

London 3D Summer School

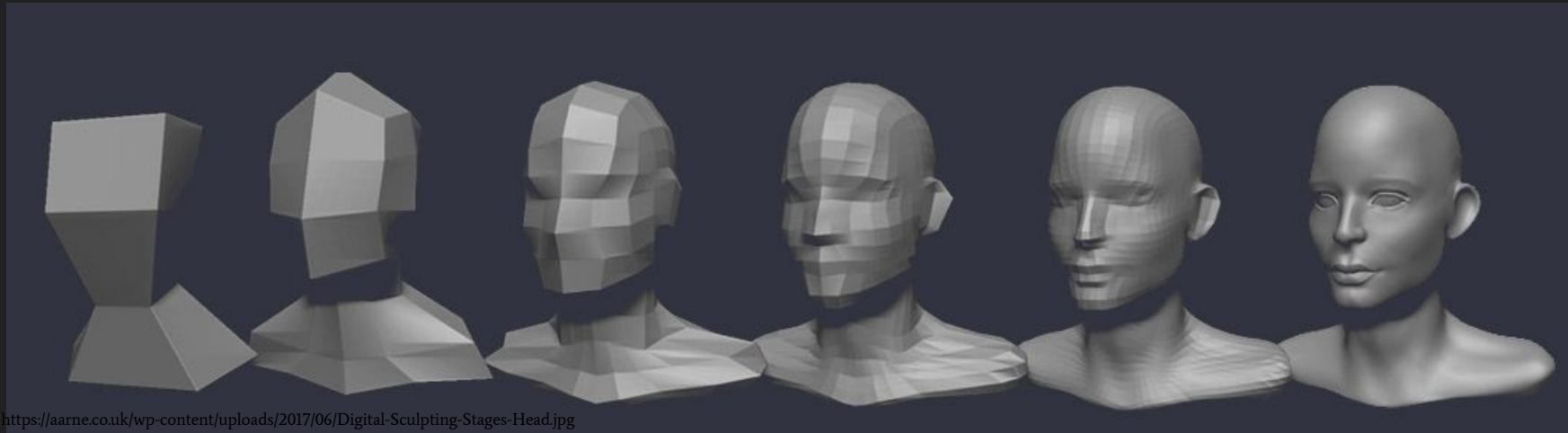
3D Modelling and Visualisation

Gabriel Bodard, University of London
Valeria Vitale, University of Sheffield
Alicia Walsh, Recollection Heritage

What is 3D Modelling?

The creation of a 3D digital representation of an object or landscape that may or may not exist in materiality.

- Computer-aided design (CAD)
- Digital Sculpting
- Procedural modelling
- Simulations and Virtual Worlds
 - Sims, Second Life, Minecraft, Metaverse
- Real Time Engines
 - Unreal, Unity3D

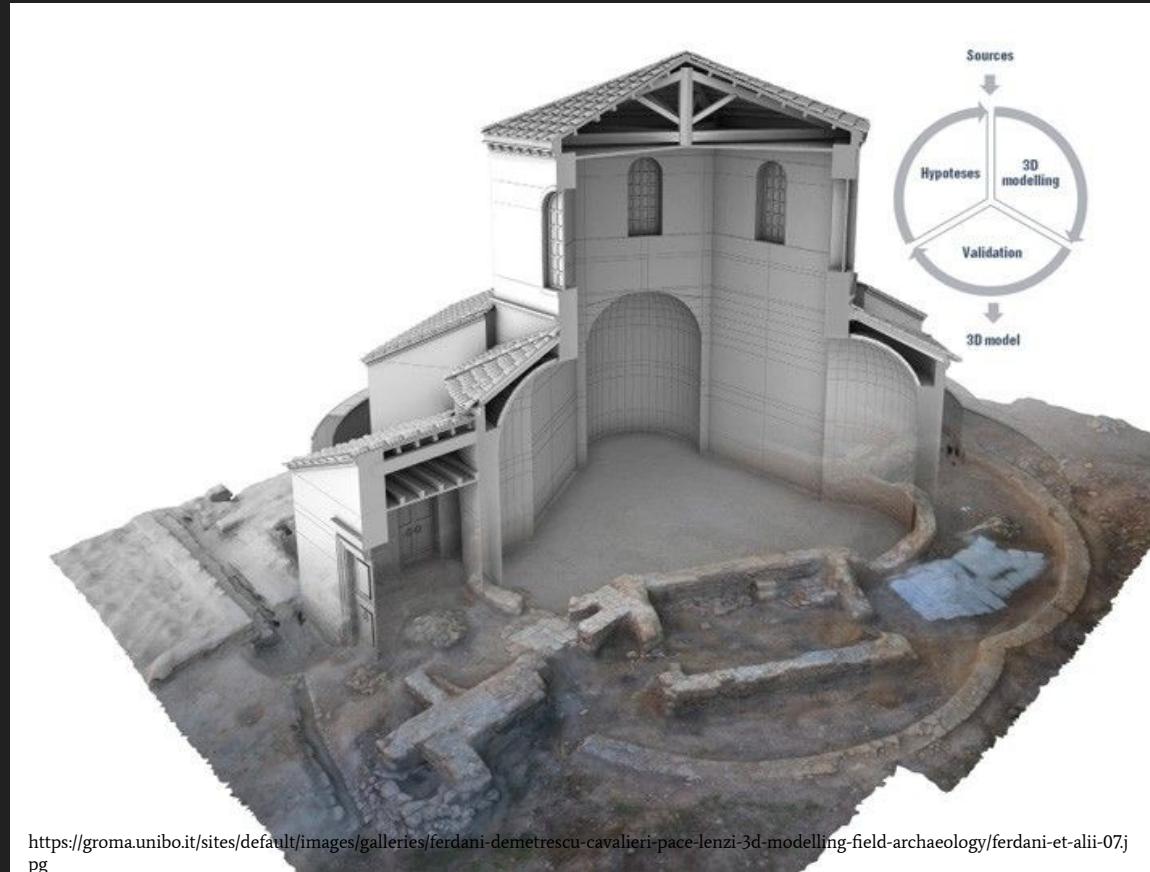


3D modelling for Cultural Heritage

Used for visualizing objects that do not exist (anymore), have changed over time, or are inaccessible.

Applications:

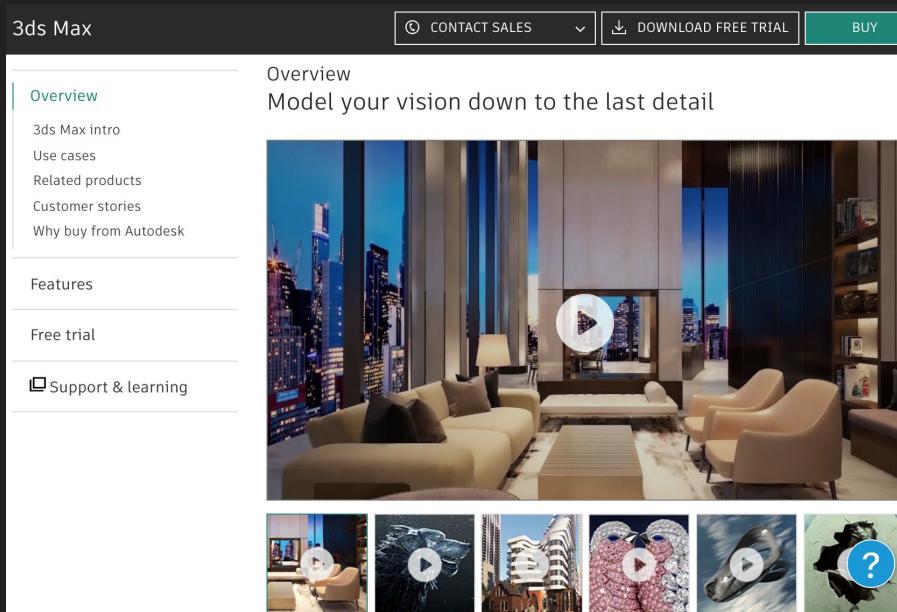
- Visualizing light and shadow
- Investigate lines of sight
- Simulate structural strength
- Communicate research findings (public outreach)



CAD and 3D software

- Autodesk 3DS Max
- Blender
- Maxon Cinema 4D
- Rhino 3D
- Sketchup Make/Pro
- Unity

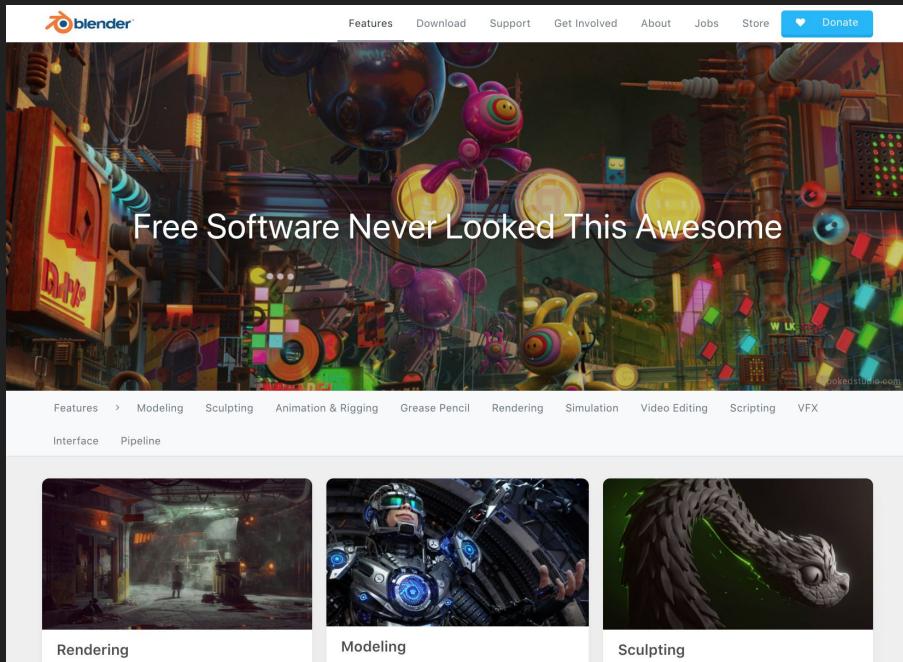
Autodesk 3DS Max



The screenshot shows the Autodesk 3ds Max product page. At the top, there are buttons for 'CONTACT SALES' and 'DOWNLOAD FREE TRIAL', and a large green 'BUY' button. Below this, the word 'Overview' is highlighted in green. The main content area features a large image of a modern living room with floor-to-ceiling windows overlooking a city skyline at night. A play button icon is overlaid on the image. To the left of the main image is a sidebar with links: 'Overview' (highlighted), '3ds Max intro', 'Use cases', 'Related products', 'Customer stories', 'Why buy from Autodesk', 'Features', 'Free trial', and 'Support & learning'.

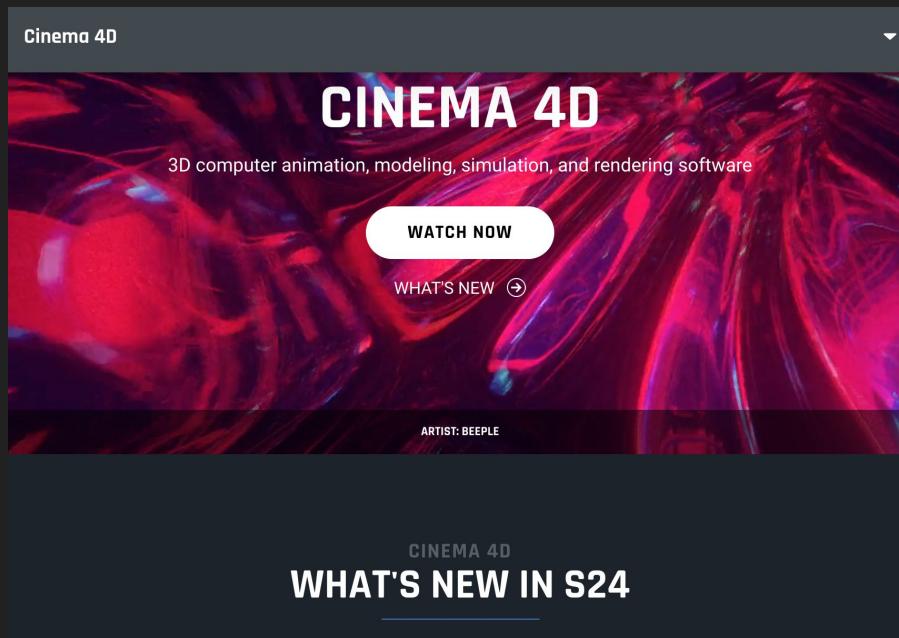
- Windows only
- Free education license
 - ◆ Full £2000/yr
- Pro architect tool
 - ◆ Compatible with suite
- Granular control of objects
- Export in all formats

Blender



- PC/Mac/Linux
- Open source software
- Redundant functionalities:
 - ◆ Extended keyboard
 - ◆ Keyboard shortcuts
 - ◆ Counterintuitive geometry
- Responsive dev community
- Export in several formats

Maxon Cinema 4D

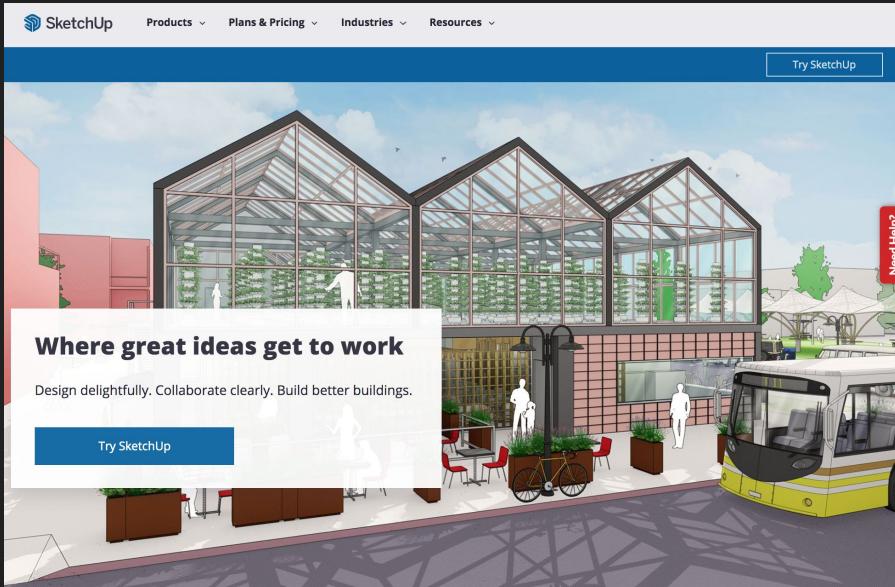


- Windows/Mac/Linux
- Education license £58/yr
 - ◆ Full £55/month
- Best tool for textures
 - ◆ Integrates Adobe CS
- Export in all formats

Maxon ZBrush

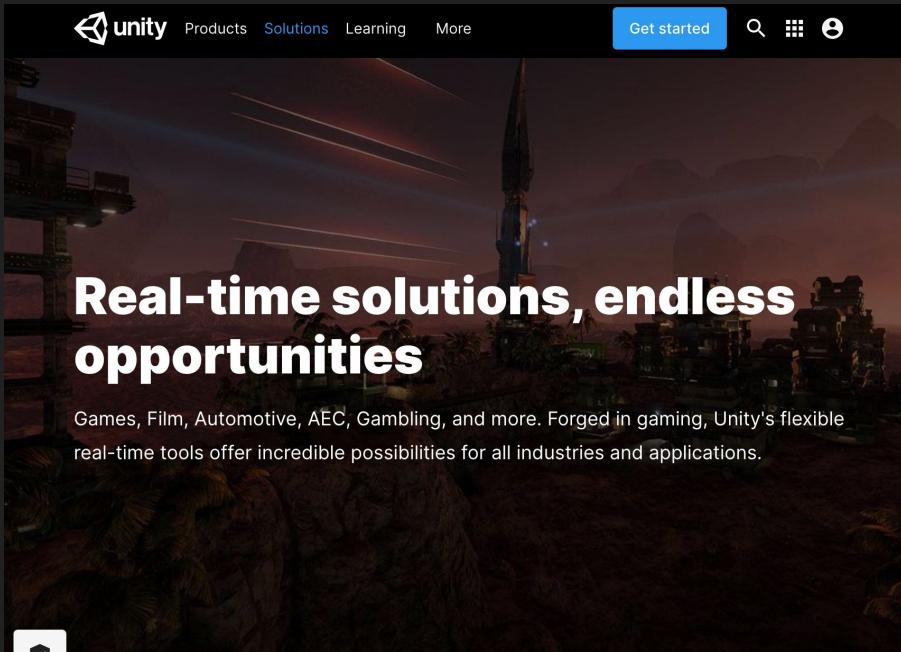
The website features a dark header with a red 'M' logo, a navigation bar with 'PRODUCTS' (highlighted in blue), 'NEWS', 'LEARN', 'SUPPORT', 'TRY', 'BUY', and user icons. Below the header is a secondary navigation bar with categories: 'ZBRUSH', 'SCULPTING', 'PAINTING & TEXTURING', 'RENDERING', 'PIPELINE', and 'INDUSTRY'. The main content area has a large, colorful collage of digital art including a man's face, a colorful figure, and a fish. Overlaid on the collage is a large white 'ZBRUSH' logo. Below the logo is the tagline 'The industry standard for digital sculpting and painting'. A white button labeled 'WATCH NOW' is positioned in the center of the collage. To the right of the button is a link 'WHAT'S NEW' with a small circular icon. In the bottom left corner of the collage, there is a small circular icon with the letters 'co'.

Sketchup



- Windows/Mac
- [Sketchup Make 2017: free]
- Sketchup Pro:
 - ◆ £245/year
 - ◆ Teacher/student: \$55/year
- Sketchup Web:
 - ◆ free
- Easy to learn
- Limited granularity
- A few export options

Unity



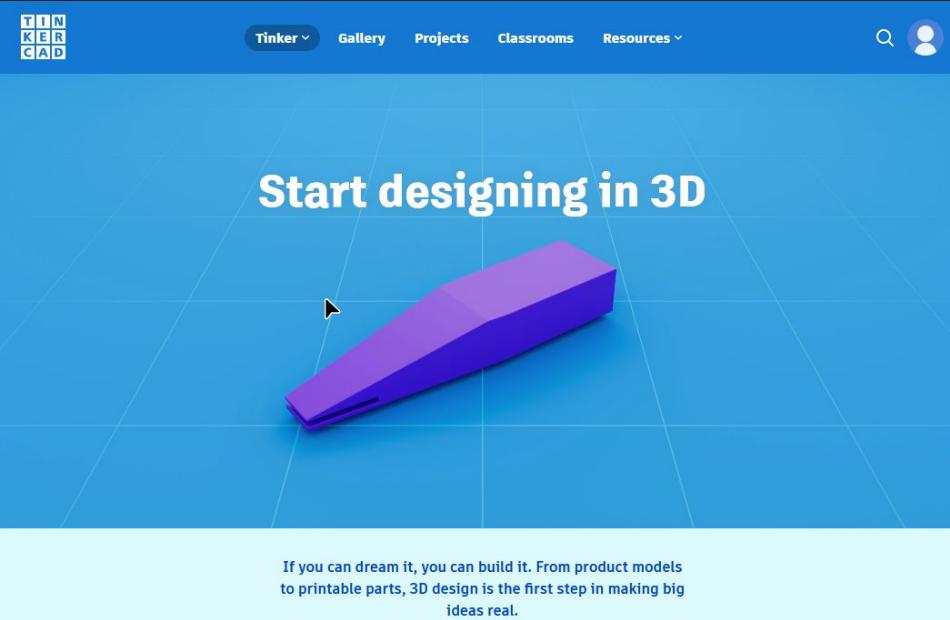
- Windows/Mac
- Real-Time Engine
- Personal/student free
- Pro €1900/year
- Not ideal for building
- Imports all formats

Rhino 3D



- Windows/Mac
- Cost: €1200/student €234
- Design tool
 - ◆ Free-form 3D sculpting
- Steep learning curve

AutoDesT TinkerCAD



- Free online app
- Basic functionality
 - ◆ Lots of presets
- Very easy to use
- Limited scale
- Good for knocking up an idea for printing

- Many even more expensive tools on market
 - Usually very specialist
 - Often steep learning curve, require training
 - Institutional licenses prohibitive
- Also many free apps with limited functionality
- Projects/institutions will have preferences



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Modelling for 3D Printing

Michael Donnay

Digital Humanities Research Hub

london.ac.uk



Modelling for 3D Printing

Why do you want to
print the object?



Functional Display

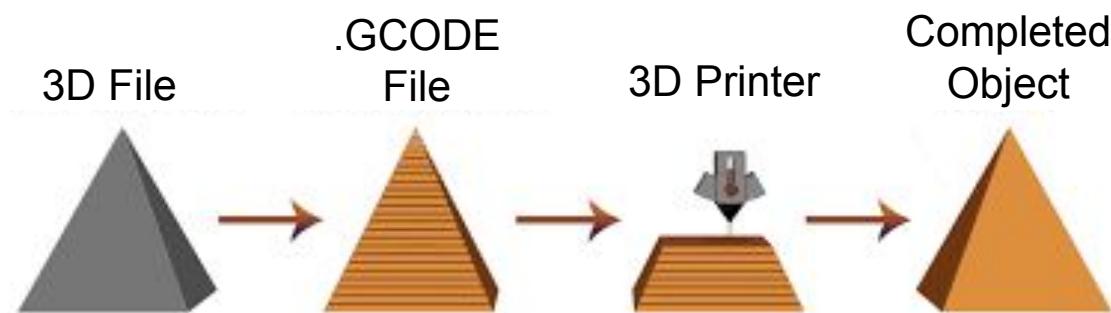
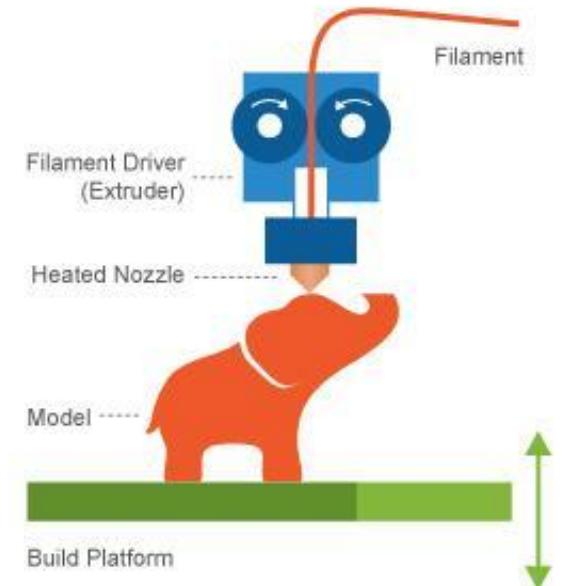


Overview of 3D Printing

Translating a 3D model from triangle-based geometry to layered geometry

Additive manufacture – stacking layers on top of one another to create objects

Fused filament fabrication – heating and extruding a material, that cools into a new shape



3D Printing Constraints: The Model

Essential: Model needs to be **manifold** (i.e. watertight)

Design considerations

- Bridging and overhangs
- Material spread
- Bed adhesion
- Time & material use
- Functionality – Moving parts? Strength needs?



3D Printing Constraints: The Printer



Size limits for your printer

- Overall size of object
- Potential reassembly

Orientation & support

Material characteristics

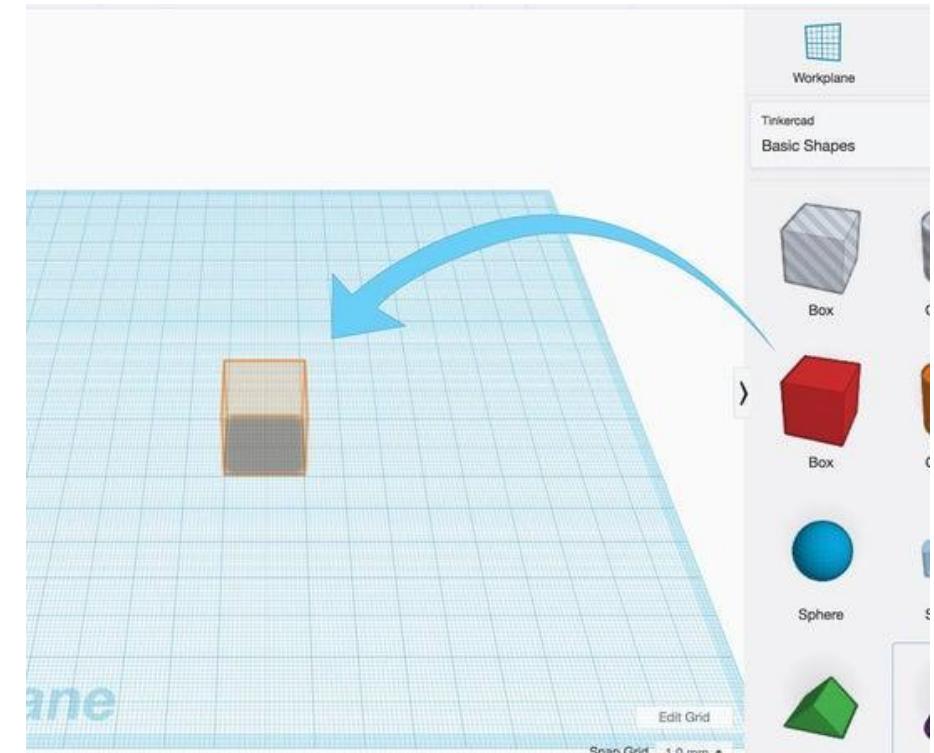


AUTODESK Tinkercad

Advantages: easy to learn, works online, free, easy export to 3D printing formats (STL & OBJ)

Disadvantages: basic functionality, less flexible than SketchUp

Useful for: designing objects to print





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tinkercad.com

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Demo

