Workflow Part 2: Data Processing

Some steps will be different depending on...
What are you trying to accomplish?
Digital Fabrication? or Digital Presentation?

Software used in these steps:
- Blender
- Instant Mesh
- Photoshop
- Sketchfab
- Also recommend High-End PC

Prepping for Digital Presentation:

Goal: create textured, decimated, OBJ 3D models that can be viewed in various digital environments and platforms

1. Establish settings in rendering software that produce a model with highest number of polygons.
   a. Use Photoscan (highest settings), Remake (“ultra” settings), Artec Studio (.1mm accuracy)
   b. Manually editing Point Cloud
2. Artec models will require decimation
   a. “Fast Mesh Simplification” (Recommended: “600k faces”)
   b. Photogrammetry software should render low enough
3. Apply texture
   a. Mosaic vs. Atlas
   b. Select resolution
   c. Artec: “Texture menu”, Photoscan: “Generate Texture”, Remake is auto
   d. Note about: Shaded (photogrammetry) vs Shadeless (scanned)
      i. Internal adjustments to texture color?
4. Export as .obj with .mtl and .png

… and if you are planning to import into VR/AR...

5. High-poly, Textured Models with coupled with transparent, Low-poly colliders
   a. Generating low-poly meshes
      i. Demo Instant Meshes app
   b. Generating Bump Map
      i. Demo processing in Photoshop
   c. Combine two meshes in game engine
      i. Demo in Part 3A: Digital Presentation

Continue to Part 3A: Digital Presentation or...

Prepping for Digital Fabrication:
The Role of Emerging Technologies in Higher Ed: Impacts on Teaching, Learning, and Research

Goal: create high-polygon, untextured, watertight 3D models that can be read by slicing software.

1. Establish settings in rendering software that produce a model with highest number of polygons.
   a. Use Photoscan (highest settings), Remake (“ultra” settings), Artec Studio (.1mm accuracy)
   b. Manually editing Point Cloud

2. Some software will allow you to repair, smooth, and fill mesh prior to exporting.
   a. Photoscan: “Smoothing Passes” and “Hole Filling (100%)”
   b. Artec Studio: “Smoothing Tools” and “Hole Filling”
      i. additionally, Artec allows for “Small Object Filter”

3. Some Photogrammetry applications may require Plane Slicing
   a. Remake has this feature

4. Orientation is important for 3D printing
   a. Artec has this feature built in
   b. Meshmixer can also do this

5. Additional Manual Smoothing may be desirable
   a. Advanced and nuanced: Blender
   b. Simple and rough: Meshmixer

6. Export as STL (ascii)

Continue to Part 3B: Digital Fabrication...

Glossary:
High-polygon: a 3D model with a high number of faces (very large file sizes)
Low-polygon: a 3D model with a low number of faces (smaller file sizes)
Texture: image data wrapped around a 3D model to create the illusion of surface variation
Watertight: a 3D model without any holes; could theoretically hold water inside without spilling
Photogrammetry: algorithmic process of stitching 2D pictures of a stationary object into a single 3D model of said object
Repair: fix any issues with a 3D model (ie. redundant information, holes, overlapping data)
Orientation: a 3D model’s relationship to a software’s representation of XYZ coordinates
Smoothing: process of eliminating unwanted distort on the surface of a 3D model
Colliders/Collision: Simulated physical interaction between two or more 3D models’ surfaces
Shading: multiple methods for 3D models interaction with simulated light
Point Cloud: a collection of single data points used to construct a single, 3D surface
Mosaic/Atlas: two common methods for generating image data for 3D model textures