

The Protection We Need: Decentralised and Local Sourcing of Medical Supplies

A proposal from Autonomy

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Autonomy

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Contents

1. Underfunded, under-doctored and under-resourced: The NHS and COVID 19
2. Overdemand and undersupply
3. Meeting the crisis head on: bringing the right actors together
4. Existing case studies
 - Textile and paper processing companies
 - Cosmetics, perfume and chemicals manufacturing
 - Manufacturing and additive manufacturing
5. Conclusion

1. Underfunded, under-doctored and under-resourced: The NHS and COVID-19

Covid-19 is currently spreading exponentially, with governments across the world either ill-prepared or unable to face up to the scale of the crisis. Here in the UK, hospitalizations and deaths are still rising, with no certainty yet about when the pandemic will peak.

This is placing unprecedented strain on the NHS, which was already described in a report by the Royal College of Physicians in 2016 as 'underfunded, under-doctored and overstretched'.² Efforts are being made to take strain of the service through government measures such as self-isolation and social-distancing. The government's recent announcement asking 1.5 million of those most vulnerable to the virus to self-isolate for 12 weeks removes a significant pressure from the service. But according to the British Medical Association,³ there are another 18 million people in the UK with a chronic health condition, many of whom may require hospitalization.⁴ Even with the government's decision to enforce a lockdown, self-isolation can only go so far. Key workers must stay on the job, and people have to use supermarkets, exercise and care for loved ones, friends and their community.

The crisis the coronavirus poses to the NHS is not just one of staffing or pharmaceutical supplies, but also one of resources and equipment. There are many devices and supplies, medical or otherwise, that are necessary to treat COVID 19 (see Figure 2 below). This is not just to treat patients, but also to protect frontline health workers. Personal protective equipment (PPE) acts as a barrier between healthcare workers and patients, and is, therefore, critical to preventing exposure to coronavirus. In Italy, where PPE

2 'Underfunded, Underdoctored, Overstretched: The NHS in 2016', RCP London, 2016 <<https://www.rcplondon.ac.uk/guidelines-policy/underfunded-underdoctored-overstretched-nhs-2016>> [accessed 6 April 2020].

3 'Working in a system that is under pressure', British Medical Association, March 2018.

4 Ibid.

shortages have been dire, around 20% of health workers have already caught the virus, some of whom have died.⁵

| Supplies | PPE personal protection equipment | Medical Supplies | Devices |
|----------------|--|--|--|
| Hand Sanitizer | N95 Respirators Surgical Face Masks Goggles / Masks Powered Air Purifying Respirators (PAPR/ CAPR) Examination Gloves Gowns Face Shields (Full Face Protection / FFP) Aprons | Nasal Cannulas Catheters Flow-Splitters for Oxygen Supply Thorpe Tube Flowmeter Oxygen Masks Venturi Masks (High Flow) | Negative Pressure Rooms Non-Contact Thermometers Ventilator Machines Hospital Beds Oxygen Concentrators Pulse Oximeters Non-Heated Humidifier Laryngoscopes Infusion Pumps |

Figure 1: Table of devices, equipment and supplies necessary for treatment of, and protection from, COVID 19 in the NHS ⁶

2. Overdemand and undersupply

As the pandemic develops, access to PPE is a growing concern across the UK. In an open letter to The Sunday Times, NHS staff

⁵ 'COVID-19: Protecting Health-Care Workers', The Lancet, 395.10228 (2020), 922 <[https://doi.org/10.1016/S0140-6736\(20\)30644-9](https://doi.org/10.1016/S0140-6736(20)30644-9)>.

⁶ Adapted from: 'Coronavirus: richiesta di disponibilità alle aziende e indicazioni tecniche per la produzione di mascherine e dispositivi di protezione individuale (DPI)' Regione Lombardia, 2020 <<https://www.regione.lombardia.it/wps/portal/istituzionale/HP/DettaglioAvviso/istituzione/attivita-istituzionali/avv-mascherine-made-in-italy>> [accessed 6 April 2020].

called on the prime minister to intervene and make sure they had adequate PPE such as disposable masks, surgical gowns and gloves.⁷ Due to overdemand, supply chain interruptions and an already under-resourced service, a significant number of PPE items are already running low, and these, we must remember, are only the early stages of the pandemic's impact.⁸

We are also heading toward a serious mismatch of medical equipment and patient needs. While the government has recently set up a consortium of UK manufacturers to address shortages in ventilators, there are other items and devices the UK lacks.⁹

A study by the University of Cambridge found that if the virus continues to grow exponentially in the UK, five out of seven of the UK's regions will have more cases than there are ICU (intensive care unit) beds available.¹⁰

Over 60% of the UK's medical equipment is imported from abroad, the majority of which is from the EU.¹¹ As a crisis of overdemand also affects many EU countries, it may be that many of these transnational supply chains are nationalised, meaning that governments of the countries that manufacture the goods could

7 'Coronavirus Letter to the Editor: Without Protection, NHS Staff Are Cannon Fodder | The Sunday Times' <<https://www.thetimes.co.uk/article/coronavirus-letter-to-the-editor-without-protection-nhs-staff-are-cannon-fodder-tswOnmbsx>> [accessed 5 April 2020].

8 'NHS England » Hospitals Get Ramped up for Delivery of Protective Kit to Staff Fighting Coronavirus' <<https://www.england.nhs.uk/2020/03/hospitals-get-ramped-up-for-delivery-of-protective-kit-to-staff-fighting-coronavirus/>> [accessed 5 April 2020].

9 'Coronavirus: Unite Welcomes Incredible Work of Ventilator Challenge Consortium in Saving Lives' <<https://unitetheunion.org/news-events/news/2020/march/coronavirus-unite-welcomes-incredible-work-of-ventilator-challenge-consortium-in-saving-lives/>> [accessed 5 April 2020].

10 Jacob Deasy and others, Forecasting Ultra-Early Intensive Care Strain from COVID-19 in England (Intensive Care and Critical Care Medicine, 23 March 2020) <<https://doi.org/10.1101/2020.03.19.20039057>>.

11 'Brexit: Impact of "No Deal" on the UK Medical Devices Industry', Verdict Medical Devices, 2017 <<https://www.medicaldevice-network.com/comment/commentbrexit-impact-of-no-deal-on-the-uk-medical-devices-industry-5774942/>> [accessed 5 April 2020].

make their production a public industry and to greater or lesser extents stop exporting abroad. This would mean that the UK is left with even more severe shortages of essential PPE and medical devices, unless other supply chains are developed rapidly.

The crisis in medical equipment goes beyond the hospital setting. For the public to take the necessary preventative measures to reduce hospitalizations, many will need to wear face masks. This does not apply to absolutely everyone, but for care workers, supermarket workers and those who are looking after friends or family with the virus, a face mask significantly reduces the risk of catching the disease through droplets.¹² Similarly, those who currently have the virus should wear a mask in the company of others to reduce potential transmission.

This lack of masks poses a significant risk to workers in the care industry, particularly those in private care homes, who can less easily access government medical items. There are over 1.6 million care workers in the UK and 1.5 million of those work outside of the NHS, either for independent institutions, local councils or private companies.¹³ Many of these workers need a number of the items listed in the PPE column in Figure 1, including masks, aprons and gloves.

3. Meeting the crisis head on: bringing the right actors together

Demand for medical equipment is already high. But if productive output continues to lag behind the speed at which the pandemic

¹² Hannah Devlin Science correspondent, 'Can a Face Mask Protect Me from Coronavirus? Covid-19 Myths Busted', The Guardian, 5 April 2020, section World news <<https://www.theguardian.com/world/2020/apr/05/face-mask-protect-coronavirus-covid-19-myths-busted>> [accessed 5 April 2020].

¹³ 'The State of the Adult Social Care Sector and Workforce in England' <<https://www.skillsforcare.org.uk/adult-social-care-workforce-data/Workforce-intelligence/publications/national-information/The-state-of-the-adult-social-care-sector-and-workforce-in-England.aspx>> [accessed 5 April 2020].

accelerates we will be left with serious shortages of essential equipment. Time is of the essence. The scale and speed required for the production and distribution of these items is unprecedented, and will rely on significant cooperation between medical facilities, manufacturers and designers.

To make sure we can meet this demand, we suggest a central logistics system - or platform - to connect hospitals and medical facilities with manufacturers, small fabrication hubs and designers. Many manufacturers in the UK are already repurposing their plants to produce essential medical items. These initiatives are both useful and laudable, but are happening independently and separately as opposed to collectively and collaboratively. Through this proposed central logistics system - which we're calling Medisyn - hospitals, care homes and pharmacies can easily place orders for items they are running low on.

In nuce Medisyn would centralise the coordination of the various processes necessary to manufacture and deliver medical equipment efficiently by bringing together all the necessary actors in one online space, allowing hospitals, manufacturers, universities and designers to communicate easily throughout the crisis.

The platform would also include a map, which updates in real-time according to which pharmacies currently have masks available, so that people who have the virus, or are looking after a relative or friend, can easily get hold of the items they need.¹⁴

There would also be space for manufacturers and designers to upload designs, share data, results and instructions to speed up the process of production and solve design and supply chain problems collaboratively. This would prevent unnecessary bottlenecks and mean that demand can be met with efficiency and ease. This side of the platform would have international scope, allowing companies

14 'The Coronavirus App' <<https://coronavirus.app>> [accessed 5 April 2020].

across the world to share designs and procedures for engineering specific parts and devices. This would aim to encourage greater international cooperation in tackling the crisis. A UK company that had designed a ventilator that can be rapidly manufactured could easily share the designs with, say, an Italian or US company. A model for this side of the platform has already been established by the Italian Open Source Mask Platform, which allows designers to upload mask models, ready for manufacturers and people across the world to download and print for free.¹⁵

Pausing and redistributing IP

Because the Medisyn platform would allow start-ups, designers and others to share designs, data and results, we suggest that under conditions of national emergency, the protections of trademarks and patents should be temporarily bypassed to allow rapid production and distribution of essential medical items. The UK government should hand patents over to companies with the capacities to produce the items, so that products can be produced safely and in large enough numbers to fulfil demand.

Our proposed platform would also link designers and manufacturers to the government's new streamlined testing and regulation process. This new system relaxes regulations around which manufacturers can create medical equipment, as well as how they go about it.¹⁶ Applications for exemptions from regulations can be fast-tracked to the Department of Health and Social Care (DHSC), creating greater flexibility for manufacturers, meaning a greater number of items are produced in less time.

The new testing and approval system might be further expedited by setting up a cooperative programme between government

15 See <https://www.opensourcemark.com/en/>

16 'Exemptions from Devices Regulations during the Coronavirus (COVID-19) Outbreak', GOV.UK <<https://www.gov.uk/guidance/exemptions-from-devices-regulations-during-the-coronavirus-covid-19-outbreak>> [accessed 5 April 2020].

and universities, as has been the case in some regions of Italy. In the Lombardy region, a collaboration between the regional government and the Politecnico di Milano has made the university's research and plans readily accessible to local designers and manufacturers, with the university also offering advice on which materials are eligible for the production of different medical items.¹⁷ In Puglia, universities have been brought in to help local factories reconvert their production¹⁸. The idea is to inventory all the textile companies of each region, their materials and production capacities, and make sure they conform to national health directives. This systematic approach to standardising equipment and items should be followed in the UK. Again, this could be readily coordinated across the UK using a centralised platform that allows universities and companies to readily share data about their inventories.

The platform would also offer an efficient payment system for those manufacturing NHS items, allowing companies to first produce and distribute medical items, and then send an invoice via the NHS supply chain. It would also allow manufacturers and distributors to send invoices to private care companies and pharmacies.

There are many enterprises small and large already taking the kind of initiative a platform such as the one we are proposing might harness. It is worth looking through some of the examples to show just how much of UK business could be turned toward meeting this crisis.

17 'Italian Fashion Textile Cos. Convert Production to Fight Coronavirus', WWD, 2020. See: <https://wwd.com/business-news/business-features/italian-textile-fashion-companies-fight-coronavirus-converting-production-1203543661/>

18 'Coronavirus, 165 Aziende Del Sud Pronte a Produrre Mascherine, Tute e Camicie' <<https://www.lagazzettadelmezzogiorno.it/news/bari/1214922/coronavirus-165-aziende-del-sud-pronte-a-produrre-mascherine-tute-e-camicie.html>> [accessed 6 April 2020].

4. Existing Case Studies

Textile and paper processing companies

The crisis of equipment in the UK is primarily one of PPE. So, it is worth looking first at examples of small and medium enterprises (SMEs) that have taken the initiative to produce this equipment. Across Italy, there have been many initiatives to turn existing textile, fashion and paper companies into manufacturers of medical equipment and items. Many companies have had to convert entire factories into new facilities capable of meeting the demand for PPE.

In the Lombardy region, one of the areas hit worst by the pandemic, the regional government has put out a call to manufacturers asking for the rapid production of PPE.¹⁹ Specifically, manufacturers have been asked to reconvert their factories so they are capable of producing face masks and/or individual protective equipment such as water repellent lab-coats and protective clothing.²⁰ In Veneto, Grafica Veneta has started producing face masks, instead of books, with the aim of producing as many as 2 million units per day.²¹

¹⁹ Regione Lombardia 'Coronavirus: Richiesta Di Disponibilità Alle Aziende e Indicazioni Tecniche per La Produzione Di Mascherine e Dispositivi Di Protezione Individuale (DPI)' 2020. See here: <<https://www.regione.lombardia.it/wps/portal/istituzionale/HP/DettaglioAvviso/istituzione/attivita-istituzionali/avv-mascherine-made-in-italy>>

²⁰ 'Coronavirus: richiesta di disponibilità alle aziende e indicazioni tecniche per la produzione di mascherine e dispositivi di protezione individuale (DPI)'. See: <<https://www.regione.lombardia.it/wps/portal/istituzionale/HP/DettaglioAvviso/istituzione/attivita-istituzionali/avv-mascherine-made-in-italy>> [accessed 5 April 2020].

²¹ Gianni Favero, 'Coronavirus, Dai Libri Alle Mascherine: La Svolta Solidale Di «Grafica Veneta»', *Corriere Del Veneto*, 2020. See: <https://corrieredelveneto.corriere.it/padova/cronaca/20_marzo_17/coronavirus-libri-mascherine-svolta-solidale-grafica-veneta-0795ff08-682f-11ea-8372-e06aa5c607e8.shtml> [accessed 5 April 2020].

Some companies in the UK are already refitting their textile factories to produce protective masks. Lancashire textiles, a company that usually manufactures duvets, is already doing so, while there are many more in the position to do the same, such as Edward Taylor Textiles.²²

As well as businesses, community run enterprises are also taking the initiative to manufacture PPE. Makespace, a community workshop, is using its space and equipment to make masks and source materials from the local Cambridge area.²³

Cosmetics, Perfume and Chemicals Manufacturing

Many global fashion companies are turning their manufacturing capacities and supply chains toward the production and distribution of PPE. To provide equipment across Europe, both H&M and Zara have repurposed their supply chains to start producing PPE.²⁴ The same has happened in the US, with the designers Brandon Maxwell and Christian Siriano using their facilities to make face masks and gowns. Companies like Prada and Gucci have also joined the initiative.²⁵

As well as PPE items, fashion brands such as Louis Vuitton have started making sanitary products such as hand sanitiser. Many other pharmaceutical, cosmetics and spirit companies have done the same.²⁶ Such a shift can be readily achieved, as many of these

22 'Textiles Firm Switches from Duvets to Face Masks', BBC News, 20 March 2020, section Lancashire <<https://www.bbc.com/news/uk-england-lancashire-51979430>> [accessed 6 April 2020].

See also: <http://www.edwardtaylor textiles.co.uk/>

23 See: <https://twitter.com/cammakespace>

24 'Fast Fashion leaders H&M and Zara; Weathering the Pandemic'. Forbes, 2020. See: <https://www.forbes.com/sites/shelleykohan/2020/03/30/fast-fashion-leaders-hm-and-zara-weathering-the-pandemic/#647f023b17a2>

25 'Luxe labels Gucci, Armani, Bulgari make protective gear to fight coronavirus'. New York Post, 2020. See: <https://nypost.com/2020/03/26/luxe-labels-gucci-armani-bulgari-make-protective-gear-to-fight-coronavirus/>

26 'Louis Vuitton owner to make hand sanitizer for hospitals' Sky News, 2020. See: <https://news.sky.com/story/coronavirus-louis-vuitton-owner-to-make-hand->

companies already have the denatured alcohol required to create disinfectant products readily available.

In the UK, there have been fewer instances of designers turning their capacities toward the production of PPE. However, other kinds of industry are meeting demand for products like hand sanitizer. Shortages of the product have prompted the large chemicals company Ineos to create two large factories purely to produce this product.²⁷ The beer company, Brewdog has also turned its distillery into a factory for hand sanitizer.

Manufacturing and Additive Manufacturing

The Italian additive manufacturing start-up Isinnova has 3-D printed an essential valve for a hospital in Lombardy currently overwhelmed by coronavirus cases (see figure 3).²⁸ The company was unable to obtain the 3-D models of the part so had to reverse engineer it. Our proposed platform would mean that the procedure for how to engineer parts in this manner would be easily shared with additive manufacturing companies the country over.

These parts must be able to stand the sterilization process required for hospital equipment. The majority of 3-D printed items easily warp or lose tensile strength after undergoing the process a few times, so in some cases they may need to be treated as discardable. There are, however, some 3-D printing facilities that can make parts that are strong enough to repeatedly undergo the sterilization process.

In the UK, manufacturers would also need to meet the

[sanitiser-for-hospitals-11958170](#)

²⁷ UK chemicals firm plans to build two hand sanitizer factories in ten days', The Guardian, 2020. See: <https://www.theguardian.com/world/2020/mar/24/uk-chemicals-firm-plans-to-build-two-hand-sanitiser-factories-in-10-days>

²⁸ '3D Printers Fabricate Valves for Ventilators to Keep Corona Victims Breathing' <<https://www.dezeen.com/2020/03/19/3d-printers-valve-ventilators-hospital-coronavirus/>> [accessed 5 April 2020].

requirements of safety set out by the ISO:13485 guidelines.²⁹ Any UK additive manufacturing companies who meet these standards and are capable of making robust medical equipment, should be organised into a coordinated supply chain for NHS hospitals. The platform we propose would allow companies such as 3T Additive Manufacturing and Renishaw, which already meet these standards and have the capacity to produce a range of medical items, to supply items for UK hospitals.³⁰



Figure 3: Emergency valves for respirators, 3-D printed by Cristian Fracassi and Massimo Temporelli for the Chiari Hospital in Brescia.
Photo: Massimo Temporelli via Twitter

The UK company Warwick Sasco has answered a national call to produce and deliver PPE products to the NHS.³¹ The company produces a range of plastic medical devices, which are currently in demand, and is already part of a voluntary delivery service to bring the products to NHS hospitals.

29 14:00-17:00, 'ISO 13485:2016', ISO <<https://www.iso.org/cms/render/live/en/sites/isoorg/contents/data/standard/05/97/59752.html>> [accessed 6 April 2020].

30 '3D Printers Fabricate Valves for Ventilators to Keep Corona Victims Breathing' <<https://www.dezeen.com/2020/03/19/3d-printers-valve-ventilators-hospital-coronavirus/>> [accessed 5 April 2020].

31 'Warwick Company Answers National Call to Support NHS' <<https://www.leamingtoncourier.co.uk/news/people/warwick-company-answers-national-call-support-nhs-2517521>> [accessed 5 April 2020].

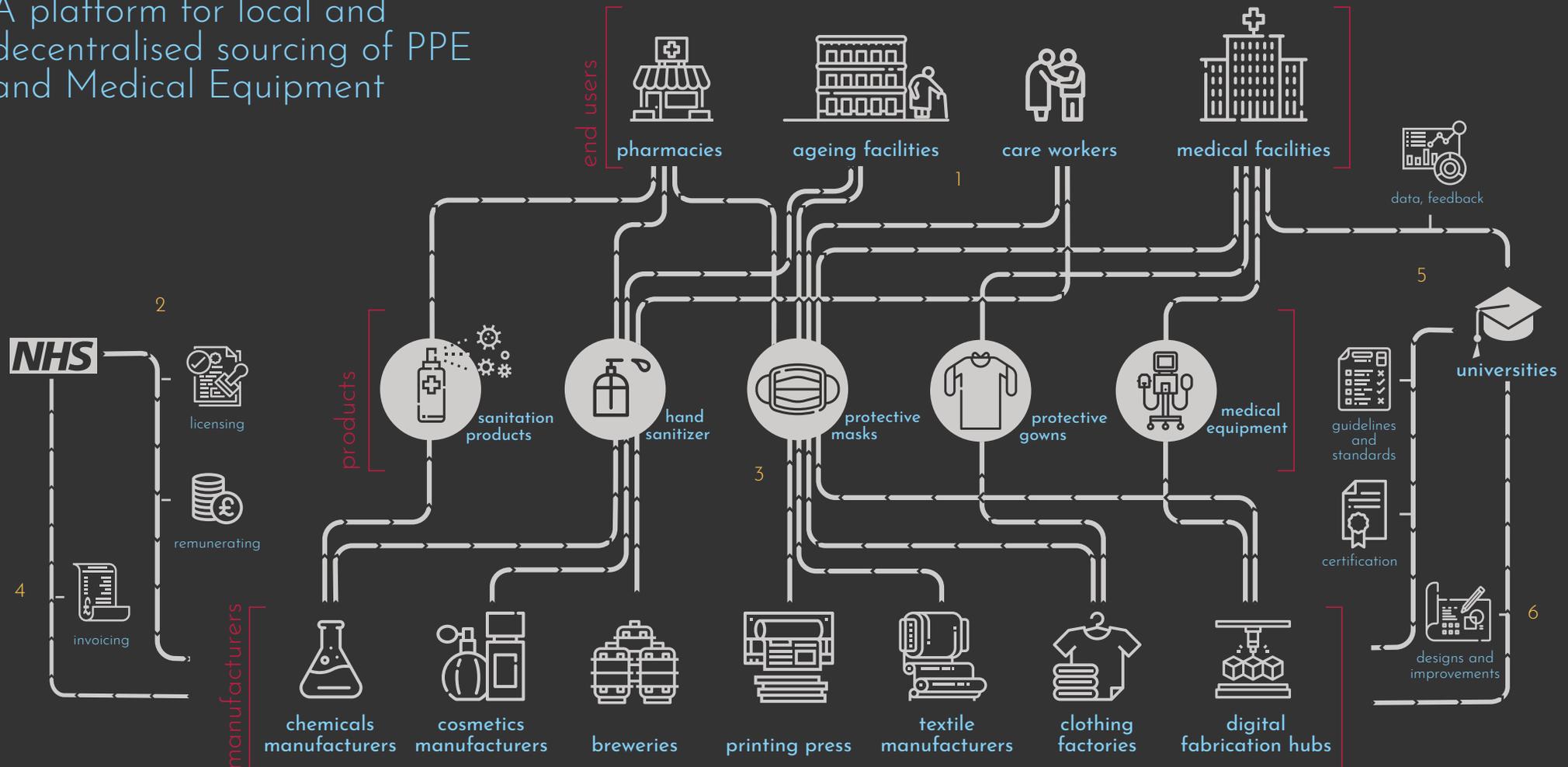
5. Conclusion

These companies are taking the right kind of initiative. But in a system of individual actors responding to spontaneous demand, such initiative can only ever be piecemeal and partial. As the pandemic approaches its peak, and more of the population fall ill, greater pressure will be placed on health and care services as well as domestic carers. This means equipment will be stretched, in particular PPE, which has been running low in health facilities and care homes the country over. To make sure these frontline responders receive the essential items that protect their lives and the lives of others, a more concerted effort to meet demand is now necessary.

The Medisyn platform we are proposing would bring a network of actors across the country together in one space, to meet demand, solve problems, share designs and standardise processes and products. This would mean that the already laudable efforts of many workers, institutions and enterprises are coordinated in a more systematic and comprehensive way.

Medisyn

A platform for local and decentralised sourcing of PPE and Medical Equipment



1. The end users place an order through the Medisyn platform for products such as PPE, hand sanitizer and masks.
2. The NHS has access to manage and oversee orders, so that supply and demand can be monitored centrally.
3. The order is sent to the appropriate manufacturer, which makes the product and then sends it to the end user.
4. For every product ordered, an invoice will be sent to the NHS, which will remunerate the manufacturer.
5. Universities help make the process more efficient by helping to standardize designs and processes, as well as providing a point of access for end users to leave feedback.
6. This feedback and data can then used to improve products and enhance processes across all manufacturers