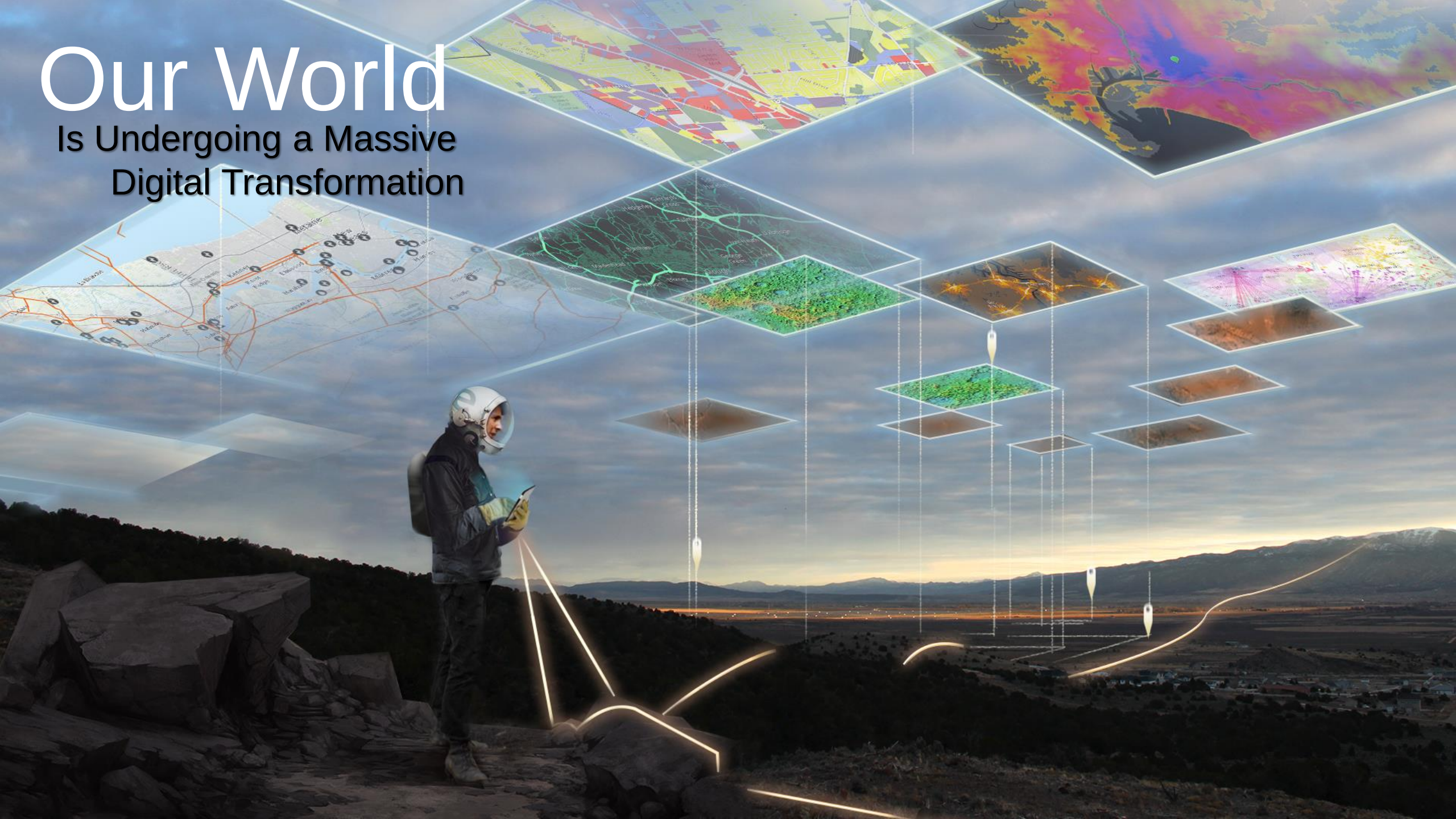
Information Technology and Geoheritage

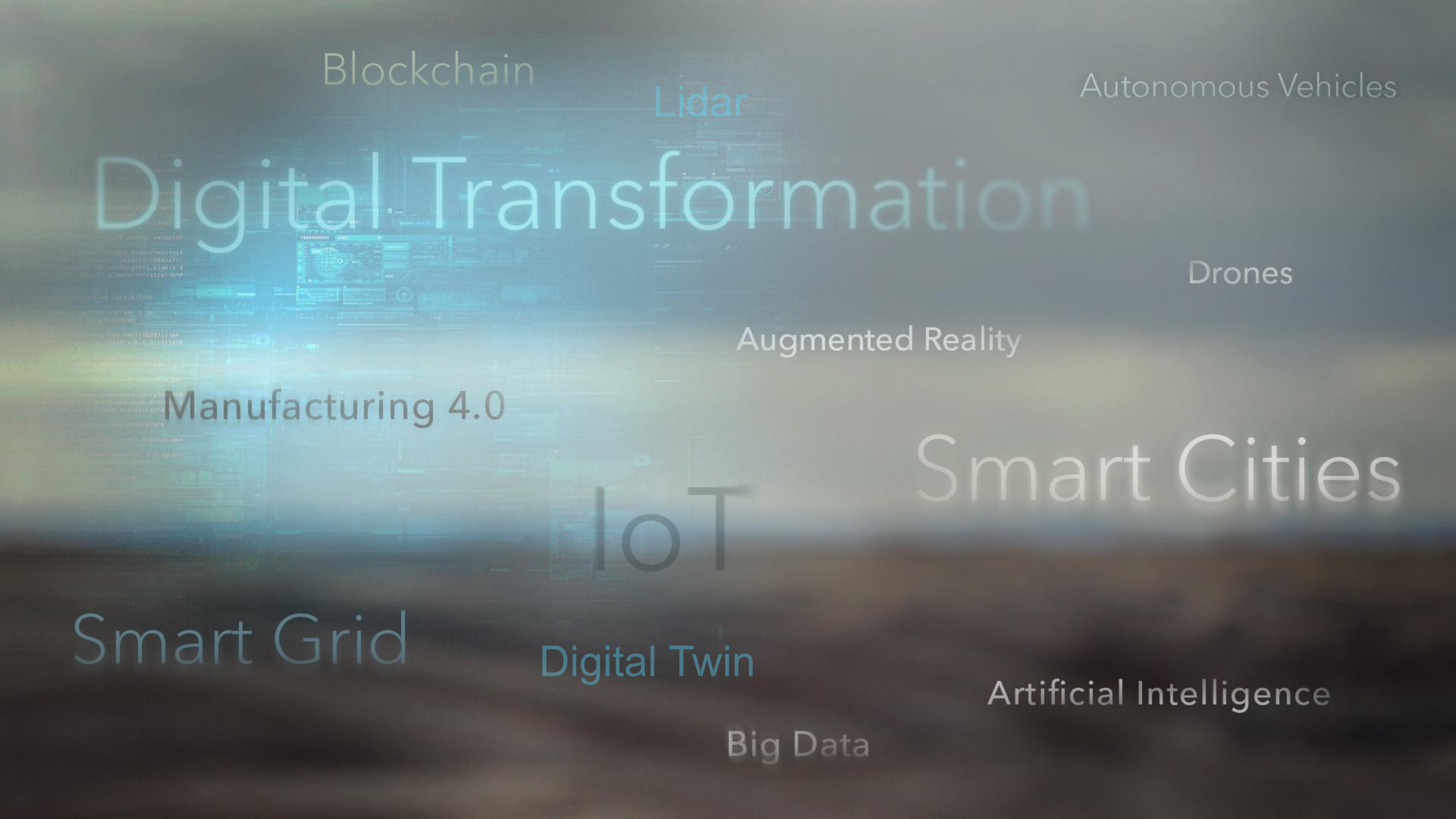
Digital Transformation of Geoheritage Sites

Damian Spangrud
Director of Solutions, Esri

Our World

Is Undergoing a Massive Digital Transformation




Blockchain
Lidar
Autonomous Vehicles
Digital Transformation
Drones
Augmented Reality
Manufacturing 4.0
Smart Cities
IoT
Smart Grid
Digital Twin
Artificial Intelligence
Big Data

The Geoheritage Landscape is Undergoing a Digital Transformation

Expanding the Impact and Transforming The Use

The Geoheritage Landscape is Undergoing a Digital Transformation

Expanding the Impact and Transforming The Use

Digital Transformation is Underway - Today

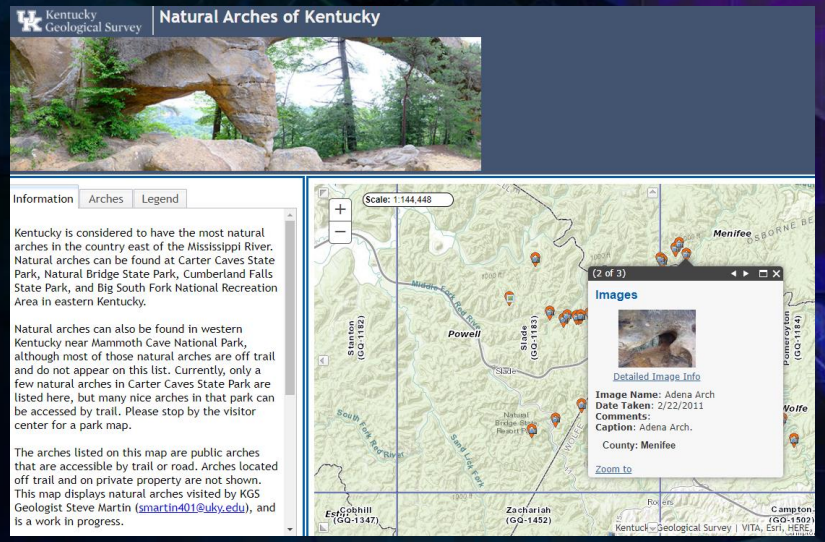
- Basic Digitalization Underway for quite sometime
- “Digital Natives” now on campuses and in organizations
  - Driving New Digital Innovation and Use
- Well positioned when COVID-19 lockdowns hit

- COVID-19
  - Turned “Interesting” Digital Projects into “Must Have”
  - Spurred Innovation


An Explosion of Innovation
Around Geoheritage Sites
EUROPE
ASIA
AFRICA

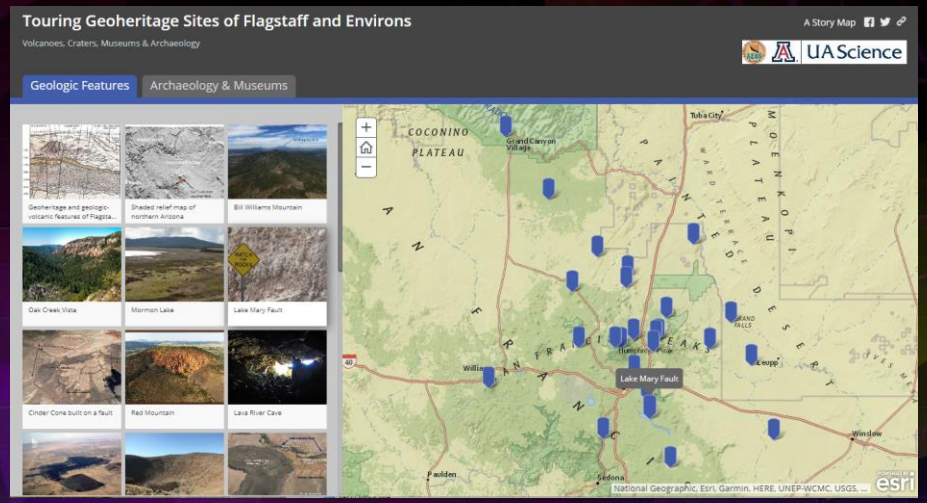
Geoheritage Tours

Tour of Natural Arches



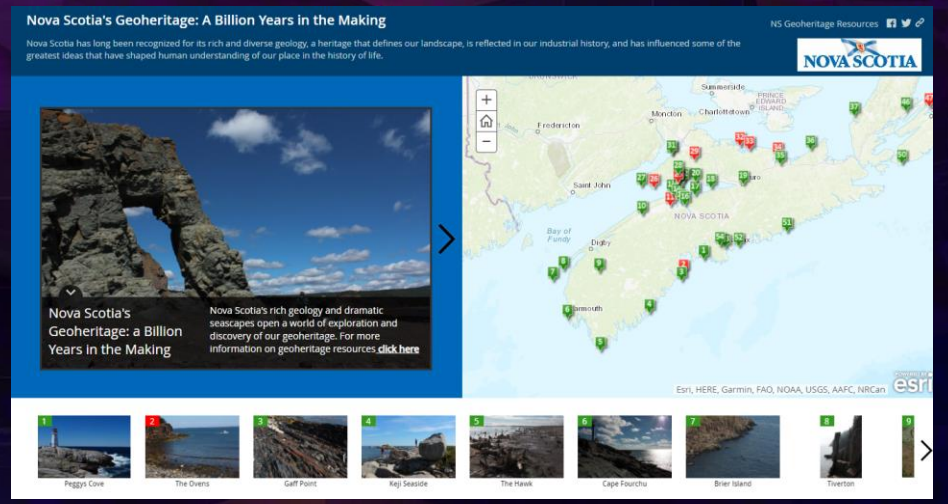
University of Kentucky
https://kgs.uky.edu/arches/

Tour of Geoheritage Sites



University of Arizona
https://uagis.maps.arcgis.com/apps/Shortlist/index.html?appid=fdc21ae7afe74716830194bd466f268a

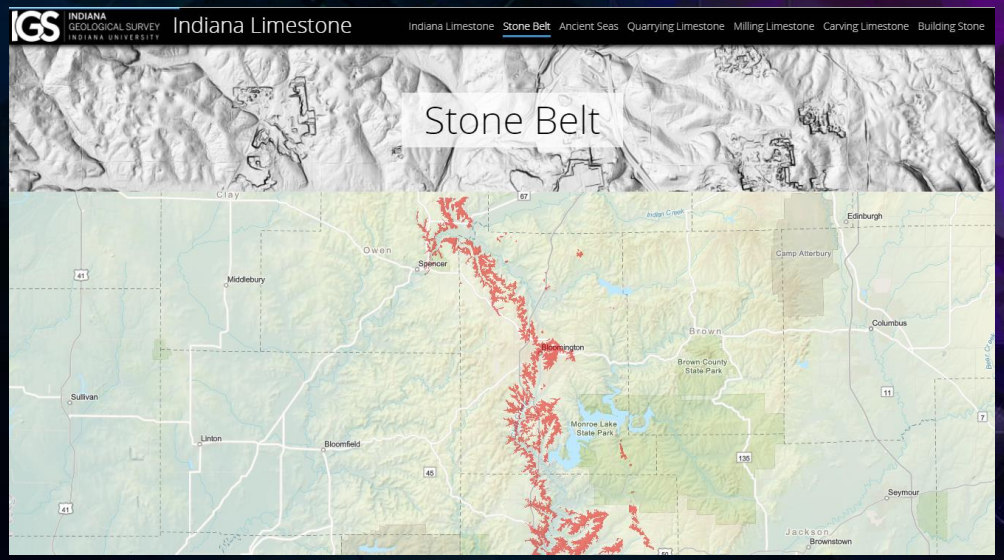
Tour of Geoheritage Sites



Geoscience & Mines Branch, Nova Scotia, Canada
https://fletcher.novascotia.ca/geoheritage_ns_tour/index.html

Landscape Exploration

Limestone Sources in Indiana

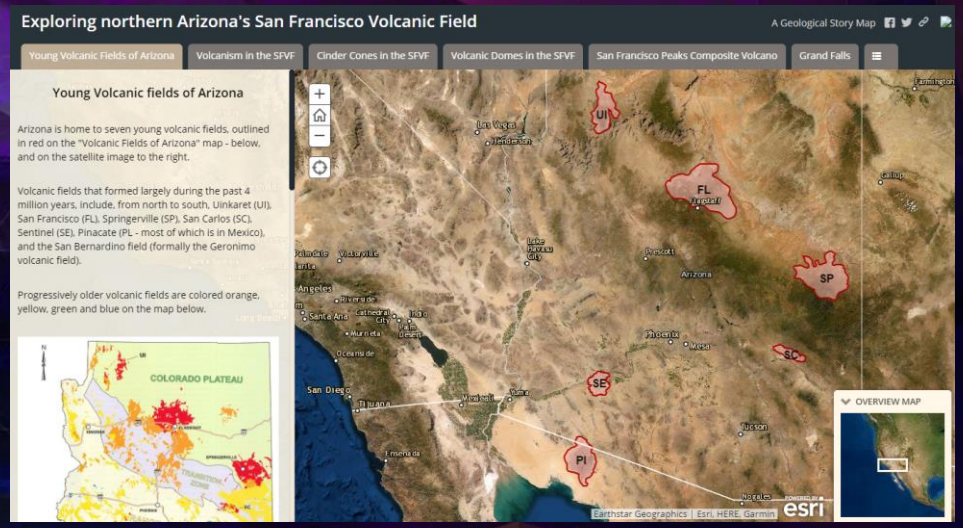


Indiana Geological Survey
https://igsmap.maps.arcgis.com/apps/Cascade/index.html?appid=b9ec967ce39a49cd8de6fd24aa14d477

Sapphires in MT

Montana Bureau of Mines and Geology
https://www.mbmg.mtech.edu/Information/Storymaps/sapphirestorymap.asp

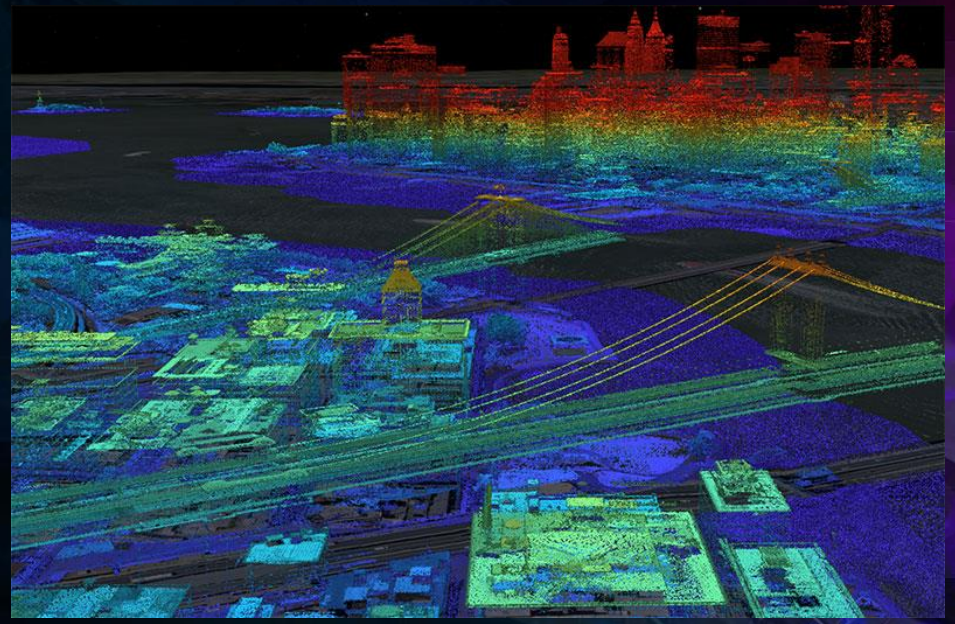
San Francisco Volcanic Field, AZ



University of Arizona
https://uagis.maps.arcgis.com/apps/MapSeries/index.html?appid=4bdb7afed5a649df98789cad92348ec8

Incorporating 3D Landscapes

Lidar

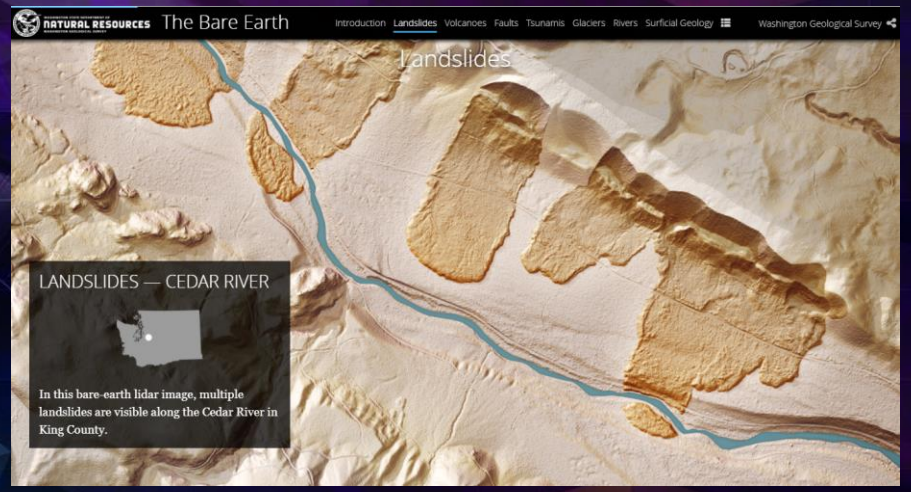


NYC DOITT
https://maps.nyc.gov/lidar/2017/

3D Exploration

Manitowoc County, WI
https://storymaps.arcgis.com/stories/d37d8a3d0d1e49579dce031be8aa36d9

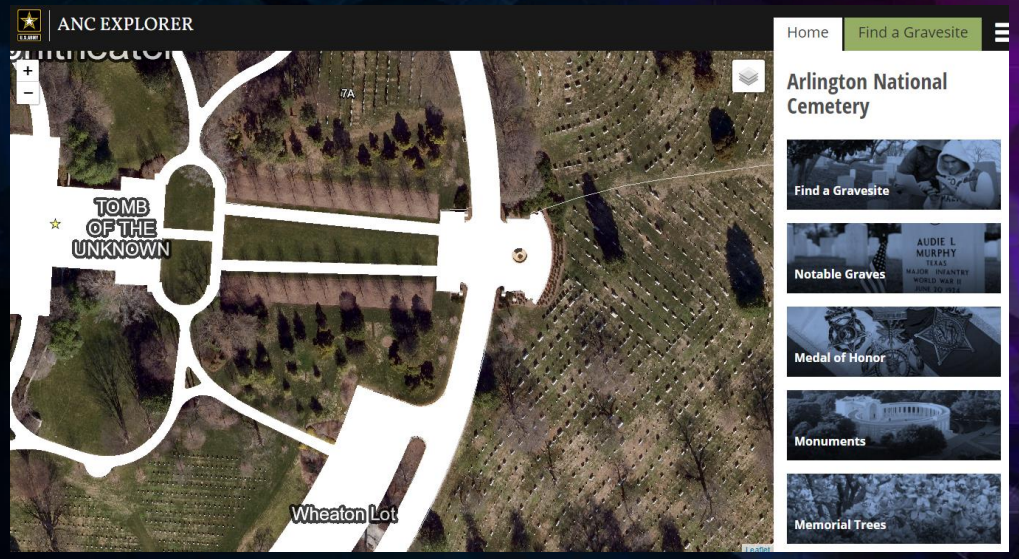
Landslides



Washington State DNR
https://www.arcgis.com/apps/Cascade/index.html?appid=36b4887370d141fcbb35392f996c82d9

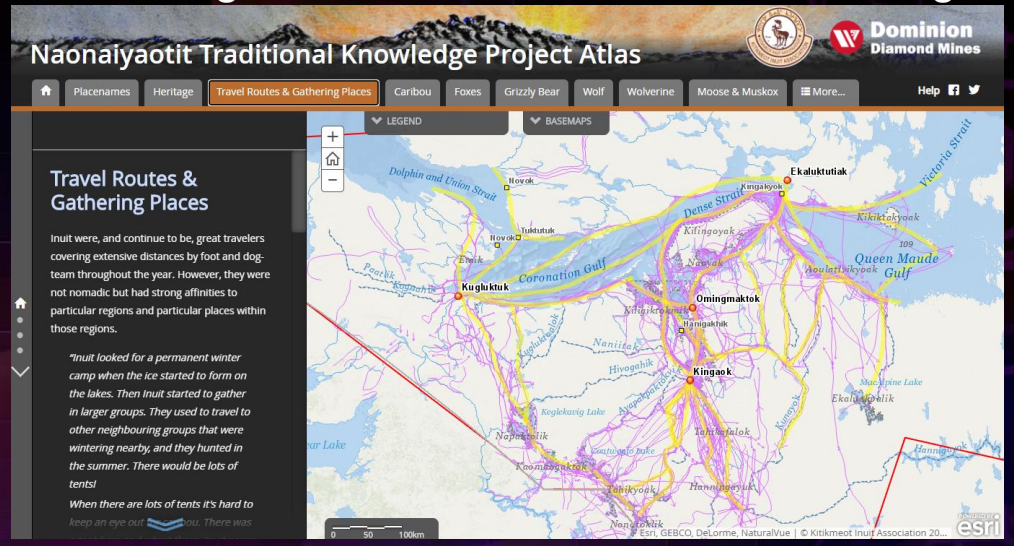
Cultural Exploration

Understanding Cultural Landscapes



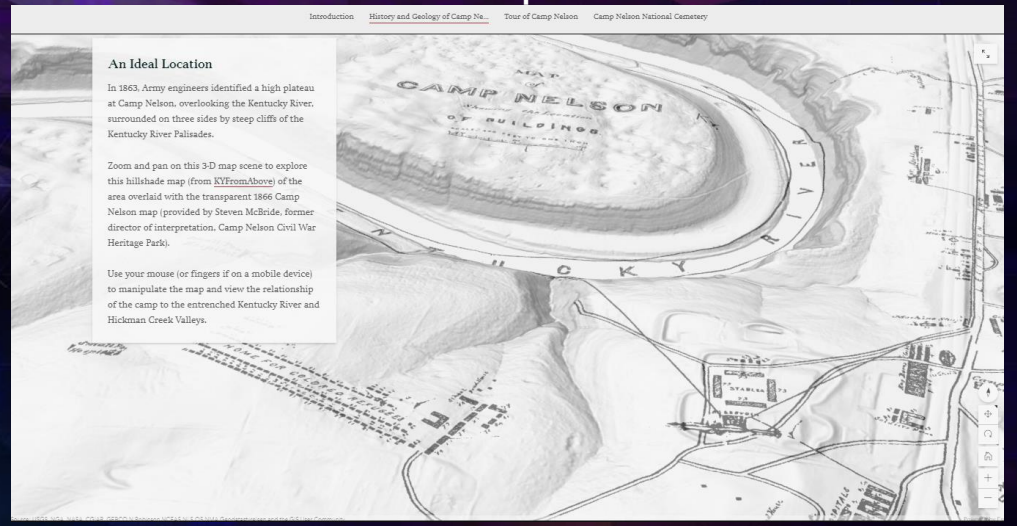
Arlington National Cemetery
https://ancexplorer.army.mil/publicwmv/#/arlington-national/

Preserving and Share First Nation Knowledge



Kitikmeot Inuit Association (KitIA)
https://www.ntkp.ca/

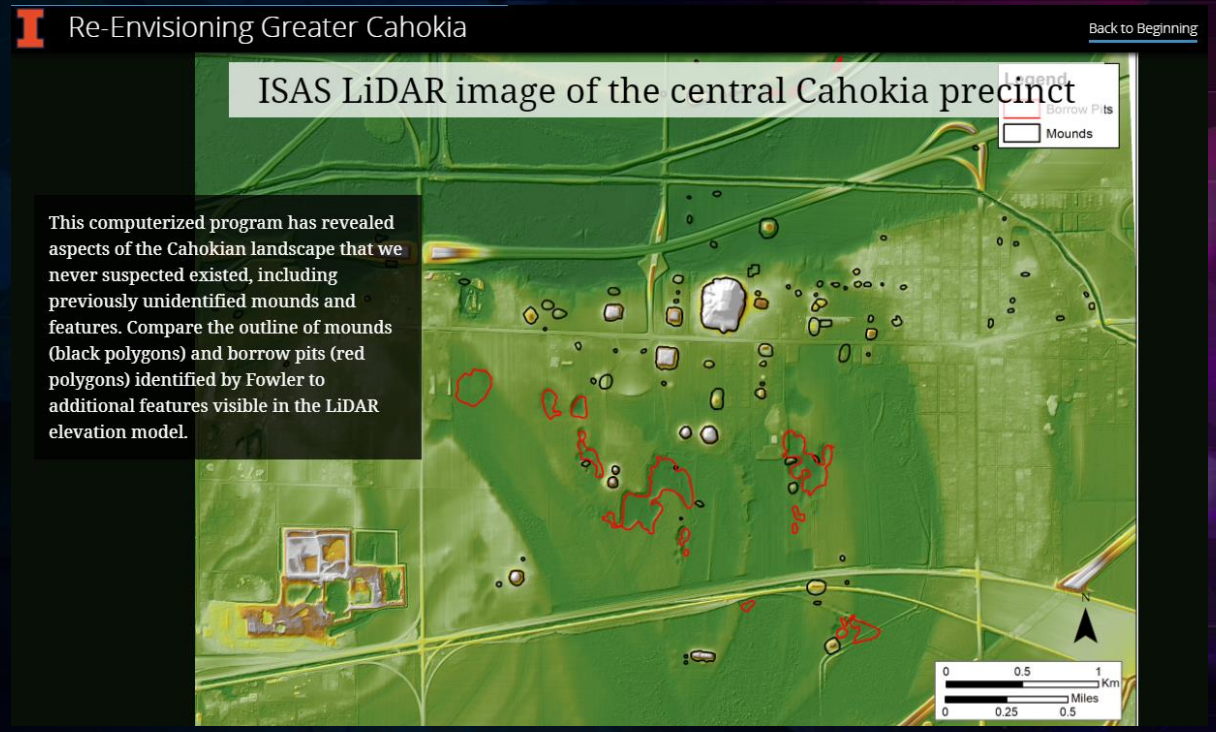
Historical Context: Camp Nelson National Monument



Kentucky Geological Survey
https://storymaps.arcgis.com/stories/a998ea07070543e6a7acda28a219bd4e

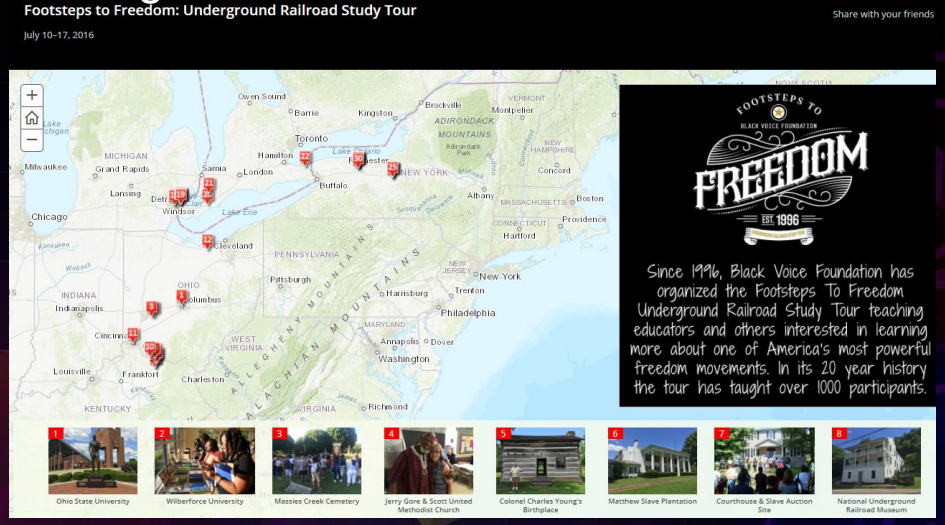
Rediscovering the Past

Exploring the Past with Technology



University of Illinois
https://univofillinois.maps.arcgis.com/apps/Cascade/index.html?appid=a58c2043100d4f3a891dc83d9bc00c2e

Underground Railroad



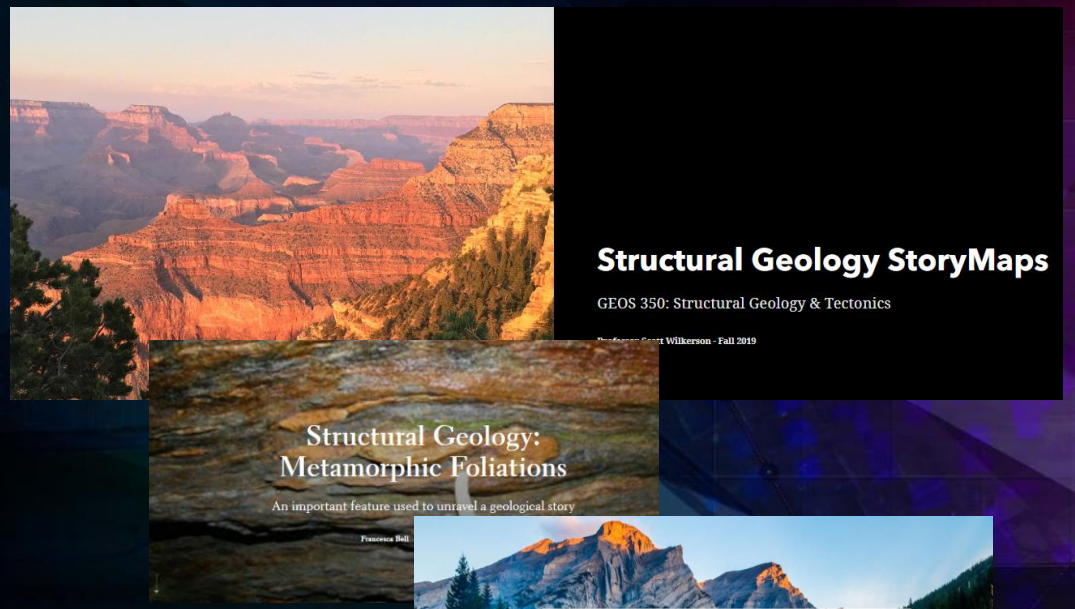
Footsteps To Freedom
http://www.arcgis.com/apps/MapTour/index.html?appid=4c58d41064114a638a94f31a2f61d676

Internment Camps

US Library of Congress
https://www.loc.gov/ghe/cascade/index.html?appid=69183af8d45d4f46a9dc4eba99440891

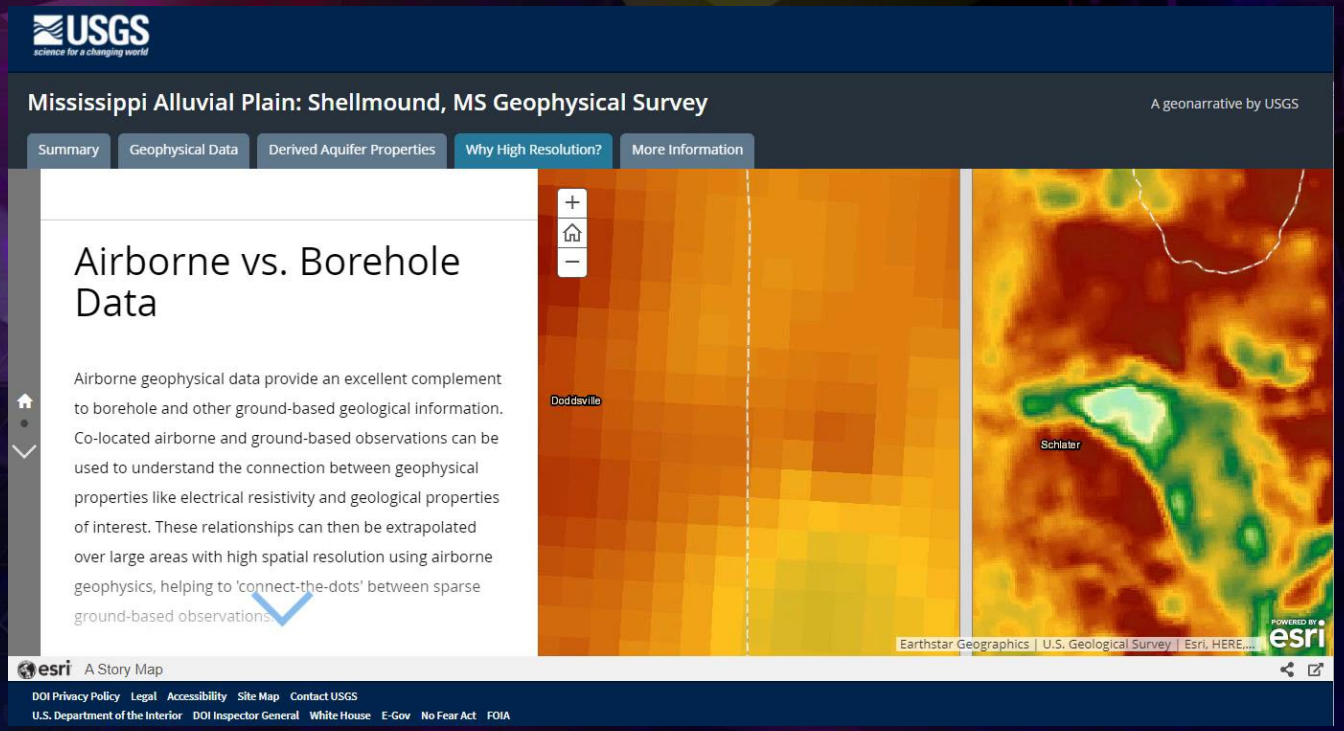
Science and Education

Class Material



DePauw University
https://storymaps.arcgis.com/stories/236ddc5c062e492184ca0a645e1eccc2

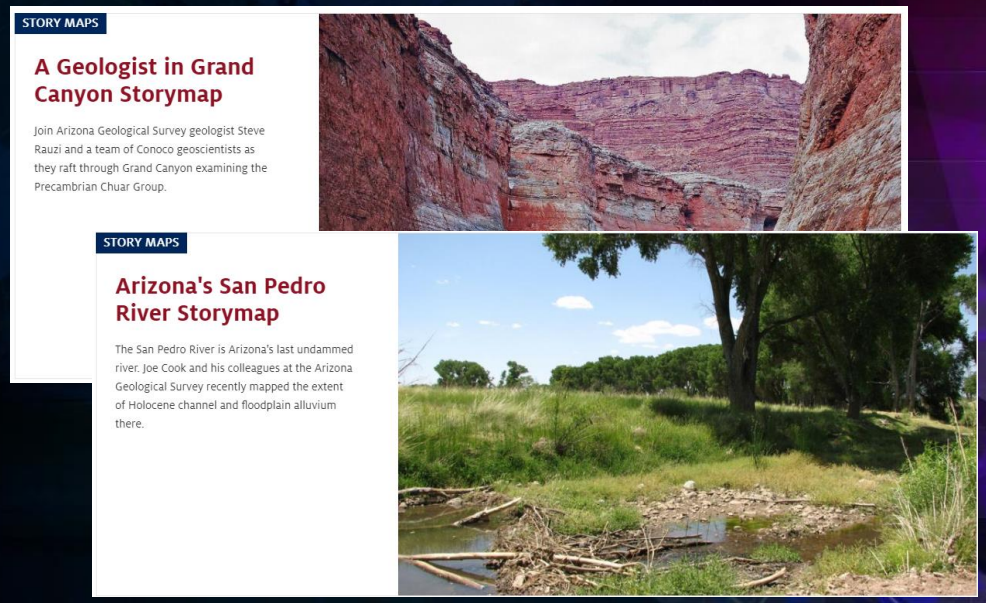
Geophysical Survey



USGS
https://www2.usgs.gov/water/lowermississippigulf/map/shellmound_SM.html

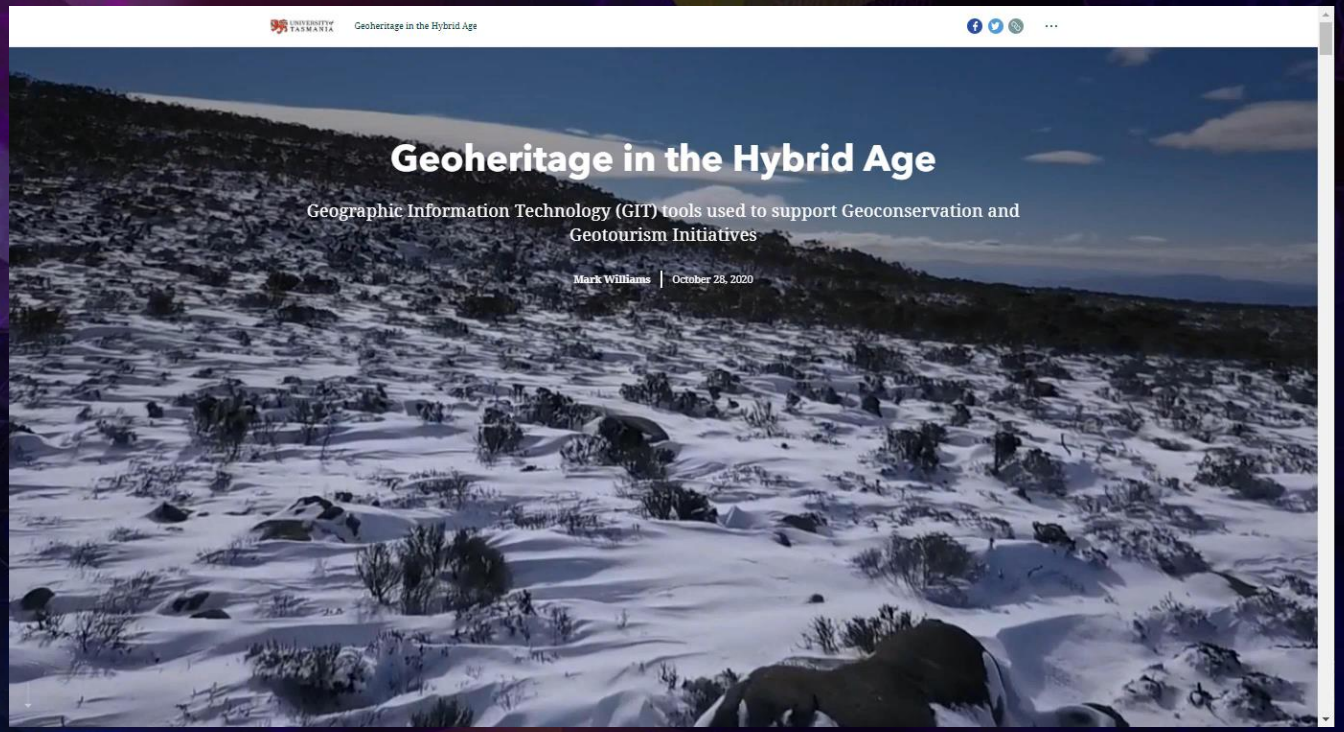
Science Communication

Virtual Guidebooks



AZ Geological Survey & University of AZ
https://azgs.arizona.edu/outreach-geoheritage/arizona-geoheritage

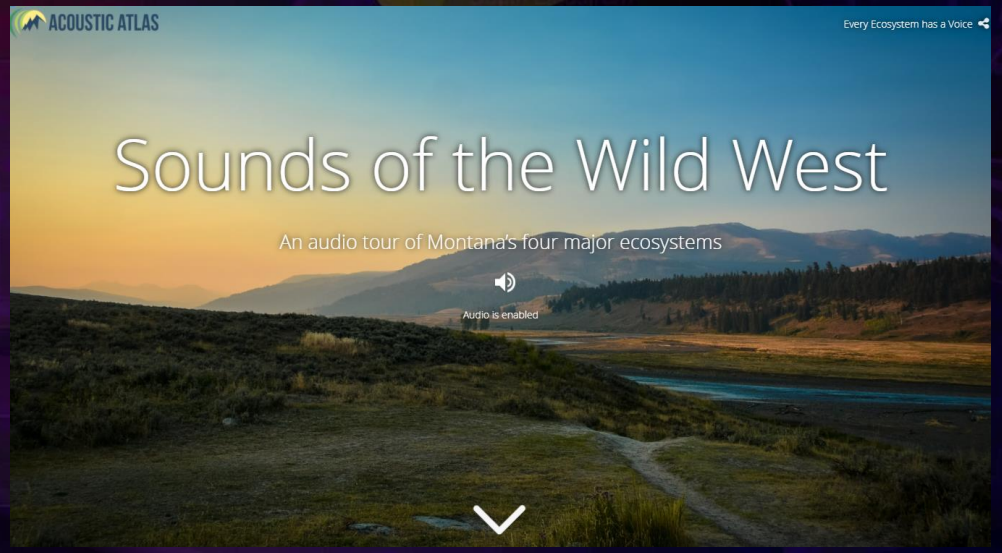
Geoconservation and Geotourism Initiatives



University of Tasmania
https://storymaps.arcgis.com/stories/f3fbc830c44d4f16a7f30003dc2b6714

Integrating Sounds and Geography

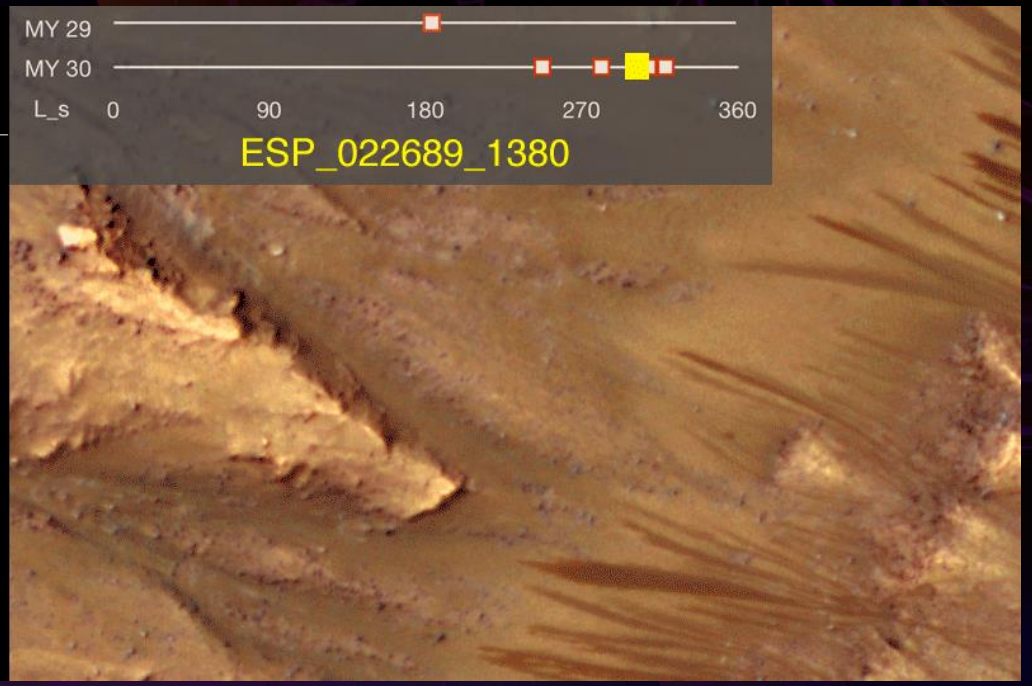
Sequoia and Kings Canyon NP, National Park Service
https://nps.maps.arcgis.com/apps/Cascade/index.html?appid=9f33fa32af394a129b0b548429dced01



Acoustic Atlas, Montana State University
https://storymaps.esri.com/stories/2018/sounds-of-the-wild-west/index.html

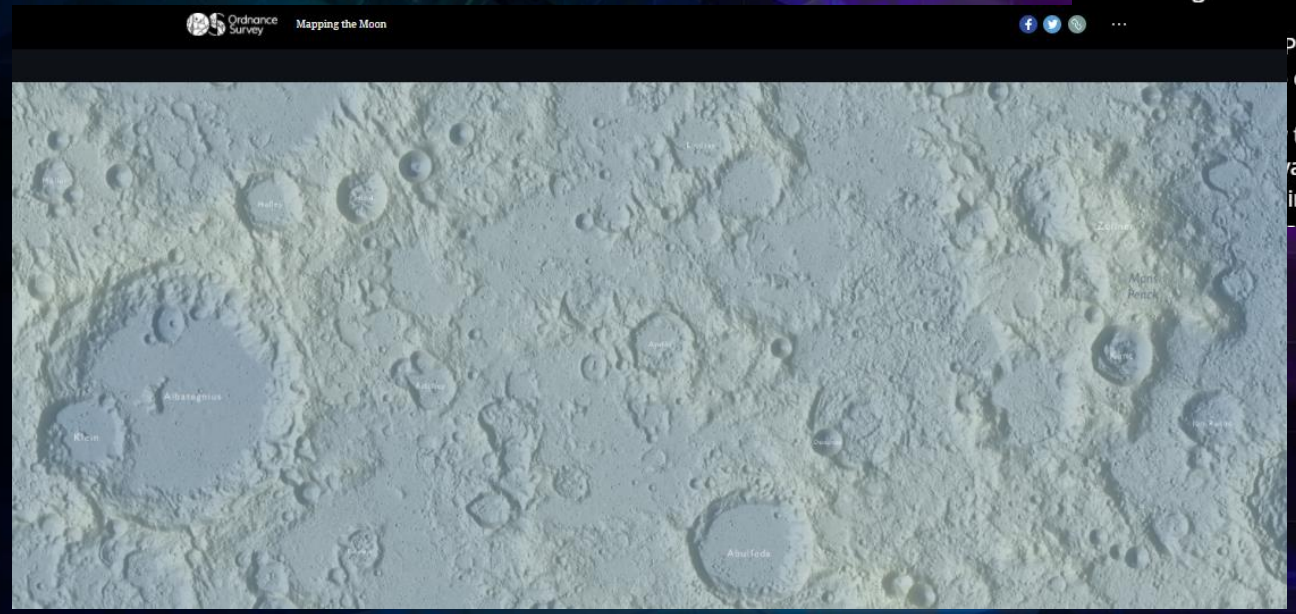
Other Planets

Liquid Water on Mars



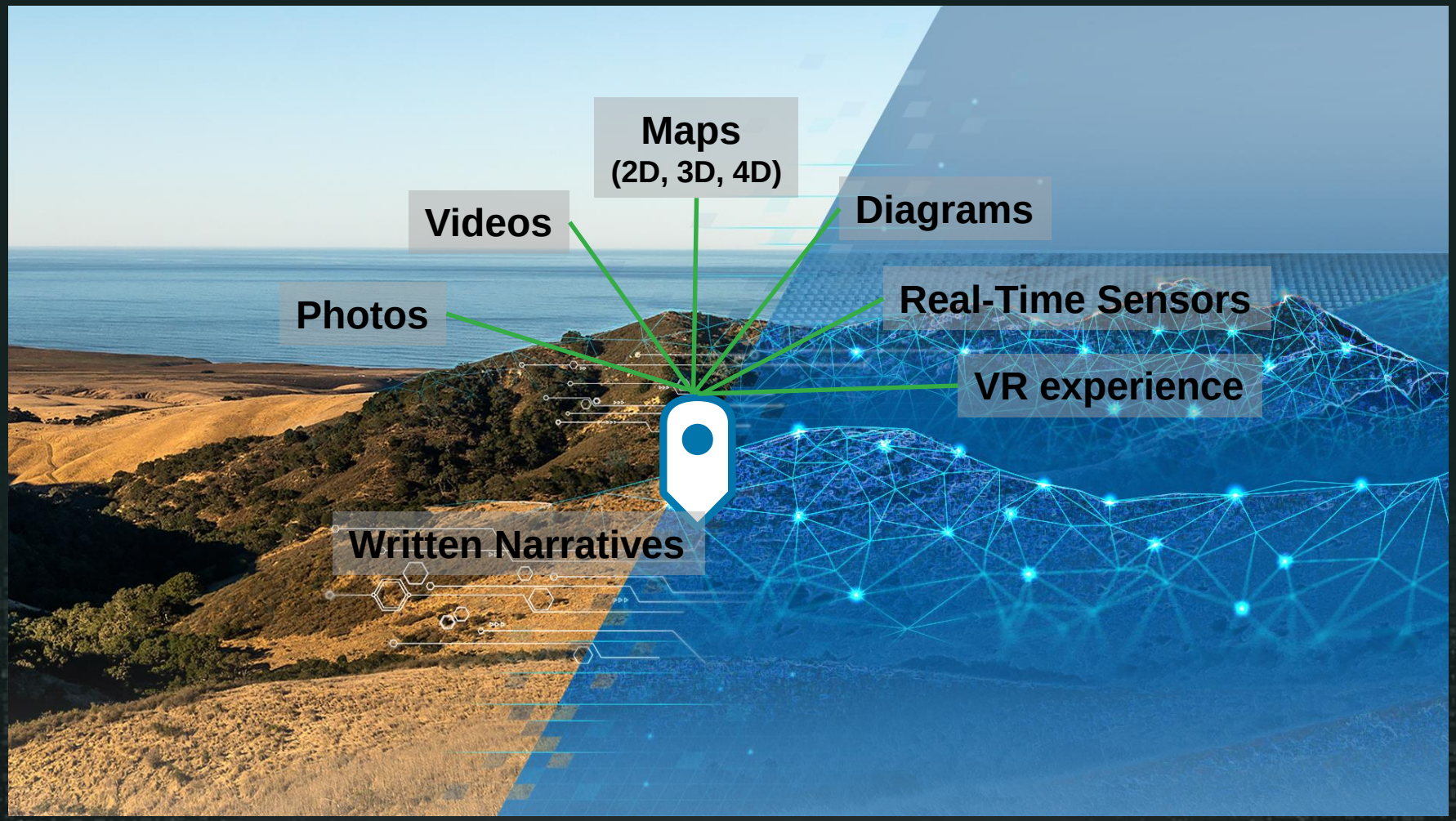
NASA/JPL
http://storymaps.esri.com/stories/2015/water-on-mars/

Moon Mapping



Ordnance Survey UK
https://storymaps.arcgis.com/stories/65f55419593744afbec48276c6e5b63c

Representation of Geoheritage Sites is Evolving



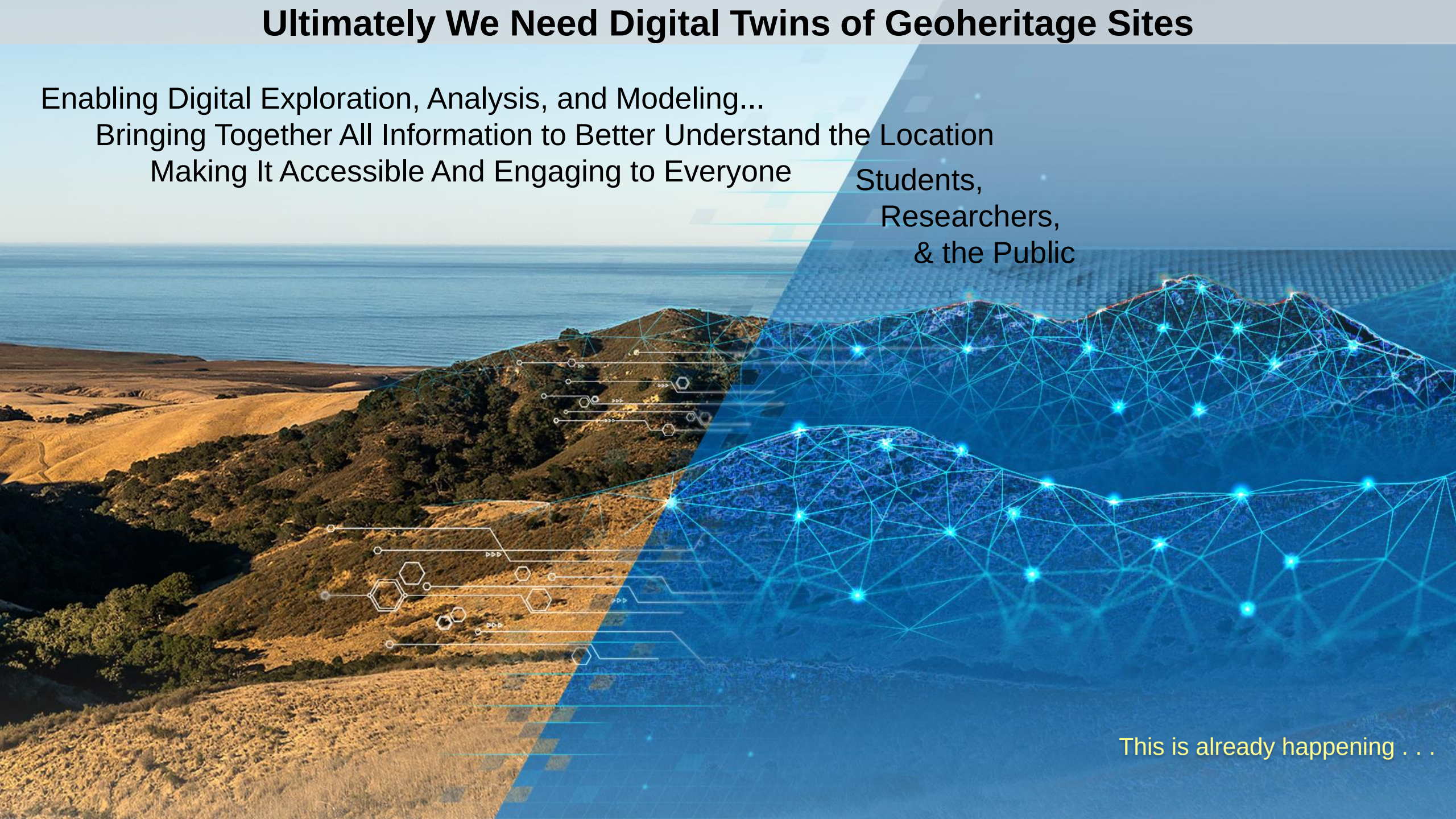
Using Geography to Integrate all Information

Technology is Also Helping in the Establishment of Geoheritage Sites

Ultimately We Need Digital Twins of Geoheritage Sites

Enabling Digital Exploration, Analysis, and Modeling...
Bringing Together All Information to Better Understand the Location
Making It Accessible And Engaging to Everyone

Students,
Researchers,
& the Public



This is already happening . . .

Developing a Digital Twin and Open Research Repository

Photo credit: Peter Montgomery

Challenges . . .

- “Level Up” in technology usage
- Pace of Change
- Staying Relevant / Interesting
- Expectations Change with Technology . . .
- Persistence of the data in a digital world
- A Complete Digital Twin is a lot of work

Realizing the Vision of how Technology Continues to Transform the Geoheritage Practice . . .

. . . Requires More Than Science and Technology

Art of Storytelling

Collaborating

Envisioning Solutions

Embracing Innovation

. . . Inclusive Mindset

The Work of Geoscience Professionals Is Critical . . .
Your Leadership Is Essential

Thank You for Everything You Do.

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