A summary of the first week's slide presentation

https://uky-gis.github.io/geo109/slides

Introduction

Hello Class! How are you today?

I am Boyd. Before we get to introductions, let's do a little digital housekeeping and show you can get this presentation on your screen.

[Show how to navigate Canvas to the uky-gis site to find presentation. Show how the slide NAV works]

Today I'll talk a little bit about digital and mapping. Throughout the semester will focus on Kentucky maps. There is no better way to understand the power of maps than using them where you spend the most time.

Introductions.

Please, just call me Boyd. I am one of your instructors for GEO 109, Digital Mapping, this semester. The three other members of the mapping team are:

[introduce TAs]

Facilities

You might have noticed a lot of construction on campus. Let's get a handle on where our facilities are located on Campus – and introduce our first map.

[Discuss POT and lab space on campus. Show map of facilities]

This is digital map. We are not looking paper, obviously. The information that makes this map is stored on computers scattered around the world. When I ask to see the map, exact copies of this information are downloaded and assembled in my browser to make the map we see now. I have control in what is shown, here we see buildings and trees. The map is dynamic and interactive. If this were the only map you ever saw, it might work well. However, it is virtual. It's doesn't exist without electricity.

OK, where is our lab space where you will create digital maps?

[Show lab space and make note about not having open-top containers or meals in the lab or lecture space]

Our Tools

Who uses a mouse? Show your hands, please. Let me ask you this: would you play basketball wearing a pair of hiking boots? Unless you have excellent finger dexterity for gestures, a mouse will give precise control in the tools that we will discover and use.

Here's the most important tool: an open mind. Be open to new techniques and perspectives in creating things. Challenge your comfort zone because we will need to gently fail a few times on journey before we make something that we are proud of.

As instructors, we bring an open mind to help you succeed. Think of us as collaborators on your digital mapping journey.

OK, is this a map? Imagine if we could do an instant MRI-like scan of Lexington where we could see things and the insides of things. So, yes it could be a 3D map though it sounds more like a plot to an apocalyptic alien vs. Earth movie.

iPhone

Let's talk about a tool that is not alien to you: Your mobile devices. You will use them in class and learn how collect detailed data of your movements on Earth. Like your brain, your movements are unique in the universe. No other person has or will experience the exact same places you have. However, we can map them and share them with others.

What makes a these devices so powerful? They are connected to the internet and allow you to share exact copies of information. Then internet is our digital universe.

But where is the internet and can it be mapped? In the Internet Mapping Project, people were invited to draw mental maps of the internet. A mental map is an image that you conjure from your imagination of a place, most likely the place you spend most of your time.

In this example we have the River Google flowing through landscape by the Mountain YouTube and villages like eBay and eTrade.

In this next example, we have a home connected to a few others, which are connected to few others, and on it goes. Every home is connected.

In this last example, a home sits at the center of the infinity symbol. The home has access to everything.

Today, this what we expect – constant internet connectivity to everything.

But is the internet observable? Does it have a physical incarnation? Yes, your phone is a node on the internet.

This map diagrams the physical connections and capacities of fiber optic cables – the backbone of the global internet. These are cables on the ocean floor that transmit your digital information as pulses of light.

Let's say you want to visit France. Your digital signals are routed at physical locations on the planet.

[Show trace route to www.francetourisme.fr]

While the Internet might seem infinite, it has a physicality that can be observed – and then mapped. The grand takeaway: anything can be mapped, though it might take insight and creativity to visualize it.

Call and response time.

The phone is jam-packed with sensors to observe your environment. One sensor in particular gives us the blue dot on a map. That's where we are! Can

someone give me the three-letter acronym for this technology? Don't be shy, it will be a long semester.

GPS + internet + mobile device is the digital bedrock on which live our daily lives.

A world without connected devices

Imagine a world without them. Can you read a map. A compass? Which was is north?

Now imagine a world without the concept of a map.

How would get around campus and town? Are you too shy to ask for directions?

What about boundaries? How do you know when you leave one property and enter a new one? Certainly fences and cairns, stacks of rocks, would be used.

How would you cross oceans? In much the same way as ancient civilizations did by observing the movements of celestial bodies. Eventually, someone would say, "let's write these observations down and record it". Then, we start using compasses, precision telescopes for measuring angles, and mostly importantly, clocks, to fit these observations together on a single page. Maps are born with lines on a page representing a finite feature on Earth among an infinite amount of features that could be mapped.

What helps me teach mapping?

I actively make maps, on speculation, for sale, learning for successes and failures. If this were an arts & creativity class on rock-n-roll, you'd probably expect us to do a little rock-n-roll.

A photograph is like a map. It shows a real place and it is composed by its maker. In fact, much of modern maps are based on photos from airplanes and satellites. Today we have a challenge with GenAI and deepfake photography. The truthfulness of a photo is now suspect. Maps have always been untruthful in

someway and we'll return to this topic in the future. But when they align with some version of reality, they powerful vehicles of persuasion.

Maps inspire exploration. It's doubtful we would travel someplace new without a map. Yet, beyond the blue dot and route showing your destination, maps and map readers fail. Being (safely) lost sharpens your senses to your environment more than any other experience.

Experimentation is a hallmark of good science and design. You need to willing to try a new directions before you find your direction.

Maps show real places so why not use them in the places they depict. Here are examples of field trips in our upper-level mapping classes.

How far is it? How tall? What might I see along the way?

Topography.

Let's break down this word into its roots. Graphy is from latin meaning roughly a "written description" So, we're in a Geography class. What are we describing? Geo = Earth. Topo is from latin meaning "place."

We can use maps to show the shape of earth, a good thing to know if you were teleported to a random place on the planet. We can also use maps to show the characteristics of place as observed from a single point. We can also show the change in surface heights of our landscape, revealing patterns of human modification and the evolution of ecosystems.

How will this course be taught?

As the creator's journey – making maps from scratch.

Question: What needs to be mapped or seen by you. Where are the best places to study while enjoying a coffee on campus?

Observe. Visit these shops and observe their qualities. Note their location. Perhaps pull in observations from satellites to make a base map.

Analyze: Classify and categorize the locations. Which are good and which are bad?

Visualize: Map your locations and symbolize so that readers can understand what you observed.

Persuade: Design your map for impact. When a reader first sees the map, they 'get it' and can live your experience through it. Is it a balanced layout, neatly designed, with a strong informational hierarchy?

Critique: Take a moment to reflect on your journey. What would you have done differently? Consider revisiting each step to refine your presentation.

Falling in love with maps

Maps fall within the tradition of visual fine arts. Early cartographers employed the same manual methods, such as drawing, etching, and painting, as artists of their time. Today we still marvel at a well-designed map and decorate our homes with them. However, maps were also scientific documents using surveying and trigonometry to locate desired features own the planet. They were and still are coveted for their ability to reveal secrets. Who wants a sheet of paper with the proverbial X on it to mark the treasure?

So, what is a map?

Every map starts with a blank canvas and every mapmaker has a first map. It is intimidating. But, you make a first design, then add to it. This is the iterative cycle of creativity. This map shows my early experimentation with design software. It's not pretty but I learned a lot in this exercise. Give yourself grace to make ugly designs and discover capabilities.

The first rule of mapping is that it is never finished. The world changes, designs are tweaked. The map is like a puzzle that can never be solved.

Globe

Perhaps one the most complete maps is a globe. It shows the true shape of landmasses. It has the property that if you can find the shortest distance between two points, say with a string, you have an arc along a great circle, a circle that divides the Earth in half. This is used today to plan long-distance travel. But a globe isn't too convenient for navigation because it doesn't fit neatly in your pocket and it's woefully too small.

But how do we get a map we use on a daily basis from a sphere-like object? We have to flatten Earth. What could go wrong?

[Demonstrate how circles on a grapefruit are distorted when it is flattened. Offer Cumberland Gap maps to two volunteers]

OK, now extra credit for everyone attending class today. Over the holiday weekend, search for globes and take a photograph of the globe and show it's surroundings. Is it on a mantel, in a bookcase, or automobile hood ornament. We'll open Canvas submissions next Tuesday.

So how do we flatten a globe? We use projections.

[Show how a piece of paper can be wrapped around a globe as a cylinder and then flattened.]

No single project can show the Earth properly. We use circles on a map to show projections distort shape and size. Some projections are used for navigation (Mercator] while others show the size of landmasses (Robinson). Some projections were intentionally used in propaganda – Mercator's projection makes the Soviet Union look larger than it is.

Families of maps

The correct use of map projections brings us to the two basic families of maps that we use. Reference maps show where things exist in relation to other things. Where are the roads and cities? We use these maps for navigation and need the

projection to show the correct shape of things when we're zoomed in. Google maps is an example.

Thematic maps show the spatial patterns of something. Where are COVID-19 rates the highest? Thematic maps are fun to make because we can tell stories about the patterns that they reveal. Let's look at some maps and discover stories that they tell.

Use online digital libraries to explore more maps.

Are these maps?

A map is

- An artistic rendering of Earth

- A measurement of our environment

- A tool for remembering the past and navigating the unknown.

Space

We measure space on Earth in three dimensions. Elevation above sea level, north/south distance from the equator, latitude, and east/west distance, longitude from an agreed upon, arbitrary line called the prime meridian.

But these are numbers. What we are really concerned about is the places they represent. How are the people, what type of food can I get, where will I sleep, etc? We affectionately call this meatspace, where the proximity of things matter. However, you could be sitting next to someone and they are engaged with people around the world. Have you seen someone play online VR?

Cyberspace

The virtual space created by the internet. It doesn't have the same physical laws that govern meatspace. We not concerned about how far one experience is from another (say in roblox), because we can instantly be in any desired community. However, if the server that hosts the experience is physically far away, you might

have a glitchy experience. A map of cyberspace is a map of nodes (my phone, your xbox, every computer online) and their connections. The metaverse, a termed coined by Neil Stephenson in 1992 Snow Crash, intends to give us a more meatspace-like experience in cyberspace.

The digital

Digital refers to encoding data in binary digits and instantly sharing exact copies of the data. Your experience can be exactly the same as mine. The digital capacity of the world is ever increasing:

• We can store more data

• We can share more data more quickly

• We can digitize more things in more detail

Emerging from rocket engineering in the 2000s, came this idea of a digital twin; a detailed virtual replica that we can experiment with. Today, we are creating digital twins of cities using Lidar, GPS, and special photographic methods. One application is for the future of autonomous vehicles which needs the most detailed and expansive 3D map ever made. What happens when the digital twin of Earth is online, in the metaverse? Can we instantly visit far away places in an immersive experience. Can we eventually say that you can only visit the virtual Grand Canyon because the real one is too polluted?

Digital mapping

We have explored a few concepts explaining what we mean by digital and maps. We can summarize that digital mapping is the practice of using a number of technologies to produce, use, and share (ever) more detailed representations of us and our planet. Digital mapping gave us Google Street View. Question: how many people worry about what their Street View represents?

In a fable by Jorge Luis Borges, a long-ago empire needed detailed maps. The cartographers kept making more detailed maps which required the size of the

map to increase, too. Eventually, the map was the same size as the empire. Something happened when the map became this large. Subsequent generations found the map useless and let it fall into ruin. The only place you can find remains of this map are in inhospitable climates inhabited by wild animals and beggars.

What happened? Jean Baudrillard, a French philosopher that wrote about technological communication and hyperreality, interprets this fable as an obsession with representation. The early empire were more concerned about how they appeared on the map than with their own reality. They fell to ruin.

With the convergence of digital mapping, digital twins, and the metaverse, is this our fate? When's the last time you bought something for your avatar – just a little something to bling it up?