Mapping the UTBIOME

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Motivation and Objectives

• Engage UT community in collection and analysis of environmental samples.
• Develop an interactive mapping platform and data portal for citizens and researchers.
• Establish framework to support sustainability and health initiatives at UT and elsewhere
UT “A living Laboratory”

UT campus as a “living” laboratory to collect environmental data.
Map the communities of microbes living in the air and water around us.
Provide a platform to share and collaborate.
Sampling Campaigns

Classroom study

Waller creek

UT AUSTIN
• > 250 students involved
• CSE, Environmental Science Institute, School of Nursing, Sequencing Center, Integrative Biology

Battle Hall study

Forty acres
Sample tracking system

1. Prepare Google form based on RDP MIMARKS
2. Prepare Qrcode
3. Prepare Sampling kits
4. Scan the sampling kits
5. Submit Google form

Submit Google form
Data Curation

• Data curation is done in steps
  – Gather the responses from Google forms
  – Check for quality
  – Arrange the data in a pre-decided format
  – Save the data as *.json, and *.csv files
  – Make map services for features and publish using ArcGIS server
Data Challenges

• Spatiotemporal data sets
• Data hierarchy and meta data representation was not simple.
• Some locations had time series collections, while others were single time periods.
• Sampling locations involved both outdoor (e.g. creek) and indoor locations (e.g. levels of buildings)
Meta data organization

- **Sampling locations**
  - **Outdoor**
    - time series data
      - Multiple variables
    - static data
      - Waller creek cross sections
  - **Indoor**
    - static data
      - Class room study

- A tree structure was implemented to allow users to traverse through the data per sampling location.

- The tree structure is created for different types of sampling types within a *.json file and displayed when clicked on the feature.
Interactive Mapping Platform

- The interactive mapping platform was built using HTML5, CSS3 and JavaScript.
- We used ArcGIS API for JavaScript, dojo toolkit in combination with HTML5 and CSS3 where necessary.

https://developers.arcgis.com/javascript/
http://fortawesome.github.io/Font-Awesome/
http://dojotoolkit.org/
http://fortawesome.github.io/Font-Awesome/
UTBIOME – Map components

http://crwr-utbiome.austin.utexas.edu/utb_webapp/utbiome.html
UTBIOME MAP components -1
For single time series, a pop up dialog was constructed to hold the premade images.
What’s interesting: Biome spheres
UTBIOME – Image Gallery

Image light box

Flag showing image location
UTBIOME – 3D

• The 3D buildings were obtained from City of Austin as KML files. 

• The KML files were converted into Multipatch objects using ArcGIS desktop.

• The lidar elevation raster was acquired by Mandli communications and made available to UT Austin students and faculty as part of the Digital campus initiative.

• The 3D scene was created in ArcScene and was converted to a 3D web scene using the export to 3D web scene Geo processing tool. 
  http://downloads.esri.com/support/whitepapers/ao_/J10223_Exporting_ArcScene_Docs_to_3D_Web_Scene.pdf
UTBIOME in 3D

http://www.arcgis.com/apps/CEWebViewer/viewer.html?3dWebScene=4cdc5ee7aa0f42bfa3abbc2c91cc204e
Rapid advances in sequencing technology have made it possible to investigate the microbiome that surrounds us in unprecedented depth. While much attention has focused recently on the human microbiome, the bacterial and fungal microbial community that surrounds us is equally as important. Indeed, we are now using next generation techniques to identify the microorganisms present in our drinking water, in the air we breathe and in the surface water and soil surrounding us.

While the initial platform is being developed to map the microbiome and associated environmental data collected from across campus, we envision broadening this platform to include a variety of sustainability, energy, and water-related data. Stay tuned for updates as we continue to add to this interactive map and work with collaborators across campus and beyond. If you are interested in adding your data to the map, please contact Dr. Kinney or Dr. Passalacqua.
UTBIOME Data

- The DNA sequencing data is available on request. All other environmental data is available for download in the Maps page.
UTBIOME - Social Media

Twitter.com @UTBiome

Facebook.com/UTBiome

Blog in Wikis.utexas.edu @UTBiome
UTBIOME - Team

http://crwr-utbiome.austin.utexas.edu/utb_webapp/utbiometeam.html

Hello From:
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Conclusion and Future

- Expand Engagement Across Campus and Beyond to City of Austin and other Campuses – Partners?
- Bridge Gap between GIS framework and BIM framework with visualization tools.
- Extend Scope to Map Other Sustainability, Energy and Health Metrics.