GIS&T BoK PROJECT UPDATE

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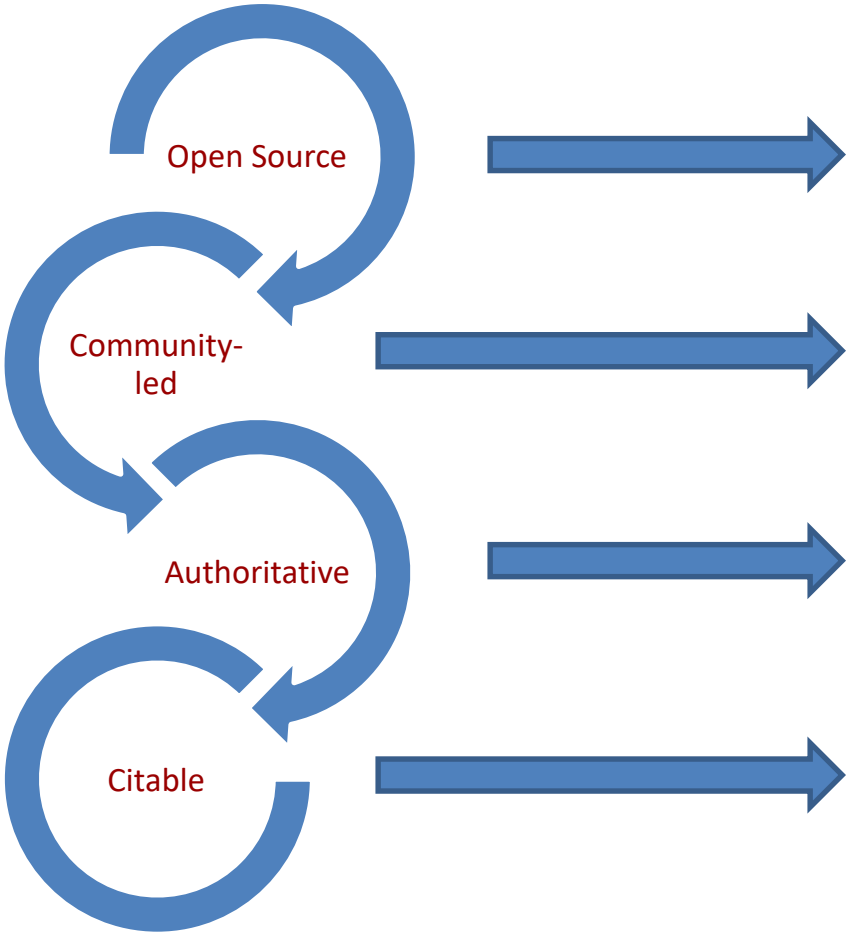
2006 GIS&T BoK

- BoK as a book is excellent for serving as an authoritative resource
- Difficult to update (impossible)
- Difficult to access (relatively speaking)
  - 10 knowledge areas
  - 73 units
  - 329 topics
  - 1,660 objectives

The alternative …



BoK as open data, accessible/transparent system

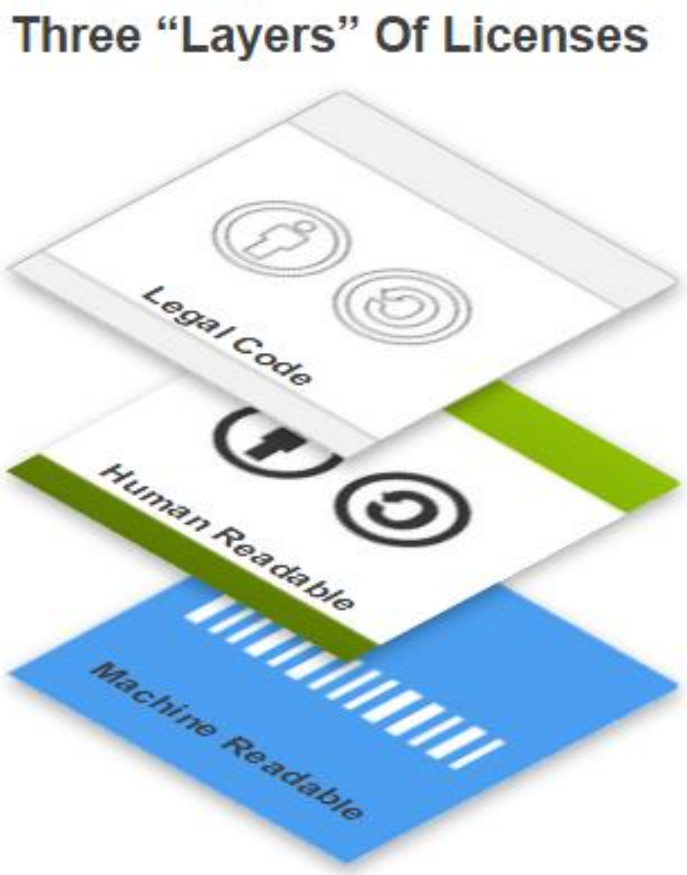
Individual contributions, group editing

Group vetting, peer reviewed

DOIs as ORCIDs?

Creating authoritative copy

- Currently exploring the combination of copyright registration and licensing that most effectively meets the needs of the organization and the contributors

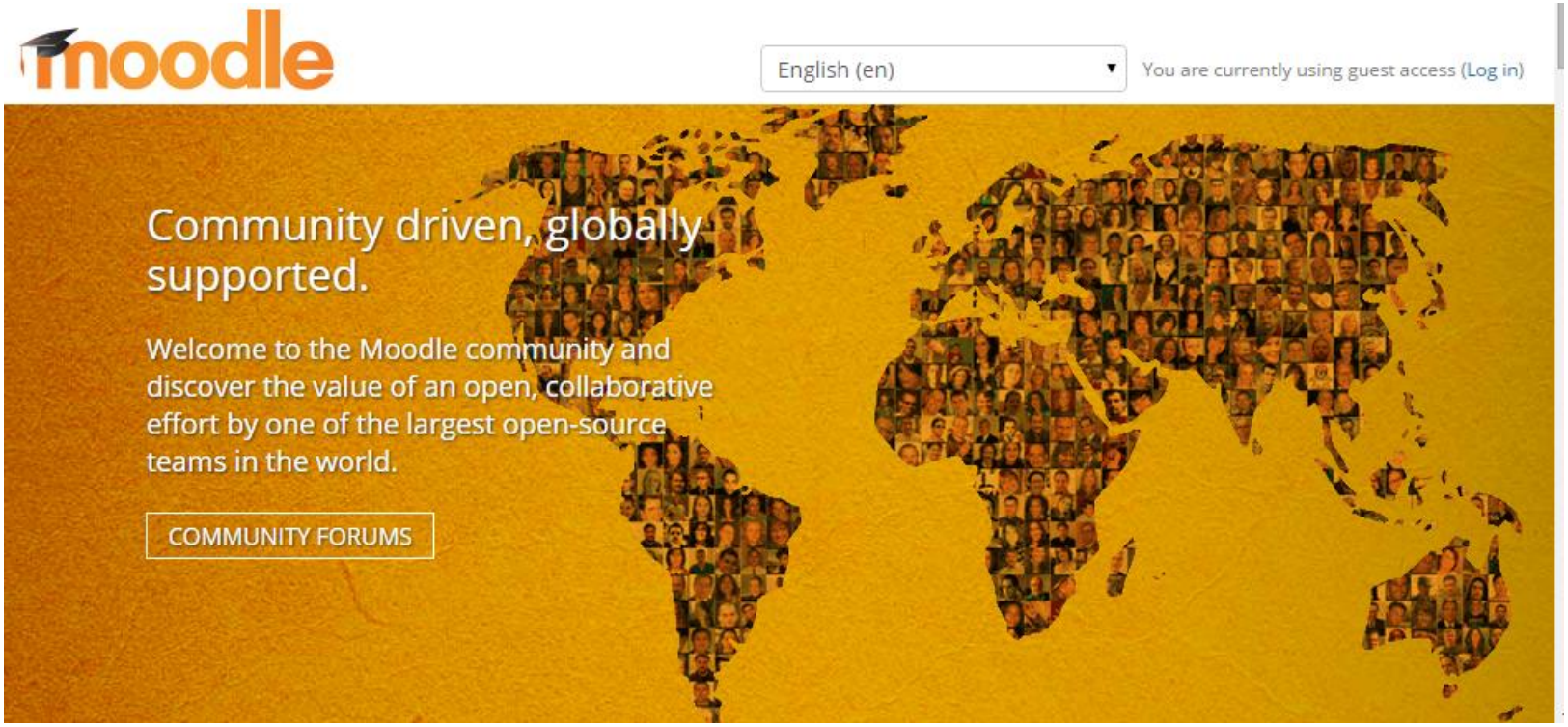


Source: http://creativecommons.org/licenses/

Creating an agile platform

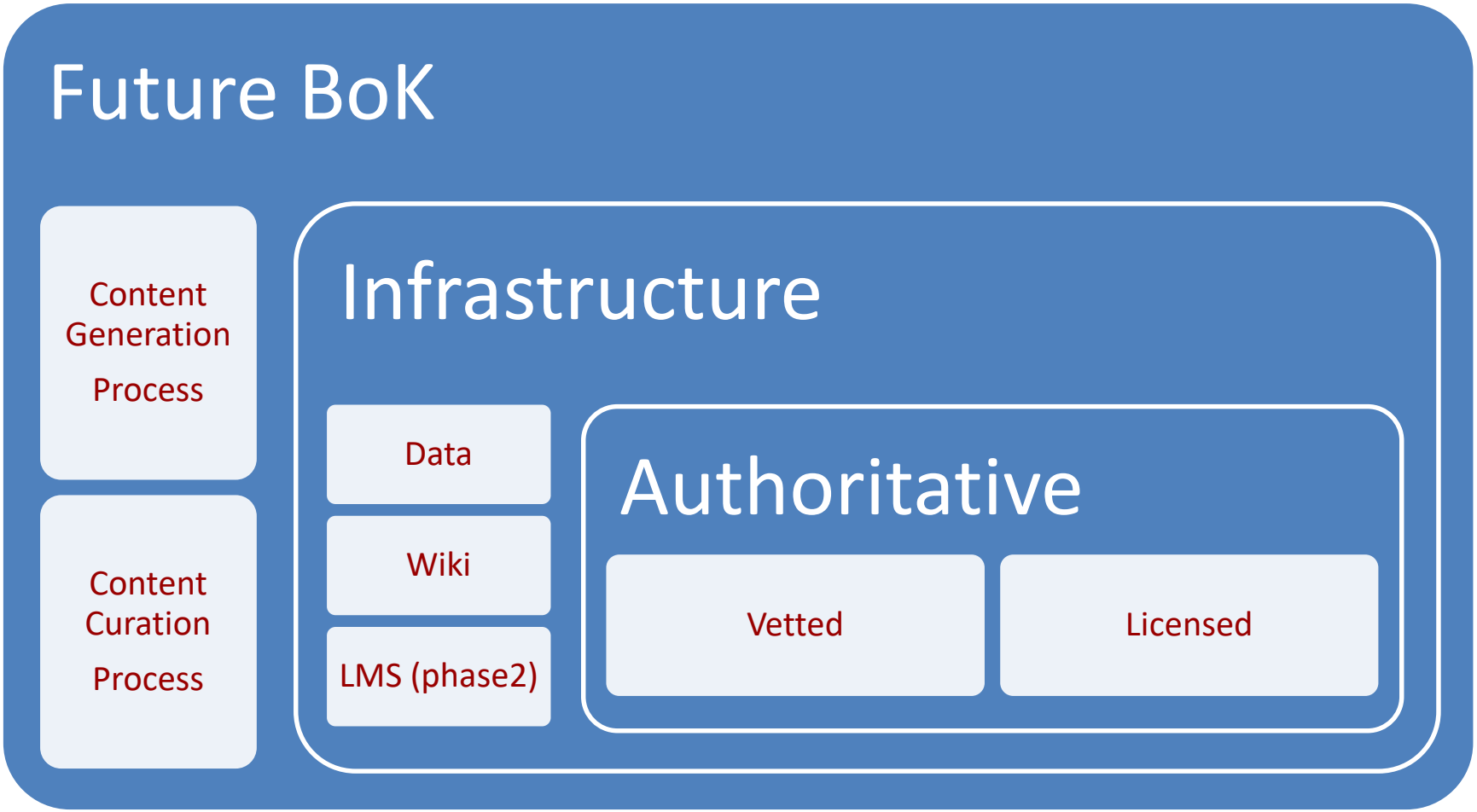
- MediaWiki is an open source platform that we will use to host the BoK content
- Easy to manage users for editing, but also open for easy access

Parallel resource



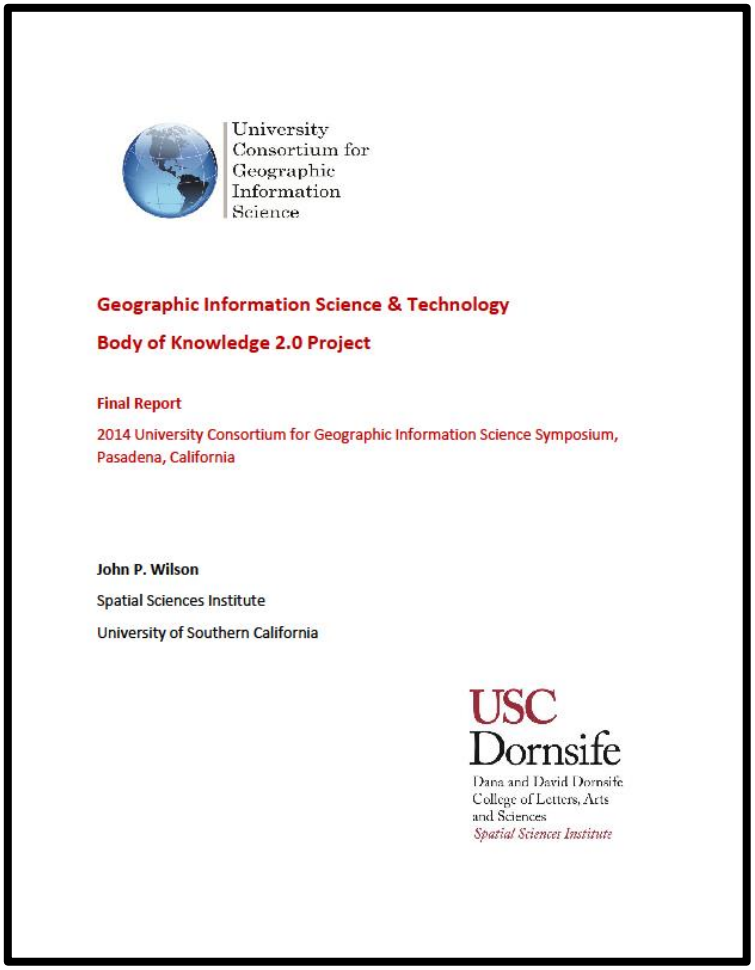
Once we get the wiki up and running, we would also like to create a parallel LMS resource to support the development and linking of learning material & related content. This will likely use Moodle, but options are open

The BoK Ecosystem – August launch



2014 Pasadena Meeting

- Two Qualtrics surveys
- Group discussions
  - Geospatial revolution, spatial thinking
  - Technology platforms, support & skills, spatial data acquisition & curation
  - Spatial modeling, analysis & visualization, outcomes, maps & services
  - Geospatial applications, emerging topics &trends
- Final report


University Consortium for Geographic Information Science

Geographic Information Science & Technology

Body of Knowledge 2.0 Project

Final Report

2014 University Consortium for Geographic Information Science Symposium, Pasadena, California

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University of Southern California

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BoK Steering Committee

- Ola Ahlqvist
- Sarah Battersby
- Michael Goodchild
- Diansheng Guo
- Rodney Jackson
- Krystoff Janowicz
- Joseph Kerski
- Werner Kuhn
- Wenwen Li
- Amy Lobben
- Marguerite Madden
- Jeremy Mennis
- David O'Sullivan
- Marco Painho
- Jane Read
- Doug Richardson
- Anthony Robinson
- Diana Sinton
- André Skupin
- Josef Strobl
- Lynn Usery
- Fahui Wang
- Shaowen Wang
- Nigel Waters
- Kenneth Yanow
- Xinyue Ye

Containers (1-5)

- **Guiding principles**
  - Spatial primitives, spatial turn, geospatial revolution
- **People power**
  - Human resources, professional development & support, project management
- **Computing platforms**
  - The cloud, servers, personal computers, mobile devices
- **Programming & customization**
  - Hadoop, Python
- **Data capture & acquisition**
  - GPS, remote sensing, volunteered geographic information

Containers (6-10)

- **Data management**
  - Organization, representation, storage
- **Data processing**
  - Analysis, modeling
- **Data display & dissemination**
  - Cartography, map production, visualization
- **Domain-specific applications**
  - Agriculture, hydrology, intelligence, location-based services, policing, real estate
- **Broader societal implications & concerns**
  - Professional ethics, privacy, public participation

Next steps – GIS&T BoK Steering Committee

- Project oversight
- **Recruiting & managing contributors**
- Editing existing content
- Generating new content

- **Go after low hanging fruit first**

Containers	Volunteers
Guiding principles	10
People power	3
Computing platforms	2
Programming & customization	1
Data capture & acquisition	5
Data management	1
Data processing	7
Data display & dissemination	7
Domain-specific applications	8
Broader societal concerns	5

Template …

Digital Terrain Modeling (2-8 bullets, 240 word limit)

- Methods and data sources used to generate Digital Elevation Models (DEMs) and calculate land surface parameters.
- These workflows typically start with data capture, continue with data pre-processing and DEM generation, and conclude with the calculation of one or more primary and secondary land surface parameters.
- There may be multiple sources of elevation data, including contours, spot heights, LiDAR and RADAR remote sensing datasets, and some preprocessing is nearly always required to produce the final DEMs.
- There are many subtleties involved in calculating the primary land surface parameters that are derived directly from DEMs without additional inputs and the two sets of secondary land surface parameters that are commonly used to model solar radiation and the accompanying interactions between the land surface and the atmosphere on the one hand and water flow and related surface processes on the other.
- The computed terrain attributes are frequently used to classify landforms and soils and as inputs for environmental models.
- There will inevitably be some errors embedded in the DEMs, so it is important to know how these may be propagated and carried forward in calculating various land surface parameters and the consequences of this state-of-affairs for the work at hand.

Which concepts/skills are prerequisites of this concept? (4-6 bullets, if appropriate)

1. Scale
2. Remotely sensed data
3. Raster data model
4. Vector data model
5. Triangulated irregular networks (TINs)
6. Error and uncertainty

For which concepts/skills should this concept be a prerequisite? (4-6 bullets, if appropriate)

1. Spatial modeling
2. Geological applications
3. Geomorphic applications
4. Hydrological applications
5. Ecological applications
6. Soils applications

Sample Software Tools (4-6 examples; if appropriate)

1. ArcGIS (http://www.esri.com)
2. GRASS – Geographic Resources Analysis Support System (http://grass.osgeo.org)
3. LandSerf (http:// www.landserf.org)
4. SAGA – System for Automated Geoscientific Analyses (http://www.saga-gis.uni-goettingen.de)
5. TAS – Terrain Analysis System (http://sed.manchester.ac.uk/geography/research/tas/)

Template (2)

Digital Terrain Modeling (cont.)

Key References (4-6 references)

1. Deng, Y.X. (2007) New trends in digital terrain analysis: Landform definition, representation, and classification. *Progress in Physical Geography* 31: 405-419
2. Hengl, T. and Reuter, H.I. (eds) (2009) *Geomorphometry: Concepts, Software, Applications.* Amsterdam, Elsevier
3. Mitášová, H., Mitas, L., Brown, W.M., Gerdes, D.P., Kosinovsky, I., and Baker, T. (1995) Modeling spatially and temporally distributed phenomena: new methods and tools for GRASS GIS. *International Journal of Geographical Information Systems* 9: 433-446
4. Wilson, J.P. (2011) Digital terrain modeling. *Geomorphology* 137: 107-121
5. Wilson, J.P. and Bishop, M.P. (2013) Geomorphometry. In Shroder, J.F. (ed) *Treatise in Geomorphology: Volume 3, Remote Sensing and GIScience in Geomorphology.* San Diego, CA, Academic Press: 162-186
6. Zhou, Q., Lees, B.G., and Tang, G.A. (eds) (2008) *Advances in Digital Terrain Analysis.* Berlin, Springer Lecture Notes in Geoinformation and Cartography

Version Notes (Sequential list)

Proposed by John Wilson, University of Southern California, 3/18/14

Revised by John Wilson, University of Southern California, 2/18/15

Template …

Spatial Weights (2-8 bullets, 240 word limit)

- Methods (contiguity-based weights, distance-based weights, kernel weights) and data sources (polygon-based files, point files, data tables) used to generate weights matrices.
- The output of spatial weights operations are a weight matrix in which a cell value represents the spatial relation between feature 1 (row index) and feature j (column index).
- The weights data can be encoded in a GAL or SWT format.
- Spatial weights, which provide spatial relationships between features at different locations, are a key component in many spatial analysis methods and their generation often constitutes the first step in a spatial analysis workflow.
- There workflows usually need the support of a provenance module that can trace the data processing flow and record execution metadata in an interoperable format to ensure replicability.

Which concepts/skills are prerequisites of this concept? (4-6 bullets, if appropriate)

1. Vector data model
2. Spatial dependence
3. Contiguity
4. Transformation
5. Standardization / normalization

For which concepts/skills should this concept be a prerequisite? (4-6 bullets, if appropriate)

1. Spatial autocorrelation
2. Spatial regression
3. Spatial analytical workbench
4. Spatial statistics
5. Spatial econometrics

Sample Software Tools (4-6 examples; if appropriate)

ArcGIS (http://www.esri.com/software/arcgis)
GeoDa (https://geodacenter.asu.edu/software/downloads)
PySAL (http://pysal.readtheocs.org/en/v1.7/)
Spdep (http://cran.r-project.org/web/packages/spdep/index.html)

Template (2)

Spatial Weights (cont.)

Key References (4-6 references)

1. Anselin, L. (1988) *Spatial Econometrics: Methods and Models.* Berlin, Springer-Verlag
2. Anselin, L. (2001) Spatial econometrics. In Baltagi, B.H. (ed.) *A Companion to Theoretical Econometrics.* Oxford, UK, Blackwell Publishers: 310-330
3. Anselin, L., Rey, S.J., and Li, W. (2014) Metadata and provenance for spatial analysis" The case of spatial weights. *International Journal of Geographical Information Systems* 28: 2261-2280
4. Rey, S.J. and Anselin, L. (2010) PySAL: A Python library of spatial analytical methods. In Fischer, M.M. and Arthur Getis, A. (eds.) *Handbook of Applied Spatial Analysis.* Berlin, Springer: 175-193

Version Notes (Sequential list)

Proposed by Wenwen Li, Arizona State University, 11/17/14

Revised by John Wilson, University of Southern California, 2/18/15

Call to action …

Become a contributor

Look for launch of wiki in August

Look for updates and status reports on UCGIS website

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