Justifying the Cost of Custom Imagery in a World of Free Data

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What's the Issue?

Online search engine companies and other web sources are trying to distinguish themselves by offering ever greater amounts of free content. This is especially true for imagery, and managers in public agencies find themselves in the position of having to answer the question - "Why aren't we just using the imagery freely available on the web?" They must then justify what can be considerable sums of money for a custom imagery project. This question is understandable, especially 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.

Online Imagery versus Custom Imagery

These issues distinguish custom imagery from online imagery:

Authenticity – Most government agencies must be able to use data in a legal context. Online imagery may have been modified by the online provider for a variety of reasons. There is no way to validate whether or not the imagery has been changed.

Currency - Online imagery has no guaranteed temporal specification. It could be current, 1 year old, or 5 years old. In general, government has to validate the time the imagery was collected, and the requirement is often for current data.

Accuracy – Online 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 of use for online 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.

It is easy to illustrate that custom aerial imagery can be precisely overlaid with road centerlines, parcel information, or other data to show that it isn't just some picture. This imagery has gone through a rigorous process called orthorectification, which uses ground reference targets, precise position and orientation information for the camera sensor at the time of each exposure, and a three dimensional model of the terrain surface to run a highly sophisticated computer program that removes a distortions from the imagery, and positions it correctly in a chosen coordinate system, such as latitude and longitude. 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.

In many cases, public agencies use custom aerial imagery to derive other products such as building footprints, road center-

lines or utility inventories. If the currency and accuracy are not known, the derivative data is questionable, and can be challenged. Purchasing imagery to a required specification and validating it mitigates this issue. Public and private entities that use custom 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 as diverse as 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, and you have to be able to back-up your decisions. Free or low-cost online imagery may look great, but you weren't in control of the specifications for creating this data, probably don't 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, and in many cases unknown. This will typically make online imagery useless in a court or legal proceeding.

This doesn't mean that online 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 to clarify the value of custom imagery based on specific characteristics.

Value of Custom Imagery

In return for its cost, custom 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 needs of today's geospatial professionals are complex and demanding, and imagery that can stand up to their tasks is often equally so. Some of the more critical specifications for imagery include:

- **Accuracy**—How accurate does the imagery need to be for your specific requirements. This dictates how accurately it will be 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, in order 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, with weather delaying acquisition much of that time.
- **Shadows**—The time of day the imagery needs to be acquired for certain applications is critical. Shadows from high buildings and trees can render large portions of imagery virtually useless because the shadows obscure features that must be mapped.
- **Spectral Resolution**—Today's sensors virtually all collect the near-infrared band together with the conventional red, green and blue bands that compose natural color imagery. Modern processing methodologies often make this data available for very little if any additional cost. Near-infrared imagery can be tremendously useful for a wide variety of applications such as wetlands identification.
- **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 custom 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 they want in terms of imagery and derivative data products, commissioning a custom project at least 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.