

# A workflow learning model to improve geovisual analytics utility

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*context:* Geovisual Analytics and G-EX Portal

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*goal:* Successful Software

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*approach:* Workflow Learning Model

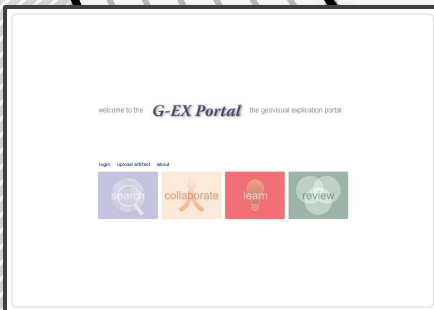
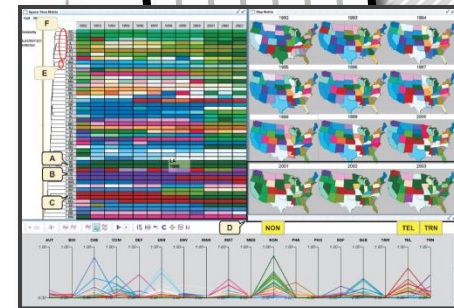
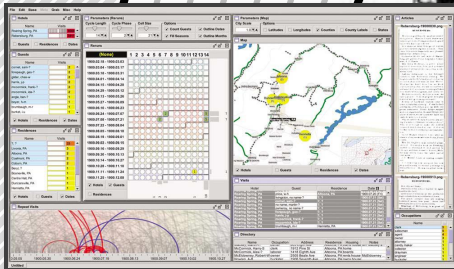
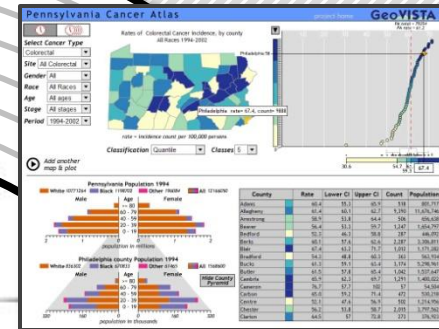
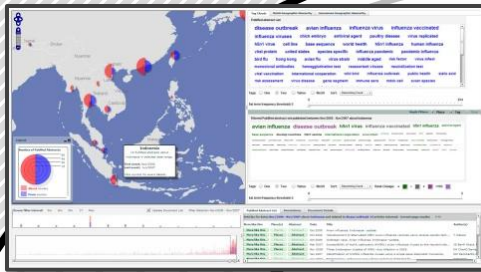
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# *context: geovisual analytics*

vs. interactive cartography/geovisualization

*human reasoning or sensemaking*  
of geospatial datasets that are:

1. voluminous
2. heterogeneous
3. spatio-temporal
4. multivariate



enhancing the perceptual-cognitive abilities of humans through visual interfaces to computational methods

# G-EX Portal

Geovisual Explication Web Portal

welcome to the **G-EX Portal** the geovisual explication portal

[login](#) [upload artifact](#) [about](#)



## The G-EX Portal: Web-Based Dissemination of Geovisual Analytic Results

Anthony C. Robinson, Etien Koua, Frank Hardisty, Jin Chen, and Alan M. MacEachren

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Department of Geography  
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### Abstract

Here we present work in progress on the G-EX Portal, a web repository designed to facilitate investigator-to-investigator research dissemination on the application of geographic exploration and analysis tools in cancer control and surveillance. The G-EX Portal is intended to serve four major tasks: to provide access to interactive tutorials for

displaying 1-10 of 20 total artifacts matching the search term **Robert Roth**

June 19, 2008

Sort results by:



Filter results by date:



1 2 last

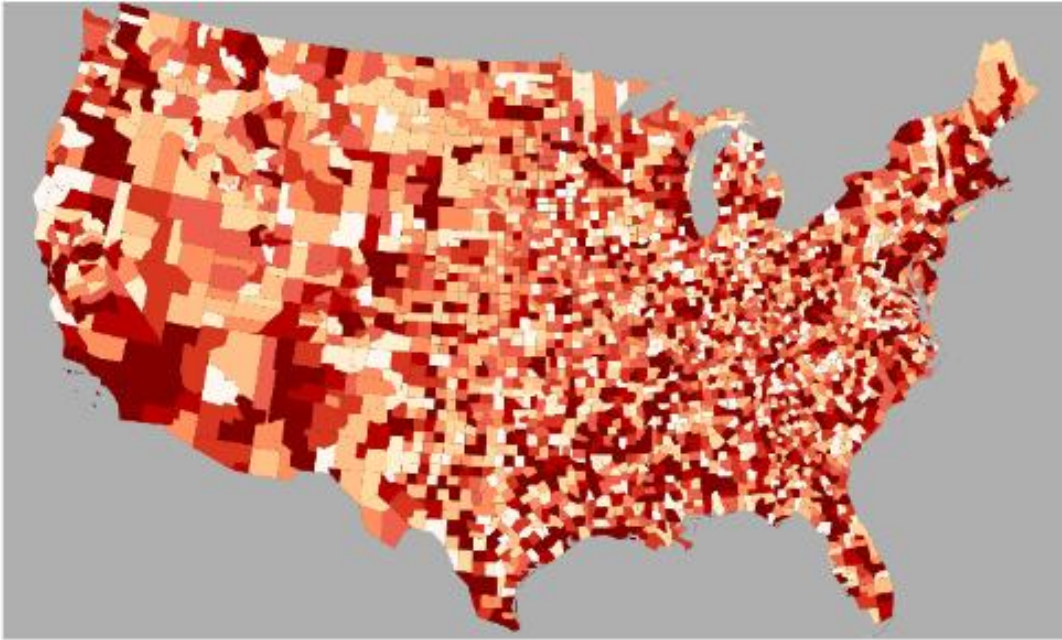
- |  |   |   |
|--|---|---|
|  | <p><b>Gevisual Analytics to Enhance Spatial Scan Statistic Interpretation: An Analysis Of US Cervical Cancer Mortality - Draft</b></p> <p>Kulldorff's spatial scan statistic and its software implementation – SaTScan – are widely used for detecting and evaluating geographic clusters. However, two issues make using the method and interpreting its results non-trivial: (1) the method lacks cartographic support for understanding the clusters in geographic context and (2) results from the method</p> <p>United States clustering SaTScan reliability visualization cervical cancer</p> | <p>NCI - Cervical Cancer Clustering<br/>Robert Roth<br/>added May 10, 2009<br/>30 prior views</p>   |
|  | <p><b>Addressing Map Interface Usability: Learning from the Lakeshore Nature Preserve Interactive Map</b></p> <p>This is a paper that Mark and I just had accepted by Cartographic Perspectives detailing the development of the Lakeshore Nature Preserve Interactive Map.</p> <p>Madison Wisconsin interactive map Lakeshore Nature Pr... cartography</p>   | <p>Lakeshore Nature Preserve<br/>Robert Roth<br/>added July 10, 2008<br/>66 prior views</p>         |
|  | <p><b>Cervical Cancer Clustering Paper - Draft #1 (rev)</b></p> <p>This is the first draft of the paper on cervical cancer clustering, specifically looking at the reliability of SaTScan clusters.</p> <p>Appalachian Region Southeastern United ... clustering SaTScan cervical cancer reliability</p>  | <p>NCI - Cervical Cancer Clustering<br/>Robert Roth<br/>added April 01, 2008<br/>8 prior views</p>  |
|  | <p><b>Screenshot #2 (Analysis Session 3-19-2008)</b></p> <p>This screenshot is similar to Screenshot #1, but shows p-values for white women only. Again, a checkerboard map is produced.</p> <p>US counties clustering cervical cancer SaTScan white</p>  | <p>NCI - Cervical Cancer Clustering<br/>Robert Roth<br/>added March 19, 2008<br/>21 prior views</p> |
|  | <p><b>Screenshot #1 (Analysis Session 3-19-2008)</b></p> <p>This screenshot shows a display from the VIT mapping the p-value from SaTScan cervical cancer clustering using a nine-class choropleth map. We found the checkerboard pattern extremely interesting. That there is this much variation is not odd, because the p-value must conform to the normal distribution (which must place a particular</p> <p>US counties p-value SaTScan cervical cancer clustering</p>   | <p>NCI - Cervical Cancer Clustering<br/>Robert Roth<br/>added March 19, 2008<br/>80 prior views</p> |
|  | <p><b>NCI Meeting Notes (3-6-2008)</b></p> <p>These are the meeting minutes from the March 6th analysis session held in Room 206, Walker Building. Stemming from this analysis a separate paper on cervical cancer cluster</p> <p>reliability</p> <p>Appalachian Region Los Angeles Texas Ohio River visual analytics analysis session SaTScan visualization significance uncertainty</p>   | <p>NCI - Visualization<br/>Robert Roth<br/>added March 06, 2008</p>                                 |
|  | <p><b>NCI Cervical Cancer Covariates Working Paper Draft</b></p> <p>This is the second draft of the NCI cervical cancer case study paper. My additions are in blue.</p> <p>Appalachian Region cervical cancer health care access covariates cancer determinants</p>   |   |
|  | <p><b>Available Determinant Variables for Covariate Analysis</b></p> <p>This is a listing of all variables available for the covariate analysis.</p>  |   |

# Search Module

welcome to the **G-EX Portal** the geovisual exploration portal

# Collaborate Module

## Screenshot #1 (Analysis Session 3-19-2008)



### Artifact Details

download

Project: NCI - Cervical Cancer Clustering

User: Robert Roth

added at 5:01 PM on March 10, 2008

00 prior views

US counties p-value SaTScan cervical cancer clustering

DESCRIPTION: This screenshot shows a display from the VIT mapping the p-value from SaTScan cervical cancer clustering using a nine-class choropleth map. We found the checkerboard pattern extremely interesting. That there this is this much variation is not odd, because the p-value must conform to the normal distribution (which must place a particular frequency of counties into each p-value interval). What is interesting is that the values are so disaggregated (not clustered).

### Comment on this Artifact

clustering

- RE: clustering
- RE: clustering

Subject: RE: clustering [reply](#) [start thread](#)

Posted by acrl81 on Wed Nov 11 2008 09:27:03 PM: why do you think there is so little clustering?

### Other Project Artifacts

displaying #15 of 27

[previous in series](#) [next in series](#)



*conceptual goal*

techniques that successfully support geovisual analytics

*implementational goal*

software that successfully implement these geovisual analytics techniques



hypothesis  
generation

benchmark tasks

sensemaking

error  
frequency

decision  
support

*utility*  
(usefulness)

ease of learning

*usability*  
(ease-of-use)

knowledge  
construction

error  
frequency

insight

subjective  
satisfaction

error  
severity

memorability

*goal: successful software*

# *iPod Shuffle*

- transparently usable
- limited utility



*goal: successful software*

# *RothPod Shuffle*

- poor usability
- expanded utility



*goal: successful software*

# useful, difficult to use

The screenshot displays a complex software interface with several panels:

- Parameters (Reruns):** Includes sliders for Cycle Length (14), Cycle Phase (2), and Cell Size (21). It has checkboxes for Count Guests, Outline Dates, Fill Seasons, and Outline Months.
- Parameters (Map):** Includes a City Scale (1.0) and checkboxes for Latitudes and Longitudes.
- Map:** A geographical map showing locations like Altoona, Roaring Spring, and Henrietta with various markers and lines.
- Tables:**
  - Hotels:** Lists hotels like Roaring Spring, PA and Rebersburg, PA with visit counts.
  - Guests:** Lists names like cornet\_sam-7 and forepaugh\_geo-7 with visit counts.
  - Residences:** Lists names like Livonia, PA and Altoona, PA with visit counts.
  - Visits:** A table with columns for Hotel, Guest, Residence, and Date.
  - Directory:** A table with columns for Name, Occupation, Address, Residence, Housing, and Notes.
  - Occupations:** A list of occupations like clerk, salesman, agent, owner, attorney, candy maker, and collector with associated counts.
- Repeat Visits:** A network diagram showing connections between nodes over time.
- Parameters (Reruns) Grid:** A large grid with columns 1-14 and rows representing time intervals from 1900.02.18 to 1900.11.25.

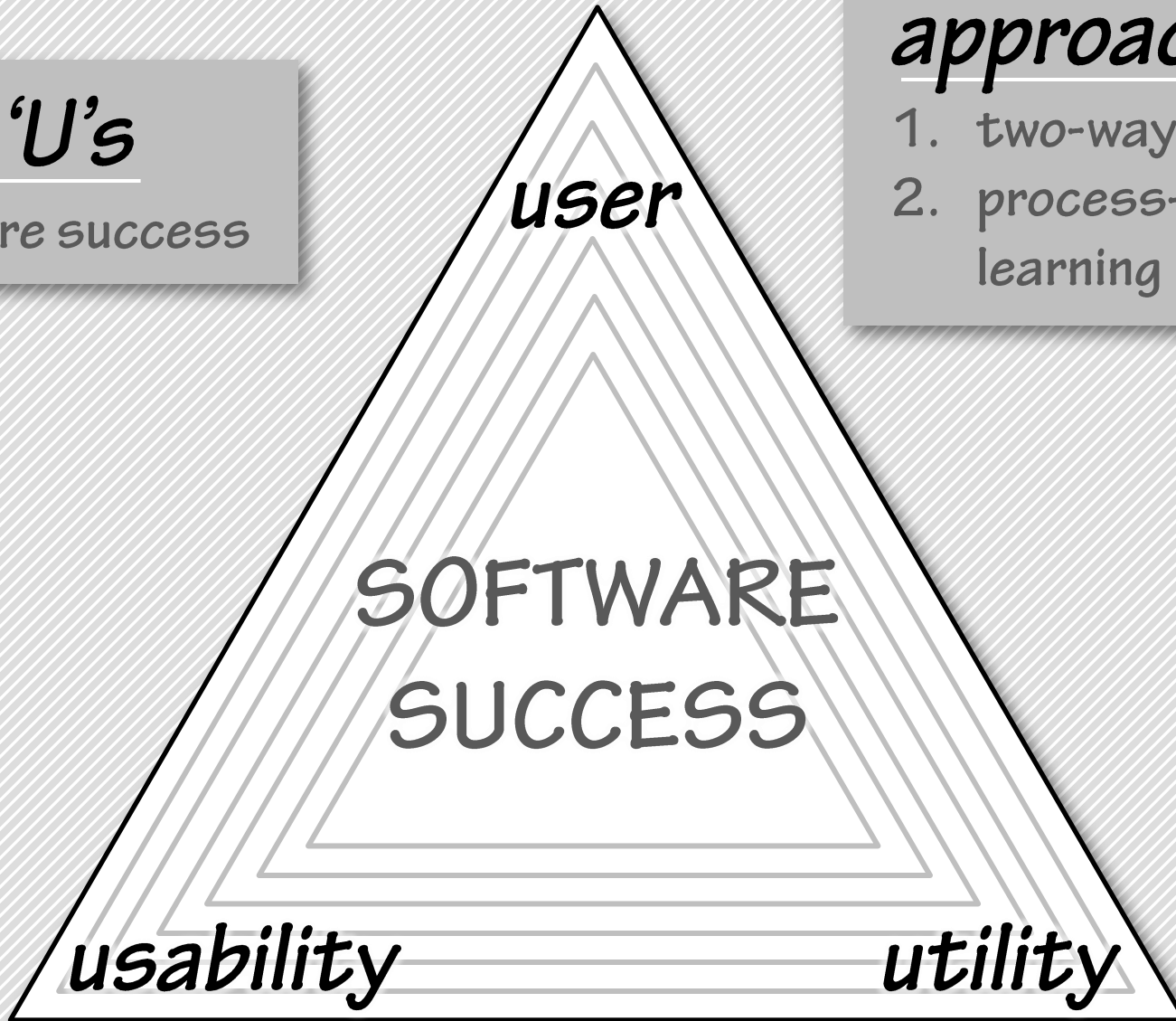


Weaver et al. (2007)

goal: successful software

## three 'U's

of software success

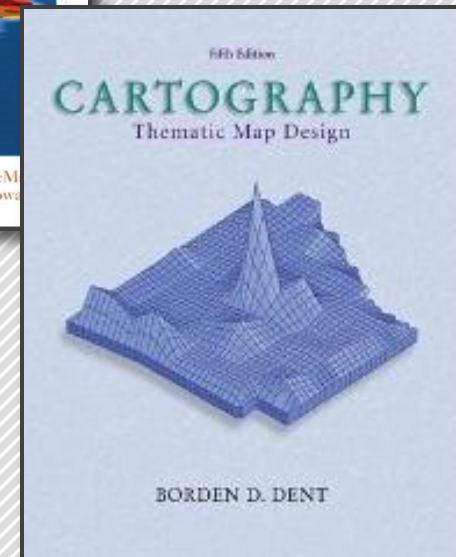
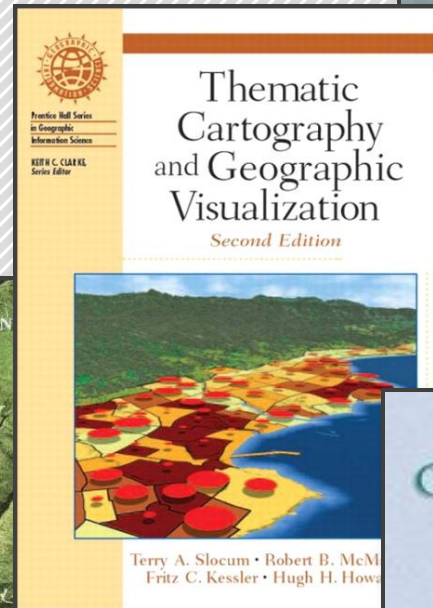
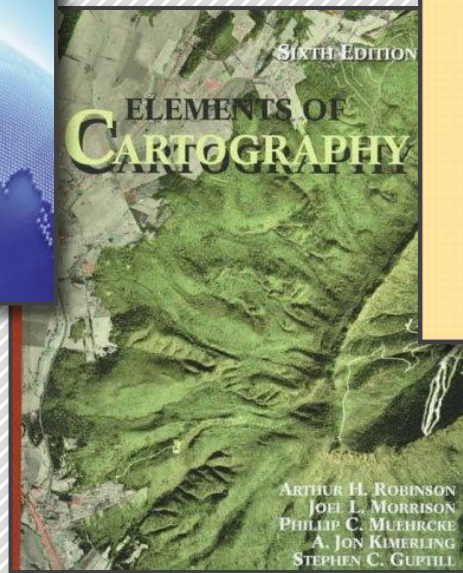
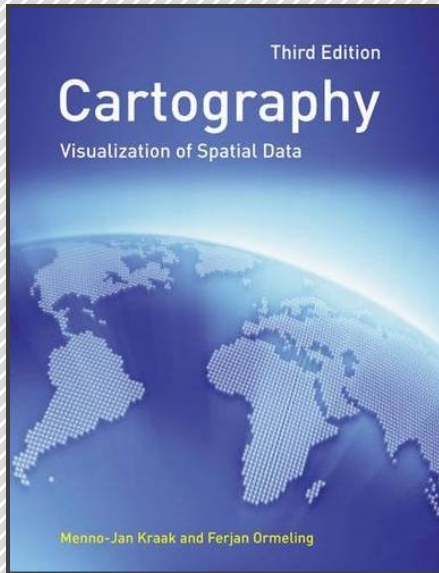
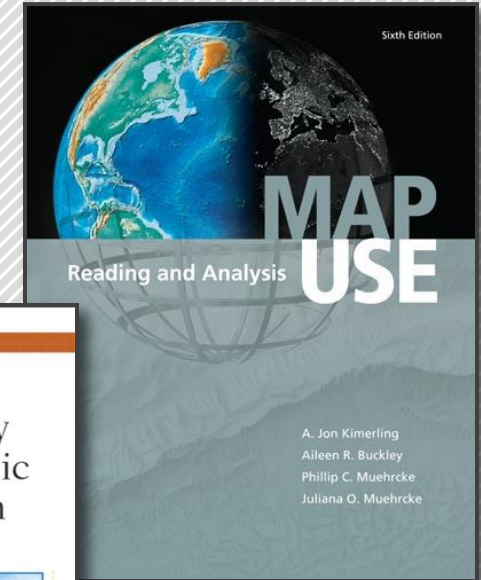


## approaches

1. two-way learning
2. process-oriented learning

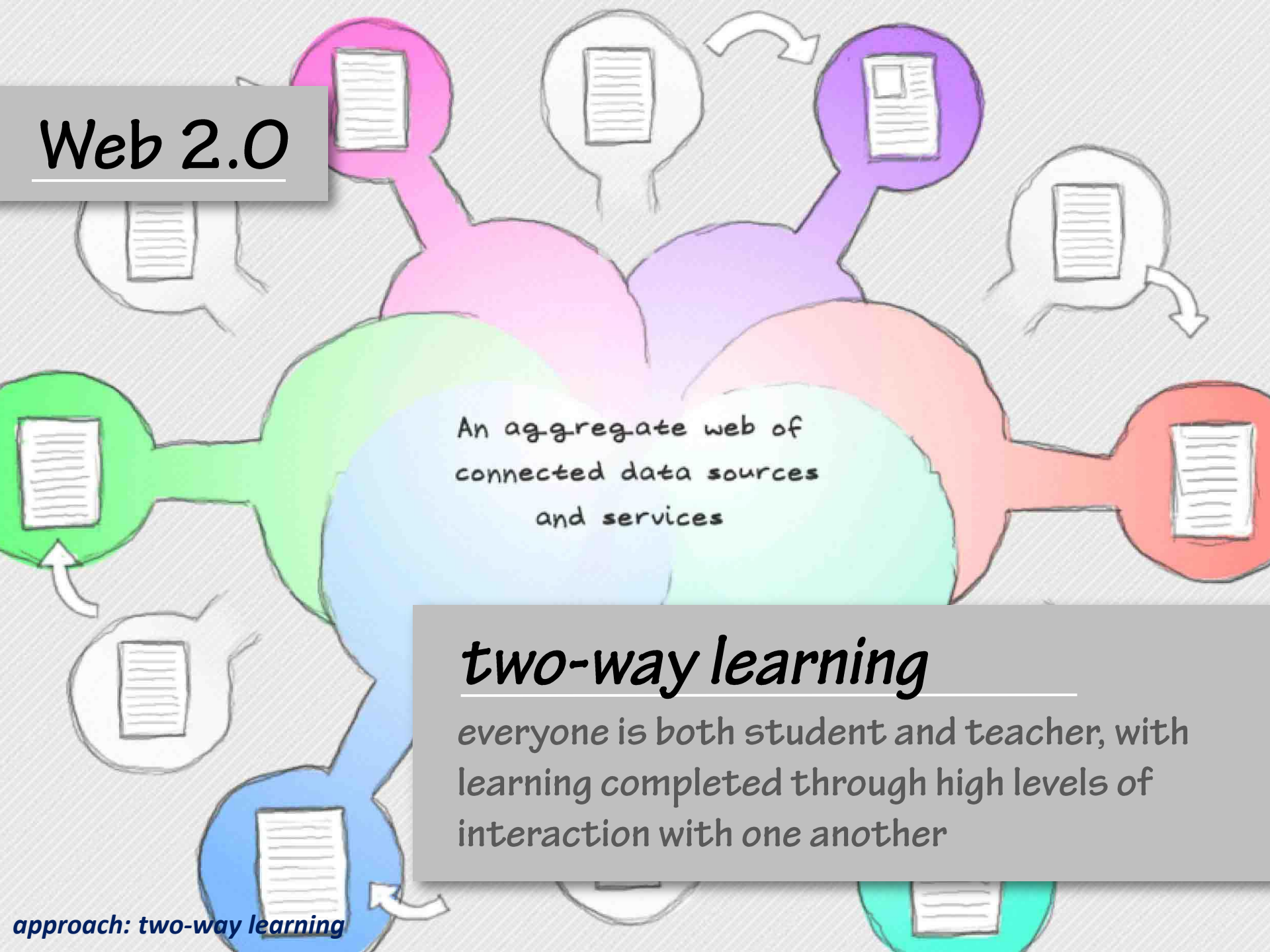
# one-way learning

one teacher, many students, little interaction



*approach: two-way learning*

# Web 2.0



An aggregate web of  
connected data sources  
and services

## *two-way learning*

everyone is both student and teacher, with  
learning completed through high levels of  
interaction with one another

*approach: two-way learning*



## Upload Analysis Artifact to the Repository

file  G-EX Search Demo.xmldescription 

This tutorial introduces the G-EX Portal Search module. The Search module allows users to search the library of existing learning materials, including: tutorials, multimedia demonstrations, example problems, and other training materials. The search capabilities incorporate artifact sorting, filtering by place/keyword/date, metadata, and creating artifact discussion threads.

### Information

title project user 

### Attribute/Content Tags

tags 

### Location/Place Tags

tags 

#### Select Consistent Place Tags Using the MeSH Geographic Hierarchy

- North America
  - Canada
  - Greenland
  - Mexico
  - United States
  - South America
- Antarctic Regions





# Learn Module

G-EX Portal

enter search term

search

reset search parameters

logout as reroth upload artifact about

G-EX Search Demo

welcome to the **G-EX Portal** the geospatial explanation portal

login upload artifact about



welcome to the **G-EX Portal** the geospatial explanation portal

login upload artifact about



navigate to the learn module

Artifact Details

download

Project: G-EX Portal

User: Robert Roth

added at 3:08 PM on November 13, 2009

2 prior views

United States G-EX Portal Search module Keyword Filtering Sorting

DESCRIPTION: This tutorial introduces the G-EX Portal Search module. The Search module allows users to search the library of existing learning materials, including: tutorials, multimedia demonstrations, example problems, and other training materials. The search capabilities incorporate artifact sorting, filtering by place/keyword/date, metadata, and creating artifact discussion threads.

Comment on this Artifact there are currently no discussion threads

Subject:  reply start thread

click on a thread to see comment

Other Project Artifacts displaying #6 of 6

previous in series



Via Toolkit, PDF views are useful for:

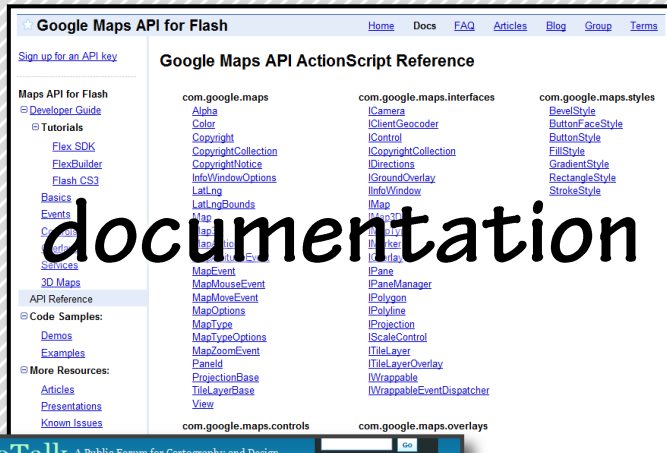
Viewing PDFs in G-EX

Support

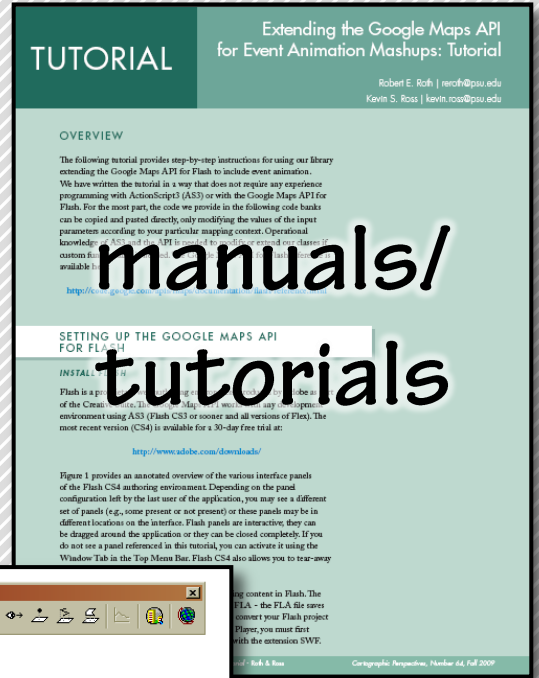
approach: two-way learning

# task-oriented learning

linear completion of learning modules



documentation



manuals/  
tutorials



discussion  
boards



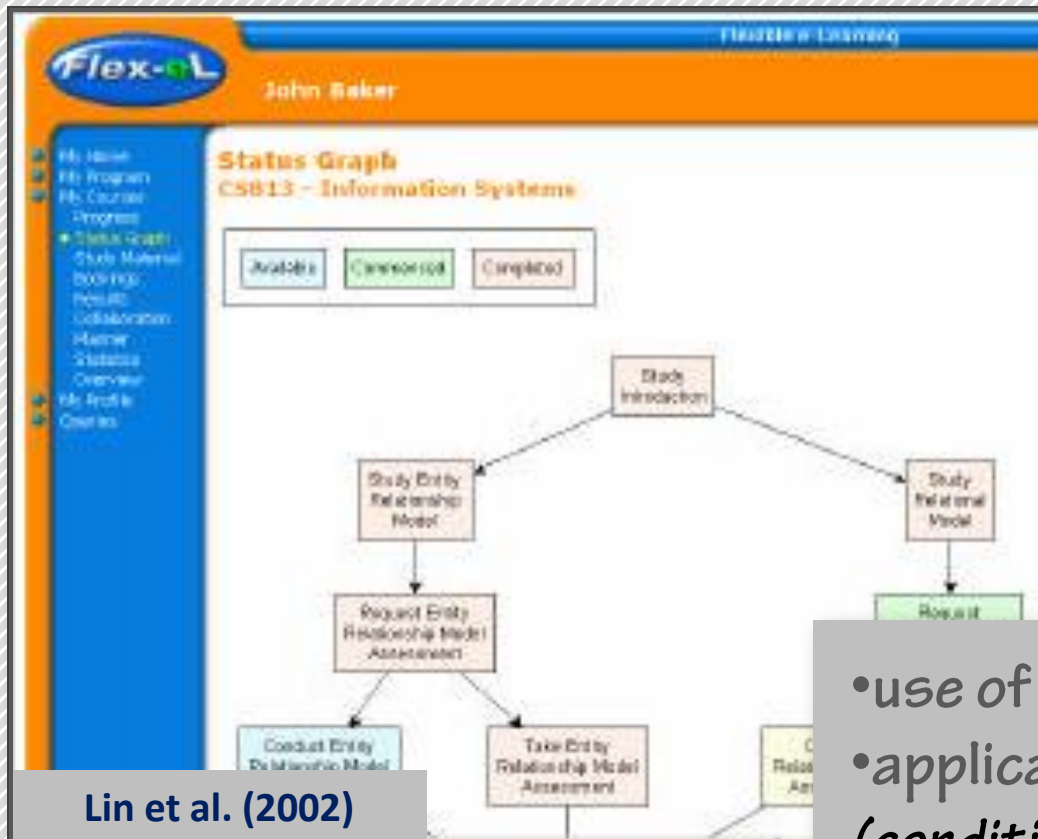
wizards

focus on the use of software  
(i.e., button clicking)

approach: process-oriented learning

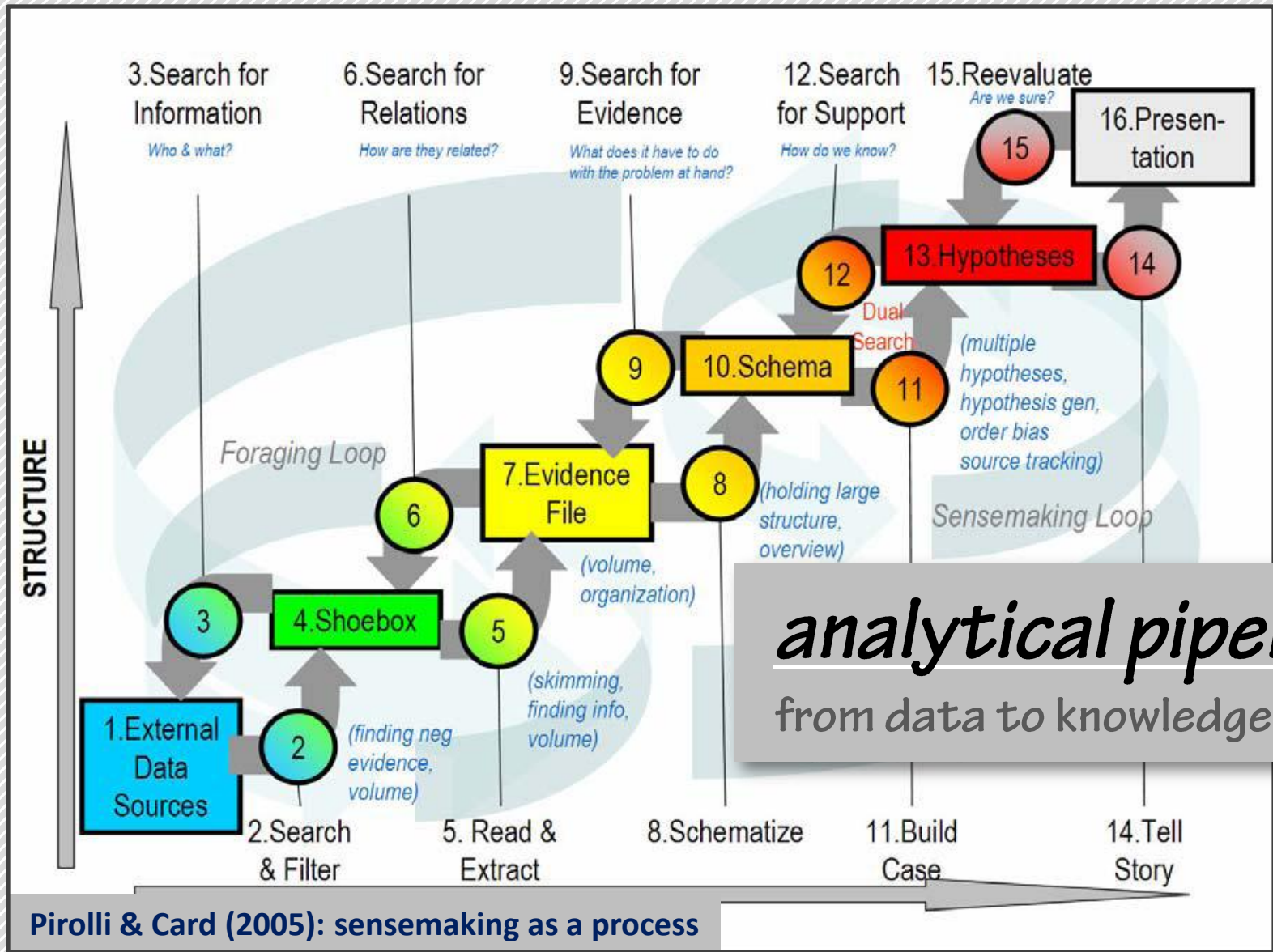
# *process-oriented learning*

conditioned and iterative completion of learning modules in the workflow representation

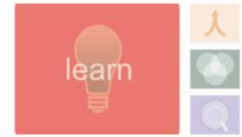


Lin et al. (2002)

- use of software (*the nodes*)
- application of software (*conditionals & connections*)

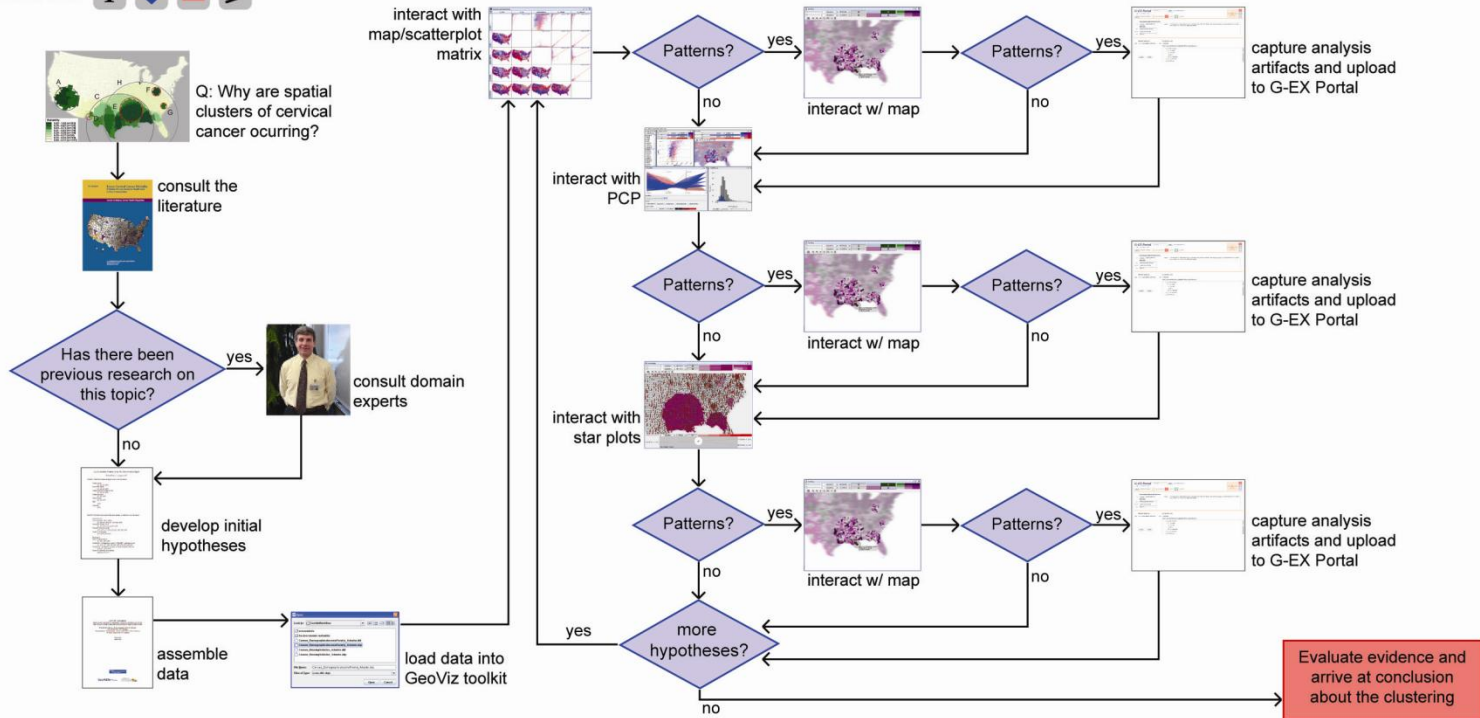


*approach: process-oriented learning*



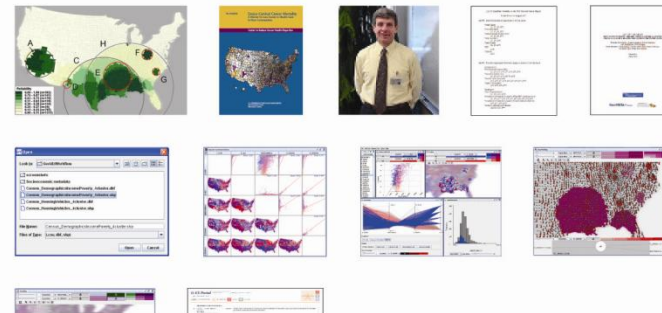
## Workflow: Cervical Cancer Clustering Covariates

Whiteboard Tools



Comment on this Workflow there are currently no discussion threads

### Lessons in this Workflow



*workflow*  
learning model

# Questions?

<http://www.geovista.psu.edu/G-EXPortal/>

## Further reading on the G-EX Portal:

- Robinson, AC, EL Koua, F Hardisty, J Chen, and AM MacEachren. 2007. The G-EX Portal: Web-Based Dissemination of Geovisual Analytic Results. In: *Proceedings of the ICA Commission on Visualization and Virtual Environments Workshop*. Helsinki, Finland.
- Roth, RE, AC Robinson, M Stryker, AM MacEachren, EJ Lengerich, and E Koua. 2008. Web-based Geovisualization and Geocollaboration: Applications to Public Health. In: *Proceedings of the 2008 Joint Statistical Meeting*. Denver, CO.
- Roth, RE, AM MacEachren, and CA McCabe. 2009. A Workflow Learning Model to Improve Geovisual Analytics Utility. In: *Proceedings of the International Cartographic Conference*. Santiago, Chile.
- Robinson, AC, RE Roth, and AM MacEachren. (accepted) Designing Web-Delivered Learning Materials for Geographic Visualization and Analysis in Public Health. *Health Informatics*.