless other policies are put into place (subsidies, incentives). Expanded group of stakeholders also engaged will include the public, NGOs and industry.	

2017-2018 RUSSELL RANCH WORKPLAN

In a new grant from CDFA Specialty Crops program--"Integrating Sustainable Waste Management in Agriculture"--we will compare the costs and benefits of compost application and irrigation regimes that reduce water use in conventional tomato systems. The effects on fruit quality, yield, soil pathogen suppression, and soil health attributes will be measured and results shared with UC Cooperative Extension advisors, growers, and the scientific community via on-farm workshops, field days, conference presentations, and online publications (Cassandra Swett, Nicole Tautges, Kate Scow).

A grant from the National Alfalfa & Forage Alliance will support research to characterize the rotational benefits of alfalfa on subsequent cash crops in rotation to analyze rhizosphere and bulk soil for soil microbial factors, including biomarkers of mycorrhizal and saprophytic fungi, bacteria, and eukaryotes, as well as microbial C and N, and soil organic carbon. Biological and chemical relationships between these soil factors and subsequent tomato crop productivity will be explored to identify why and how alfalfa benefits tomato yields, compared to corn, in rotation (Nicole Tautges, Dan Putnam)

A new project from the California Healthy Soils Program will investigate the impacts of soil health indicators of growing cover crops and different types of compost in processing tomatoes and feed corn rotations at Russell Ranch and on an adjacent commercial farm. We will compare high N composted poultry manure and low N composted yard waste, both with or without winter cover crops. A comprehensive soil health assessment tool developed for soils will be tested for use in CA soils and paired with the development of an economic model to convey results. (Rad Schmidt, Nicole Tautges, Kate Scow)

Funding from the California Tomato Research Institute will be used to continue a project to explore relationships between soil health indicators and nutrient management and productivity through interviewing farmers and collecting samples on commercial farms. In 2019, we will extend this dataset by focusing on tomato growers and farms in the San Joaquin Valley and explore links between soil salinity and soil microbial communities, especially mycorrhizal fungi. Results from this project are yielding important insights for relating soil health indicators to productivity and economic outcomes that growers connect with, further incentivizing adoption of soil health-building management practices (Emily Woodward, Nicole Tautges, Kate Scow)

To address a growing issue of potassium (K) deficiency in processing tomatoes, we were funded by the California Tomato Research Institute to compare three types of potassium fertilizer types and application method including a soil-incorporated solid form and fertigated soluble forms. We will measure their effects on soil available K levels, tomato K uptake efficiency, tomato fruit yield, and economic cost/benefit outcomes. (Nicole Tautges, Brenna Aegerter, Israel Herrera)

A new long term biochar experiment was established in small plots of a tomato-corn rotation at Russell Ranch to test the effects of pine bark-derived biochar, combined with compost or mineral fertilizer, on soil fertility, structure, biodiversity and crop yields and quality (Sanjai Parikh, Daoyuan Wang, Soil Health institute).

A new project was started in to measure nitrate loss in different systems at Russell Ranch using resin samplers. Nitrate (NO_3^-) leaching under four cropping systems will be measured during the growing season under full irrigation and again during the winter season, when the region receives most of its annual precipitation levels. Results from this study will provide nitrate leaching data that will 1) determine if sustainable practices used at Russell Ranch minimize nitrate leaching, 2) fill gaps in our understanding of nitrogen cycling at Russell Ranch, and 3) test the suitability of resin samplers to measure nitrate leaching in soils. (Emily Woodward, Nicole Tautges, Kate Scow)

A new project will investigate the role of viruses in carbon and nitrogen cycling and relationships between soil viral communities and soil or crop health. This will be the first in-depth, systematic characterization of soil viruses in agricultural soils. Data will include 36 viral size-fraction metagenomes (viromes), 36 bulk soil metagenomes, and accompanying geochemical characterizations. (Joanne Emerson, Kate Scow)

We will investigate the opportunity for integrating livestock into CA vegetable row crop systems as a means to generate additional income from cover crop grazing while augmenting cover crop benefits to soil health, carbon storage, and via reducing tillage. We will compare the effects of grazed cover crop with ungrazed cover crops and winter fallow on soil health indicators, including soil organic matter, nutrient cycling, and biodiversity, while identifying potential food safety risks of manure deposition, in a tomato cropping system (Amelie Gaudin, Nicole Tautges)

4. FOOD SYSTEM INFORMATICS (FORMERLY "SUSTAINABILITY BENCHMARKS")
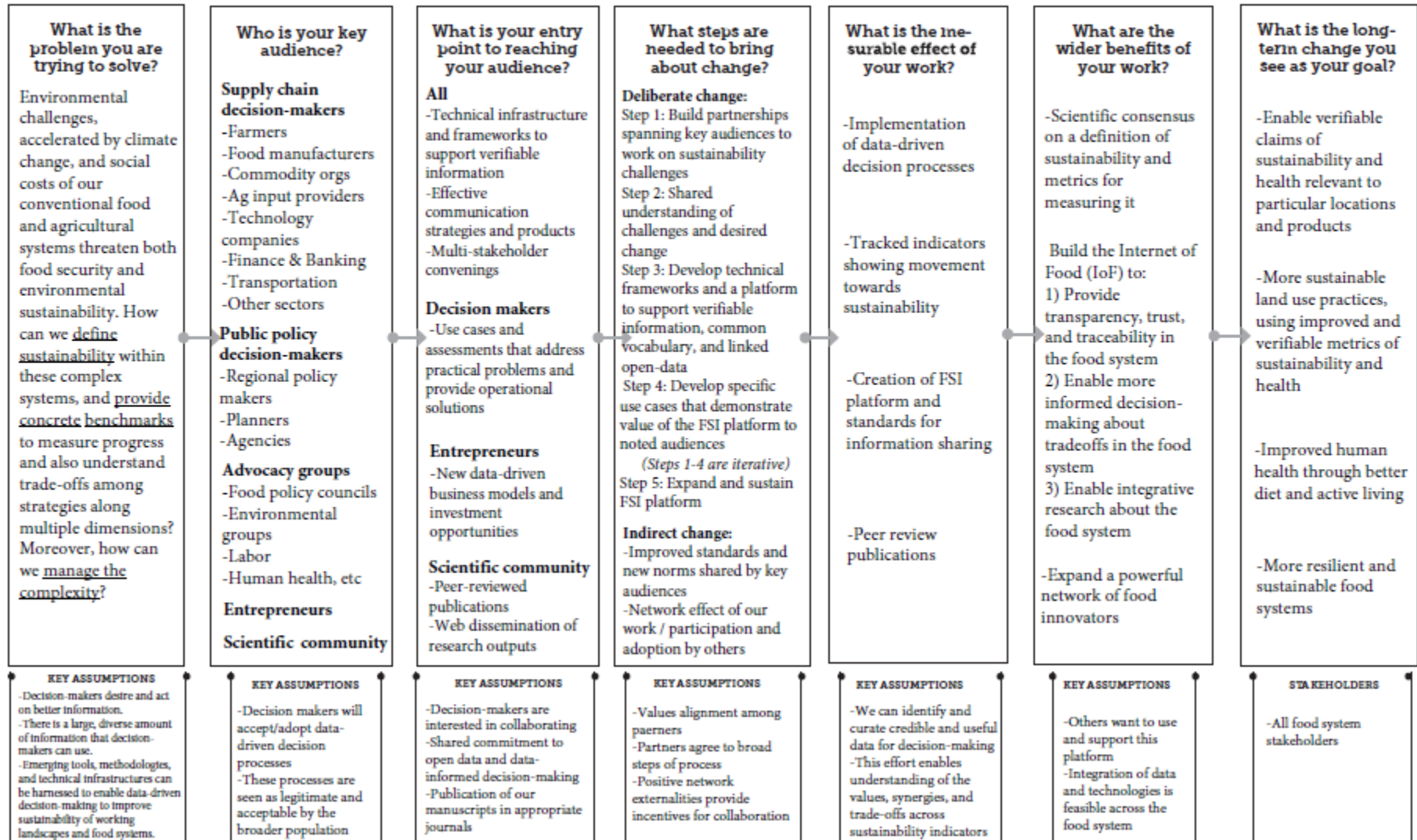
HIGHLIGHTS NOV 2017 – DEC 2018

- Designed and formally launched the Food System Informatics program as a formal, stand-alone program within ASI.
- Launched NSF Smart Regional Foodshed Research Coordination Network (in partnership with Ohio State University)
  - Work completed over the past year has focused on developing the conceptual and data structures to support the network. The team has expanded the base set of ontologies to more fully enable representation of food system actors and relationships. Sacramento Assessment work (below) is a complementary piece of our network activities, and development of some elements are supported through both projects. Particular accomplishments this year include:
    - Development of a formal ontology to express the relationships between people, projects, organizations, and datasets (PPOD). This ontology will be used to help describe the stakeholders in the region, issues of interest to them, and pertinent datasets. The beta version of the PPOD ontology was completed and published on GitHub (with support from NSF, EPA, eXtension). We have begun using the PPOD ontology to map out relationships in the Sacramento region.
    - Stakeholder mapping: Preliminary lists of key actors within both the Sacramento Foodshed and our partnering Columbus, OH Foodshed
    - Convenings: our FSI team hosted a project design meeting with Ohio State University partners early in 2018, a steering committee meeting at the end of 2018, and a variety of exploratory engagement activities with food system actors throughout the year, including hosting a workshop at the ANR annual conference. 2019 will focus much more on engagement with the network.
- Sacramento Sustainability Assessment
  - Completed work on the first portion of the Sacramento region natural resource assessment project funded by the Sacramento Area Council of Governments (SACOG). This work developed an extensive database linking natural resource information across the 6-county Sacramento region.
  - Completed the Natural Resources Assessment for the Sacramento Region, a project funded by the Capitol Southeast Connector JPA, and the second part of the Sacramento regional assessment. This funding was used to conduct a series of meetings with data users/providers in order to develop a comprehensive database of important natural resource data for the region. Several land use prioritization analyses were conducted as well.
  - Launched portion funded by US EPA, focused on connecting human health outcomes with broader environmental sustainability. Our team has initiated interviews with key regional users and providers of health data in order to identify the most important health issues facing the region and better understand their nexus with environmental factors. We have also developed

technical platforms for capturing and assessing the information we are collecting.

- Launched the Ecuador Banana Sustainability Assessment project in summer 2018. In this first phase, we engaged with diverse partners from industry, government, and civil society in framing assessment questions and boundaries and to identify key datasets and data partners, and did a series of field visits to banana farms of different sizes and to other key parts of the value chain, including input providers and export facilities. We will finish the engagement phase soon, and finalize the list of sustainability issues and the indicator set for inclusion in the assessment. As part of the engagement process, we gave a set of presentations about the assessment at a business school course designed for banana industry professionals at IDE Business School in Guayaquil, Ecuador in November 2018. The next phase will focus on data and analysis.
- Developed an ontology describing expertise in the national cooperative extension network, under funding from the umbrella organization eXtension. A poster describing this ontology was presented at the International Conference for Biological Ontologies held in Corvallis, Oregon in August 2018. This expertise ontology slots into the PPOD ontology described above under the NSF work.
- Received funding to produce an update to ASI's Bay Area Regional Advance Mitigation Planning (RAMP) project. RAMP is an ongoing statewide effort to develop a framework for conducting mitigation for impacts from infrastructure projects in a more systematic, effective manner. This effort is a collaboration between state and federal resource and infrastructure agencies, environmental non-profit organizations, and UC Davis. Working landscapes are a key part of these planning efforts, both for compensation for loss of farmland and through agricultural areas potentially serving as habitat for listed species.
- Funding Proposals submitted:
  - Collaborated with other ASI, UC Davis, Ohio State University, and multiple other partners in writing and submitting a $10 Million proposal to USDA Sustainable Food Systems program entitled "Tipping the scales towards a sustainable food system: connecting soil health practices from microbiomes to working landscapes". (pending)
  - Participated in the development of a proposal (led by the Conservation Biology Institute) to conduct a conservation assessment of California's Central Valley, an extension of an ongoing program developed by the California Landscape Conservation Cooperative. (pending)
  - Submitted a funding proposal to the California Strategic Growth Council that would add an explicit climate change assessment to the ongoing Sacramento Assessment. Funding was not granted.
- Publications / manuscripts submitted:
  - "A malleable workflow for identifying the issues and metrics that define and measure sustainability in food systems", submitted to a special issue of *Food Research International.* (pending).
  - "Towards smart foodsheds: using stakeholder engagement to improve informatics frameworks for regional food systems", submitted to a special issue of the *Annals of the American Association of Geographers* on smart spaces and places (pending).

ASI FOOD SYSTEM INFORMATICS PROGRAM

THEORY OF CHANGE

What is the problem you are trying to solve?	Who is your key audience?	What is your entry point to reaching your audience?	What steps are needed to bring about change?	What is the measurable effect of your work?	What are the wider benefits of your work?	What is the long-term change you see as your goal?
Environmental challenges, accelerated by climate change, and social costs of our conventional food and agricultural systems threaten both food security and environmental sustainability. How can we define sustainability within these complex systems, and provide concrete benchmarks to measure progress and also understand trade-offs among strategies along multiple dimensions? Moreover, how can we manage the complexity?	**Supply chain decision-makers** -Farmers -Food manufacturers -Commodity orgs -Ag input providers -Technology companies -Finance & Banking -Transportation -Other sectors **Public policy decision-makers** -Regional policy makers -Planners -Agencies **Advocacy groups** -Food policy councils -Environmental groups -Labor -Human health, etc **Entrepreneurs** **Scientific community**	**All** -Technical infrastructure and frameworks to support verifiable information -Effective communication strategies and products -Multi-stakeholder convenings **Decision makers** -Use cases and assessments that address practical problems and provide operational solutions **Entrepreneurs** -New data-driven business models and investment opportunities **Scientific community** -Peer-reviewed publications -Web dissemination of research outputs	**Deliberate change:** Step 1: Build partnerships spanning key audiences to work on sustainability challenges Step 2: Shared understanding of challenges and desired change Step 3: Develop technical frameworks and a platform to support verifiable information, common vocabulary, and linked open-data Step 4: Develop specific use cases that demonstrate value of the FSI platform to noted audiences *(Steps 1-4 are iterative)* Step 5: Expand and sustain FSI platform **Indirect change:** -Improved standards and new norms shared by key audiences -Network effect of our work / participation and adoption by others	-Implementation of data-driven decision processes -Tracked indicators showing movement towards sustainability -Creation of FSI platform and standards for information sharing -Peer review publications	-Scientific consensus on a definition of sustainability and metrics for measuring it Build the Internet of Food (IoF) to: 1) Provide transparency, trust, and traceability in the food system 2) Enable more informed decision-making about tradeoffs in the food system 3) Enable integrative research about the food system -Expand a powerful network of food innovators	-Enable verifiable claims of sustainability and health relevant to particular locations and products -More sustainable land use practices, using improved and verifiable metrics of sustainability and health -Improved human health through better diet and active living -More resilient and sustainable food systems
KEY ASSUMPTIONS -Decision-makers desire and act on better information. -There is a large, diverse amount of information that decision-makers can use. -Emerging tools, methodologies, and technical infrastructures can be harnessed to enable data-driven decision-making to improve sustainability of working landscapes and food systems.	**KEY ASSUMPTIONS** -Decision makers will accept/adopt data-driven decision processes -These processes are seen as legitimate and acceptable by the broader population	**KEY ASSUMPTIONS** -Decision-makers are interested in collaborating -Shared commitment to open data and data-informed decision-making -Publication of our manuscripts in appropriate journals	**KEY ASSUMPTIONS** -Values alignment among partners -Partners agree to broad steps of process -Positive network externalities provide incentives for collaboration	**KEY ASSUMPTIONS** -We can identify and curate credible and useful data for decision-making -This effort enables understanding of the values, synergies, and trade-offs across sustainability indicators	**KEY ASSUMPTIONS** -Others want to use and support this platform -Integration of data and technologies is feasible across the food system	**STAKEHOLDERS** -All food system stakeholders

December 2018

2017-2018 FOOD SYSTEMS INFORMATICS WORKPLAN

Key steps identified for our program Theory of Change analysis (steps embedded in all of our projects)

1. Build partnerships spanning key audiences to work on sustainability challenges
2. Facilitate a shared understanding of challenges and desired change
3. Develop technical frameworks and a platform to support verifiable information, common vocabulary, and linked open-data
4. Develop specific use cases that demonstrate value of the FSI platform to noted audiences
5. Expand and sustain FSI platform

5. INTER-INSTITUTIONAL NETWORK FOR FOOD, AGRICULTURE AND SUSTAINABILITY (INFAS)

INFAS HIGHLIGHTS NOV 2017 – DEC 2018

1. INFAS published a collaborative Network white paper: "*A Deeper Challenge of Change: The role of land-grant universities in assessing and ending structural racism in the US food system*" http://asi.ucdavis.edu/networks/infas/our-work/INFASAntiracismasaChallengeofChangeEssayFeb222018.pdf

2. The INFAS Graduate Fellows Program (IGFP) launched with its first selected graduate fellows, a cohort of three graduate students from Historically Black Colleges/Universities (Tuskegee University and Howard University)

3. INFAS organized a workshop and panel of experts at the 2018 Sustainable Agriculture Education Conference "*Restructuring Higher Education: New Models of Learning Exchanges that Prioritize Experiential and Community Knowledge*"

4. INFAS and its work was featured in the journal Civil Eats in the article entitled "*Inside the Push to Bring Racial Equity to Land Grant Universities*" https://civileats.com/2018/05/30/inside-the-push-to-bring-racial-equity-to-land-grant-universities/

INFAS: Inter-institutional Network for Food, Agriculture, and Sustainability

Problem INFAS are trying to solve	INFAS key audiences	Entry point to reach our audiences	Steps needed to bring about change	Measurable effects	Wider benefits of INFAS' work	INFAS' goal for long-term change
• The food system is profoundly inequitable and institutions of higher education hold power and privilege that can be used for good or harm. • Food and agriculture are part of a diverse set of interconnected systems and multiple converging trends in US systems, including public policies and practices, are leading us further away from sustainability, resilience and social equity. • Most efforts on food systems and sustainable agriculture at institutions of higher education are not adequately challenging inequities within institutions and in how they conduct their work • Academia (departments, societies) is organized around disciplines, whereas tackling both inequity and food system problems requires transdisciplinary approaches.	• academic institutions and individuals that engage in sustainable agriculture and food systems scholarship and practice • leading national activist associations • communities that are fighting, and are most affected by, systemic inequities and disparities in agricultural and food systems ○ e.g. communities of color; children; practitioners of color and/or historically underrepresented or de-centered in opportunity and access	To help build equity in the food system, we are focusing on the barrier of structural racism as an initial entry point. We recognize multiple forms of oppression; so we also will focus on gender and class oppression, and the intersections among race, class, and gender that shape barriers and opportunities to equity. As an academic collaborative network, we seek to diversify our approaches by, e.g. • connecting with other like-minded academic groups (e.g. Agroecology Research-Action Collaborative, ARC) • increasing academic capacity for equitable collaboration with activists that serve both action and research/education, & • intentionally connecting with leading national activist associations to strategize/collaborate (e.g. Union of Concerned Scientists; Real Food Challenge; NSAC; Food Workers Alliance)	-Increase/strengthen relationships among members and with communities that aren't connected (or connected weakly) to facilitate collaboration towards goals -Analyze our current mode for engaging collective thinking & assess our effectiveness -Determine who has typically been excluded from leadership roles; enable respectful engagement. -Engage with complementary networks that present synergistic opportunities to increase our impact Develop Guidelines, Processes For: - Participation & representation that incorporates diverse perspectives - Decision making including assessing perspectives without being reactive; determine if we're moving from thinking to action too fast - Consider unintended consequences - Document & communicate collective thinking - Assess the effectiveness of our actions and our use of network resources	• # institutional members • # involved members • Collaborative outputs e.g.: ○ White papers, reports, other communication ○ Grants/funding applications ○ Funding secured • Fellows in IGFP graduate fellows program • New connections & collaborations e.g.: ○ Institutions, including diverse types, locations ○ External networks ○ Organizations • Ability/frequency for INFAS impact: locally & nationally, e.g.: ○ On panels, working groups, conferences etc ○ Invited authorship ○ Engagement with other groups/organizations ○ Sign-on, commentary, etc.	• Increased visibility about complex food systems challenges & opportunities through engaged, cross-US and cross-discipline scholarship & practice. • Increased focus on alternative/traditionally excluded or de-centered perspectives on sustainable agriculture and food systems; bringing these perspectives in from the "margins" of traditional ag and food systems scholarship & practice. • Increased communication and collaboration amongst scholars across the US, in different disciplines and institutions, to enhance the ability to provide input to policy makers, foundation leaders, and community advocates (as well as within the institutions themselves). • Enhance the legitimacy and clout of individual Network members at their institutions through strength in numbers and sharing of information and actions. • The Network is a resource to be leveraged by others working towards a common vision	We envision a US food system that is environmentally sustainable and socially just. This includes having achieved structural equality such that race, class, and gender no longer determine health outcomes, social status, or economic opportunity and that healthy, restored agroecosystems and fisheries are achievable Specific examples of what this looks like: • 'True' agroecology is mainstream • Equitable activist-academic collaborations abound and are common • More transdisciplinary Sustainable Food Systems programs (or departments) • Faculty and students in these arenas are representative of gender and racial makeup of the US

Assumptions: (1) Change happens through the power of Networks. (2) The INFAS network provides space for marginalized ideas and ways of thinking to gain legitimacy and provides the space for people with the power for making change outside the University to exert influence on the University. (3) Members and sub-networks within INFAS are the liaisons with communities. (4) We can work for institutional change without the requirement to first address market structure.

2018-2019 INFAS WORKPLAN

1. Coordinate the Network member-championed follow up activity to last year's INFAS "Deeper Challenge of Change" report that responded to the APLU's 2050 Commission on Food Security.

    a. New project's draft title: "<u>Taking the Pulse of Land-grant University Efforts to Address Social Equity Challenges in Agrifood Systems Research and Extension</u>." This is a collaborative research project that builds on INFAS recommendations in the "Deeper Challenge of Change" report by surveying and evaluating 1862 Land-Grant Universities to determine how they are currently addressing the social equity aspects of food and agricultural system sustainability through their research and extension capacities. The project involves assessing the extent and nature of current efforts; highlighting successful strategies that have been employed; and identifying promising avenues for change and future opportunity. Two surveys (of Land-grant Cooperative Extension systems and of University Sustainable Food and Agriculture Centers) will be performed; responses will be analyzed and three briefing papers written to disseminate the information to stakeholders in Cooperative Extension and University Sustainable Agriculture and Food Systems Centers. Several public presentations of results are also planned in conjunction with national and/or international conferences.

2. Conclude the pilot INFAS Graduate Fellowship Program (IGFP); assess impacts and evaluate its effectiveness to determine the direction of future efforts. The program focuses on supporting early career scholars that engage in scholarship in the context of sustainable food systems in the areas of racial inequity; social justice; structural inequality; structural racism; and/or intersectionality of oppression.

    a. The pilot project funded three fellows from Historically Black Colleges/Universities. The three fellows will meet with network members and contribute to an analysis of the program and recommendations for future iterations. Key objectives for this activity include to recognize and encourage future leaders and contributors in food systems work, with a focus on scholars that work in areas of social sustainability, and to cultivate new, creative thinking and approaches that will give new insights and perspectives to practitioners working with, and in, institutions of higher learning.

3. Share the draft INFAS Theory of Change with the broader network for input and to provide more opportunities for members to engage in activities, such as previously proposed priority areas: expanding diversity within the Network; and bringing issues of equity into classes and required curricula.

4. Continue to prioritize structural racism and inequities in the food system as network activities are considered and selected for engagement.

6. SOCIAL EQUITY

SOCIAL EQUITY HIGHLIGHTS NOV 2017 – DEC 2018

- ASI developed 2018 and 2019 Racial Equity Improvement plans with clearly defined goals and metrics, and will report progress on the 2018 Improvement Plan to the EAB in January 2019. These plans were based on a 2017 ASI Racial Equity Assessment.

- The ASI Social Equity Committee (SEC) developed an organization-wide training and communications plan to expand the abilities of all ASI employees in cultural responsiveness. This plan will be implemented in 2019 and revised annually.

- The ASI SEC and participating units organized 10 learning opportunities in 2017-2018, including online and in-person trainings with UCD Staff Development Professional Services (SDPS), informal "lunch and learn" meetings, and "workshop" meetings to discuss implementing learnings at ASI.

- ASI'S core support team, with advice from the ASI SEC, have developed a plan for tracking financial resources directed to funded partnerships (subawards and other contracts) to reduce disparities. They have also developed plans and guidelines for ASI programmatic leads to track total funds allocated each year to reduce disparities (such as staff time, costs of interpretation and translation, speaker fees, honoraria, reimbursements for participants, and targeted outreach and communications to groups experiencing disparities).

- The ASI SEC and core support team generated a list of all UC Davis vendors owned by women or people of color, and calculated a baseline for ASI by cross-checking that list with all the vendors that ASI used in 2018. Core support also drafted new purchasing guidelines, including specific improvement metrics and goals for 2019.

- The SEC has gathered information from ASI units (via surveys) on their current evaluation procedures in order to assess current practices and develop future guidelines.

- An anonymous feedback mechanism has been implemented (via an online survey shared in our quarterly newsletter, with additional options being explored) to ensure opportunities for partners, program participants, and other stakeholders to provide feedback without fear of retaliation. Two staff members on ASI's core support team have been designated to document feedback and any actions taken.

- The Leadership Team recruited new EAB members to broaden stakeholder expertise and perspectives with regards to equity.

- The ASI SEC researched and made preliminary decisions on how to collect demographic information in different contexts, including online and in person, as well as among our workforce, program participants, and partners.

- The ASI SEC contracted live interpreters to assist Spanish-speaking ASI employees in completing the required Principles of Community training, and later worked with the Office of Campus Community Relations to make a Spanish transcript of the training available to all Spanish-speaking UCD employees.

- ASI SEC members met with the CAES Dean's Office to discuss providing required trainings and forms in Spanish, and identified high priority items to be translated.

- ASI developed a relationship with a statewide multilingual translation and interpretation service, Excel Interpreting. Excel Interpreting is now an approved vendor in the UC Pre-Purchasing System. We also established a relationship with ANR's News and Information Outreach in Spanish (NOS) unit, which provides translation and cultural competency support for ANR staff working with Spanish-speaking stakeholders.

- ASI's Program Manager drafted a detailed memo identifying patterns, gaps, and areas for improvement in diversifying ASI's workforce. The SEC held preliminary discussions on creating a formal workforce diversification plan based on some of these insights.

2018-2019 SOCIAL EQUITY WORKPLAN

Action Step 1: ASI will develop an annual Equity Improvement Plan by the end of each calendar year with clearly defined goals and metrics.
- Progress on the Improvement Plan will be reported to the EAB and ASI's senior leadership annually.

Action Step 2: ASI will implement the organization-wide training and communications plan developed in 2018 to expand the abilities of all ASI employees in cultural responsiveness.
- This plan includes a mix of learning modalities and communications strategies that will be piloted in 2019. ASI-affiliated faculty/staff and community partners (including EAB members) will be surveyed annually to guide annual revision of the content and structure of the learning plan.

Action Step 3: ASI will optimize and implement procedures developed in 2018 to track how financial resources are allocated to reduce disparities.
- In the first half of 2019, core support staff will test the tracking plan developed in 2018 with several ASI teams and optimize the tracking guidelines based on feedback from programmatic staff and the SEC. In the second half of 2019, the new procedures will be implemented. ASI programmatic staff will be expected to track total programmatic funds expended on equity in the previous fiscal year and report those details in their strategic updates for the late-2019 EAB meeting.

Action Step 4: ASI will draft and pilot purchasing guidelines and supporting resources to help ASI units prioritize engagement with minority-owned businesses, women-owned businesses, and emerging small businesses.

- In the first half of 2019, core support staff will review improvement metrics/goals with the ASI SEC and seek feedback on metrics/goals and purchasing guidelines from the Internal Steering Committee. In the second half of 2019, the SEC will establish a preferred vendor list for commonly used services and establish and implement a tracking system.

Action Step 5: ASI will complete and follow up on evaluations for all ASI events. ASI will fully implement the anonymous feedback/complaint process for program participants developed in 2018.

- A summary of current ASI unit evaluation practices (based on survey data) is being compiled and will be used in the first quarter of 2019 by the ASI director and committee to draft written documentation of ASI's expectations and standards for evaluation by ASI staff. We expect all staff to be committed to completing and following up on evaluations for all ASI events by the third quarter of 2019.

Action Step 6: ASI Director, Program Manager and Board Chair will create guidelines and document efforts to allocate specific stakeholder membership slots to the EAB in order to ensure that it includes the necessary expertise to review ASI's compliance with these standards in the Protocol and the annual Equity Improvement Plan and its achievements.

- In the first half of 2019, SEC will identify expertise needed on EAB to ensure compliance with equity protocols. The ASI Director, Program Manager, and Board Chair will survey board to assess current expertise, experience, and background of members and identify priority and secondary gaps to fill on the EAB, which will be brought to the ISC for feedback. In the second half of 2019, the ASI Director, Program Manager, and Board Chair will develop an outreach and engagement plan with guidelines for bringing on new EAB members.

Action Step 7: ASI will implement mechanisms developed in 2018 to track and document the race, ethnicity, and language status of our workforce (by program and rank), program participants, and event attendees. We will assign responsibility for data collection and analysis to at least one employee, and file this report with the Social Equity Committee. The Committee reviews and analyzes the report and shares findings with the ASI Director and EAB.

- Preliminary decisions made on collecting and processing demographic data will be formalized in the first half of 2019 through the development of data collection guidelines and a system for processing collected data. This system will include at least one employee who is responsible for maintaining collection and processing systems and for creating an annual report. Data collection will begin in the second half of 2019.

Action Step 8: Work with the CAES Dean's Office to ensure time sheets and official University communications are available in Spanish.

- A Russell Ranch representative will present concerns regarding language accessibility of required forms and trainings for monolingual Spanish-speaking staff at the Dean's Office quarterly managers meeting in the first half of 2019.
- ASI SEC representatives will meet with UC Davis Safety Services to try to get mandatory training materials translated and/or secure UC funding to hire a translator to do group trainings in Spanish for monolingual Spanish staff.
- ASI SEC members will work to build relationships with other departments, institutes, or staff coalitions with shared interests in this issue to help demonstrate need and demand change.
- At least 2 priority forms and/or trainings will be translated out of ASI's equity budget in 2019.

Action Step 9: Develop guidelines for ASI staff to budget for translation costs in all new proposals.

- Now that we have established relationships with multilingual translation and interpretation services, we will focus in 2019 on ensuring that all staff understand the expectation that translation costs be included in new proposals that include an extension or communications component, know how to contact the approved vendors, and are comfortable estimating costs.

Action Step 10: ASI will develop an annual plan with specific goals and metrics to diversify ASI's workforce, to be reported on and filed annually with the EAB.

- The ASI SEC will meet at least twice in 2019 to develop an ASI Diversification Plan based on the Program Manager's initial report and an Equity in Hiring training that will be held in the first half of 2019.

7. FUNDRAISING

FUNDRAISING HIGHLIGHTS AND WORKPLAN NOV 2017 – DEC 2018

UPDATE ON FUNDRAISING WORKPLAN FROM 2017 EAB REPORT
2018 FUNDRAISING HIGHLIGHTS AND GOALS FOR 2019

GOAL FROM 11/17: Bring in at least $1 million in competitive grant funding, emphasizing the pursuit of larger grant opportunities and building strategic partnerships.

UPDATE AS OF 11/18: We raised $2.8M in competitive grant funding in FY 17/18. In addition to smaller grants, the $2.8M is made up of the following larger grants:
- $600,000 from the California Energy Commission as a part of the California Energy Product Evaluation (Cal-EPE) Hub consortium, which will allow Russell Ranch to evaluate the energy efficiency of new agricultural technologies;
- ~$670,000 in grants from the California Department of Food & Agriculture to investigate healthy soils practices; assess the potential of elderberry as a California specialty crop; and develop online training modules for organic specialty crop production in California;
- $500,000 from the National Science Foundation to create a network of researchers and food system stakeholders to build an informatics framework for understanding and optimizing the food system;
- ~$600,000 from the U.S. Environmental Protection Agency to explore integrating human health and ecosystem services into a Sacramento region sustainability assessment.

WORKPLAN FOR 2019: Bring in at least $1 million in competitive grant funding in FY 18/19, emphasizing the pursuit of large (6+-figure) grant opportunities and building strategic partnerships.

:::::::::::::::::::::::::::

GOAL FROM 11/17: Bring in at least $300,000 in various gifts for ASI programs, with emphasis on unrestricted funding or ASI endowment.

UPDATE AS OF 11/18: Since November 2017 we have secured just over $460,000 in new philanthropic gifts and pledges plus an additional $100,000 bequest expectancy (a committed estate gift).

The $460,000 is made up of the following larger gifts plus many smaller donations from friends, alumni, staff and faculty including payroll deductions from members of the ASI team:
- $300,000 gift from the TomKat Charitable Trust to support work on soils and climate smart agriculture

- Just over $40,000 in pledges formally recorded for the Green Fellowships and Sustainable Living and Learning Communities with another ~$40,000 informally committed (and not included in the above total) expected over the coming five years.
- $25,000 from an anonymous donor via the Jewish Community Endowment Fund to support the Community Table Project at the Student Farm
- $30,000 total from Rebekah Hess, Valent Corporation and the McClarty Family to 'adopt' acres at the Russell Ranch at $10,000/acre
- $12,500 from the Wells Fargo Foundation for the Student Farm--a contribution we hope will become annual and grow in future years.

While we achieved the financial goal, most of the funding was at least somewhat restricted by program area. But this was consistent with our updated strategy as described below.

WORKPLAN FOR 2019:
Work with program leadership (Student Farm, Russell Ranch and SAREP) to clarify priorities for immediate funding.

Secure at least $500,000 for ASI programs broadly including soil health initiative.

Support and educate campuswide development officers to promote ASI initiatives to their audiences to broaden donor pool. This effort began with a November 2017 tour of the Student Farm for campus development officers that increased awareness of SF as a compelling donor opportunity.

::::::::::::::::::::::::::::::::

GOAL FROM 11/17: Continue to build ASI's Sustainable Agriculture and Food Systems Endowment. This endowment must eventually exceed $1 million and may be built through a mix of gifts from individuals, industry, foundations, and estate giving.

UPDATE AS OF 11/18: In early 2018, Director Tomich provided updated strategic direction for our fundraising efforts shifting from an emphasis on endowed funds to an emphasis on funding that can be used immediately to produce results within the program areas. The SAFS Endowment did not grow appreciably during 2018 but the current use funding did grow, consistent with this revised goal.

WORKPLAN FOR 2019: Because the endowment is not a priority for 2019 and because significant endowment gifts are frequently secured via estate gifts, the only effort will be to work with individual donors to consider including ASI endowments in their estate plans. These conversations will take place alongside solicitations for current use gifts.

::::::::::::::::::::::

GOAL FROM 11/17: Bring in at least one competitive grant and/or gift for ASI's healthy soils initiative.

UPDATE AS OF 11/18: In FY 17/18 we brought in $580,000 in grants and gifts for ASI's healthy soils initiative, including:

- A $300,000 gift from TomKat Foundation to increase public and policymaker awareness of soil health research and how it relates to climate change;
- $30,000 in continued funding from the California Tomato Research Institute to explore how subsurface drip irrigation affects soil fertility, soil moisture, and energy and water use;
- $250,000 from CDFA's Healthy Soils Program to explore the impacts of cover cropping and compost application on soil health and measure field greenhouse gas emissions from fields where these practices are used.

WORKPLAN FOR 2019: Build on public grant funding with strong private support from corporate and foundation donors for a soil health program at UC Davis including support for graduate students, infrastructure, faculty and priority research areas. Goal of $1 million per year for five years to broadly support soil health programs largely, but not exclusively, centered at the Russell Ranch.

:::::::::::::::::::::::::
GOAL FROM 11/17: Continue to build funding for ASI's food system and health informatics initiative.

UPDATE AS OF 11/18: We had high expectations for a major corporate proposal for this program and because we had positive feedback were surprised that the proposal was not funded, a setback for this fundraising effort. No major philanthropic gifts were secured for this program in 2018.

WORKPLAN FOR 2019: Looking ahead, we have submitted a $10 million USDA Sustainable Agricultural Systems program grant proposal jointly with Ohio State University and, if successful, this grant will provide significant funding to the Food Systems Informatics project.

8. COMMUNICATIONS

COMMUNICATIONS HIGHLIGHTS NOV 2017 – DEC 2018

Use finding from Communications Evaluation to direct the work of the ASI communications team. Focus on building stronger presence in media by developing relationships with journalists, looking for opportunities to write op-eds and other media stories.

> *Progress:* based on the top priority topic areas identified by stakeholders in our Communications Evaluation (climate change, food and agriculture policy, agroecology, and soil science and management), we have recently embarked on a new communications "climate smart" agriculture communications and fundraising campaign, focusing on how managing for soil health contributes to climate change adaptation and mitigation. An important aspect of this campaign will be building ASI's capacity to function as a boundary organization that links academic, policy communities and the actual communities most impacted by climate change.

Complete our contact management database and train staff to use database.

> *Progress:* We completed our contact management database, created a list and tagging system for sending targeted communications, and held a preliminary training for staff. Numerous targeted email campaigns have been sent using this system, which is under continuous improvement based on staff feedback and contributions.

Workshop 3 Reminder_farmer/buyer mixer	**27%** OPEN RATE	**2%** CLICK RATE
Reminder: Fresno Farmer-Buyer Specialty Crops Mixer & Tasting Showcase	**38%** OPEN RATE	**10%** CLICK RATE

Two emails sent using our new contact management database for a reoccurring workshop. Top figure was sent Dec. 2017, bottom figure sent Dec. 2018). By using more targeted lists, we were able increase open and click rates significantly- this translates into greater email engagement which yields higher attendance rate

Develop ASI newsletter to regularly communicate with our audiences. Newsletter will highlight high level research findings, opportunities to engage with ASI, and staff/faculty expertise.

> *Progress:* In the spring of 2018 we developed and ASI newsletter format, originally sent out monthly, now sent out quarterly, that highlights research findings, opportunities to engage with ASI, and staff/faculty expertise.
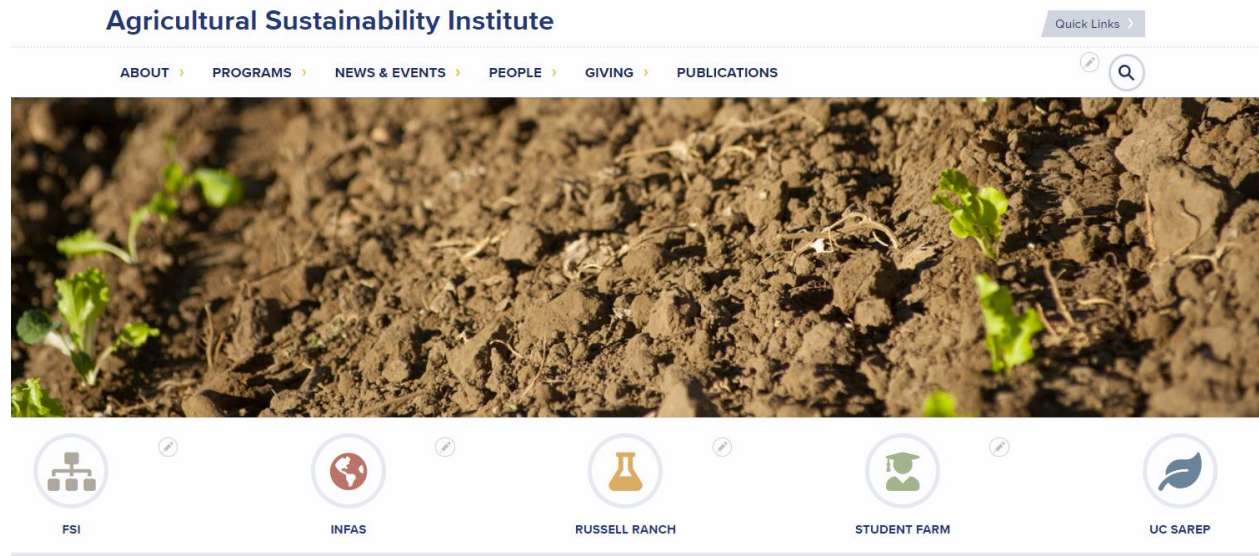
2017-2018 COMMUNICATIONS WORKPLAN

New Website:
In 2018, the university underwent a migration from a Plone website server to Sitefarm, slated to go live by mid January of 2019. We are leveraging this transition to improve navigability, increase retention, and maintain the site up-to-date.
Goals for new site:
Improve navigability

By consolidating sections, replacing text with images, and limiting the number of 'layered' drop downs, users will be able to find the information they need in three clicks or less. Creating evergreen sidebars for each program will also allow programs to bring front and center recent findings and publications.

Increase retention on site
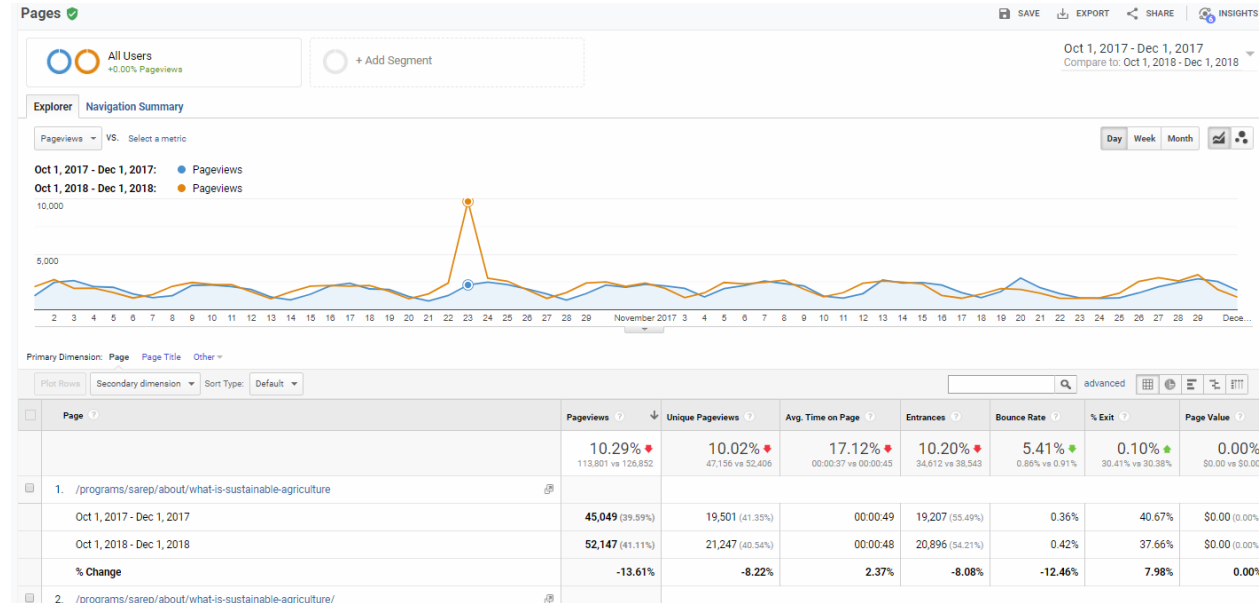
Using google analytics, we can better track and analyze spikes in retention or page hits. This image shows a huge spike in late October, where we realized that our page "What is Sustainable Ag?" had been linked to a UCD site, a model we can replicate.

Articles (formerly 'blog posts') will serve as the main vessel for dissemination of information on the website and have the ability to highlight faculty, link to new resources, etc.

Increase in 'blog development'. In the fall of the 2018, we began to standardize the practice of blog writing to share findings, events attended. See from website that 'blogs' has been updated to News & Events. Promoting more consistent content creation and distribution with which to share new resources, trends and innovations. For example, UC SAREP produces reports, one-pagers, factsheets and publishes case studies. Using the 'blog' format will bring these reports to the main page and keep the audience that frequents our site up-to-date on all ASI happenings.

Maintain content up-to-date

Each program has assigned a point of contact, each given user accounts and will undergo a high level training with our website developer. This will decrease bottlenecking. To preserve consistency across the programs, all layout changes would need to be reviewed by the Communications Team.

Internal Priorities:

Improve internal communications, launching the development of a quarterly impact report. This will build on our current quarterly ASI *Insider*. The narrative will be complemented with measurable impacts. An internal tracking system will be implemented to keep such metrics.

2019 ASI Grant Projects and Programs			Core	Food Systems Informatics								Russell Ranch						
			Nature Conservancy- CA Sustainable Transportaiton Planning	EPA STAR Ecosystem Services	RCN - Smart Foodsheds	Strategic Growth Counsel	UCD/ SACOG/ ECOS South Sacramento Project	Hold	Hold	Hold	Hold	CEC Clean Energy	CDFA Scow Tomatoes	CTRI Yr 2	Healthy Soils Demonstration	AFRI CARE	2017 CDFA SCBGP Elderberry	20 Agrito R Manag
			Award	Award	Award	Award	Award					Award	Award	Award	Award	Award	Award	Aw
CONVENOR	Total																	
No. of Events																		
No. of Workshops																		
No. of Stakeholder Meetings																		
No. of Attendees																		
Webinars																		
Evaluations																		
Courses																		
Attendee Breakdown																		
Students																		
Faculty																		
Staff																		
Elected Officials																		
Non Profit/ NGO																		
Community Members																		
Farmers																		
THINK TANK																		
Co-authors																		
Scientific Reviewers																		
UCCE advisors																		
Agricultural Stakeholders																		
Peer-reviewed Publications																		
Non Peer-reviewed publications																		
White Papers Written																		
Op-eds																		
Media mentions																		
CLEARINGHOUSE																		
Facebook followers																		
Facebook likes																		

An internal tracking system, such as the template above, will be tested in the coming quarters. Ongoing tracking will facilitate internal communication and end-of-year reporting.

External Priorities:

1. Improve relationships with affiliated faculty, programs on campus by co-writing blog posts and cross-pollinating promotional endeavors. This speaks to both bolstering collaboration across ASI programs (research initiatives at Russell Ranch, highlighting Student Farm campus involvement, etc), and other UC units.

2. Update our comprehensive communications plan and developing messaging grid to complement the institute-wide style guideline which involves scheduled conversations with UC Davis' CA&ES Communications Director and UC ANR's Communications Teams.

   Update institute-wide style guidelines and templates for use by Communications team and ASI programs to develop a strong and appealing visual brand.
3. Continue to explore other methods of communication (i.e. podcasts). We can convert much of our blog content and faculty interviews on a range of issues into recorded segments for wide distribution. (i.e. TomKat project, a climate adaptation-focused project.)

   Address video editing capacity within ASI. Explore video-making as a different medium for presenting new findings. (i.e. UC SAREP's Cover Crop course series)

4. Translation of materials into other languages – improve community based partnerships and outreach (i.e. UC SAREP and Russell Ranch bring together community members and agriculturalists from across the state, many of whom speak different languages. In order to create greater access to innovative material and improve equitable outcomes, resources should be translated into one or more languages. We are exploring resources with UC ANRs Spanish speaking media team and other third party translation services).

5. Continuation of Soil Health campaign; including building relationships with journalists and op-eds/media stories. (specific to the TomKat project)

V - INDICATORS OF SUCCESS
Where are we going?

ASI's strategic plan, and particularly our vision statement, suggests a number of desired transformations within agriculture and the food system and institutional capabilities to be built within ASI. With input from our director, deputy director, academic coordinators, communication coordinator, and proposal coordinator, ASI's program manager is working to institutionalize monitoring and evaluation of various performance indicators, including measures of inputs, outputs, their uptake by partners, and ultimately studies of outcomes for our partners and impacts in the "real world."

We are developing monitoring systems that will serve several useful purposes: 1) focus our work on ASI's mission and priority goals, 2) guide adaptive management of our current projects and activities, 3) stimulate learning within our team and with our partners, and 4) provide compelling evidence of ASI's impacts for current and potential funders and other stakeholders.

During 2011 – 2012, we worked with an evaluation consultant, Francesca Wright, to guide our development of a broad monitoring and evaluation plan. Based on meetings with SAREP's academic coordinators and Student Farm staff, we identified a first draft of potential outcome statements and associated data collection methods.

1. ASI Builds Knowledge through Externally Funded Projects & SAREP-awarded Grants
   - For internal learning, team members identify and share process insights at key points during and after projects. Track key learnings on shared written documents, including formulation, testing, and reframing of hypotheses.
   - For external audiences, identify key findings and outcomes from projects; track and report via ASI web site, press releases, various reports, as appropriate.

2. ASI Distributes Knowledge
   - Track staff presentations and publications (using MyInfoVault – on-line campus academic activity reporting system)
   - Track media coverage
   - Track web site use
   - Track meaningful and significant external inquiries via simple on-line form. (Consider follow-up w/ email survey to clients.)
   - Periodic email surveys to "customers" (e.g. Student Farm alumni, key strategic partners to document uptake)

3. ASI Incubates Leaders, Producers, Consumers and Advocates
   - Track SA&FS graduates
   - Track # of students participating in Student Farm activities. Consider follow-up w/ some.
   - Track # of K-12 students & school district personnel trained in eco-garden trained.

4. ASI Collaborates with Strategic Partners
   - Explore informal group process to document growing network of strategic partners every 6 – 8 months. (Large wall paper, post-its, color coding, photo recording.) Link with ASI contacts database.

5. ASI Leverages Resources
   - Track external funding

We expect our monitoring and evaluation plan to be a dynamic construct that we will adapt and improve over time. Since time is always a constraint, we are looking for ways to streamline data collection, and effectively use the support offered by our student assistants.

Lastly, our process should help us to evaluate how we are living up to our operational principles: practicing sustainability, legitimacy, usefulness, and the scientific credibility of our work.