

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



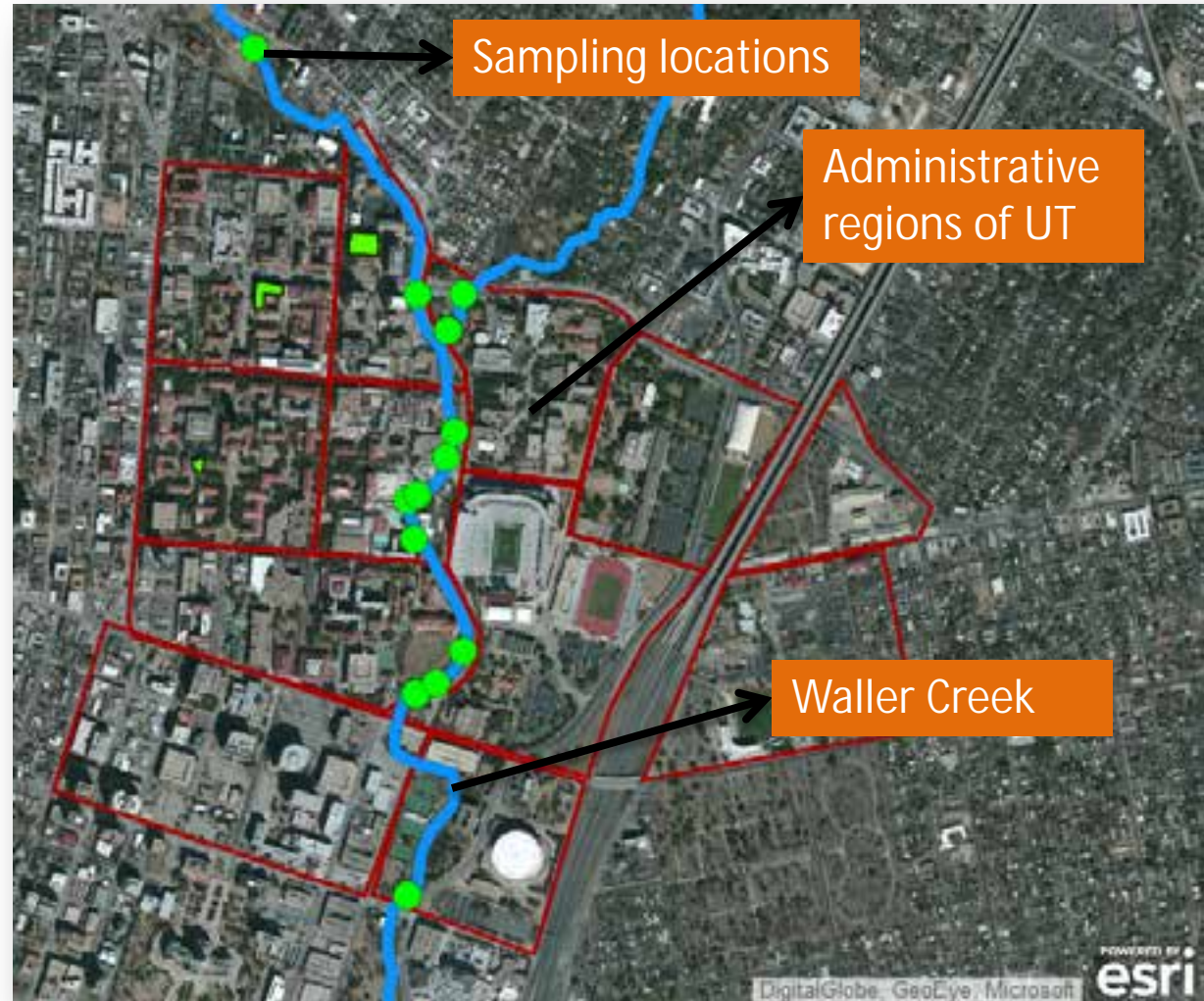


UT "A living Laboratory"

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



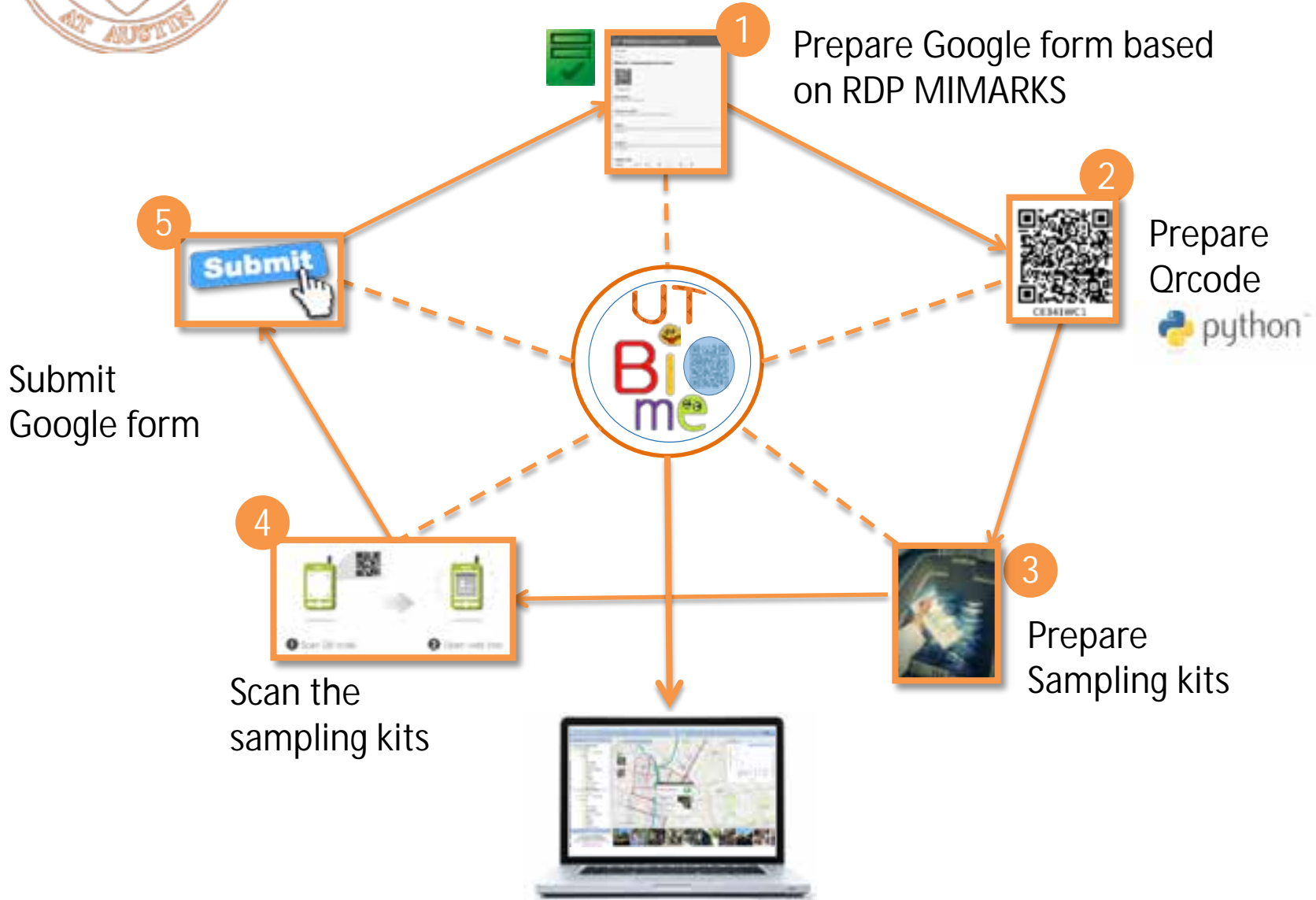
Forty acres

Battle Hall study





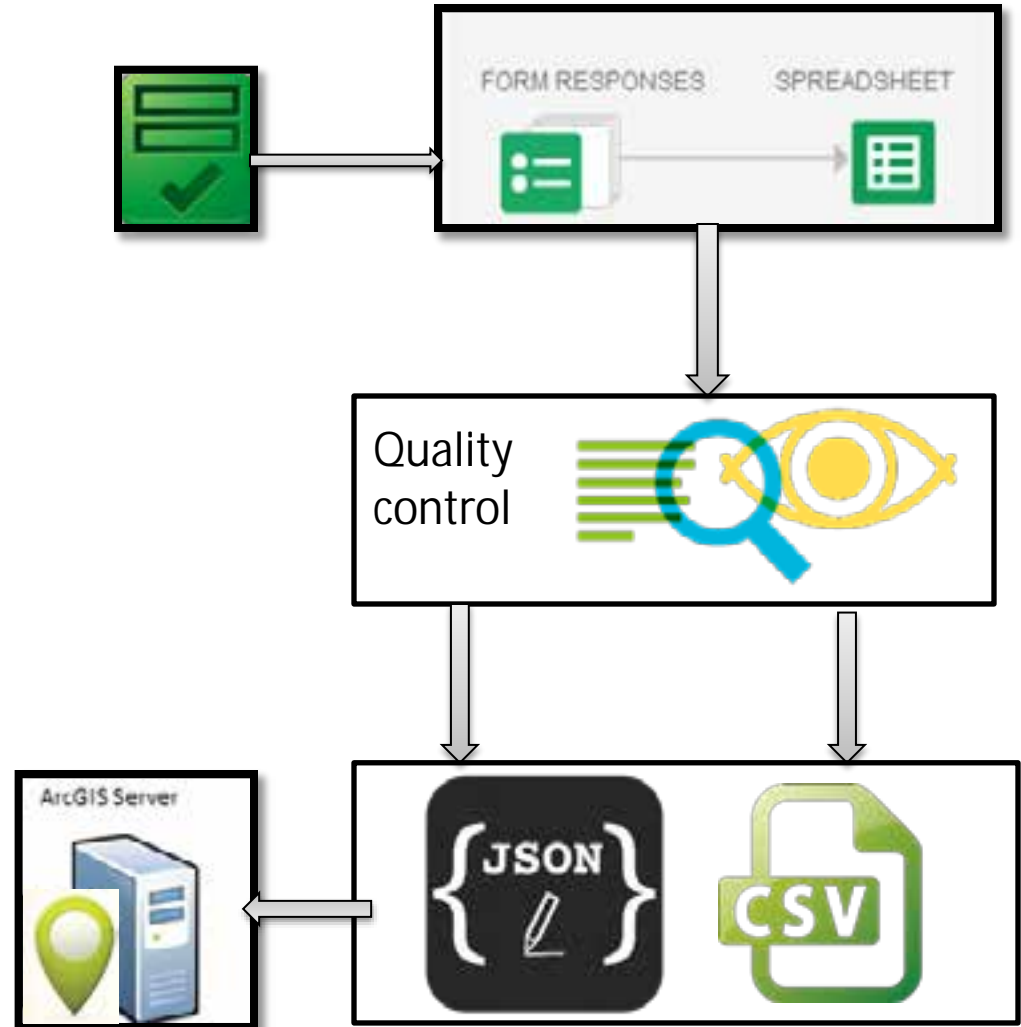
Sample tracking system





Data Curation

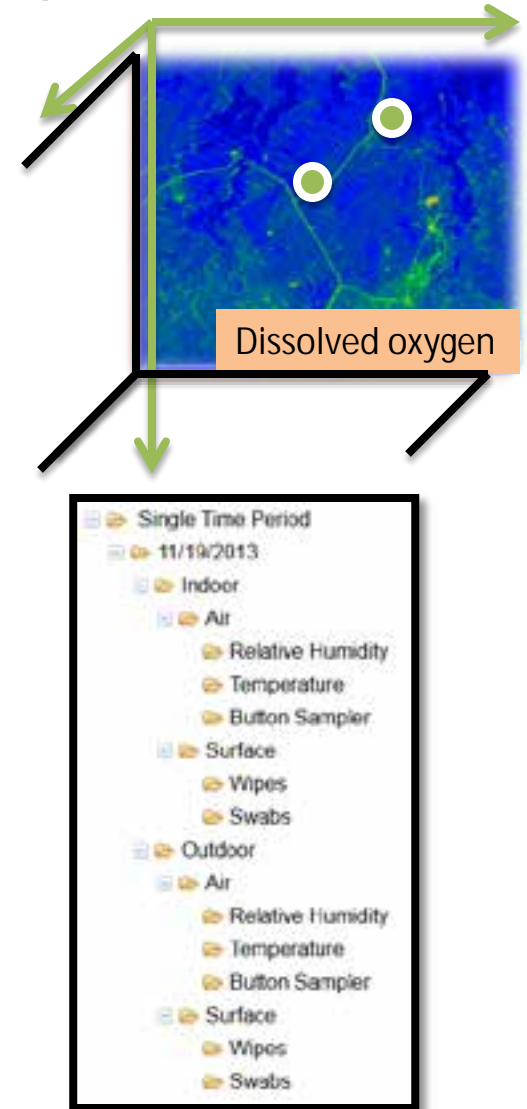
- Data curation is done in steps
 - Gather the responses from Google forms
 - Check for quality
 - Arrange the data in a pre-decided format
 - Save the data as *.json, and *.csv files
 - Make map services for features and publish using ArcGIS server





Data Challenges

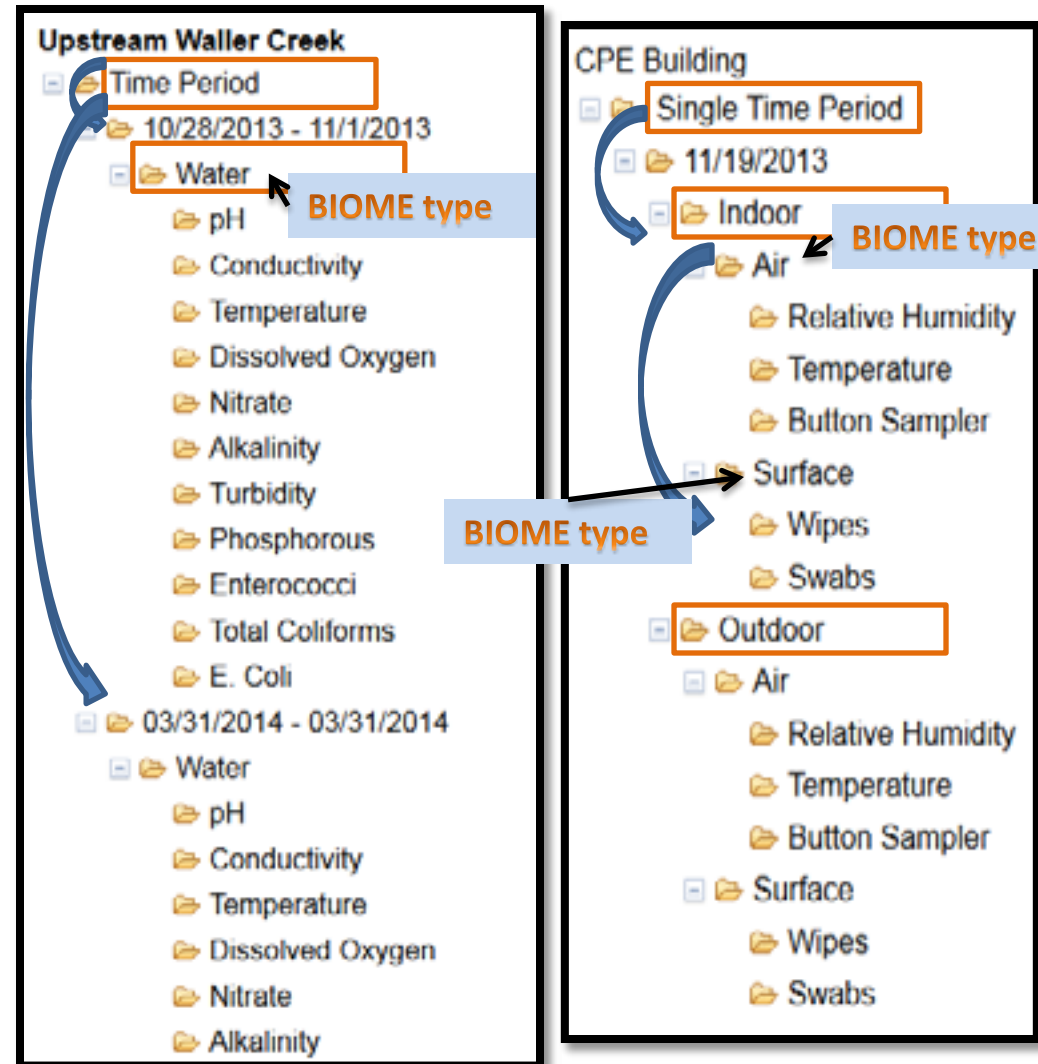
- Spatiotemporal data sets
- Data hierarchy and meta data representation was not simple.
- Some locations had time series collections, while others were single time periods.
- Sampling locations involved both outdoor (e.g. creek) and indoor locations (e.g. levels of buildings)





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 traverse through the data per sampling location.
- The tree structure is created for different type 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.



ArcGIS API for JavaScript

<https://developers.arcgis.com/javascript/>

dojo
toolkit

<http://dojotoolkit.org/>

Font Awesome 3.2

<http://fontawesome.github.io/Font-Awesome/>

```
<link rel="stylesheet" href="http://js.arcgis.com/3.9/js/esri/css/esri.css">  
<script src="http://js.arcgis.com/3.9/"></script>
```



UTBIOME – Map components

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

The screenshot shows the UTBIOME web application interface. The browser address bar displays the URL: crwr-utbiome.austin.utexas.edu/utb_webapp/utbiome.html. The page header includes navigation links: PROJECT, TEAM, BLOG, and UET. The main content area features a map of the University of Texas at Austin campus, overlaid with a red boundary and green data points. A sidebar on the left contains an 'Explore' section with instructions and a '3D-MAP' button. A 'Dashboard' button is located in the top right corner. A 'Contact' section at the bottom left lists the project team members and funding information. A gallery of images is shown at the bottom right.

1 Explore

- Click on Features in the Map to explore them.
- Some Features will have timeseries of data while others are a single point in time.
- Explore the pH, conductivity tabs to get a sense of the spatial variability of these variables in UT-BIOME
- Click on the 3D map to explore UT in 3D

2 Contact

Kateri Koney-Paula Passalacqua
Juan Pedro Maestas, Harish Sampreddy
The project is funded by the Langham Innovation Fund for Technology (LIFT) (2013-2014)
kpaula@crwr.utexas.edu

3 Dashboard

4 3D-MAP

5 Home Who's Involved

6

7



UTBIOME MAP components - 1

The screenshot shows the UTBIOME MAP web application interface. The browser address bar displays `cnwr-utbiome.austin.utexas.edu/utbi_webapp/utbiome.html`. The page title is "UT BIOME MAP".

Callout 1: A pop-up window titled "Station: Upstream, Waller Creek" is centered over a map. It contains the text "Outdoor sampling site", "Latitude: 30.288°", "Longitude: -97.733°", and "The samples were collected by students of class CE341: Intro to Environmental Engr". A green download icon is visible in the top right corner of the pop-up.

Callout 2: A sidebar on the left titled "Explore" lists various parameters for "Upstream Waller Creek". The "E. Coli" parameter is highlighted in blue. The sidebar also shows time periods: "10/28/2013 - 11/1/2013" and "03/31/2014 - 03/31/2014".

Callout 3: A "Dashboard" window on the right displays a scatter plot of "E. Coli MPN/100ml" versus "Time". The plot shows data points for various times of day. A "Download E. Coli data" link is located in the top right corner of the dashboard.

Table 1: E. Coli MPN/100ml vs Time

Time	E. Coli MPN/100ml
7:00 AM	12
8:00 AM	10
9:00 AM	10
10:00 AM	10
11:00 AM	8
12:00 PM	6
1:00 PM	5
2:00 PM	4
3:00 PM	4
4:00 PM	3
5:00 PM	3
6:00 PM	2
7:00 PM	2

Table 2: Contact Information

Name	Role		
Kerry Kinney	Paola Passalacqua	Juan Pedro Maestre	Meriah Sanyreddy

Text: This project is funded by the Longhorn expansion Fund for Technology (LFT) (2013-2014).
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UTBIOME Map components -2

The screenshot displays the UTBIOME web application interface. On the left, a sidebar menu is visible, with the 'Wipes' option under the 'Indoor' category highlighted. A red circle with the number '2' is placed next to this menu. The main map area shows a city street grid with a red circle and the number '1' over a specific location. A pop-up dialog box is open over this location, titled 'Building: CPE building', and contains text about sampling sites and a photo of a classroom. A red circle with the number '3' is placed over the 'Wipes data analysis' window on the right, which features a pie chart and a list of categories. At the bottom of the page, there is a blue text box with the following text:

For single time series , a pop up dialog was constructed to hold the premade images.



What's interesting: Biome spheres

UT BIOME - Maps

cwr.utbiome.austin.utexas.edu/utb_webapp/utbiome.html

PROJECT TEAM BLOG LIST

UT BIOME MAPS

Home What's Interesting Dashboard

Explore

Interesting Facts!

- Students from the Air Pollution Engineering Class collected over 50 samples to assess how the environment in their classroom differed from the environment outside their classroom
- Surface, air and dust samples were collected from a classroom, the hallway as well as from the patio outside the building. In addition, classroom surfaces (desks, chairs, door handles) were wiped with a collection cloth and analyzed to identify bacteria present.
- When the classroom is occupied there is a much higher concentration of fine particles in the air than when the classroom is empty. This means that walking in a room kicks up fine dust from

Contact

Kerry Kerney, Paola Pissalacova, Juan Pedro Meastro, Hannah Dangreddy

This project is funded by the Langhorne Innovation Fund for Technology (LIFT) (2013-2014)

@FWRU-UTAU/UTBN 2014-2015

Biome spheres

What is interesting about this biome sphere...

Zoom To

esri



UTBIOME – Image Gallery

The screenshot shows the UTBIOME web application interface. On the left, there is a sidebar with a "Features" section containing a list of instructions:

- Click on Features in the Map to explore them.
- Some Features will have timeseries of data while others are a single point in time.
- Explore the pH, conductivity tabs to get a sense of the spatial variability of these variables in UT-BIOME.
- Click on the 3D map to explore IJT in 3D.

Below the list is a "Credits" section with the following text:

Henry Herrera, Paolo Pataaleague,
Javier Pardo-Masave, Heish Sangretho
This project is funded by the Langhorne Innovation
Fund for Technology (FFD0132014)
© UTBIOME/UT AUSTIN 2016-2018

The main content area displays a 3D map of the UTBIOME site. A yellow circle highlights a red flag on the map, with a callout box containing the text "Flag showing image location".

Overlaid on the map is a gallery of six images showing various activities:

- Top-left: A chalkboard with "CE339E" written on it and a table with many small white cards.
- Top-right: A man in a purple shirt and a woman in a blue shirt looking at a device.
- Middle-right: A woman in a pink shirt kneeling on the floor, working with a wooden structure.
- Bottom-left: A woman in an orange hoodie working at a table.
- Bottom-right: A man in a blue shirt crouching on the floor, looking at a device.

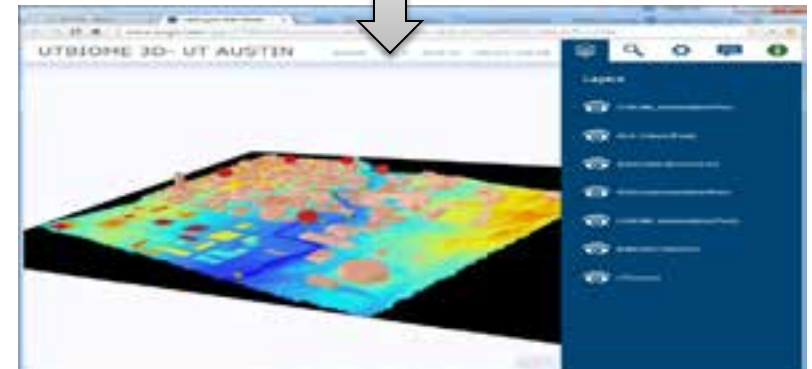
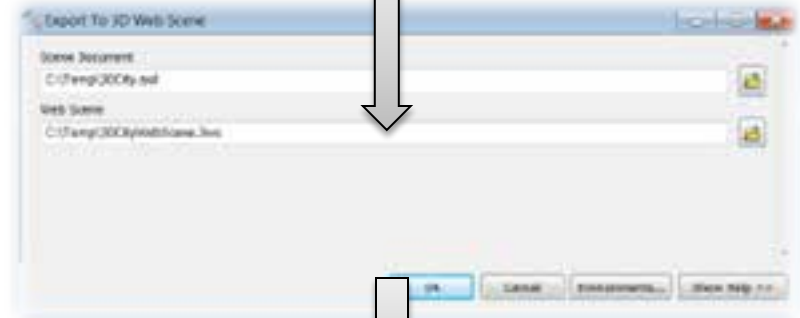
A callout box labeled "Image light box" is positioned over the bottom-left image.

At the bottom of the page, there is a footer with the URL: csw.utbiome.austin.utexas.edu/utb_webapp/images/2016_phototour.jpg



UTBIOME – 3D

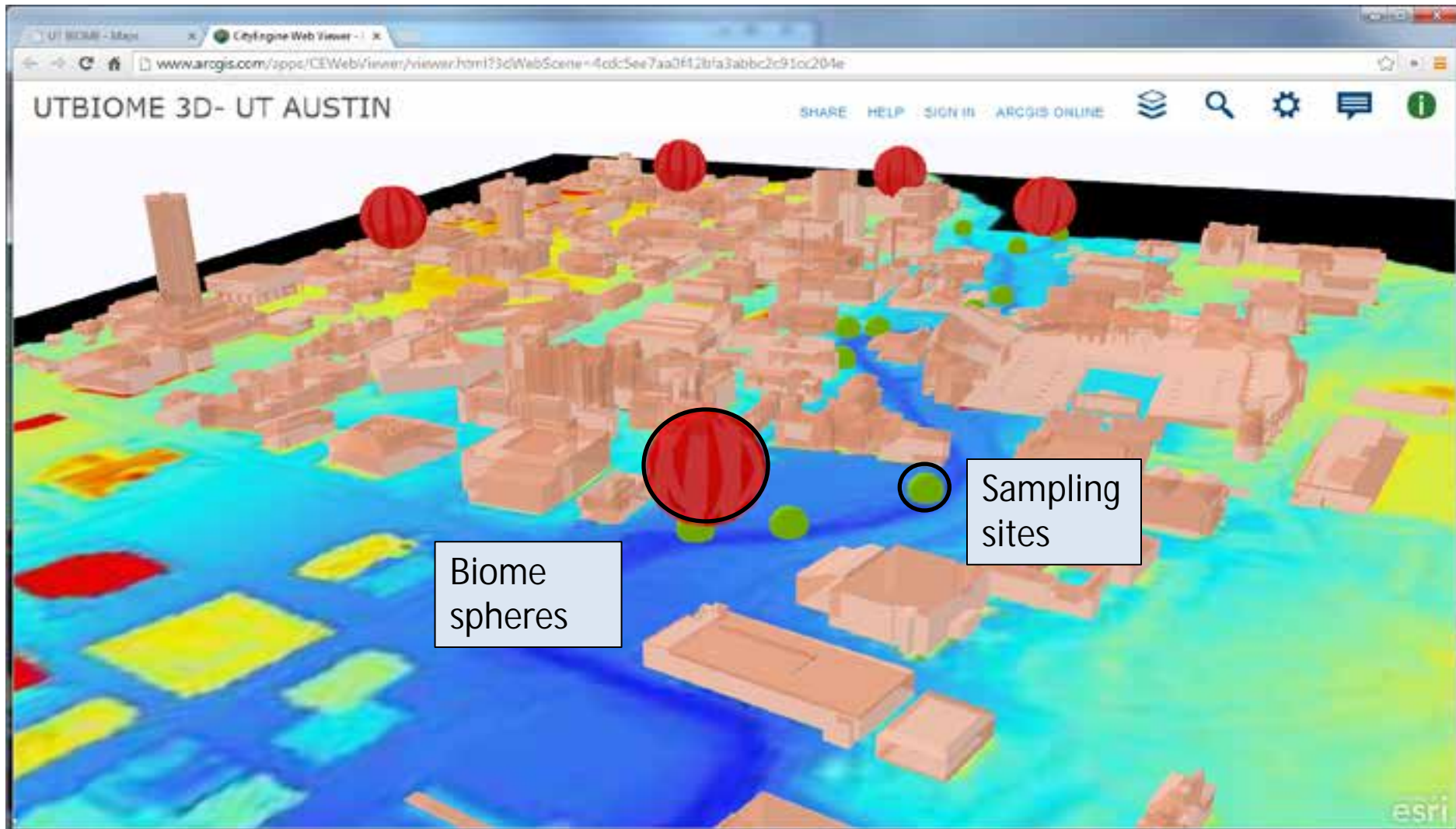
- The 3D buildings were obtained from City of Austin as KML files.
ftp://ftp.ci.austin.tx.us/GIS-Data/Regional/coa_gis.html
- The KML files were converted into Multipatch objects using ArcGIS desktop.
- The lidar elevation raster was acquired by Mandli communications and made available to UT Austin students 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_110223_Exporting_ArcScene_Docs_to_3D_Web_Scene.pdf





UTBIOME in 3D

<http://www.arcgis.com/apps/CEWebViewer/viewer.html?3dWebScene=4cdc5ee7aa0f42bfa3abbc2c91cc204e>





UT BIOME - Home

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

UT BIOME

Home People Data Maps Blog


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](#).

UT BIOME

The effect of climate change on microbial diversity, the interactions between human occupation and the microbiome present in buildings, the rich microbial community present in surface water, tap water and even reused water can now be explored in new ways. However, much of this data is difficult to access for our students and even for fellow researchers who are interested in investigating the environmental, health and ecological implications of this newfound diversity of



UTBIOME Data

UT BIOME 

Home People **Data** Maps Blog

All the sampling data is available for download on the maps page. The sequencing data is available for download here upon request.

Please fill in your name and email address below to receive download links to the sequencing data in your email.

Name:

Email:

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

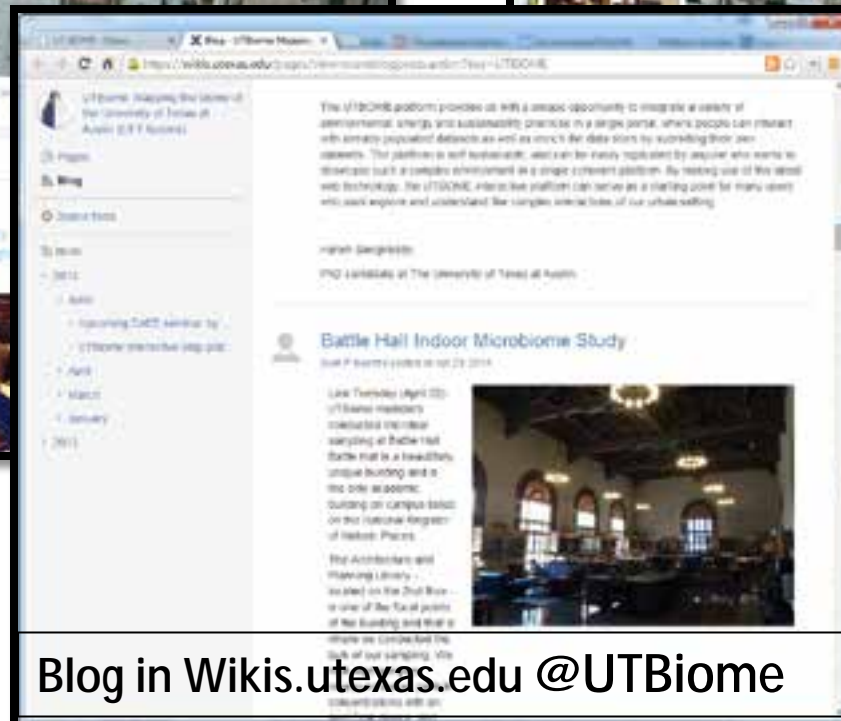
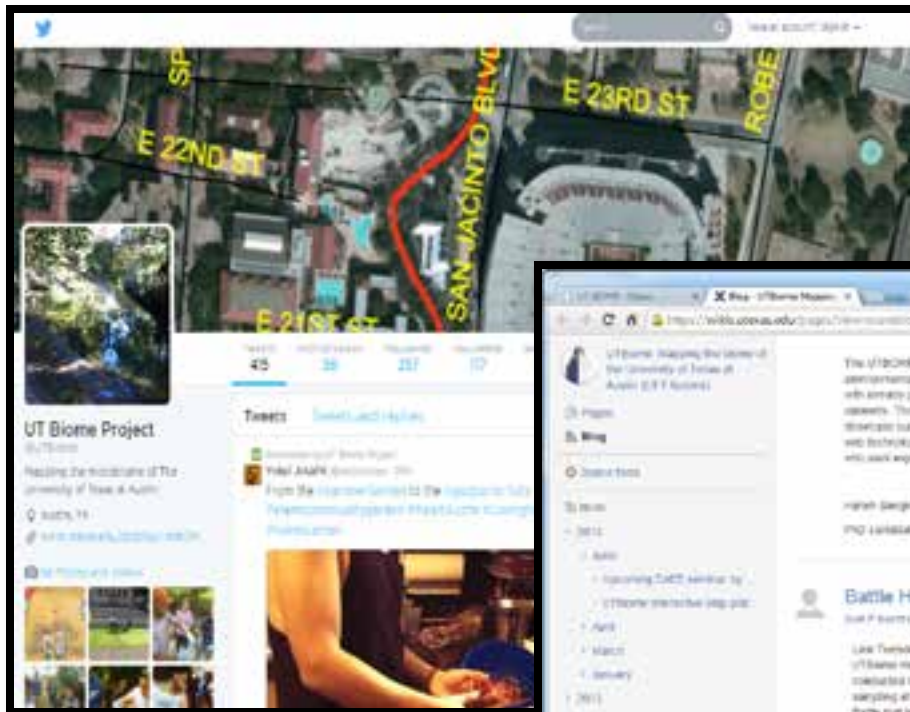
© 2014 The University of Texas at Austin-CIRM
This project is funded by the Lushan Innovation Fund for Technology (LIT) (2013-2014)
Contact: Nancy Hunter, Paula Castanheira, Juan Pedro, Marcelo, Helen, Danyel



UTBIOME -Social Media

Twitter.com @UTBiome

Facebook.com/UTBiome

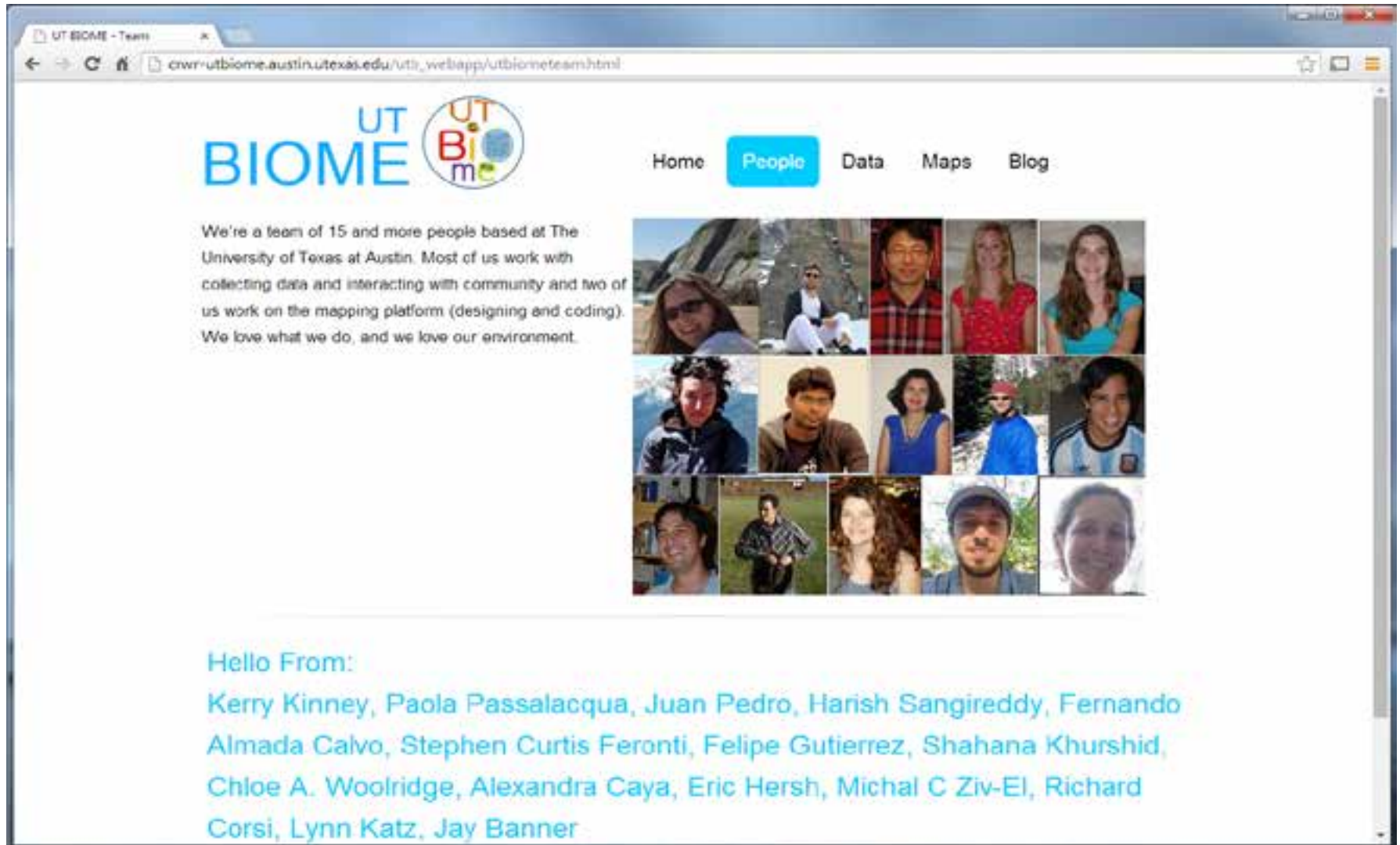


Blog in Wikis.utexas.edu @UTBiome



UTBIOME - Team

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

A screenshot of a web browser displaying the UTBIOME - Team website. The browser's address bar shows the URL 'cwr-utbiome.austin.utexas.edu/utb_webapp/utbiometeam.html'. The website features the UTBIOME logo, a navigation menu with 'Home', 'People', 'Data', 'Maps', and 'Blog', and a grid of 15 team member photos. Below the photos, there is a 'Hello From:' section listing the team members' names.

UT BIOME

Home People Data Maps Blog

We're a team of 15 and more people based at The University of Texas at Austin. Most of us work with collecting data and interacting with community and two of us work on the mapping platform (designing and coding). We love what we do, and we love our environment.

Hello From:
Kerry Kinney, Paola Passalacqua, Juan Pedro, Harish Sangireddy, Fernando Almada Calvo, Stephen Curtis Feronti, Felipe Gutierrez, Shahana Khurshid, Chloe A. Woolridge, Alexandra Caya, Eric Hersh, Michal C Ziv-El, Richard Corsi, Lynn Katz, Jay Banner



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.

