

On Baking Cakes

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BioMedware
Geospatial Research and Software

NAACCR
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How to bake the METRIC cake

- Focus on the user
- Solicit user and stakeholder feedback throughout the development process
- Iterate!

METRIC Stage: Early Phase II

Phase 0

Feasibility
assessment,
proposal
development,
and technical
review

Phase 1

Establish
technical merit,
feasibility, and
commercial
potential

Phase 2

Continue
research and
development
efforts initiated
in Phase 1

Phase 3

Pursue
commercialization
objectives
identified in
Phases 1 and 2

Your Job

- Learn the current status of the NCI METRIC contract
- Identify opportunities, obstacles and benefits of METRIC software and resources in cancer research and public health
- Formulate recommendations in 5 focus groups
 - **1. Software & Tools Evaluation**
 - **2. Research Applications**
 - **3. Integration with Existing Tools**
 - **4. Security & Data Confidentiality**
 - **5. Commercialization Plan**



Expected Outcomes

- 5 focus group reports
- NAACCR/BioMedware Workshop report
- Publication (?) of workshop recommendations

[Journal of Geographical Systems](#)

July 2017, Volume 19, [Issue 3](#), pp 197–220

Geospatial cryptography: enabling researchers to access private, spatially referenced, human subjects data for cancer control and prevention

Authors

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Original Article

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3

Shares

72

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Abstract

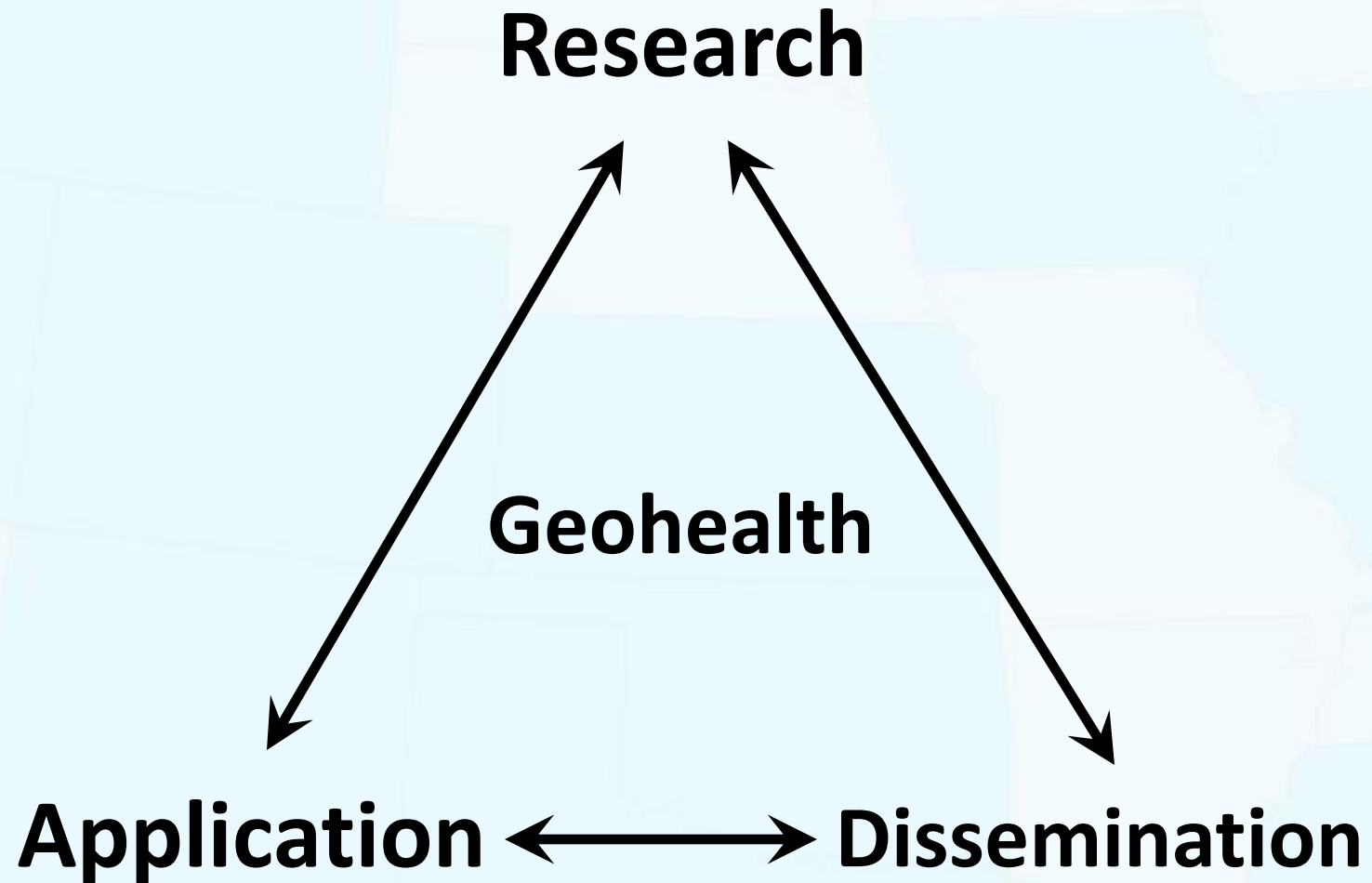
As the volume, accuracy and precision of digital geographic information have increased, concerns regarding individual privacy and confidentiality have come to the forefront. Not only do these challenge a basic tenet underlying the advancement of science by posing substantial

BioMedware?

- Develops methods and software for exploring health-environment relationships
- Created Stat, ClusterSeer, BoundarySeer
- NIH funded
- www.biomedware.com

Example Geohealth Projects	PI Name
Case-only Cancer Clustering for Mobile Populations	Jacquez, G
Cancer Cluster Morphology	Jacquez, G
Geostatistical software for health and exposure analysis	Goovaerts, P
A Space-Time Information System for the NCI Cancer Atlas	Jacquez, G
Space-Time Clustering of Testicular Cancer Using Residential Histories	Meliker, J; Jacquez co-PI
Geostatistical software for the space-time analysis of health disparities	Goovaerts, P
Cancer Clustering for Residential Histories	Jacquez, G
Space-Time Technology for Reconstructing Exposure in Cancer Epidemiology Studies	Meliker, J; Jacquez co-PI

BioMedware R&D



Example Problems

- Geographic Complex Systems?
- Human Mobility?
- Cluster Morphology?
- Time-dynamic Exposure Reconstruction?
- Indices and Cancer?

Activities in Space-Time GeoHealth Analysis

1. **Describe data** using descriptive statistics and statistical graphics
2. **Visualize data through time** using time plots, synchronized windows and statistical graphics animation
3. **Visualize data geographically** using maps, cartographic brushing and map animation
4. **Identify statistical, spatial and temporal outliers** using boxplots, histograms, variogram clouds and LISA statistics
5. **Transform variables** using the normal score and z-score transformations with time-slice and time-weighted means

All activities for time-dynamic data!

Activities in Space-Time GeoHealth Analysis

8. **Evaluate rate stability** to determine whether adjustment for the “small numbers” problem is needed
9. **Stabilize rates** using empirical Bayes and Poisson kriging
10. **Interpolate** data using nearest neighbor, distance and kriging methods
11. **Identify sub-populations with significant health disparities**
12. **Identify clusters** and undertake disease surveillance accounting for human mobility, known risk factors and covariates
13. Quantify and model spatial dependencies using **global and local spatial autocorrelation analysis**

Activities in Space-Time GeoHealth Analysis

14. Quantify and model spatial dependencies using **variogram analysis**
15. Make predictions using **aspatial regression through time** (linear, Poisson, logistic)
16. **Analyze residuals** (aspatial, spatial and through time)
17. Make predictions using **spatial lag, spatial error, geographically weighted and multi-level regression**
18. **Compare results** from aspatial, spatial, geographically weighted, and multi-level regressions
19. Make predictions using **geostatistics**
20. **Reduce dimensionality** using PCA and other multivariate approaches
21. **Evaluate cancer risks** using environmental and other indices

Your Job

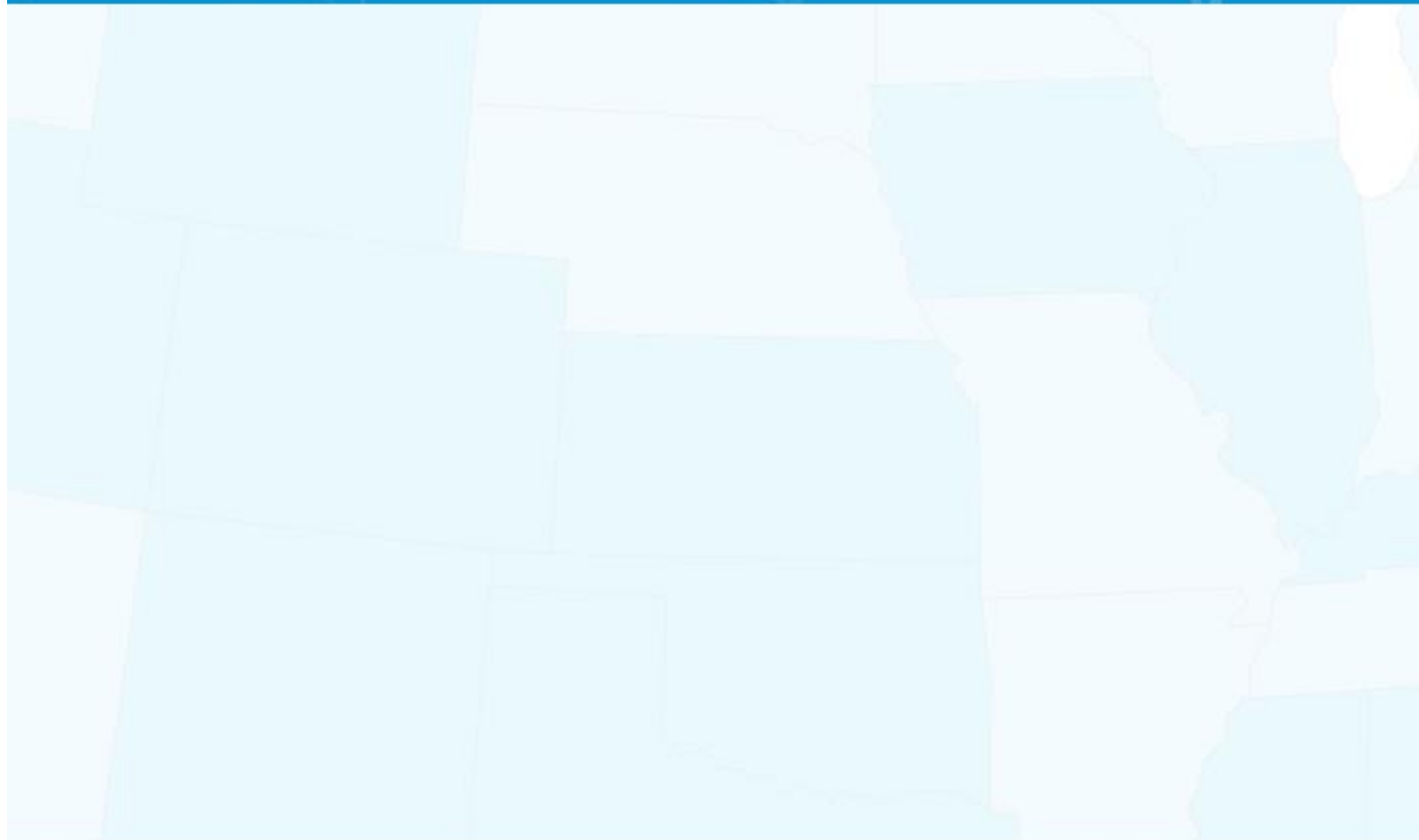
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Please ...

- Do **not** limit your musings and recommendations to how we pose possible solutions
- Give us consensus **and** minority opinions and recommendations

$$\sum_{i=1}^n z_i + \frac{1}{2} G \cdot V_{\text{rm}}$$



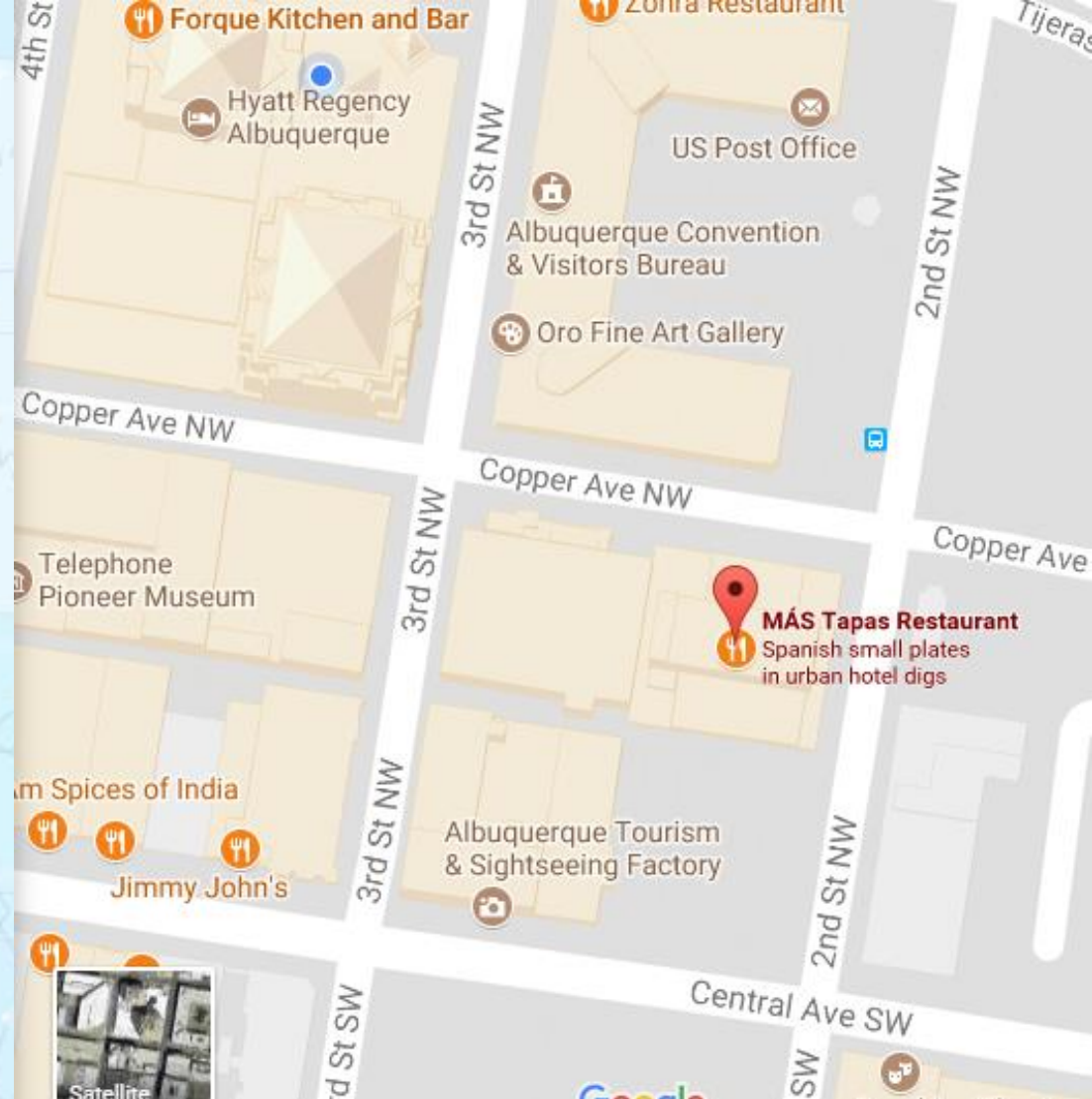
6p this evening

MAS Tapas Restaurant

Hotel Andaluz

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