

Justifying the Cost of Authoritative Imagery

....a brief review of the issues



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Referential

Authoritative

Examples provided by
State of Ohio (OGRIP)

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The Principal Issue

As internet content providers and commercial entities provide ever greater amounts of free, low-cost or 'bundled' data, managers of public agencies are being asked with increasing frequency - "Why do we have to pay for data when it is available on the web or off the shelf?" This question is understandable for imagery projects which can amount to considerable sums of money, particularly in a time of strained budgets, where nearly everyone is being called upon to maintain their current level of service with reduced funding. It is also understandable in the context of legislators, executives and senior-level managers who are trying to carry out their responsibilities as best they can, but who may see imagery only as a visual display, without understanding the technical specifications that are necessary to meet intended business requirements.

Referential Imagery v. Authoritative Imagery

It is easy to illustrate that authoritative aerial imagery can be precisely overlaid with road centerlines, parcel information, or other data to show that it isn't just a picture. Authoritative imagery has very specific mathematical and geometric properties making the imagery's scale uniform throughout - similar to a map. Corrected images allow the 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 must be clearly understood and documented. When your business model is based upon selling advertising through the use of visualization, and doing it all for free, you may not be able to economically produce imagery that meets the

specific business requirements of state and local government agencies. A simple contrast of Referential and Authoritative data is the accurate positioning of the bridge shown in the images at the lower left of this page.

The following issues distinguish authoritative imagery from referential imagery:

Authenticity – Most government agencies must be able to use data in a legal context. Referential imagery may have been modified by the provider for a variety of reasons. There is no way to determine if the imagery has been changed.

Currency - Referential imagery has no guaranteed temporal specification. It could be current, 1 year old, or 5 years old. Often, government is called on to validate the time imagery was collected, and the requirement is generally for current data.

Accuracy – Referential imagery may not be produced to a published accuracy specification. Where there are specifications, they may be relaxed to maximize acquisition speed and coverage without being subjected to independent validation.

Ownership – Is there documentation that defines the rights to use referential imagery? Can derivative products be made from it? Who owns those products? Are royalties required? This is only a sample of the issues that need to be addressed.

In many cases, public agencies use authoritative aerial imagery to derive other prod-

ucts such as building footprints, road centerlines or utility inventories. If the currency and accuracy are not known, the derivative data is questionable, and can be challenged. Purchasing and validating imagery to a required specification mitigates this issue. Public and private entities that use authoritative aerial imagery and derivative products frequently make crucial decisions based upon this information, many of which have significant impact on the public-at-large, including their safety and security.

Applications like the routing of emergency responders, planning and design of transportation infrastructure, code enforcement and property tax assessment are just a few examples of how this data is used. In short, for a great many applications, the imagery has to be built to stringent specifications, as lives depend on it. Free or low-cost referential imagery may look great, but if you are not in control of the specifications for creating this data, you probably do not know what those specifications were, and most of the time, you can't find out. Authenticity and currency are significant issues related to accountability in public agencies. The time period during which the imagery was collected may not be readily available, or is simply unknown. This makes referential imagery useless in a court or legal proceeding.

This doesn't mean that referential imagery services don't have high value for particular state and local government business requirements. They work very well in certain instances. The following information will help clarify the value of authoritative imagery based on specific characteristics.

Authoritative Imagery Values

In return for its cost, authoritative aerial imagery provides the ability to dictate the standards and specifications, and to have ownership of products. You regulate the quality-control procedures and documentation, and your products are backed by a guarantee. The data needs of today's geospatial professionals are complex and demanding. Some of the more critical specifications for imagery include:

- **Accuracy**—How accurate the imagery needs to be for your specific requirements dictates how accurately it is positioned in global space, and how precisely end users can overlay other data.
- **Resolution**—The spatial resolution of the imagery should be based on the smallest objects that need to be identifiable with the imagery (e.g. manhole covers or utility poles).
- **Coordinate System and Projection**—The imagery needs to be in compatible formats, so it can be overlaid with other data sets for which end users have often invested considerable sums of money.
- **Time of Acquisition**—The time of year the imagery is acquired is often critical. For most government applications, imagery must be acquired in leaf-off, snow-free conditions to see as much built infrastructure beneath tree canopies as possible before it becomes obscured. The time that these conditions exist in some places is measured in a few short weeks due to weather & environmental conditions.
- **Shadows**—The time of day the imagery needs to be acquired for certain applications is critical. Shadows from tall buildings and trees can render large portions of imagery virtually useless because the shadows obscure features that must be mapped.
- **Spectral Resolution**—Modern sensors collect the near-infrared band along with conventional red, green and blue bands that compose natural color imagery. Processing methods make this data available for very little if any additional cost. Near-infrared imagery can be tremendously useful for applications such as wetlands identification. Access to the original uncompressed data with all of the spectral bands is critical to support remote sensing applications. Most online and off the shelf products do not have all spectral bands and the images have been compressed. This can destroy their utility.
- **Project Hybridization** – Professional firms have the ability to collect and process imagery to a variety of different resolutions, accuracies and other specifications in order to meet the varying needs of end users, while still keeping costs to a minimum.
- **Derivative Data Products** – Ownership of authoritative aerial imagery provides access to fully-controlled stereo-imagery that can be used for terrain modeling, planimetric data extraction, production of 3D visualization products, and other products and processes.

Currently, off-the-shelf imagery products and services often fail to meet important specifications at both project and enterprise-wide levels. While budgetary constraints may not always allow an organization to procure everything it wants in terms of imagery and derivative data products, commissioning an authoritative project provides the ability to dictate the specifications for the imagery that is procured, and to meet the business requirements of the largest number of end users possible.