3D Modeling of Han Dynasty Mirrors using application of Photogrammetry
Photogrammetry: what is it?

- Photogrammetry is a method of measurement and interpretation in order to derive the shape and location of an object based on a series of photographs of that object.
- Today it is a computerized process that produces spatial accuracy from photographs.
- Creates an output: 3D model, mesh, point cloud, map, drawing, measurement, etc.
3D Modeling Technologies: Pros and Cons

**Photogrammetry**

**Laser Scanning**
Types of Photogrammetry

- Aerial Photogrammetry
  - Scale: landscape

- Field Photogrammetry (Complex subject)
  - Scale: site specific, i.e. architecture, contexts, in-situ objects

- Lab Photogrammetry (Simple subject)
  - Scale: individual objects/artifacts in a controlled setting
Capture the Subject
- Lab/Object Set-up
- Good Photography
- Good Geometry

Image Preprocessing
- Color Correction
- Format as JPEG/TIFF
- Remove Camera Settings

3D Modeling
- Agisoft Photoscan Pro
- Align Photos
- Build Dense Cloud
- Build Mesh
- Create Texture
Han Dynasty Mirrors

Bryn Mawr College
Art and Artifacts Collection: 82.47.a-c

Princeton Art Museum
Asian Arts Collection: y.1965-49

Smithsonian
Freer Art Gallery: F1911.108
Shooting the Mirror: Set Up

Key Components:

- Light Source
- Diffuser Box
- Camera
- Turntable
- Computer
- Cable for Remote Shooting
IDEAL CAMERA SETTINGS:

- Aperture: f/16-f/22
- Shutter: 1/60-1/125
- ISO: 100-200

Shooting the Mirror: Good Photography
Each blue square represents a photograph taken; diagram demonstrates complete photographic coverage of the object.
Shooting the Mirror: 3D Modeling

Dense Cloud  Mesh  Textured Model
Why do we practice photogrammetry?

Obtain accurate renditions of archaeological features/artifacts
- Take measurements from the models because they remove distortion present in 2D photographs

Cultural Heritage
- Photogrammetry provides an opportunity to preserve cultural heritage in an electronic format
  - Ex. Assyrian reliefs destroyed by Isis
  - Reconstruction of damaged buildings

Increase public interest
- Photogrammetry provides an opportunity to “democratize” information and make it available to the public
  - Ex. 3D city models