

A recent AM-project Introducing the Materialise Passive NIP solution



Co-funded by the
Erasmus+ Programme
of the European Union

Dr. Michel Janssens, **Materialise**



Project No. 601217-EPP-1-2018-1-BE-EPPKA2-SSA-B



This project has been funded with support from the European Commission. This publication reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

Materialise



Software



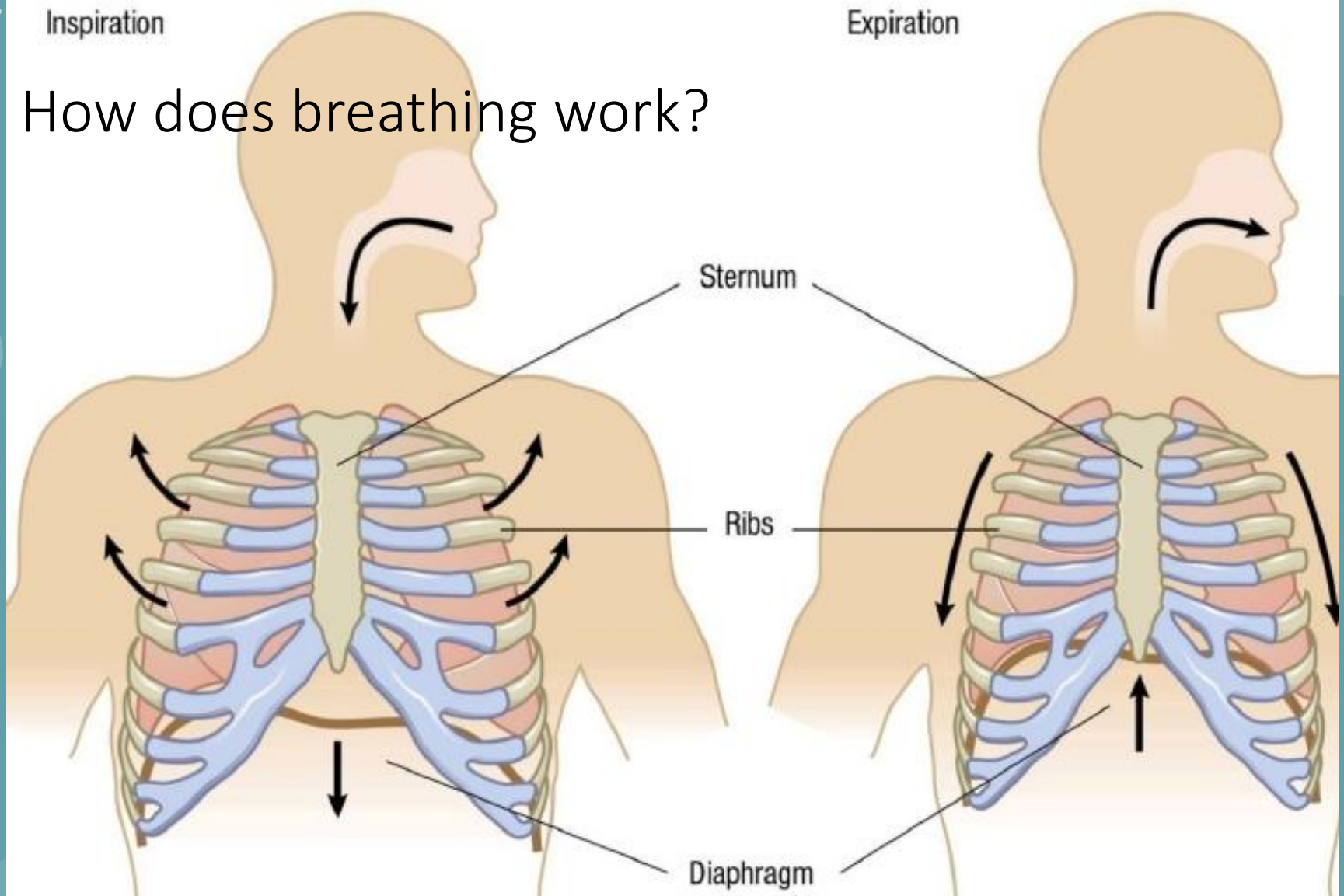
Manufacturing



Medical

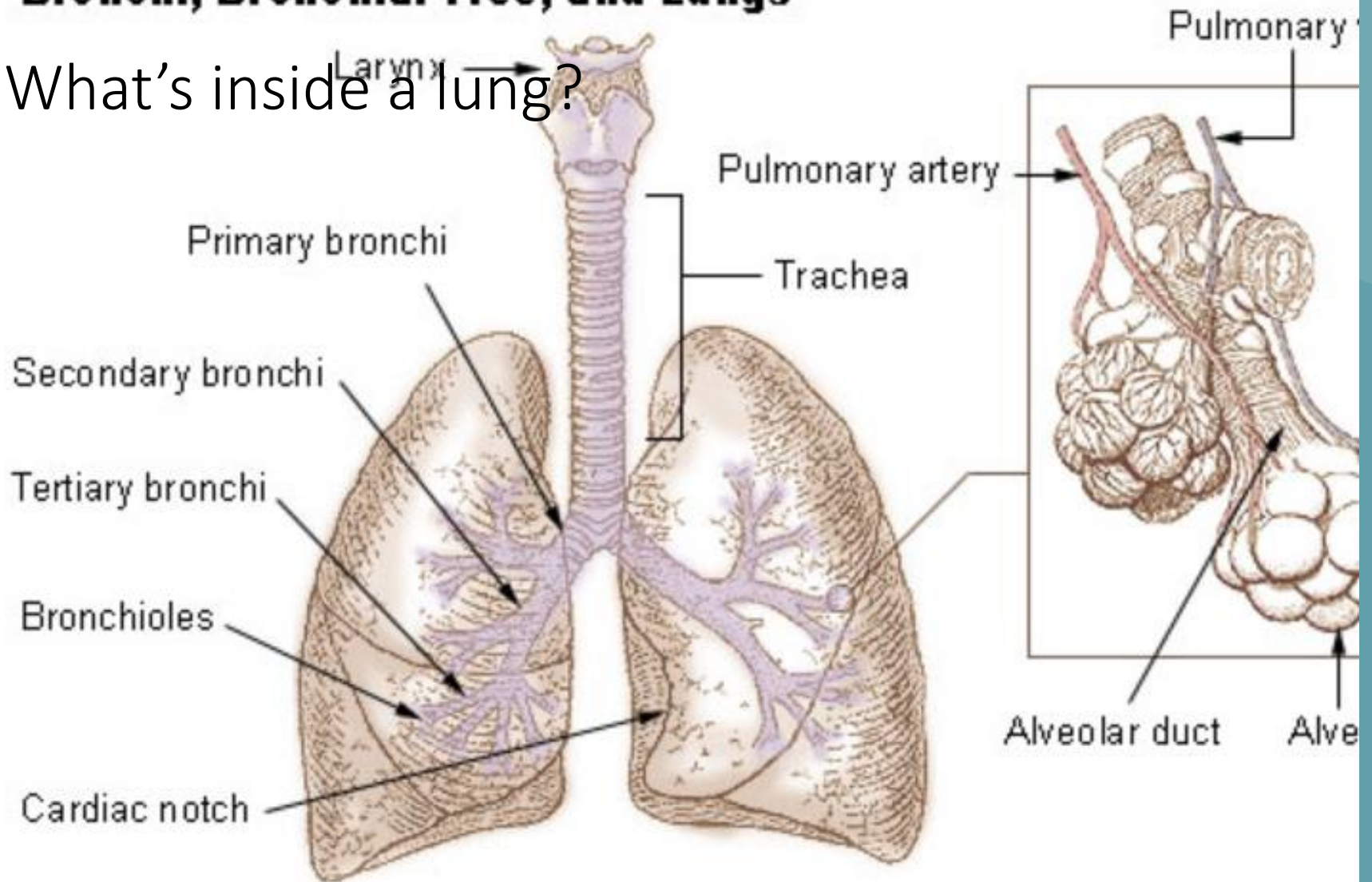


How does breathing work?



Bronchi, Bronchial Tree, and Lungs

What's inside a lung?



When the patient is deteriorating with a higher need for oxygen, there is the need to switch towards **positive oxygen pressure** in the airways pushing back the fluids in the lungs which will lead to a **better uptake of oxygen**. It is a **safe** thing to do. Because of the mask there is **low risk for contamination** and it's not invasive. **The high mortality rate** related to the **invasive ventilation** is exactly what we try to avoid with the passive PEEP approach. The ventilators are putting so much pressure on the lungs in the inhalation phase that they do **damage to the lungs of many Covid patients** in an effort to keep the oxygen level high.

Prof. Pulmonology W. De Backer
University Hospital Antwerp, Belgium
Director of respiratory imaging company FLUIDDA



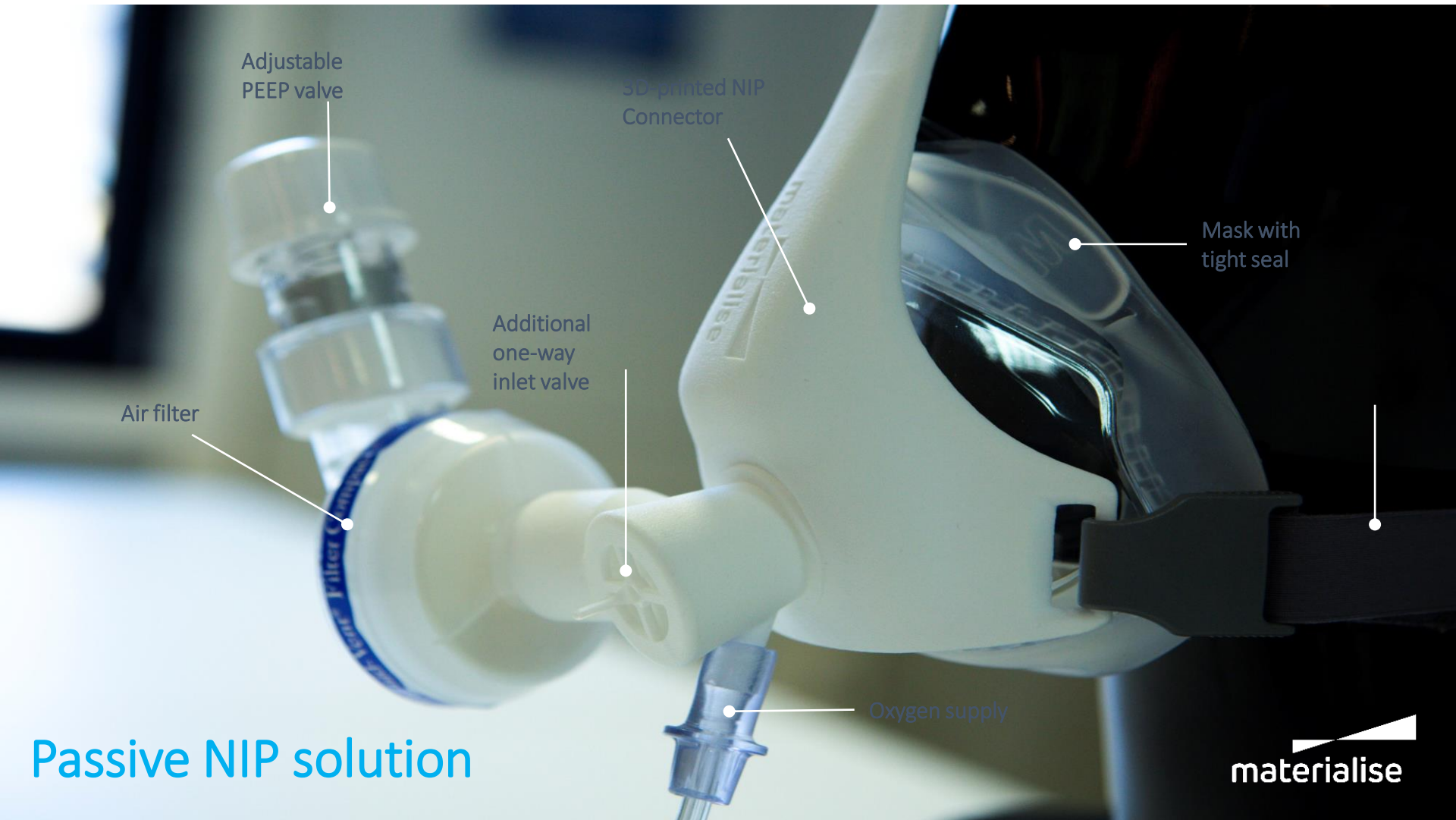
KEY PROBLEMS IN HOSPITALS

- COVID-19 patients are in need of **oxygen**
- **Positive pressure** (PEEP) is required to keep the alveoli open for severe patients
- Caregivers are concerned about **aerogenic contamination**, so hospitals initiate invasive ventilation sooner and more
- **Patients suffer from complications** related to long periods of **invasive ventilation** and very high positive pressures
- **Shortage of ventilators** in some countries



AM is only the manufacturing part

- We need an idea
- It needs to be checked on all aspects
- It needs to be engineered, designed
- It needs to be validated
- It needs to be approved
- The final product needs to be delivered



Passive NIP solution

materialise

What does Passive NIP mean?

Passive

no need for a mechanical ventilator, relying on the patient's breathing

Non-Invasive

no need for intubation, but using a mask instead

PEEP

Positive End Expiratory Pressure. Create a positive pressure in the lungs while exhaling (like while blowing up a balloon)



How does the Passive NIP help patients?

Classical Oxygen
Interfaces

nasal prongs & masks



MTLS Passive NIP

focus on a combination of
high oxygen delivery and
providing PEEP, with
minimal aerosol formation



Invasive Ventilation
Intubation

Ventilators



Rewind to the last week of February

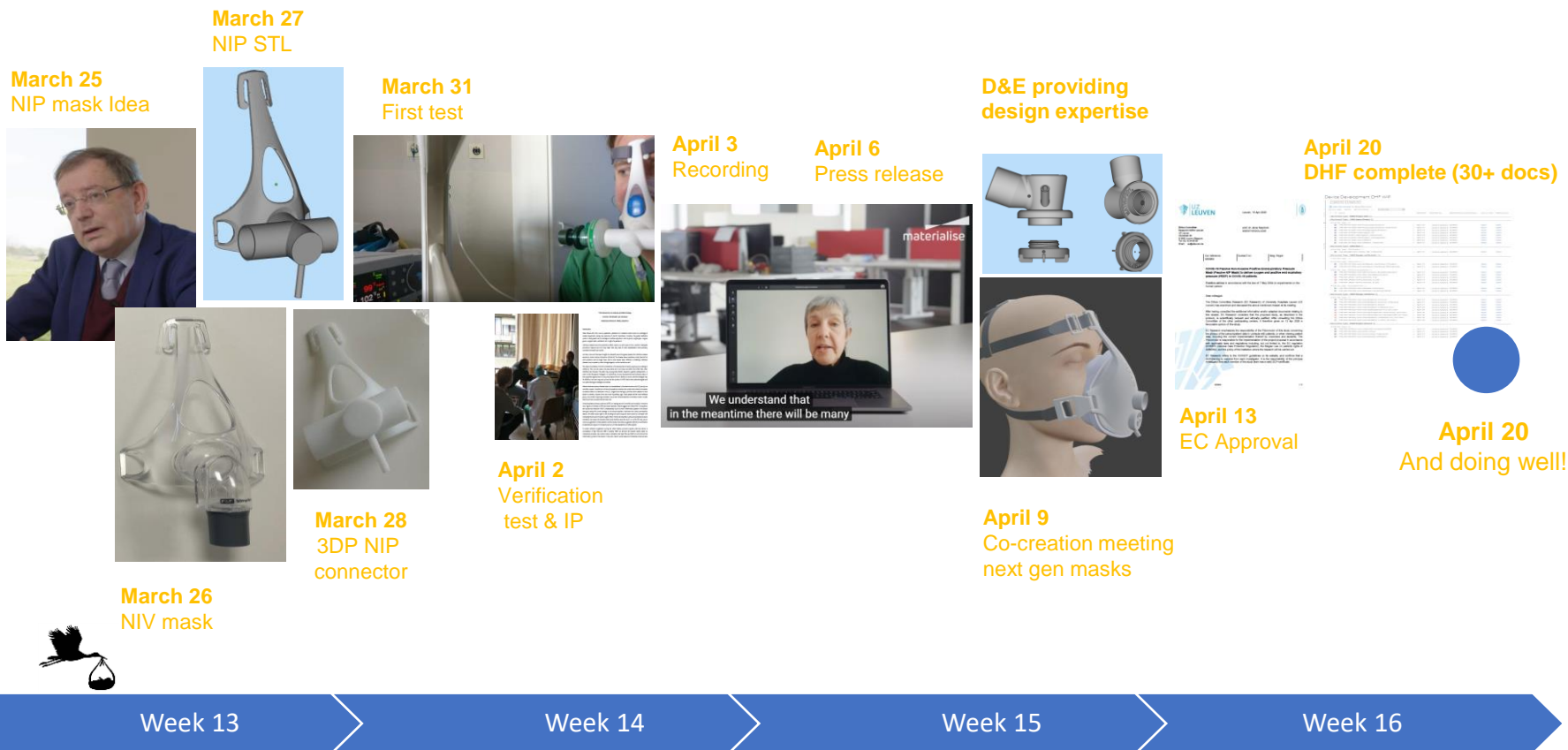
- China was over its peak
- Italy was becoming first country outside China with significant cases
- No such thing as pandemic (on March 12)

	# cases
China	77658
Italy	221
Belgium	1
US	53



3 weeks later

From idea to patient in 25 days



Bridging Materialise

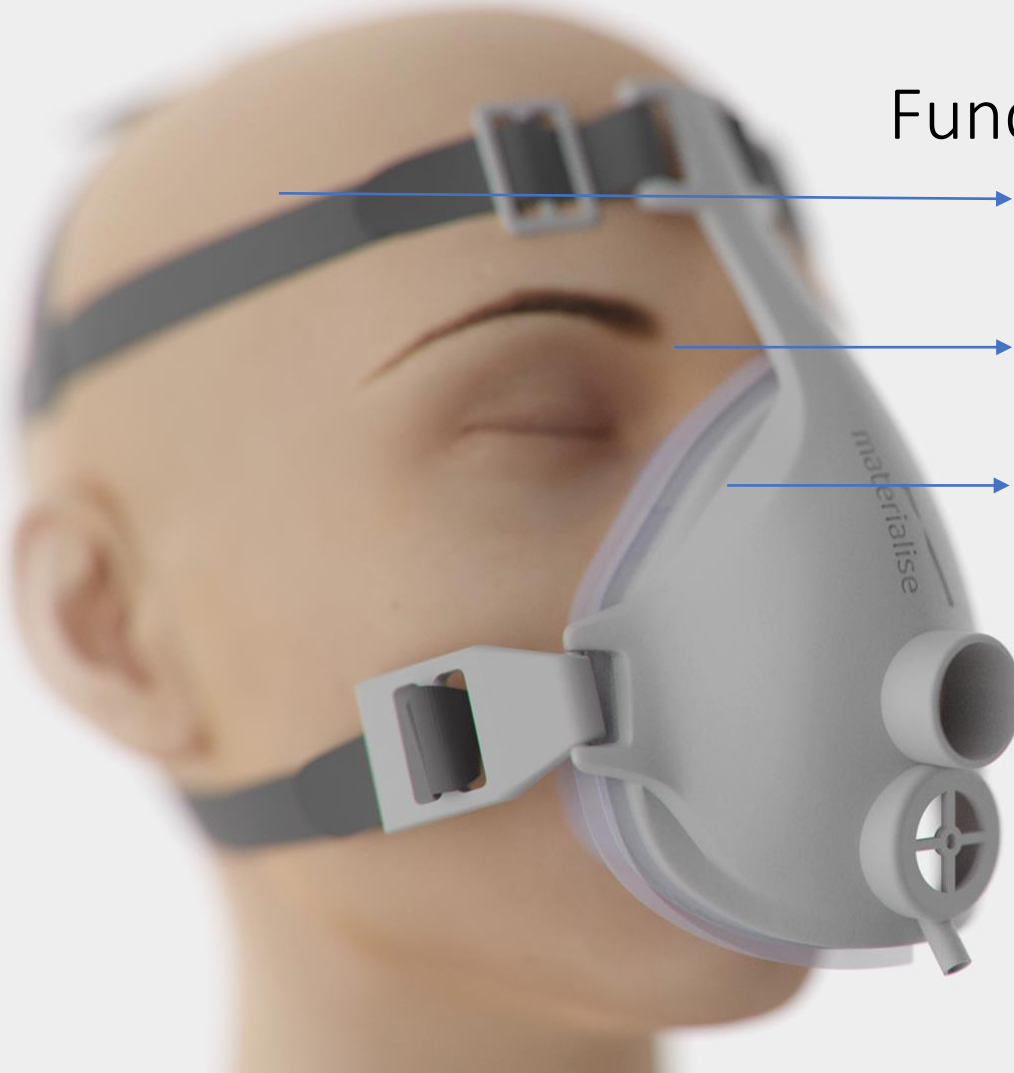
- Central manufacturing stepped in to print prototypes
- Collaboration with D&E for fast iterations
- Made use of SSM average face model to improve design of cushion (straps)
- Collaboration with MatCz for Vacuum Casting

Safeguarding the
Medical
functionality

Considering
Non-3DP
manufacturability
(e.g., injection molding)

materialise

Functionality to Design for AM



MJF head strap

Vacuum-casted Silicon part

3D Printed PA part, fully integrated



15

Respiratory Market = Target Market

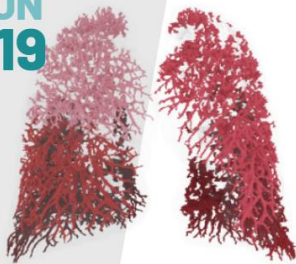
Great exposure

New network

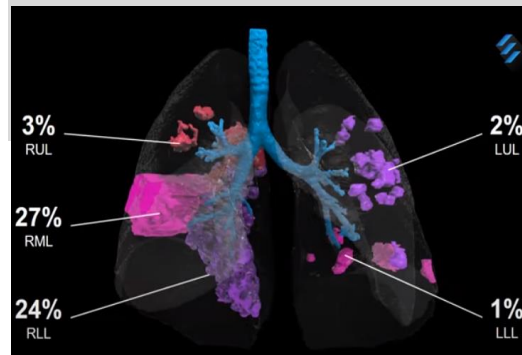
Durable product line?

FLUIDDA

OUR WAR ON
COVID-19



MIMICS



MATERIALISE
PASSIVE NIP



An Epic Collaboration

As a whole organization

+ 30 people directly involved

All of them backed-up by their teams

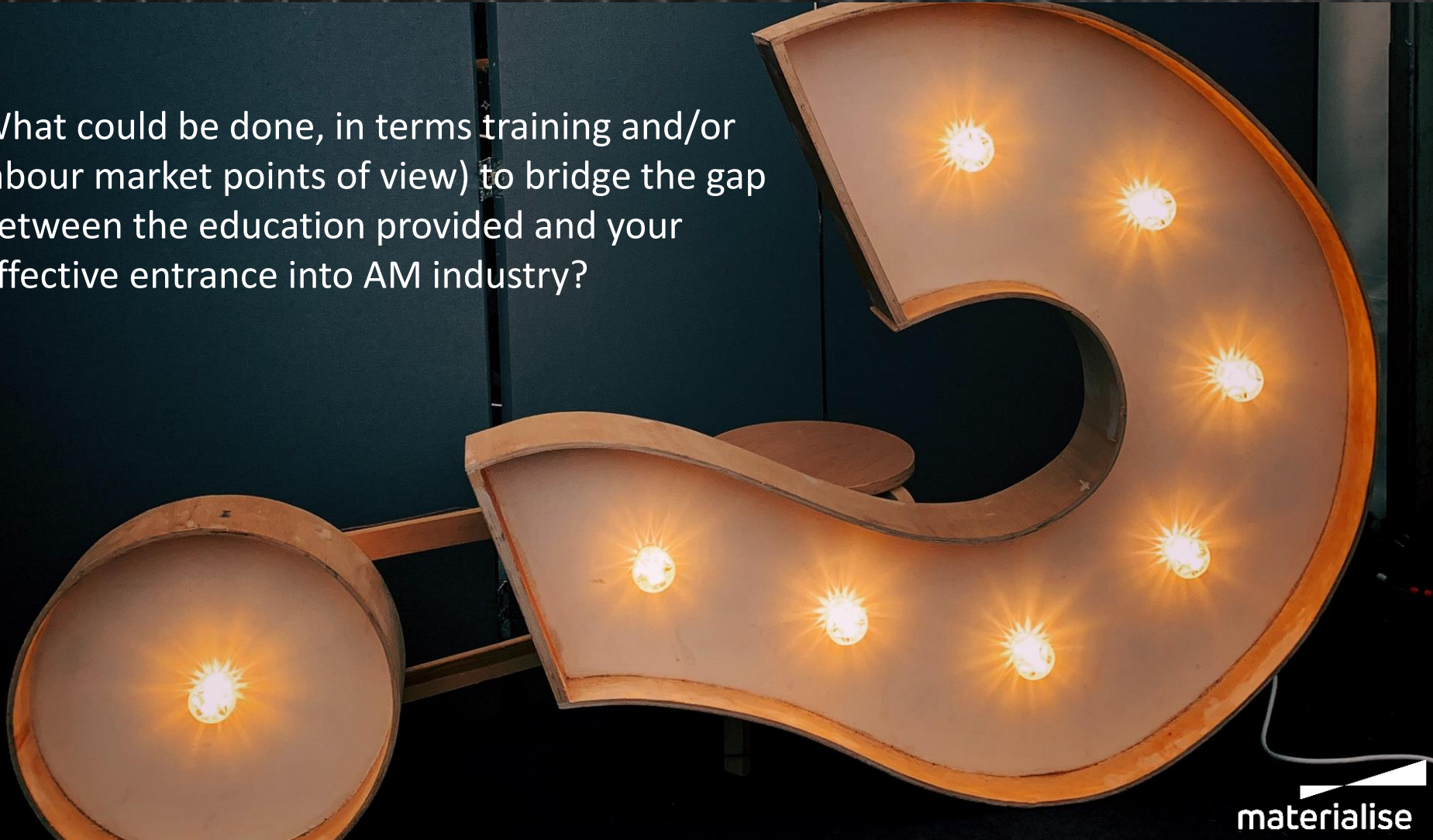
Motivated by our mission statement

BCPS
Central Design & Engineering Team
Central Research
Clinical Affairs
Corporate Marketing
Device Development
Innovation Management
Internal Marketing Agency
Legal and IP
Medical & Central production
Medical & Manufacturing MT
Process Engineering
Process R&D
Product Marketing and Communications
Quality and Regulatory



Time for Q&A

What could be done, in terms training and/or labour market points of view) to bridge the gap between the education provided and your effective entrance into AM industry?





Co-funded by the
Erasmus+ Programme
of the European Union

Thank
you

This project has been funded with support from the European Commission. This publication reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.