

FORWARD THINKING INTELLIGENT HEALTHCARE



Creating a secure and optimised supply chain in a pandemic

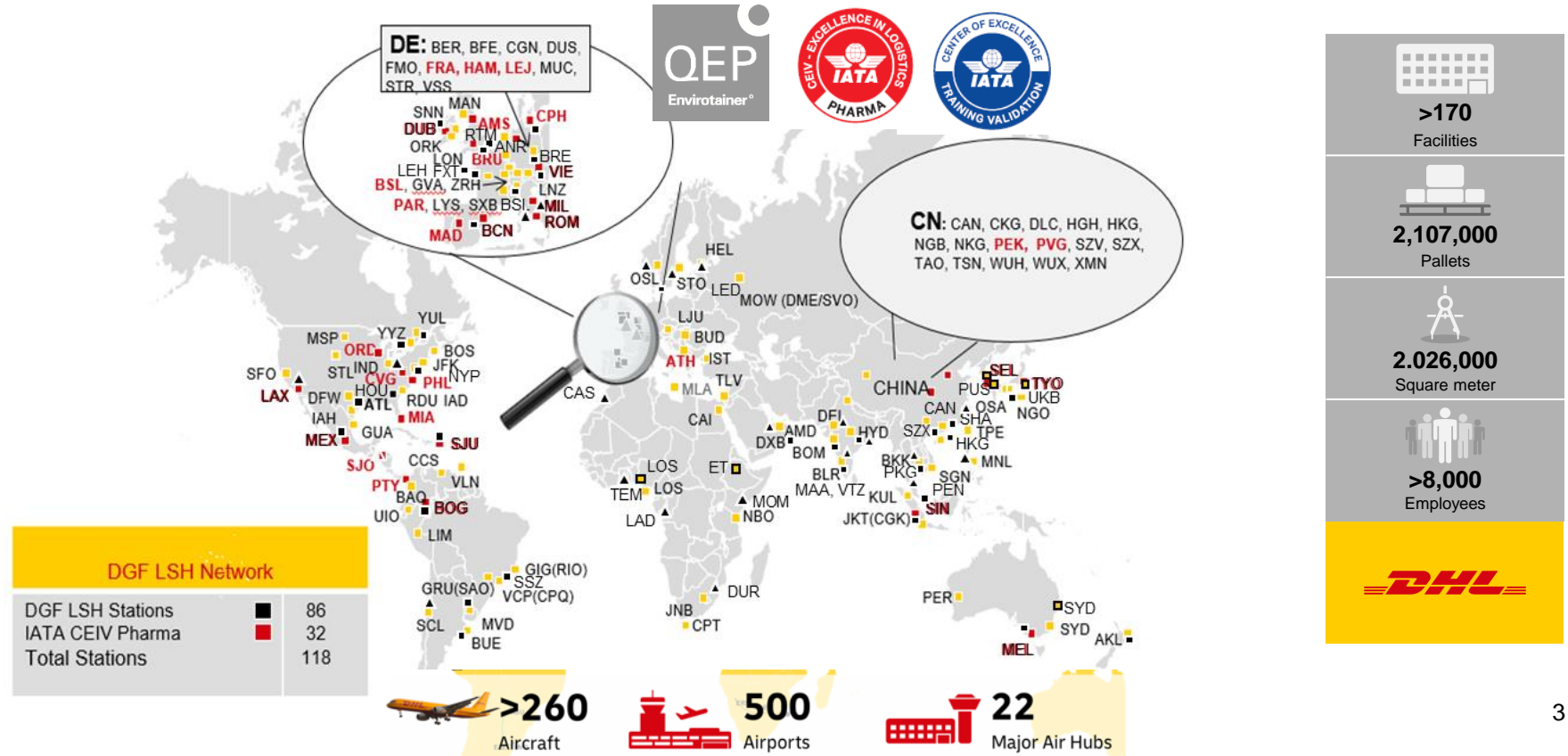
Mike Meakin, VP Quality & Regulatory Compliance
DHL Supply Chain

Webinar
9th December 2020

Agenda

- 1 Background - supply chains in a new global pandemic (PIPP)
- 2 A quick resume of 2020 – Planning, Preparations, White Papers/Mapping
- 3 Building Freezer Farms – DQ,IQ,OQ,PQ, Validations, Covid 19 vaccines
- 4 Designing different Logistics Models – Direct, National X Docks, Traditional
- 5 Implementing solutions and delivering Covid 19 vaccines by the New Year
- 6 Other Innovative solutions to protect the patient through GS1 Healthcare

DP DHL Background - Dedicated Networks for 5 Divisions



Q2 2020 – Dust off PIPP, Preparing for Pandemics, PHA Exercise Chain Reaction

Support the Guardian Available for everyone, funded by readers
 Contribute → Subscribe →

The Guardian UK edition

News Opinion Sport Culture Lifestyle More

UK World Business Coronavirus Football Environment UK politics Education Society Science Tech Global development Obituaries

Society

Government to announce bird flu protection plan

Plans for dealing with a bird flu pandemic in the UK are to be unveiled by the government today.

The health secretary, John Reid, and the chief medical officer, Sir Liam Donaldson, will outline a "preparedness plan" for a potential flu pandemic in the future.

It follows warnings from the World Health Organisation (WHO) last week that a new strain of bird flu could develop, meaning the virus would spread from human to human.

Advertisement: Discover a brand new way to choose a secondary school. Powered by schooldash. The Guardian Schools Guide

Press Association Tue 1 Mar 2005 11:20 GMT

NHS

PANDEMIC FLU

UK HEALTH DEPARTMENTS

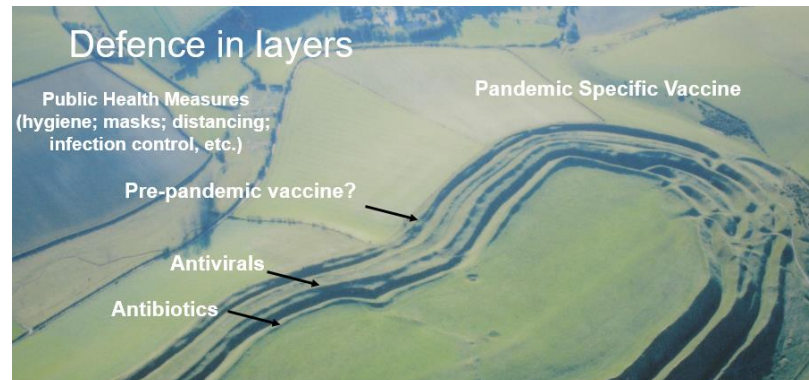
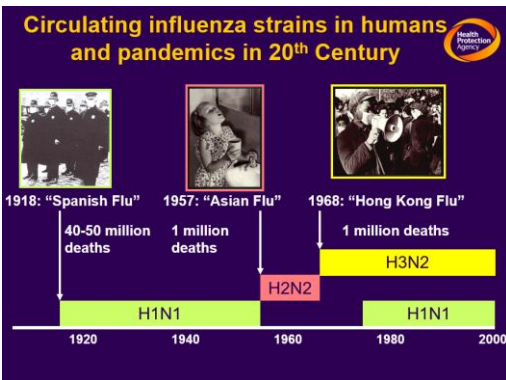
UK INFLUENZA PANDEMIC CONTINGENCY PLAN

OCTOBER 2005

Pandemic Influenza Preparedness Plan

Deutsche Post World Net

June 2007



DHL WHITE PAPER

DELIVERING PANDEMIC RESILIENCE

HOW TO SECURE STABLE SUPPLY CHAINS FOR VACCINES AND MEDICAL GOODS DURING THE COVID-19 CRISIS AND FUTURE HEALTH EMERGENCIES

SEPTEMBER, 2020

Q3 - Warehouses to Freezer Farms, developing Active & Passive Solutions at -70°C

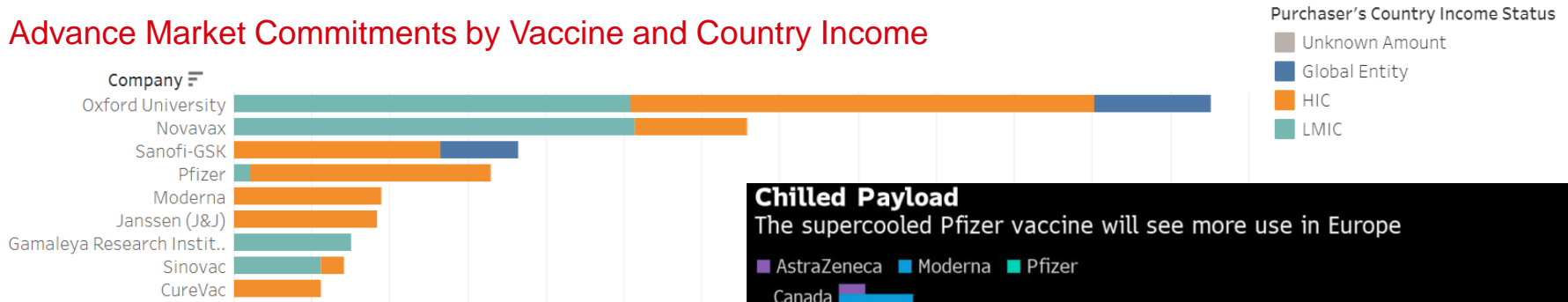
As soon as DHL knew that manufacturers required -70°C storage solutions we:

- ❑ Increased the number of our ULTs used in Clinical Trials/GMP hubs around the globe.
- ❑ Increased the number of approved suppliers.
- ❑ Changed the design from 2 inch boxes to Pizza boxes with rapid F1 pit lane processes.
- ❑ Looked at its TCP and qualified the equipment using deep frozen vehicles and deep frozen storage units at below -20°C.
- ❑ Achieved -70°C for 9-10 days for 2 Euro pallets using 250kg of dry ice and simulated air shipments on long intercontinental lanes.
- ❑ Required new temperature monitoring systems with batteries to operate at -70°C.



Q4 2020 - We realised airlines faced ‘Mission of the Century’ in shipping vaccines, impact of HICs

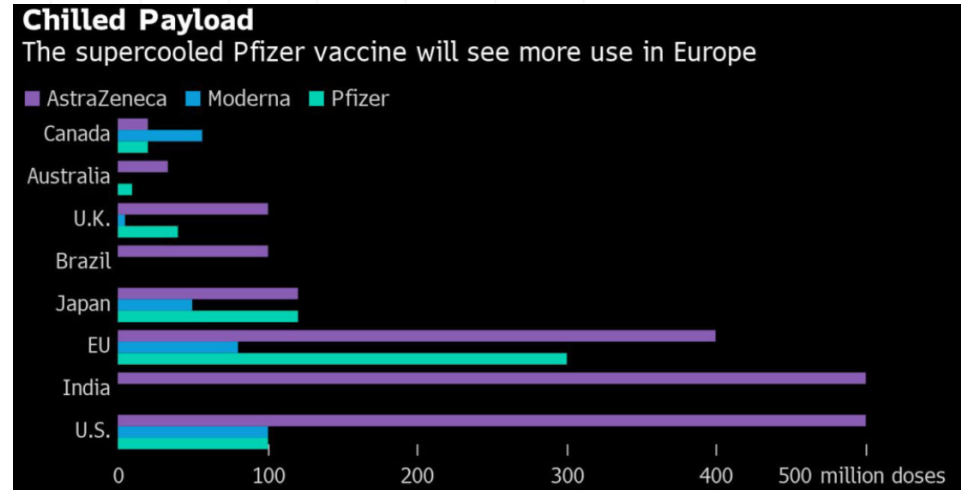
Advance Market Commitments by Vaccine and Country Income



Bloomberg states that the Pfizer-BioNTech SE vaccine adds an extra layer of difficulty – transported and stored at -70°C

Companies plan to use GPS-enabled thermal sensors to track the location and temperature of each vaccine shipment.

Vaccines can be stored in ULT (ultra-low temperature freezers), in a fridge at a hospital for 5 days at 2-8°C or in a special Pfizer thermal shipper, in which the doses are kept in dry ice for 15 days.



Source: Duke Global Health Innovation Center. (2020). Launch and Scale Speedometer. Retrieved from: <https://launchandscalefaster.org/covid-19>

Source: Bloomberg - <https://www.supplychainbrain.com/articles/32279-airlines-face-mission-of-the-century-in-shipping-vaccines> (as of Nov 2020)

10bn+ COVID vaccines need to be distributed to countries with vastly varying climates and logistical capabilities

10+ bn vaccines needed



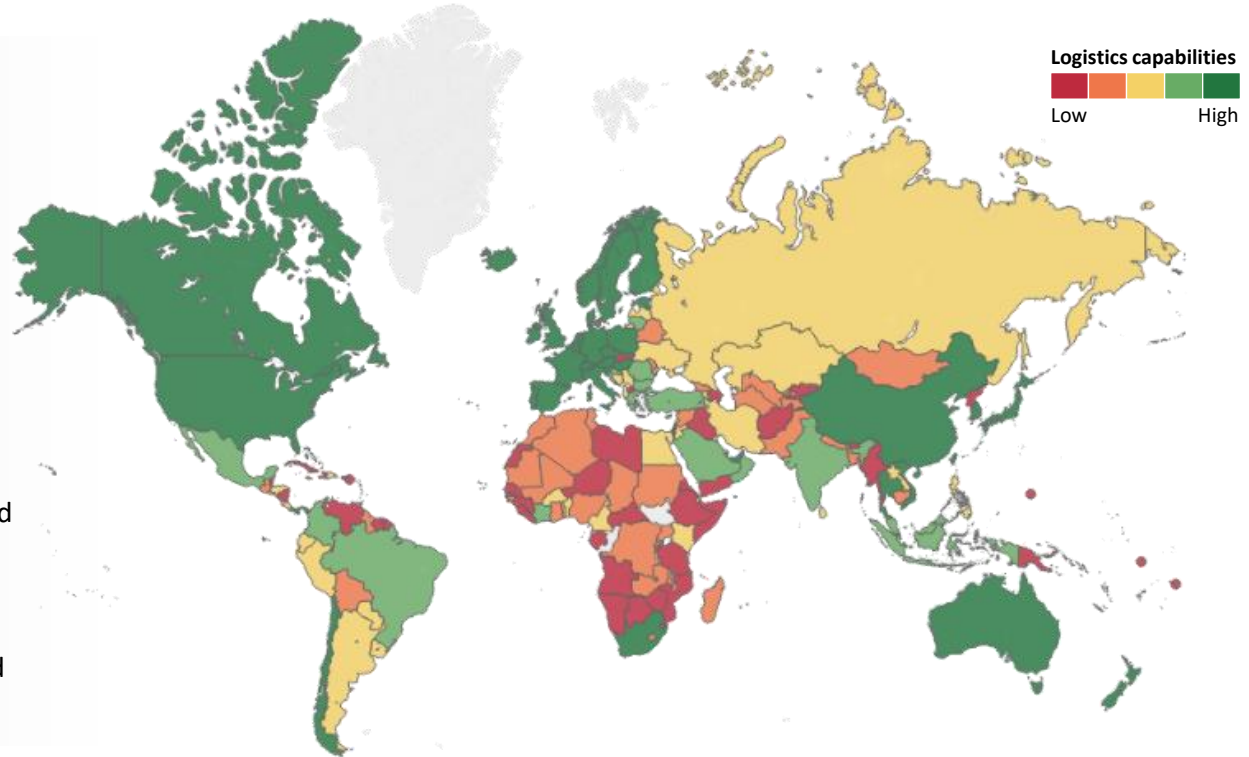
7.8 bn global population



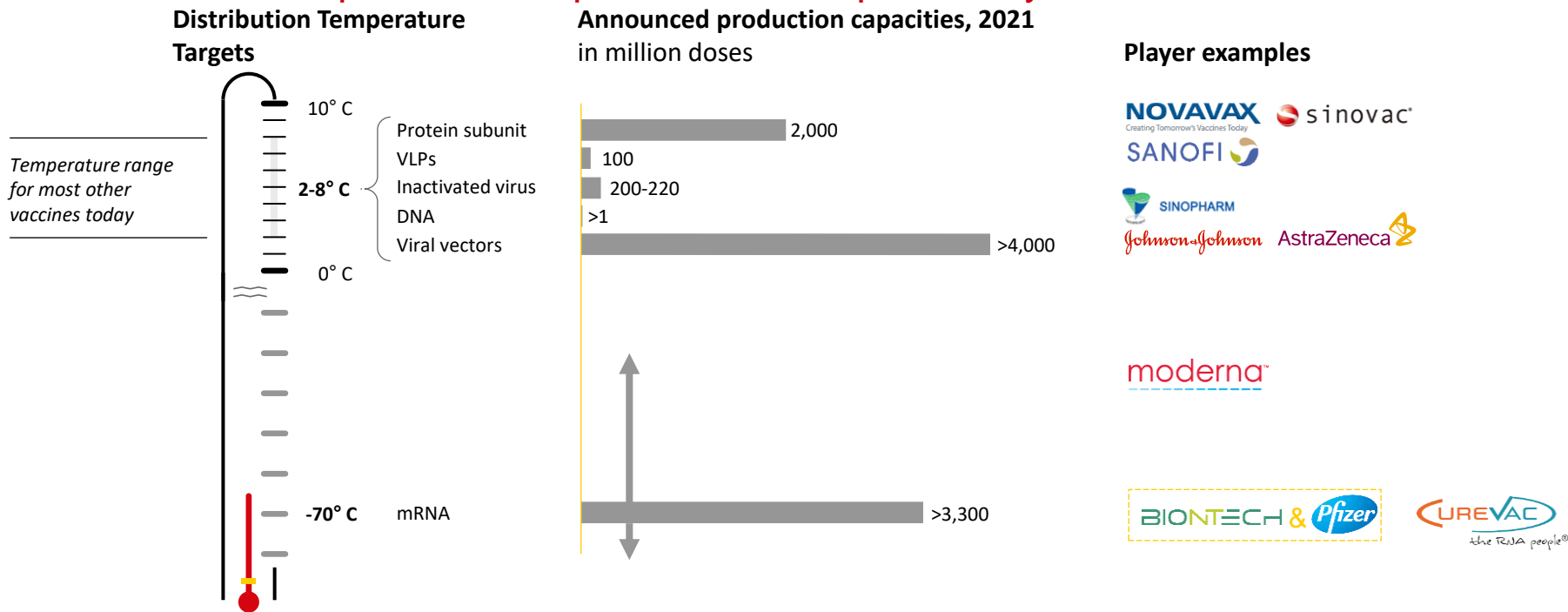
~70% immunization in population to achieve herd immunity



~1.8 avg. doses/person needed for immunization



Shortened development cycle of vaccines to meet ambitious schedules can require distribution at deep-frozen temperatures for a potentially sizeable volume share



Source: Press search, company statements, expert interviews, DHL, McKinsey – last updated on the 13th of August 2020

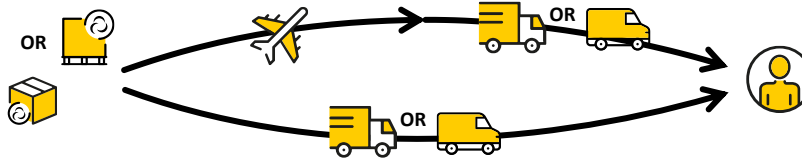
DHL saw 3 supply chain archetypes of end-to-end logistics solutions for COVID-19 vaccine distribution

3 supply chain archetypes

Direct shipment to point of use

Direct shipment of pallet shipper or cooling box from fill-finish to point of use

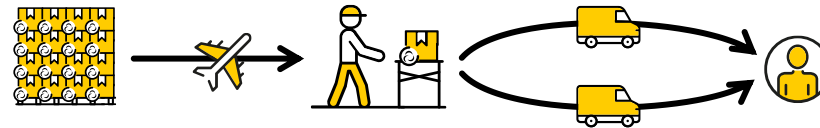
Direct shipment to point of use



Local cross-docking

Local cross-docking of cooling boxes on pallet to reduce cross-border costs

Local cross-docking and distribution



Local warehousing

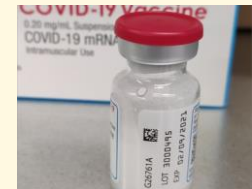
Use of local storage and fulfillment capacities to break-down pallet shipper into cooling boxes

Local warehousing and distribution



Considerations for choice of archetype:

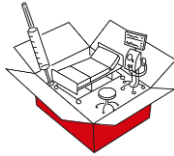
- Supply assurance and in-country stock levels
- Lead-time
- Availability of infrastructure
- Availability of packaging
- Temperature requirements
- First 2 used traditional global standards for track and trace
- The local Warehousing could be more bespoke and use further traceability standards
- ULT (Ultra Low Temperatures) did pose some challenges to Public Sector distribution and traceability eg full track and trace



DHL role as a supplier for COVID-19 vaccine logistics worldwide

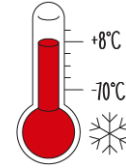
All related products

such as ancillaries and medical equipment transported in sync



End-to-end solutions

with extensive and guaranteed transportation capacities across modes and state-of-the-art cold-chain warehouse infrastructure



Controlled temperature

for all regimes through own freezers, packaging and dry ice facilities incl. advanced sensors and temp loggers

All approved vaccines

distributed by DPDHL as trusted partner



Real-time tracking

and full transparency of temperature adherence

All continents

reached by DPDHL for deliveries of vaccines and ancillaries



Highest security

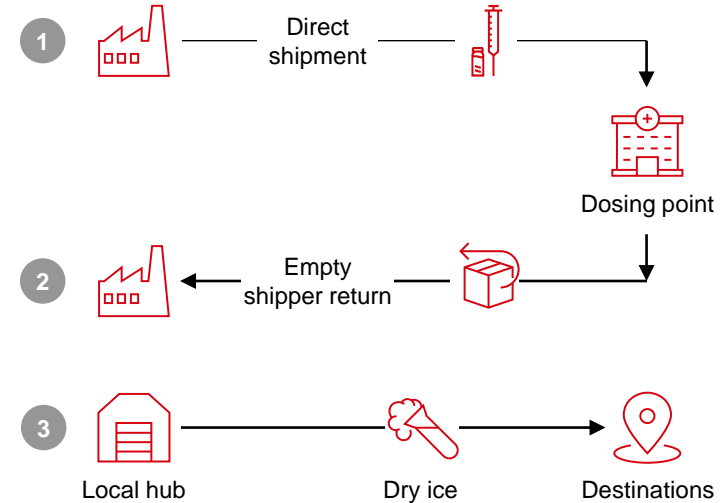
E2E incl. TAPA-certified vans and security escorts

Deep dive: DHL distributes COVID-19 vaccines to >25 countries via Medical Express services and DGF line hauls for larger quantities

Supply chain model for a -70°C vaccine producer...



...with 3 synchronous flows

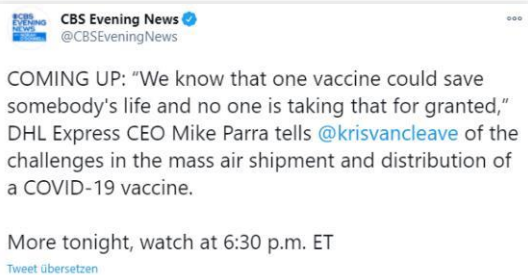


**DHL
Medical
Express**

- **Priority handling** & earliest possible delivery
- Dedicated **customer service** and e-booking tool
- **24/7/365 tracking**

- **Temperature controlled** solutions (-80°C – ambient)
- **Dry ice**, pre-conditioning and **dangerous goods** compliance

We got there! From the New Year implementation, so far successful and smooth



Some Case Studies using GS1 Standards

Shipping direct Supply Chain 1 Belgium to 25+ Countries SSCC (Serial Shipping Container Codes)

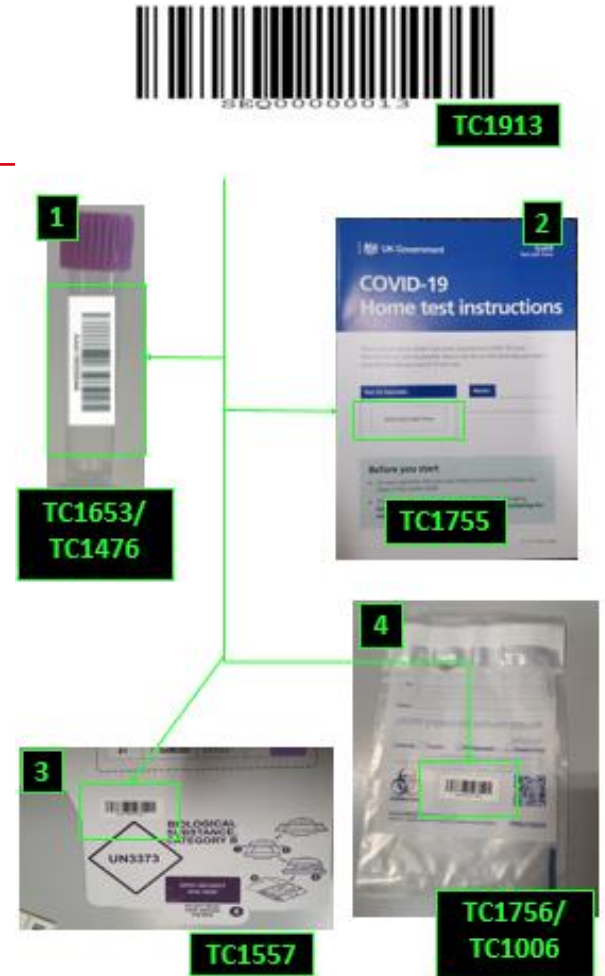
Tracking the Brazilian variant in the UK via a serial number on a PCR Diagnostic Test Kit

Tracking Barcodes from Manufacturer in Germany to delivery in Hong Kong via GS1 Hong Kong

COVAX COVID-19 vaccines shipped to over 100 countries

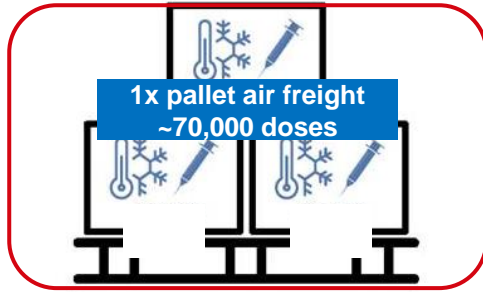
Local warehousing finding missing labels and barcodes on secondary packs for German

Establish postponement manufacturing for 2D barcoding with serialisation for a mRNA ULT Covid-19 vaccine

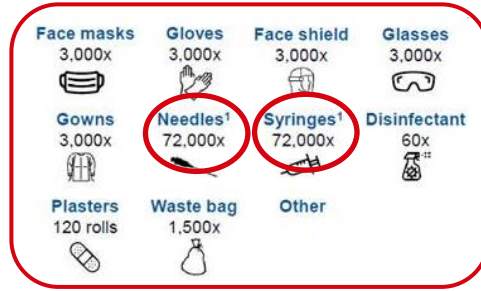


ANCILLARIES - Vaccine ancillaries may contribute more to airfreight than vaccines, growing challenges in Diagnostics

VACCINE



ANCILLARIES



~45% Air



7 BN
60k t



9 BN
77k t

~ 15% Air



65k t



~85%
368k t



- Administering the vaccine requires a variety of accessories to be in place at the moment the vaccine arrives
- The airfreight demand on ancillaries likely to exceed the one for vaccines
- There is an estimate factor **x3** in terms of Ancillaries vs. Vaccines.
- Wide range of suppliers in CN, IN, EU and US

Source: Seabury, Médecins Sans Frontières (MSF)

Important role of public sector and NGOs in LMIC contexts – DHL engaged with leading organizations

PUBLIC SECTOR PLAYS PRINCIPAL ROLE IN VACCINE FLOWS IN LMICS

COVAX: ensuring global equitable access to COVID-19 vaccines


2 billion

vaccine doses by
end of 2021


1 billion

syringes by 2021


190

countries

  **World Health Organization**

CEP  **Unicef**

DHL IS ENGAGED WITH LEADING PLAYERS TO DELIVER GLOBAL DISTRIBUTION



DHL's Singapore office helps in movement of medical equipment to WHO's Division of Pacific Technical Support in Fiji



WHO, DHL join hands to deliver medical equipment to the Pacific



HQ secondments,
technical support
and logistics
services for vaccine
movements



Logistics services for
vaccine movements
into Africa



Initial discussions
around knowledge
sharing of cold-
chain expertise and
vaccine handling

Summary - #OneInABillion

- Numbers speak for themselves
- Rapid rollercoaster journey operating in a highly regulated environment
- Country supply chain models varied – not all changed
- Amazing what can be achieved – no DHL LSHC operations closed
- Returning to traditional vaccine distribution models 2-8°C & -20°C
- ULT investments not wasted - opportunities in other areas CGT
- Supply chains became more complex - MAH v Public Sector
- We had vaccine nationalism/protectionism!
- Supply chains involved other agencies, including Military
- Not long before the #fakes began to arrive

ONE IN A BILLION

Our sophisticated global network in Life Sciences and Healthcare logistics enables us to make a meaningful difference in the fight against COVID-19. We're playing a key role in the vaccination roll-out and are delivering unparalleled expertise and life-saving medical supplies to people all over the world.

We have delivered:

> 1

BILLION

COVID-19 VACCINE DOSES SO FAR
All approved COVID-19 vaccines



529.1
MILLION

TEST KITS

Essential PPE, ancillaries
and medical devices



Our global network has reached:

ALL 7
CONTINENTS



164
COUNTRIES



PEOPLE IN
THE EVEN
MOST REMOTE
COMMUNITIES

Our specialist transportation and logistics includes:



EXTENSIVE AND
GUARANTEED
CAPACITY IN
**CERTIFIED
COLD-CHAIN
WAREHOUSES**



EXTENSIVE AND
GUARANTEED
CAPACITY
**ACROSS MODES
OF TRANSPORT**



REAL-TIME TRACKING
WITH TEMPERATURE LOGS

**TEMPERATURE
CONTROLLED**
TRANSPORTATION AND
STORAGE FACILITIES



DHL



THANK YOU

Twitter @MikeMeakinDHL

<https://www.linkedin.com/in/mike-meakin-8677112/>



Mike Meakin

Vice President

Global Quality, Regulatory & Compliance
Life Sciences & Healthcare

Phone: +44 (0) 1283 494211

Mobile: +44 (0) 7774 299402

Fax: +44 (0) 1283 494237

mike.meakin@dhl.com

DHL Supply Chain
Brindley House
Eastern Avenue
Burton On Trent
DE13 0BB
United Kingdom
www.dhl.com