

Testimony of
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“Big Data and Agriculture: Innovation in the Air”
Before the Subcommittee on General Farm Commodities and Risk Management
House Committee on Agriculture
June 23, 2016

Mr. Chairman and Members of the Subcommittee:

Thank you for the opportunity to testify at this morning’s hearing on “Big Data and Agriculture: Innovation in the Air.” I am Craig Molander, Senior Vice President of Surdex Corporation, one of the three prime contractors working with the USDA’s Farm Service Agency (FSA) to implement the National Agricultural Imagery Program or NAIP. With me is Tim Crago, Vice President of North West Geomatics Ltd., representing another of the three NAIP contractors. Surdex and North West have each been involved with NAIP for 15 years.

Agriculture, because of its tie to the land, has been a leader in mapping since the 1930s when USDA first began collecting aerial photography of farmland on a small scale basis, then consolidated its efforts with the Aerial Photography Field Office in Salt Lake City (APFO) in 1977. NAIP was initiated in 2002 to coordinate the collection of imagery in support of the administration of FSA farm programs. Today, NAIP imagery covers the entire lower-48 states and has achieved a 2-year refresh cycle. It is safe to say that this is the largest continuous imagery mapping program in US history.

So useful has NAIP imagery become that a 2014 National Earth Portfolio Assessment by the White House Office of Science and Technology Policy ranked NAIP as the fifth most important of 149 existing earth observation systems in terms of assisting federal agencies and providing societal benefits. Much of the imagery in consumer products, from automobile GPS systems to web services companies, that consumers assume originate with satellites, actually come from NAIP and other aerial sources.

Imagery from satellites and drones also play vital roles, and we appreciate that this hearing has been structured to explore the importance of each of these technologies in a complementary fashion. NAIP, however, has demonstrated that aerial imagery acquisition is uniquely capable of providing widespread coverage that meets the demanding seasonal windows aligned with peak crop growing seasons and weather and cloud constraints.

Within USDA, NAIP imagery is a key geospatial data layer for FSA, the Risk Management Agency (RMA), the Natural Resources Conservation Service (NRCS), the US Forest Service (USFS), and the Animal and Plant Health Inspection Service (APHIS), which use it for a variety of farmer services and program

compliance functions. But NAIP imagery is used far beyond USDA itself. It is made available both government-wide and to the public for digital download, purchase at nominal cost – literally the cost of a thumb drive -- or web imagery services hosted by the APFO. Within the Federal government, other users include the Department of Interior and its US Geological Survey (USGS), the US Army Corps of Engineers, Homeland Security, the Census Bureau, and the National Geospatial-Intelligence Agency. State and local governments use NAIP imagery to support functions from law enforcement to fire and emergency services to crisis management to transportation to urban planning to natural resources management and monitoring. In the private sector, NAIP imagery has become an essential tool for companies involved in mining and energy, urban planning, engineering, and environmental analysis. Attachment A shows the range of entities using NAIP imagery from the USDA NRCS portal.

Finally, individual farmers and their supporting services use NAIP for a host of farm management functions. They are a foundation for FSA's Common Land Units, crucial to acreage reporting for crop insurance and farm programs, and are integrated into precision farming, agronomic analysis, and irrigation systems. Attachment B is a list of typical NAIP farmer uses. In order to assure consistency and avoid duplication, the NAIP program, and particularly its technical specifications, are coordinated through the government-wide Federal Geographic Data Committee created in 1990 by OMB Circular A-16 and co-chaired by the Secretary of Interior and the Deputy Director of OMB, as well as its National Digital Orthoimagery Program (NDOP) subcommittee.

The collection and processing of NAIP imagery each year is a substantial undertaking that has required continual investment by contractors in equipment, software, and process refinement. Imagery is acquired under "leaf-on" conditions during the growing season in order to reflect crop status. This is in marked contrast to nearly all other Federal, state, and local government "leaf-off" projects at higher resolution for traditional mapping. The aircraft used in NAIP, approximately twenty-five of them in 2015, represent an investment of \$2.5 to \$3.5 million each. These aircraft operate at up to 35,000 feet using multispectral sensors yielding color and color-infrared imagery. Standard NAIP products include Compressed County Mosaics (CCMs) and Digital Orthophoto Quarter-Quadrangle (DOQQ) imagery. In recent years, the contractors have implemented Early Access Web Services (EAWS) to provide initial imagery within 5 days of acquisition, allowing USDA and its federal partners to begin analysis earlier and meet demanding reporting timelines.

NAIP imagery fits seamlessly into modern Geospatial Information Systems as a "base layer" that is combined with other layers such as farm program data, information on structures and underground pipelines, political boundaries, financial and census information, land agronomics, elevation data, soil qualities, addresses, so on. Often, these systems also incorporate imagery from drones and satellites to address special needs, creating powerful systems for business, government, and science.

Over the years, we have witnessed numerous improvements in NAIP:

- Cost: The program cost has fallen sharply from an estimated \$55 million per year to cover the entire lower forty-eight states a few years ago to now just below \$30 million, a result both of improved technology and excellent program management by FSA's APFO. APFO has reduced the program to three prime contractors (down from as many as ten early in the program) to streamline management and coordination.

- *Quality:* NAIP imagery is now entirely captured with digital sensors rather than film cameras, and has improved in clarity to as fine as half-meter resolution, thus meeting established map accuracy standards at the highest level. The multispectral data can be exploited using automated classification for investigation of plant health, spread of infestations such as bark beetles and the like. The success of the program has resulted in its standards and guidelines being adopted by many other federal, state, and local projects.
- *Speed and currency:* Initial imagery is now available within five days of acquisition and final products within 30 days. With resolution of the funding issue discussed below, it is possible to provide coverage of the entire lower-48 states on an annual basis, which would provide substantial benefits to program users. User surveys conducted by the USDA and organizations such as the National States Geographic Information Council (NSGIC) highlight the need for annual coverage. Surveys by the USDA have shown a consistently very high level of satisfaction among NAIP users.

The result of these improvements has been an extremely high return on taxpayer dollars, a high value for funding partners, and more widespread use both by public and private sectors.

The single greatest concern regarding NAIP is its funding structure that has resulted in instability. Since NAIP originally was created as an internal oversight/service initiative within the FSA, it has been funded primarily out of FSA's own "salaries and expenses" appropriation – despite the program's wide use both by government and the public -- and without a separate statutory authorization from Congress. FSA's support for NAIP has been strong and unwavering, a principal reason that NAIP has survived several years of budget constraints. FSA annually provides about two-thirds of the annual cost of NAIP, with its partners, notably USGS, NRCS, and USFS, funding the remaining portion along with occasional investments by state partners. As mentioned earlier, public users of NAIP and non-contributing government agencies obtain imagery essentially for free.

This situation has placed FSA in a difficult position with regard to NAIP, and the result has been unpredictable program funding. (Attachment C contains a chart showing the annual NAIP funding from 2003 through 2016.) In years when FSA faces severe internal funding needs – be it staff training, implementation of Farm Bills or other major legislation, computer upgrades or maintaining field offices – these create direct competition for funding NAIP. In some years, FSA has been forced to turn to the Commodity Credit Corporation to fill the gap. In other years, contracts were finalized too late for much of the growing season.

For this reason, we have long advocated that Congress adopt a statutory line-item authorization and appropriations for NAIP as a basis for long-term funding stability. We hope you will consider this idea in upcoming legislation.

From our collective experience in contracting with federal, state, and local government, we at Surdex and North West Geomatics have found NAIP an exemplary illustration of a true government-private partnership that has improved products and services and exploited technology to lower costs, resulting in expanded coverage. Our annual contractor meetings with APFO at the end of each year to

review lessons learned and explore improvements features open discussions benefitting both sides and, most importantly, improve the quality, accuracy, and timeliness of our imagery for the end users.

Thank you again for the opportunity to appear at today's hearing. We would be glad to answer any questions you might have.

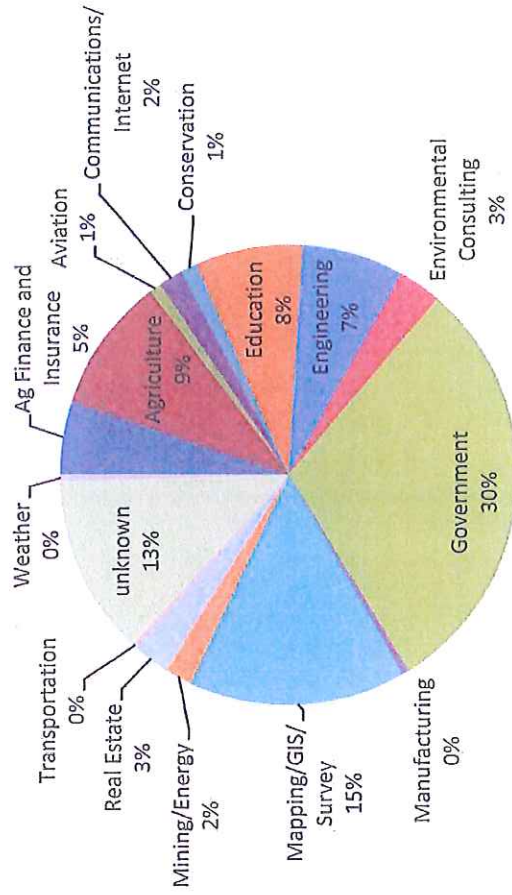
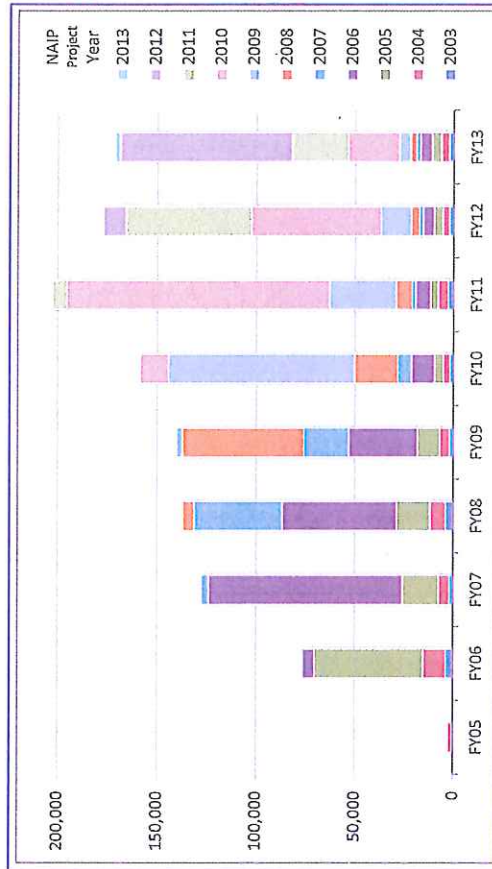
THE NATIONAL AGRICULTURE IMAGERY PROGRAM



Data Distribution by the USDA

Downloads of CCMs from the USDA Geospatial Data Gateway

Note: APFO CSS more than offset the drop-off in 2012-2013



Downloads by Usage

>30% are from some level of government

How Farmers Benefit from NAIP Imagery

Managing their Farms:

- Keep current, effective farm records
- Oversee operations and plan new projects
- Find best locations for grain bin and other farm structure locations for loans
- Identify urban encroachment, sites for new buildings, gas and oil well development
- Review topography changes around waterways after flooding or other extreme weather
- Identify and plan irrigation changes
- Assist with crop reporting
- Support program appeals
- See surrounding lands and fields for comparison and planning;

Receiving benefits from USDA agencies:

- Respond to inquiries on USDA programs
- Self-check for program compliance
- Verify crop history and planting patterns
- Apply for and receiving disaster response/assessments
- Manage food plots on CRP fields and CRP-managed haying and grazing acreage
- Assess, monitor, and address crop and animal disease outbreaks with APHIS
- Assist US Forest Service in managing forest lands
- Work with NRCS on resource assessments & inventory management
- Benefit from NASS, ERS, and University statistics and ag. Research in USDA program management and development

Receiving services from private vendors:

- Agricultural industry
 - Precision farming systems
 - Agronomic services
 - Private insurance offerings
 - Irrigation consultants and monitors.
- Tool for obtaining carbon offsets where available
- Basis for Google Earth, Microsoft Maps, and GPS navigation systems used by farmers
- Forestry management companies
 - Inventory and financial planning
 - Fire tracking and mitigation
 - Riparian analysis
 - Fire inventory

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Funding Challenge

CCC Funding Replaced
FSA S&E Funding for
2011-2014

