



October 17th–18th, 2022

RE AND AM FOR MEDICAL SIMULATION AND SURGICAL PLANNING

Michaela Servi

📍 Plesso Didattico Morgagni, Viale Morgagni,
44-48, 50134 Firenze



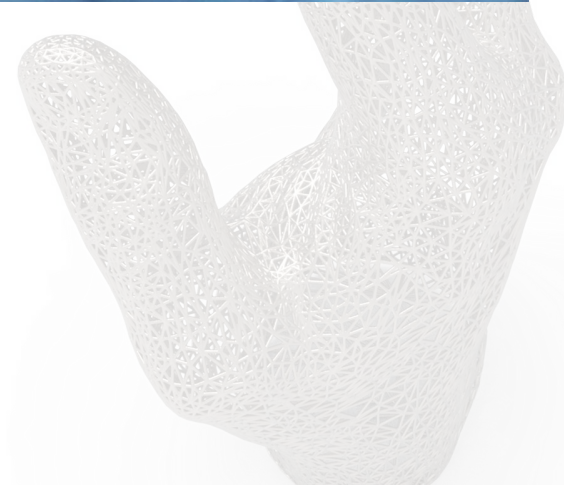
MEDICAL SIMULATION



Surgical simulation has several purposes :

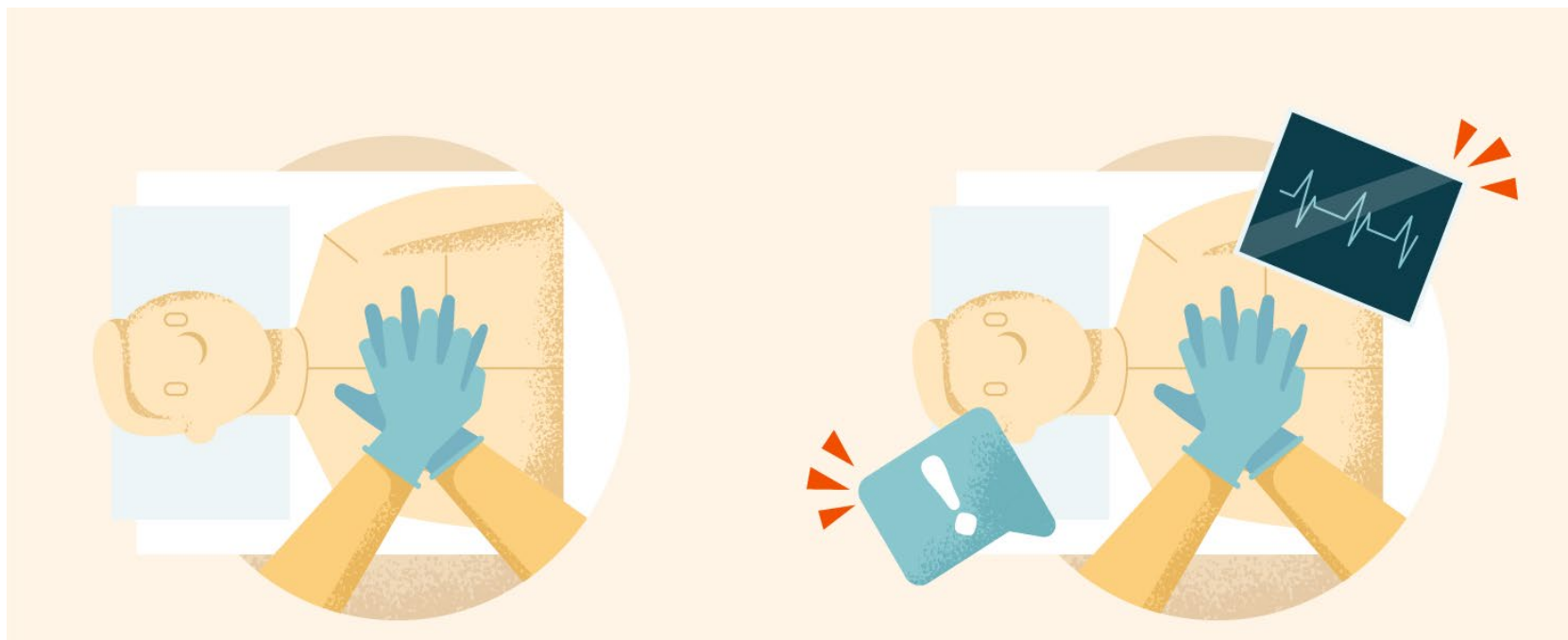
- **Training:** To train young surgeons in different surgical approaches
- **Planning:** To help both junior and experienced surgeons plan a specific surgery

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MEDICAL SIMULATION

Low-fidelity simulation VS high-fidelity simulation



Helps physicians master individual tasks and the smaller key concept

Emphasizes realistic situations and puts stress and pressure on practitioners

MEDICAL SIMULATION



No Harm, No Foul
Allows learners to make mistakes without any risk of harm to patients



Safety First
Provides safety for students in otherwise dangerous environments

MEDICAL SIMULATION



Repetition

Learners can repeat an experience as many times as they want or need



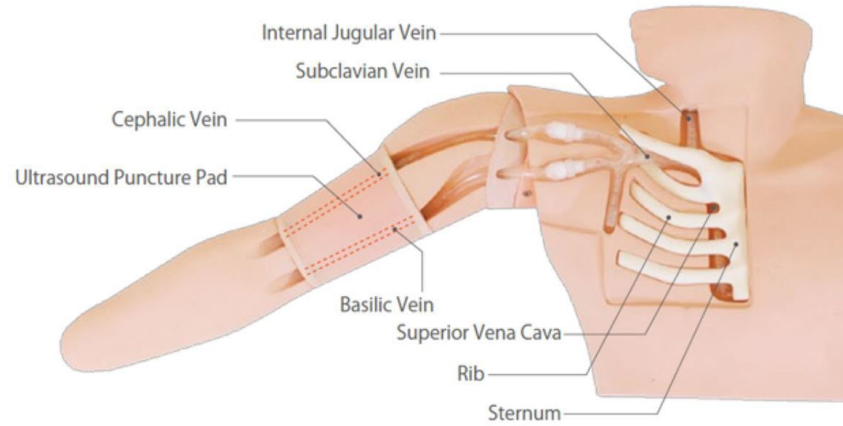
Gather and Measure Data

It's relatively easy to monitor learner performance and generate performance data



MEDICAL SIMULATION

Commercial simulators



INTERDISCIPLINARY LAB



Personalized pediatric medicine & 3D technologies

T3DDY A JOINT LABORATORY
DEDICATED TO RESEARCH



ADDITIVE 4 BIOMEDICAL



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INTERDISCIPLINARY LAB

Why...



Realism

To meet particular medical demands

Specific pathologies

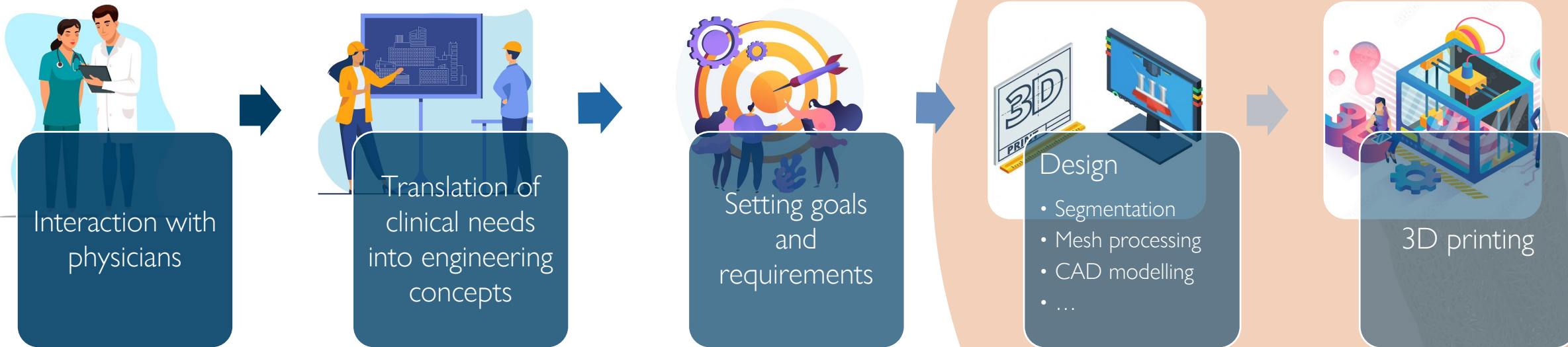
Specific cases

Extensibility

INTERDISCIPLINARY LAB

How...

ADDITIVE 4 BIOMEDICAL



INTERDISCIPLINARY LAB

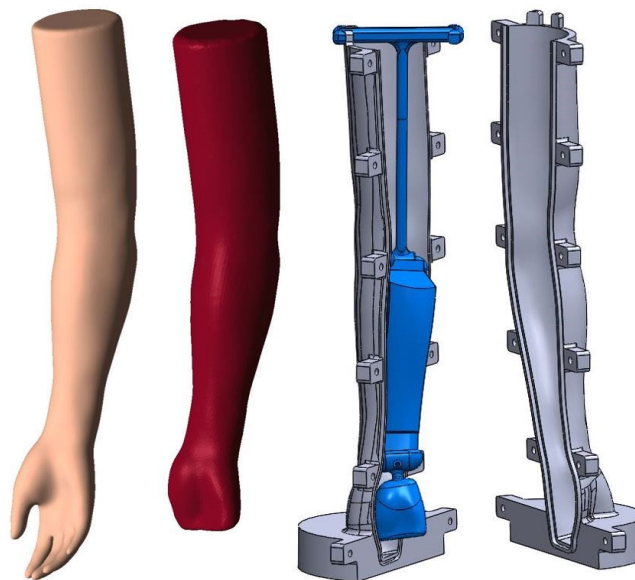


In brief

- Examples of simulators developed by the lab
- Training vs Planning
- 3D printing methods
- An overview of one comprehensive example

SIMULATION FOR TRAINING

Ultrasound-guided venipuncture

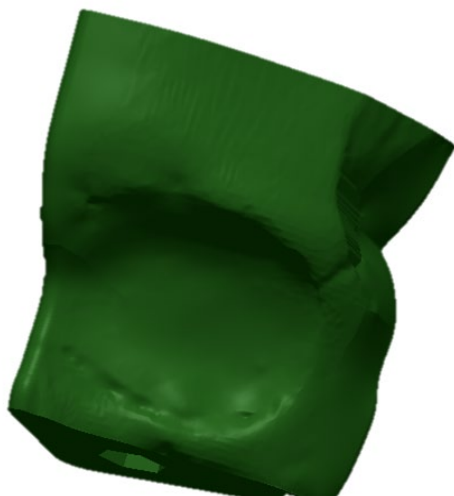
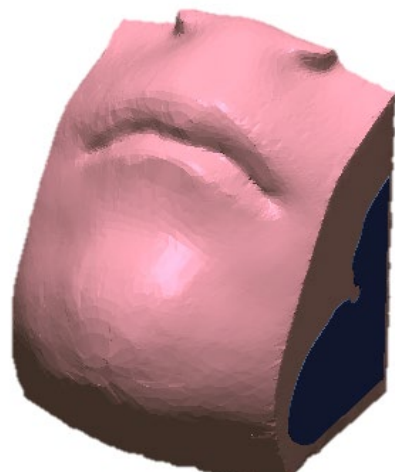
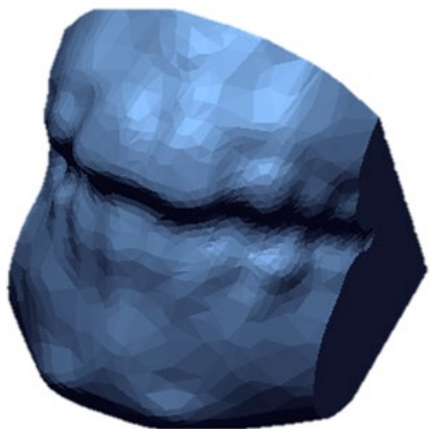


3D printing method: SLS

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SIMULATION FOR TRAINING

Suture pads

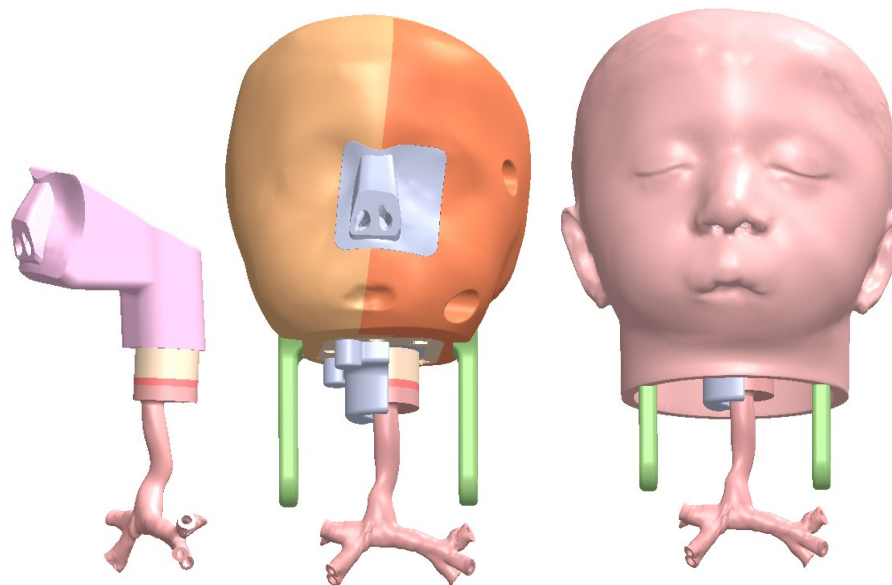
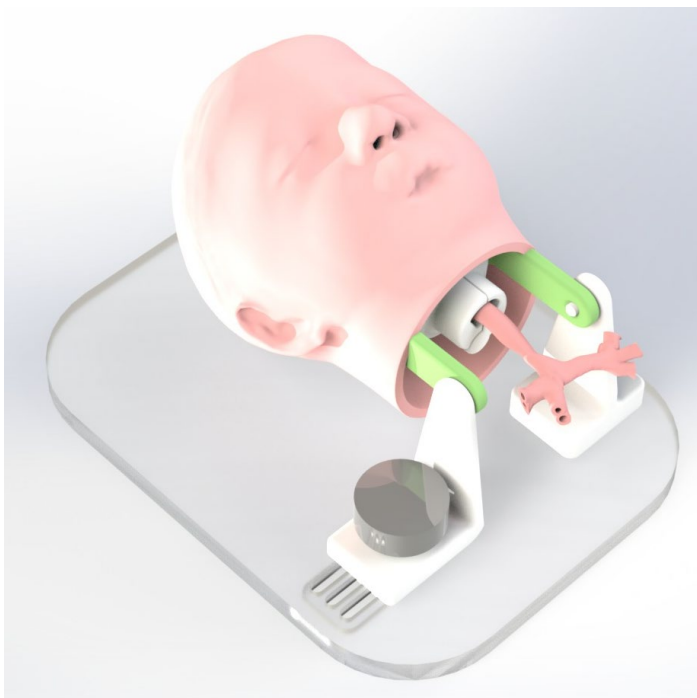


3D printing method: FDM



SIMULATION FOR TRAINING

Child endoscopy task trainer

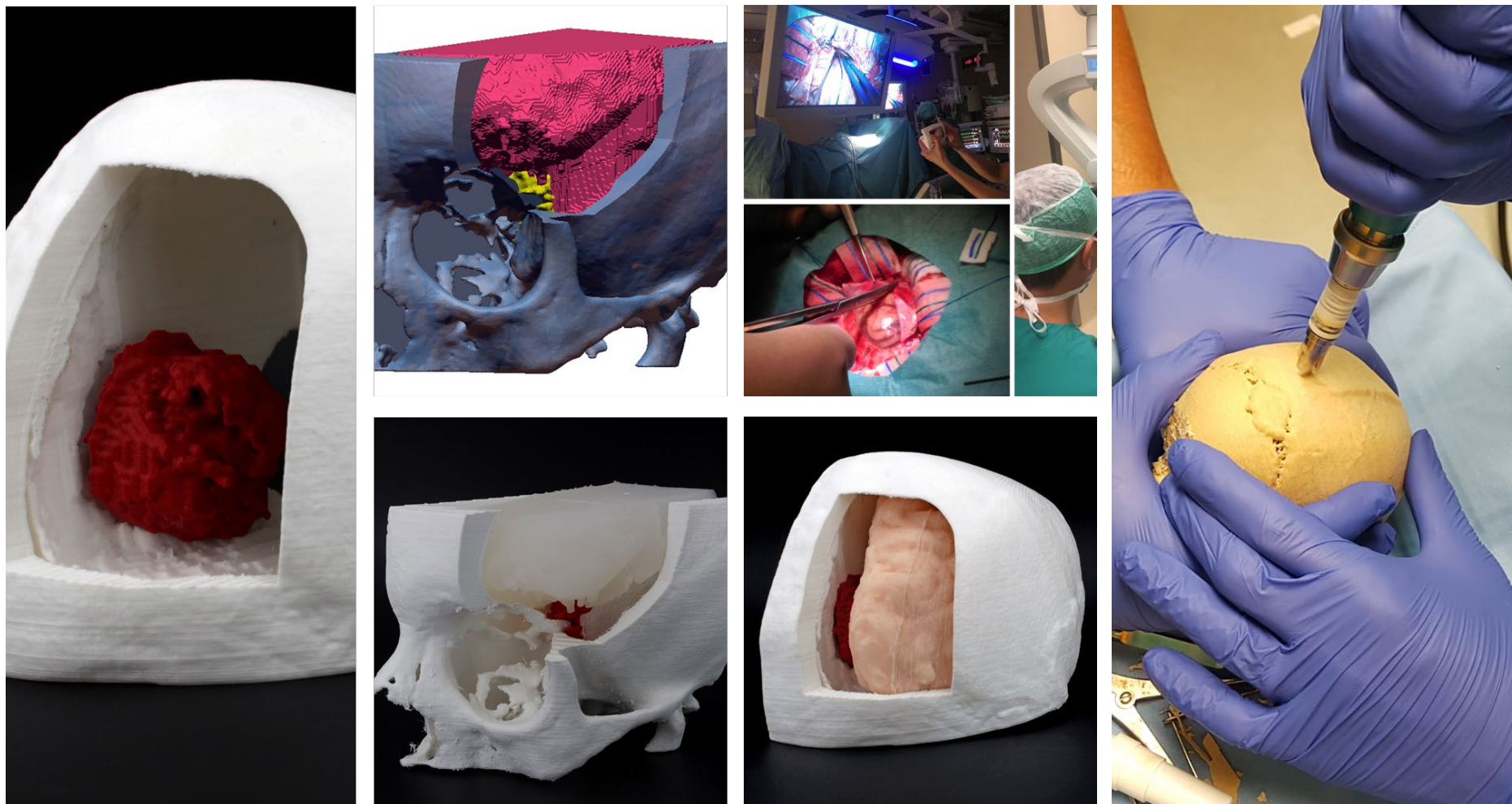


3D printing method: FDM/SLA

SIMULATION FOR PLANNING

Skull and tumor replica

3D printing method: FDM

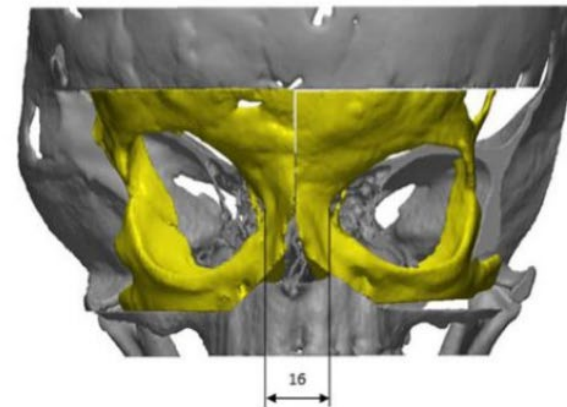
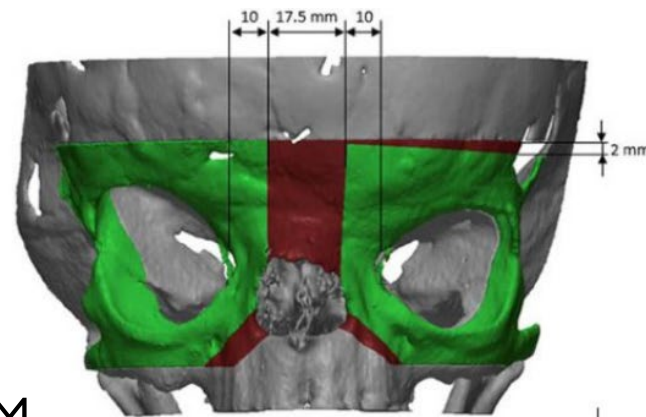
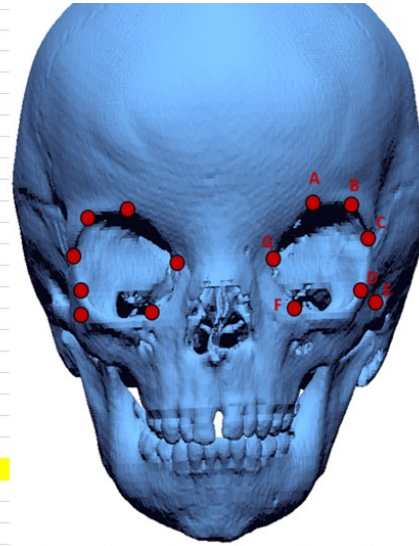


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SIMULATION FOR PLANNING

Correction of hypertelorism

PIANO SAGITTALE			
	DX	SX	DX-SX
A	29.737	29.3988	0.34
B	39.4591	39.2525	0.21
C	45.139	46.2523	-1.11
D	41.5009	43.7591	-2.26
E	42.5167	42.6757	-0.16
F	19.513	23.715	-4.20
G	12.2299	15.9658	-3.74
PIANO TRASVERSO			
A	32.0091	33.8058	-1.80
B	30.2688	33.9925	-3.72
C	18.6976	25.8128	-7.12
D	7.1579	8.9969	-1.84
E	2.6049	2.8936	-0.29
F	2.6475	4.2671	-1.62
G	18.4612	17.3776	1.08
PIANO CORONALE			
A	56.9668	55.9796	0.99
B	49.8228	47.5973	2.23
C	39.7116	36.0385	3.67
D	41.8366	38.2924	3.54
E	38.5279	37.4659	1.06
F	56.7042	53.6666	3.04
G	59.4273	55.6584	3.77

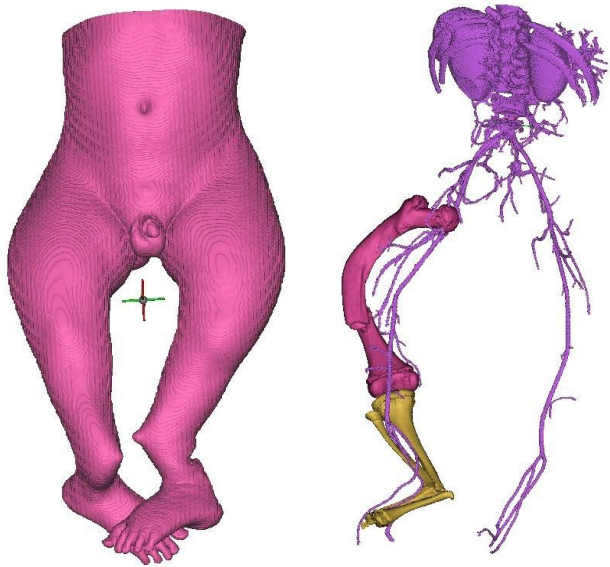


3D printing method: FDM

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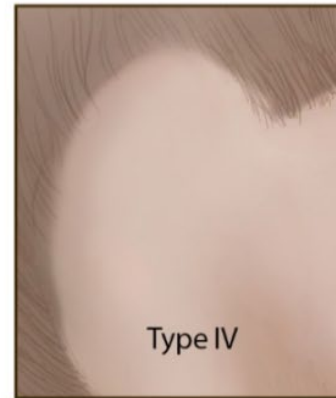
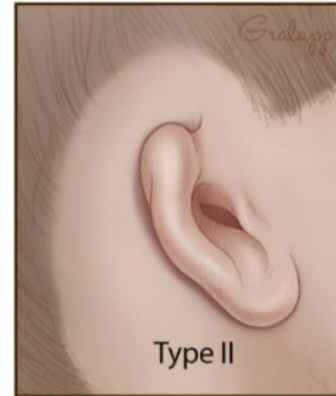
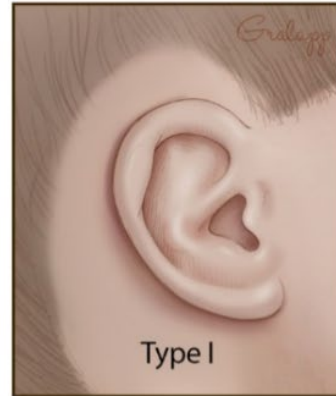
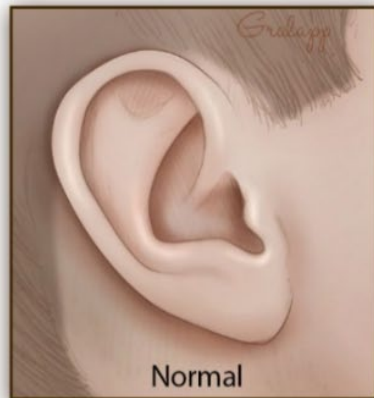
SIMULATION FOR PLANNING

Correction of severe bone deformation



3D printing method: FDM

SIMULATION FOR PLANNING - MICROTIA



2.06 per 10,000 births



Speech and language delays



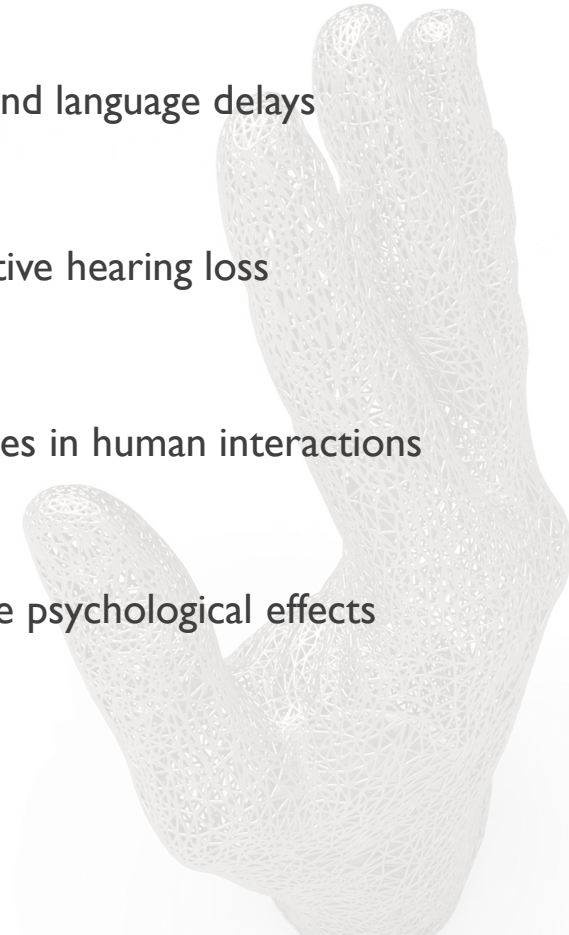
Conductive hearing loss



Difficulties in human interactions

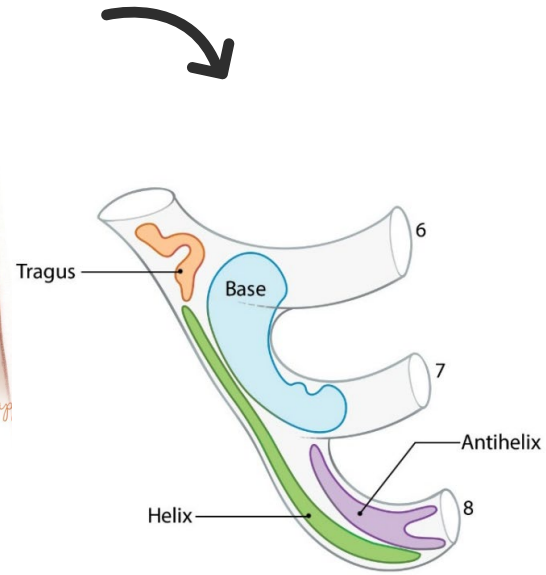
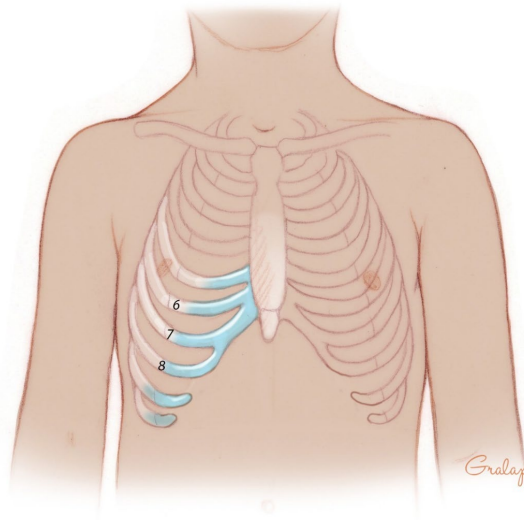


Negative psychological effects

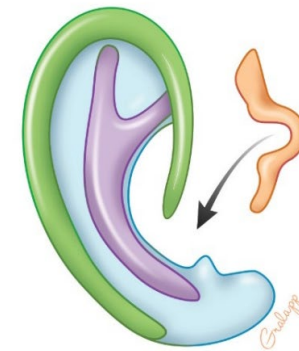


SIMULATION FOR PLANNING - MICROTIA

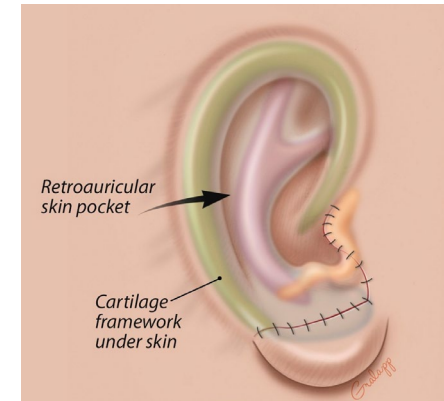
Autologous Ear Reconstruction



Costal Cartilage Pattern

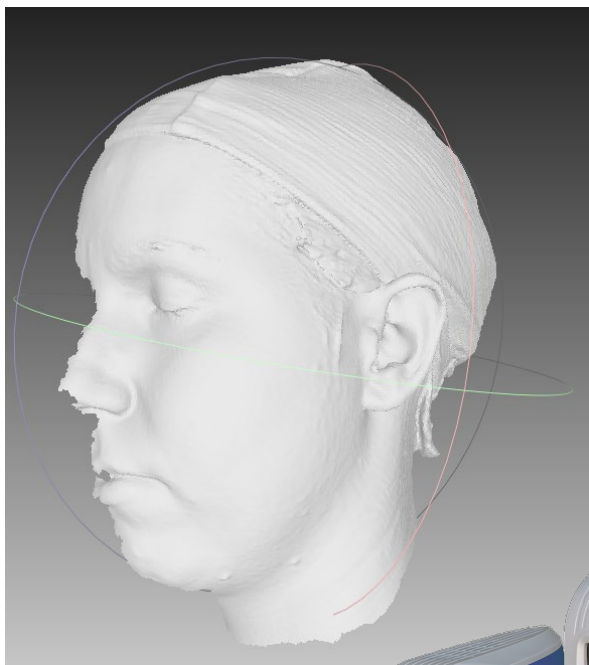


Framework Assembled



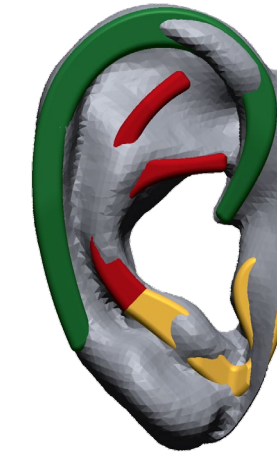
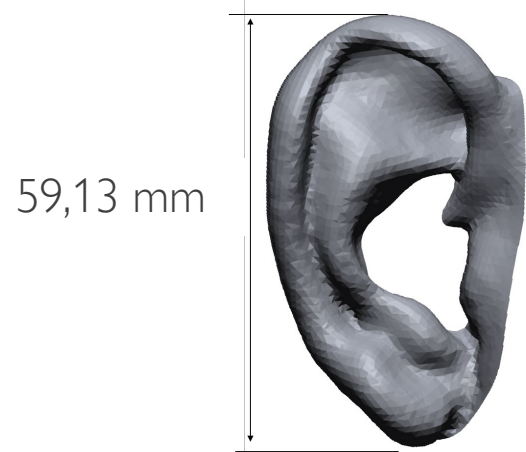
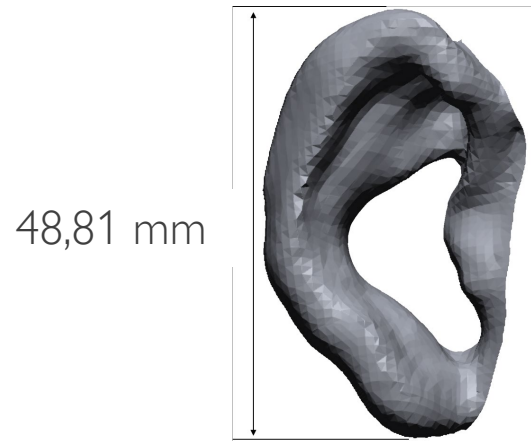
SIMULATION FOR PLANNING - MICROTIA

ADDITIVE 4 BIOMEDICAL



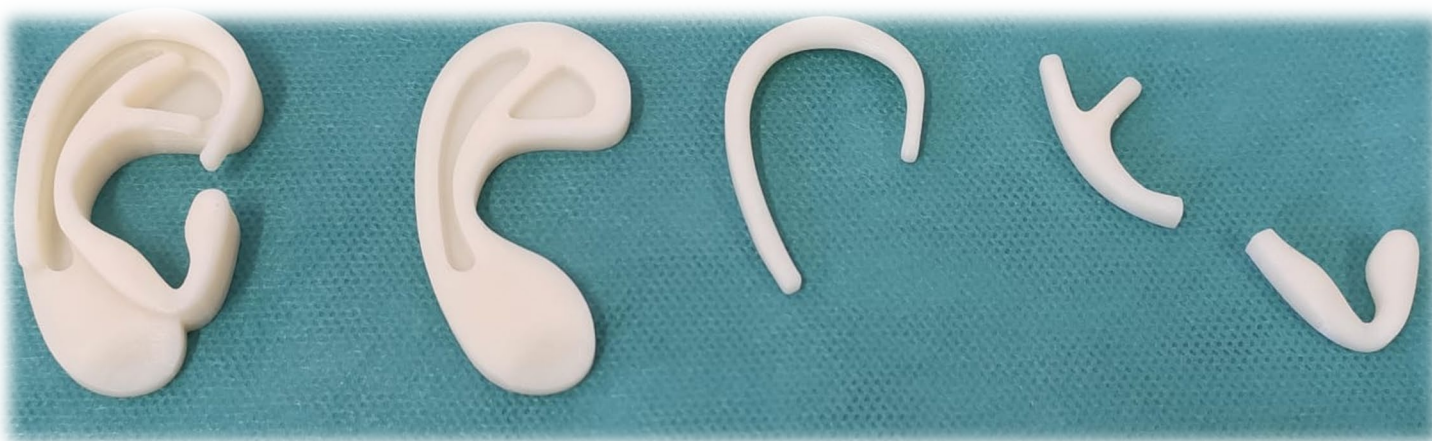
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SIMULATION FOR PLANNING - MICROTIA



SIMULATION FOR PLANNING - MICROTIA

- ABS-M30i
- Gas plasma sterilization



3D printing method: FDM

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SIMULATION FOR PLANNING - MICROTIA



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GRAZIE PER L'ATTENZIONE!

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