THE EDUCATIONAL EXPERIENCE OF AUGMENTED AND VIRTUAL REALITY:

AN APPROACH TO ANTHROPOLOGICAL AND ARCHAEOLOGICAL IMPLEMENTATION

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ARCHAEOLOGICAL LOSS AT PALMYRA

"In the end, we will conserve only what we love.

We will love only what we understand.

And we will understand what we've been taught."

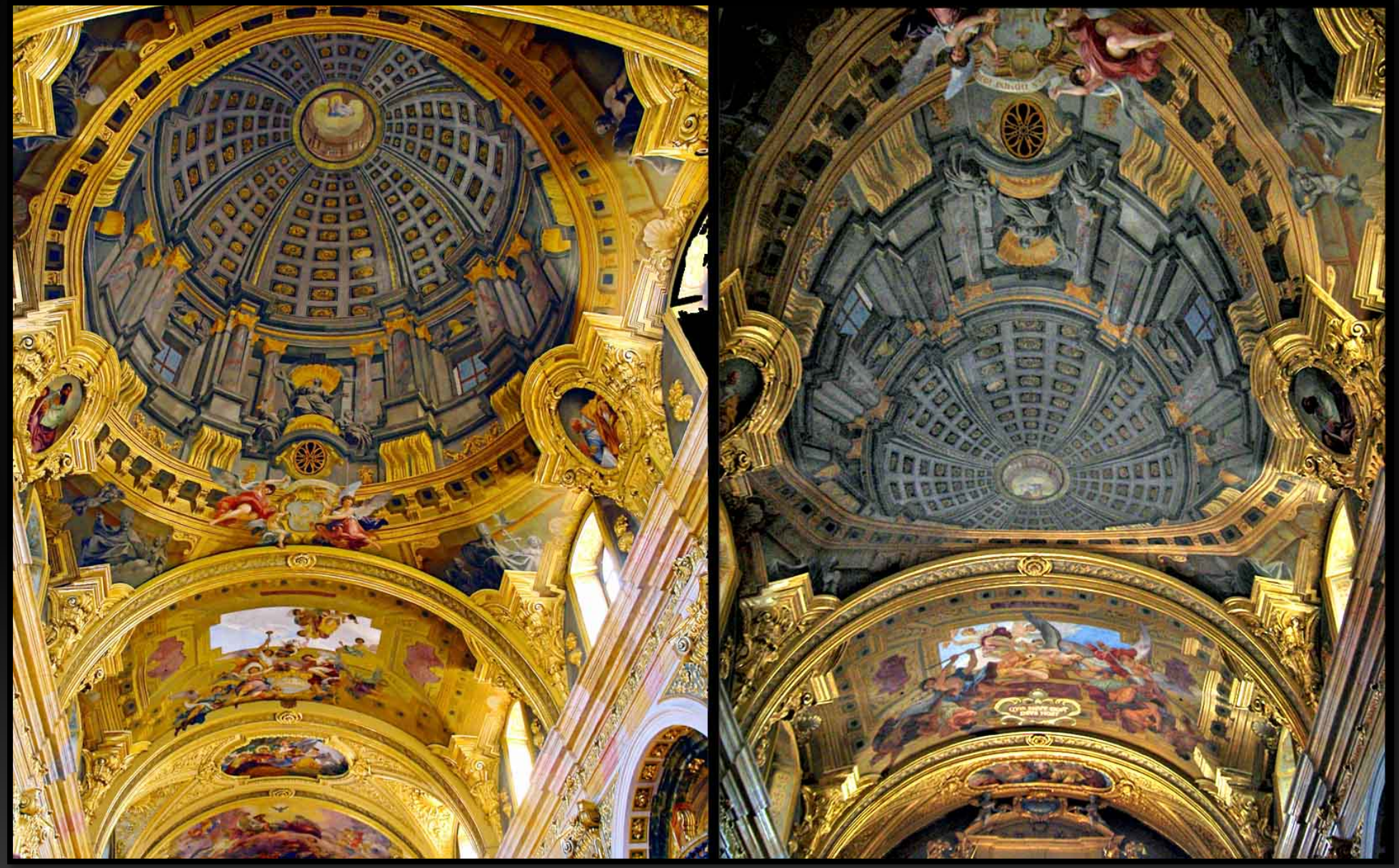
- Baba Dioum, Senegal 1968

RESEARCH QUESTIONS:

- *How can Virtual Reality, Augmented Reality, and Digital Representation be used to educate, interpret, and preserve archaeological and cultural resources?*
- *How can we standardize and best use the technologies?*
- *What can be said about the nature of experience, identity, and relationships as understood within the context of synthetic reality in educational entertainment?*

TROMPE-L'OEIL

EARLY ARTISTIC AUGMENTED REALITIES

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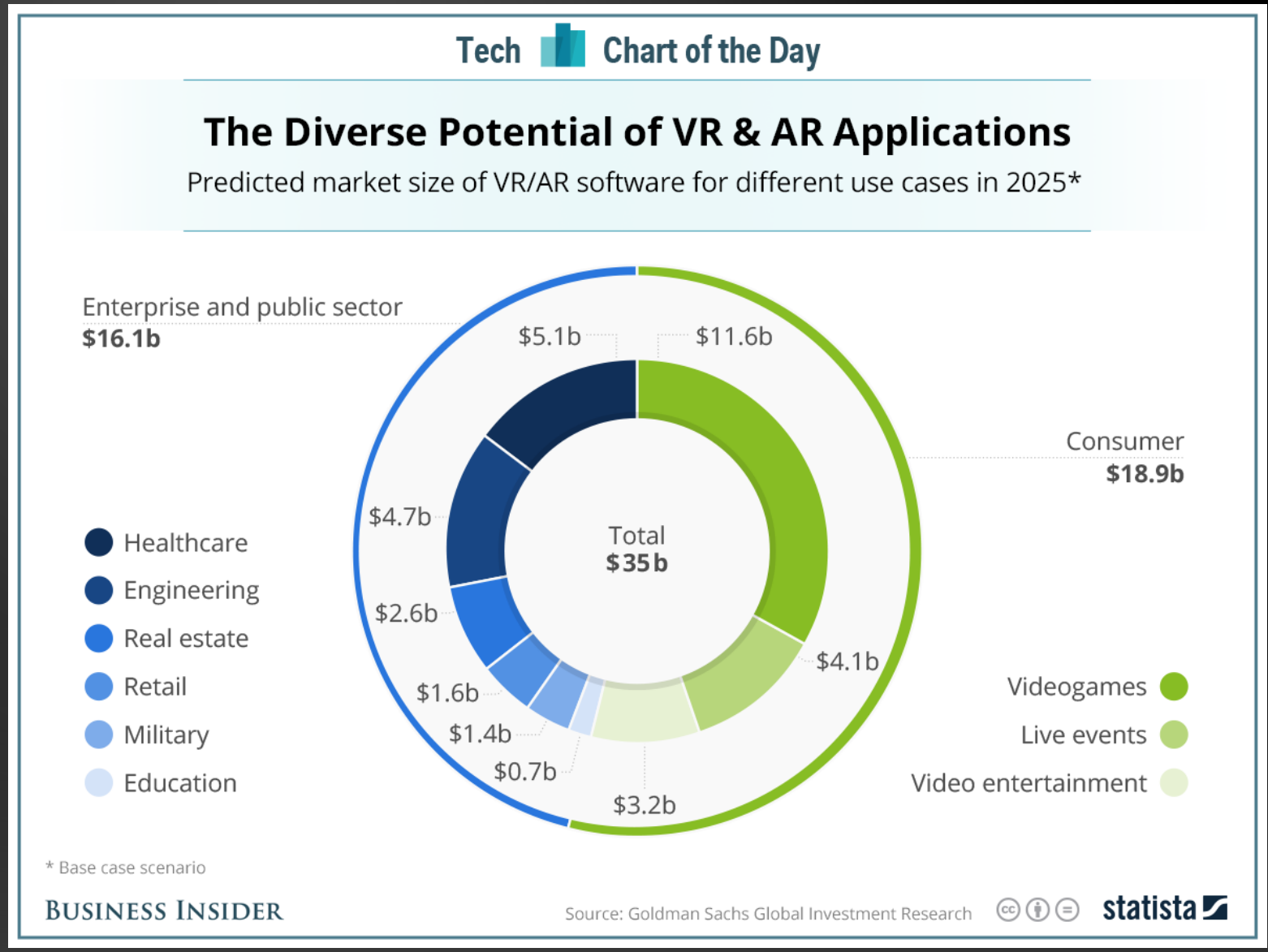
MARKET ANALYSIS:

- Diverse Applications of VR and AR Uses
- Projected Market Size of Use-Cases by 2025
- Note portions of Videogame and Education uses



http://www.businessinsider.com/goldman-sachs-vr-and-ar-market-size-and-segmentation-2016-4

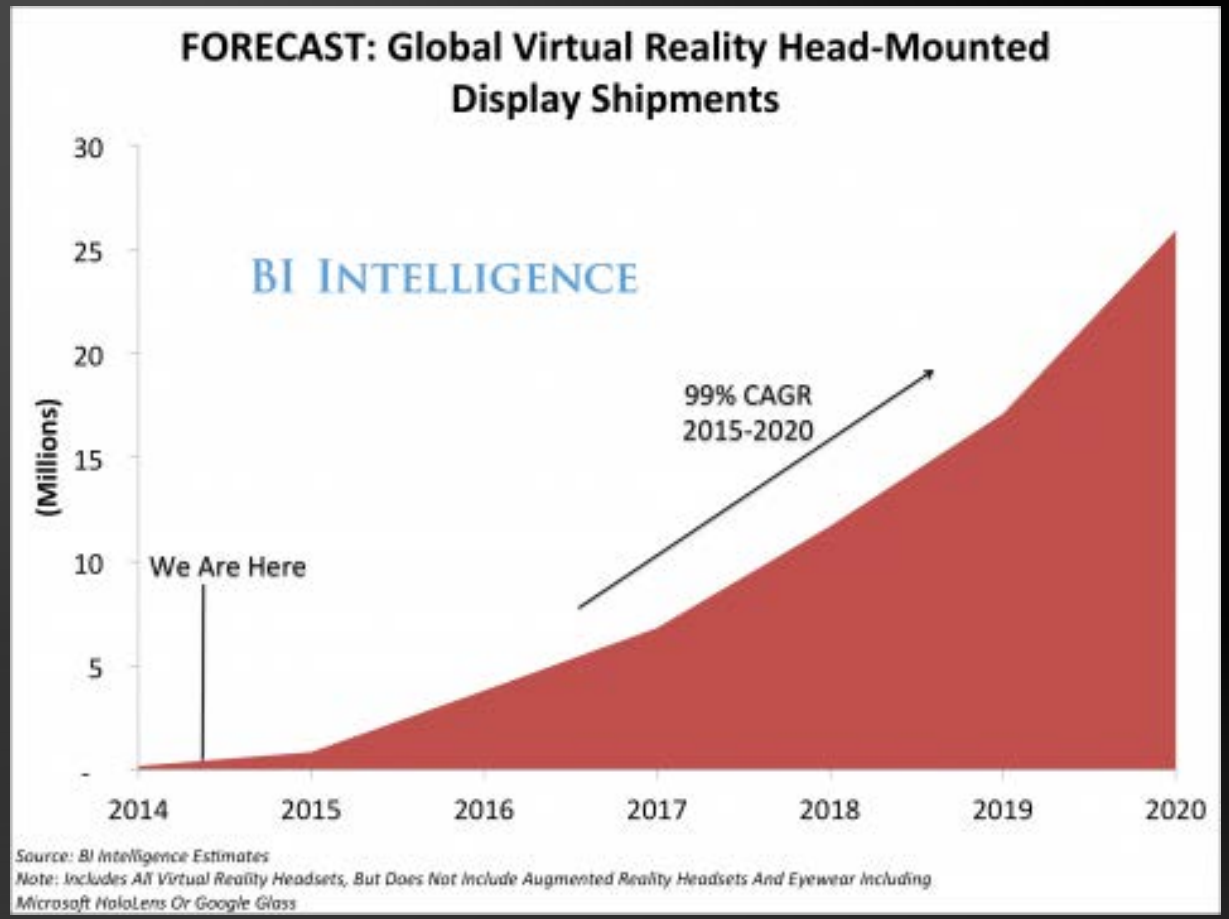
Current Consumer Products:

- Oculus Rift
- Vive
- Samsung Gear VR (with smartphone)
- Google Cardboard (an affordable option open to everyone with a smartphone)
- http://www.instructables.com/id/DIY-You-Virtual-Reality-Headset-Google-Cardboard/

Gaming Industries and other Media, in addition to Real Estate and some Museums and Internet-based Exhibitions are launching applications, such as:

- Steam (popular gaming purchasing portal)
- Facebook (popular social networking site)
- Google Maps Street View (in some locations)
- Assembly, New Zealand: http://assemblyltd.com/work/exhibit-01-humpback-whale
- Museum of Stolen Art: http://mosa.ziv.bz/
- Science Museum of London: http://www.sciencemuseum.org.uk/about_us/history/shipping.aspx

- Based on Market Reports Released in June 2015:
- Financial Growth Reveals in Headsets Expected Increase in Ownership and Popularity (see Compound Annual Interest Growth Rate Chart to right[1])
- Headsets in Conjunction with Additional Areas of the Market Expected to Generate Over $150 Billion by 2020[2]



- References:
- 1) http://www.businessinsider.com/virtual-reality-headset-sales-explode-2015-4;

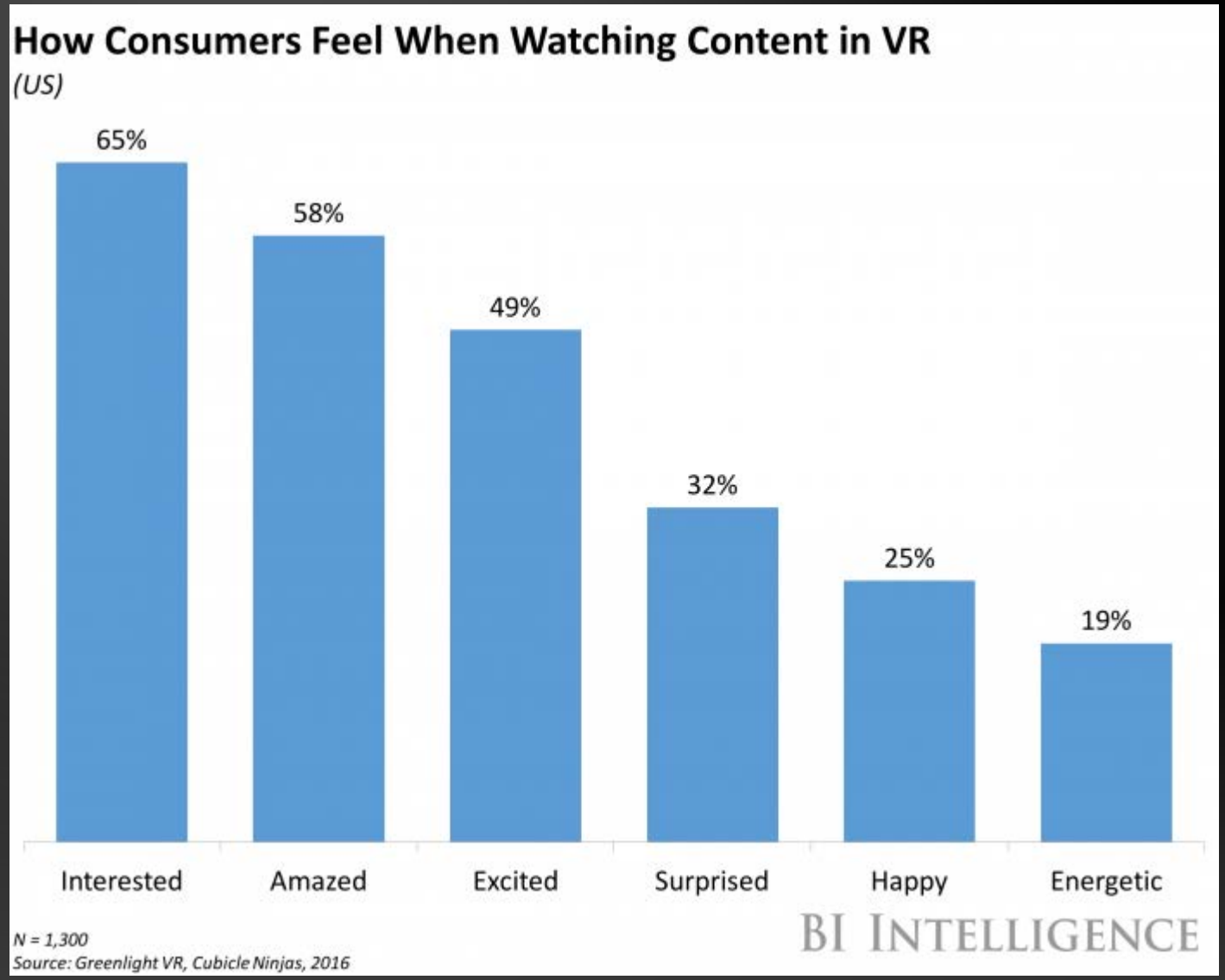
2) http://fortune.com/2015/04/25/augmented-reality-virtual-reality/

Current Research Follows Projections:

GreenLight VR hosted a survey of user experience, documenting consumer interest (see chart to right[1])

"Total revenue for virtual reality (VR) and augmented reality (AR) is projected to increase from $5.2 billion in 2016 to over $162 billion in 2020, according to the IDC[2]"

What this means to us: **This technology is following projections, and it will be a very popular new medium that can be used to promote, educate, preserve, and eventually interpret our cultural heritage sites in a way that is low cost and non-destructive.**



References:
1) http://www.businessinsider.com/virtual-and-augmented-reality-markets-will-reach-162-billion-by-2020-2016-8
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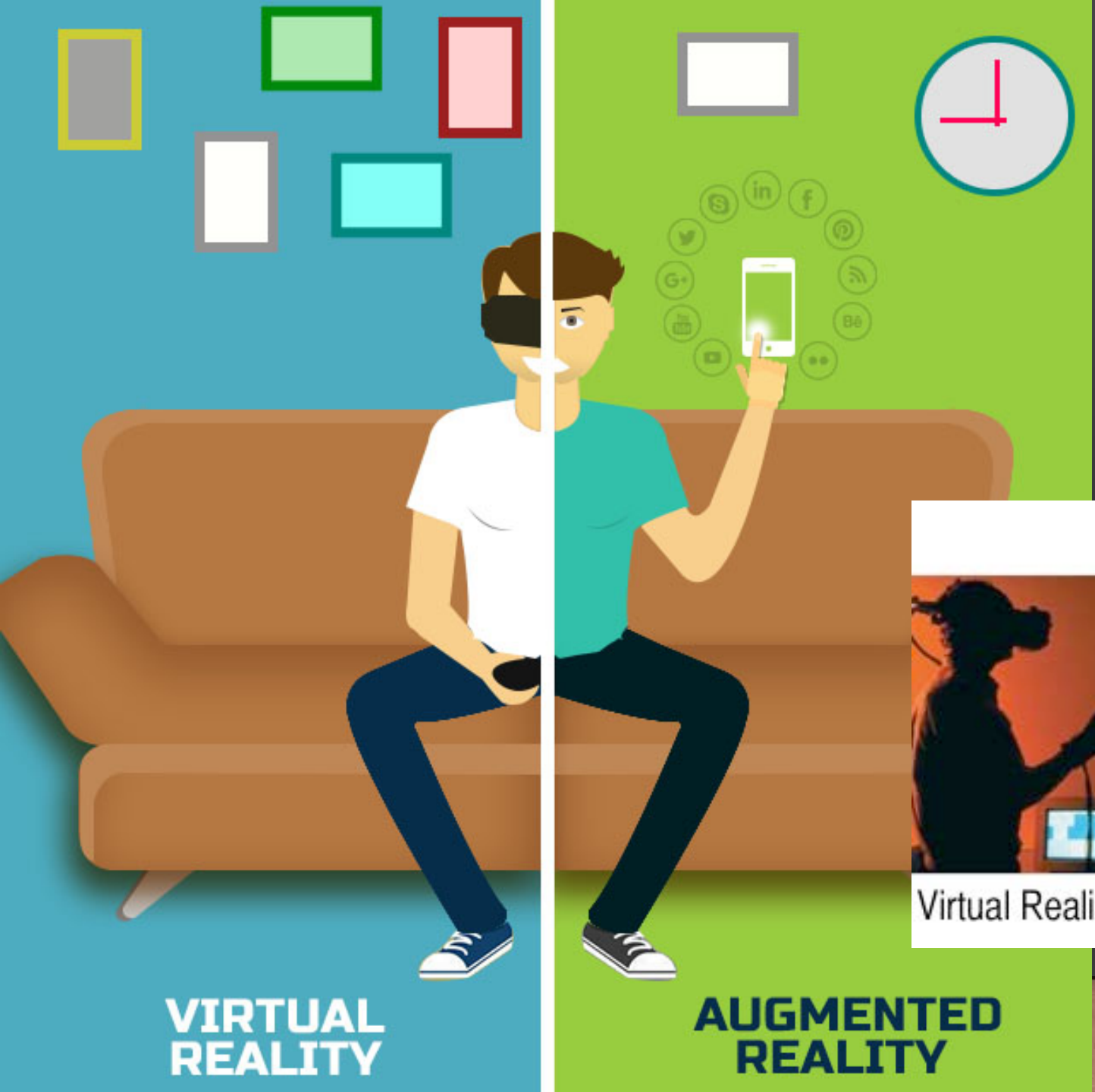
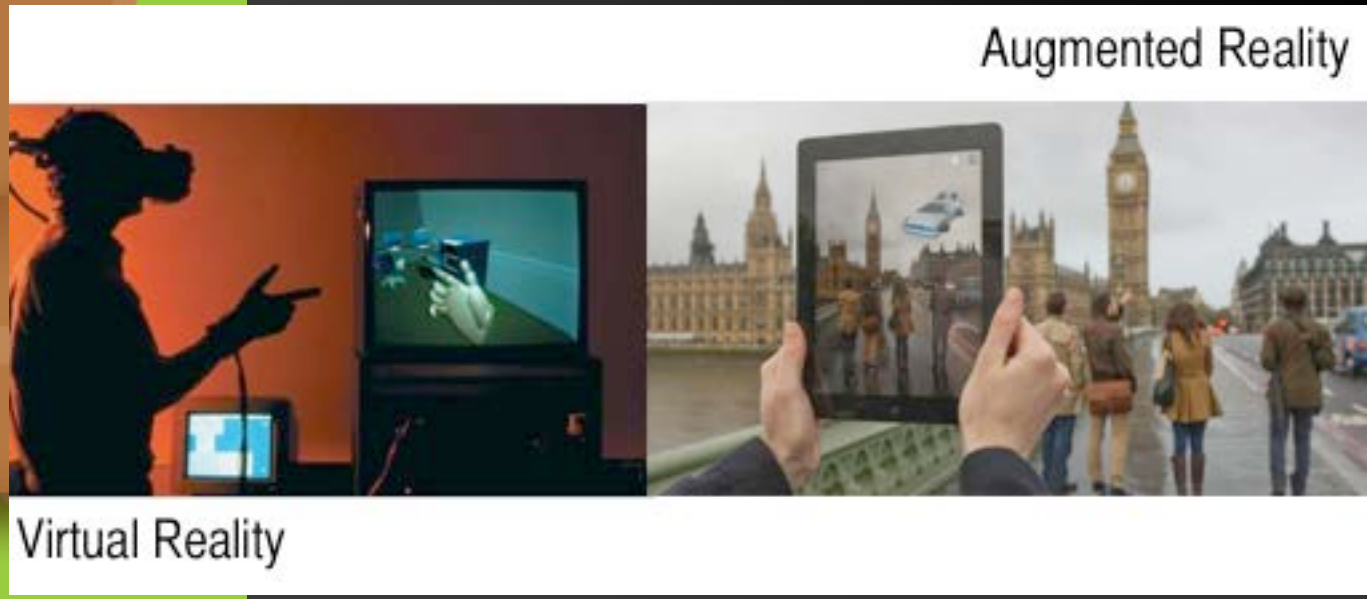
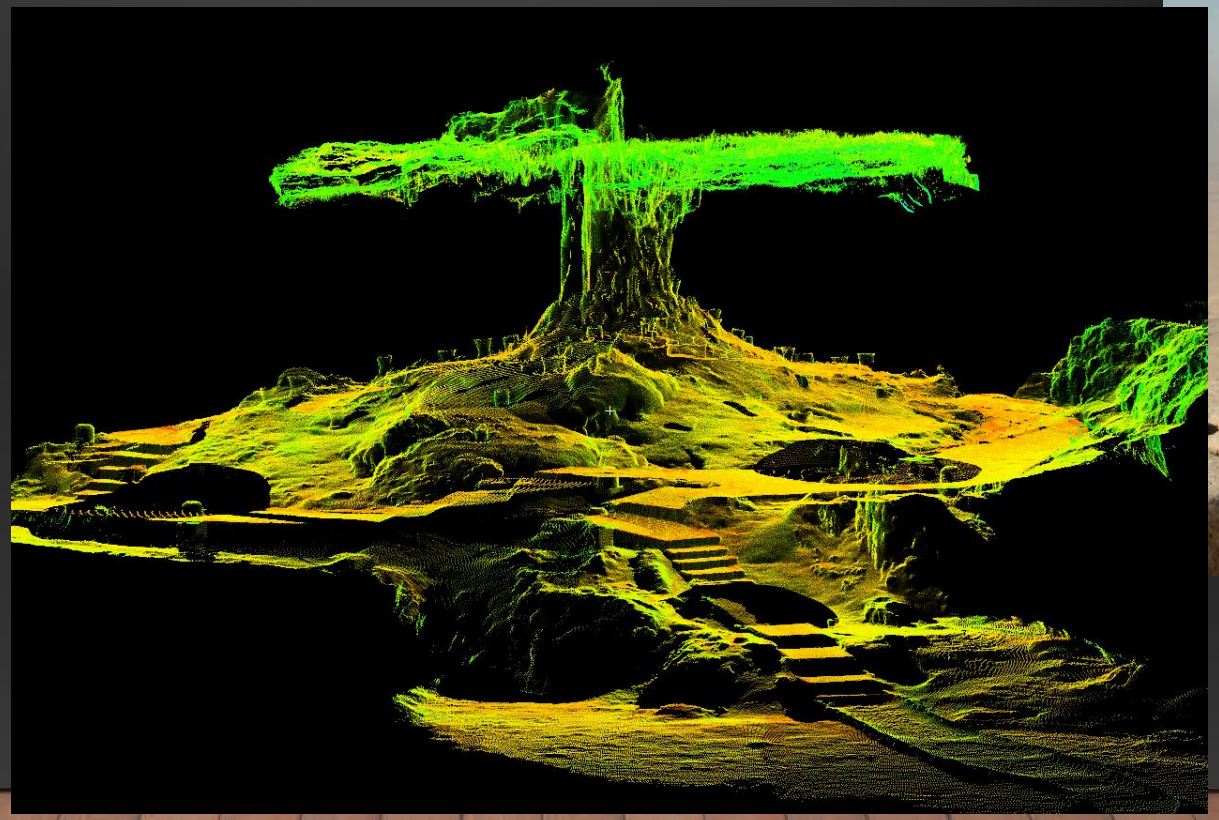
Virtual vs. Augmented Reality





CURRENT APPLICATIONS OF VR FOR HERITAGE & HISTORIC SITE VIEWING

- 3D Models
  - Built in programs such as Blender or Maya
  - Can be visualized both online in 3D or used in VR once prepared with Unity or Unreal engines
- Point Clouds
  - Photogrammetry: Photos stitched together in programs such as Agisoft SFM
  - Laser Scanner: Large-scale point clouds to produce 3D Models
  - Can be visualized both online in 3D or used in VR once prepared with Unity or Unreal engines
- WebVR (in the works)
  - Many of these applications will soon be available on the web so they are accessible on all platforms



EDUCATION

INTERACTIVE VERSES DIDACTIC LEARNING

DYNAMICALLY IMMERSIVE CURIOSITY AND CRITICAL THINKING

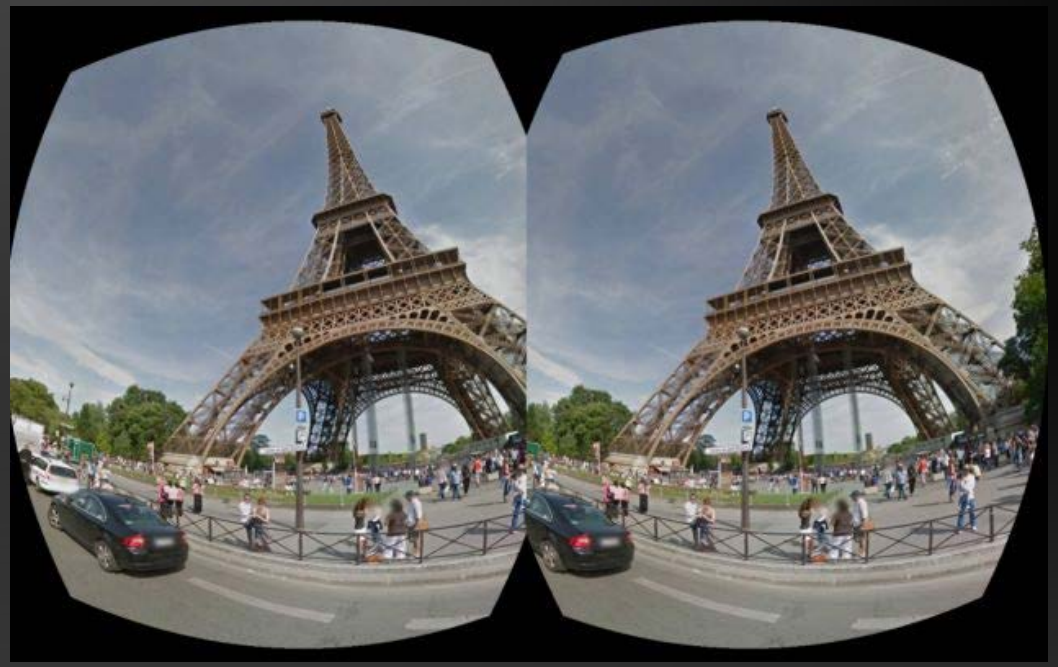
EDUCATION

- Interactivity and Discovery breed Curiosity and Critical Thinking Skills in all ages, as many studies show in both museum education and archaeology
- Interactive learning methods and dialogues continue to result in more engaged students and visitors opposed to more traditional didactic methods and monologue lectures
  - Roussou 2001, 2006; Stone 1997; Little 2002 among many others
- Google's VR Classroom Education Initiative, Expeditions, now in development utilizing the cost effective Google Cardboard VR viewer
  - https://www.google.com/edu/expeditions/

EDUCATION

- Virtual Reality coverage of sites will increase accessibility and awareness about local and non-local heritage sites and their importance, which is a primary goal of public archaeology, creating a more informed public

- As archaeology can be viewed as "educational entertainment that sells" (Little 2002: 16), Immersive Virtual Tours and Exhibits offer a fun and consumable way for archaeological sites and interpretations to be presented to the public



PRESERVATION

DOCUMENTED SNAPSHOT IN TIME

TOURISM WITHOUT DETERIORATION

PRESERVATION THROUGH VR PRESENTATION

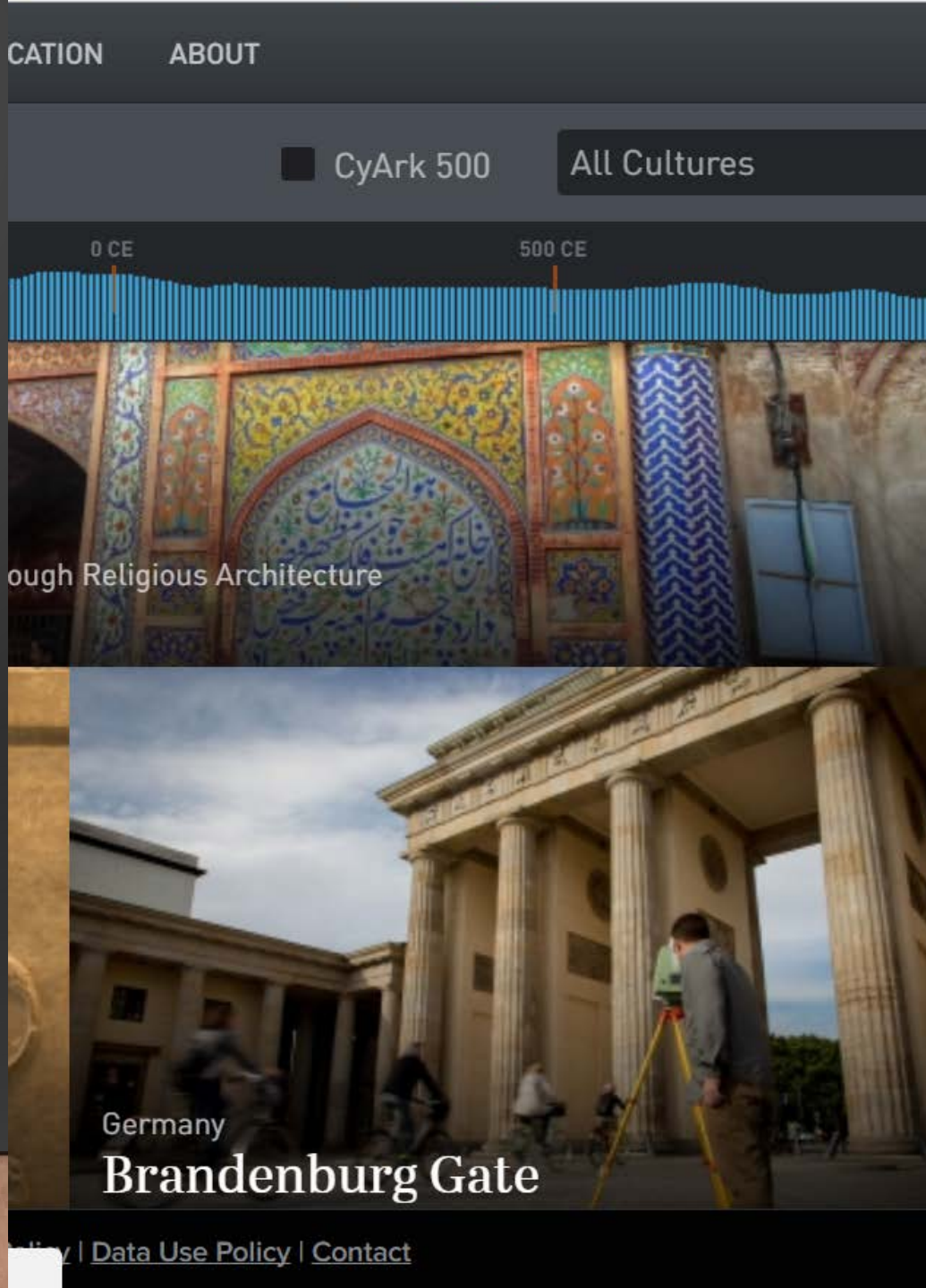
- Preserving 360° snapshots in time, digitally recorded of Heritage Sites
  - Dynamic, not static images, that can be archived and updated if necessary
  - Creating a database of excellent resources of archaeological and historical information for an uncertain future

- Allowing greater accessibility to sites without damaging effects of traffic
  - Reaching a wider audience than possible through physical connection while allowing for autonomy and discovery without ropes, lines, or traffic
  - Maintaining site structure and context while granting access to a wider audience without fear of contamination or destruction of evidence or deterioration of the site

PRESERVATION THROUGH 3D DIGITAL REPRESENTATION

- CyArc and UNESCO Work on Preservation:
- http://www.cyark.org/projects/chichen-itza
- http://archive.cyark.org/monte-alban-gallery-all#
- http://cyark.org/projects/xochicalco

- A Sample of Academic Projects:
- http://www.mayaarch3d.org/language/en/mayaarch3d-digital-collections/
- http://cisa3.myqnapcloud.com:8082/mexico/apr_2016_excavation/Op3B_Burial1_29Apr.html



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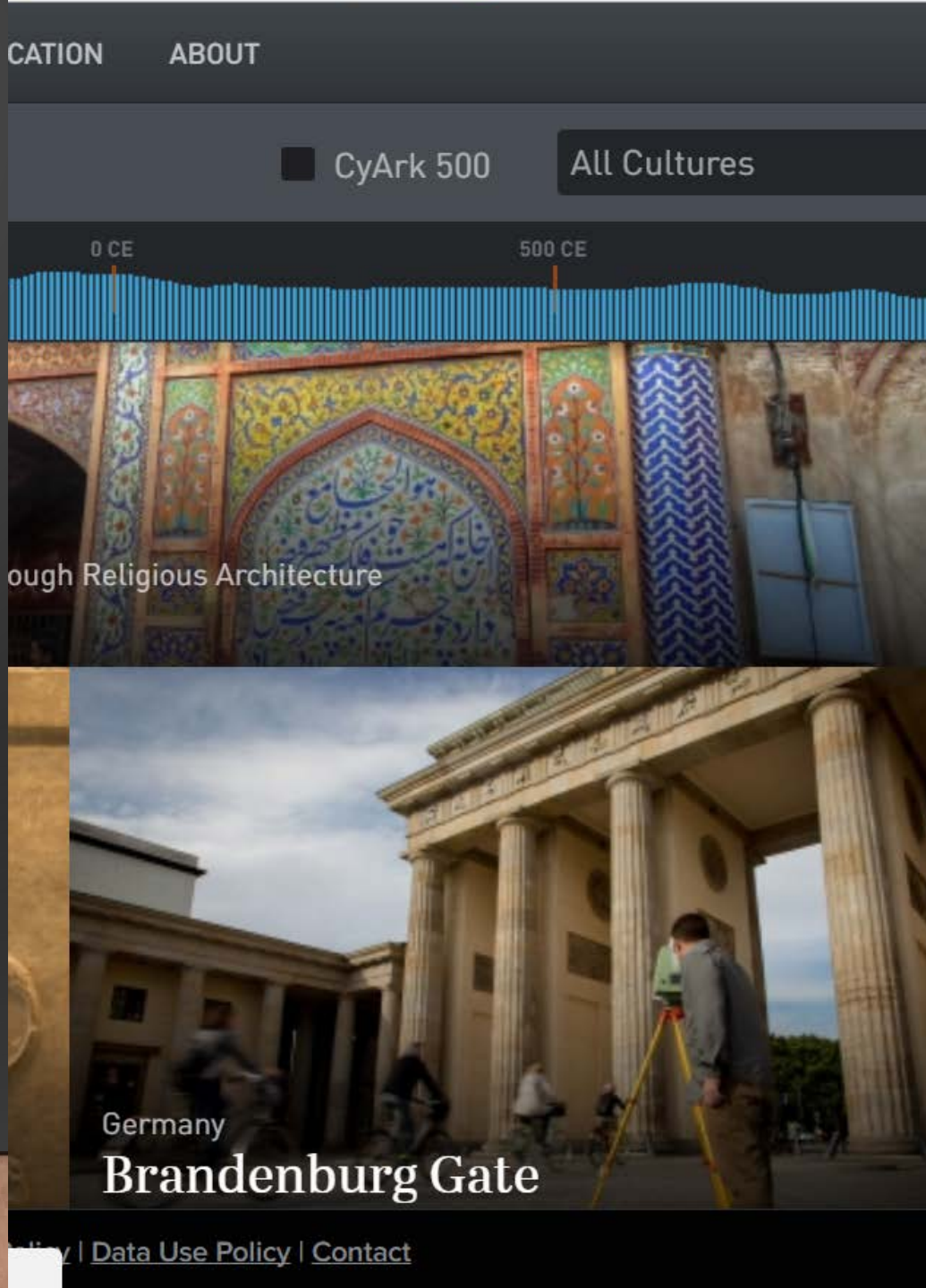

INTERPRETATION

A FUTURE GOAL OF INCORPORATING DYNAMIC AND IMMERSIVE INTERPRETIVE ENVIRONMENTS

INTERPRETATION THROUGH VR PRESENTATION

- Future versions of this technology will allow for more fluid movement in space, creating even more immersive and life-like experiences
  - Could be used for archaeologists to review work from remote sites or add in interpretive analysis of spatial usage or change over time
  - Could be combined with historical data to "recreate" virtual environmental or other conditions leading to potential interpretive data

INTERPRETATION THROUGH VR PRESENTATION

- Future versions of this technology will allow for virtual archeologically informed interpretive overlays of the past upon the existing environment, allowing people to experience contemporary interpretations of past cultures! The potential for future directions are very exciting!
- This can also be used for interpretation, digital preservation, and excavation level reconstruction.

ARCH 3D

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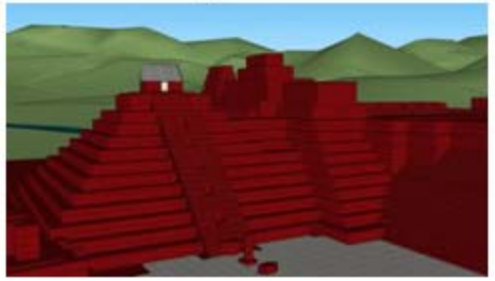
sing Lidar to reveal ancient buildings



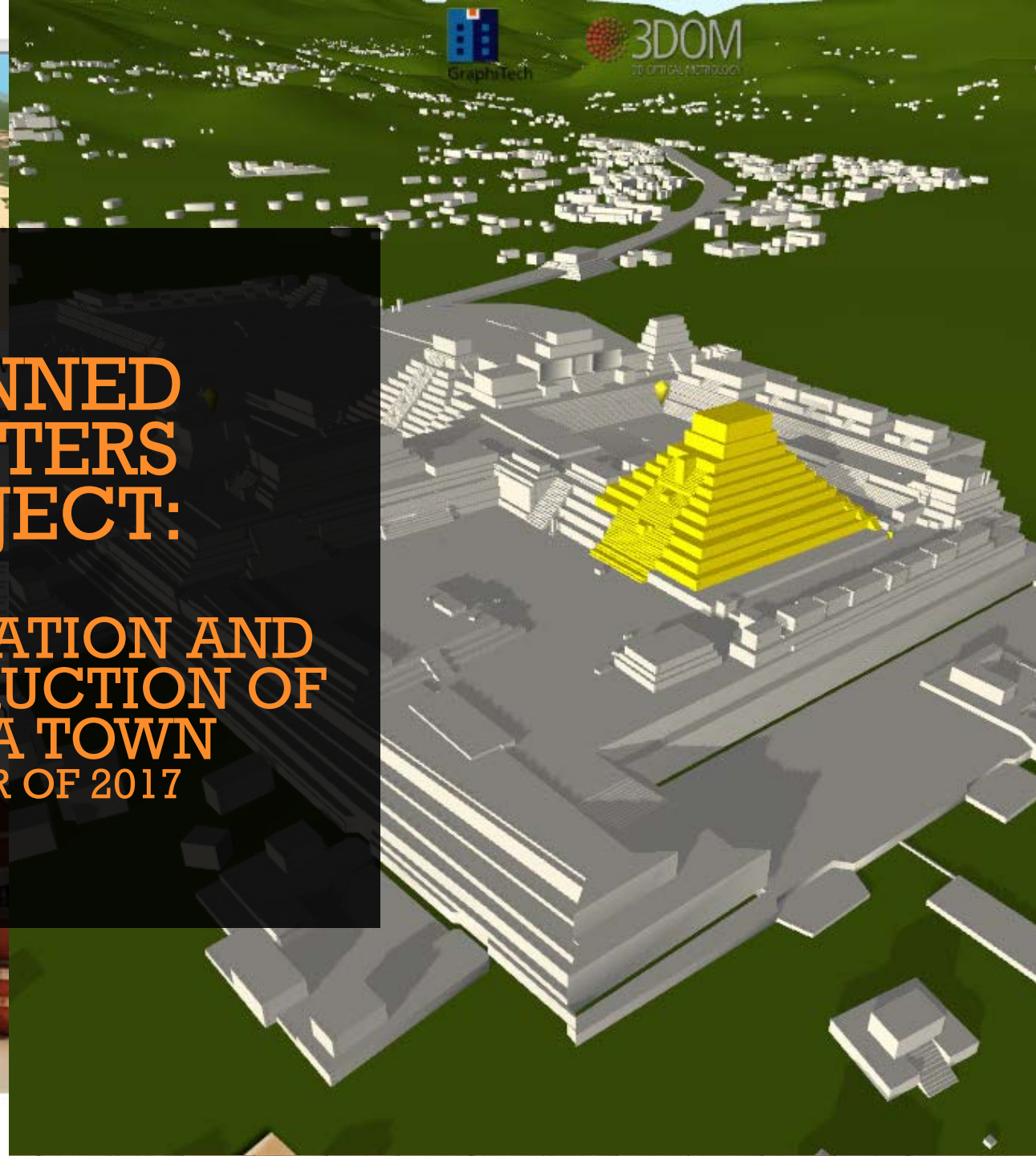
loring ancient landscape experience

GIS, aerial imagery & 3D tools for reconstruction of ancient temples

PLANNED MASTERS PROJECT:

DIGITALIZATION AND RECONSTRUCTION OF A MAYA TOWN

SUMMER OF 2017



BRINGING GLOBAL HERITAGE TO SMARTPHONES AND VR HEADSETS EVERYWHERE

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