STF

SHAPING THE FUTURE

Digital Tools Set

Shaping the Future - 101055789

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Abstract (for public dissemination only)	This document lists the digital tools set of the Shaping the Future project. The training of visual artists and the iIncubation of visual artists. The document also covers a brief technical description of listed digital tools.
Keywords	Digital tools, 3D scanning, generative 3D modelling, AI image creation, fab labs, physical computing

1. TABLE OF CONTENTS

ACRONYMS AND ABBREVIATION

ACRONYM	DESCRIPTION
CA	Consortium Agreement
STF	Shaping the Future
SG	Steering Group
EC	European Commission
DT	Dissemination Team
GA	Grant Agreement
PC	Project Coordinator
WP	Work Package
XX	EXAMPLE

2. Introduction

Shaping The Future is an international project, co-financed by the Creative Europe Programme of the European Union, aimed to foster the capacity of artists to imagine and shape the future through visual arts, design and critical thinking. The project's core goal is to provide a modular support path for empowering artists to produce, disseminate and market their creations internationally. By educating them on the most recent technologies and digital methodologies and supporting them in the development process of an artistic project, we aim to improve visual artists' skills and competencies spanning through analogue and digital areas.

The consortium brings together four partners from Italy, Slovenia, Hungary and Belgium, each active in the field of training, promoting and supporting visual artists under complementary aspects. Accademia di Belle Arti Aldo Galli is a Fine Arts Academy, offering a transversal and interdisciplinary education focused on synergies between visual arts, restoration, design and fashion textiles. Ljudmila is a laboratory for developing art, science and technology based on community and open-source approaches. Moholy-Nagy University of Art and Design is a community of designers, artists & innovators working together to tackle global challenges. Cityfab 1 is a fabrication laboratory that gives anyone, regardless of their level of knowledge, access to the tools and knowledge needed to carry out projects using computer-controlled machines.

2.1. Scope of this Document

This document intends to list the digital tools used for implementing the Shaping the Future project model. Shaping The Future is an international project, co-financed by the Creative Europe Programme of the European Union, conceived during the Covid19 Pandemic, aimed to foster the capacity of young visual artists and designers to imagine and shape the future through visual arts, design and critical thinking by using the most recent technologies and digital methodologies. The core concept behind the project is that if we can't shape multiple images of the future we won't be able to change it.

The main objective is to create and validate a model to support designers and visual artists in the production of futuristic projects while enriching their competencies related to digital technologies and methodologies. The latter are described in the document D3.2 Modular Training Path Model, while this document covers the set of tools used in the training.

2.2. Intended Audiences for this Document

This document is public to serve as a supporting document for understanding the Shaping the Future training methodology and present technologies available for creation in the fields covered by the Shaping the Future project.

2.3. Tools and Methodologies used

Expert mentors involved in the project have designed workshop modules that combine theoretical overviews of the topics covered (AI co-creation, 3D scanning, generative 3D modelling, physical computing and interaction design) with practical training for creation with digital tools. This is a list of tools that Shaping the Future experts used in the Capacity Building and will use in the Transnational Training tasks.

3. List of tools by workshop

3.1. From virtual to Real - Francesco Pusterla

Metashape

https://www.agisoft.com/
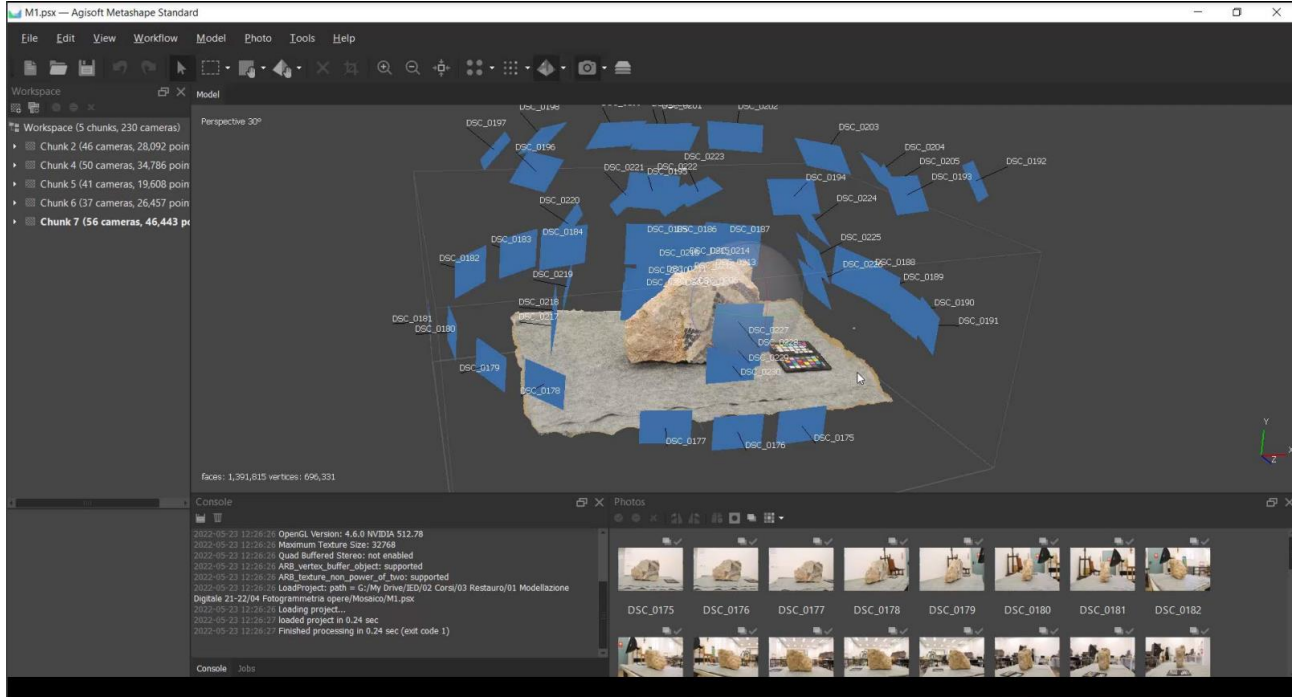
Agisoft Metashape (previously known as Agisoft PhotoScan) is a tool for a photogrammetry pipeline. The software is available in Standard and Pro versions, the standard version sufficient for interactive media tasks, while the Pro version is designed for authoring GIS content. It is widely used by archeologists and UAV companies.

MeshMixer

https://meshmixer.com/

Meshmixer is a free 3D modelling and mesh editing software. It offers an efficient meshing and remeshing tool set, making it a common last step in 3d design prior to 3d printing or publishing.

Rhinoceros

https://www.rhino3d.com/

Rhinoceros 3D, also known as "Rhino", or "Rhino 3D", is computer-aided design software. Rhino CAD is used primarily in architectural trades, industrial design, and jewellery design.

Sketchfab

https://sketchfab.com/feed

Sketchfab is a web-based viewing, creating, and publishing tool for 3D models. With this solution, users can organise models using the tool's collection, tag, and category options. 3D models created with Sketchfab can be embedded and shared on websites, forums, and social media pages.

Mozilla Hubs

https://hubs.mozilla.com/

Hubs is a Virtual Reality chat room designed for every headset and browser, but it is also an open source project that explores how communication in mixed reality can come to life.

Simplify 3D

https://www.simplify3d.com/

Simplify3D develops premium 3D printing software, preferred by innovators, engineers and

professional users worldwide. The powerful software application streamlines the 3D printing process, while providing robust customization tools that empower users to achieve high-quality results.

Sharebot 3D printers

https://www.sharebot.it/en/

Sharebot is an Italian dynamic company devoted to develop high precision, reliable and easy to use 3D printers.

Oculus Quest 2

https://www.meta.com/it/en/quest/products/quest-2/

The Quest 2 is a virtual reality (VR) headset. It can run as either a standalone headset with an internal, Android-based operating system, or with Oculus Rift-compatible VR software running on a desktop computer.

Call for applicants

3.2. Mediating between the digital and the real world - Bart Vanderput

Arduino

https://www.arduino.cc
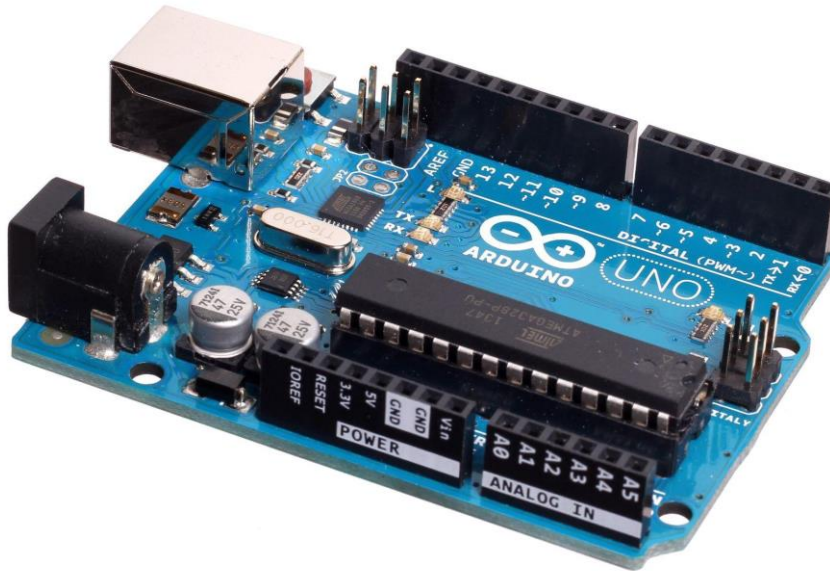
Arduino is an open-source electronics platform based on easy-to-use hardware and software. Arduino boards are able to read inputs - light on a sensor, a finger on a button, or a Twitter message - and turn it into an output - activating a motor, turning on an LED, publishing something online. You can tell your board what to do by sending a set of instructions to the microcontroller on the board. To do so you use the Arduino programming language (based on Wiring), and the Arduino Software (IDE), based on Processing.

Over the years Arduino has been the brain of thousands of projects, from everyday objects to complex scientific instruments. A worldwide community of makers - students, hobbyists, artists, programmers, and professionals - has gathered around this open-source platform, their contributions have added up to an incredible amount of accessible knowledge that can be of great help to novices and experts alike.

(ref: https://www.arduino.cc/en/Guide/Introduction)

3D printer

The term "3D printing" originally referred to a process that deposits a binder material onto a powder bed with inkjet printer heads layer by layer. More recently, the popular vernacular has started using the term to encompass a wider variety of additive-manufacturing techniques such as electron-beam additive manufacturing and selective laser melting.

The most-commonly used 3D printing process is a material extrusion technique called fused deposition modeling, or FDM. While FDM technology was invented after the other two most popular technologies, stereolithography (SLA) and selective laser sintering (SLS), FDM is typically the most inexpensive of the three, which lends to the popularity of the process.

(ref: https://en.wikipedia.org/wiki/3D_printing)

Laser cutter

Laser cutting is a technology that uses a laser to vaporise materials, resulting in a cut edge. While typically used for industrial manufacturing applications, it is now used by schools, small businesses, architecture, and hobbyists. Laser cutting works by directing the output of a high-power laser most commonly through optics. The laser optics and CNC (computer numerical control) are used to direct the laser beam to the material. A commercial laser for cutting materials uses a motion control system to follow a CNC or G-code of the pattern to be cut onto the material. The focused laser beam is directed at the material, which then either melts, burns, vaporizes away, or is blown away by a jet of gas, leaving an edge with a high-quality surface finish.

(ref: https://en.wikipedia.org/wiki/Laser_cutting)

CNC milling machine

Translates programs consisting of specific numbers and letters to move the spindle (or workpiece) to various locations and depths. Can either be a Vertical Milling Center (VMC) or a Horizontal Milling Center, depending on the orientation of the spindle. Many use G-code. Functions include: face milling, shoulder milling, tapping, drilling and some even offer turning. Today, CNC mills can have 3 to 6 axes. Most CNC mills require placing the workpiece on or in

them and must be at least as big as the workpiece, but new 3-axis machines are being produced that are much smaller.

(ref: https://en.wikipedia.org/wiki/Numerical_control)

Vinyl cutter

A vinyl cutter is an entry level machine for making signs. Computer designed vector files with patterns and letters are directly cut on the roll of vinyl which is mounted and fed into the vinyl cutter through USB or serial cable. Vinyl cutters are mainly used to make signs, banners and advertisements. Advertisements seen on automobiles and vans are often made with vinyl cut letters. While these machines were designed for cutting vinyl, they can also cut through computer and specialty papers, as well as thicker items like thin sheets of magnet.

In addition to sign business, vinyl cutters are commonly used for apparel decoration. To decorate apparel, a vector design needs to be cut in mirror image, weeded, and then heat applied using a commercial heat press or a hand iron for home use.

Some businesses use their vinyl cutter to produce both signs and custom apparel. Many crafters also have vinyl cutters for home use. These require little maintenance and the vinyl can be bought in bulk relatively cheaply.

Vinyl cutters are also often used by stencil artists to create single use or reusable stencil art and lettering

(ref: https://en.wikipedia.org/wiki/Vinyl_cutter)

CURA

https://ultimaker.com/software/ultimaker-cura

Cura is an open source slicing application for 3D printers. It was created by David Braam who was later employed by Ultimaker, a 3D printer manufacturing company, to maintain the software. Cura is available under LGPLv3 license. Development is hosted on GitHub. Ultimaker Cura is the preferred 3D printing software for Ultimaker 3D printers, but it can be used with other printers as well.

Ultimaker Cura works by slicing the user's model file into layers and generating a printer-specific g-code. Once finished, the g-code can be sent to the printer for the manufacture of the physical object.

(ref: https://en.wikipedia.org/wiki/Cura_(software))

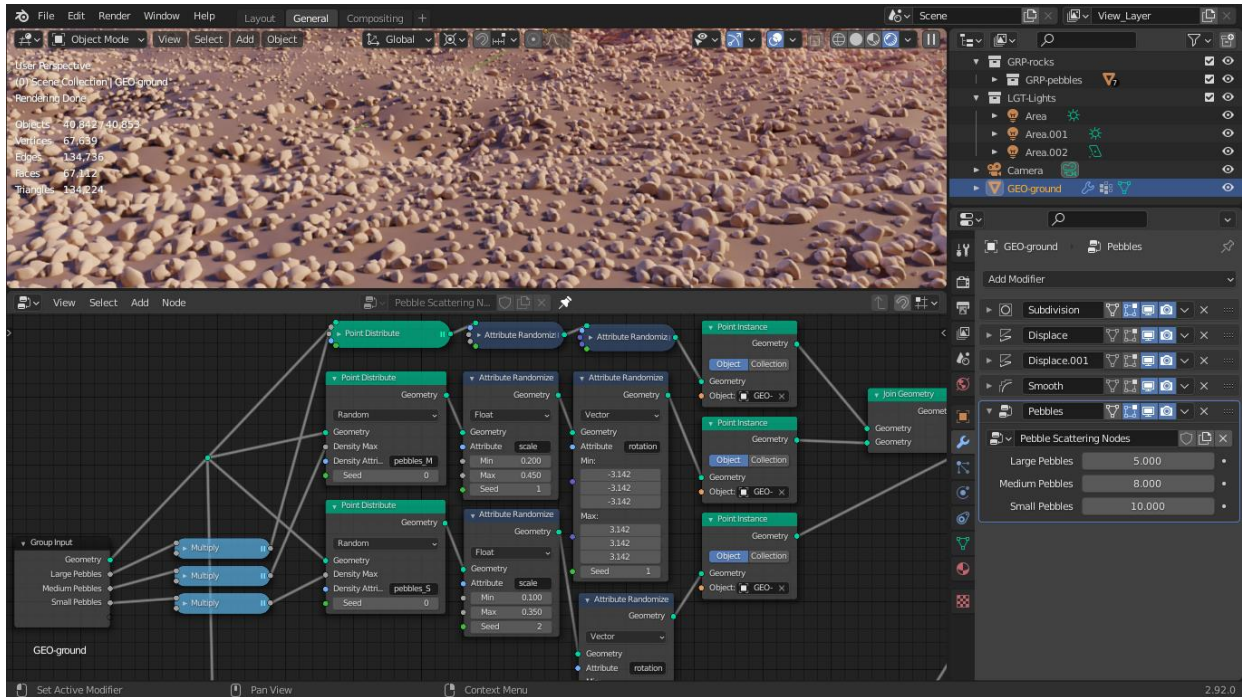
Preform

https://formlabs.com/software/

Formlabs Preform Software is proprietary slicing software for Formlabs 3D printers, meaning you need a Formlabs printer to use it.

PreForm takes your 3D model file and slices it into the universal language of 3D printers, G-code. All you need to do is design your model in standard CAD software, then import the STL or OBJ file into PreForm and it will do the rest.

Unlike open-source slicing programs that are geared for FFF 3D printers, PreForm is designed specifically for SLA (Stereolithography), LFS (Light Force Stereolithography) and SLS (Selective Laser Sintering), supporting Formlabs 3D printers only.

(ref: https://additive-x.com/blog/a-quick-guide-to-formlabs-preform-software/)

3.3. An Introduction to Procedural 3D Computer Graphics - Blaž Miklavčič

Blender

https://www.blender.org

Blender is the free and open source 3D creation suite. It supports the entirety of the 3D pipeline—modeling, rigging, animation, simulation, rendering, compositing and motion tracking, even video editing and game creation. Advanced users employ Blender's API for Python scripting to customize the application and write specialized tools; often these are included in Blender's future releases. Blender is well suited to individuals and small studios who benefit from its unified pipeline and responsive development process.

Blender is cross-platform and runs equally well on Linux, Windows, and Macintosh computers. Its interface uses OpenGL to provide a consistent experience. As a community-driven project under the GNU General Public License (GPL), the public is empowered to make small and large changes to the code base, which leads to new features, responsive bug fixes, and better usability.

(ref: https://www.blender.org/about/)

3.3. AI Co-Creation - István Keszei

Lexica and Stable Diffusion

https://stablediffusionweb.com/

https://lexica.art/

Stable Diffusion is a deep learning, text-to-image model released in 2022. It is primarily used to generate detailed images conditioned on text descriptions, though it can also be applied to other tasks such as inpainting, outpainting, and generating image-to-image translations guided by a text prompt. It was developed by the start-up Stability AI in collaboration with a number of academic researchers and non-profit organizations.

Stable Diffusion is a latent diffusion model, a kind of deep generative neural network. Its code and model weights have been released publicly, and it can run on most consumer hardware equipped with a modest GPU with at least 8 GB VRAM. This marked a departure from previous

proprietary text-to-image models such as DALL-E and Midjourney which were accessible only via cloud services.

Lexica Aperture is another step on the way to photorealistic AI-generated images. The model is based on Stable Diffusion and has been trained with high-resolution photos.

(ref: https://en.wikipedia.org/wiki/Stable_Diffusion)

MidJourney

https://www.midjourney.com

Midjourney is an artificial intelligence program created by a San Francisco-based independent research lab Midjourney, Inc. Midjourney generates images from natural language descriptions, called "prompts", similar to OpenAI's DALL-E and Stable Diffusion. The tool is currently in open beta, which it entered on July 12, 2022. The Midjourney team is led by David Holz, co-founder of Leap Motion. Users create artwork with Midjourney using Discord bot commands. To generate images, users use the /imagine command and type in a prompt; the bot then returns a set of four images. Users may then choose which images they want to upscale. Midjourney is also working on a web interface. Midjourney has three subscription tiers, and offers a free trial. (ref: https://en.wikipedia.org/wiki/Midjourney)

Disco.Diffusion

https://colab.research.google.com/github/alembics/disco-diffusion/blob/main/Disco_Diffusion.ipynb

Disco Diffusion (DD) is a Google Colab Notebook which leverages an AI Image generating technique called CLIP-Guided Diffusion to allow users to create compelling and beautiful images from just text inputs. Disco Diffusion is complex, and continually evolving with new features with an active user community.