Imagery for the Nation
Collaborating on an imagery base map to reduce costs

find this position paper at http://nsgic.org

The Vision

The Nation will have a sustainable and flexible digital imagery program that meets the needs of local, state, regional, tribal and federal agencies.

Existing Situation
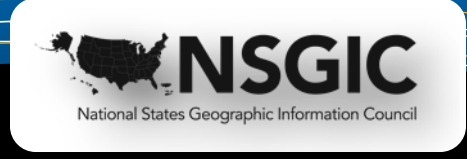
Aerial and satellite imagery, in the form of digital orthoimagery, is the foundation for most public and private Geographic Information Systems (GIS). These essential products are being developed by as many as 1,300 government entities across the Nation according to a NSGIC survey. Individual contracting efforts lead to higher costs, varying quality, duplication of effort and a patchwork of products. Large area contracting methods will keep the cost to taxpayers as low as possible and improve the availability of standardized, high-quality products.

Background on the Initiative

Implementing an initiative like Imagery for the Nation is a long process that requires collaboration with many entities. NSGIC first proposed Imagery for the Nation (IFTN) in 2004. We began working with the National Digital Orthophoto Program Committee (NDOP) and the Federal Geographic Data Committee (FGDC) in 2005 to try and create a new nationwide aerial imagery program that would collect and disseminate standardized multi-resolution products on established schedules. Local, state, regional, tribal, and federal partners would have been able to exercise "buy-up" options for enhancements that are required by their organizations. The imagery acquired through such a program would have remained in the public domain and have been archived to secure its availability for posterity. The U.S. Department of Agriculture (USDA) and U.S. Geological Survey (USGS) funded the development of a Cost Benefit Analysis (CBA) in 2006. The CBA document was released in July 2007. As originally envisioned, the USDA National Agriculture Imagery Program (NAIP) would acquire 1-meter leaf-on imagery for the Nation on an annual basis and USGS would acquire 1-foot and higher resolution imagery of the nation every three years. The NAIP program made many improvements to their

program and embraced some of the features of IFTN. USGS decided that NAIP imagery met the majority of its own business needs and didn't pursue the high resolution program except for the existing 133 Cities program done in collaboration with NGA.

The FGDC created an Executive Committee to Study IFTN. They established several work groups (e.g. Technical, Communications, Contracting) to develop plans for the component pieces of the program. By the time the work groups were done with their plans, the Nation's economy had worsened and it became highly unlikely that a program like IFTN would be funded by Congress. The work group plans were never publicly available. In addition, there was never a consensus reached by the Executive Committee to pursue funding for IFTN.

A Request for Information (RFI) to industry was issued by the National Geospatial Intelligence Agency (NGA) in August 2010, to gain additional information on the potential costs and benefits of different approaches to meet the goals of the Imagery for the Nation (IFTN) initiative. The results of this RFI were never made publicly available.

A Federal Position on IFTN is Needed

Federal and state representatives invested thousands of hours to research the most efficient way to implement IFTN. The National Geospatial Advisory Committee (NGAC) endorsed the IFTN concept in its advisory role to the Department of Interior. NSGIC believes that the FGDC has a responsibility to take a definitive position on IFTN, publicly share the information generated during its research, and look for effective cost sharing alternatives that will lead to the successful implementation of this initiative. In the interim, the NAIP imagery program at USDA should be adequately funded to meet its goals.

Leaf-on Imagery

Leaf-off Imagery

The time of year and the time of day are both critical for Authoritative Imagery. The leaf-on conditions for the image at left obscure features on the ground such as the 860 ft^2 workshop (red circle) clearly shown in the image on the right. In many cases, entire homes or neighborhoods are masked by leaf-on conditions. The red arrows identify areas dominated by deciduous trees and clearly show ground features in the image on the right. Evergreen trees (yellow arrows) are problematic at all times of the year for most mapping applications. For some applications (e.g. monitoring agricultural crops) leaf-on imagery is ideal. The sun angle for the image on the left is totally unacceptable. It was taken late in the afternoon, while the image on the right was taken in the morning. Neither of these images is ideal for sun angle, but they clearly demonstrate how shadows from trees and tall buildings can obscure other ground features that must be mapped. A well coordinated national high-resolution leaf-off imagery program is required by all levels of government to prevent waste and duplication of effort.

Referential   Authoritative

Map Accuracy

Authoritative imagery undergoes an orthometric rectification process that gives the raw imagery very specific mathematical and geometric properties making the imagery's scale uniform throughout - similar to a map. The corrected image allows measurement of true distances and areas, and the accurate overlay of other mapped information. To be usable for government agencies the mathematical and geometric properties of the imagery have to be clearly understood and documented. Referential imagery that lacks these critical properties may not be usable for rigorous government applications, even though as displayed online the imagery may "look just fine" for most potential uses.

Bridges don't normally sag or curve. The referential image on the left was not properly corrected (orthometric rectification) to give it map accurate qualities. That is why the bridge looks this way. The imagery on the right was properly corrected and the bridge appears as it should. This is usually caused by poor quality elevation models, a lack of ground survey points or poor techniques. 'Free' imagery like the image on the left is often what is available from online services. These types of errors occur throughout the imagery, but are not as apparent in other areas. This is why this imagery may not meet the more stringent requirements of government agencies for applications like Next Generation 9-1-1 or accurately mapping critical infrastructure.