**Impact Statement**   
**ProjectTitle:\_Open Access Data and Opportunities for Smarter Agriculture™**

**Issue:** In a memo dated Feb. 22, 2013, John Holdren, President Obama’s Director of the Office of Science and Technology Policy (OSTP), presented the framework to guide Federal agencies charged with increasing access to the results of Federally funded scientific research, including publications and data (see a complete description of the mandate at http://www.whitehouse.gov /sites/default/files/microsites/ostp/ostp\_public\_access\_memo\_2013.pdf). This drive for open access data at the Federal agency level is reflective of the emerging, global sentiment that opportunities abound to advance the science and sustainable practice of agriculture through better use of the wealth of data collected by researchers, state and federal agency monitoring programs, public-private partnerships and farmer collaboratives. While “open access” publication is well known to agriculture as part of the business models of many peer-review journals, “open access” data is not only a novel concept to many agricultural researchers but one for which we are not presently well equipped. Achieving functional open access to all agricultural research data will require the development and implementation of significant, novel infrastructure including standards, policies for sharing, embargoing, preservation and curation, workflows and educational modules to facilitate data preparation and repositories tailored to the unique object attributes of data.

My FSLI project has focused on identifying challenges and opportunities for Purdue College of Agriculture under the major themes of Big Data and Open Access Data, themes that are dominant in discussions of agenda setting across all three mission areas of Land Grant institutions.

**What has been done:** A series of interrelated projects and activities have been undertaken and/or are currently ongoing within the Purdue College of Agriculture, with professional societies and with colleagues at Land Grant Institutions and in private industry. Major projects / activities are as follows:

1. Smarter Agriculture™ ~ Dialogue on Critical Data for Agriculture: A NIFA-AFRI planning grant (NIFA Award No:2010-85208-20411; Brouder, PI) was used to support an invite-only workshop in Potomac, MD (Oct. 10 – 11, 2013). The workshop objective was to coalesce the grass-roots efforts currently on-going across a broad array of projects and entities and to foster dialogue on critical steps in the pathway from our present situation of short data lifecycles with limited return on investment to a data model featuring longer lifecycles and added value through data repurposing and aggregation. We identified and invited broad representation with the intent of accelerating existing efforts through collaboration. The workshop format was designed to brainstorm, identify and foster beneficial linkages toward the broad goal of developing a functional data infrastructure for agriculture. A “Lightning Round” of four-minute presentations set the stage by highlighting a subset of diverse data initiatives. Subsequent panel discussions addressed: Evidence-based Clinical Agriculture, Data Literacy and Curricula, Data Publication and Preservation, and Funding Agency Roles and Responsibilities; small breakout groups were used to brainstorm solutions to critical infrastructure gaps.
2. Syntheses of lessons learned through the workshop and targeted written statements and presentation about needs and opportunities through open access data include the following:
   1. “Purdue team heading effort to create ag research data system” by K. Robinson, Purdue Univ. Dept. of Agricultural Communication Press Release, Oct. 16, 2013.
   2. “Open Access Data: A Federal Mandate and Agriculture’s Opportunity” by S. Brouder and J. Volenec *In* CSA News, December 2013, doi: 10.2134/csa2013-58-12-X
   3. “Making a Case for Evidence-Based Agriculture” by M. Fisher *In* CSA News, May 2014, doi: 10.2134/csa2014-59-5-1
   4. “Smarter Agriculture™: Data Information Literacy (DIL) and Preparing for a Future of Data-Enabled Decision Making in Agriculture” *Prepared by* S. Brouder for K. Plaut (Purdue College of Agriculture Associate Dean and Director of Ag. Research Programs) to circulate within and beyond Purdue (statement available on request).
   5. “Smarter Agriculture™: The quest to use big (and little) data for evidence based management and policy” Keynote address by S. Brouder at The Ohio State University 2014 OARDC Annual Research Conf. “From Biology to Business – The Transformational Power of Big Data,” April, 24, 2014.
   6. “Data Stewardship: What is it? Why bother with it? How to get started…” Training Session by S. Brouder for the International Plant Nutrition Institute Staff Meeting, 6/26/2014 (remote delivery to Argentina Mtg. venue).
   7. “Open Science, Data, and Publications” Presentation by S. Brouder and S. Daley-Laursen at 2014 ESS/SAES/ARD Fall Meeting, Sept. 30-Oct. 2, Jekyll Island, GA.
3. Acquiring resources to support and advance data infrastructure and curriculum development are ongoing. Example efforts are:
   1. A Higher Education Challenge Grant “Developing a data literacy curriculum model with online delivery for graduate programs in Agriculture” was developed and submitted in April, 2014 (Brouder, CoPI). While not selected for funding, the proposal will serve as a template for future grants.
   2. A proposal for a pilot partnership between Purdue and the International Plant Nutrition Institute for a data repository using the Purdue Libraries template for data curation and preservation is under development.

**Impacts/New Partnerships:** Key impacts and new partnerships are as follows:

1. To capture the energy created by the October 2013 Smarter Agriculture™ workshop and to indicate an intent to continue to grow programming under the theme of Big Data, Purdue College of Agriculture trademarked the term “Smarter Agriculture” and the trademark has been conditionally approved. It is now the umbrella under which the Purdue College of Agriculture is coalescing research and educational programming related to research data and its management including strengthening partnerships with Purdue Libraries who are providing leadership in the development of (i) infrastructure and policy for data curation and preservation, and (ii) curriculum for data competencies. Purdue College of Agriculture has reached out to IBM to explore opportunities linking our expertise in agricultural data with IBM’s expertise in Big Data Analytics.
2. S. Brouder and Purdue colleagues are collaborating with the Alliance of Crops, Soils and Environmental Science Societies (ACSESS) to advance data opportunities relevant to them. A task force has been established (5/2014) to promulgate data standards, endorsed by all three professional societies and implemented within 7 top-tier journals published by these societies. The 2015 theme for the International ACSESS Annual Mtg. will be “Data Stewardship for Evidence-Based Agriculture,” a theme derived by ACSESS leadership following participation in the Smarter Agriculture™ Workshop.
3. Entities outside of Purdue including the International Plant Nutrition Institute and National Agricultural Libraries have expressed interest in the “data curation pipeline” (workflows, policies, etc.) pioneered by Purdue Libraries in collaboration with College of Agriculture Faculty. We are currently exploring (i) an opportunity to co-pilot a project with National Agricultural Libraries on data from an AFRI-NIFA Coordinated Agricultural Project on Bionenergy and (ii) business models for novel public-private partnerships for data repository development and housing of data from small research programs funded by collaborations of private partners such as the major fertilizer companies who contribute to the “4R Research Fund” promoting nutrient stewardship (http://www.nutrientstewardship.com/funding).

**Outcome of Project (societal impact/ measure of increased quality of life)** My overarching goal is to improve the evidence base for management and policy in agriculture. Because this project is still in progress, major outcomes and societal impacts are difficult to discern in any great detail. However, the following near-term outcomes include (i) raised awareness among administrators and faculty of the challenges presented by the Open Access Data Directive and of opportunities for novel cross-campus collaborations (Computer Science, IT, Libraries with Colleges of Agriculture) to advance Big Data agendas, (ii) articulation of curricular needs and the development of educational programming to meet those needs, and (iii) articulation of faculty needs for workflows and tools to facilitate data curation, preservation and reuse and the development of prototype workflows/tools.

**How has your project been aided by your FSLI experience?** Many entities have a vested interest in Big Data for Agriculture. Among the most valuable lessons learned via my FSLI experience have been the suite of insights into and strategies for effective communication with diverse audiences and for building consensus among those with disparate interests and objectives. Open access data is an unfunded mandate with tremendous potential but requiring vision articulation, collaboration, motivation, persuasion and persistence, all leadership skills directly fostered through the FSLI curriculum.

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