



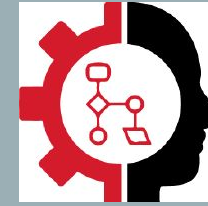
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Automation for the Built and  
Living Environment Laboratory  
(ABLE)

## Acknowledgements

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- Dr. Brad Lehman and Claire Duggan
- Nicolas Fuchs and Tyree Thompson

## Funding

The National Science Foundation (NSF)



National Science Foundation  
WHERE DISCOVERIES BEGIN



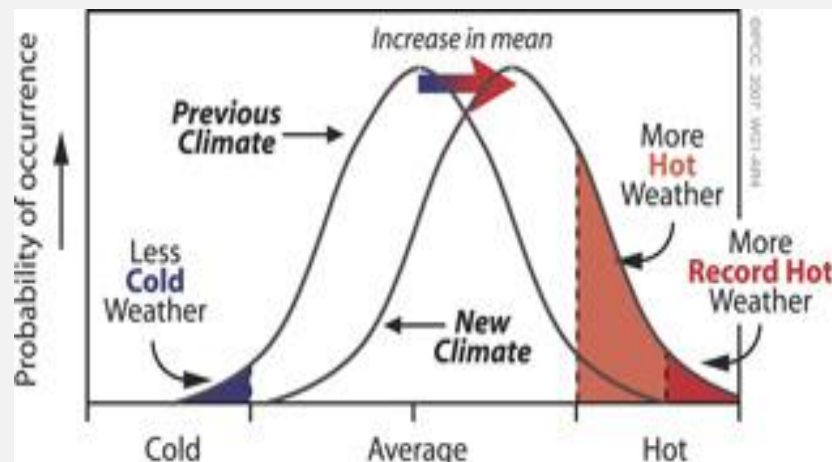
Northeastern  
University

#1757650

# Communicating Vulnerability to Extreme Heat in Worcester, Massachusetts

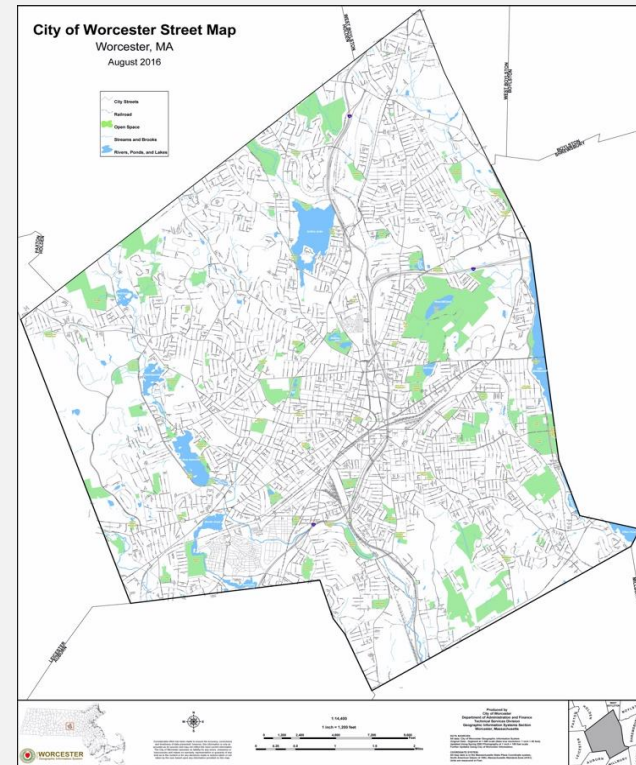
# Communicating Vulnerability to Extreme Heat in Worcester, Massachusetts

- Extreme heat is the deadliest weather-related hazard in the United States (NWS Analyze, Forecast and Support Office)
- A typical home can reach dangerous temperatures in just a few hours
- Well-informed responses can reduce these deaths



# Communicating Vulnerability to Extreme Heat in Worcester, Massachusetts

- Worcester, MA
- Population: ~185,000
- Variety of data: census, utility, and socio-demographic data
- important for measuring vulnerability to extreme heat

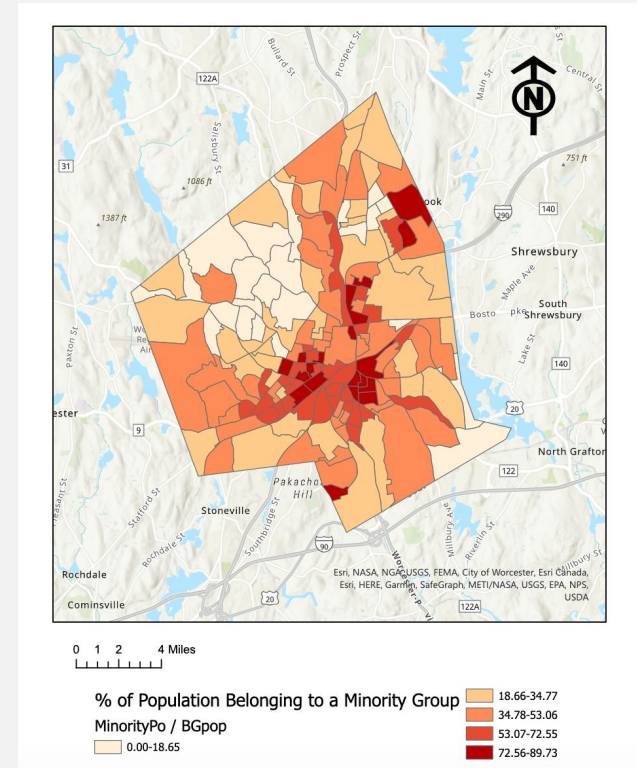


Source:  
<https://ontheworldmap.com/usa/city/worcester/worcester-street-map.html>

# Communicating Vulnerability to Extreme Heat in Worcester, Massachusetts

## OVERALL RESEARCH FOCUS

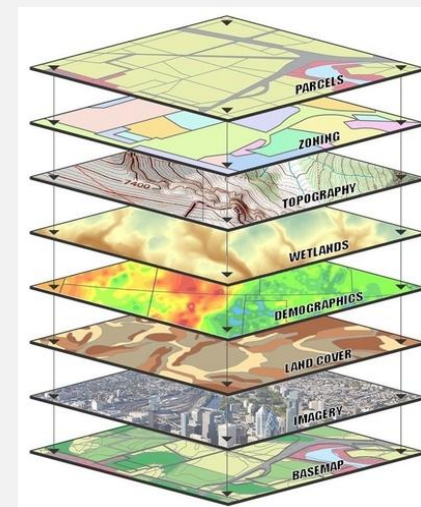
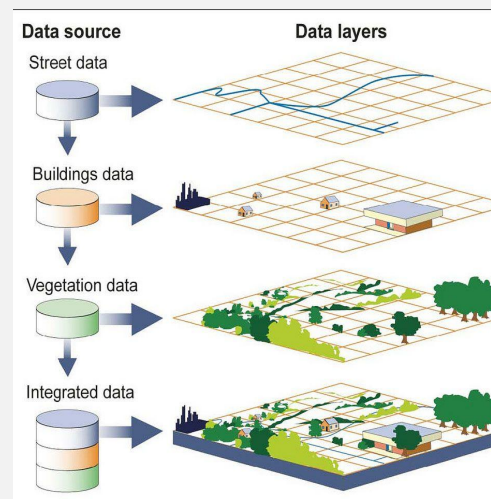
- Analyze and model the impacts of extreme heat on the health and resilience of Worcester, Massachusetts
- Using **geographical information systems (GIS)** to create data driven maps



# Communicating Vulnerability to Extreme Heat in Worcester, Massachusetts

## WHAT IS GIS?

- Display data related to positions on Earth's surface
- ArcGIS Pro software:
  - provides intuitive analysis to better understand data
  - spatial data used to recognize important patterns in information
  - visualizing data is relevant to exploring heat vulnerability and informing public



Source: esri.com

# Communicating Vulnerability to Extreme Heat in Worcester, Massachusetts

## GIS TRAINING

### Courses:

- GIS Basics
- ArcGIS Pro Basics
- Basics of Geographic Coordinate Systems
- Getting Started with Data Management
- Mapping Map Layers in ArcGIS Pro
- Querying Data Using ArcGIS Pro
- Integrating Data in ArcGIS Pro
- Getting Started with Mapping and Visualization
- Getting Started with Spatial Analysis
- Get Started with ArcGIS Story Maps
- Getting Started with ArcGIS Story Maps

STATUS

Active

PLAN TYPE

Viewing All

SORT

Recently Enrolled

Viewing: 1 Result [Clear Search](#)

100 %  
Completed

### ABLE Lab NEU On-Boarding

Created by govertsen.k\_NU on May 26, 2021

**Assigned Jun 1, 2021 | Due Jul 2, 2021**

[Copy Plan](#) [Assign Plan](#) [Share Plan](#)

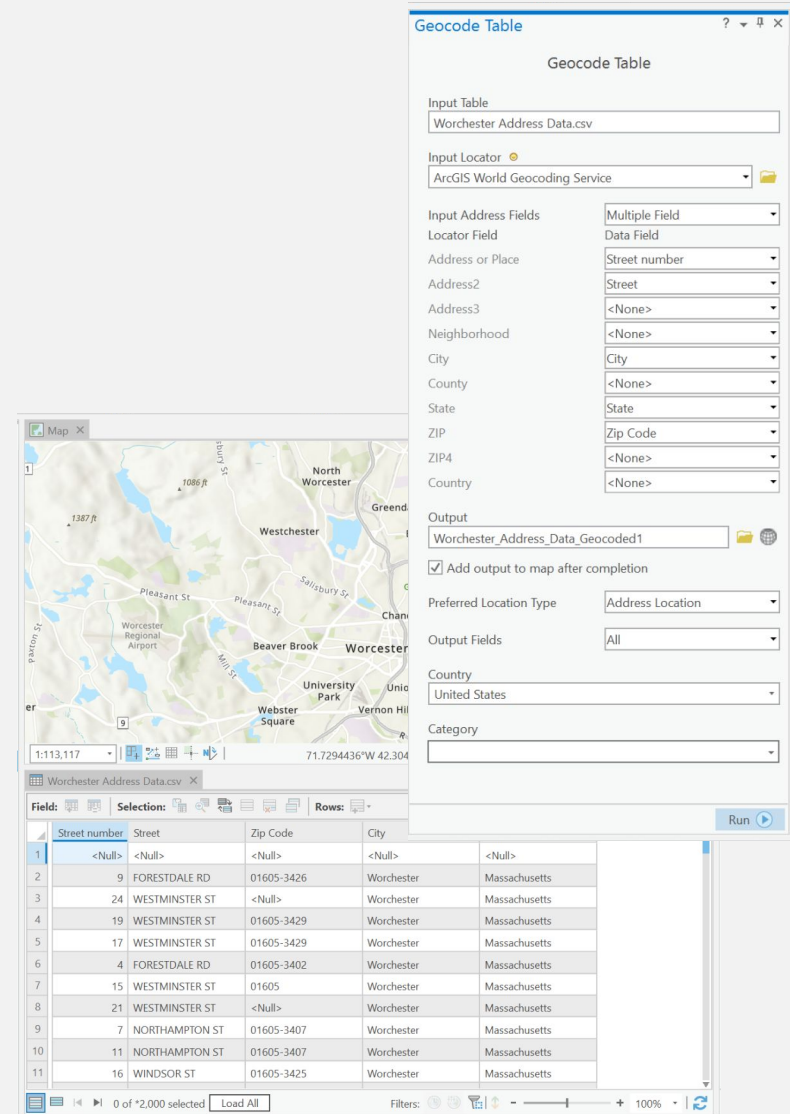
View 11 Courses



# Communicating Vulnerability to Extreme Heat in Worcester, Massachusetts

## MAPPING PARCEL DATA

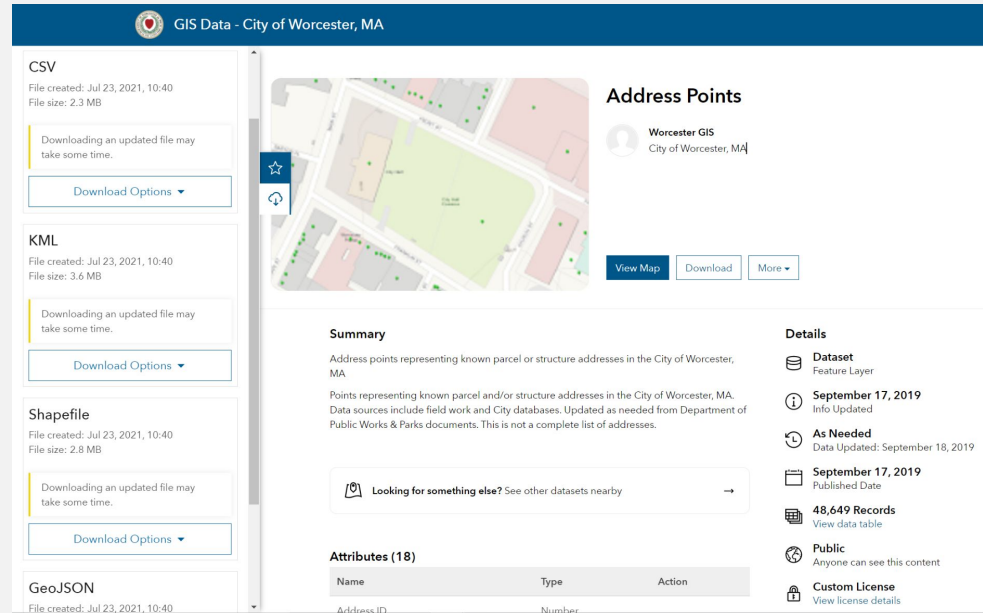
- Accessed Demographic Data
- Shifted focus to mapping Attribute Data
- Geocoded data from Excel Sheets
  - Didn't have any parcel data, so we needed to create it using the Geocode function in ArcGIS Pro
- Merged Parcel and Attribute data
- Color coded Attribute Data





# Communicating Vulnerability to Extreme Heat in Worcester, Massachusetts

## MAPPING PARCEL DATA



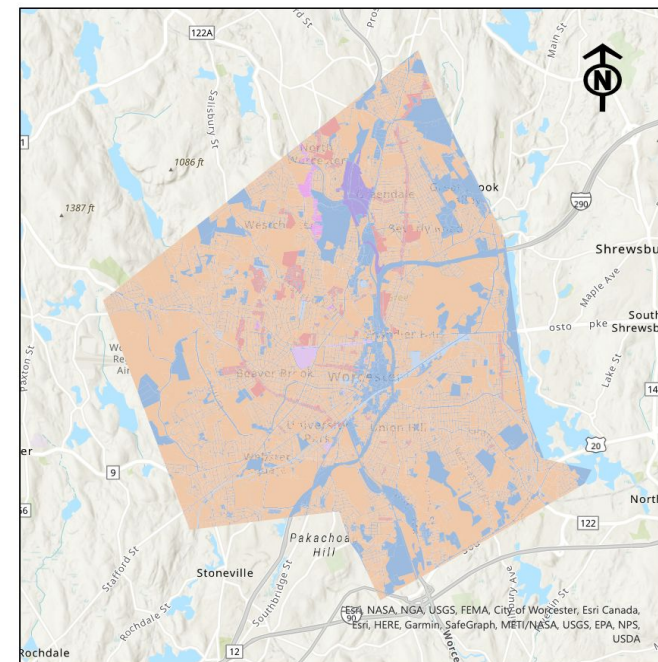
- **Obstacle:** Exceeded ArcGIS credits
  - Functions such as Geocoding use credits, and our credits were used up, which made us unable to perform any other functions
- **Solution:** Found pre-mapped Parcel Data
  - Found pre-mapped Parcel data of the addresses, so there was no need to geocode addresses

# Communicating Vulnerability to Extreme Heat in Worcester, Massachusetts

## MAPPING PARCEL DATA

- Completed previous steps again
- Started creating Attribute specific maps
  - Used attribute data about parcel data to created specific, organized maps

## Roof Cover Type



0 0.5 1 2 Miles

Roof Cover

Roof Cover

<Null>

Asphalt

Clay Tile

Composition

Metal

Rubber Roof

Slate

Tar & Gravel

Typical

Wood Shingle

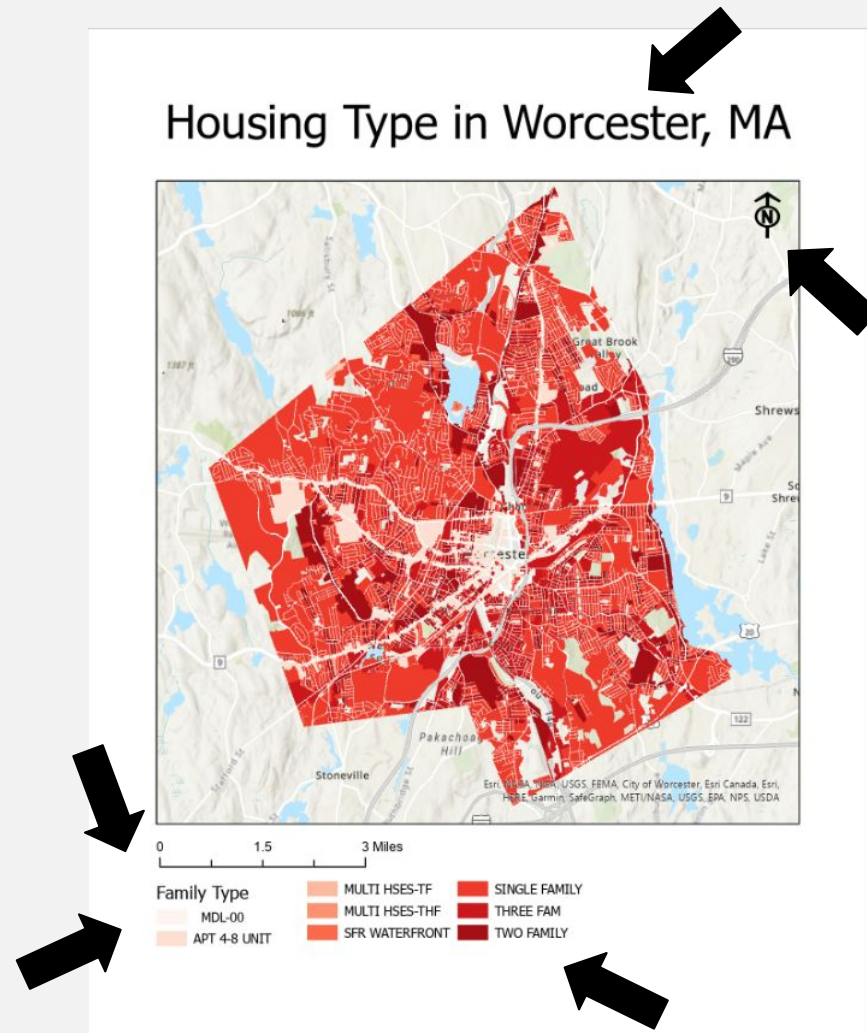
<all other values>

# Communicating Vulnerability to Extreme Heat in Worcester, Massachusetts

Map Layout - creating sheets to display specific map qualities

Layout includes (Top to Bottom):

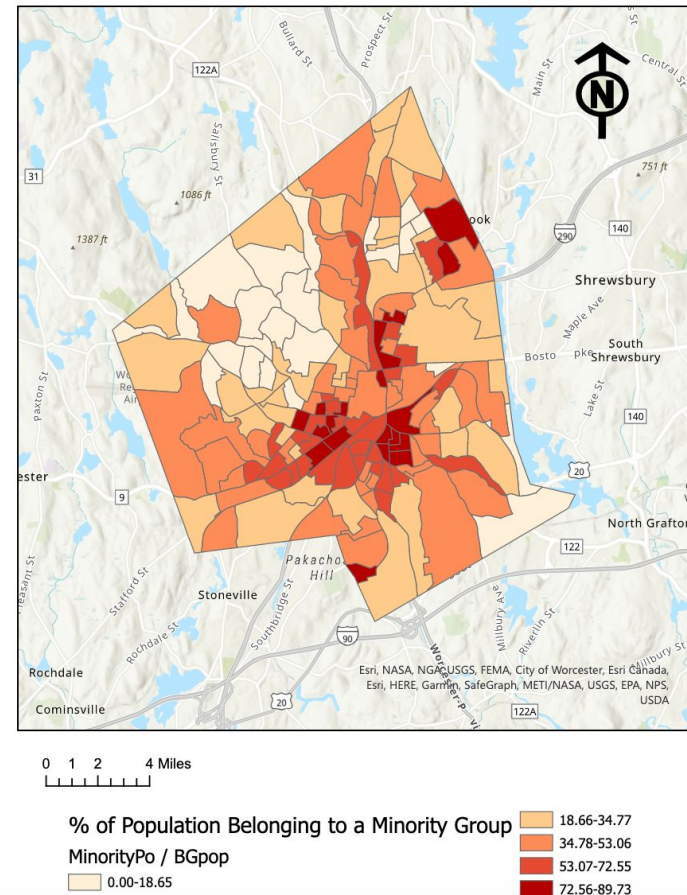
- Appropriate Title
- North Arrow
- Accurate Scale
- Label Title and Label



# Communicating Vulnerability to Extreme Heat in Worcester, Massachusetts

- Minority Population mapped based on demographic data (% of belonging to a minority group)
- Information can be compared to attribute data to explore patterns/relationships in extreme temperature vulnerability
- Assess various populations risk to extreme temperature

## Minority Population of Worcester, MA



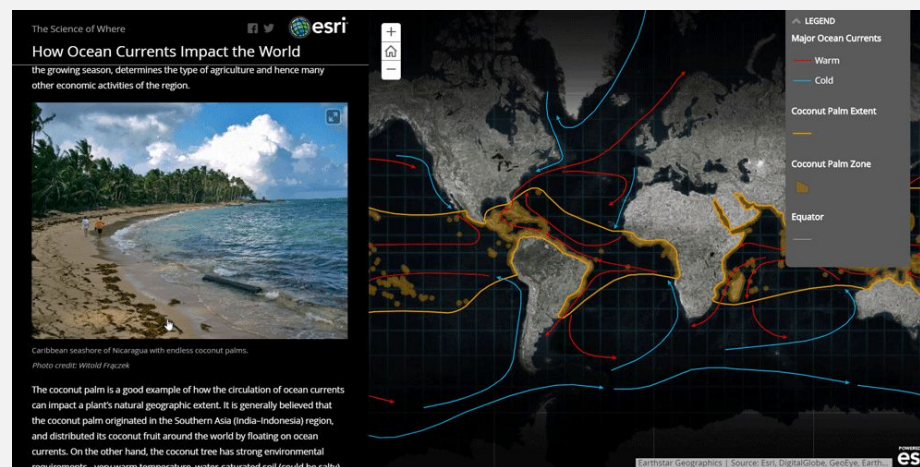
# Communicating Vulnerability to Extreme Heat in Worcester, Massachusetts

## COMMUNITY OUTREACH

- Data driven maps incorporated into community-based research
- Maps published online using StoryMaps
- Create an interactive presentation

## OUTREACH OBJECTIVES

- help the Worcester community understand the implications of extreme heat
- recruit community members to engage in informative workshops





# Communicating Vulnerability to Extreme Heat in Worcester, Massachusetts

## OPPORTUNITY TO PARTICIPATE COMMUNITY RESILIENCE RESEARCH

A community-based research workshop to learn about how you and your community respond to extreme temperature events (e.g. summer heat waves) and understand what kind of research could help improve your community's resilience.

Civil and Environmental Engineering Department & the School of Architecture

### YOU MAY BE ELIGIBLE TO PARTICIPATE IF:

- You are 18 years of age or older
- You live in Worcester, MA

### COMPENSATION:

**\$40** Bluebird pre-paid debit card

### YOU WILL BE ASKED TO:

- Participate in an outdoor 2-hour community workshop

### SAMPLE WORKSHOP ACTIVITIES:

- Scenario-playing a power outage during a heat wave or winter storm
- Group discussions about the known and unknown hazards of extreme temperatures
- Mapping exercise of social and physical features of Worcester

### WORKSHOP INFORMATION

Where: **Grant Square Park**  
(near Mt. Vernon St)

When: **Thursday, July 29th**  
**5:30-7:30pm**

### SCAN THE QR CODE TO REGISTER

<https://tinyurl.com/ExtremeTempEnglish>



NU IRB #21-03-29



# Communicating Vulnerability to Extreme Heat in Worcester, Massachusetts

## RESEARCH CONTINUATION

### Next Steps

- Finish integrating Demographic data into current maps
- Understand correlations between Demographic Data and Parcel Data
- Publish Maps through StoryMaps and share with community



# Communicating Vulnerability to Extreme Heat in Worcester, Massachusetts

Thank you for listening!

Questions?