

METRIC Software Architecture

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BioMedware
Geospatial Research and Software

Outline

- a. Software Goals and Functionality
- b. Major Components of METRIC
- c. Current State of Architecture Development

Software Goals

- Central Portal for Individuals and Groups
- Making Data easy
- Allowing Custom and Guided Analysis
- Library of Visualization Tools, Data and Indices
- Sharing and Dissemination of Results
- Security and Confidentiality



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Software Goals: a Central Portal

- Users can login from any location to access their data and projects
- Users can join groups and collaborate with co-workers, other researchers, etc.
- Users can bring data or indices into the METRIC platform and take data, results, and presentation materials out

Software Goals: Data Made Easy

- Currently data import and formats is one of the biggest hurdles in analysis
- METRIC aims to automate the import of a large variety of formats, APIs, databases, etc.
- METRIC will allow analysis between data sources that have a different spatial scale
- METRIC will handle standard operations such as geocoding needed to prepare data for analysis
- For updating data available online, METRIC will acquire up-to-date data from the source, not create a copy that becomes dated

Software Goals: Custom and Guided Analysis

- METRIC allows the user to select and index they would like to calculate
- Users can search by type, keyword, or source for relevant indices
- Users can modify existing indices or create new ones
- METRIC is smart about data and will suggest relevant data for an index – ex. If an index requires address locations only appropriate datasets will be allowed
- METRIC will be designed towards comparing indices or variants

Software Goals:

Library of Tools, Data, and Indices

- METRIC will present the user with a variety of data and indices from the first use
- As users build indices or add data sources, they can decide if these resources are private or shared with their user groups or the general public
- METRIC will support an array of visualization tools including maps, plots, and tables

Software Goals:

Sharing and Dissemination of Results

- Analyses and assets created on the METRIC platform are stored within the platform and accessible from anywhere
- Sharing can be done within the METRIC platform to other users and groups or with everyone
- METRIC will allow data to be exported in a variety of common formats
- METRIC will also export elements of analysis for use in presentations or over the web (exported results in display-ready PDF, images, etc.)

Software Goals: Security and Confidentiality

- ▶ Carlos' talk will go into some detail about METRIC's security backbone
- ▶ METRIC will also provide tools for sharing the results of confidential data
- ▶ For instance, locations or names can be masked. Data can also be transformed by methods such as up-scaling to less sensitive aggregations or adding noise to sensitive components like residences

Components of METRIC

- Account/security module
- Data import module
- Index definition module
- Data preparation module
- Analysis module
- Visualization module
- Export module

METRIC Architecture



Account/Security
Module

Security Server



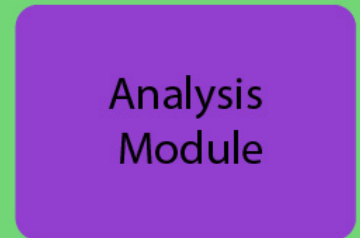
Data Import
Module

Data Preparation
Module



Export
Module

Data Server



Client Application

State of METRIC: Account/security module

- ◆ Sever backbone has been implemented requiring account-based access for all resources
- ◆ Secure communications are in place for all data transmission
- ◆ Client interface does not yet handle support group creation

State of METRIC: Data import module

- Support exists for loading flat files
- Support exists for accessing web APIs and periodically polling for data updates
- Support exists for geocoding data that contains addresses
- More APIs and other data sources need to be added
- Client support for uploading data files is nearly there

State of METRIC: Index definition module

- ◆ Indices are defined according to a formula which supports a library of mathematical functions and geographical operations
- ◆ Indices can be modified
- ◆ Equation editor needs to be added to client
- ◆ Storage of indices needs to be added to the server

State of METRIC:

Data preparation module

- ◆ Server can provide data in a common format along with geography encoding
- ◆ Need to implement automatic scaling of geographic extents for a common analysis
- ◆ Need to implement subsetting of original data sources (i.e. perform a study for the state of Michigan)

State of METRIC: Analysis module

- ◆ Support for calculating and storing analyses on the client side
- ◆ Analyses are linked to their original data sources
- ◆ Need to add saving of analyses on the server
- ◆ Need tools for batch analyses and comparison of analysis results

State of METRIC: Visualization module

- Basic table of data
- Basic plots for data
- Basic map for table
- Simple drilling down to data
- Visualizations need to be expanded
- Some new visualization types will be added

State of METRIC: Export module

- ➡ Export module to common data types needs to be implemented
- ➡ Exporting of results for presentation or web sharing needs to be implemented
- ➡ Export handling of sensitive data needs to be implemented