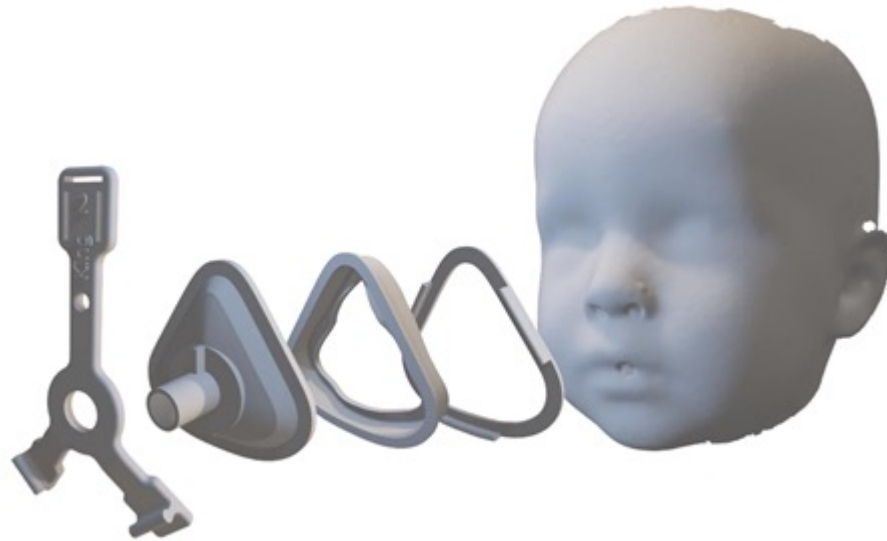


Personalized Non-Invasive Ventilation masks for children at the Pediatric ICU

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Coen Dijkman, Team Leader Medical Innovation and Development



Amsterdam UMC

- University Medical Centre
 - Medical Care
 - Research
 - Education
- Emma Children's Hospital
 - ICU
 - Nursing wards





Project

- Respiratory support
- Invasive Ventilation vs Non-Invasive Ventilation (NIV)

Cause? → Improper fitting of NIV masks

- NIV failure in 15-30% of pediatric patients

Solution? → Personalized masks

Non-Invasive ventilation masks



Nasal Mask



Oronasal Mask



Total face mask

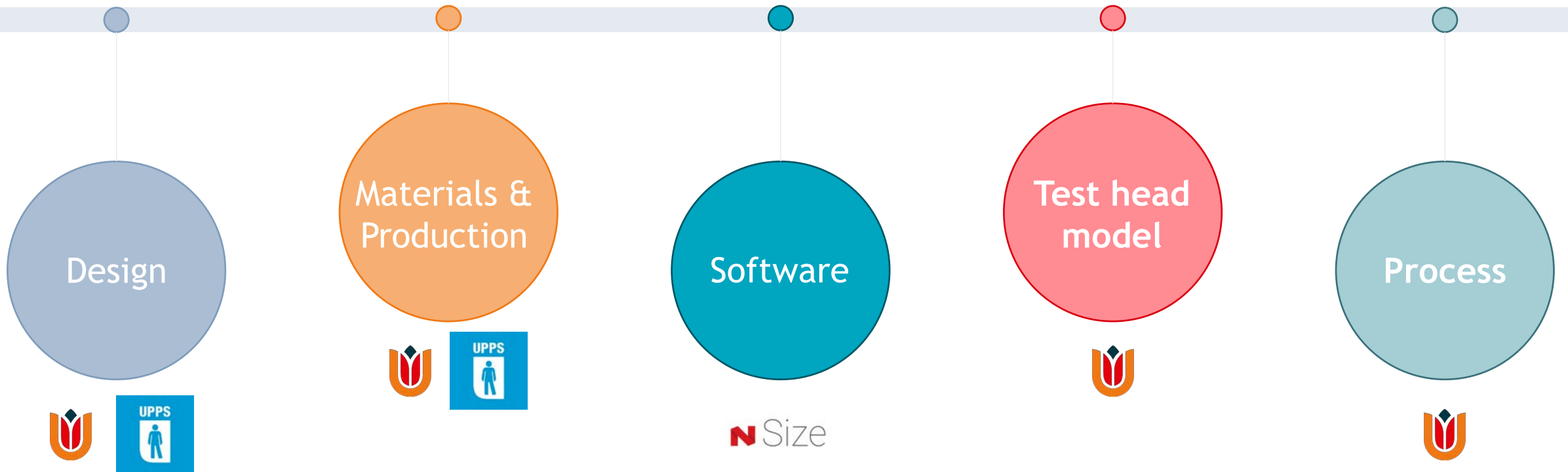


Project

What is the process of producing an ideal, **custom-made**, oronasal **mask** for long-term **ventilation** of young children at the **pediatric ICU** within a period of **24 hours**?

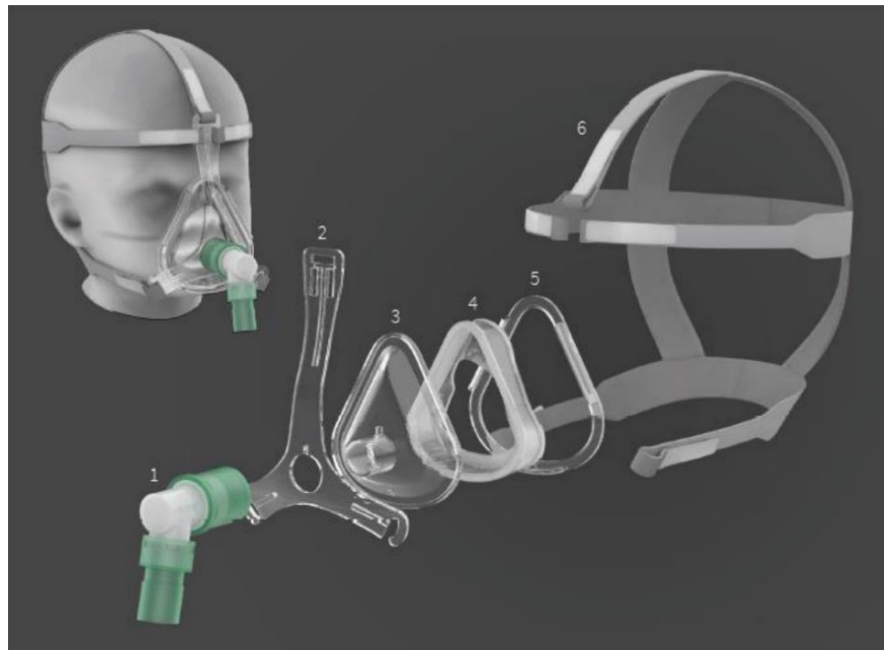
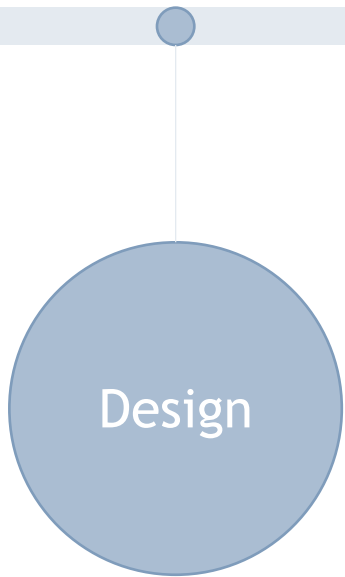


Project Approach

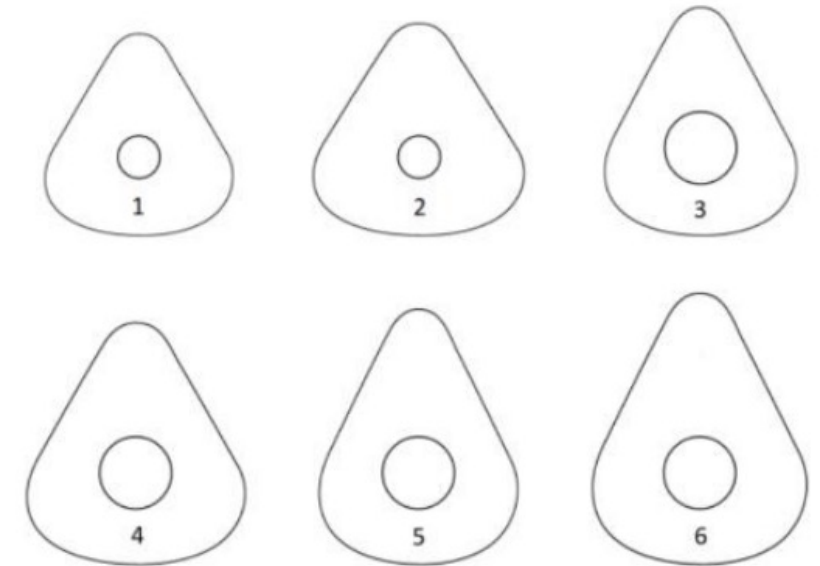




Results and Knowledge



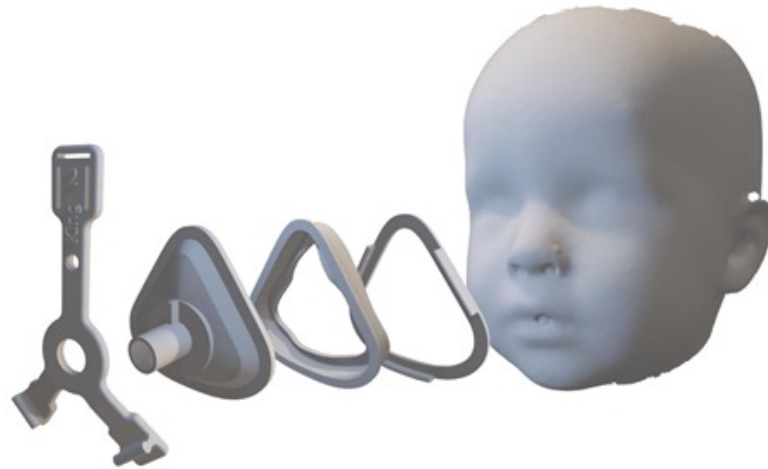
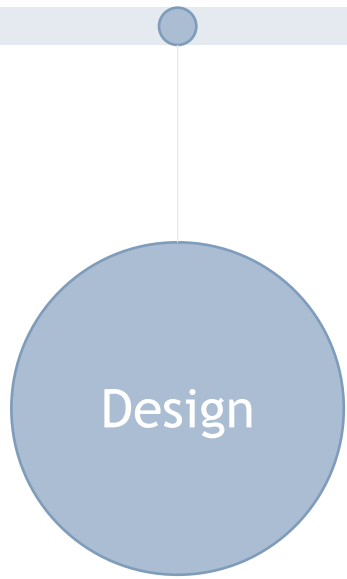
First design: modular mask



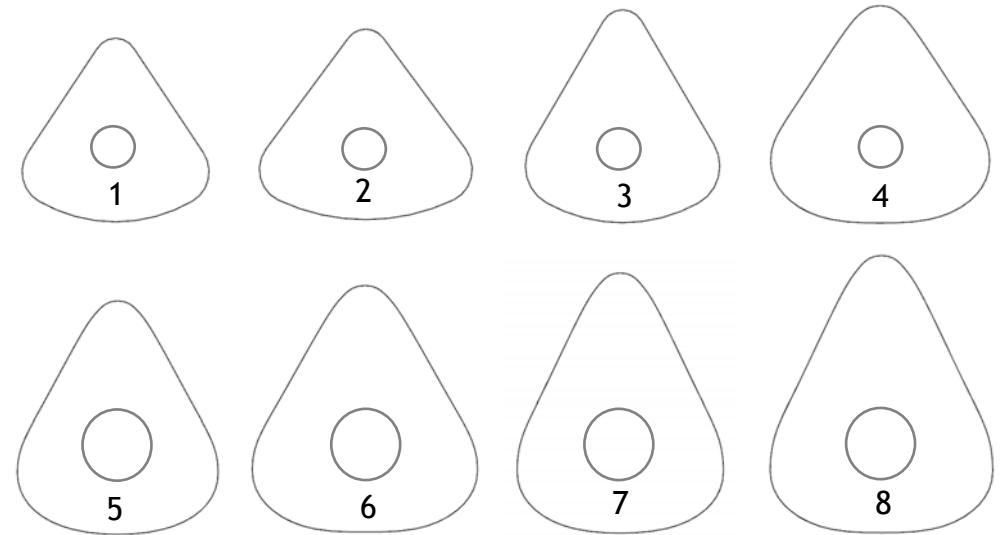
Size chart frames



Results and Knowledge



Current design: modular mask



Size chart frames



Results and Knowledge

Materials & Production



Onderdeel	Materiaal	Printer	Eigenschappen
Frame	MED610	Stratasys® J35™ Pro	Biocompatibel PolyJet materiaal voor stevige, transparante onderdelen van medische toepassingen.
Frame ring	MED610	Stratasys® J35™ Pro	
Cushion	MED625FLEX	Stratasys® J35™ Pro	Biocompatibel, flexibel en transparant PolyJet materiaal dat geschikt is voor medische toepassingen.



First prototype



Results and Knowledge

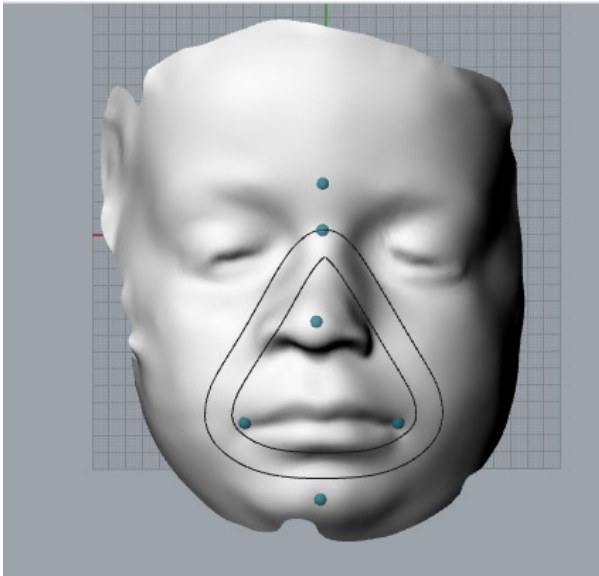
Materials & Production



Which material and printer suits our purpose best?



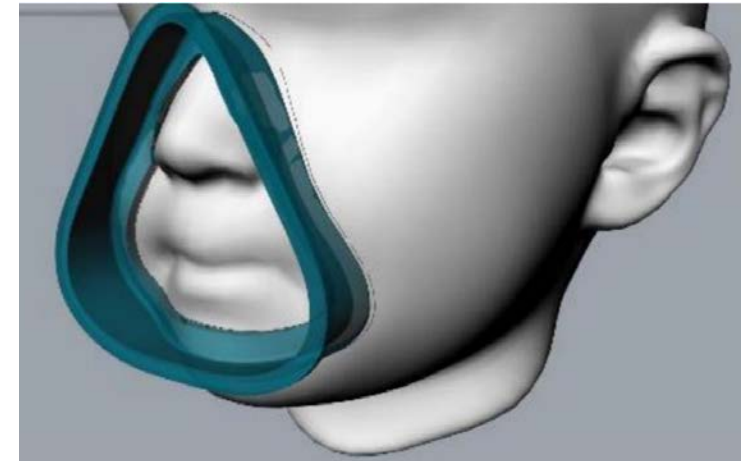
Results and Knowledge



Choosing landmarks



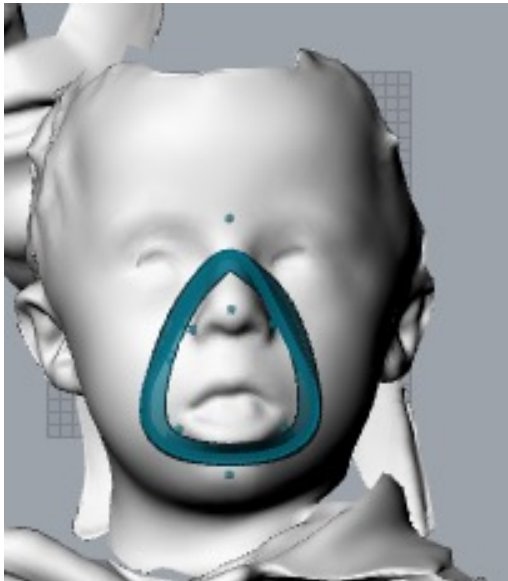
NSize



Mask projection



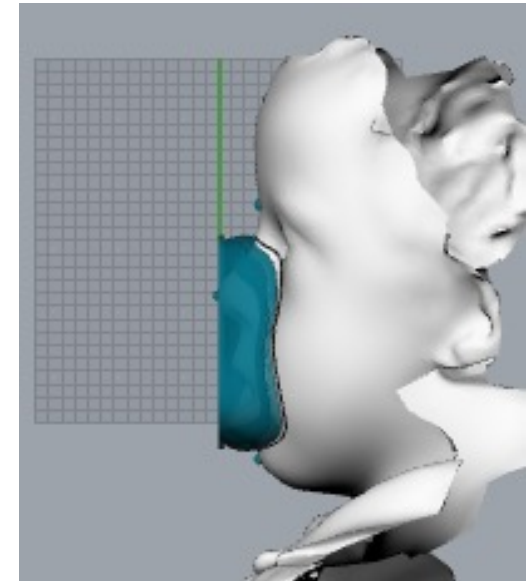
Results and Knowledge



Choosing landmarks, curvature



NSize



Mask projection



Results and Knowledge



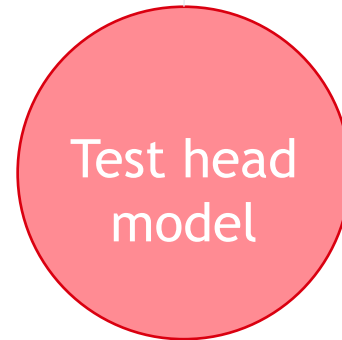
Two test head models (1y & 4y)



Inside: hard plastic



Outside: silicone





Results and Knowledge



Testing personalized mask on test head models

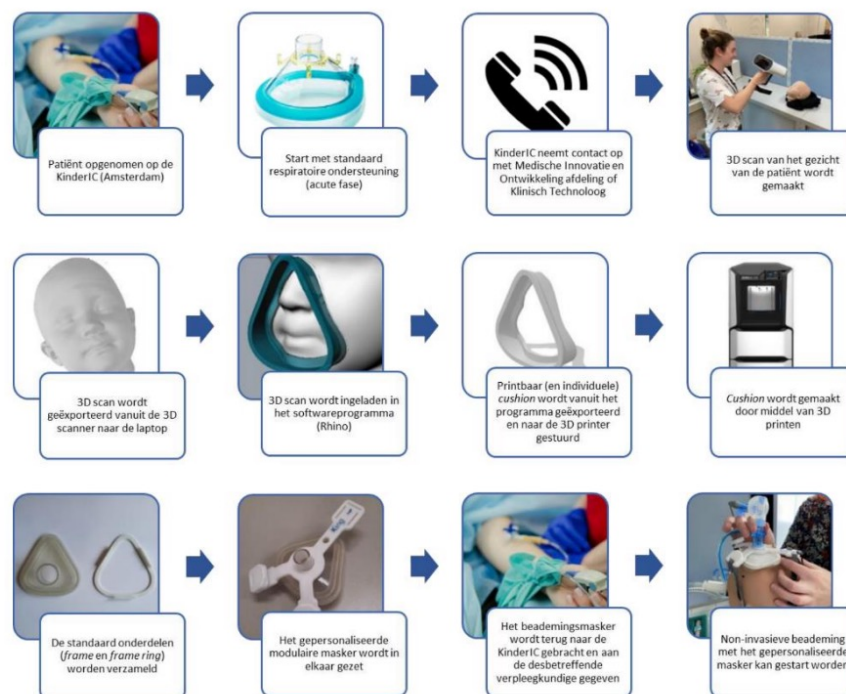
Test head
model





Results and Knowledge

All steps to provide
a personalized mask
within <24h



Process





Future perspectives

All steps to provide a personalized mask within <24h



What to do?

- Bench testing
 - Air leakage
 - Facial pressure
 - Cushion material
 - Design optimization



Future perspectives

All steps to provide a personalized mask within <24h



What to do?

- Bench testing



- Clinical testing

Personalized masks: on the way to clinical implementation

