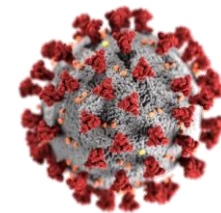


JANUARY TO APRIL 2020

PROF. DR. KAI HOBERG

DEMAND AND SUPPLY FOR PERSONAL PROTECTIVE EQUIPMENT IN THE COVID-19 CRISIS

NEWS OVERVIEW



AGENDA

Overview of PPE related news

Ad-hoc supply chains for medical equipment

THE COVID-19 CRISIS TRIGGERS AN UNPRECEDENTED GLOBAL DEMAND INCREASE FOR IN PPE



REUTERS

Germany bans export of medical protection gear due to coronavirus



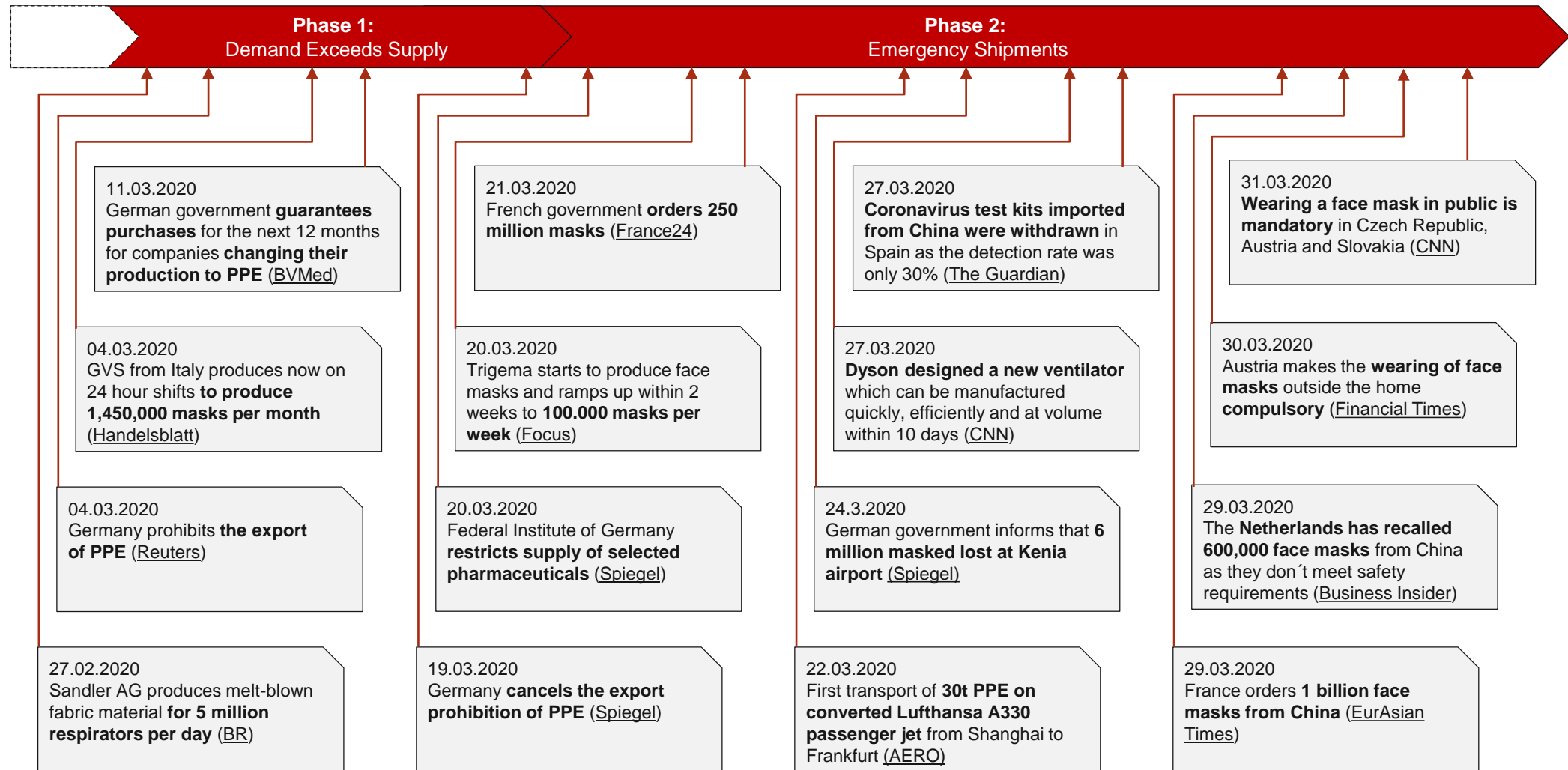
Prices for PPE has increased massively, in some cases more than 1000%

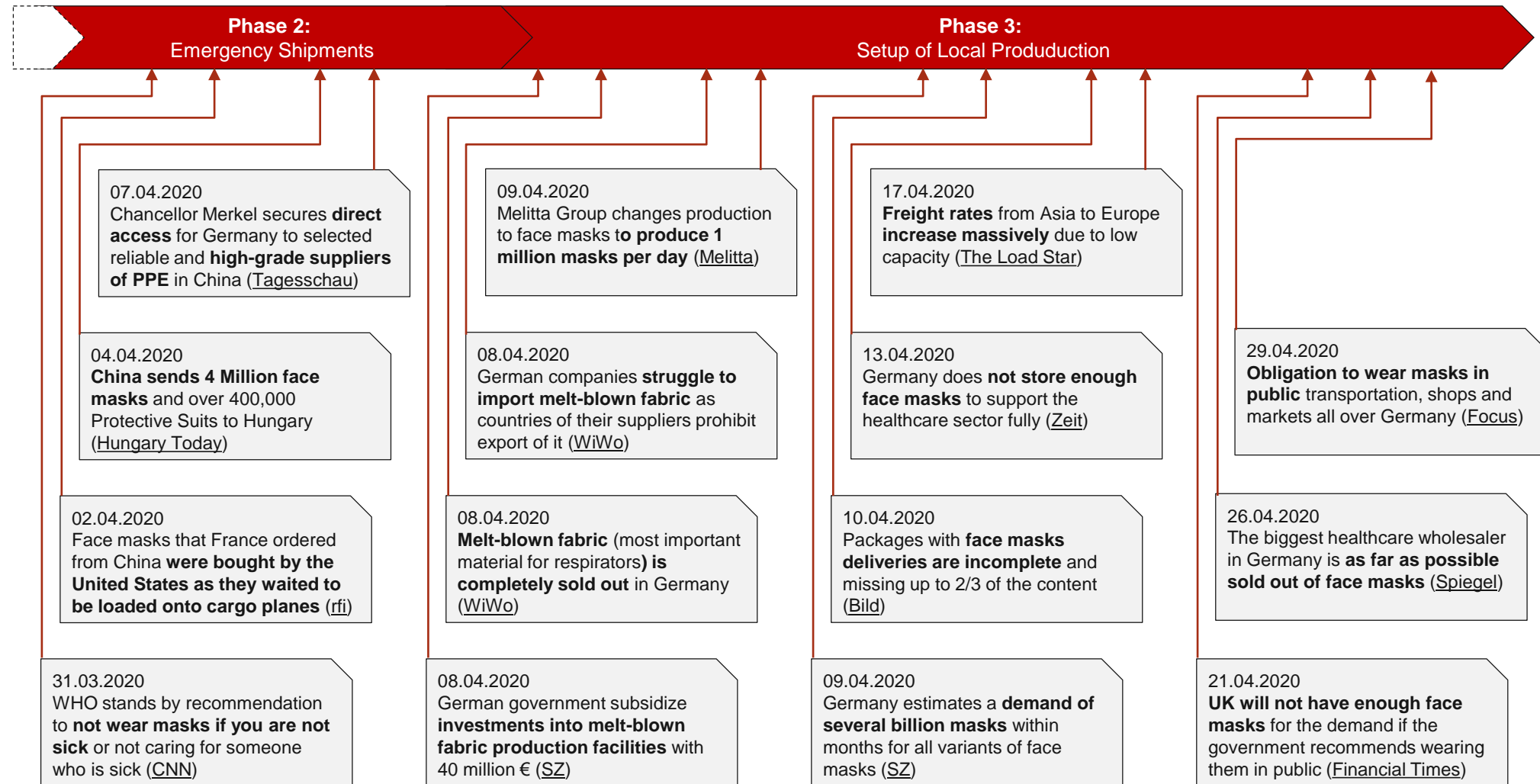


U.S. Health and Human Services suggest the country needs 300 million N95 masks

The New York Times

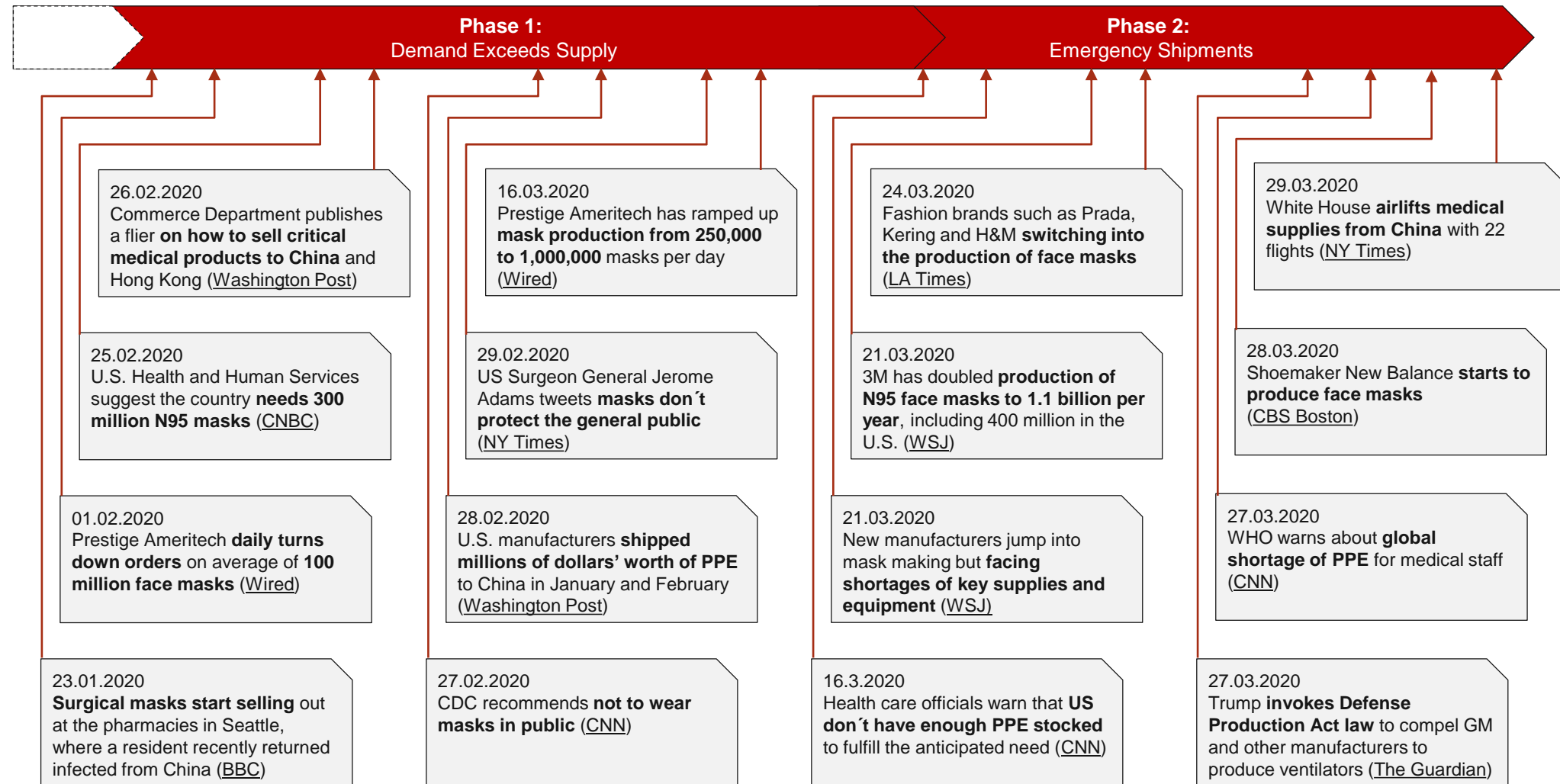
White House Airlifts Medical Supplies From China in Coronavirus Fight

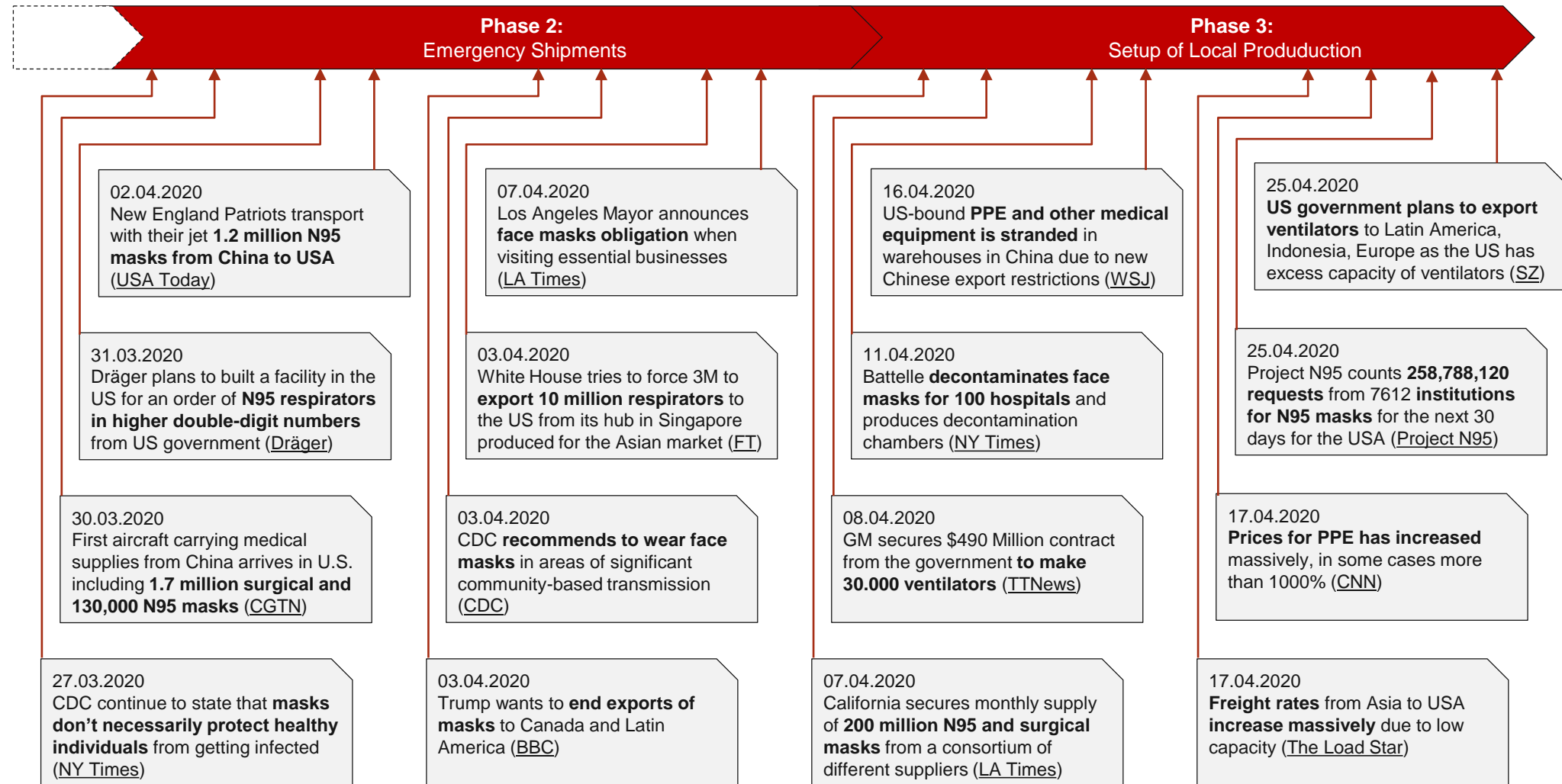


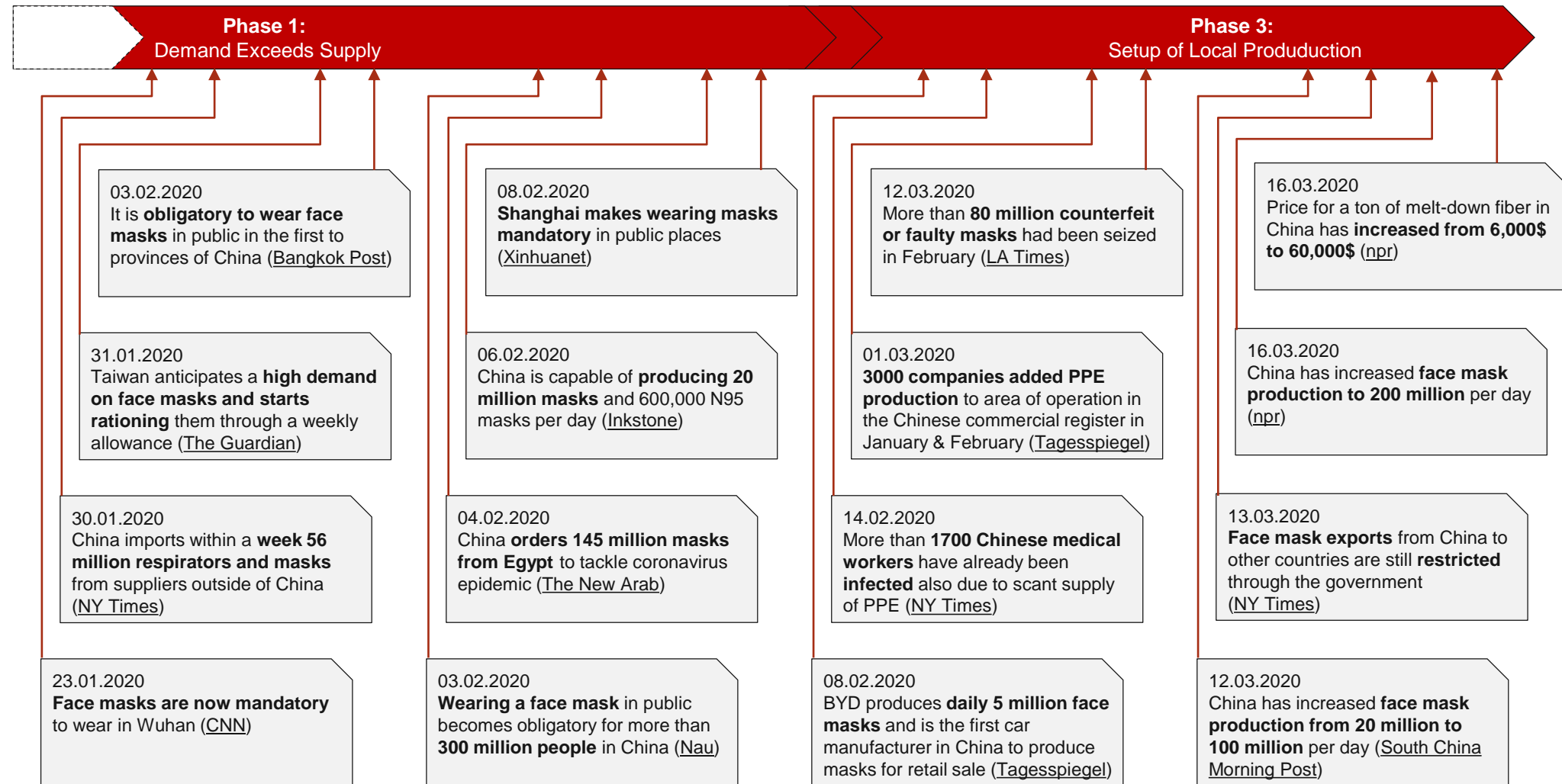


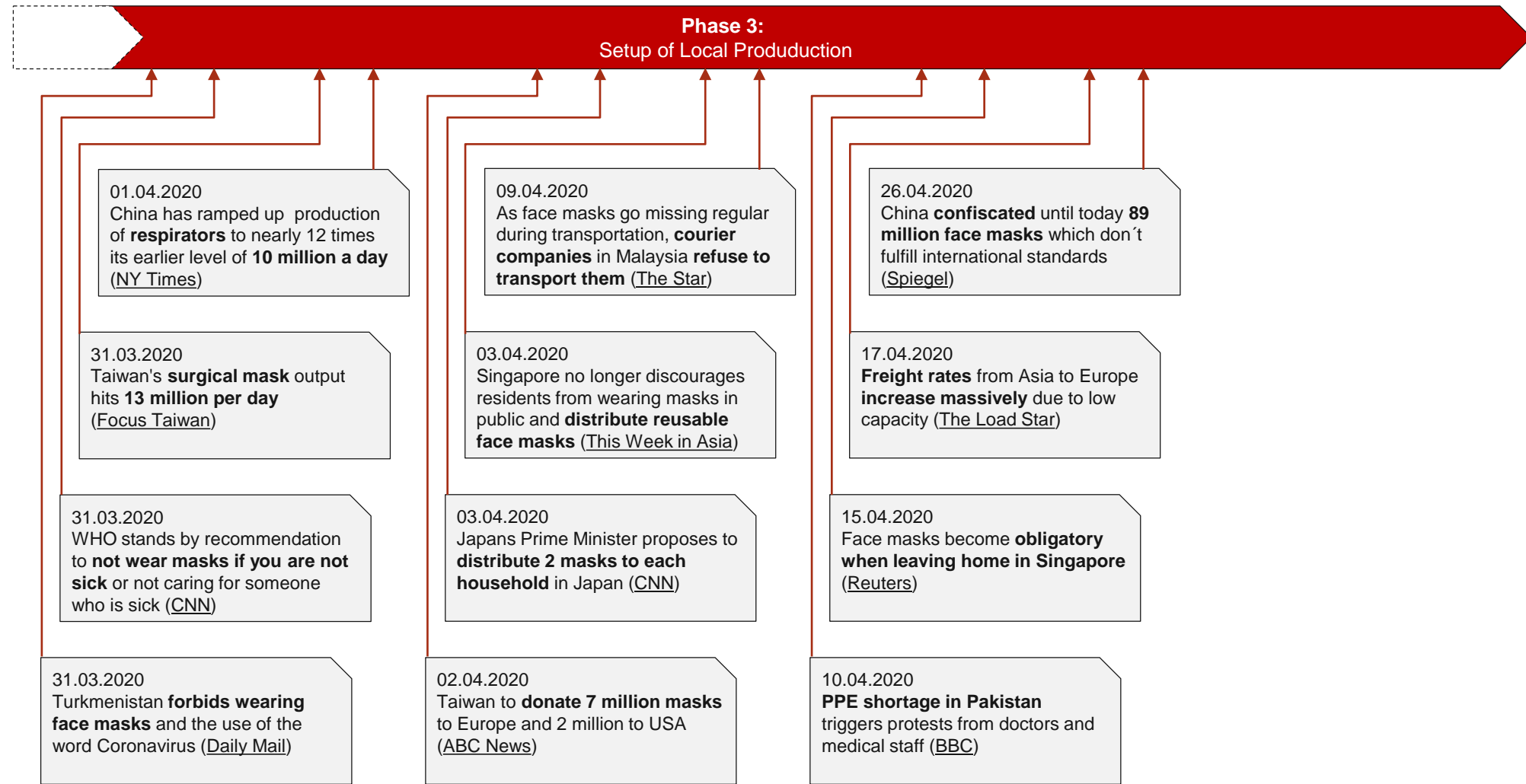
PPE DEMAND AND SUPPLY IN USA 1/2

SELECTED NEWS
FOCUS USA









AGENDA

Overview of PPE related news

Ad-hoc supply chains for medical equipment

STATUS
APRIL 1, 2020

Disinfectant



Protective equipment



Ventilators



Drugs



Assessment
delivery situation
in Germany

FOR MANY PRODUCTS WE SEE A VERY HIGH INCREASE IN DEMAND WHILE PRODUCTION STILL APPEARS STABLE

Supply

- Export bans on medical products
- Delays due to border controls
- Limited transport capacities
- Production downtimes due to quarantine measures
- ...



Demand

- Increasing replacement demand due to real consumption
- Panic buying by end customers
- Speculations by middlemen
- Stockpiling purchases by governmental institutions
- ...

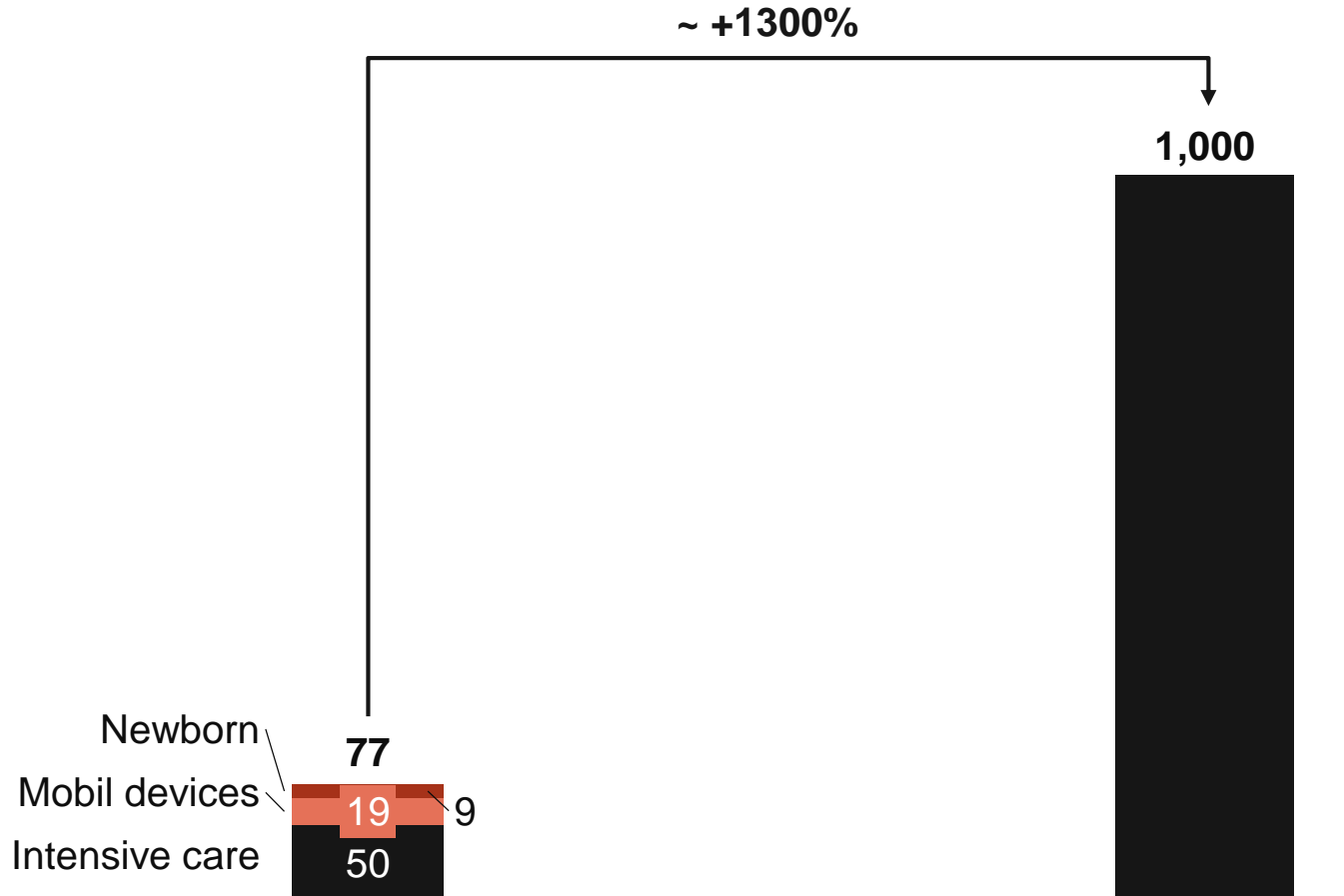
THE DEVELOPMENT OF DEMAND CANNOT BE REFLECTED BY NORMAL SUPPLY CHAINS

Sales ventilators 2019

- Worldwide, in ,000s -

Potential demand 2020

- Worldwide, in ,000s -



EXAMPLE: VENTILATORS

- Estimated global available ventilators for intensive care medicine 2019: 400-500 thousand
- Industry sales 2019: US\$ 2.8 billion (including US\$ 1.3 billion for consumables such as filters, tubing and face masks)
- Top manufacturer of ventilators for intensive care medicine:
 - Getinge (Sweden) 22%
 - Hamilton (USA/CH) 22%
 - Dräger (GER) 16%
 - Mindray (China) 10%
 - Medtronic (Ireland/USA) 5%
 - Löwenstein (GER) 3%
 - Vyaire Medical (USA) 3%
 - GE Healthcare (USA) 2%
 - Other: 17%

OPTIONS FOR THE EXPANSION OF PRODUCTION THROUGH AD-HOC SUPPLY CHAINS

Potential expansion of capacity

Production at the current manufacturer

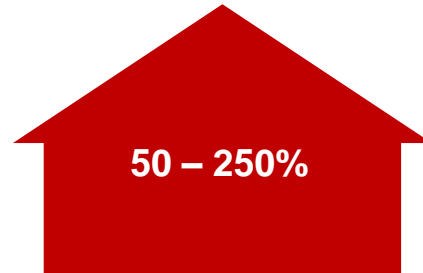
Production at a new manufacturer

Dräger switches production of ventilators to three-shift operation (from the previous three-digit number of employees)



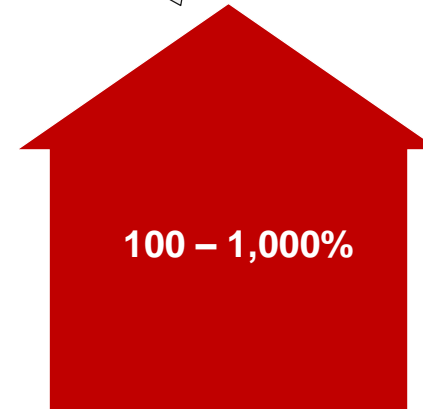
Option 1:
Excess work on previously used machines / facilities

P&G uses five additional plants to produce hand disinfectant



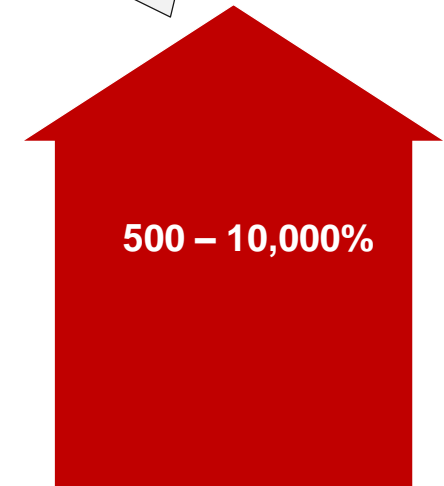
Option 2:
Expansion of production on new plants / factories at the current manufacturer

Jägermeister uses 50,000 liters of alcohol to produce disinfectants

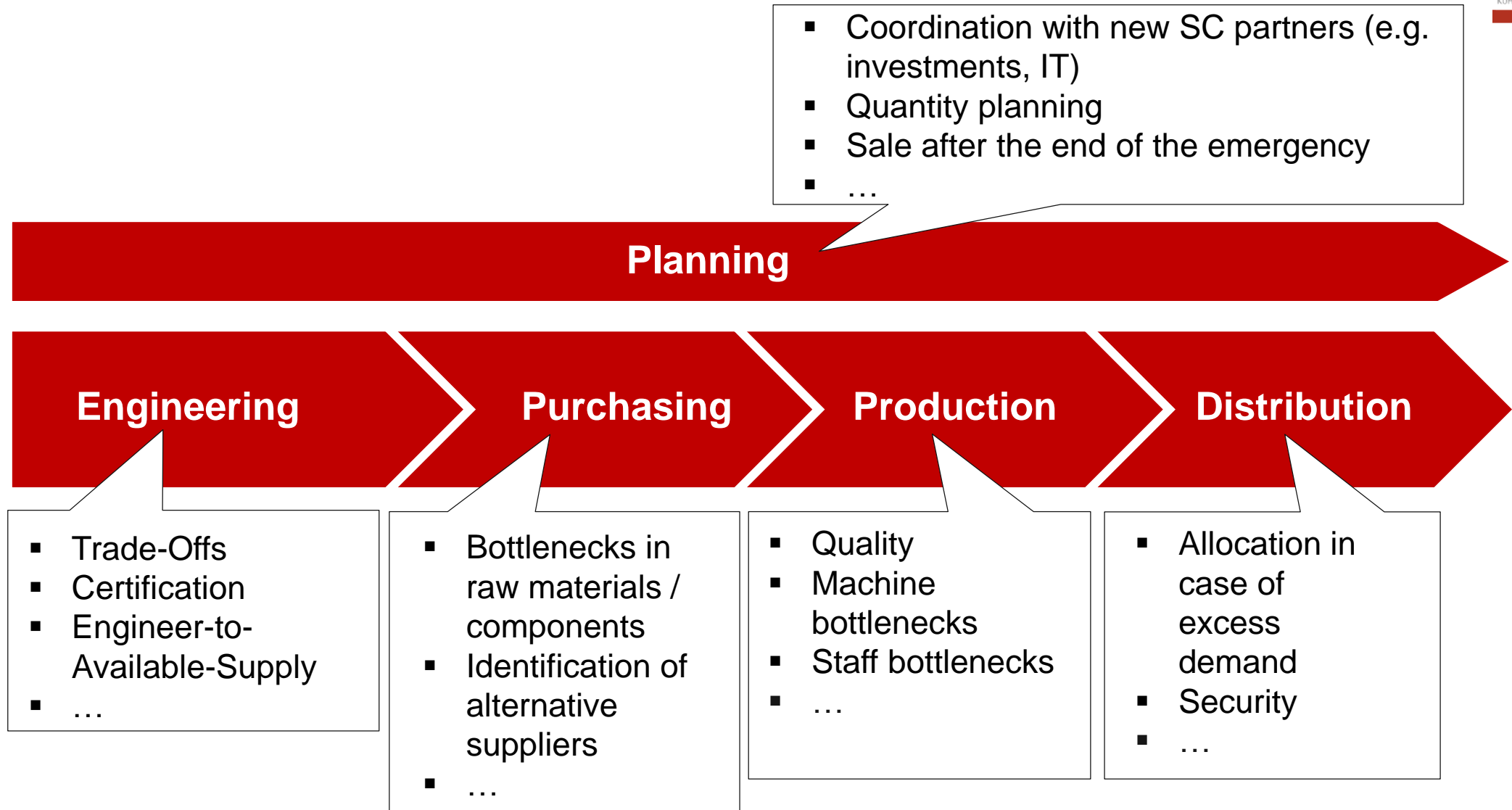


Option 3:
Expansion of production on existing plants of new manufacturers

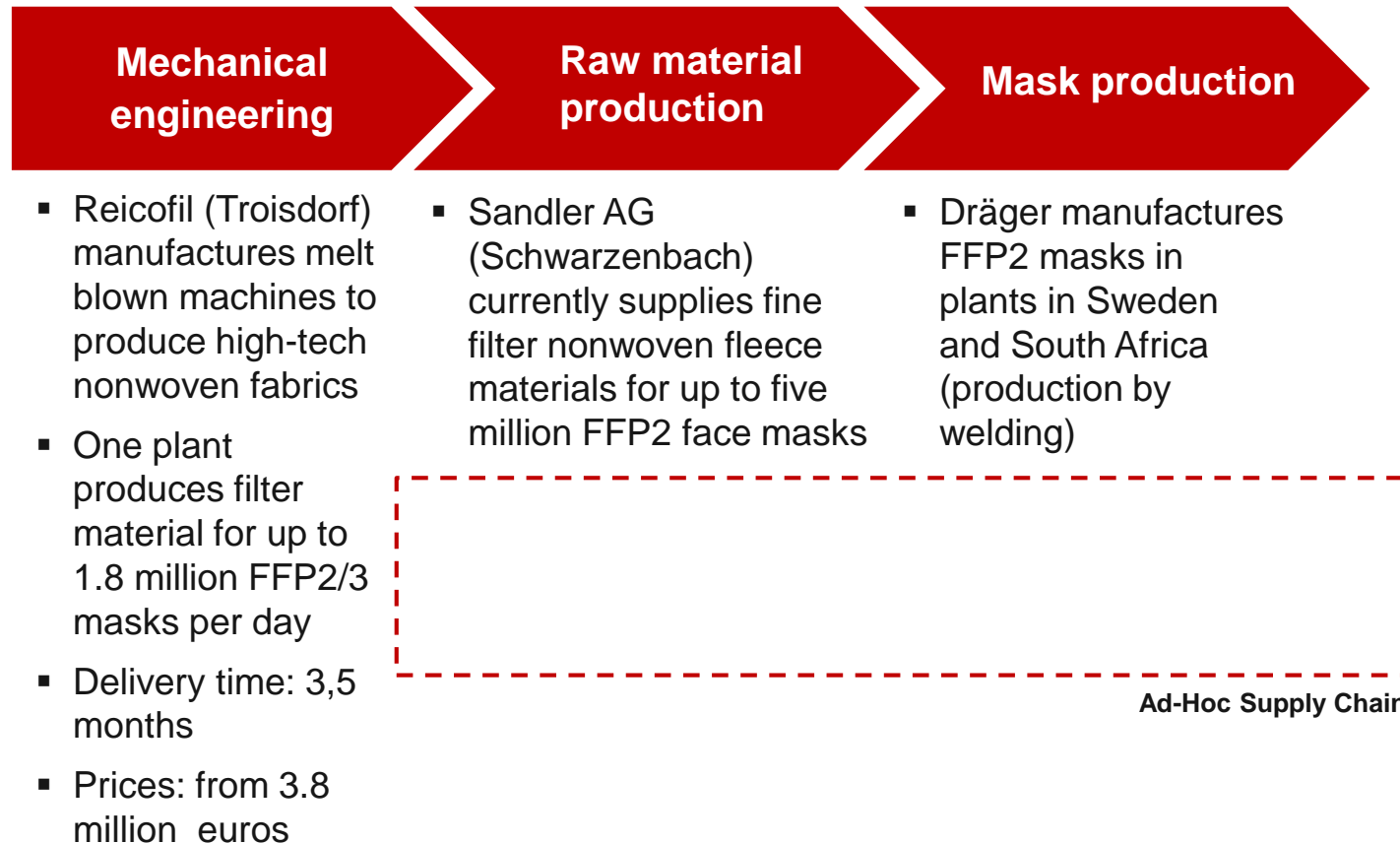
Cooperation between GM and Ventec for ventilators: Increase production target from 200 to 20,000 per month



Option 4:
Cooperation and transfer of production to new manufacturers



**EXAMPLE SUPPLY CHAIN
MASKS WITH HIGH FILTRATION**



- **Strong import dependencies for face masks:** e.g. USA with import share of 95% for surgical masks and 70% for masks with high filtration
- Increase in production of all mask types **in China from 10 million per day in 2019 to 200 million per day in March 2020** (including 600 thousand FFP2)
- US manufacturer 3M has doubled worldwide production of FFP2 masks (US Standard: N95) since the beginning of the year to **around 4 million per day**
- USA could need more than 3.5 billion FFP2/N95 masks
- **Market prices for FFP2 masks** rose from 0.40 Euro to over 10 Euro, but also raw materials, e.g. fine filter fleece in China from 6,000 to 60,000 US\$ per ton

3D PRINTING ENABLES DIGITAL DESIGNS TO BE CONVERTED INTO FINISHED PARTS WHEN BOTTLENECKS OCCUR

**EXAMPLE:
3D PRINT**

Component
Production
Example

Spare part

Valves for connecting patients to vital ventilators

6 hours after the inquiry ventilators of 10 patients could be supplied



New developments

Splitter connection for the supply of up to 4 persons with only one ventilator

After successful field tests the approval of the authorities is now expected



Protective Equipment

Frame and adjustment mechanisms that effectively protect the face with a clear film

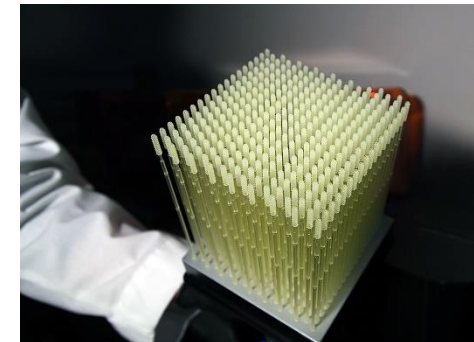
Worldwide printing in large quantities (e.g. FabLab with up to 4,000 pieces per day)



Test kits

COVID-19 diagnostic dipsticks with flexible nasal swabs for smears

Up to 150,000 dipsticks / day made of bio-compatible material



PLEASE FEEL FREE TO CONTACT ME



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