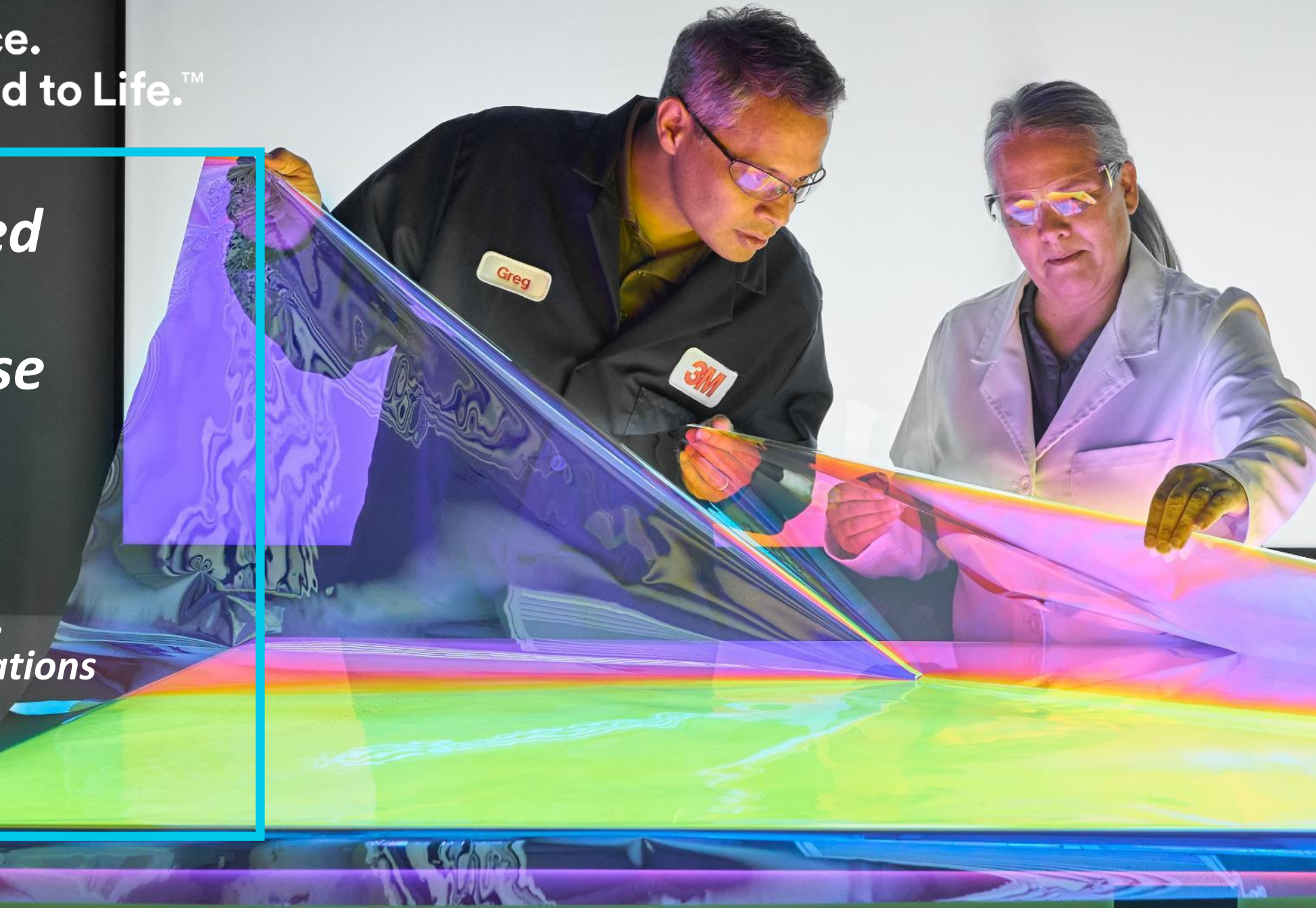




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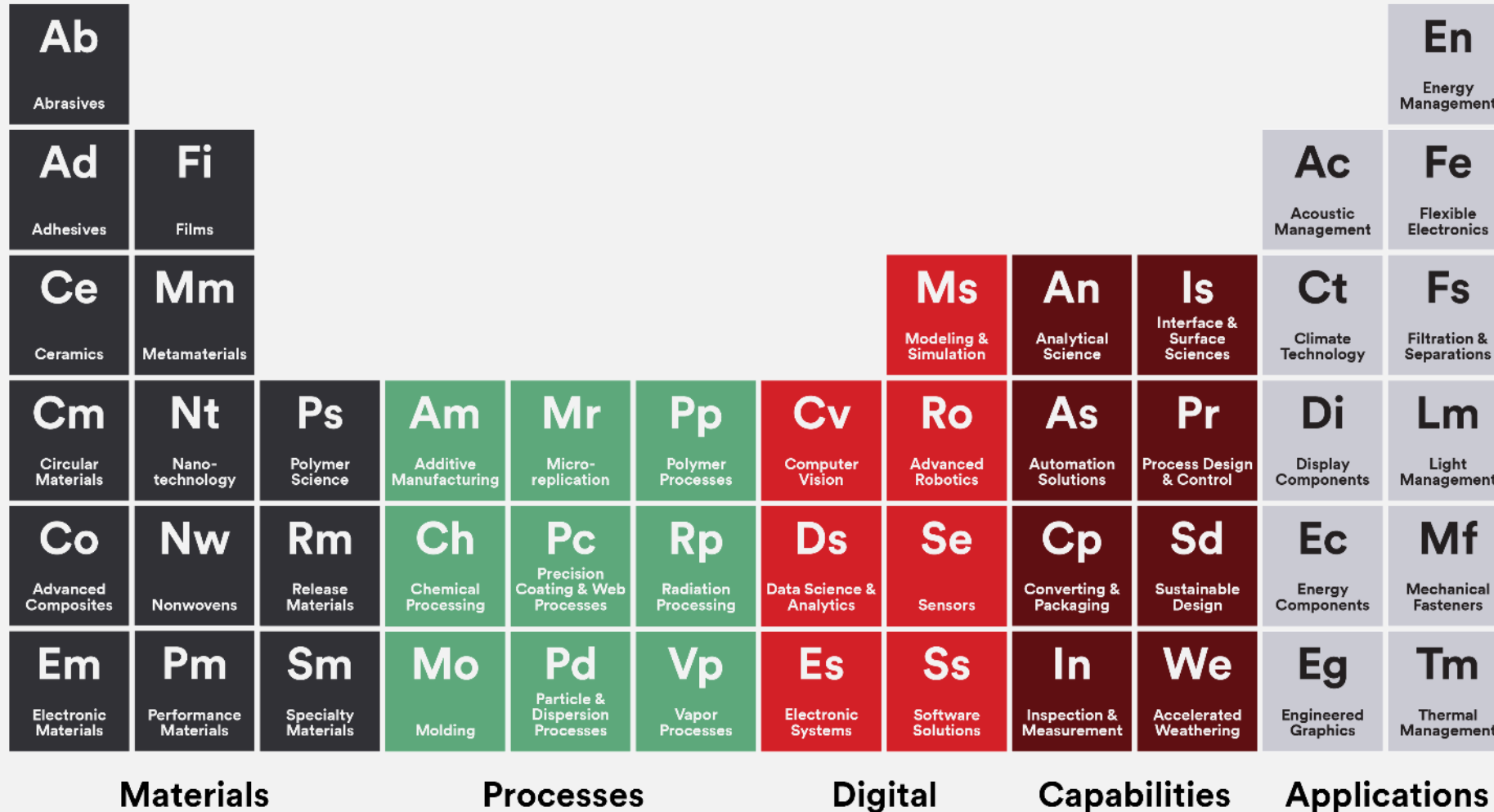
*Lessons learned
through 3M's
COVID response*

Charles Avery
*Senior Vice President,
Manufacturing Operations*



3M Technology Platforms

49 innovative technologies



Deep material science expertise

Manufacturing at scale

Ab Abrasives																				En Energy Management	
Ad Adhesives	Fi Fibers																			Ac Acoustic Management	Fe Flexible Electronics
Ce Ceramics	Mm Metamaterials									Ms Modeling & Simulation	An Analytics Science	Is Interface & Surface Sciences								Ct Climate Technology	Fs Filtration & Separations
Cm Coatings	Nt Nanotechnology	Ps Polymer Solutions	An Additive Manufacturing	Mp Micro-positioning	Pe Polymer Processes	Cv Computer Vision	Ro Robotics	As Automation Software	Pr Process Design & Control	Di Display Components	Lm Light Management										
Co Advanced Composites	Nw Nanomaterials	Rm Release Materials	Ch Chemical Processing	Pe Precision Coating & Ink Processes	Ep Epoxy Processing	De Data Science & Analytics	Se Sensors	Cp Converting & Packaging	Sd Sustainable Design	Ec Energy Components	Mf Mechanical Fasteners										
Em Electronic Materials	Pm Performance Materials	Sm Specialty Materials	Me Medical	Pd Packaging & Dispensing Solutions	Vp Vapor Evaporation	Es Electronic Systems	Sa Software Solutions	In Inspection & Measurement	We Accelerated Weathering	Eg Engineered Graphics	Tm Thermal Management										
Materials			Processes			Digital		Capabilities		Applications											



Strong, iconic brands


Unmatched global reach

Bringing our technologies into the future

1990s

Simple microfeatures
Optical & light management

Electronics Safety

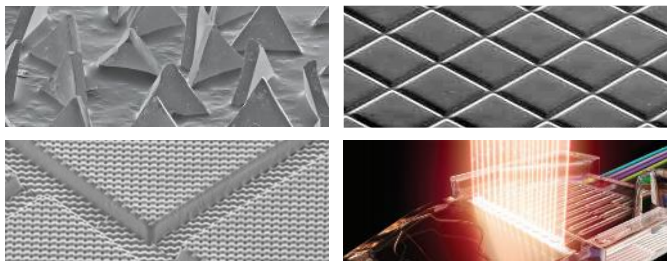


Today

Increased feature complexity
Mechanical product applications

Data centers Industrial manufacturing Semiconductor

Electronics Safety



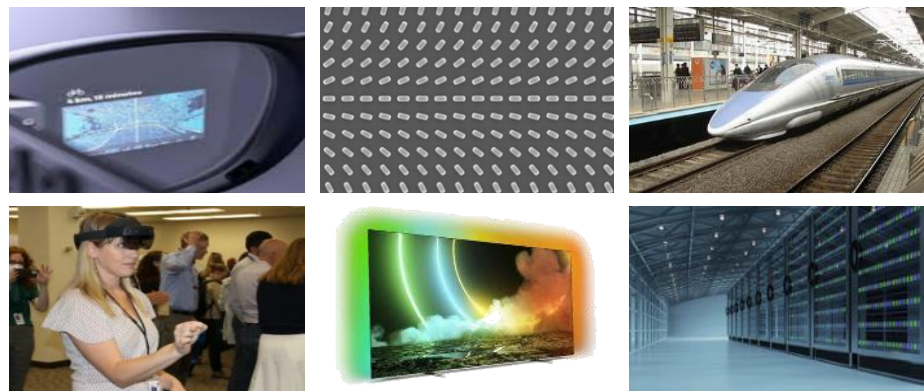
2030 and beyond

Creation of nanoscale features
Advanced optical properties

Augmented/virtual reality Optical / thermal / acoustic applications

Data centers Industrial manufacturing Semiconductor

Electronics Safety



Manufacturing surfaces with ultra-precise features to enable a broad range of products

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**Bloomberg
Businessweek**

More

**How 3M doubled N95 mask production
practically overnight**

Helping the world respond to COVID-19

Addressing the pandemic from all angles and across all relevant stakeholders



Ensuring the safety of our employees

Our top priority is the safety of our employees. We updated safe workplace protocols globally, executed new safety protocols across our operations and implemented pandemic support programs.



Helping protect healthcare workers and first responders

Since the initial COVID-19 outbreak, 3M has doubled our global output of N95 respirators to a rate of more than 1.1 billion per year, or nearly 100 million per month. 3M will double its capacity again to 2 billion per year by 2021



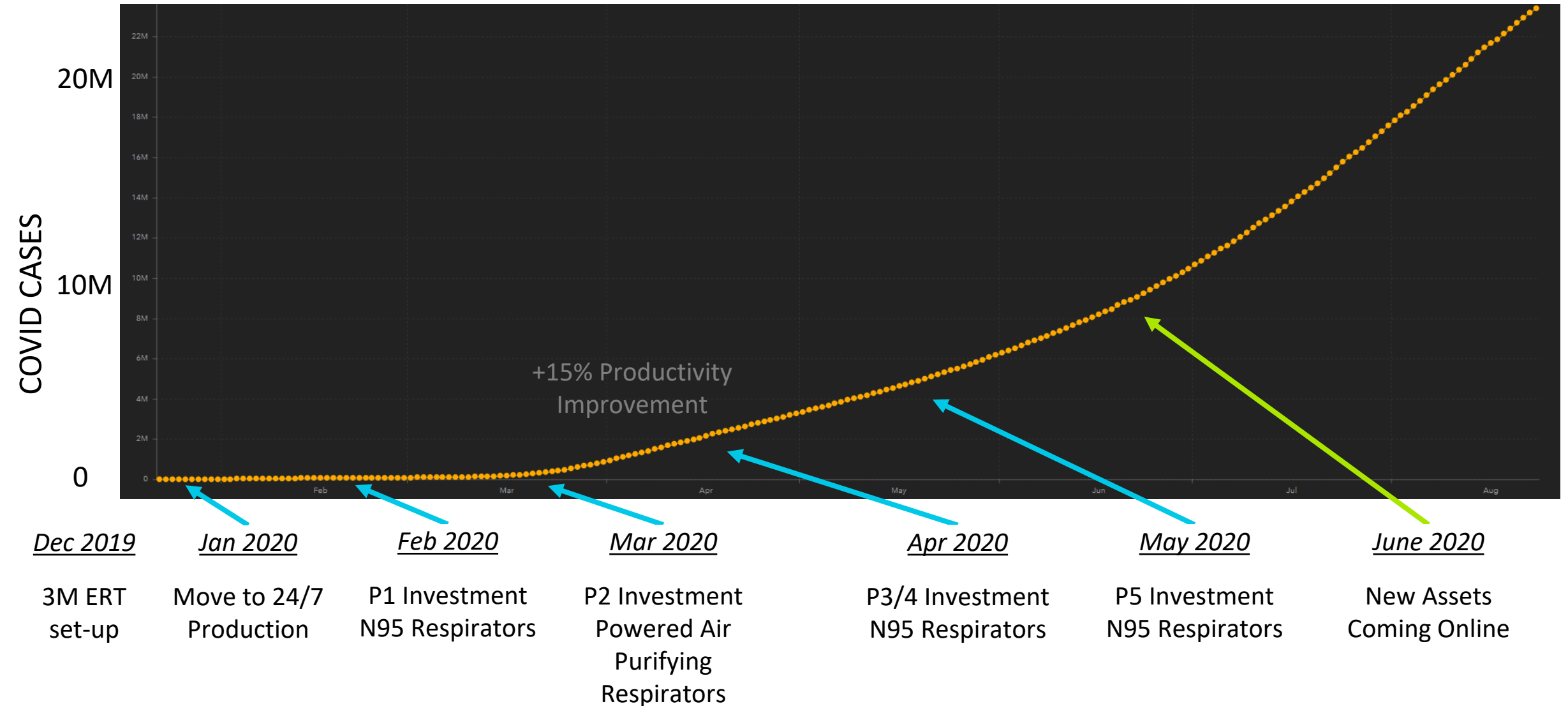
Partnering with other companies

We are partnering with other companies on a range of innovative solutions to protect healthcare workers and first responders.

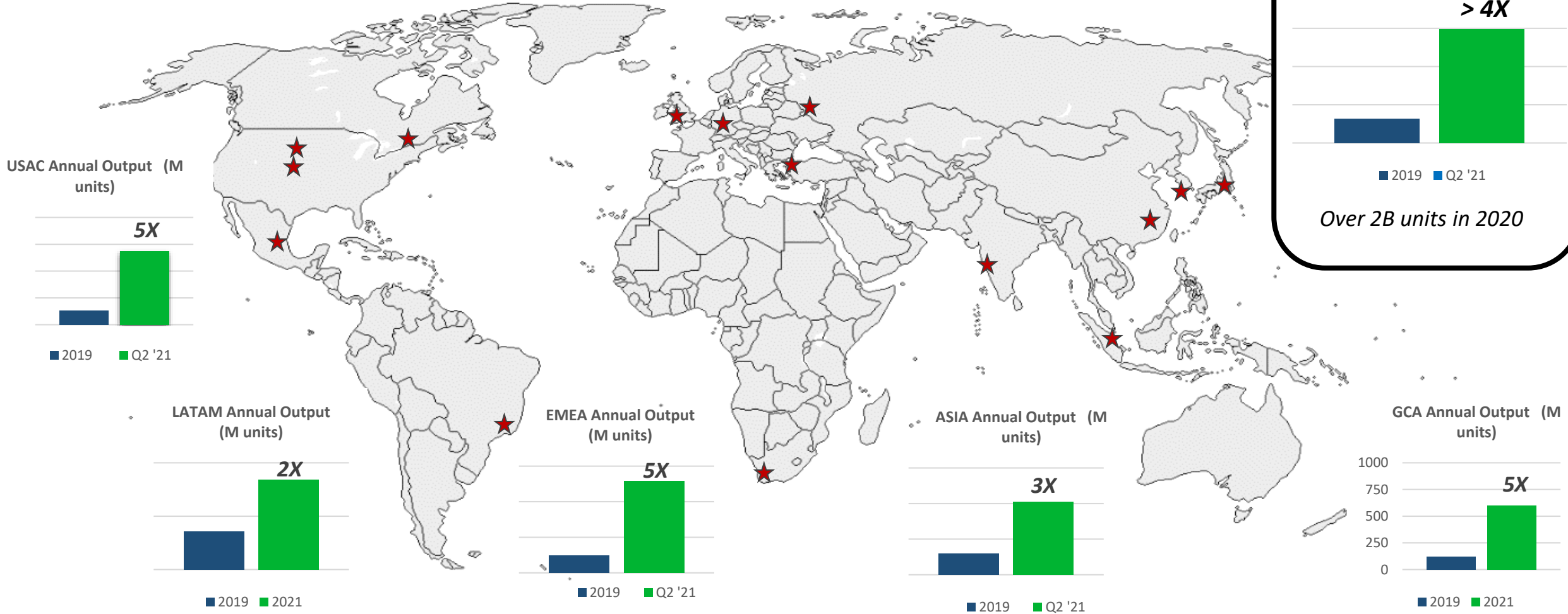
Photo courtesy of Ford

Accelerating Respiratory Supply

<https://coronavirus.jhu.edu/map.html>



Evolution of 3M N95 Respirator Global Supply



Scaling 3M's Pandemic Response

CAPACITY

15%

Productivity gains from existing operations

20+

of new respirator lines being qualified

100s

New machines add suppliers to support our response

AGILITY

10+

Number of trade restrictions that were managed

61

Days to qualify a temporary site for respirator production

Many

Public/Private partnerships to accelerate response

SCALE



1000+

of enterprise employees supporting our respiratory scaleup



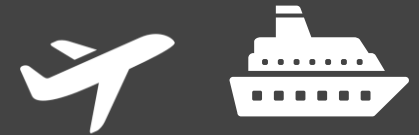
100s

of experiments to qualify new materials and processes & 30+ MOCs



4x

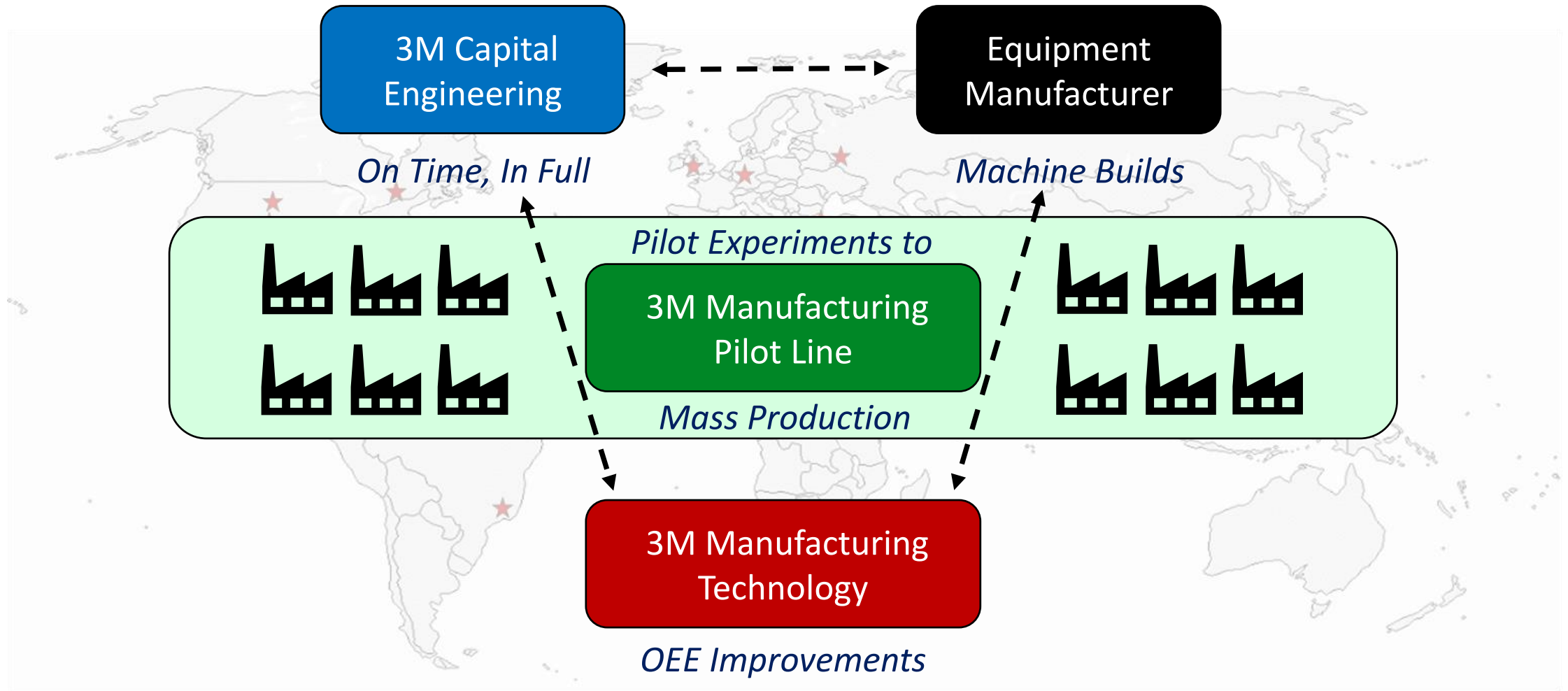
number of respirators produced in 2020 could circle the world 4x



50+/200+

planes & ocean containers from APAC to deliver 155M respirators to FEMA

Leveraging 3M Expertise and Global Architecture



Critical to define RACI and focus resources on one Pacesetter

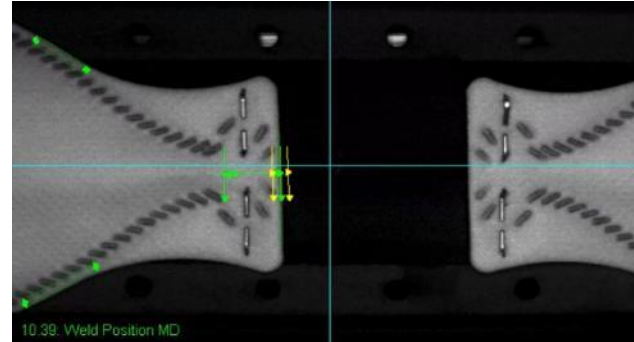
Robust Engineering Problem Statements

8 Wastes of lean

 Defects Efforts caused by rework, scrap and incorrect information	 Overproduction Production that is more than needed or before it is needed
 Waiting Wasted time waiting for the next step in a process	 Non-Utilized Talent Underutilizing people's talents, skills & knowledge.
 Transportation Unnecessary movements of products & materials.	 Inventory Excess products and materials not being processed.
 Motion Unnecessary movements by people (ex.walking).	 Extra-Processing More work or higher quality than is required, by the customer.

Define the Problem Statements

Identify the forms of waste on the shop floor and develop engineering problem statements that are impacting performance



Develop & Enhance Process Capability

Collect, analyze and visualize machine process capability to achieve reduced waste and increased uptime



Global Alignment thru Digital Platform

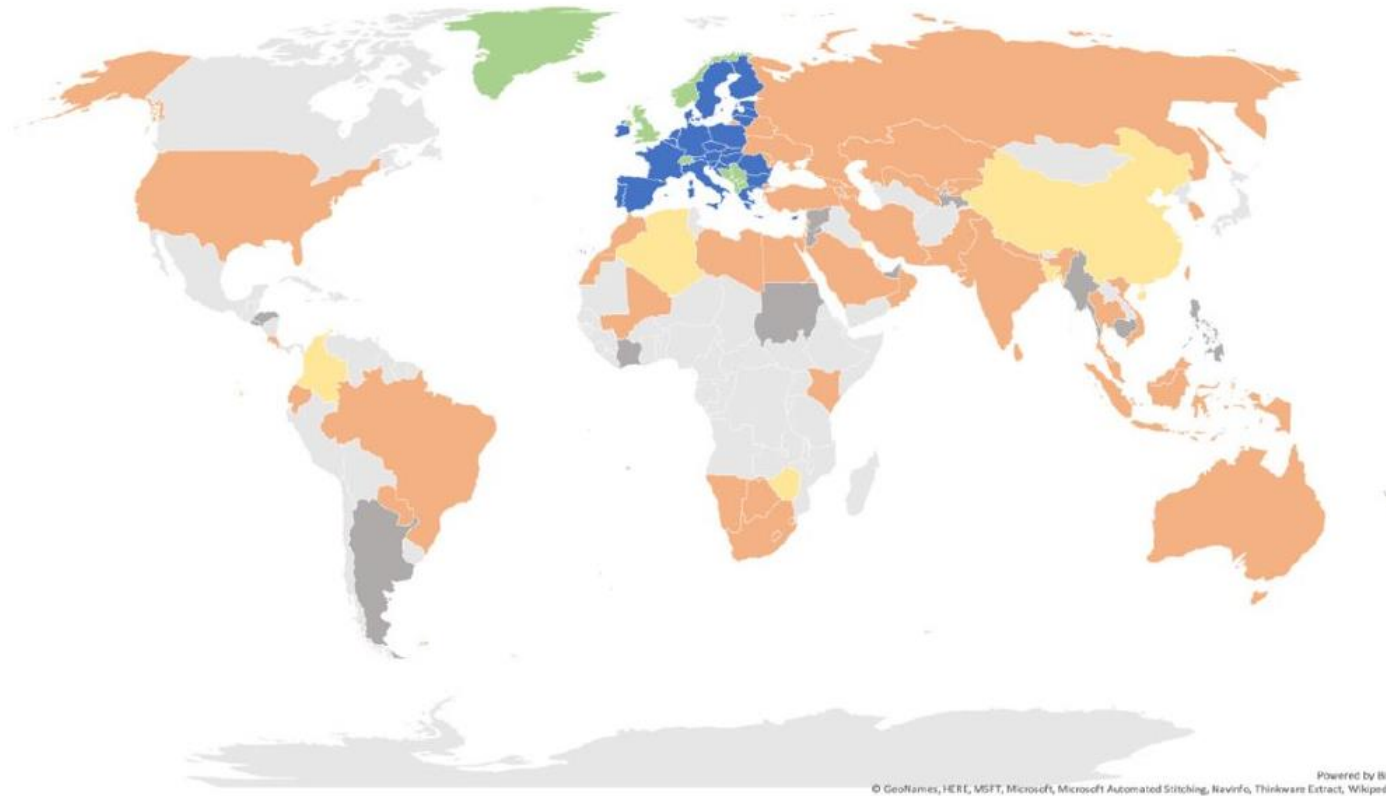
Platform for capturing, standardizing, and sharing the plant knowledge leading to faster, more consistent action

Transition from Total Output to Takt Time for each Process Step

Global Export Restrictions

Countries that have imposed trade restrictions on PPE and Medical Supplies

■ Personal protection ■ Medical supply ■ Other ■ EU ■ Exempted



Source: [International Trade Centre](#), data collected on 20 May 2020.

Supply Chain Architecture needs to account for Border Restrictions

External Partnerships Accelerated Response



Received >1000 external collaboration requests and leveraged many

Purpose Driving Team's Performance



We bring together people who have different technical expertise, industry knowledge, backgrounds and experiences.



We maintain a work environment where all our people are respected, supported, and encouraged to take initiative.



We provide purposeful work to drive the team, in addition to attract and motivate employees.



We seek and build relationships between manufacturing sites, winning together our on collective objectives.

“If you put fences around people, you get sheep. Give the people the room they need.” -William L. McKnight, 3M President (1929-1966)



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