White Paper

Geospatial Information Analysis System

Key Questions to Ask Customers and Then Provide to SGI Professional Services in Order to Best Architect a Solution

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1.0 Archive

The archive ingests imagery and geospatial information, stores the information, and serves the information out to the services for delivery to the users. The archive may manage the stored information on a combination of online, near-line, and offline systems in a hierarchical system or may be configured for entirely online storage. The type of storage and the interfaces and methods for receiving data into the archive are configured to match the local requirements.

1.1 How much data that needs to be ingested and cataloged do they expect to receive per day? What are their anticipated storage needs for one month or one year?

1.2 Is the data received electronically or on media, and in what formats and media types?

1.3. Will all their data be kept online on disk or RAID storage?

1.4 Is there a need to move their data from online to near-line storage? Is the automated migration between online and near-line storage required (hierarchical storage management)?

1.5 Is there a need to store their data offline on media that is archived on shelves to be retrieved by people?

1.6 How many users will be on the network requesting data from the archive system at any one time?

1.7 Is automated metadata (attribute) extraction required? Are there specific formats or data models for the extracted metadata?

2.0 Catalog

The catalog extracts descriptive attributes from the information received in the archive and stores these attributes as metadata and preview images that support the user's selection of appropriate information through query and browse actions. In additional to a simple index, the catalog may also include an associative index oriented around user-specified topics, such as facilities or equipment. In this type of index, the user associates information with a specific topic, such as a place or a facility, and enters key attributes to define the association. Using an associative index, spatial information can then be found in relationship to the topics. The information types that the catalog can ingest and the nature of the indices are configured to meet the user's needs.

2.1 Are query and discovery by nonspatial attributes (for example, time, keywords, or text) required?

2.2 Are query and discovery by spatial location (spatial extension to database) required?

2.3 Are query and discovery by association with facility, place, or other/user-selected topic required?

2.4 Is the display of preview/overview images (thumbnails) required?

2.5 Is a user interface for manual population/update of attributes into the catalog required?

3.0 Catalog Service

The user interfaces with the catalog service through a standard, off-the-shelf Web browser. Through the Web browser, the user forms and submits queries or browses through indices and evaluates the information attributes as well as preview images of the information. The user selects the information for analysis and specifies delivery parameters, such as direct download or media delivery, conversion and/or processing parameters such as geoextent extraction (clipping), or a combination (e.g., mosaicing, merging, blending). The catalog service interfaces with the catalog and the content service to satisfy user requests. The catalog service may be configured to support a specific look and feel and to provide extended capabilities such as user authentication for security.

3.1 What are the requirements for user interfaces for spatial object selection?
- a) Hierarchical indices of information based on facility or location association similar to a file browser?
- b) Hierarchical indices of information based on user-selected attributes (e.g., date or location)?
- c) Free-text query of user-selected attributes?
- d) Placename-based (gazetteer) queries?
- e) Graphical and/or textual map-based spatial queries?
- f) Interactive overview of attributes and thumb nails from query results?

3.2 Is a standing query (profile) required for the auto mated identification of applicable information as it arrives?
- a) Should a user profile define which user or groups of users requires specific information on specific topics at regular intervals?
- b) If information is not in the system, should the system generate a collection request?

c) If information is in the system, should the system distribute the information to the user or group of users or notify users that information is available?

3.3 Is a published API for object selection required?

3.4 Is distributed access to other archives required?

3.5 How long should a user expect to wait before receiving a query response?

4.0 Content Service

The content service delivers information as directed from the catalog service, supporting a combination of online and offline delivery mechanisms. The content service may be configured to support a variety of delivery method, conversion, and preprocessing options. The content service also may be configured to support "tailoring," the conversion of information to meet a particular customer's needs (for example, cropping or clipping, geoextent extraction or chipping, generalization or decimation). The content service may also support "customization," the combination or extraction of information to support specific needs (e.g., rectification, mosaic formation, or annotation).

4.1 Is the user interface for object retrieval required to provide:
- a) Click-to-stream or download?
- b) Order form for packaged download (electronic: tar, zip, etc.; media: 4 mm/8 mm tape, DLT, DVD MO) or packaged on media?

4.2 Do you have a requirement for a published API for spatial object retrieval (download or ordering)?

4.3 Is automated preprocessing for retrieval, processing, or streaming (e.g., RRDS or tiling) required? If yes, are there any specific formats?

4.4 Are services that provide tailoring required?
- a) Will format conversion be needed? If yes, please provide list of format A to format B.
- b) Will cropping or clipping, geoextent extraction (chipping), or generalization or decimation be required?
- c) Will other types of tailoring be required? Please specify.

4.5 Are services that support customization required?
- a) Will haze, contrast, and brightness adjustment be required?
- b) Will rotation be required?
- c) Will false coloring by band selection be required?
- d) Will planar rectification, perspective transformation, and/or map projection be required?
- e) Will image-to-image or image-to-map registration be required?
- f) Will mosaic combination be required?
- g) Will annotation and gridding be required?
- h) Will extraction of features or elevation be required?
- i) Will other types of customization be required? Please specify.

5.0 Applications

The applications provide the users with the tools to analyze the imagery and geospatial information. The applications are selected and configured based on the types of information available and the objectives of the analysis.

5.1 Should the applications retain working files and user preferences to initialize each session?

5.2 What formats of imagery should the applications support?

5.3 Should the applications display color, false color, and grayscale imagery?

5.4 Should the applications pan, zoom, reduce, move, and/or rotate the image?

5.5 Should the applications display geographic location or jump to geographic location?

5.6 Should the applications have the capability to do contrast adjustment, brightness, sharpness, dynamic range, or despeckling?

5.7 Should the applications perform edge or border enhancement, mirror, haze filtering, false color, or positive/negative flip?

5.8 Should the applications perform two-image fade-in, fade-out, flipping, split-screen display, stereo, or image difference?

5.9 Should the applications perform multispectral band ration, false color, NDVI vegetation index, or supervised and unsupervised classification?

5.10 Should the applications support measurement in ground units, including the location of a point, distance between points, and area within a circle or polygon?

5.11 Should the applications display pixel values, histograms, or spectral coding?

5.12 Should the applications drape imagery over digital elevation models for 3D display?

5.13 Should the applications perform feature extraction through identification and classification using monoscopic or stereoscopic images?

5.14 Should the applications support the annotation of images with marks, points, arrows or orientation, circles, polygons, grids, or text?

5.15 Should the applications count each type of annotation and display the count?

5.16 Should the applications have drawing tools to create, examine, modify, recover, select font size, color, line style, emphasize, display or hide, select, or move?

5.17 Should the applications overlay object files (vectors, shapes) on imagery according to geographic location?

5.18 Should the applications create, modify, and delete vectors and overlay objects?

5.19 Should the applications create, store, and examine annotation layers?

5.20 Should the applications be able to report editing, modification, archive, and retrieval in English and local languages?

5.21 Should the applications provide tools to integrate textual description, image, shape objects, tables, etc.?

5.22 Should the applications be capable of cataloging reports by geographic location, target description, country, data source, date, etc.?

5.23 Should the applications be capable of generating reports from self-defined formats, predefined tables, predefined military equipment report templates, and reports generated by database report?

5.24 Should the applications be capable of outputting in Postscript, MS Office formats, TIFF, and HTML?

5.25 Should the applications be able to import report data in HTML?

5.26 Are there any other requirements for the applications?

6.0 Transaction Manager

The transaction manager is the foundation for coordinating and controlling the responses to each user request. In security-conscious environments, the transaction manager is the key to ensuring that users are granted access only to authorized information. In charge-back or commerce situations, the transaction manager is the focal point for determining charges by user or organization. The transaction manager is configured according to the local access restriction and fee models.

6.1 Is user access controlled to specific locations, types of data, or functions?

6.2 Is there an interest in e-commerce transaction tracking and billing?

6.3 Is performance monitoring required?

6.4 Is distributed query performance monitoring and control required?

7.0 Platforms/Infrastructure

7.1 Will the system be in use 8x5 or 24x7?

7.2 What type of networking infrastructure is currently in place or desired?

7.3 What types of servers are already in place or desired (SGI™ IRIX®, Linux®, Sun™ Solaris®, HP-UX, IBM® AIX®, Windows NT®, Windows® 2000, other)?

7.4 What types of workstations are already in place or desired (SGI IRIX, Linux, Sun Solaris, HP-UX, IBM AIX, Windows NT, Windows 2000, other)?

7.5 What types of hardcopy output are required (black and white, photographic, color, or large format)?

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