

# BILH Covid-19 Innovation Hub: Innovative COVID-19 Response Supplies from Novel Sources

Emilie Downing, BS, BILH and Tod Woolf, PhD, BIDMC

## Introduction/Problem

When the COVID-19 Pandemic began, obtaining essential supplies from existing supply chain channels became an urgent challenge due to significant shortages in supplies. At the same time, there was an influx of support from community volunteers and alternative manufacturers that needed and wanted to pivot from their traditional products and apply a variety of technologies and skills to producing products in response to COVID-19. The volume of innovations coming to the surface required a team and a process to effectively catalogue, test, source, and ultimately add alternatively sourced products to supply chain for purchasing.

## Aim/Goal

The goal of this work was to alleviate the shortages of essential supplies that were in short supply during the COVID-19 surges, and create processes to be more prepared with alternative supply changes for subsequent pandemics or other major public health emergencies.

## The Team


- Administrative Project Team**
- Emilie Downing, BS; Director of Market Analytics & Intelligence, BILH
  - Catherine Gill; Senior Research Administrator, BIDMC
  - Andi Hernandez, BA; VP of Research Operations, BIDMC
  - Olivia Potvin, PhD; Research Program Manager, BIDMC
  - Gyongyi Szabo, MD, PhD; Chief Academic Officer, BIDMC and BILH
  - Eleanor Torrey, MPH; Senior Project Manager, BIDMC
  - Tod Woolf, PhD; Executive Director of Technology Ventures Office, BIDMC
- Research, Clinical, and Administrative Contributors**
- Ramy Arnaout, MD, DPhil; BIDMC
  - Sana Ata, MD; Lahey Hospital
  - Alana Dale, BA; BIDMC
  - Abby Flam, MCP; BIDMC & Atrius Health
  - Heung Bae Kim, MD; BCH
  - James Kirby, MD; BIDMC
  - Jeffrey Lamson, BS, RN; BIDMC
  - Stanley Lewis, MD; BILH
  - Chip McIntosh, NP, PhD; BILH
  - Phillip Mears, MHA, JD; BILH
  - Christopher Minette, MBA; BIDMC
  - Peter Shorett, MPP; BILH
  - Thomas Siepka, RPh, MS, FASHE; BIDMC
  - James C. Weaver, PhD; Wyss
  - Marten H. Wolckenhaar, MD; Lahey Hospital
  - Sharon B. Wright, MD, MPH; BILH
  - Mark Zeidel, MD; BIDMC

## The Interventions

- Coordinated BILH system-wide sourcing & testing of alternative PPE
- Developed and implemented BILH evaluation algorithm for PPE sourcing
- Provided business and legal guidance for alternative RT-PCR kit sourcing
- Provided business and legal guidance for open source 3D printed swab project
- Communicated BIDMC PPE needs to COVID-19 Massachusetts Manufacturing Emergency Response Team (M-ERT)
- Brought >20 alternatively sourced products into the BILH supply chain


## Results/Progress to Date

**PPE: Face Shields, Gowns, Masks, Respirators**




**COVID ASSAYS**

**SWABS**



**PCR**



**1. COVID -19 Innovation Hub.** Alternative manufacturing and methods project categories: 1) PPE Products, 2) PPE Sterilization for Re-Use, 3) Ventilators (parts, repair and novel simplified designs), 4) Assays (COVID PCR and serological assays), and 5) Therapeutics and Vaccines (discovery research and clinical trials).

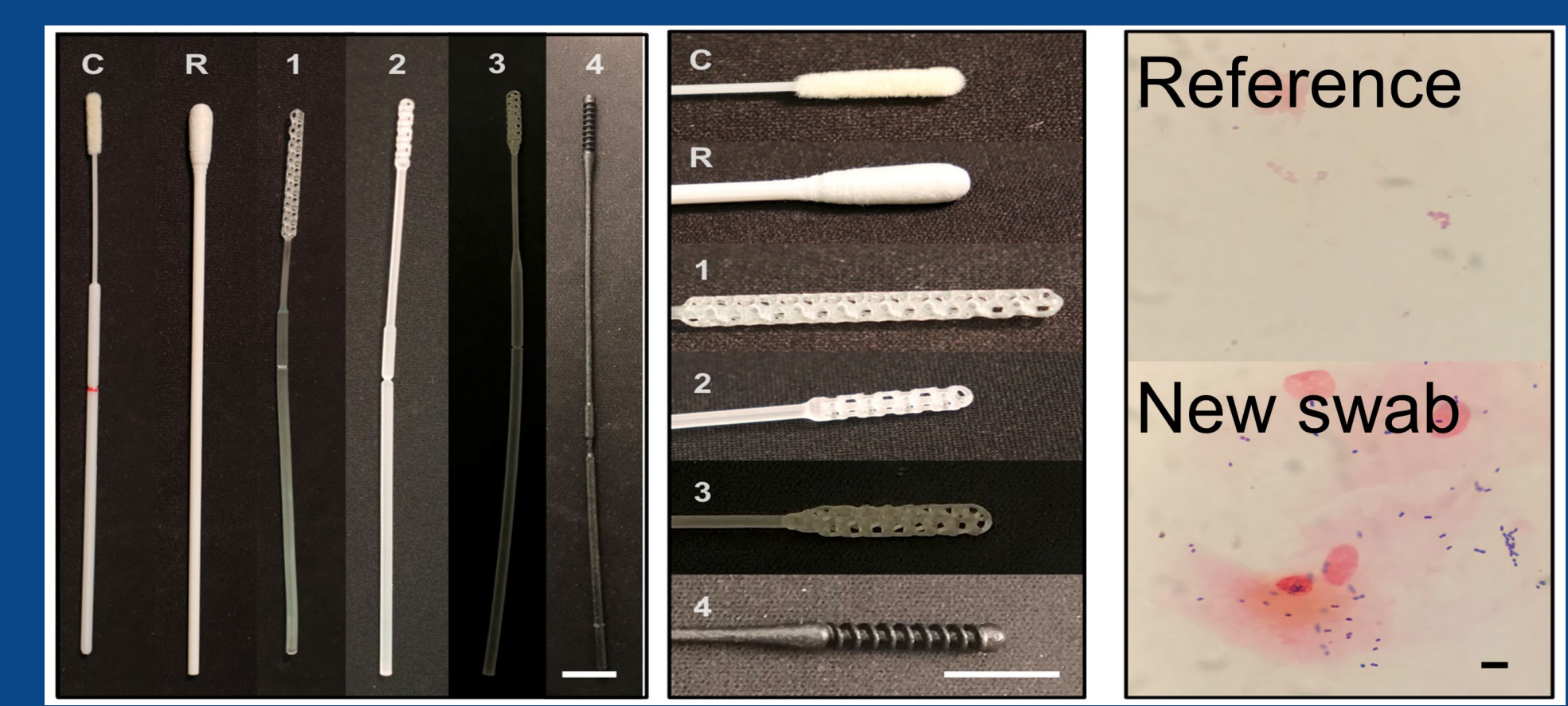
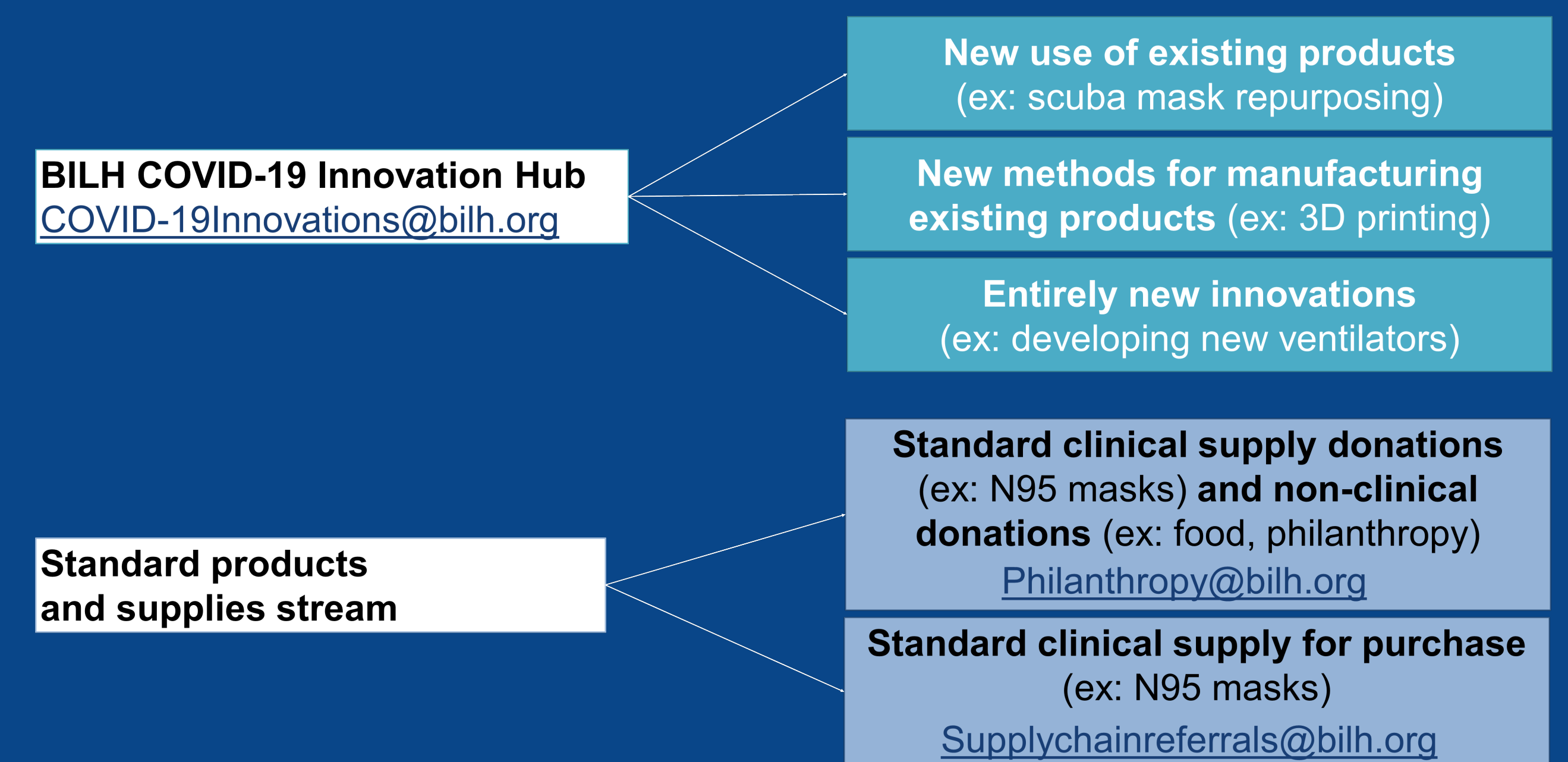
*For more information, contact:*

Tod Woolf, PhD, Executive Director of Technology Ventures Office, [twoolf@bidmc.harvard.edu](mailto:twoolf@bidmc.harvard.edu)

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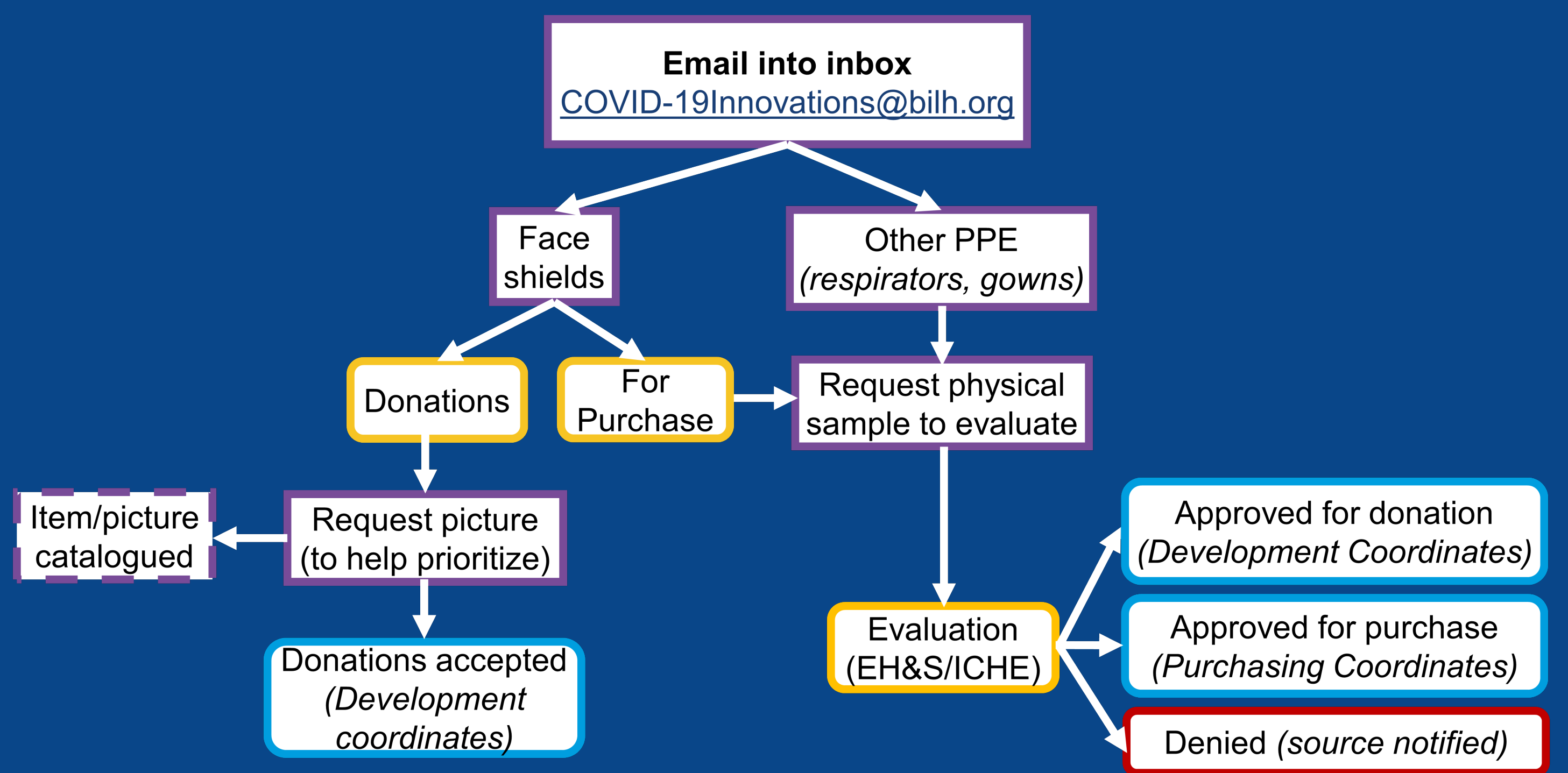
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## More Results/Progress to Date



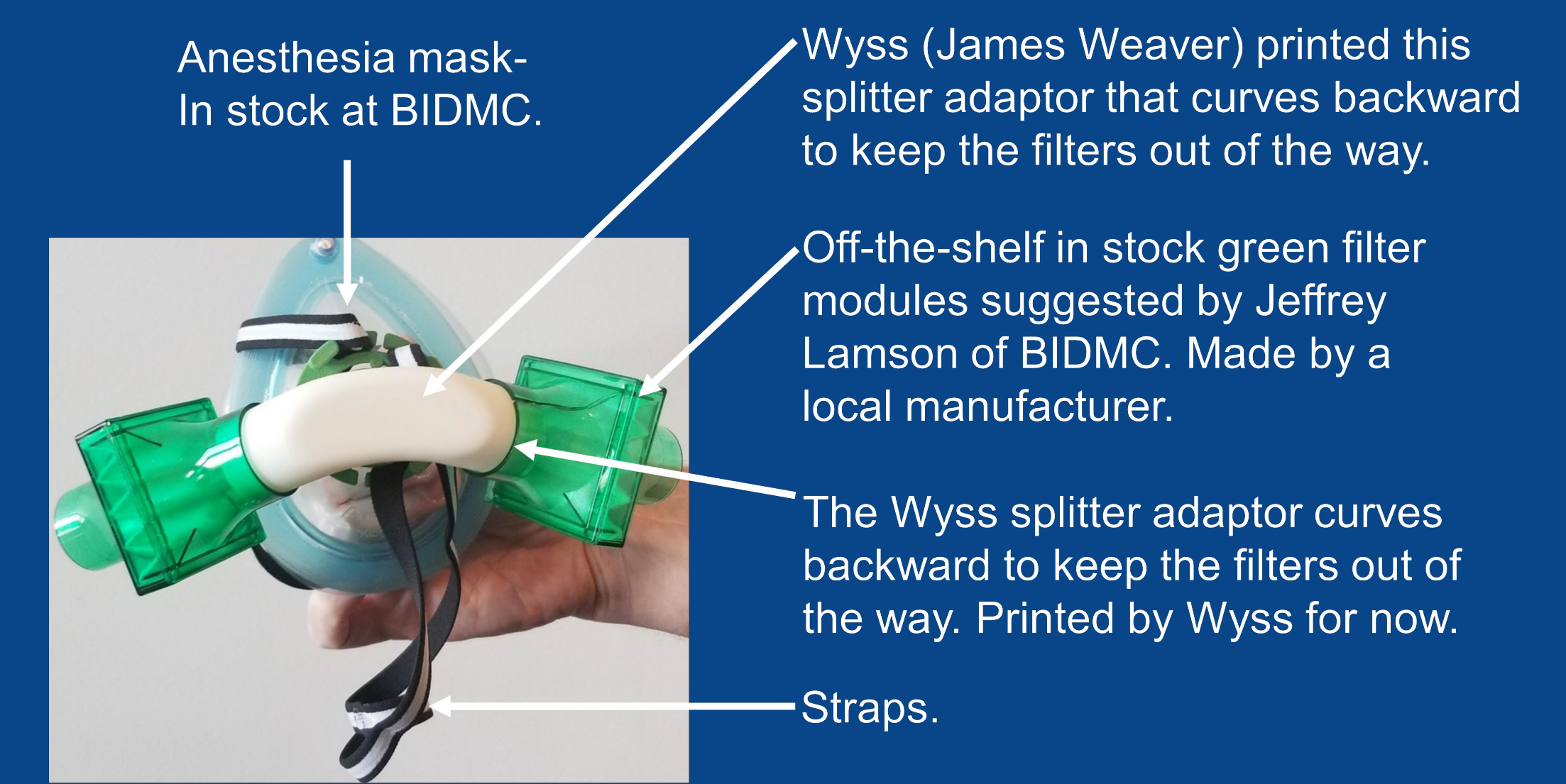
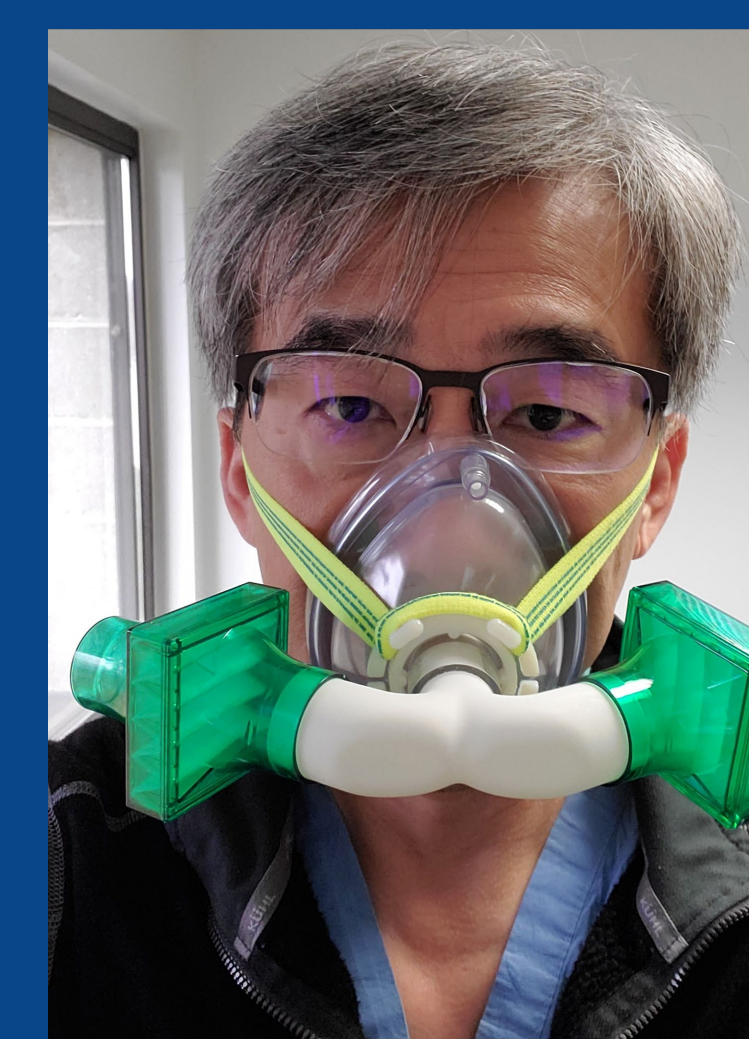
**4. Covid-19 Diagnostics.** 1) James Kirby at BIDMC quickly developed a Q-PCR assay with a local company that was used early in the pandemic and other area hospitals for clinical diagnosis of COVID-19 when CDC tests were unavailable (not shown here). 2) A multidisciplinary team of experts led by Ramy Arnaout at BIDMC collaborated with 3D printing companies and other Medical Centers to develop open source 3D printable swabs used for COVID-19 testing (above).

## 2. Community Support Overview.



**3. BILH Evaluation Algorithm for PPE Sourcing.** The BILH COVID-19 Innovation Hub 1) organized the flow of PPE donations, and had the PPE evaluated for suitability, and 2) consolidated requests and sources of PPE from pivoted manufacturers and tracked which items could be cleared for use at BILH.

Heung Kim, MD, BCH

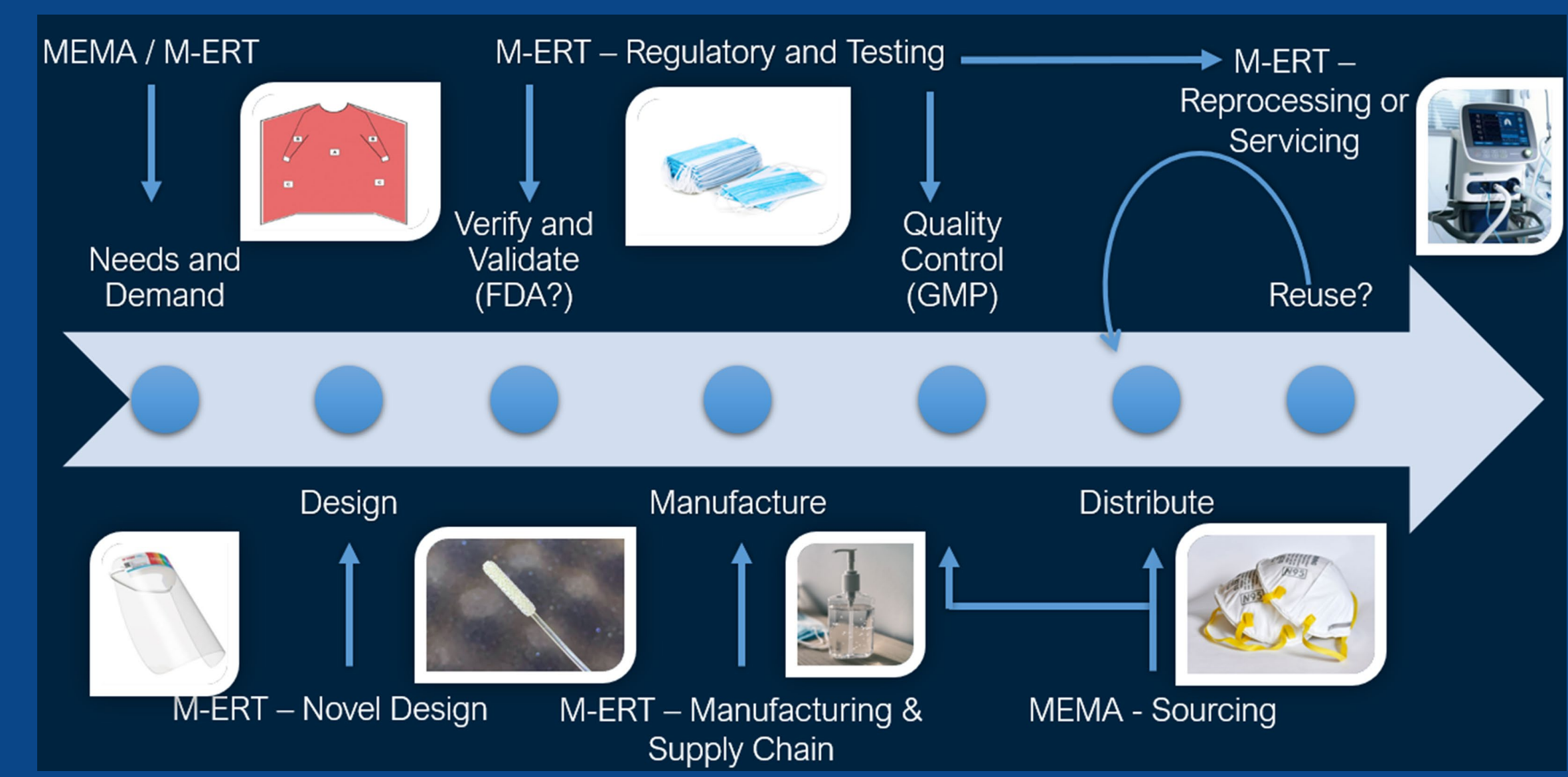


**5. Alternative N-95 Elastomeric Respirator from BCH/Wyss/BIDMC.** This alternative respirator was developed with readily available locally sourced filter modules and a 3D printed adaptor. The product was found to be effective, but was not deployed as it was not NIOSH approved.

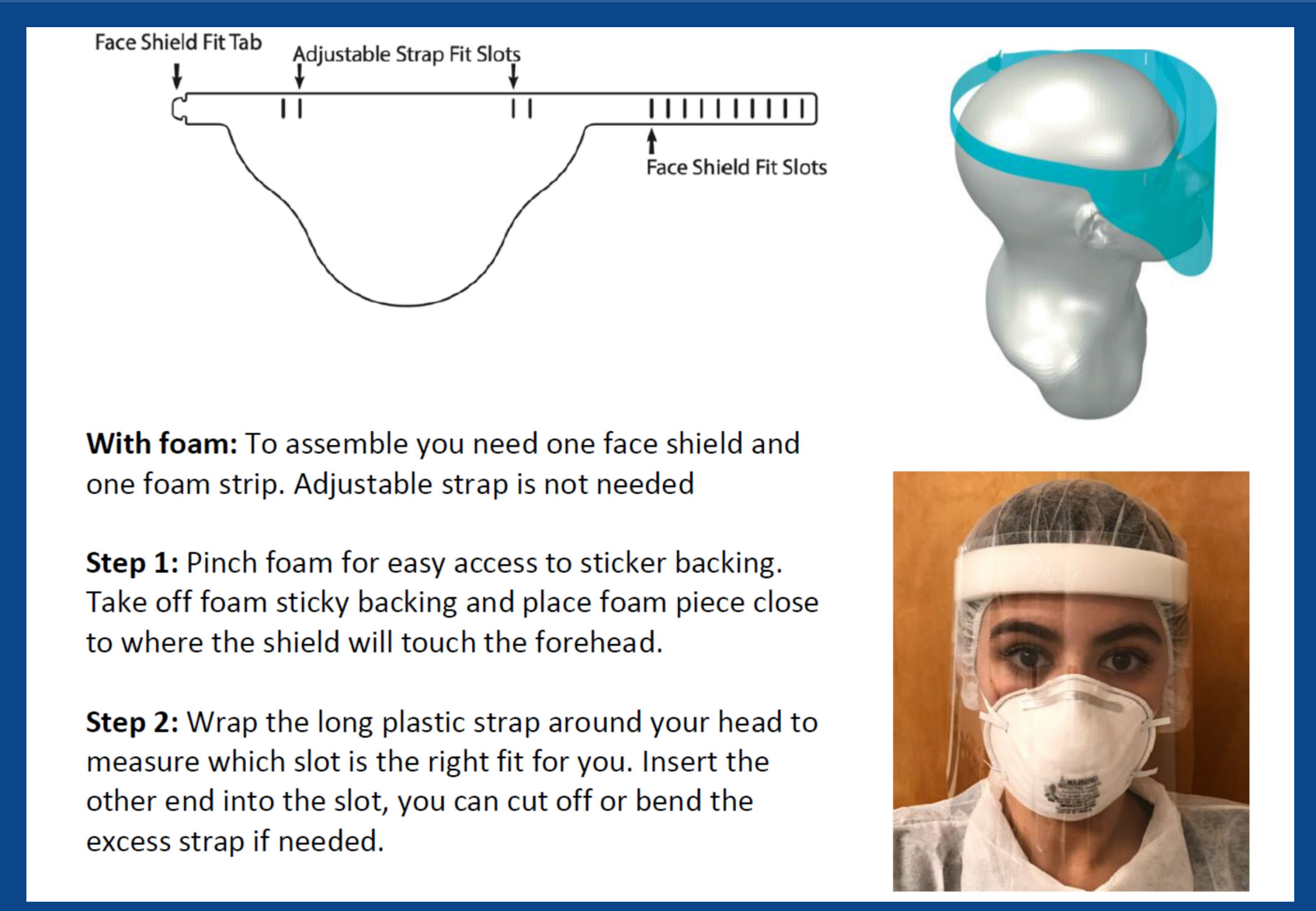
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**6. Massachusetts Manufacturing Emergency Response Team (M-ERT).** Mark Zeidel and Tod Woolf communicated BIDMC PPE needs on weekly M-ERT conference calls. Our work with the Covid-19 M-ERT had an impact in Massachusetts and beyond, and the M-ERT has been cited by government officials as a model for innovative manufacturing responses to emergencies.



**With foam:** To assemble you need one face shield and one foam strip. Adjustable strap is not needed

**Step 1:** Pinch foam for easy access to sticker backing. Take off foam sticky backing and place foam piece close to where the shield will touch the forehead.

**Step 2:** Wrap the long plastic strap around your head to measure which slot is the right fit for you. Insert the other end into the slot, you can cut off or bend the excess strap if needed.

**7. Alternative Manufacturing of Disposable Face Shields from Lacerta.** James Weaver from the Wyss Institute led this project (<https://wyss.harvard.edu/news/seven-million-face-shields-and-counting/>). These masks were produced at very large scale (millions) by local manufacturer of food packaging (Lacerta). We coordinated with environmental health at BIDMC to have these evaluated and they were added to the BIDMC supply chain.

Category/Item Type	# of Submissions to Date	Opportunity Submitted (no specifics provided)	# of Submissions Pending Evaluation	# of Submissions in Evaluation	# of Submissions Failed Screening / Evaluation	# of Submissions Passed Evaluation	# of Passed Evaluations Approved for Donations	# of Passed Evaluations Approved to Purchase (sent to Supply Chain)
PPE - N95s	39	8	9	-	14	1	2	5
PPE - Face shields	52	2	6	2	1	-	37	4
PPE straps/holders	8	-	1	-	1	-	4	2
PPE - Gowns	18	2	6	-	3	2	-	5
Hand sanitizer	8	1	1	1	4	-	1	-
Ventilators	10	1	3	1	2	3		
Assays	6				2			4
Other	15	10	-	-	4	-	-	1
<b>Grand Total</b>	<b>156</b>	<b>24</b>	<b>26</b>	<b>4</b>	<b>31</b>	<b>6</b>	<b>44</b>	<b>21</b>
% of Total		15%	17%	3%	20%	4%	28%	13%

**8. Summary.** Our Innovation Hub reviewed over 156 alternatively sourced items, with >20 items passing the evaluations and being approved to enter the BILH supply chain. We have established work flows for evaluating novel supply chains during future emergencies.

## Lessons Learned

- We learned that making products which require governmental approval is quite challenging, and requires input from regulatory agencies, engineers, environmental safety and end users. Some items, like face shields and ethanol hand sanitizer, were relatively easy to find alternative sources, but complicated items like the specialized materials used in N-95 masks was much more difficult and time consuming to obtain from alternative manufacturers.

*For more information, contact:*  
 Tod Woolf, PhD, Executive Director of Technology Ventures Office, [twoolf@bidmc.harvard.edu](mailto:twoolf@bidmc.harvard.edu)