

DIGITAL MAPPING TECHNIQUES 2026 LITE

The following was presented at DMT'26 Lite
(April 1, 2026 - A Virtual Event)

The contents of this document are provisional

See Presentations and Proceedings
from the DMT Meetings (1997-2026)

<http://ngmdb.usgs.gov/info/dmt/>

Hearing the “Quaternary Geology of Wisconsin” - geologic maps, accessibility, and GeMS

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with

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DMT Lite
April 1, 2026



xrnavigation.io

- **goals**
- **current map draft**
- **how the GIS attributes become accessible**
- **using GeMS to facilitate accessibility of additional maps**

Accessibility = access to the information

Digital assistive technology:

Keyboard-navigated, no direct pointing device (e.g., mouse)

“Reading” via screen reader or text read-out (such as a refreshable braille display)

Sound design as a shortcut

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Data Navigator

Figure 1

- 1. Introduction
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- 6. Conclusion
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Data Navigator: An Accessibility-Centered Data Navigation Toolkit

[Frank Elavsky](#), [Lucas Nadolskis](#), [Dominik Moritz](#)

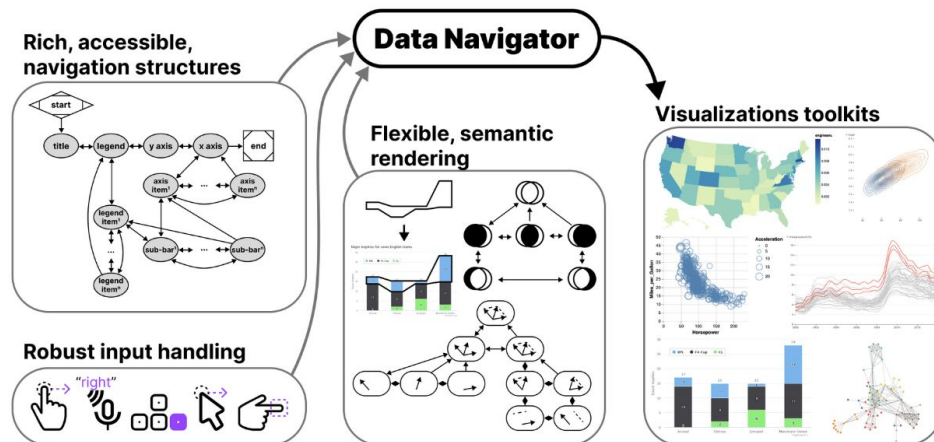


Figure 1: Data Navigator provides data visualization libraries and toolkits with accessible data navigation structures, robust input handling, and flexible semantic rendering capabilities.

Audiom.net



Brandon Biggs

← → ↻ audiom.net ☆

Try Audiom for yourself!

Powered by **Audiom** [Instructions](#) 🔊 [Speech Log](#)

Use the keyboard to move around when the avatar is activated!

Grassy turf

Adobe Creek

Maplibre

© Mapbox © OpenStreetMap [Improve this map](#)

- End Demo Mode
- Open Main Menu (Enter)
- Open Maps Menu
- Previous Speech Message (I)
- Next Speech Message (I)
- First Speech Message (Shift + I)
- Last Speech Message (Shift + J)
- Keyboard help (h)
- Speaker test (Shift + t)
- Toggle ambient sounds (p)
- Increase ambient volume (k)
- Decrease ambient volume (Shift + k)
- Jump to GPS Location (J)
- Enable Geolocation
- Get coordinates (c)
- Go to dialogue (Shift + o)

About Audiom

If you are blind, low vision, have trouble using normal map controls, or have trouble understanding maps in general, and wish maps and geographic information were more accessible, you've come to the right place! If you're a company interested in integrating Audiom into your website or app, please visit the main XR Navigation website ([Opens a new website](#)).

Quaternary Geology of Wisconsin in Audiom

Thematic:

Map Unit Polygons

Overview areas

Geologic Line and Point Features

Author Responsibility

Base data:

Counties

National Scenic Trails

County and Tribal Seats (cities)

Highways

Reservations

Waterbodies

Specific Treaty Areas with Reserved Rights

Demo video #1:

Movement in grid
mode and in
first-person mode.

<https://drive.google.com/file/d/16uWVRQUILpI5aKkE9WsH5PX3CgnD6diE/view>



Demo video #3:

Search for
features,

Skip to next
feature in a
direction

https://drive.google.com/file/d/1N7bTuw3UPuA-3-QiOR3Qc5x00tvD_eMb/view



Content

My content ▼

 New item

 Create app

 Search Audiom Layers for XR Navigation



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Title ▼

Q500 Waterbodies



Q500 Watebodies



MapUnitPolygons_Q500



MapUnitPolygons_Q500



DirectionPoints_Q500



WisconsinCounties_Q500



Highways_Q500



 New item








 Create app

 Search Audiom Layers for XR Navigation 

1-24 of 24

https://audiom-staging.herokuapp.com/map?title=Wisconsin%20Geological%20Survey%20Quaternary%20Map&sources=counties,CountyOrTribalSeat,CededTerritories,IceAgeTrail,NorthCountryTrail,TribalLands,Highways,DirectionPoints,DirectionLines,UncertainContacts,MapUnitPolygons,WaterBodies&counties.type=esri&counties.url=https://services5.arcgis.com/hYFYGk4BynrlaicK/arcgis/rest/services/Counties_Q500/FeatureServer/0&counties.name=Counties&counties.rules=/rules/UW-Rules.json&CountyOrTribalSeat.type=esri&CountyOrTribalSeat.url=https://services5.arcgis.com/hYFYGk4BynrlaicK/arcgis/rest/services/CountyandTribalSeats_Q500/FeatureServer/0&CountyOrTribalSeat.name=County%20or%20Tribal%20Seat&CountyOrTribalSeat.rules=/rules/UW-Rules.json&CededTerritories.type=esri&CededTerritories.url=https://services5.arcgis.com/hYFYGk4BynrlaicK/arcgis/rest/services/WisconsinCededTerritories/FeatureServer/0&CededTerritories.name=Ceded%20Territories&CededTerritories.rules=/rules/UW-Rules.json&IceAgeTrail.type=esri&IceAgeTrail.url=https://services5.arcgis.com/hYFYGk4BynrlaicK/arcgis/rest/services/IceAgeTrail_Q500/FeatureServer/0&IceAgeTrail.name=Ice%20Age%20Trail&IceAgeTrail.rules=/rules/UW-Rules.json&NorthCountryTrail.type=esri&NorthCountryTrail.url=https://services5.arcgis.com/hYFYGk4BynrlaicK/arcgis/rest/services/NorthCountryTrail_Q500/FeatureServer/0&NorthCountryTrail.name=North%20Country%20Trail&NorthCountryTrail.rules=/rules/UW-Rules.json

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rules file

matches attributes to
map interactions

Rule	Category	Role	Name	GeoMaterial	Exclude	
33	MapUnit=Kb	glacial thin over bedrock	glacial-rock	Thin glacial sediment of the Kewaunee Formation	01.01.01.04.02 Glacial till, mostly silty	
34	MapUnit=Om	glacial moraine	glacial	Glacial sediment of the Oak Creek Formation in	01.01.01.04.03 Glacial till, mostly clayey	
35	MapUnit=Oh	glacial hummocky	glacial	Hummocky glacial sediment of the Oak Creek Fo	01.01.01.04.03 Glacial till, mostly clayey	
36	MapUnit=Os	glacial streamlined	glacial	Streamlined glacial sediment of the Oak Creek Fr	01.01.01.04.03 Glacial till, mostly clayey	
37	MapUnit=Or	glacial rolling	glacial	Rolling glacial sediment of the Oak Creek Forma	01.01.01.04.03 Glacial till, mostly clayey	
38	MapUnit=Ep	glacial modified by lake	glacial-lake	Glacial Sediment of the Miller Creek Formation r	01.01.01.04.03 Glacial till, mostly clayey	
39	MapUnit=Op	glacial modified by lake	glacial-lake	Glacial sediment of the Oak Creek Formation mc	01.01.01.04.03 Glacial till, mostly clayey	
40	MapUnit=Ci	glacial ice-contact	glacial-meltwater	Ice contact deposits of the Copper Falls Formatic	01.01.01.05.01 Ice-contact and ice-marginal sediment, mostly coarse-grained	
41	MapUnit=su	meltwater stream	meltwater	Meltwater-stream sediment	01.01.01.05.01 Ice-contact and ice-marginal sediment, mostly coarse-grained	
42	MapUnit=sc	meltwater stream	meltwater	Collapsed meltwater-stream sediment	01.01.01.05.01 Ice-contact and ice-marginal sediment, mostly coarse-grained	
43	MapUnit=sh	meltwater stream hummocky	meltwater	Hummocky meltwater-stream sediment	01.01.01.05.01 Ice-contact and ice-marginal sediment, mostly coarse-grained	
44	MapUnit=se	meltwater stream eroded	meltwater-eroded	Eroded meltwater-stream sediment	01.01.01.05.01 Ice-contact and ice-marginal sediment, mostly coarse-grained	
45	MapUnit=kmc	Kettle Moraine interlobate zone	meltwater-glacial	Collapsed meltwater sediment of the Kettle Mor	01.01.01.05.01 Ice-contact and ice-marginal sediment, mostly coarse-grained	
46	MapUnit=kmh	Kettle Moraine interlobate zone	meltwater-glacial	Hummocky meltwater sediment of the Kettle M	01.01.01.05.01 Ice-contact and ice-marginal sediment, mostly coarse-grained	
47	MapUnit=kmr	Kettle Moraine interlobate zone	meltwater-glacial	Rolling sediment of the Kettle Moraine area	01.01.01.05.01 Ice-contact and ice-marginal sediment, mostly coarse-grained	
48	MapUnit=wa	windblown	windblown	Windblown sand	01.01.01.06.01 Dune sand	
49	MapUnit=wt	windblown on glacial	windblown-glacial	Windblown silt on pre-Illinoian till	01.01.01.06.02 Loess	
50	MapUnit=wi	windblown	windblown	Windblown silt	01.01.01.06.02 Loess	
51	MapUnit=ln	lake	lake	Nearshore lake sediment	01.01.01.07.01 Lacustrine sediment, mostly coarse-grained	
52	MapUnit=lp	lake	lake	Lake plain sediment	01.01.01.07.02 Lacustrine sediment, mostly fine-grained	
53	MapUnit=cf	nonglacial eroded	eroded	Fine-grained colluvial sediment	01.01.01.11.01 Colluvium and other widespread mass-movement sediment	
54	MapUnit=cc	nonglacial eroded	eroded	Coarse-grained colluvial sediment	01.01.01.11.01 Colluvium and other widespread mass-movement sediment	
55	MapUnit=rb	nonglacial eroded	eroded-rock	Residual sediment over bedrock	01.01.02 Residual material	
56	MapUnit=ru	nonglacial eroded	eroded	Residual sediment over glacial sediment and bed	01.01.02 Residual material	
57	MapUnit=o	wetland	wetland	Organic-rich sediment	01.01.04 Peat and muck	
58	MapUnit=b	rock	rock	Bedrock	06.02 Rock	

text read-out



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How

GeMS

sets us up for
importing to Audiom

GeoMaterial could be the basis for a default sound-pack



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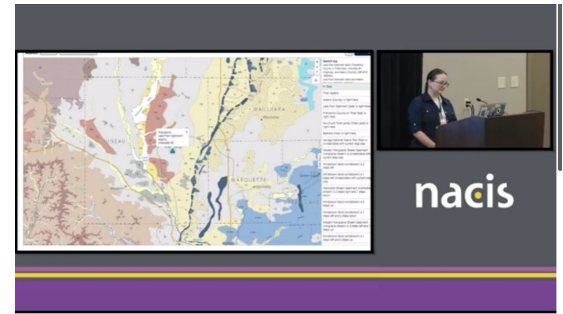
Conclusions

It's possible to hear a map.

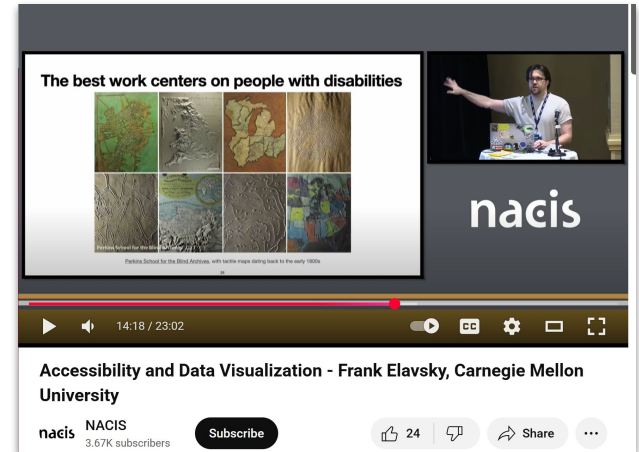
Spatial information is not inherently visual.
Visual symbology is abstraction; audio can be substituted.
Text information can be spatially organized.

Resources & Future Work

- This work continues through the summer
 - High contrast color & pattern work on this map
- ❑ Watch my Oct 2025 NACIS Talk on youtube
 - ❑ Find Brandon's interviews & webinars on YouTube!
<https://youtu.be/SCFYwbyAaBg>
 - ❑ reach out to Brandon though xrnavigation.io
 - XR Navigation has plans for an SDK.
 - ❑ Watch Frank Elavsky's 2023 NACIS talk!
 - I am also partnering with Frank Elavsky to work in his DataNavigator system.



<https://www.youtube.com/watch?v=-k5TQf3sYNA>



<https://www.youtube.com/watch?v=wqvDFYMIFYI>

thank you

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