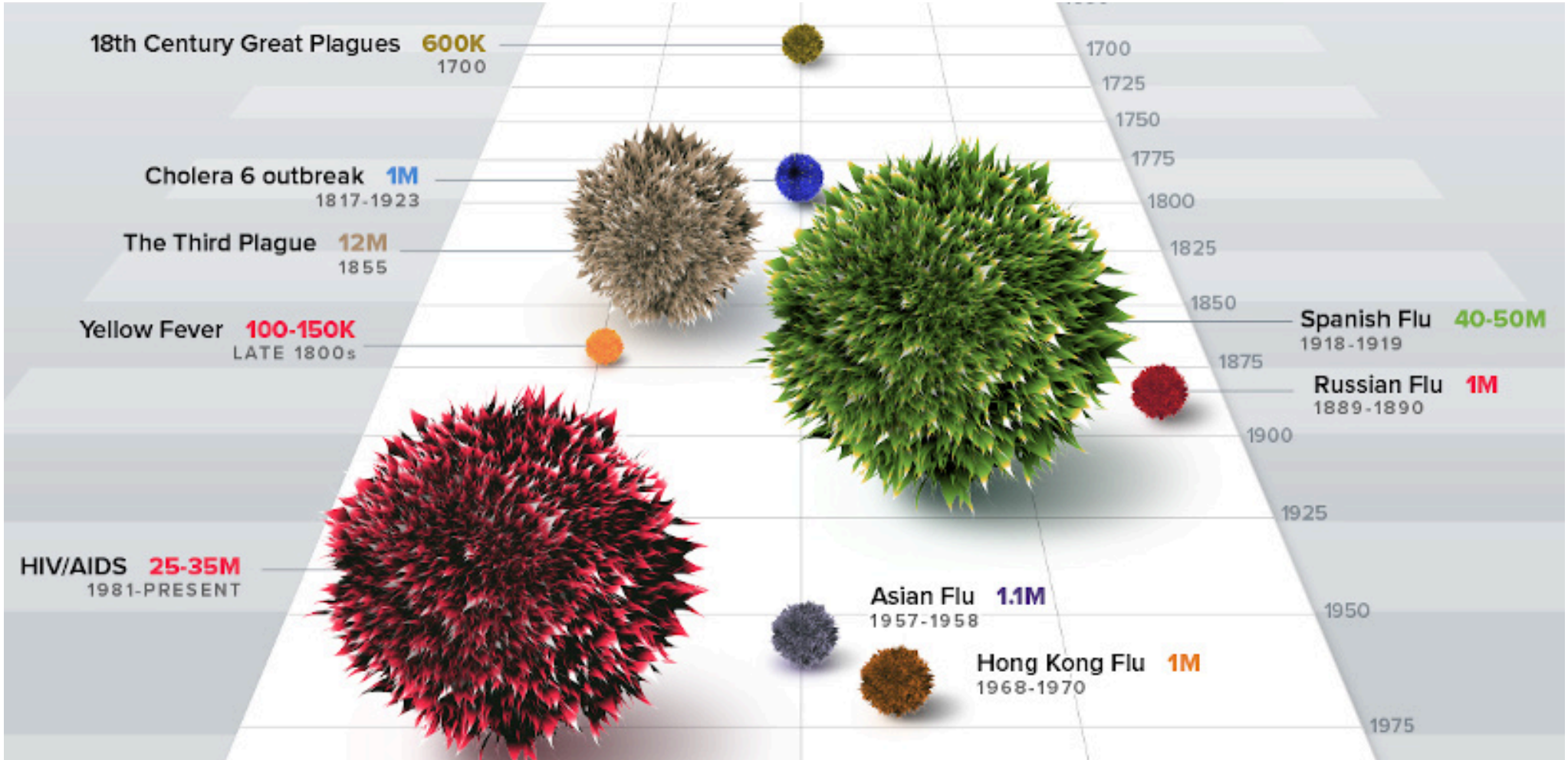
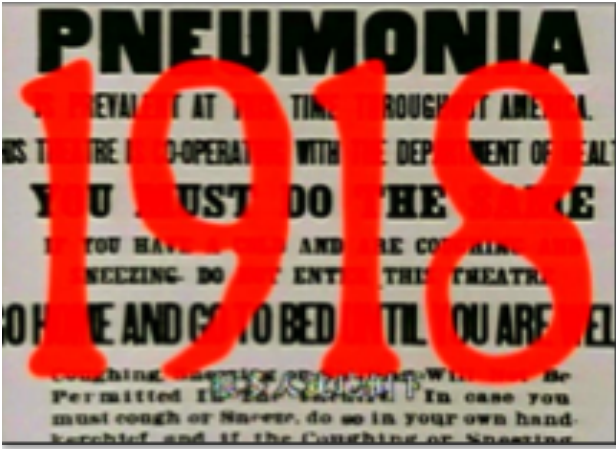


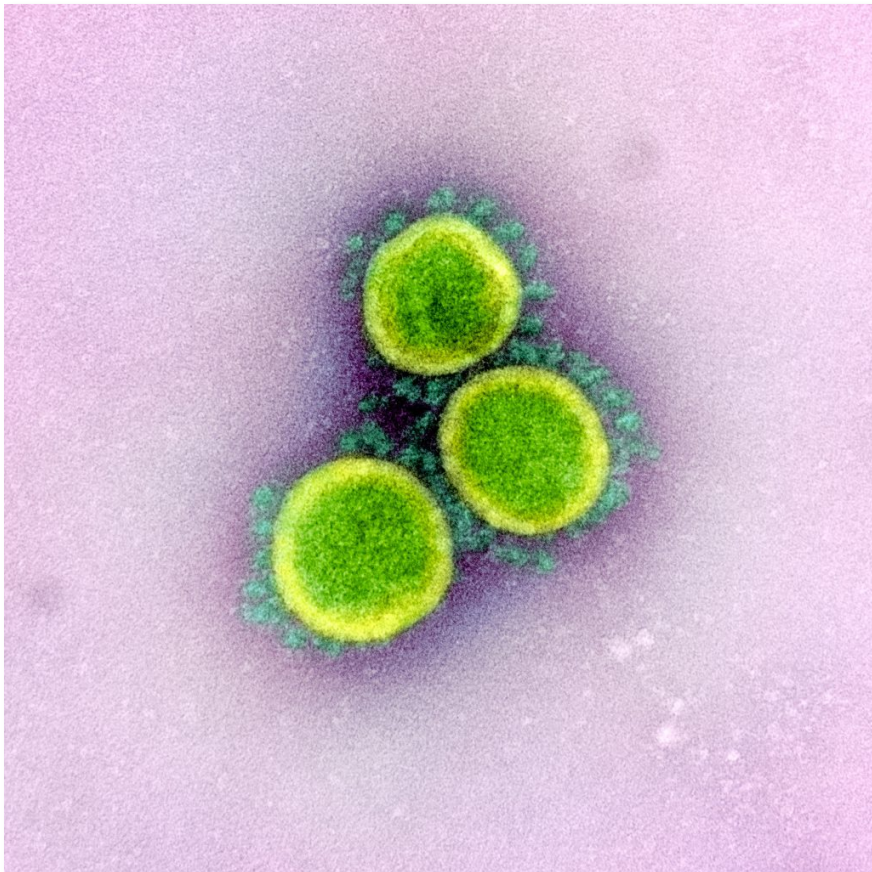
新冠肺炎全球大流行的 的衝擊與省思

林奇宏 教授
Chi-Hung Lin, M.D./Ph.D.
NCTU/NYMU

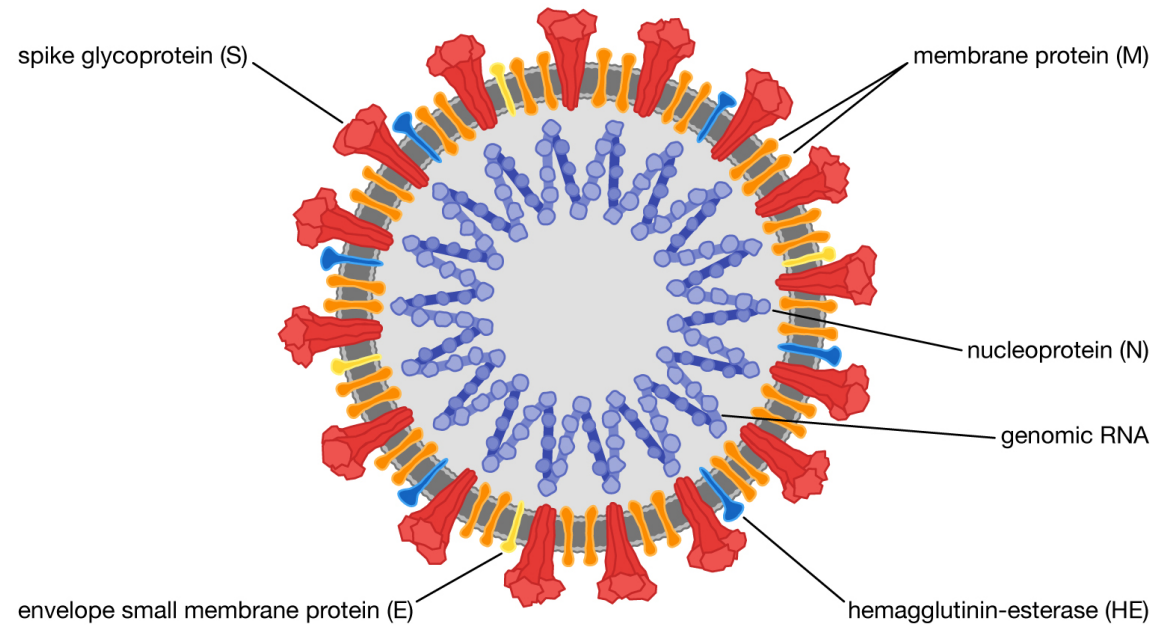




- Disease: coronavirus disease (COVID-19) From WHO
- Virus: severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2)



Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2)

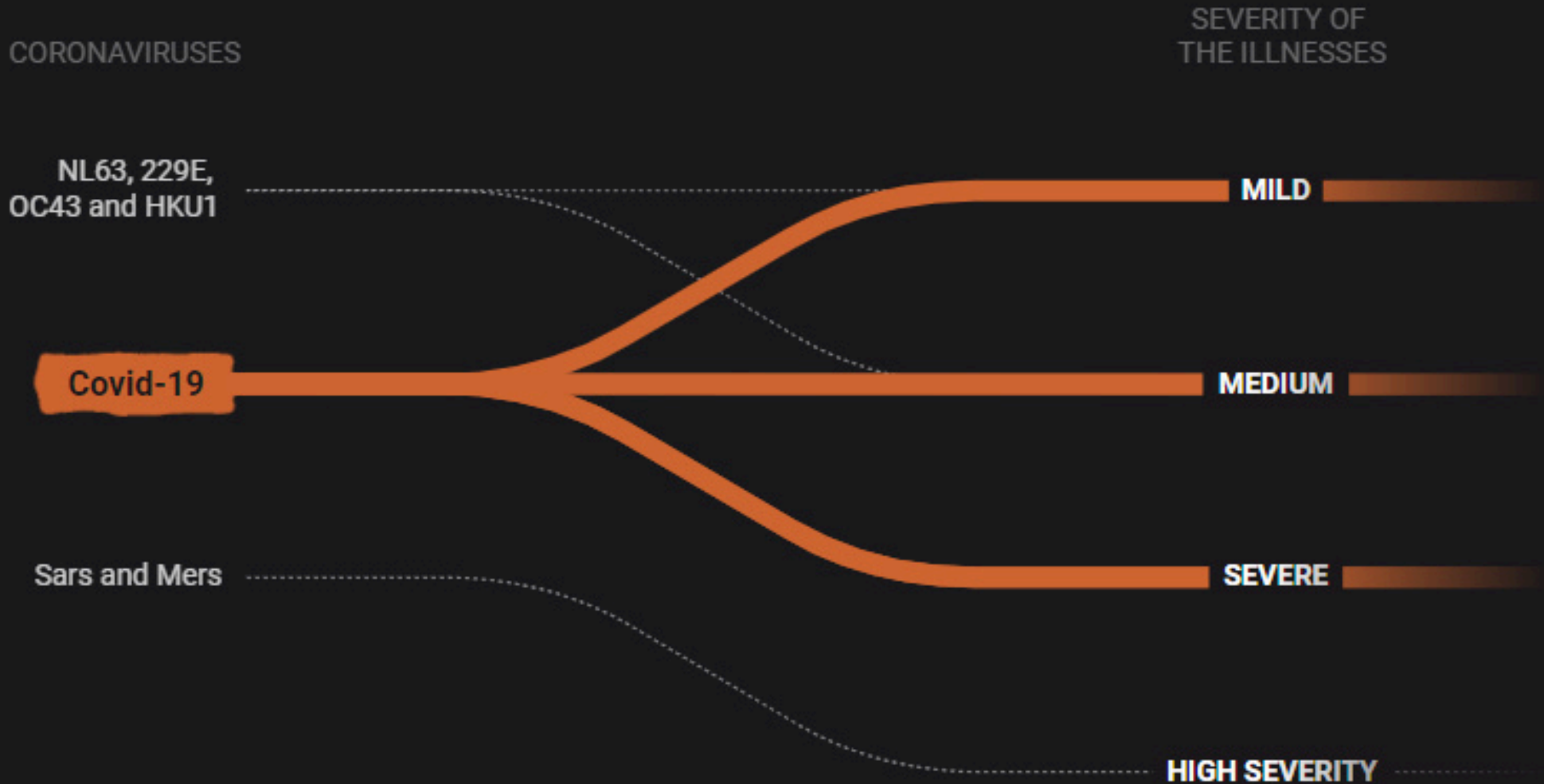


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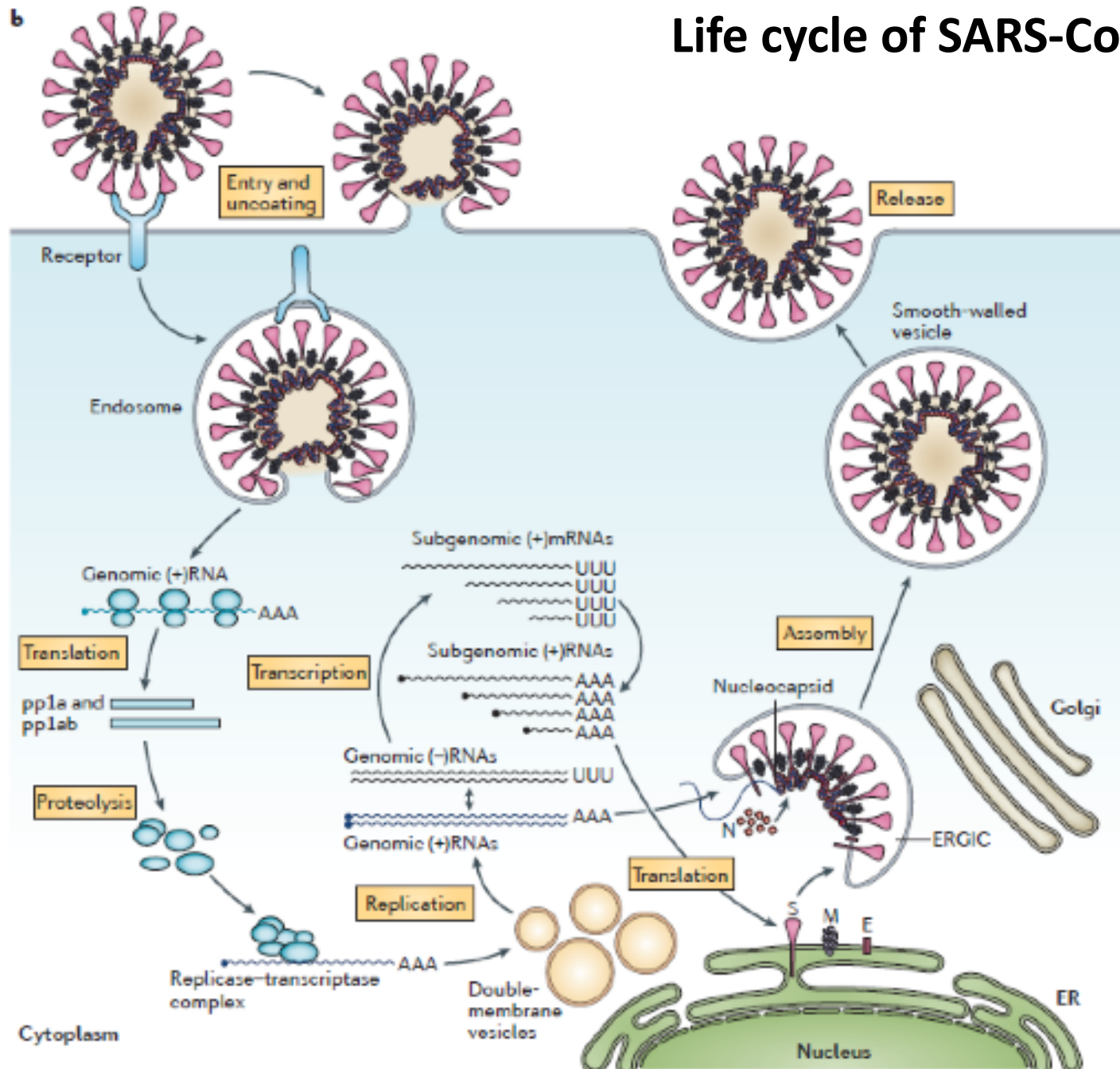
Human Coronavirus Types

There are more than 200 types of coronaviruses.

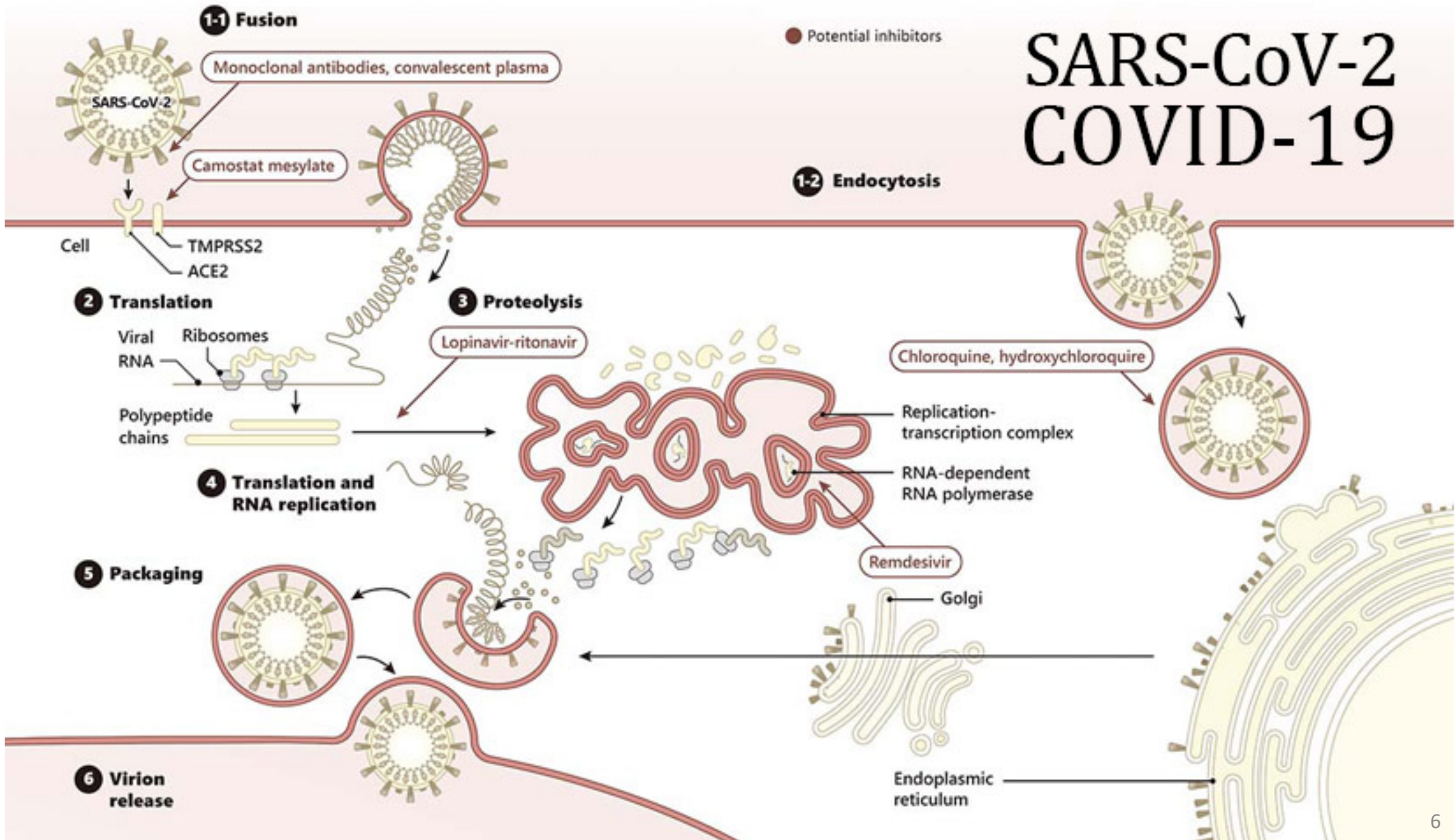
7 affect humans: 4 endemic (NL63, 229E, OC43 and HKU1) causing 15-30% of common cold, 2 (SARA and MERS) epidemic, and 1 pandemic (COVID-19)






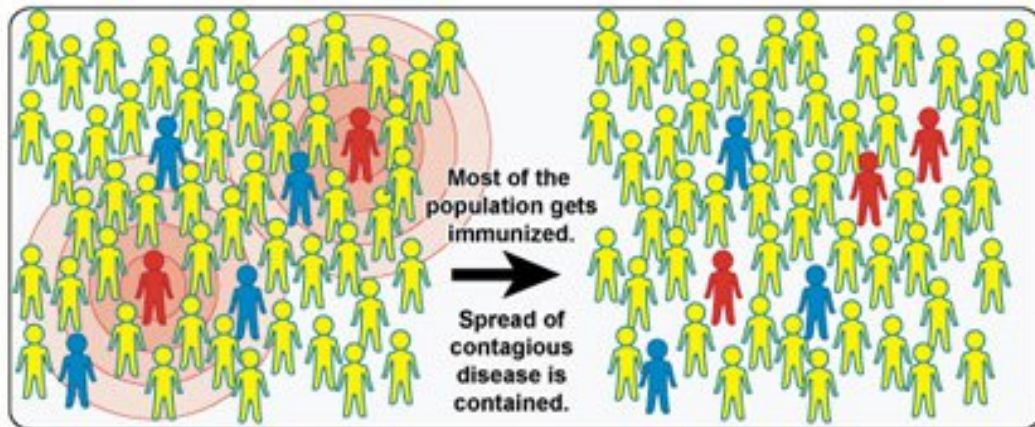
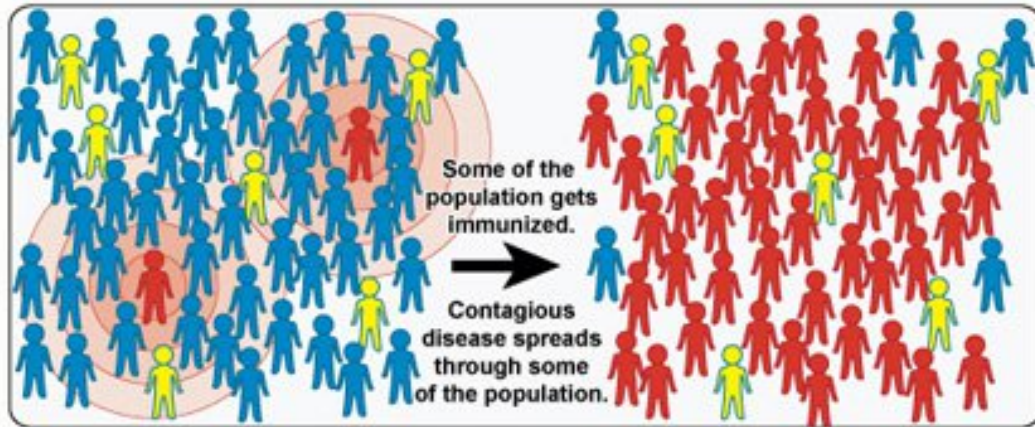
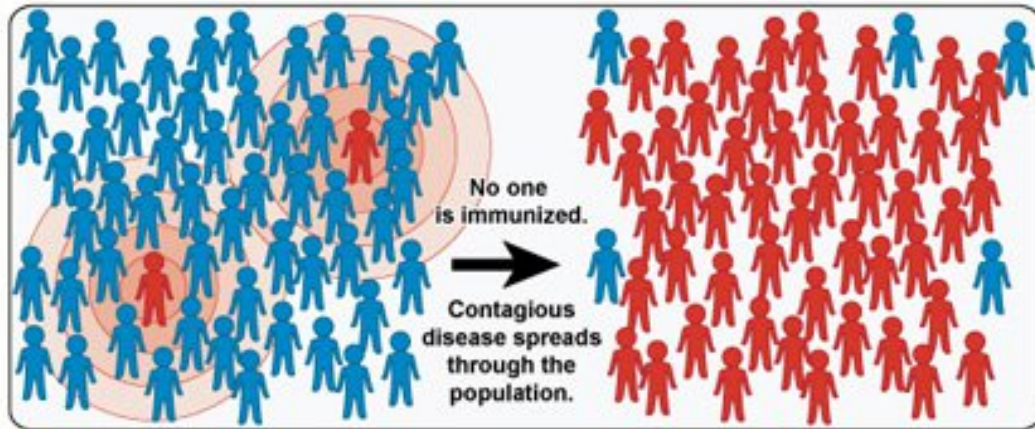
Life cycle of SARS-CoV-2)



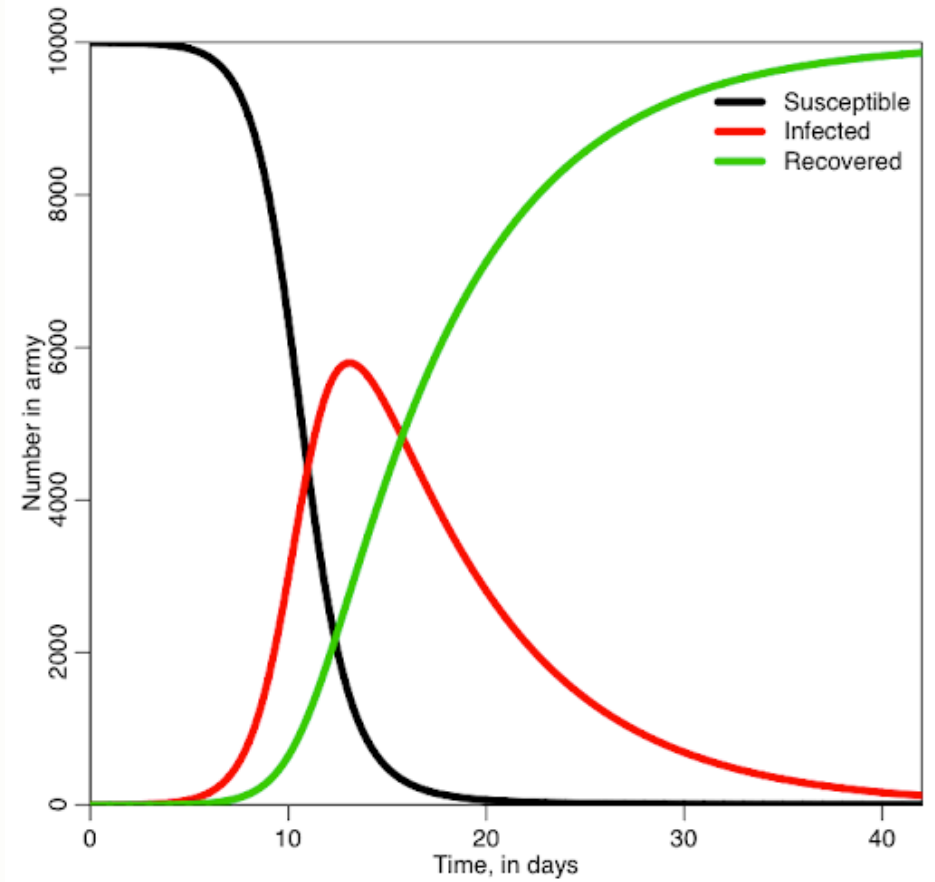
Therapeutic targets for SARS-CoV-2



 = not immunized but still healthy
  = immunized and healthy
  = not immunized, sick, and contagious



Stages of a primary infectious disease

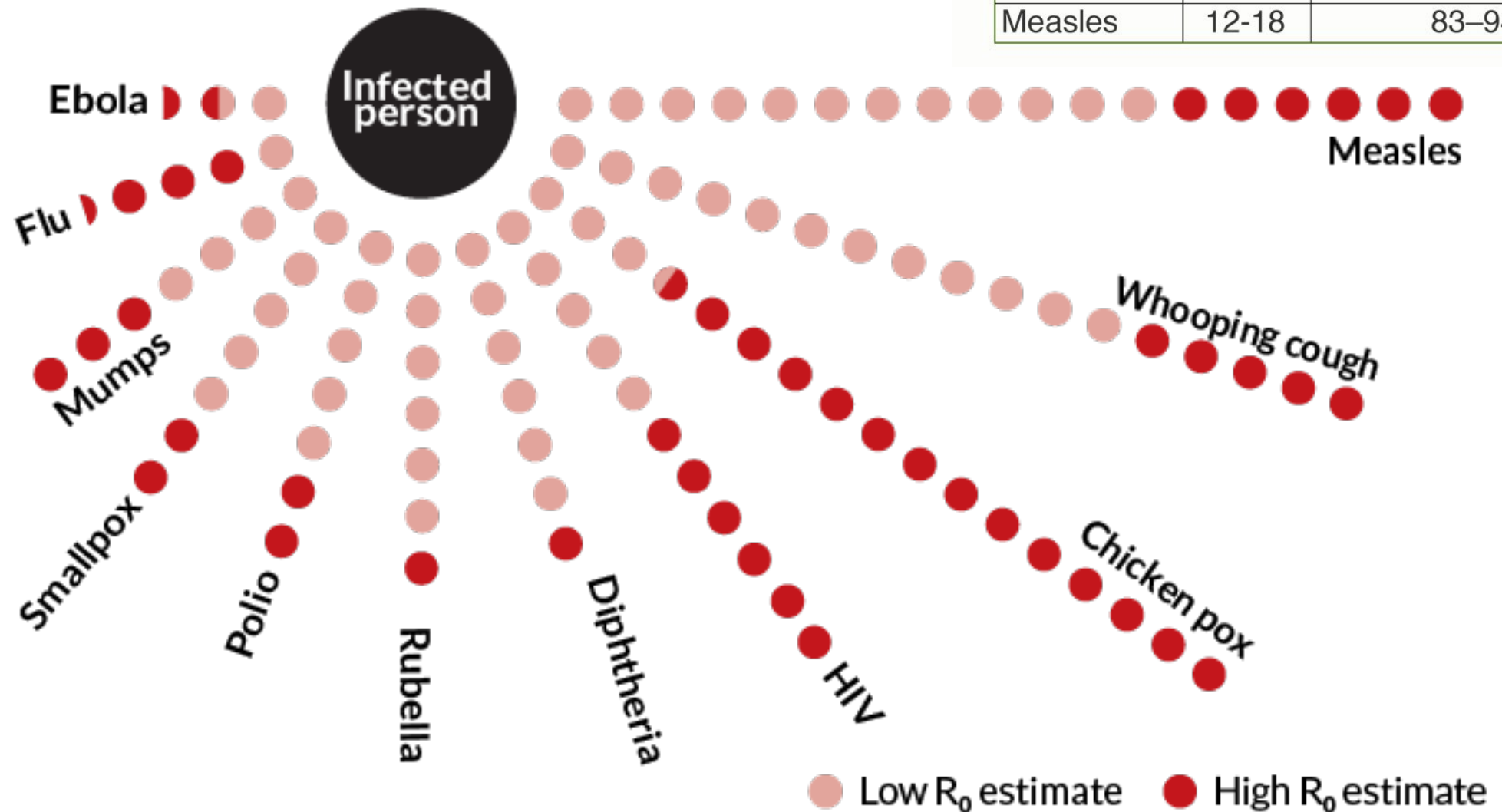


How contagious is COVID-19?

R nought, R0 基本傳染數

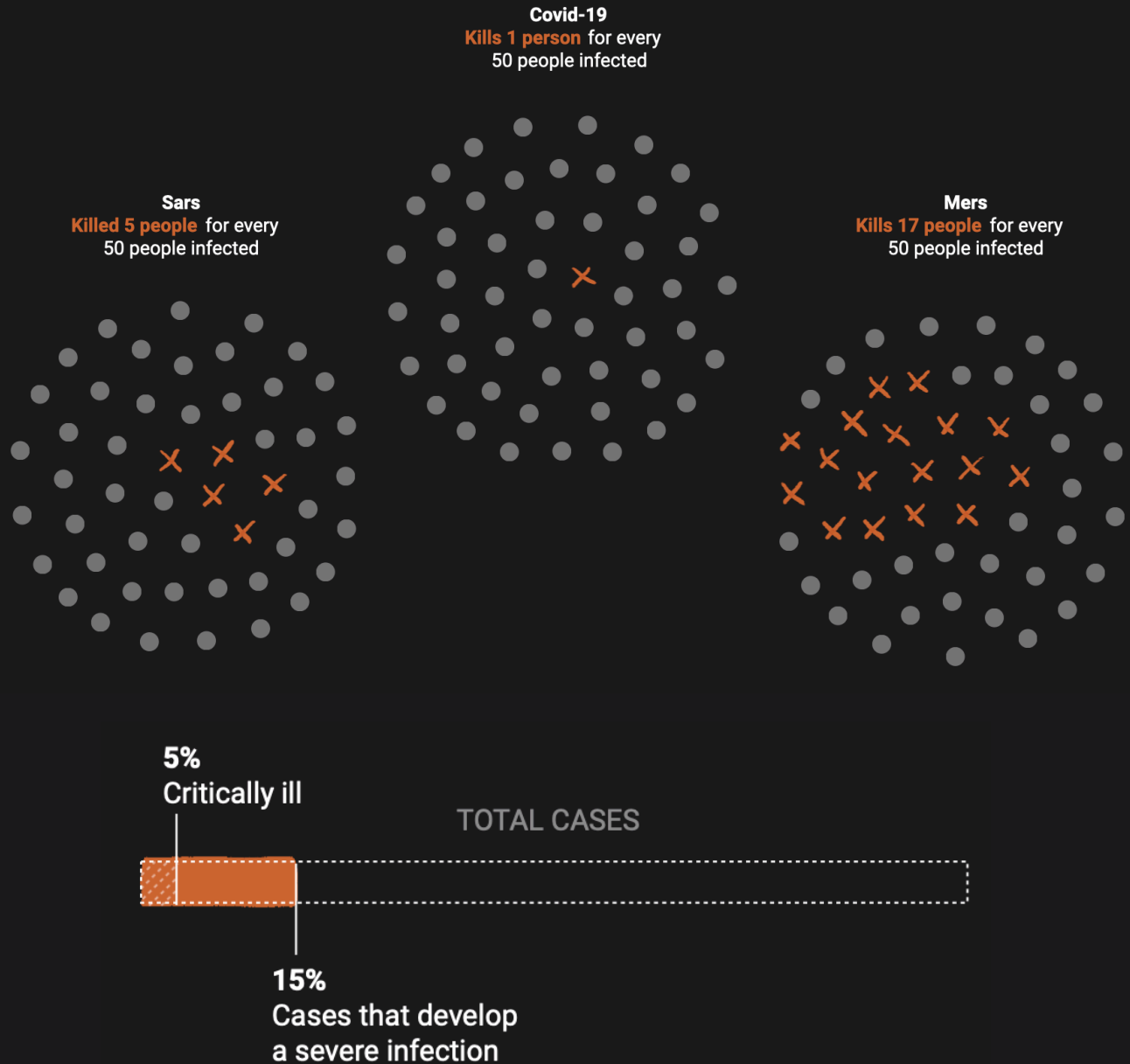
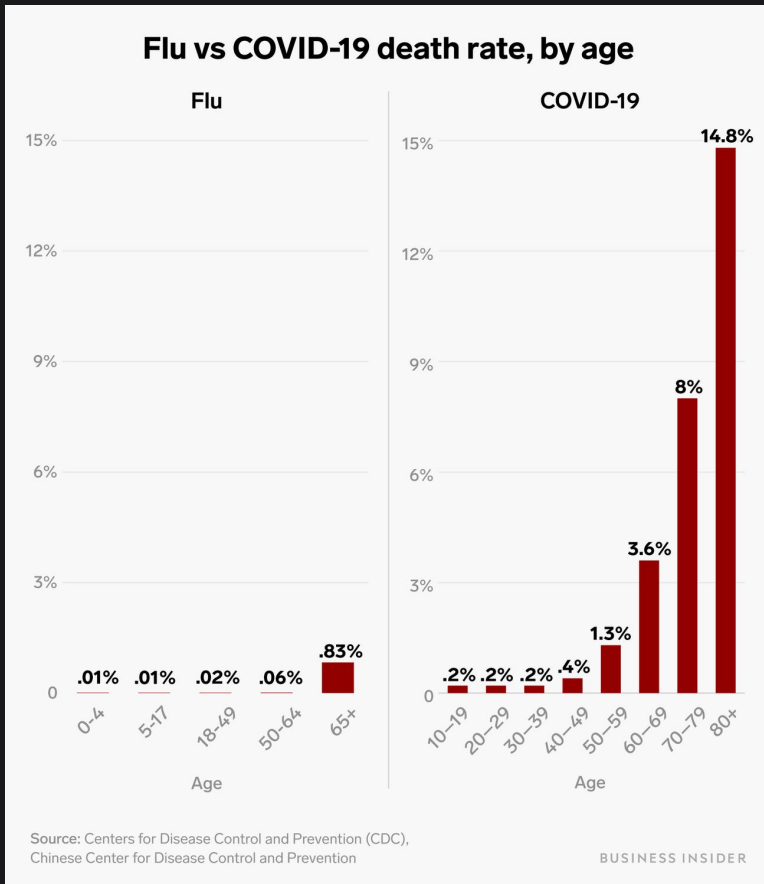
Herd immunity threshold, HIT
 群體免疫閾值, $HIT = 1 - (1/R_0)$,

Disease	R0	Threshold (%)
Mumps	4-7	75-86
Polio	5-7	80-86
Smallpox	5-7	80-85
Diphtheria	6-7	85
Rubella	6-7	83-85
Pertussis	12-17	92-94
Measles	12-18	83-94

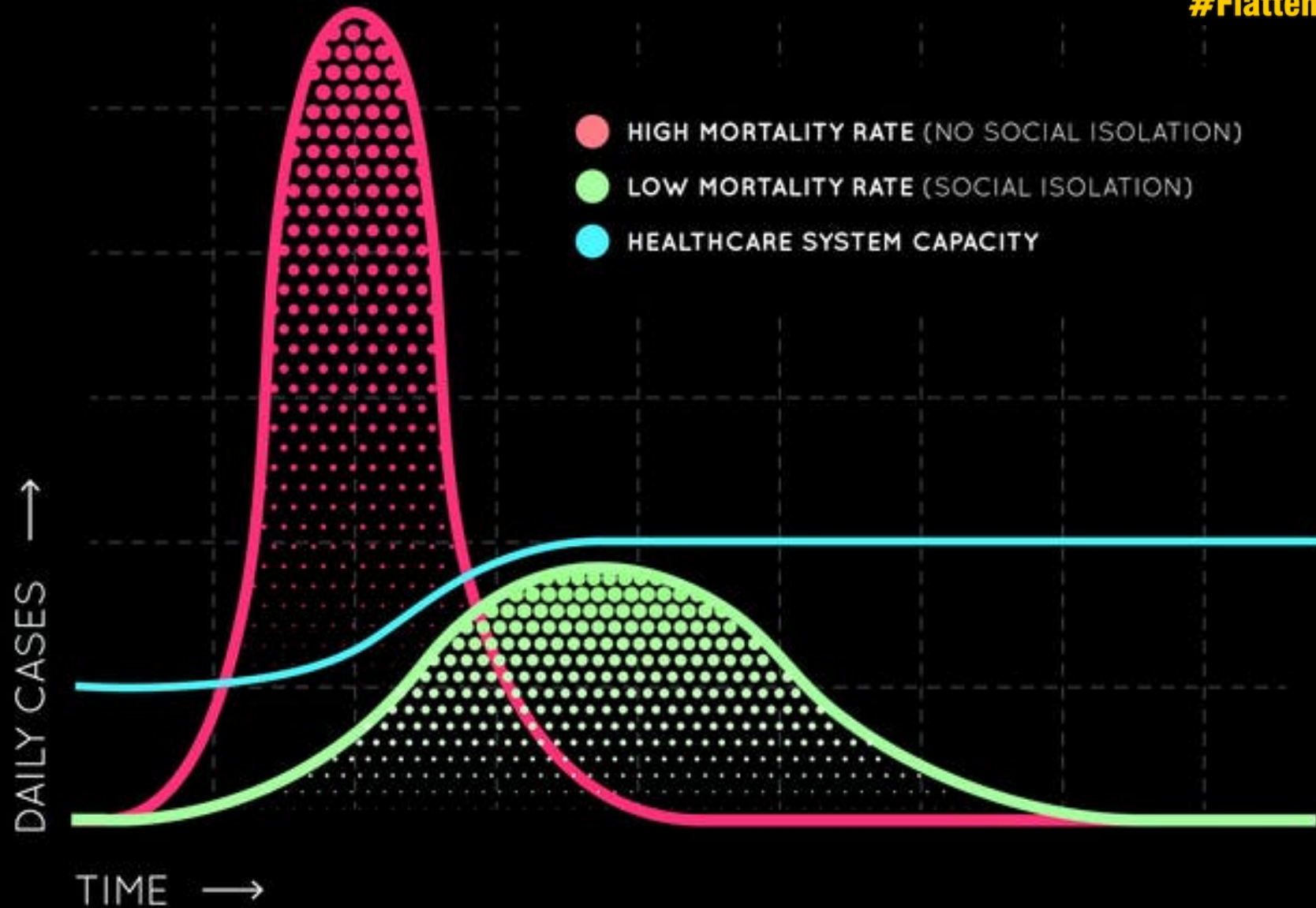
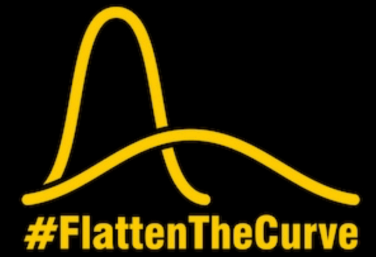


The mortality rate of COVID-19

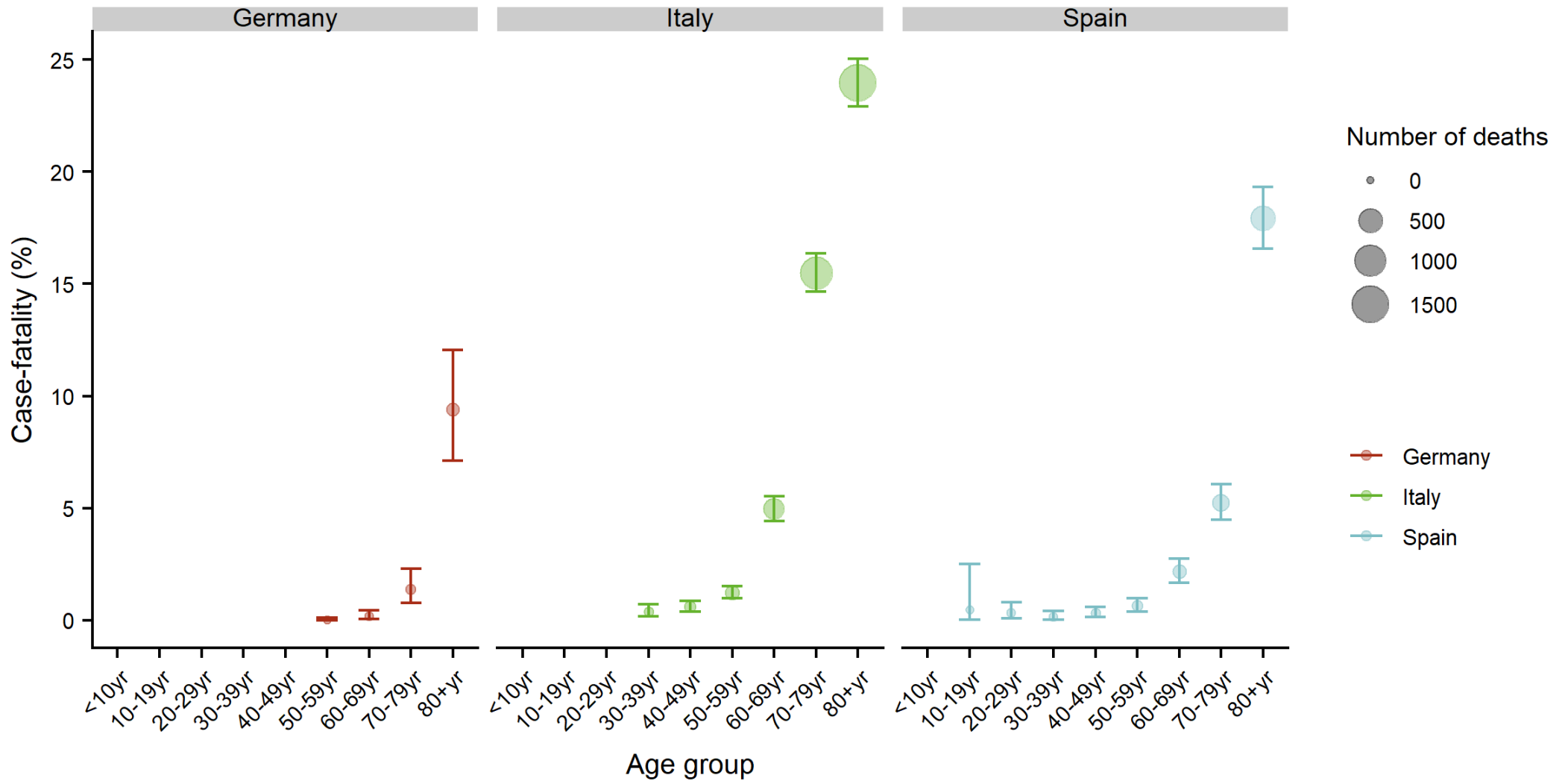
The mortality rate: influenza (0.1%), SARS (9.6 %) and MERS (34.4 %), COVID-19 (1-4% ??)



FLATTENING THE CURVE FOR COVID-19

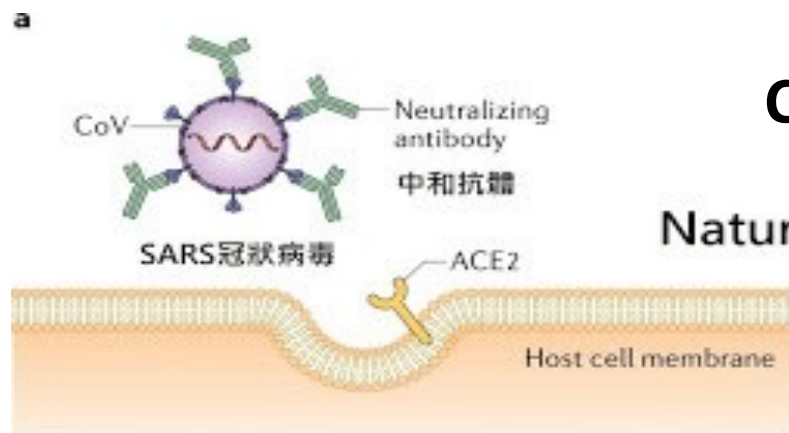


Flattening matters

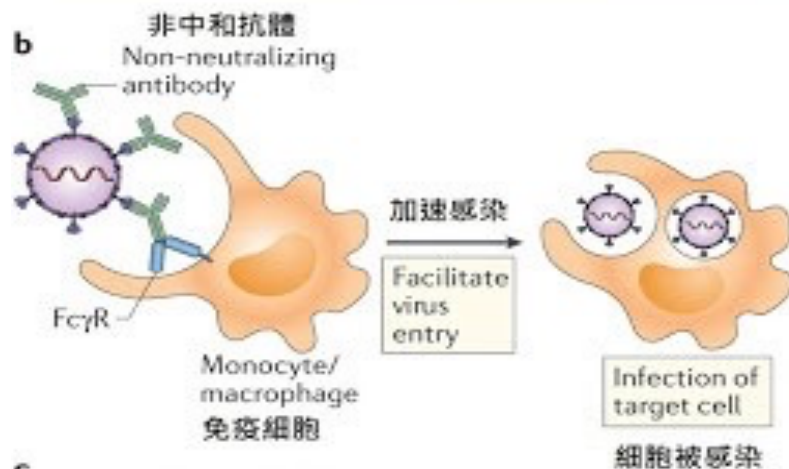


Age-specific crude case-fatality (deaths/all cases) in Germany (TESSy data up to 24 March 2020), Italy (country report with data up to 19 March 2020) and Spain (country report with data up to 22 March 2020)

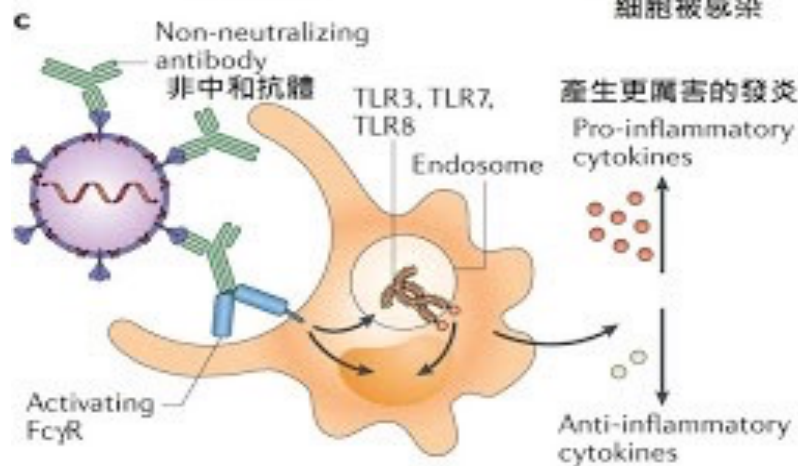
COVID-19 vaccines- all things considered



Nature：冠狀病毒感染後產生的抗體不一定都是有用的抗體



- 因為SARS與COVID-19相似，所以有參考價值
- 絕大部分的感染者產生的抗體是有效可以預防再次感染
- 中和抗體(Neutralized Ab)是有效的抗體
- 非中和抗體(Non-neutralized Ab)則是差的抗體
- 中和抗體可以阻止病毒感染宿主細胞
- 非中和抗體反而加速病毒感染
- 非中和抗體開門通敵讓病毒感染宿主免疫細胞
- 非中和抗體使得感染過程產生更嚴重的發炎反應
- 抗S蛋白抗體是較有用的抗體
- IgG抗體是較有用的抗體
- 抗體濃度較低時較容易出現，開門通敵加速感染反應



過去SARS疫苗研發過程出現的問題：

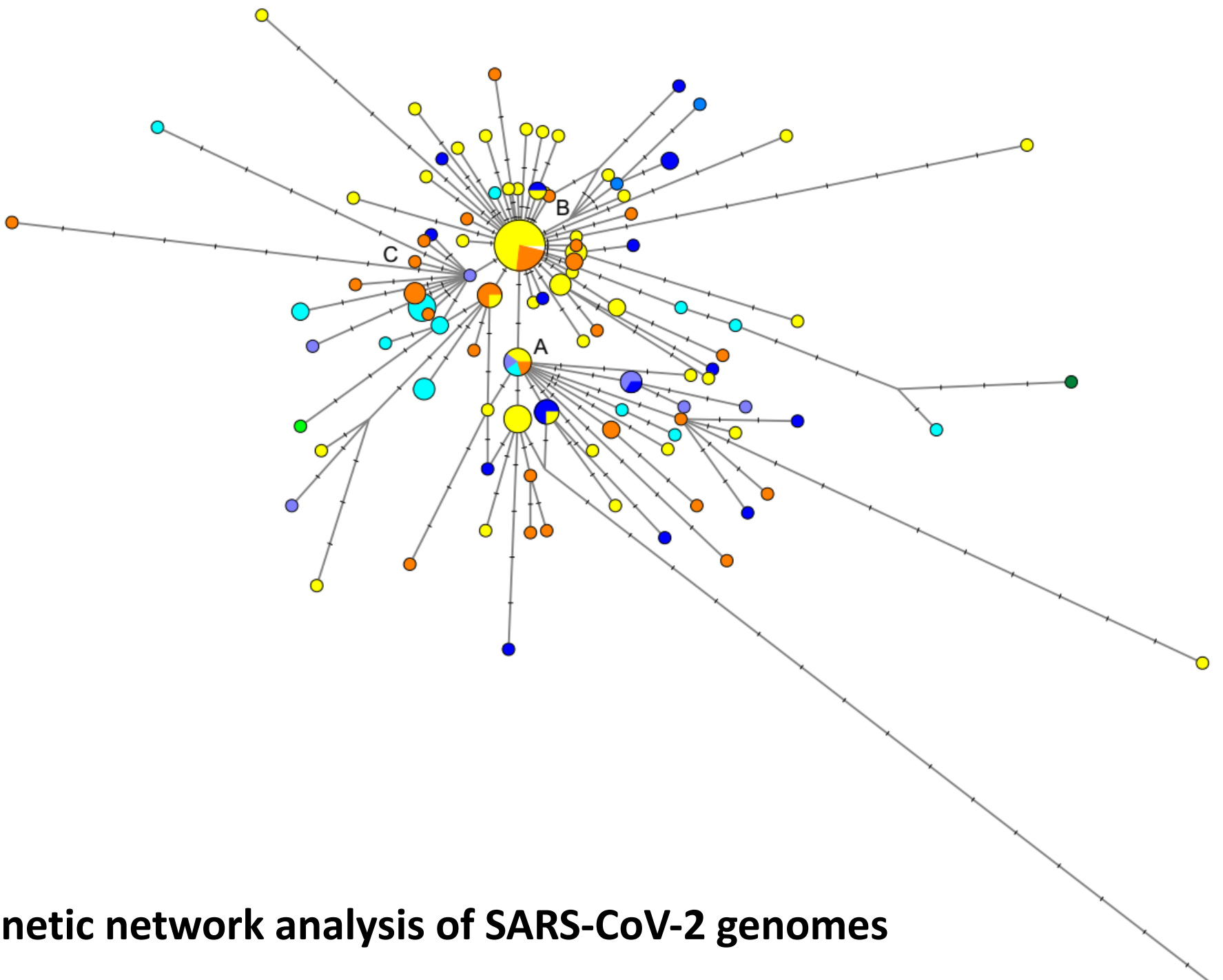
- 產生非中和抗體，反而造成實驗動物因更嚴重肺炎死亡
- 年紀大老鼠產生較低的抗體製造反應
- 鼻吸入疫苗比肌肉注射在呼吸道產生更高濃度的抗體

Iwasaki, A., Yang, Y. The potential danger of suboptimal antibody responses in COVID-19. Nat Rev Immunol (2020).

Serology-based tests for COVID-19

				Expertise Needed
Rapid diagnostic test (RDT)	10-30 minutes	The presence or absence (qualitative) of antibodies against the virus present in patient serum.	The amount of antibodies in the patient serum, or whether these antibodies are able to inhibit virus growth	Point-of-care testing, usually handheld, minimal training needed
Enzyme-linked immunosorbent assay (ELISA)	2-5 hours	The presence or absence (quantitative) of antibodies against the virus present in patient serum	Whether the antibodies are able to inhibit virus growth	Lab space generally required; some technical training required
Neutralization assay	3-5 days	The presence of active antibodies in patient serum that are able to inhibit virus growth ex vivo, in a cell culture system	May miss antibodies that are specific for viral proteins not involved in replication	Lab space required, at least BSL-3 if using live SARS-CoV-2; extensive training needed

- Geography
- BAT
 - CHINA
 - EAST ASIA
 - USA
 - CANADA
 - EUROPE
 - AUSTRALIA
 - MEXICO
 - BRAZIL

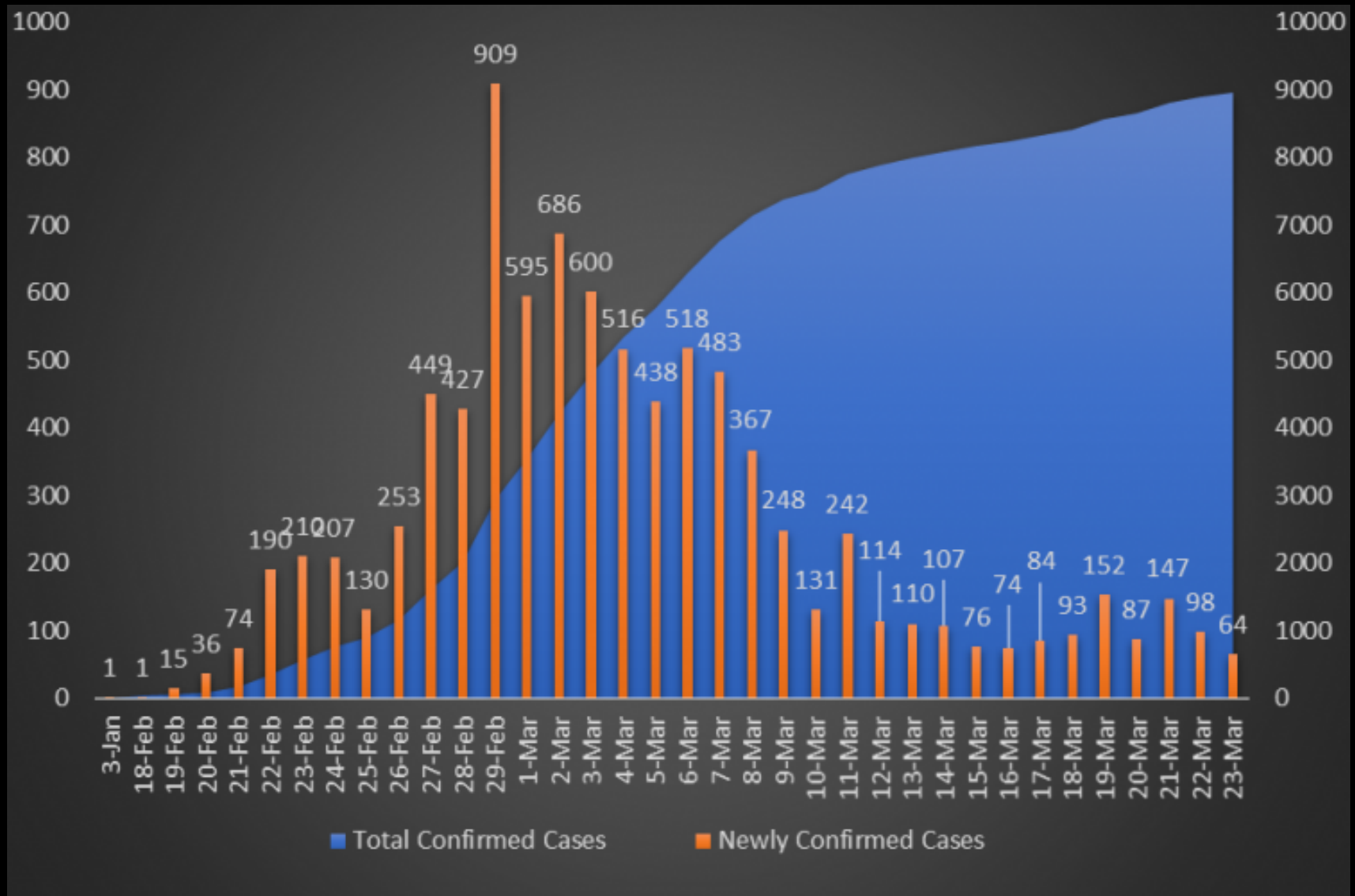


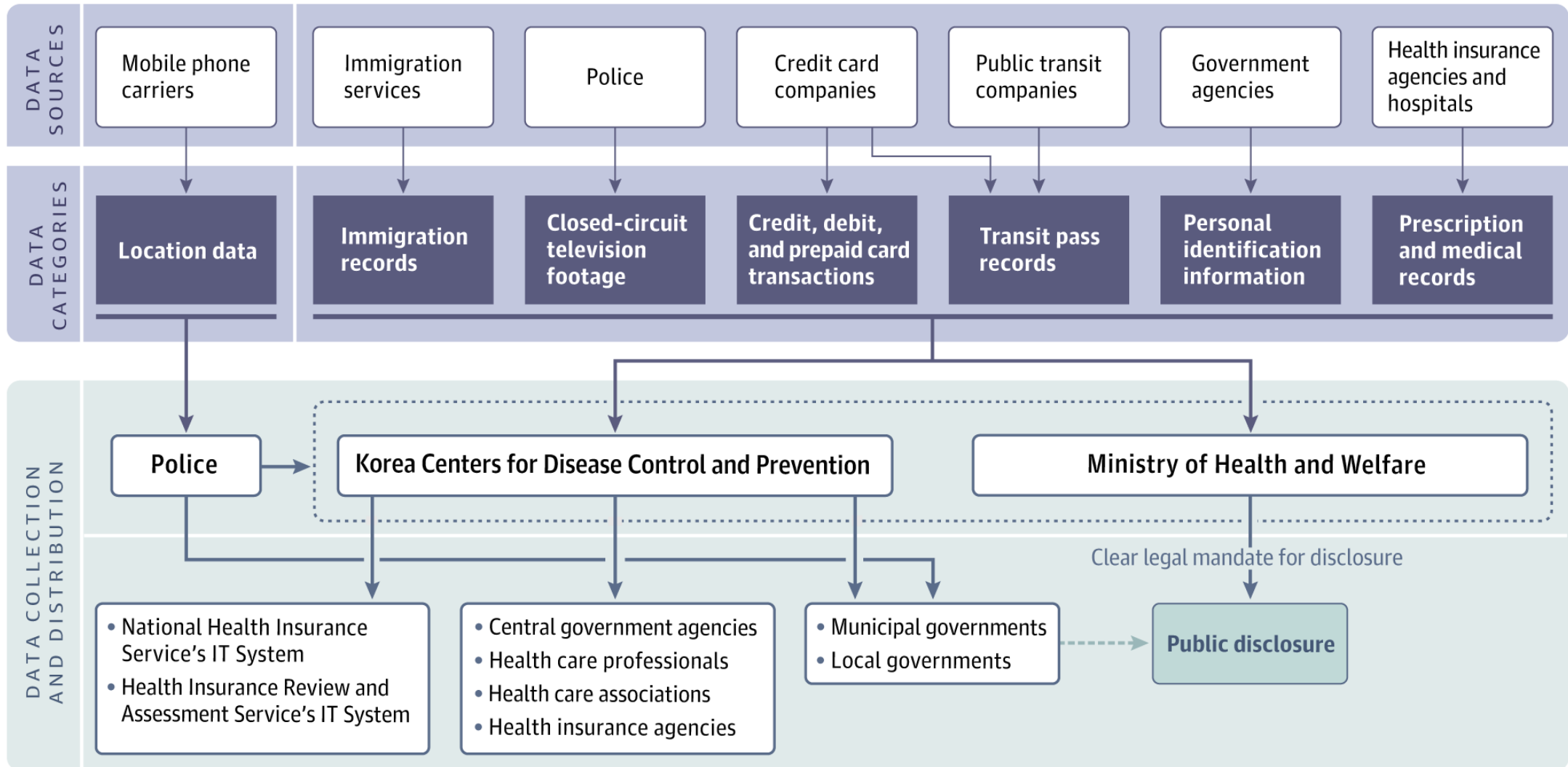
Phylogenetic network analysis of SARS-CoV-2 genomes

What we have learned from New York state

New York State Governor Cuomo said that preliminary findings from an antibody study conducted on 3,000 people at grocery stores across New York State found a 13.9% had coronavirus antibodies, suggesting a **13.9% actual infection rate statewide (21.2% in New York City)**, which translates to an estimate of about 2,700,000 actual cases in New York State (**10 times more** than the about 270,000 cases that have been detected and reported officially). Governor Cuomo acknowledged that the official count reported by New York State (which still is not including probable deaths as recommended by the new CDC guidelines) of about 15,500 deaths is "not accurate" as it doesn't account for stay at home deaths. Based on Worldometer's count (which includes probable deaths reported by New York City) of about 21,000 deaths and the 2,700,000 case estimate from the new antibody study, the actual case **fatality rate in New York State could be at around 0.78%**.

What we have learned from South Korea

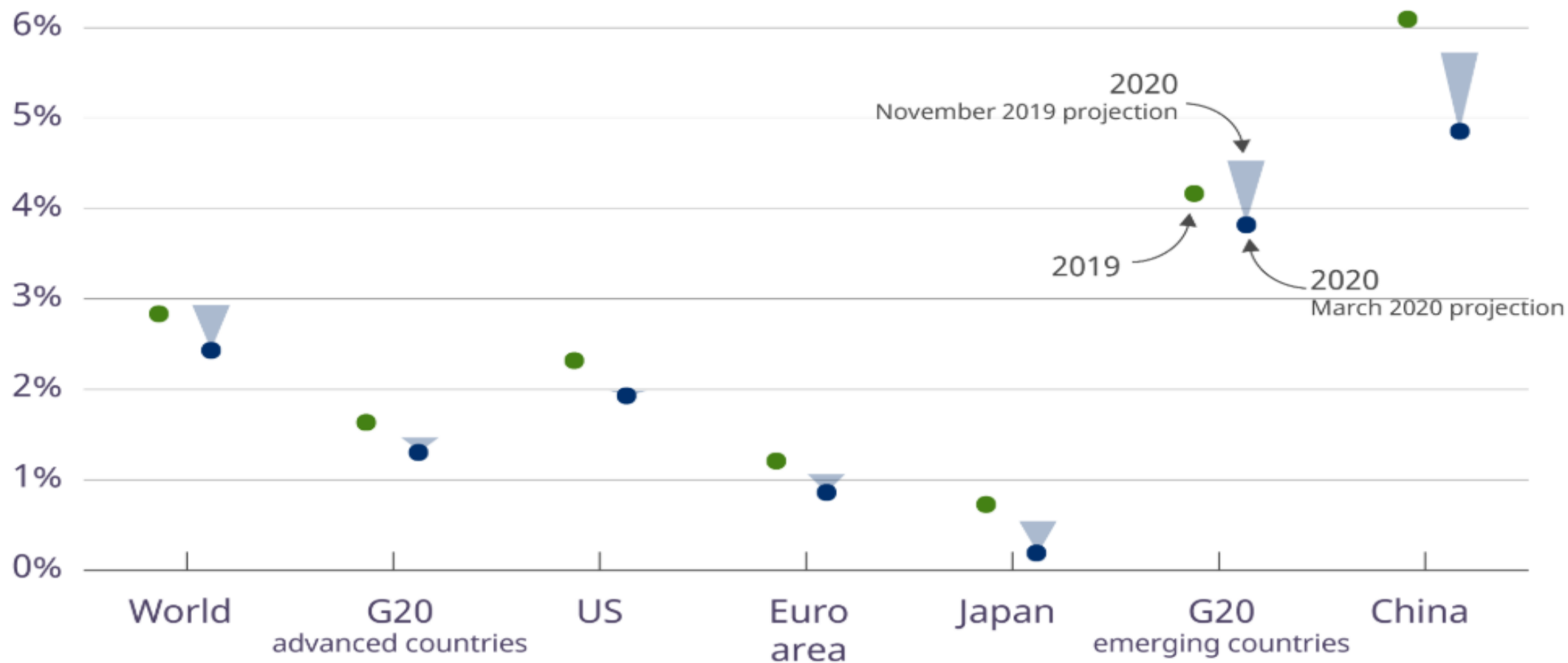




Coronavirus Disease 2019 Contact Tracing in Korea: Sources, Categories, Collection, and Distribution of DataIT indicates information technology.

GDP Growth Projection

%, year on year, 2019 and 2020



資料來源:OECD, Bloomberg, S&P Global Rating, 2020/3

5大產業聚落，面對疫情有相似的消費走向



疫情影響消費情境的可能機率

- 疫情或許重塑消費行為，專業經理人們認為「消費市場各種情境」可能的發生同意%...



傾向透過網路
操作金融相關交易



增加在網路購買
生鮮食品



習慣在網路上
購買家庭日用品



傾向透過
外送平台訂購餐點



減少出國
安排與規劃



抗菌產品成為
日常生活必備品



知名品牌
更具有影響力



增加日常生活用品
安全庫存量

上述資料為「淨同意比例」=正向同意比例-負向同意比例，以凸顯該情境的未來呈現可能性力道
資料來源：東方線上消費者研究集團 / 專業經理人調查，n=551，2019新型冠狀病毒市場衝擊 (專業經理人面)

KPMG Insight 因應疫情影響，企業可採取之相關措施

立即因應行動方案

保護員工和客戶安全

- 運用人力資源專業知識來維護員工的身心健康，並重新評估組織範圍內的旅行政策。
- 在員工穩定、經營環境、社會與經濟等方面進行企業社會責任實踐
- 為受影響的員工制定備援計劃，包括遠距工作安排或其它彈性資源的應急方案。
- 運用內外部技術來協助企業運作並替員工配備必要工具，使其在受影響區域中的人員可能無縫進行遠距工作。

評估供應商風險

- 建立危機應對團隊，並維護企業股東的信心，並通知受影響的客戶。
- 建立供應鏈評估和風險管理的團隊，根據需求、成本、服務和可行方案的情境進行分析評估，以重新配置全球和區域供應鏈流程。
- 將關鍵原料與營收進行核對，確認對營收影響最大的零組件和原料。
- 檢視與主要客戶及供應商合約，了解在供應短缺時可能應負責任。
- 透過確認目前和緩衝庫存的風險差距，以建立管理層透明和短期行動計劃。

做好營運資金與計畫管理

- 修改現金流、營運資金、庫存和供需預測。
- 瞭解股市進一步下挫與資金取得受限如何影響金融穩定。
- 檢視整體組織內的銷售和營運計劃，及整合企業業務計劃，以協助確保業務的戰略和策略計劃在所有事業處之間保持同步。
- 擁有豐富數據環境的企業可以運用高階模擬技術來幫助確定當前危機中最佳的性能折衷，從而利用採購、運營和研發方面的能力。

KPMG Insight 因應疫情影響，企業可採取之相關措施

中長期因應行動方案

制定情境計畫 (Scenario planning)

- 在制定和實施強化風險管理時，企業必須謹慎採取行動，並注重能提供先機的情境分析計畫。
- 情境分析可幫助企業看到更多前景，並做出有效決策:如持有多少庫存及存放在哪?如何平衡庫存成本與無法滿足客戶的成本?以即時庫存、客戶需求和供應商能力為評估基礎，可迅速模擬並確認矛盾與目標之間的「最佳點」。
- 透過分析過去事件與假設未來威脅，企業能夠確定重大危機中的戰略，並可以判斷當前內部風險能力不足的情況。

供應商風險管理

- 即時供應商資料，如系統性能分類警示、地緣風險事件等，有助於營運管理與解決問題。
- 當出現警示時，企業應採取積極措施，透過接觸受影響區域之外的供應商來發現其它曝險情況，以辨別供應鏈中的上游供應依存關係。
- 企業可從平衡供需受益，並與股東以及關M鍵edia供應商合作，以合約形式訂定基本物流成本和必要的緩衝庫存，進而減少危機時突然的價格上漲。

端對端供應鏈管理

- 隨著轉移至電商平台情況增加，企業必須確保供應鏈及物流能滿足需
- 透過端對端供應鏈管理，可提高建模及預測消費者行為的能力，尤其在不確定和遭阻擾的情況下

KPMG Insight 因應疫情影響，企業可採取之相關措施

中長期因應行動方案

微型供應鏈

- 微型供應鏈是有限且敏捷的微型營運模式，運用高度靈活的分散性以及更改生產和配送的能力，能在短時間內大量生產並推出新產品。
- 透過分散式方法(decentralized approach)，微型供應鏈可在盡可能接近客戶的地方創造價值，進而協助處於危機時期的企業，能從中受益。
- 除疫情之外，微型供應鏈也不易受大環境影響，如利率、匯率、稅制改變、貿易關稅等

協作供應商關係

- 對於以中國為營運重點的企業而言，因現行供應鏈生態圈的規模與品質，而完全退出中國市場是不切實際的作法。
- 可利用此次危機，作為與更多關鍵供應商，建立互信及透明度的時間與投資平台。

科技升級 & 網路安全計畫

- 依據目前所處以科技驅動商業的環境，企業應重新思考在辦公室、各地區和全球內，員工之間及員工與客戶間的合作方式。
- 透過內部科技投資，企業可以指導員工如何有效運用強大的執行工具如雲端辦公室、零接觸模式等。此將確保不僅危機時團隊可良好進行遠距工作，且隨著業務環境不斷變化，員工能適應並繼續為客戶提供服務。
- 世衛組織(WHO)知曉有電子郵件試圖利用2019年新冠肺炎緊急狀態的情形，此為網路釣魚郵件，而透過此方法，網路犯罪份子可安裝惡意軟體或竊取敏感資訊。

COVID-19's burden of success

- Similarities between SARS-CoV-1 and SARS-CoV-2, including high genetic relatedness
- Using symptom-based case detection (fever, cough, and shortness of breath) and subsequent testing to guide isolation and quarantine.
- Conventional views on developing herd immunity

Challenges

- 1. Pre-symptomatic and/or asymptomatic transmission**
- 2. Antibody-mediated immune/infection enhancement**
- 3. Reinfection**
- 4. Duration of immunity**

SIX DOMAINS OF PREPAREDNESS

The **Public Health Emergency Preparedness Program** works to advance six main areas of preparedness so state and local public health systems are better prepared for emergencies that impact the public's health.



Community Resilience:

Preparing for and recovering from emergencies



Incident management:

Coordinating an effective response



Information Management:

Making sure people have information to take action



Countermeasures and Mitigation:

Getting medicines and supplies where they are needed



Surge Management:

Expanding medical services to handle large events



Biosurveillance:

Investigating and identifying health threats



Surveillance

監測

- Tracing and tracking
- Big Data + AI
- New parameters /paradigm

Preparedness
整備

Recovery

復原

Response

應變



Emergency preparedness

COMMUNITY RESILIENCE



Community well-being promotion

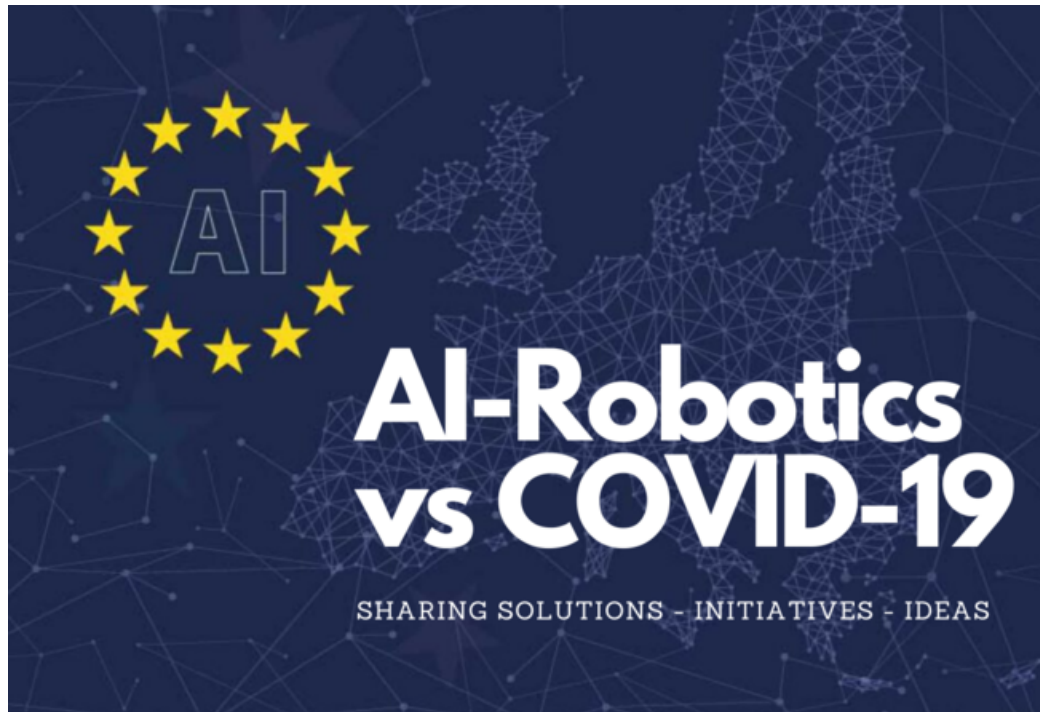
- Inequity & inequality
- Adaptation of new norm/system
- Security & privacy

- New Dx, Tx, and Px
- Quarantine & monitoring
- Spread/sharing of fact/info

Global Network Resiliency Platform

Best practices to improve COVID-19 responses

#REG4COVID



AI

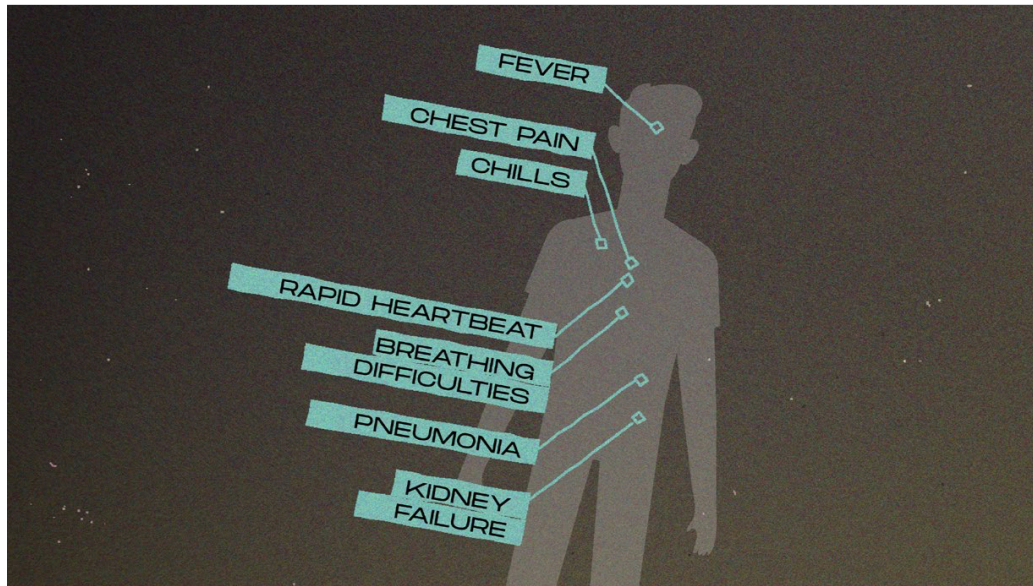
AI-Robotics vs COVID-19

SHARING SOLUTIONS - INITIATIVES - IDEAS

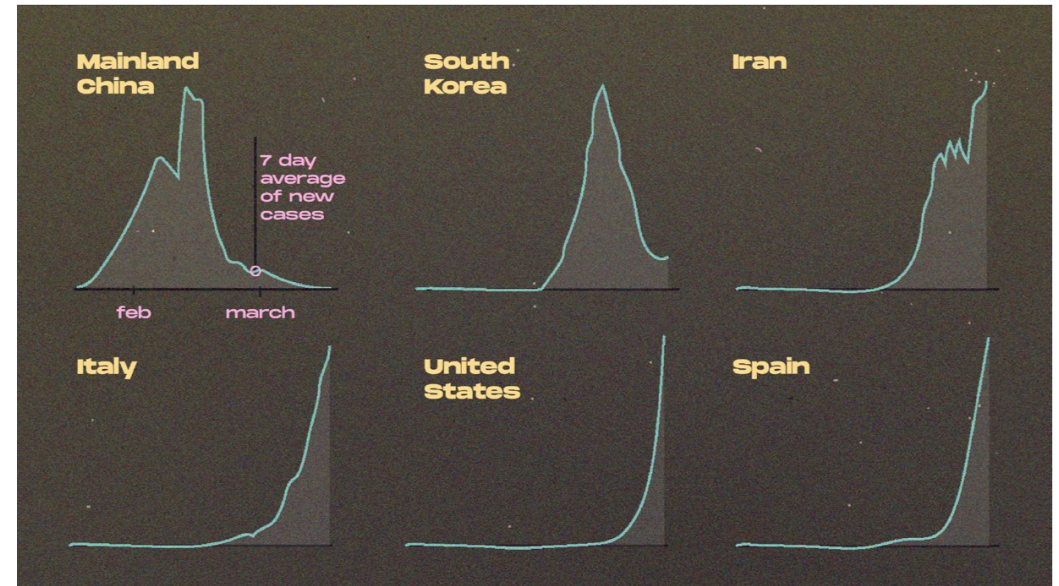
The graphic features a dark blue background with a network of white dots and lines. On the left, there is a circular arrangement of yellow stars, similar to the European Union flag, with the letters 'AI' in the center. The main text is in large, bold, white font.



A.I. to detect the spread of an epidemic



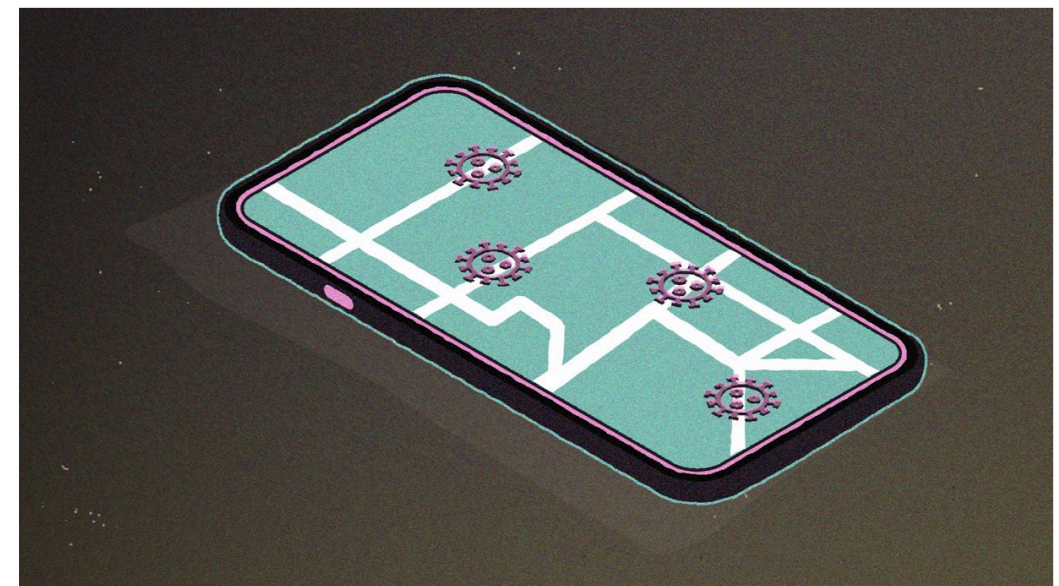
Charting viral territories with interactive maps



Artificial intelligence for extra intelligence



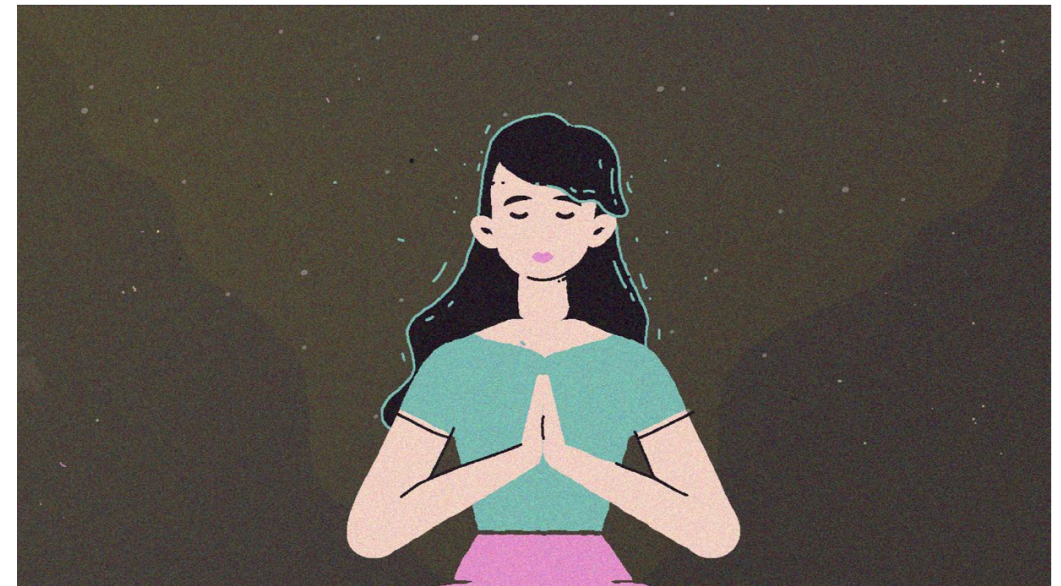
Contact tracing via phone tracking



Remote healthcare and chats with chatbots



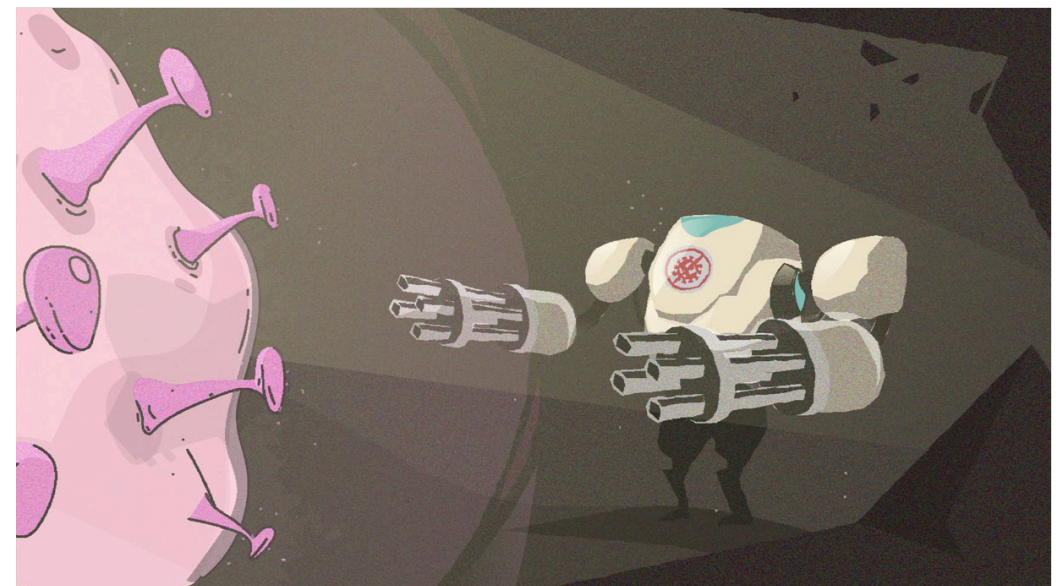
Digital health for mental health



Wearables to the rescue



Robots in the frontline



一個覺醒的社會，是一個互相成全的社會，具有極強的生命力。

國立陽明大學數位醫學中心
腦科學研究所
台北榮民總醫院
楊智傑醫師

新冠肺炎 從臨床到科技防疫

2020.04.29





Total Confirmed

3,115,977

Confirmed Cases by Country/Region/Sovereignty

- 1,012,517 US
- 232,128 Spain
- 201,505 Italy
- 169,053 France
- 162,350 United Kingdom
- 159,912 Germany
- 114,653 Turkey
- 93,558 Russia
- 92,584 Iran
- 83,938 China
- 72,899 Brazil
- 51,150 Canada
- 47,334 Belgium

Admin0 Admin1 Admin2

Last Updated at (M/D/YYYY)

4/29/2020, 9:32:25 AM



[Cumulative Confirmed Cases](#)
[Active Cases](#)
[Incidence Rate](#)
[Case-Fatality Ratio](#)
[Testing Rate](#)
[Hospitalization Rate](#)

185

countries/regions

[Lancet Inf Dis Article: Here.](#) Mobile Version: [Here.](#)
 Lead by JHU CSSE. Automation Support: [Esri Living Atlas team](#) and [JHU APL.](#) Contact [US.](#) [FAQ.](#)

Data sources: WHO, CDC, ECDC, NHC, DXY, 1point3acres, Worldometers.info, BNO, the COVID Tracking Project (testing and

Total Deaths

217,132

27,359 deaths Italy

23,822 deaths Spain

23,660 deaths France

21,678 deaths United Kingdom

17,682 deaths New York City New York US

7,331 deaths Belgium

4,214 deaths

Deaths

Recovered

Total Test Results in US

5,795,728

844,994 tested New York US

577,608 tested California US

366,875 tested Florida US

300,384 tested Texas US

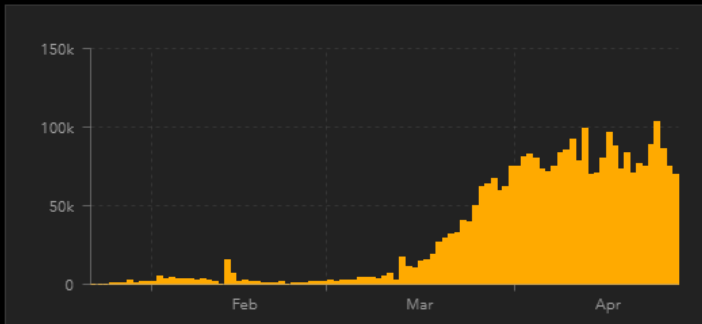
254,500 tested Massachusetts US

242,189 tested Illinois US

234,359 tested

US total tests

US Hospitalization

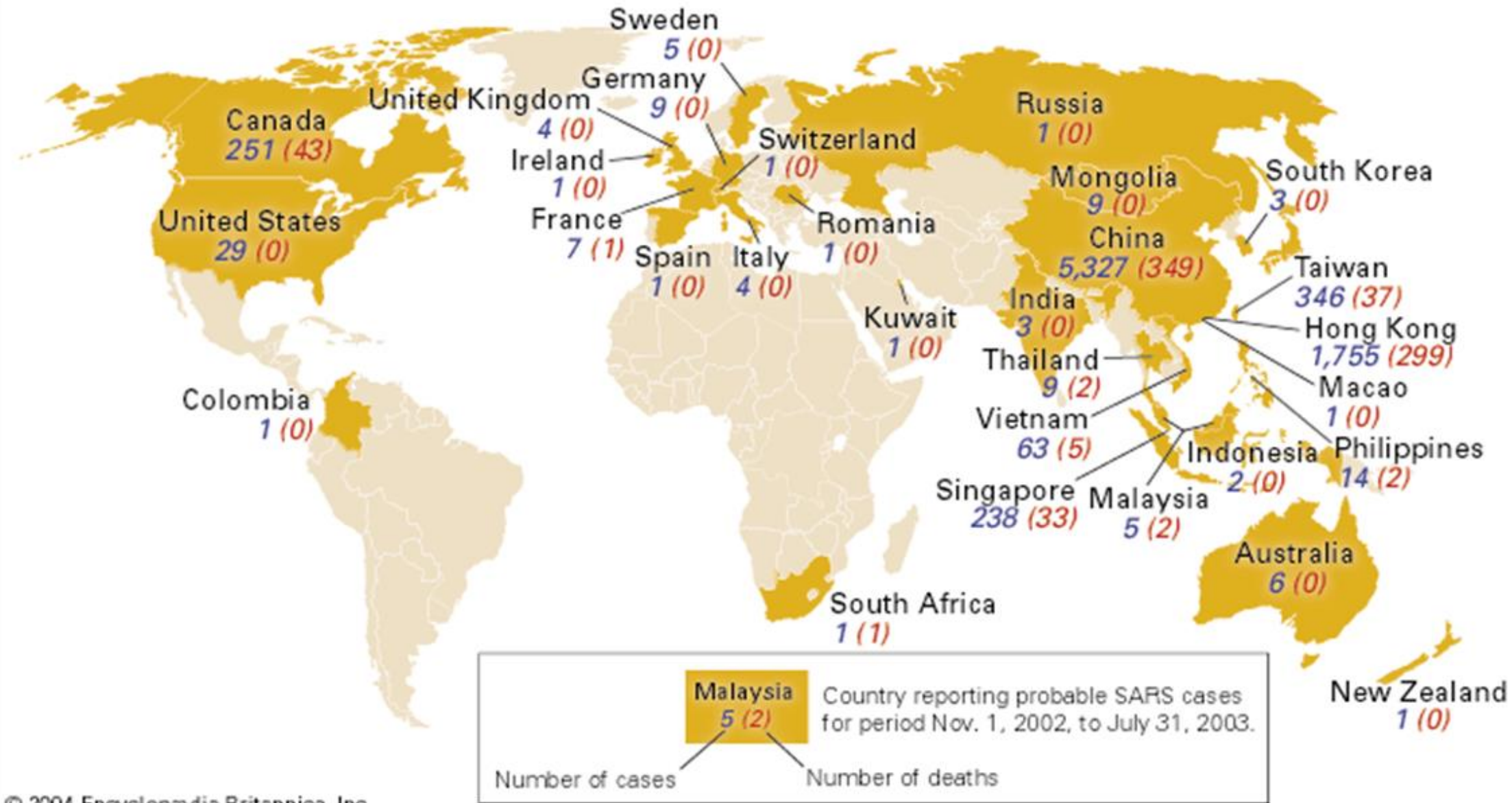


Confirmed

Logarithmic

Daily Cases

SARS EPIDEMIC, 2002–2003

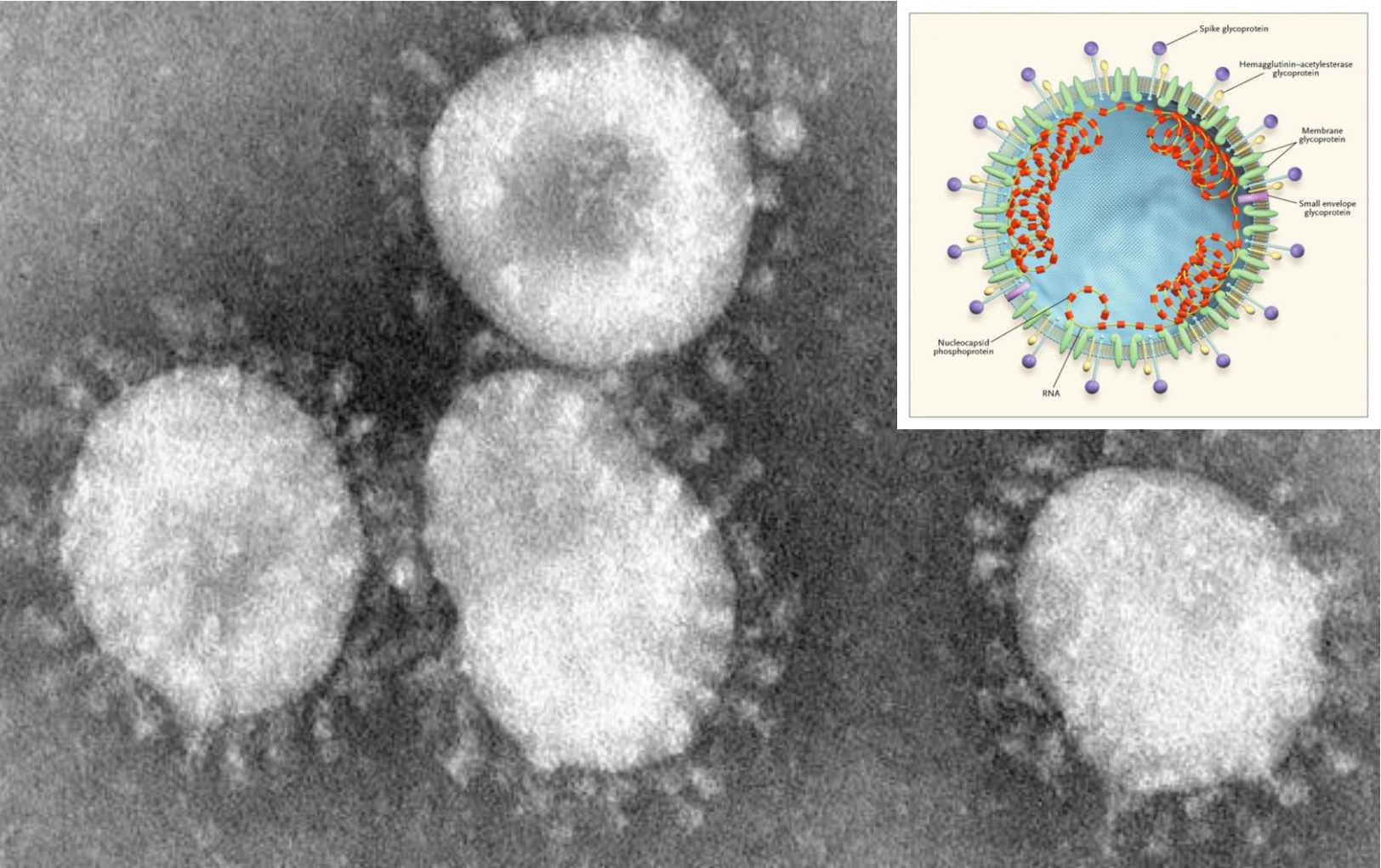
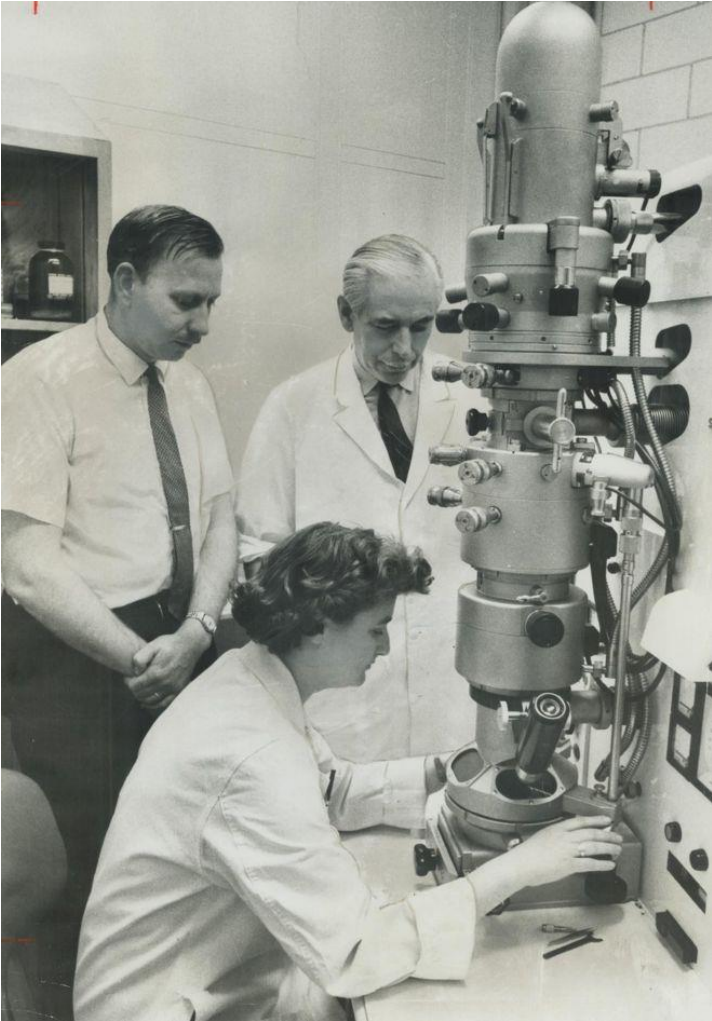




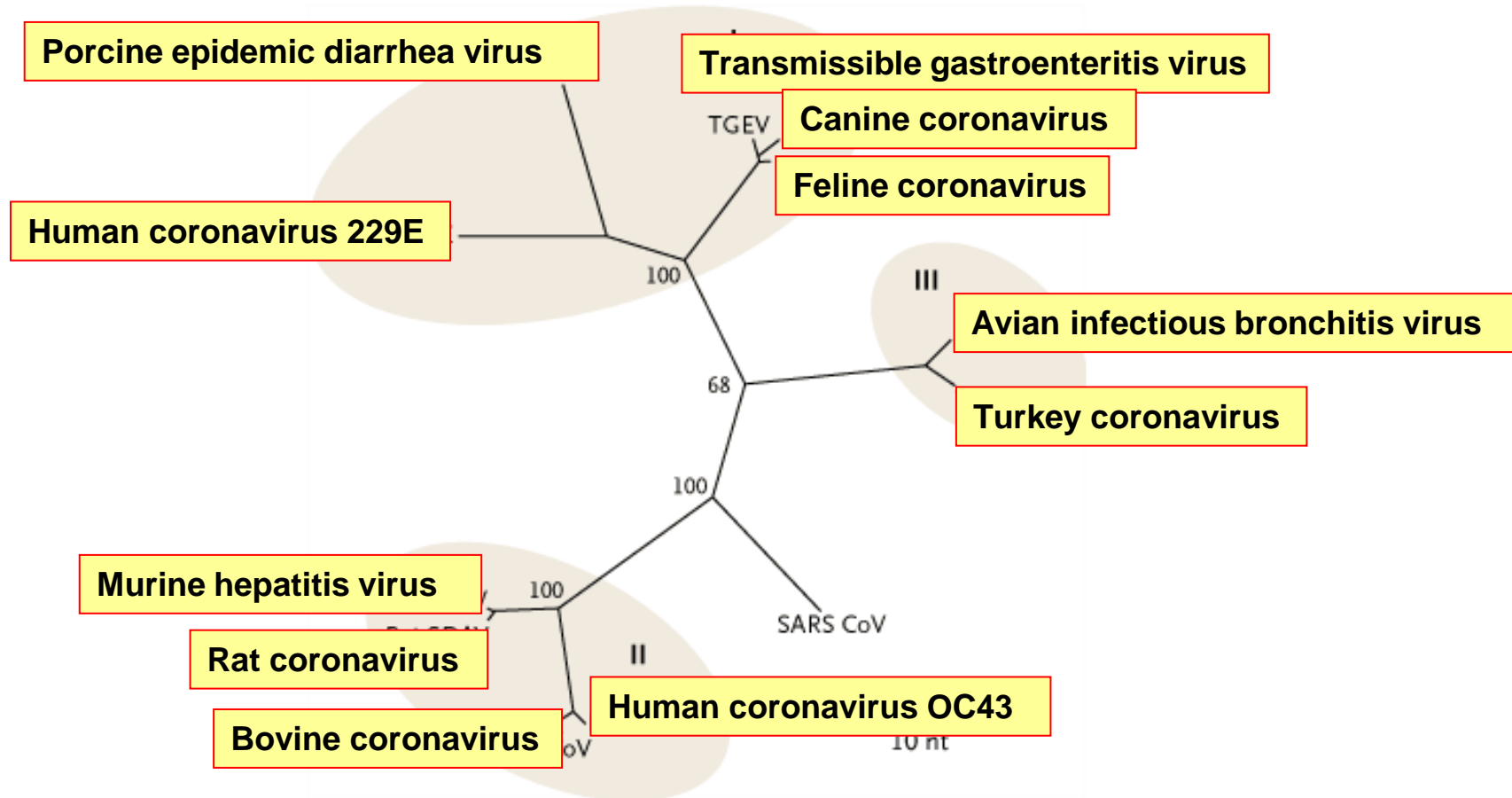
Middle East Respiratory Syndrome

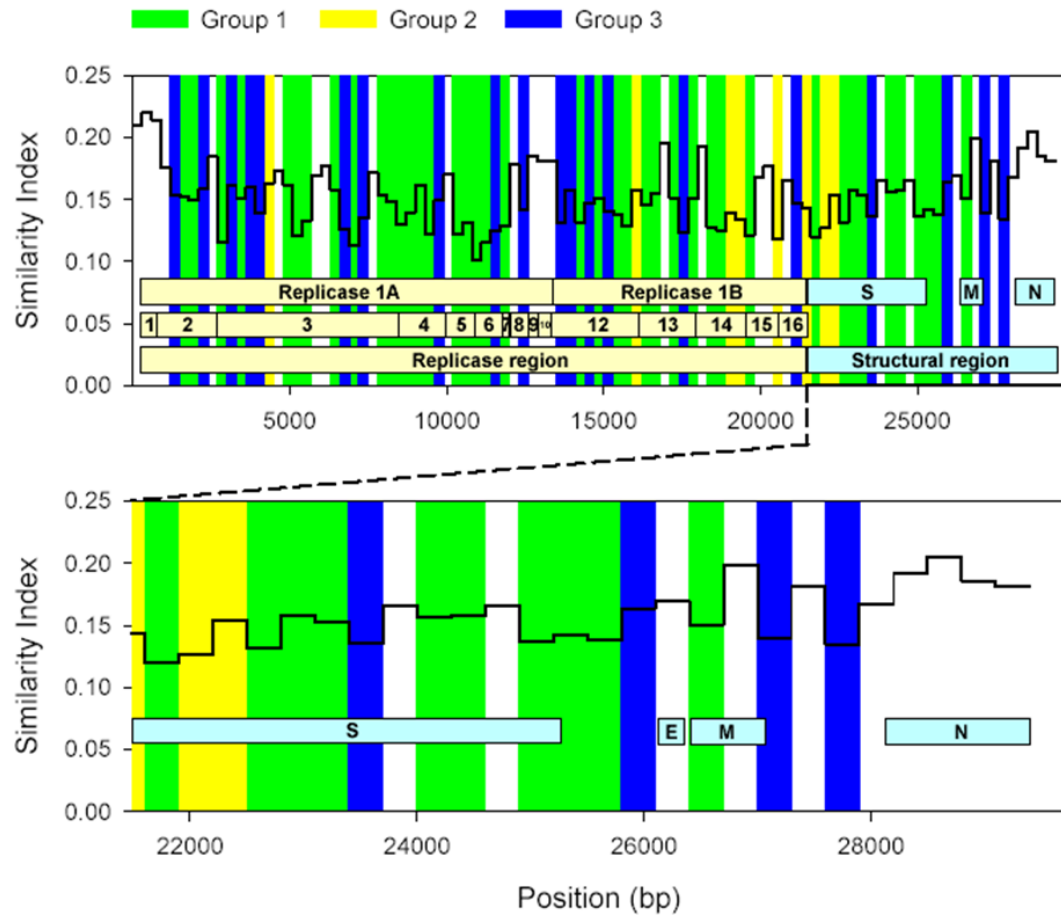
2012-Present

Coronavirus



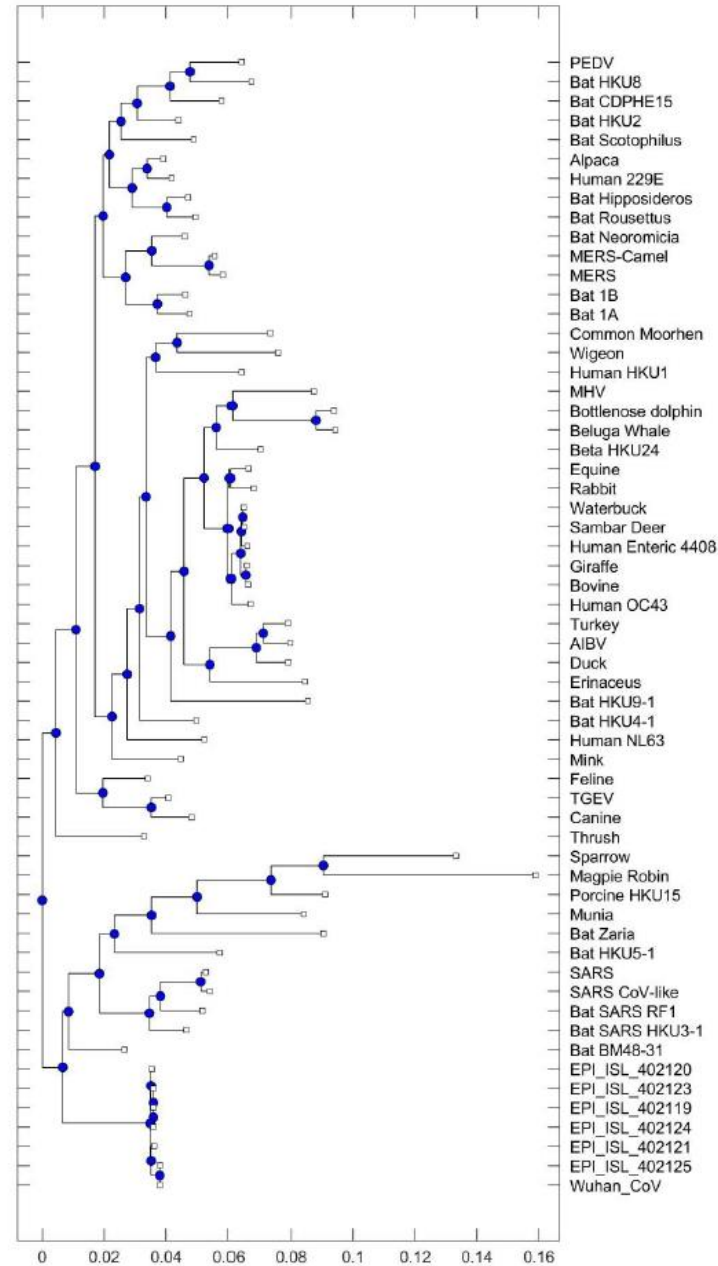
Coronavirus Family



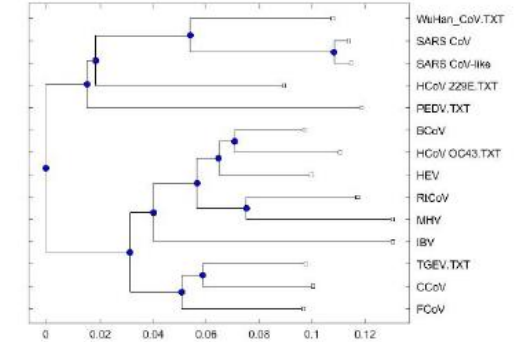


Yang AC et al. Journal of Computational Biology
12(8):1103-16 (2005).

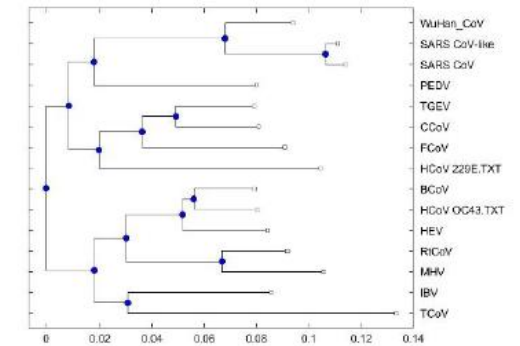
A Complete Genome



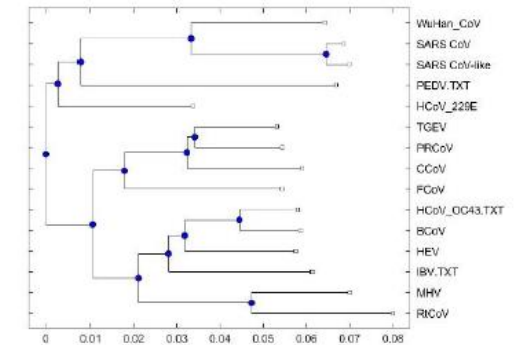
B Membrane Protein

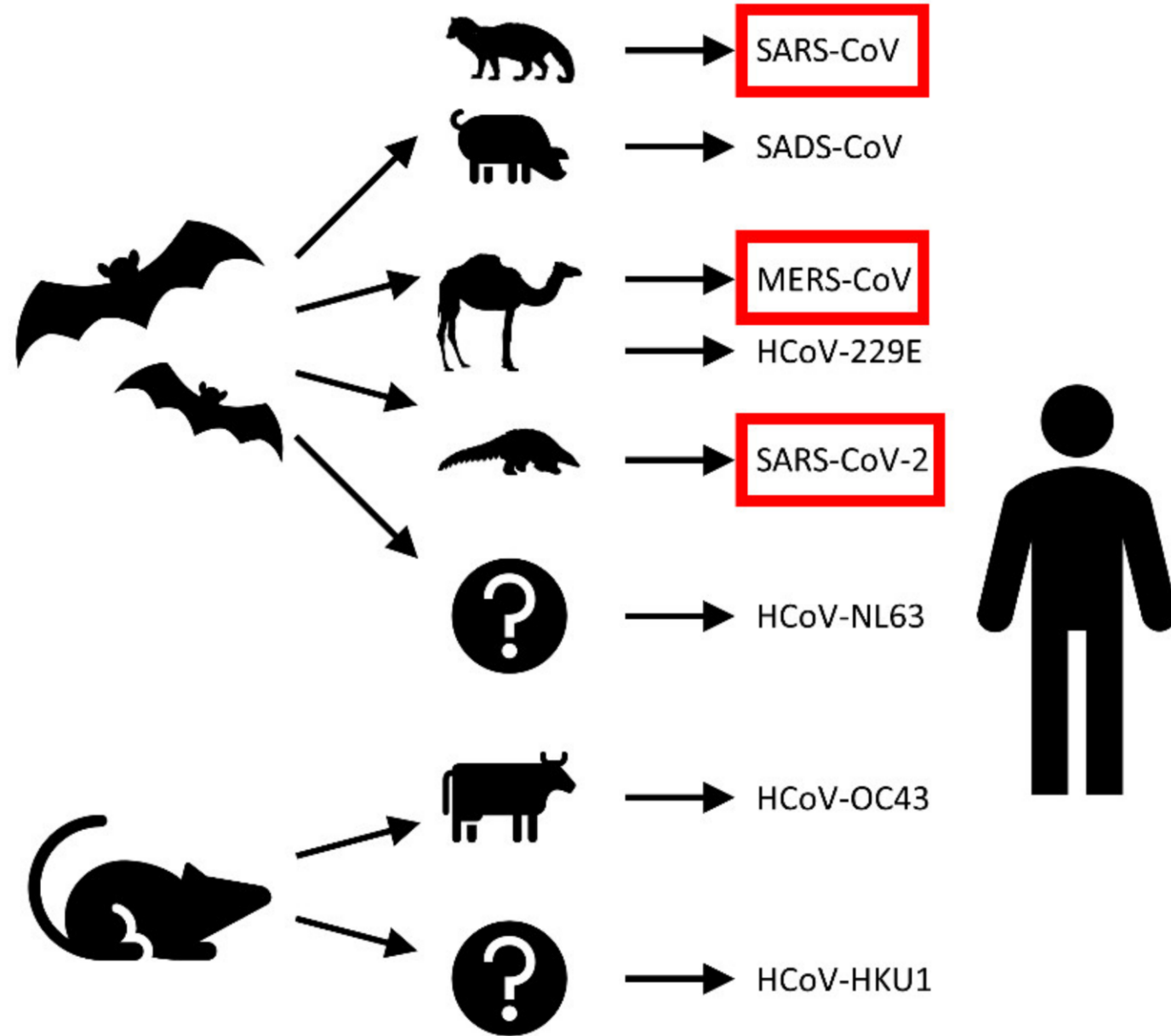
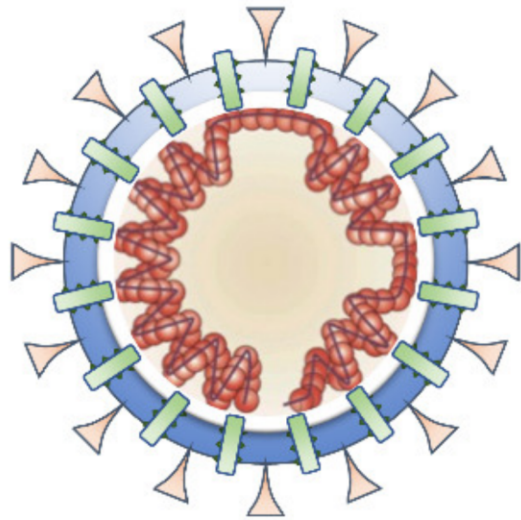


C Nucleocapsid Protein

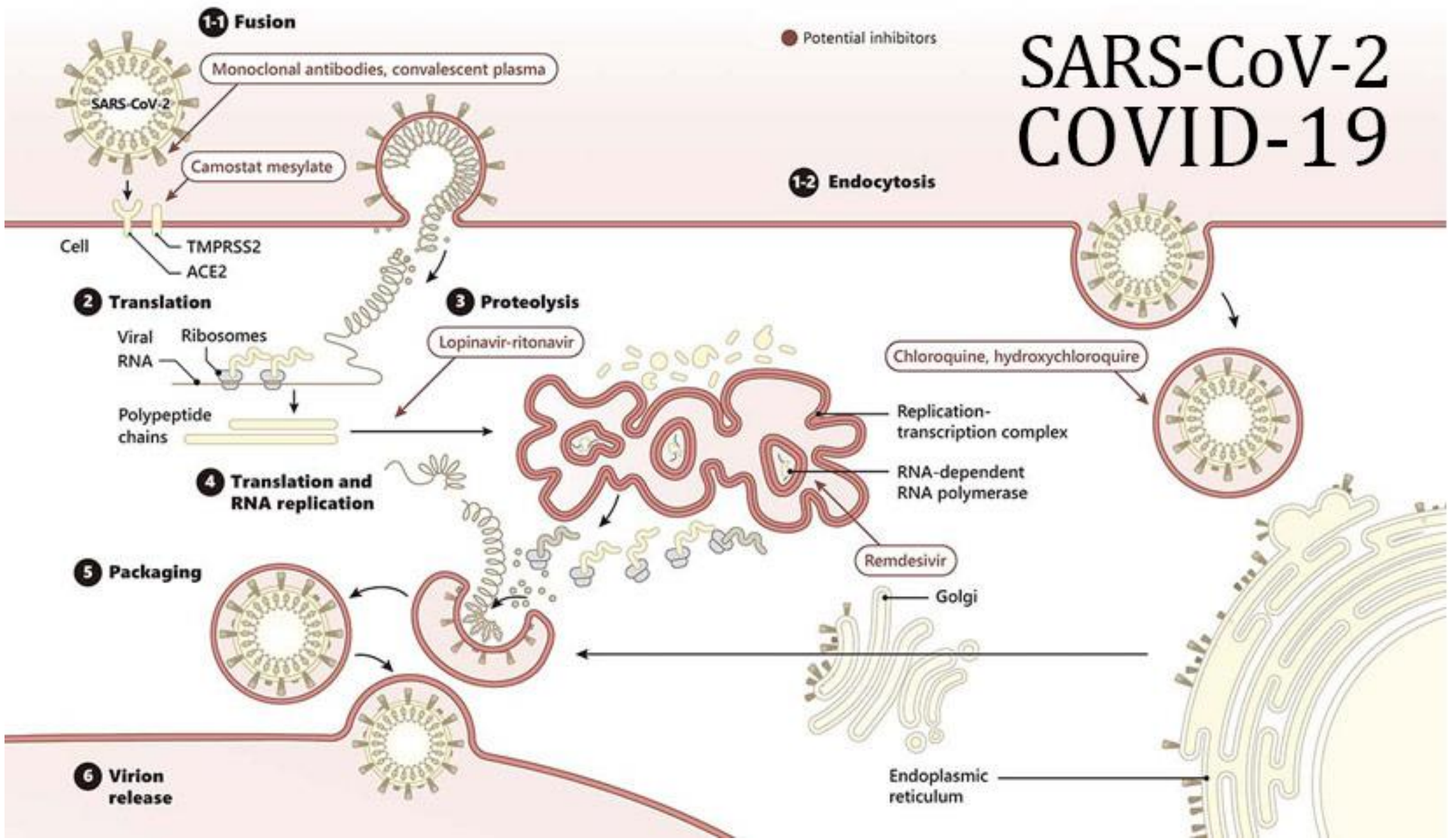


D Surface Protein





SARS-CoV-2 COVID-19



COVID-19 TEST	Antigen-based immunoassay	Antibody-based immunoassay	Real-time PCR
Analyte	Antigen	Antibody	Gene
Detectable period	From a few days after onset of symptoms	From 7-28 days after onset of symptoms	All of stages
Sensitivity	50-70% (expected)*	More than 95%	More than 95%
Specificity	50-70%*	Not clear*	More than 95%
Detection of asymptomatic infection	Depending on the amount of viral antigen	At the later stage of infection	From the early stage of infection
Status of use	Only some regions	Only some regions	All of countries (recommended by WHO & CDC)

*Based on conventional antigen-based immunoassay and affected by seasonal coronaviruses

Reference: Oral presentation from online forum of KOFST(The Korean Federation of Science and Technology Societies)

FATALITY RATE

For every 50 people that were infected,

MERS killed **17 people**



SARS killed **five people**



and the new coronavirus killed **one**



VELOCITY OF THE VIRUS

For the first 1,000 people to be infected,
MERS took **903 days or 2.5 years**



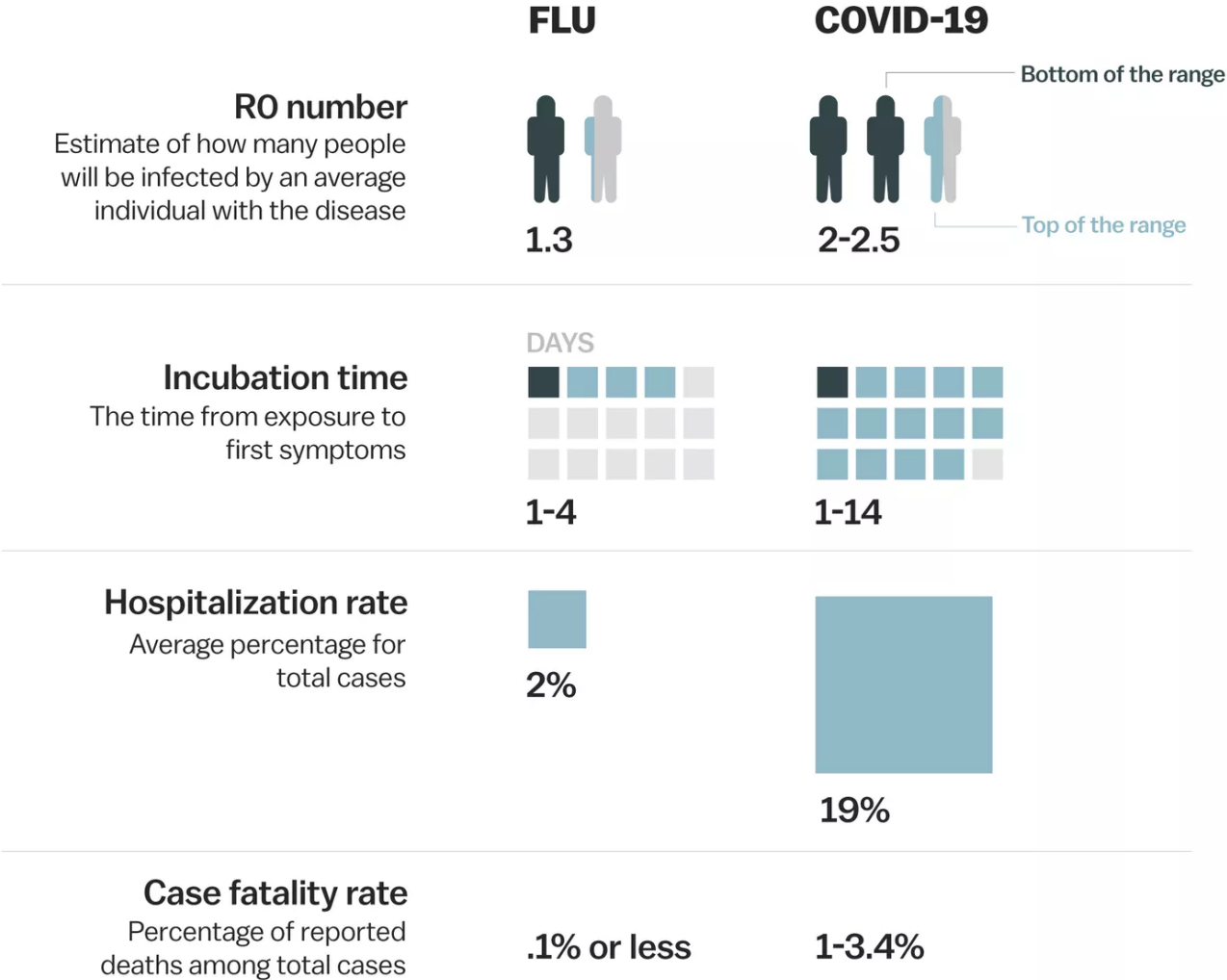
SARS took **130 days**



and the new coronavirus took **48 days**



How seasonal flu and Covid-19 compare



Sources: CDC, WHO, NCBI



COVID-19 symptoms compared to common conditions

SYMPTOM	COVID-19	COMMON COLD	FLU	ALLERGIES
Fever	Common	Rare	Common	Sometimes
Dry cough	Common	Mild	Common	Sometimes
Shortness of breath	Common	No	No	Common
Headaches	Sometimes	Rare	Common	Sometimes
Aches and pains	Sometimes	Common	Common	No
Sore throat	Sometimes	Common	Common	No



“

Find a 21st-century solution
to a 21st-century problem.

”

Intelligence Technology Applications



01 Detection

02 Quarantine

03 Treatment

04 Health Information



A hand is pointing at a chest X-ray displayed on a tablet. The background shows a stethoscope and a keyboard, suggesting a medical or clinical setting. The text '01 Detection' is overlaid on the image.

01 Detection





Covid-19: automatic detection from X-ray images utilizing transfer learning with convolutional neural networks

Ioannis D. Apostolopoulos¹ · Tzani A. Mpesiana²

Received: 25 March 2020 / Accepted: 30 March 2020

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Network	Accuracy 2-class (%)	Accuracy 3-class (%)	Sensitivity (%)	Specificity (%)
VGG19 [10]	98.75	93.48	92.85	98.75
MobileNet v2 [11]	97.40	92.85	99.10	97.09
Inception [12]	86.13	92.85	12.94	99.70*
Xception [13]	85.57	92.85	0.08	99.99*
Inception ResNet v2 [12]	84.38	92.85	0.01	99.83*

Confusion matrix of 2 best CNNs

Model	Predicted labels	Actual labels		
		Actual Covid-19	Actual pneumonia	Actual normal
MobileNet v2 [11]	Predicted Covid-19	222	8	27
	Predicted pneumonia	2	495	27
	Predicted normal	0	1	646
VGG19 [10]	Predicted Covid-19	222	8	7
	Predicted pneumonia	3	460	26
	Predicted normal	13	36	667

CNN	TP	FP	TN	FN
VGG19	208	15	1189	16
MobileNet v2	222	35	1169	2

Bold values represent the optimal observed values

Diagnosing COVID-19 Pneumonia from X-Ray and CT Images using Deep Learning and Transfer Learning Algorithms

Halgurd S. Maghdid, Aras T. Asaad, Kayhan Zrar Ghafoor, Ali Safaa Sadiq, Muhammad Khurram Khan

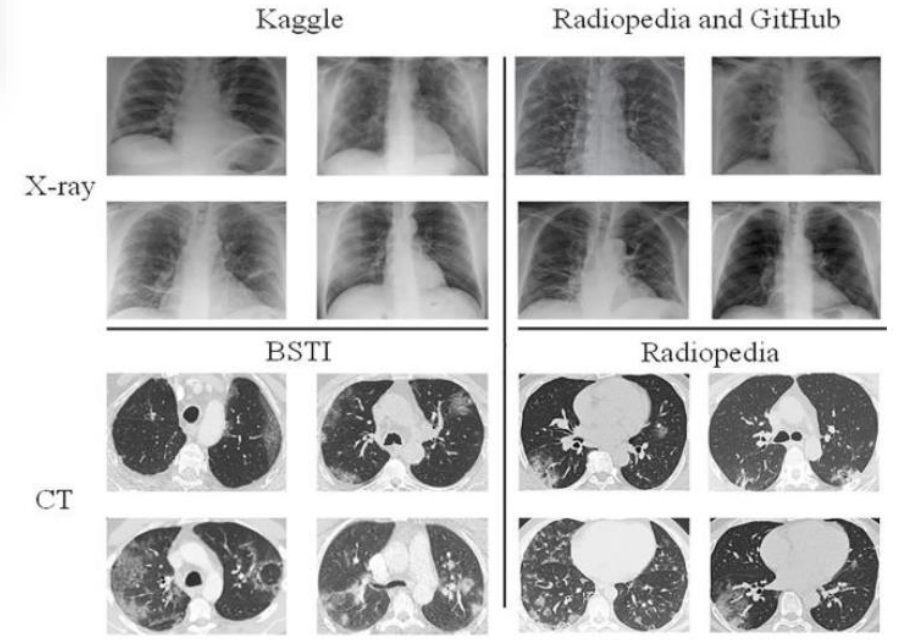
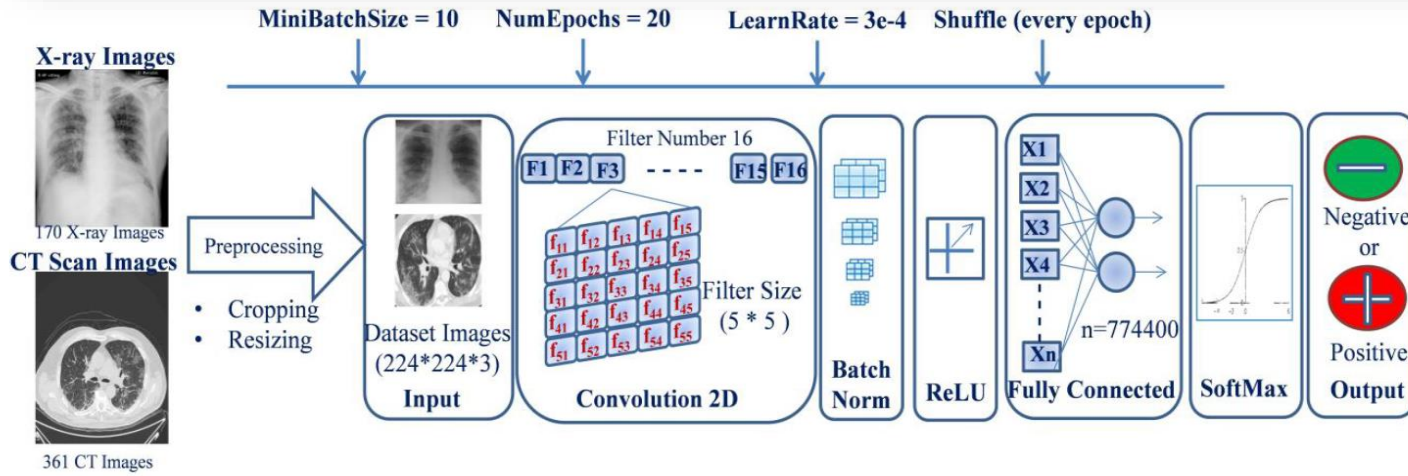
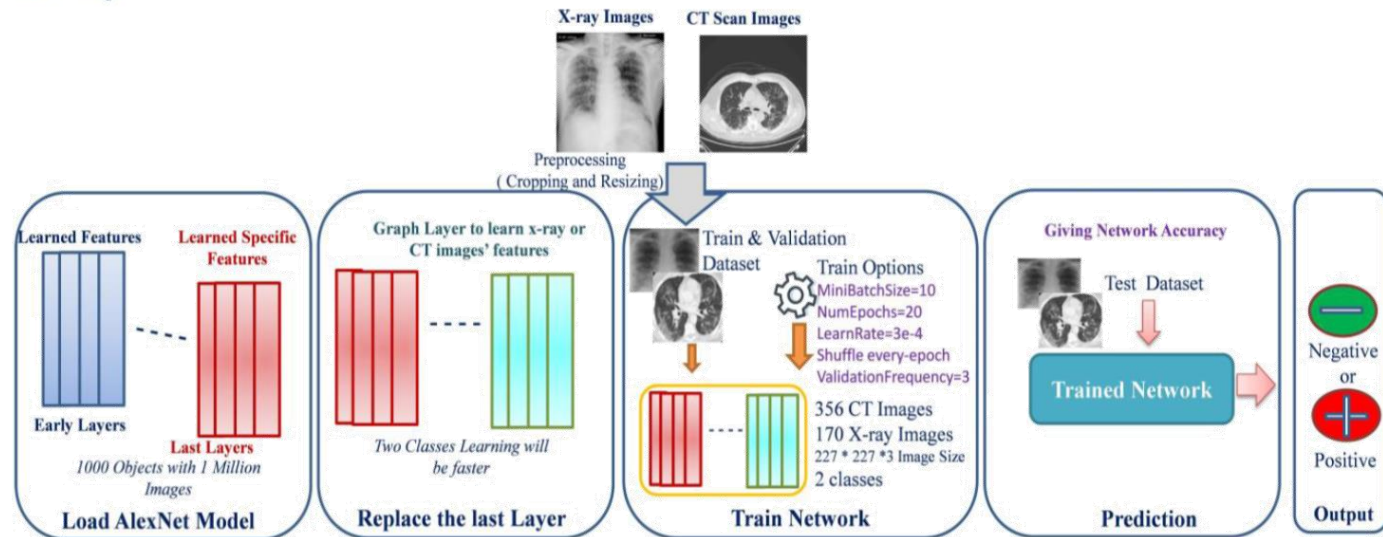


Fig. 5. CT scan and X-ray images from different sources.



Method	Image type	Sensitivity	Specificity	Acc
Our CNN	X-ray	100	88	94
	CT	90	100	94.1
AlexNet	X-ray	100	96	98
	CT	72	100	82

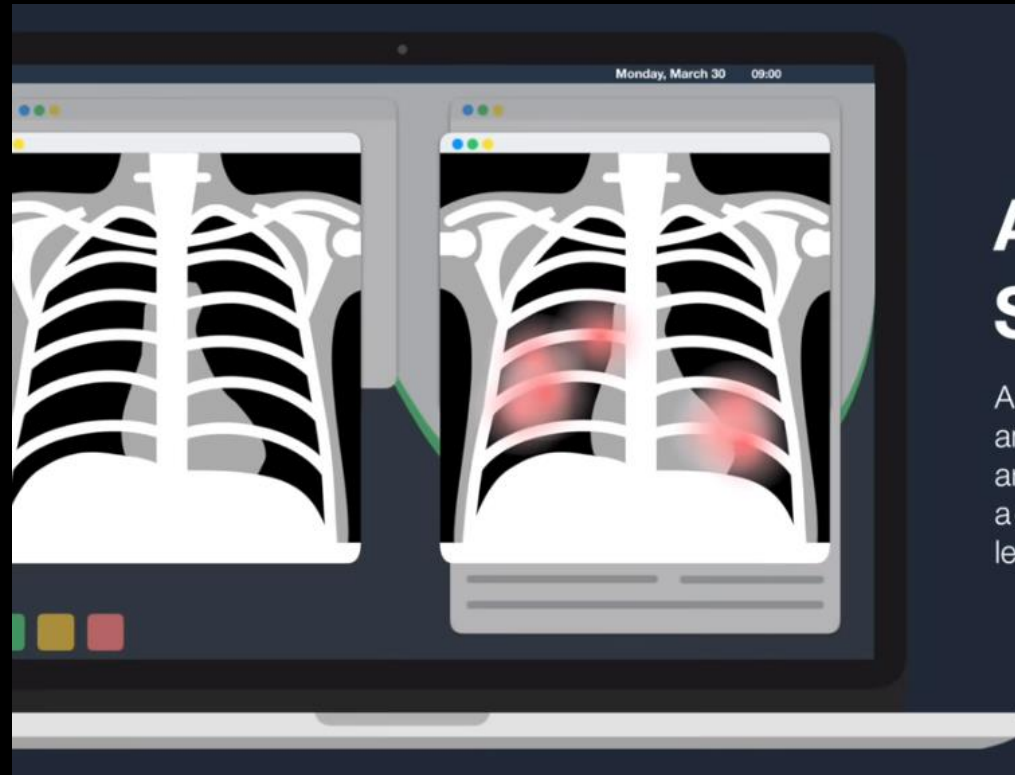
MEDCHEX

An e-Alert system for automatically detecting pneumonia from chest x-rays.

They created a Unet++ based machine learning model to automatically detect the presence of pneumonia using the labelled dataset.

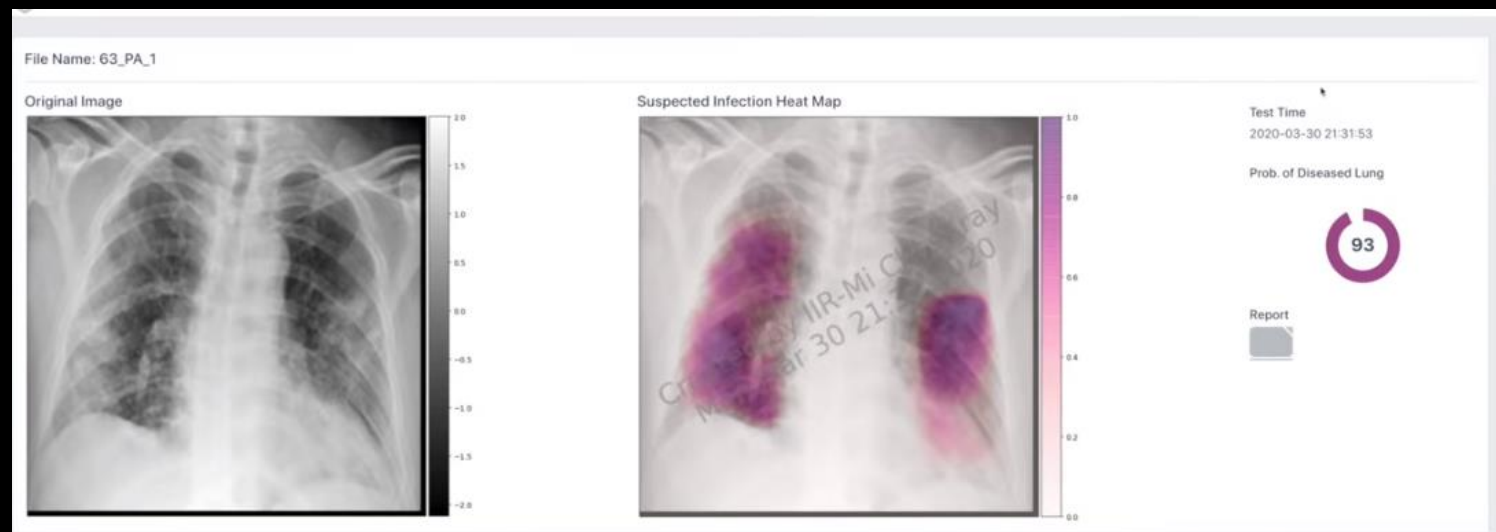
The system has already been tested with and adopted by doctors at the National Cheng Kung University Hospital. It has reduced testing time, and has increased efficiency.

The system achieved 92% accuracy to detect pneumonia based on 1400 images



Auto Segmentation

Automatic detection of pneumonia and labeling of the corresponding area in the diseased lung are accomplished with a deep learning approach.

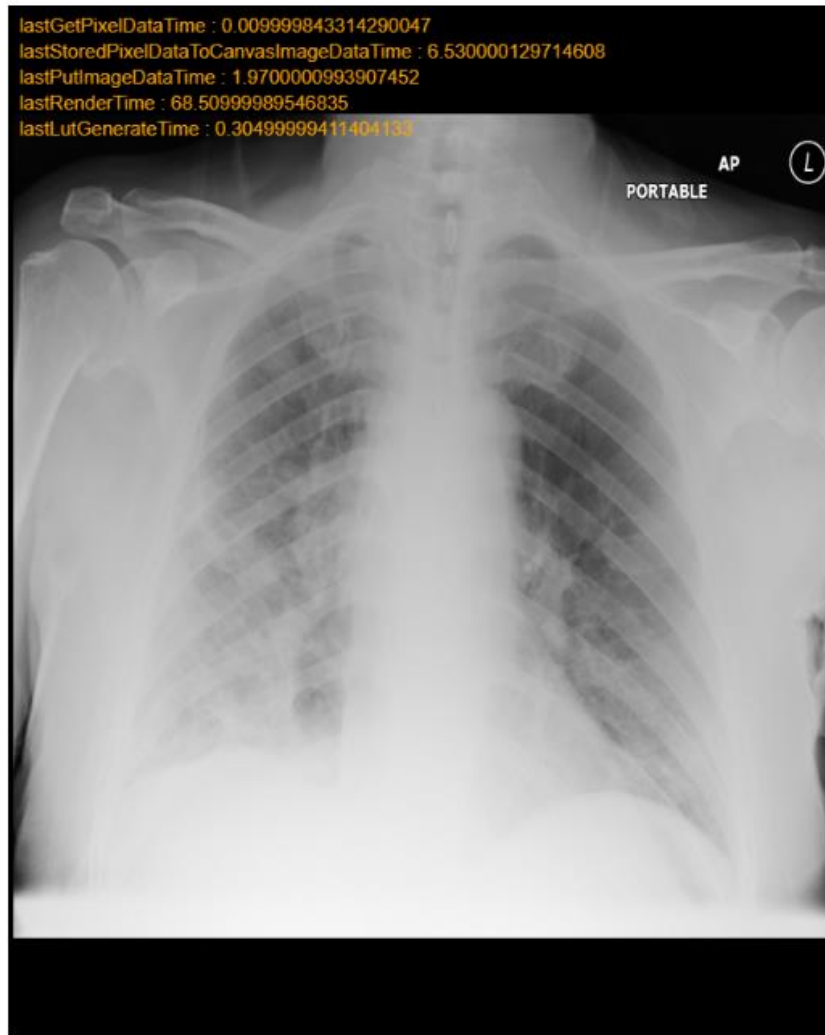


Chest X-Ray AI Assessment

Click "Choose File" and select a Chest X-Ray image on your local file system or drag and drop a Chest X-Ray image.

選擇檔案

選擇檔案



AI Assessment Results (Probability, %)

Filename:0e91afec-c246-450b-9f10-e07a75ae0086.dcm	
Atelectasis:	16.46%
Consolidation:	51.45%
Infiltration:	67.86%
Pneumothorax:	52.74%
Edema:	50.33%
Emphysema:	50.70%
Fibrosis:	50.52%
Effusion:	50.55%
Pneumonia:	50.20%
Pleural thickening:	51.85%
Cardiomegaly:	12.62%
Nodule:	55.53%
Mass:	50.49%
Hernia:	21.77%

Tentative Assessment:

Lungs: Pneumonia is suspected.
Presence of lung fibrosis.

Pleura: Pleural effusion is suspected.

Heart: Heart size is within normal limit.

Alibaba's AI

Its new AI system can detect coronavirus in CT scans of patients' chests with 96% accuracy against viral pneumonia cases.

The system was trained on images and data from 5,000 confirmed coronavirus cases.

Their new algorithm cuts down the whole process of recognition to a record 20 seconds.

At least 100 healthcare facilities in the provinces of Hubei, Guangdong, and Anhui are currently employing Alibaba's AI.



inferVISION

Identify radiologic findings of COVID-19 in suspected patients.

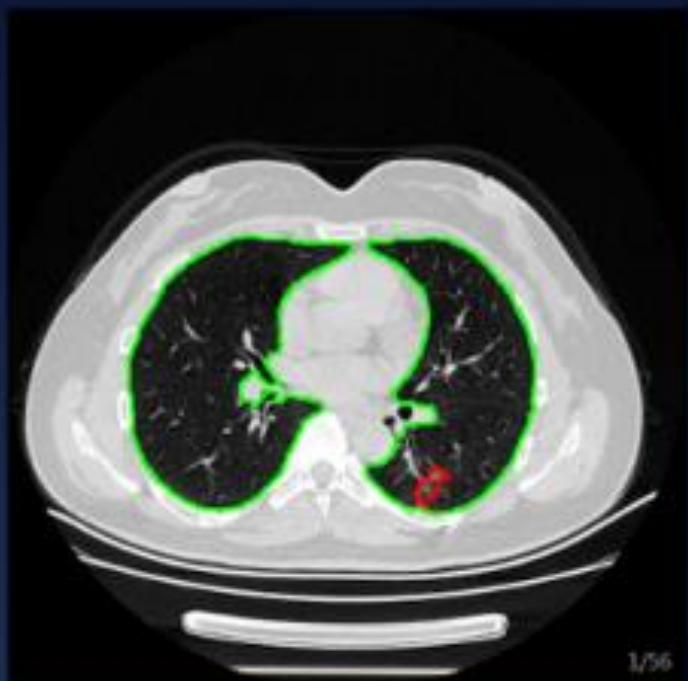
The screenshot displays the inferVISION software interface for a CT Lung scan. The central panel shows a cross-sectional CT image of the lungs with a red box highlighting a 'FOCUS_LESION' and a 'NODULE_ANALYSIS' box indicating a detection probability of 87.34%. The interface is divided into several functional areas:

- Top Left:** Logo for '推想科技 inferVISION'.
- Top Center:** 'CT Lung' header and patient information: '20181110', 'X/POS 926 /Z SLC 98 H', 'Lung Aug 7, 2018'.
- Left Panel:**
 - STUDY LIST:** A table with columns for 'Study', 'Date', 'Time', 'Modality', and 'Description'. It lists several studies, with the current one highlighted in red.
 - NODULAR DENSITY:** A histogram showing the distribution of nodular densities across the scan.
- Right Panel:**
 - AI_DETECTION:** A table listing detected nodules with columns for 'Slice', 'Type', 'Location', 'Size', and 'Volume'. The current slice (24) is highlighted in red.
 - STATE EVALUATION:** A series of progress bars for different image slices (IMAGE_001 to IMAGE_007).
 - TX_Score:** A score of '+16' and a note: 'Detected calcific nodule at slice 241-244/48-49. Density 985Hu, with max diameter of 4.22mm, volume 29.96mm³.' A 'REPORT' button is located at the bottom right.
- Bottom Panel:** A 'FUNCTION' bar with icons for various tools like zoom, pan, and windowing.

The software relies heavily on NVIDIA's Clara SDKs, which is NVIDIA's AI healthcare application framework for AI-powered Medical Imaging.

Baidu's PaddlePaddle + PaddleSeg

detection accuracy of 92%
recall rate of 97% on test data sets



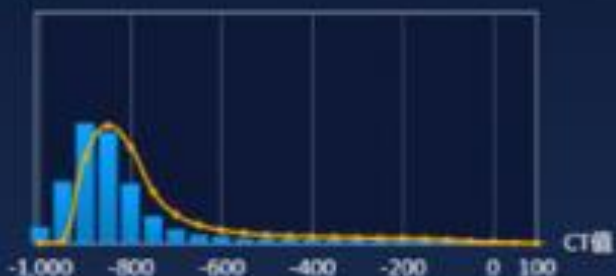
上传分析：压缩包格式为zip，大小不超过100M

导入DICOM文件压缩包

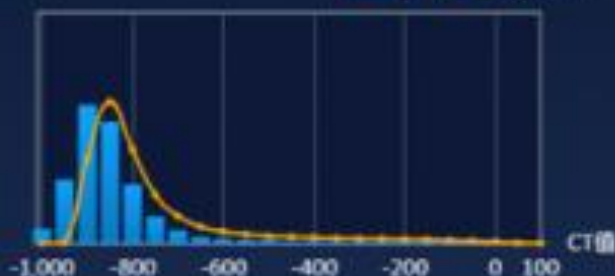
分析结果

双肺密度分析(直方图)

左肺



右肺



疑似病灶分析

	总病灶数 (个)	病灶总体积 (mm ³)	病灶负担 (%)
左肺	1	3031150.00	5.06%
右肺	0	0.00	0.00%
全肺	1	3031150.00	2.28%

AI分析结果 内容仅供医生参考 不可独立作为诊疗结论

对所上传的4张CT影像的智能分析：

1. 左肺有1个疑似肺炎病灶，病灶总体积3031150.00mm³，左肺的病灶负担为5.06%
2. 右肺有0个疑似肺炎病灶，病灶总体积0.00mm³，右肺的病灶负担为0.00%
3. 全肺总有1个疑似肺炎病灶，病灶总体积3031150.00mm³，全肺的病灶负担为2.28%

医生建议

0/100

Radiologic Findings in SARS-CoV-2

Variable	All Patients (N=1099)	Disease Severity		Presence of Composite Primary End Point	
		Nonsevere (N=926)	Severe (N=173)	Yes (N=67)	No (N=1032)
Radiologic findings					
Abnormalities on chest radiograph — no./total no. (%)	162/274 (59.1)	116/214 (54.2)	46/60 (76.7)	30/39 (76.9)	132/235 (56.2)
Ground-glass opacity	55/274 (20.1)	37/214 (17.3)	18/60 (30.0)	9/39 (23.1)	46/235 (19.6)
Local patchy shadowing	77/274 (28.1)	56/214 (26.2)	21/60 (35.0)	13/39 (33.3)	64/235 (27.2)
Bilateral patchy shadowing	100/274 (36.5)	65/214 (30.4)	35/60 (58.3)	27/39 (69.2)	73/235 (31.1)
Interstitial abnormalities	12/274 (4.4)	7/214 (3.3)	5/60 (8.3)	6/39 (15.4)	6/235 (2.6)
Abnormalities on chest CT — no./total no. (%)	840/975 (86.2)	682/808 (84.4)	158/167 (94.6)	50/57 (87.7)	790/918 (86.1)
Ground-glass opacity	550/975 (56.4)	449/808 (55.6)	101/167 (60.5)	30/57 (52.6)	520/918 (56.6)
Local patchy shadowing	409/975 (41.9)	317/808 (39.2)	92/167 (55.1)	22/57 (38.6)	387/918 (42.2)
Bilateral patchy shadowing	505/975 (51.8)	368/808 (45.5)	137/167 (82.0)	40/57 (70.2)	465/918 (50.7)
Interstitial abnormalities	143/975 (14.7)	99/808 (12.3)	44/167 (26.3)	15/57 (26.3)	128/918 (13.9)

Baidu's AI temperature sensor system



reduce 2019-nCoV prediction time from 55 minutes to 27 seconds.

It can examine up to 200 people in 1 minute without disrupting passenger flow.

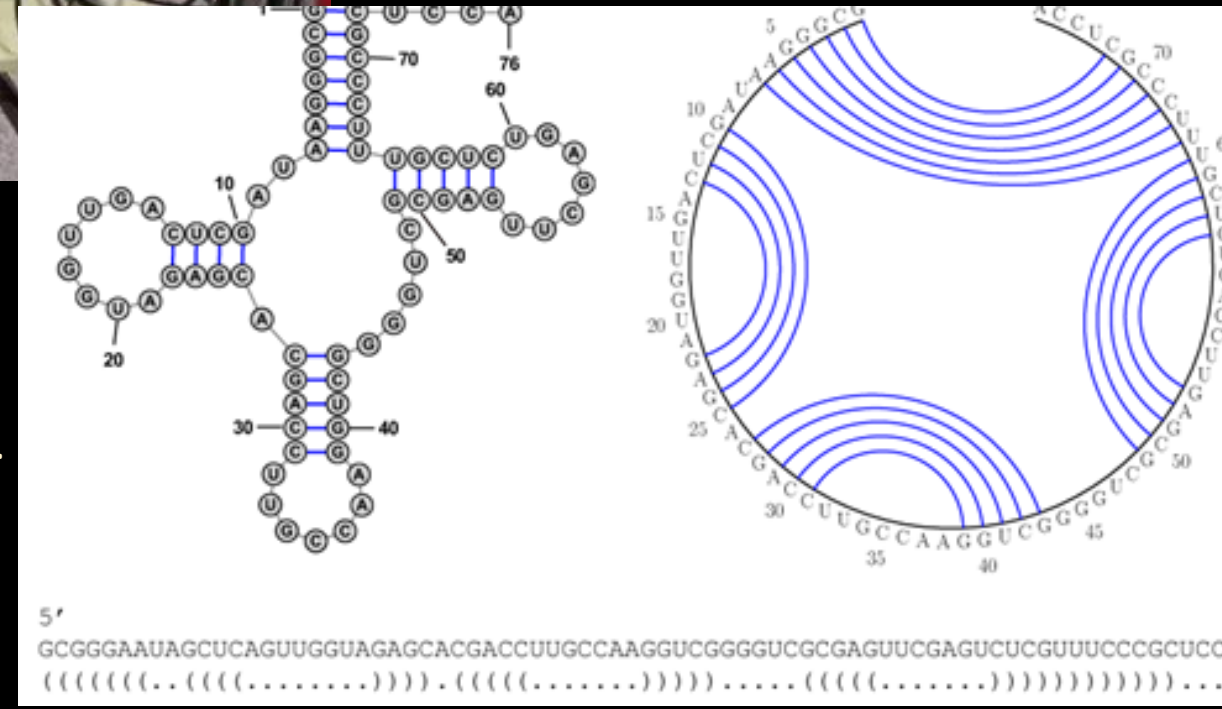
Baidu's AI – Wearing Mask or Not

The model reached a classification accuracy of 97.27% with a robust performance in long-tail scenarios, such as oronasal mask or side face.

Baidu's AI LinearFold

Cutting down the time for drug discovery.

LinearFold to reduce 2019-nCoV prediction time from 55 minutes to 27 seconds.



The world's most valuable AI startup is a Chinese company specializing in real-time surveillance

China wants to use AI-powered surveillance to help 'manage society'

By James Vincent | Apr 11, 2018, 7:25am EDT

SenseTime Facial Recognition

Contactless identification of the infected with their temperature detection software.

视频智能分析平台

02-10-2020 星期一 14:34:26

时间	置信度	目标
12-23 19:33:31	3w	目标: 中年男 黑色上衣
12-23 19:33:31	3w	目标: 中年男 黑色上衣
12-23 19:33:30	3w	目标: 中年男 黑色上衣
12-23 19:33:25	3w	目标: 青年男 黑色上衣
12-23 19:33:29	3w2	目标: 白色工程师
12-23 19:33:15	3w2	目标: 白色工程师
12-23 19:33:24	3w2	目标: 中年男 黑色上衣
12-23 19:33:23	3w2	目标: 中年男 黑色上衣
12-23 19:33:23	3w	目标: 中年男 黑色上衣
12-23 19:33:17	3w	目标: 中年男 黑色上衣
13-11 19:11:14	1w	目标: 中年男 黑色上衣

详细预警

时间: 2019-12-23 19:33:31
目标: 中年男 黑色上衣 黑色上衣
置信度: 3w

统计

分类: 轿车
车牌:
型号: 大众 桑塔纳3000
时间: 2019-12-23 19:30:37

It has been deployed at underground stations, schools and other community places in Beijing, Shanghai and Shenzhen.

Predict Flu Using Google Trends

nature

Vol 457|19 February 2009|doi:10.1038/nature07634

LETTERS

Detecting influenza epidemics using search engine query data

Jeremy Ginsberg¹, Matthew H. Mohebbi¹, Rajan S. Patel¹, Lynnette Brammer², Mark S. Smolinski¹ & Larry Brilliant¹

2007–2008 U.S. Flu Activity - Mid-Atlantic Region

ILI percentage

● Google Flu Trends ● CDC Data



BlutDot Surveillance

Where would be the next?

BlueDot gathers disease data from myriad online sources, and then using airline flight information to make predictions about where infectious diseases may appear next.



FACESPACE

It is a deep learning enabled Apple Watch app that helps people touch their face less often.



1:20
Interval: 4 Time(s)
Total: 4 Time(s)
Tracking...
Stop

```
Touching: false
2020-03-26 22:51:58.635358-0700 FaceTouch WatchKit Extension[280:9614]
Touching: false
2020-03-26 22:51:58.655024-0700 FaceTouch WatchKit Extension[280:9614]
Touching: false
2020-03-26 22:51:58.675493-0700 FaceTouch WatchKit Extension[280:9614]
Touching: false
2020-03-26 22:51:58.694482-0700 FaceTouch WatchKit Extension[280:9614]
Touching: false
```



A hand is pointing at a chest X-ray displayed on a tablet screen. The X-ray shows the ribcage and lungs. The background is a blurred desk with a keyboard and a stethoscope.

02 Quarantine

New MIT machine learning model shows relaxing quarantine rules will spike COVID-19 cases

Darrell Etherington @etherington / 10:03 pm CST • April 16, 2020

Quantifying the effect of quarantine control in Covid-19 infectious spread using machine learning

Raj Dandekar¹ and George Barbastathis^{2,3†}

¹Department of Civil and Environmental Engineering, Massachusetts Institute of Technology, Cambridge, MA 02139, USA,

²Department of Mechanical Engineering, Massachusetts Institute of Technology, Cambridge, MA 02139, USA,

³Singapore-MIT Alliance for Research and Technology (SMART) Centre, Singapore 138602

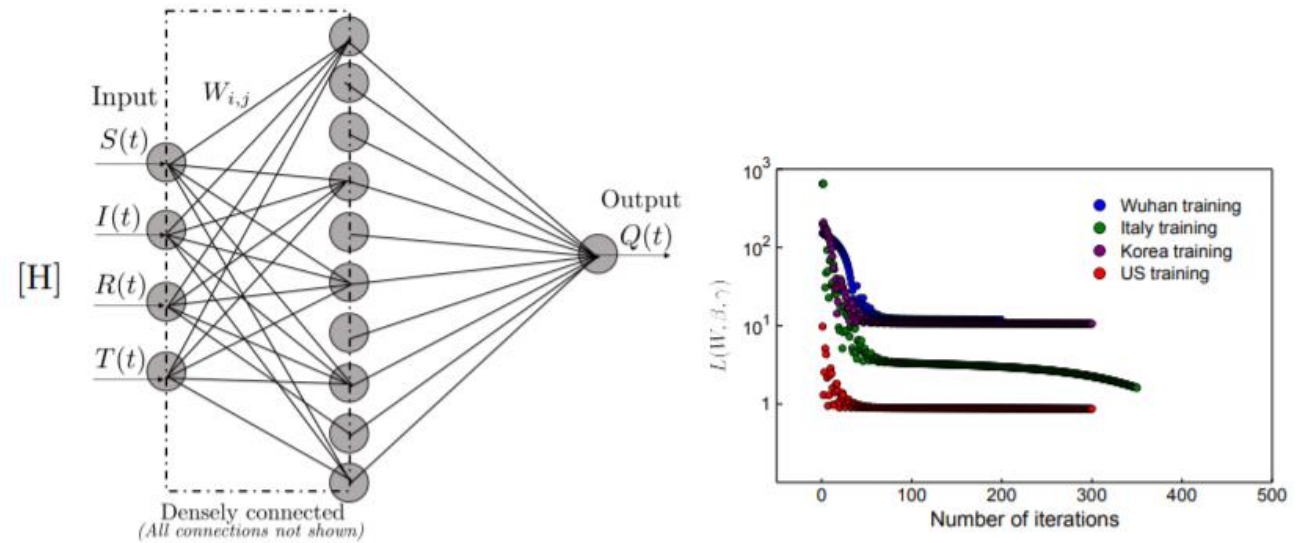
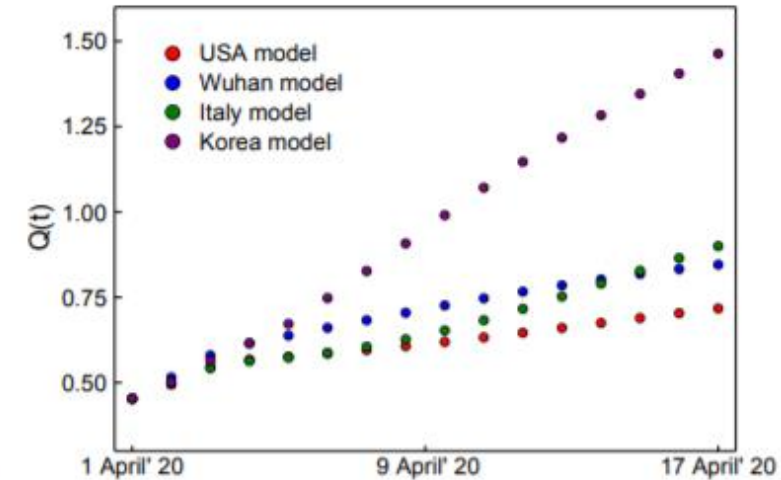
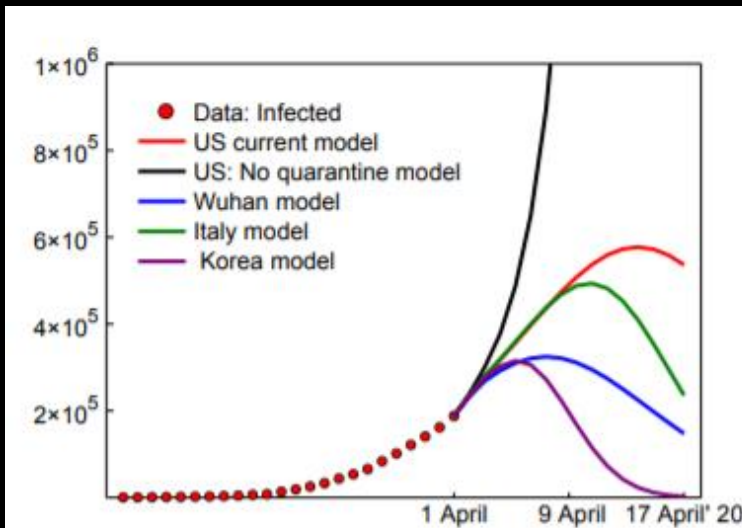
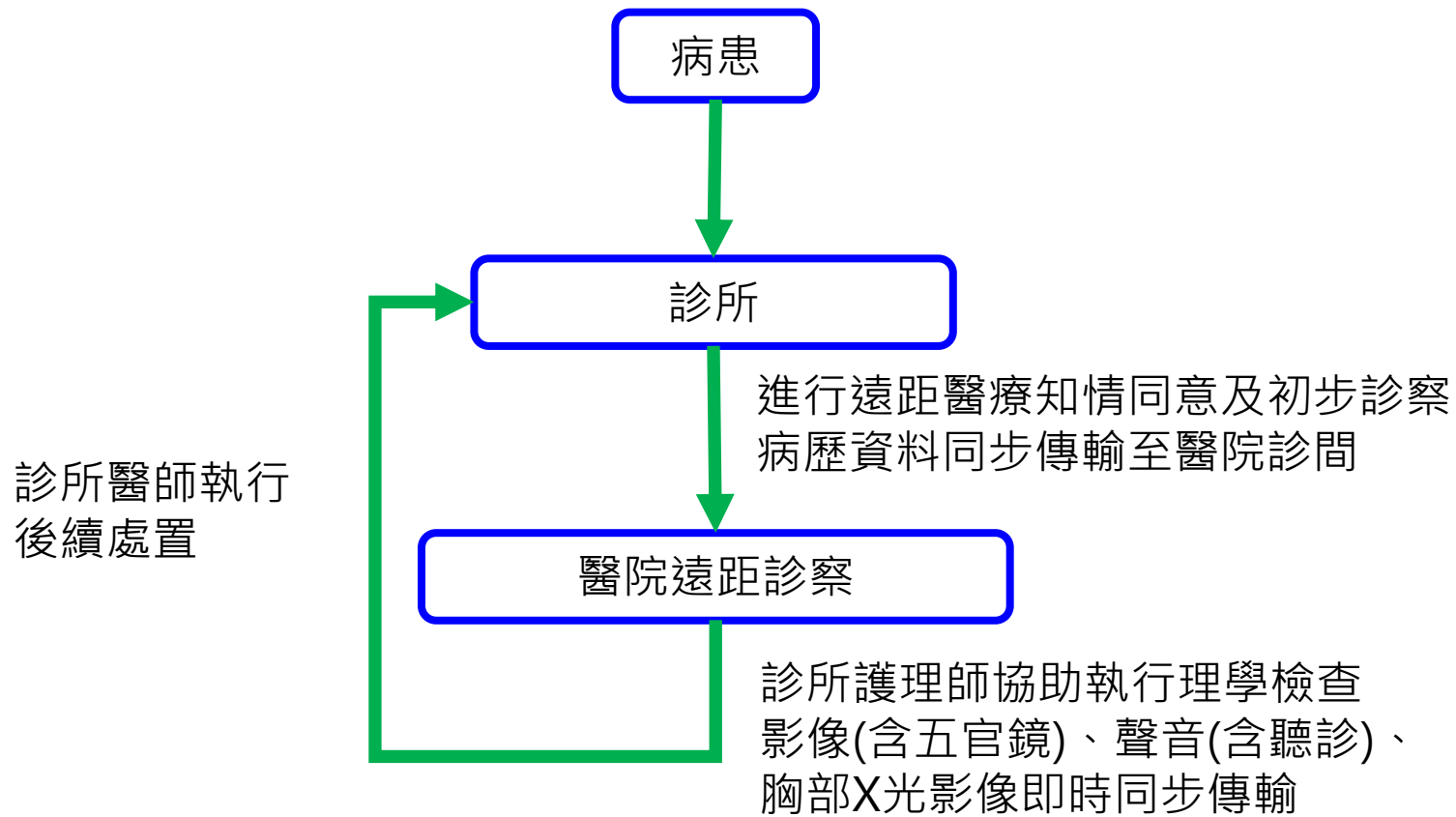


Figure 11: (a) Neural network architecture used: 2 layers with 10 units in the hidden layer. (b) Training loss, $L(W, \beta, \gamma)$ according to (4.16) for all regions considered.



Telemedicine



醫院



診所



Oxitone Wearable Vitals Monitor

Tracking at-home health, and to predict COVID-19 problems before they escalate.



It continuously tracks respiratory rate, skin temperature, pulse rate, heart rate and blood oxygen (among other vitals).



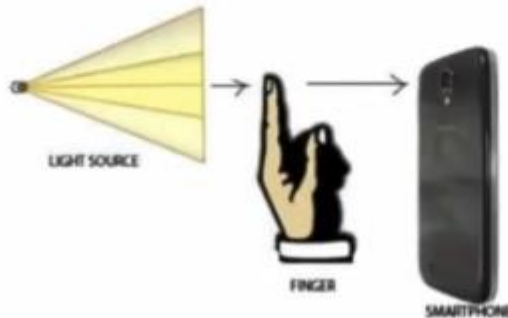
5VID-CO

5vid.co provides at-home Covid-19 screenings via web application. We use CV, video-chat, and a symptom scoring system to assess Covid-19 risk and escalate critical patients to local health volunteers.

Smartphone-based Remote Photoplethysmography

Based on: <https://www.iiitd.edu.in/noc/wp-content/uploads/2017/11/06959086.pdf>

- The idea is to measure blood oxygen saturation and heart rate using a short video of your fingertip, with a shining light behind it. A sketch is shown below:

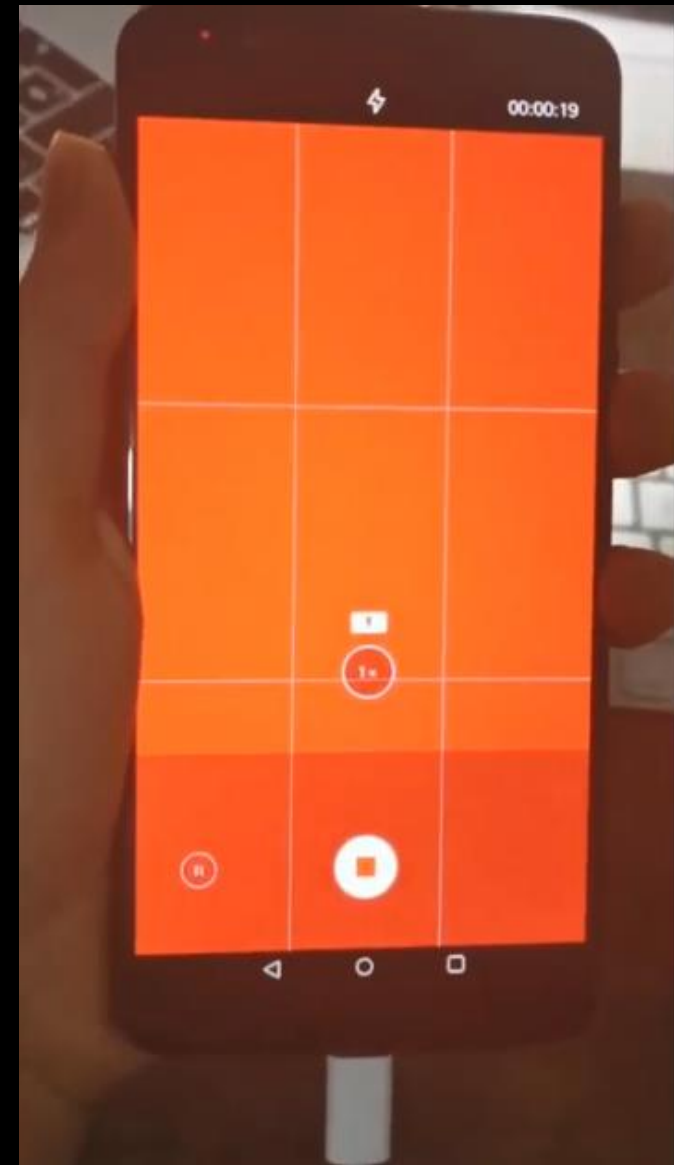


How does it work?

- Oxygen in blood cells can be calculated by the amount of infrared light absorbed by the blood cells. Fortunately, most smartphone cameras capture this infrared light and represent it in the blue color channel. Blood also absorbs red light, so by measuring the variations in the color intensity in the red and blue (for infrared) channels, we can estimate the levels of oxygen in blood. Specifically, the formula is the following:

$$SpO_2 = 100 - 5 \frac{\sigma_r/\mu_r}{\sigma_b/\mu_b}$$

Where μ is the mean, σ is the standard deviation; and b and r represent blue and red color channels, respectively.



Bahrain- Electronic Tracker Wristbands

Bahrain is leveraging technology to ensure that people under compulsory home quarantines do not move away from the confines of their homes.

The electronic bracelet that will notify the monitoring station when they are 15 meters away from their phone.

Attempting to remove or tamper with the bracelet is a violation. Violators will face legal penalties as per Public Health Law No. 34.



Electronic Tracker Wristbands in HK

Electronic wristbands developed by the Logistics and Supply Chain MultiTech R&D Centre (LSCM)



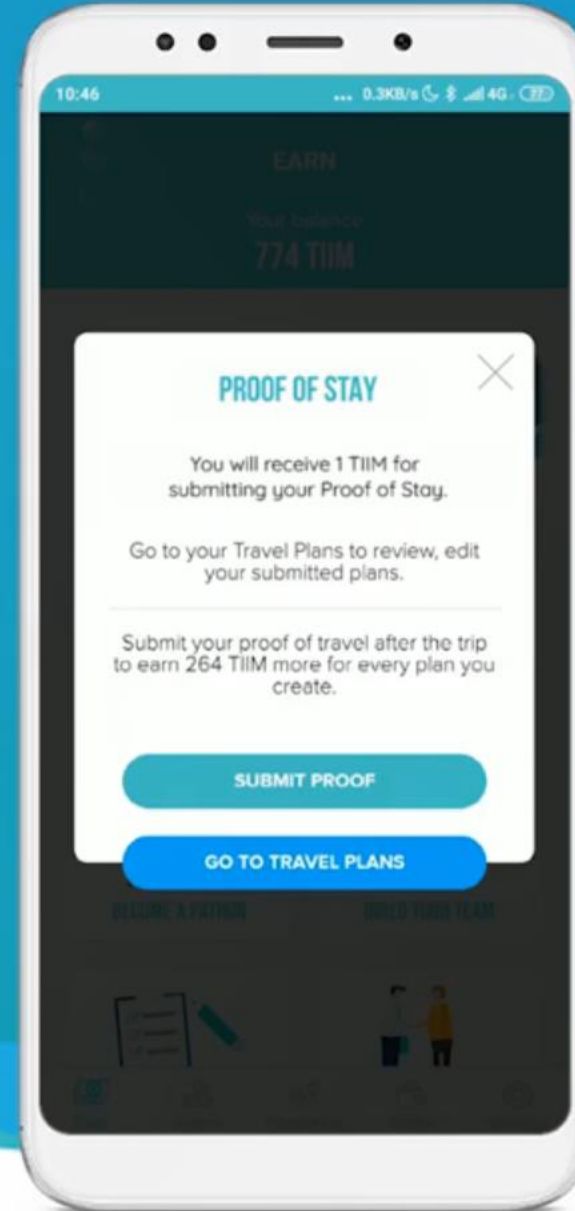
StayHomeHeros

The platform is built based on a strong and fast blockchain infrastructure.

The app has been tested with more than 160,000 users in 131 countries.

Users submit a Proof of Stay (photo of staying home) each day so we can reward the user with our TriipMiles token.

Users can use these TriipMiles token to pay for accommodations, tours, and experiences in 229 countries later.



You can earn TIIM with a **PROOF OF STAY** :

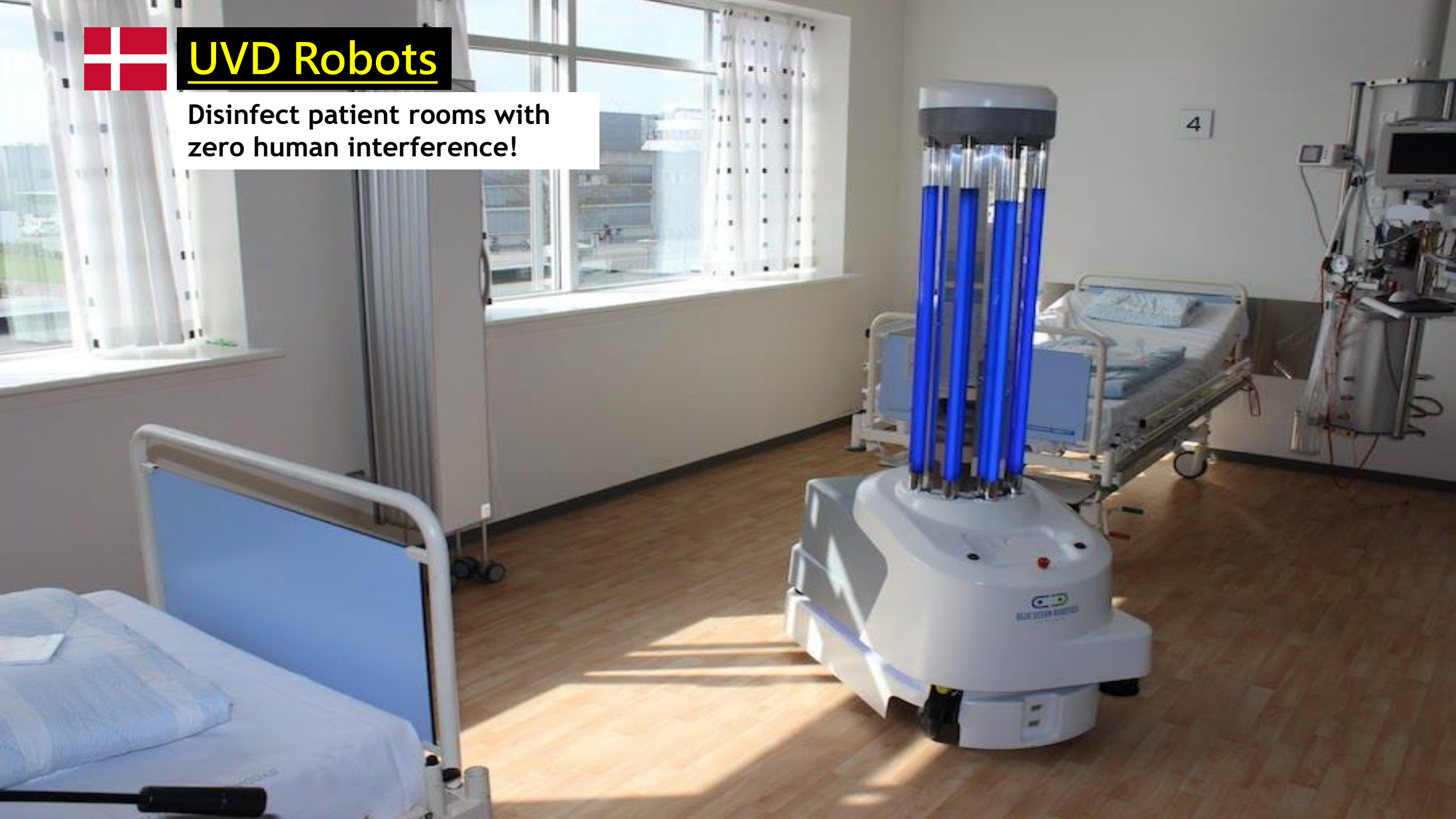
+1 TIIM ~ US\$0.015
for submitting a **Proof of Stay** daily

+ Use TIIM to pay for accommodations, tours and experiences in countries around the world



UVD Robots

Disinfect patient rooms with zero human interference!



Drones To The Rescue

Pudu Technology and MicroMultiCopter are deploying drones to transport medical supplies for 40 hospitals and conduct thermal imaging.



Autonomous vehicles carry out non-contact tasks

minimizing person-to-person transmission and alleviating the shortage of medical staff

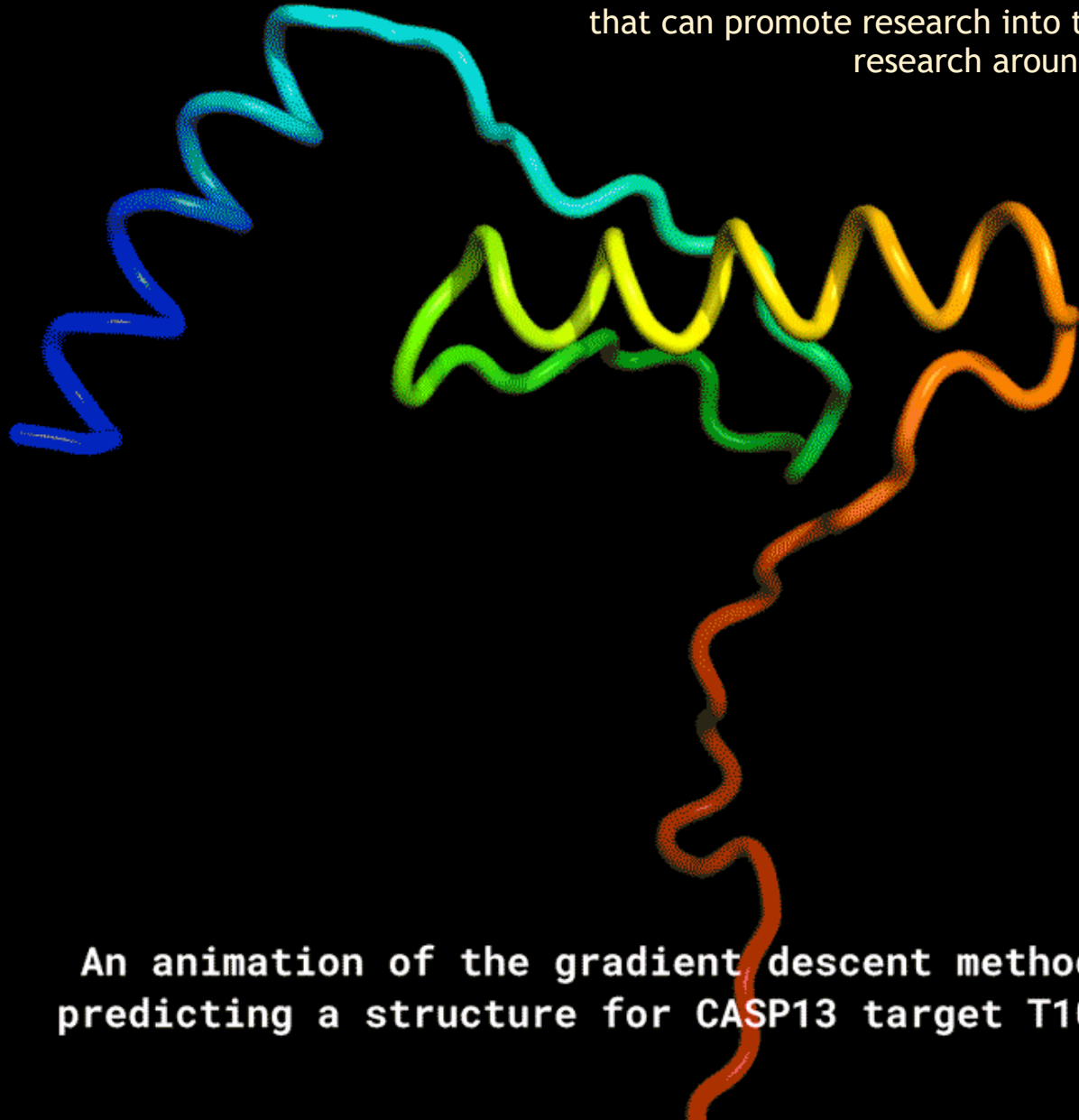


A hand is pointing at a chest X-ray displayed on a tablet. The X-ray shows the ribcage and lungs. In the background, a stethoscope and a keyboard are visible. The entire image has a dark, semi-transparent overlay.

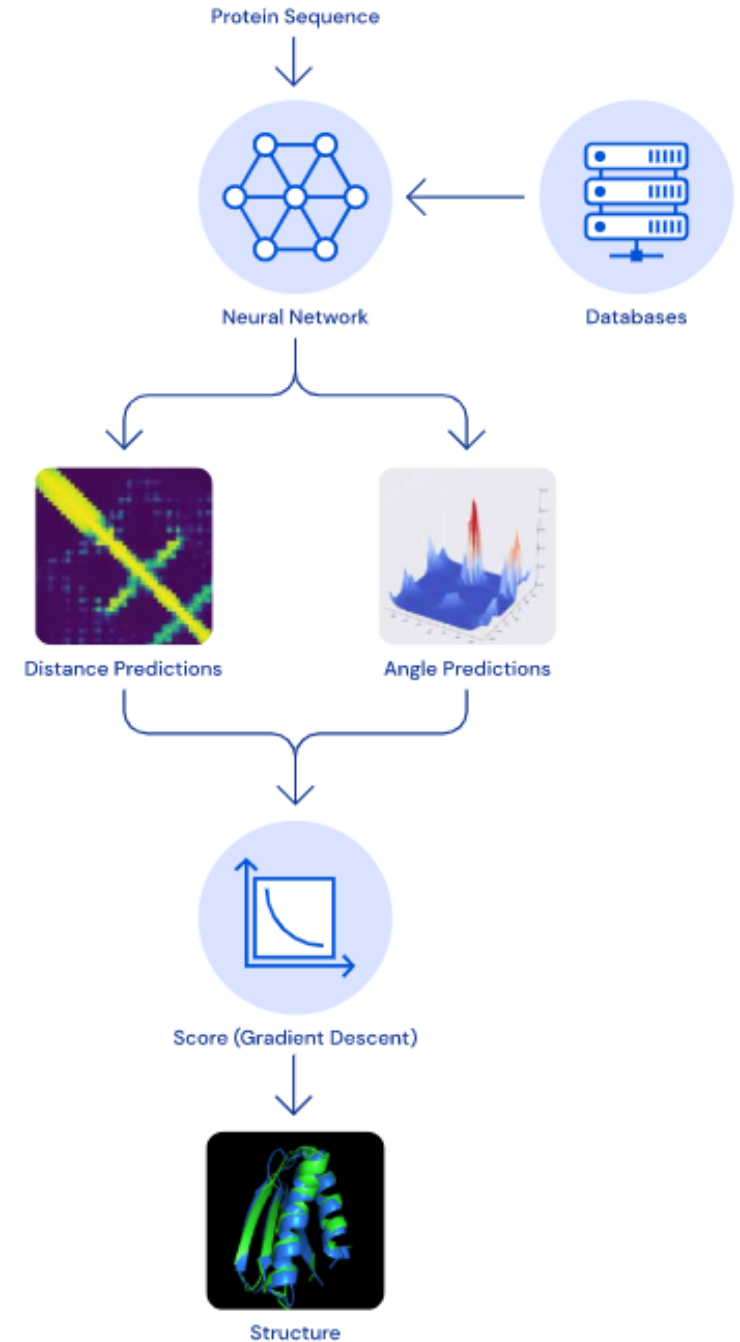
03 Treatment

DeepMind (AlphaFold System)

releasing structure predictions of several proteins
that can promote research into the ongoing
research around COVID-19



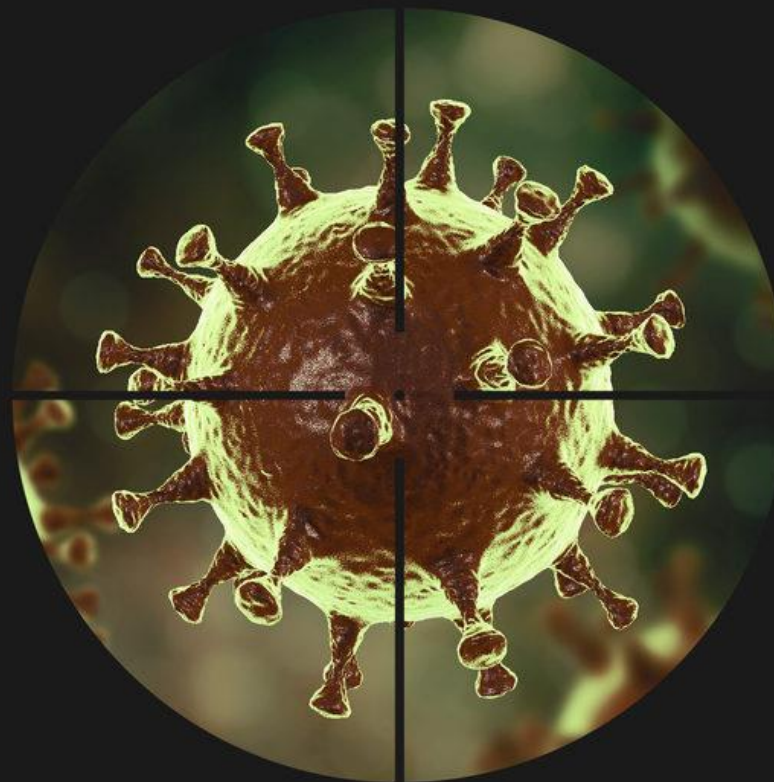
SQETRRKKCTEMKKKFKNCEVRCDESNHCVEVRCSDTKYTLC



INSILICO MEDICINE

TO SUPPORT
THE DRUG DISCOVERY EFFORTS

AGAINST
CORONAVIRUS 2019-nCoV



Using generative adversarial networks GANs to filter the molecule designs.

Insilico Medicine selected up to 100 molecules to be synthesised and tested.

Potential 2019-nCoV 3C-like protease inhibitors designed using generative deep learning approaches

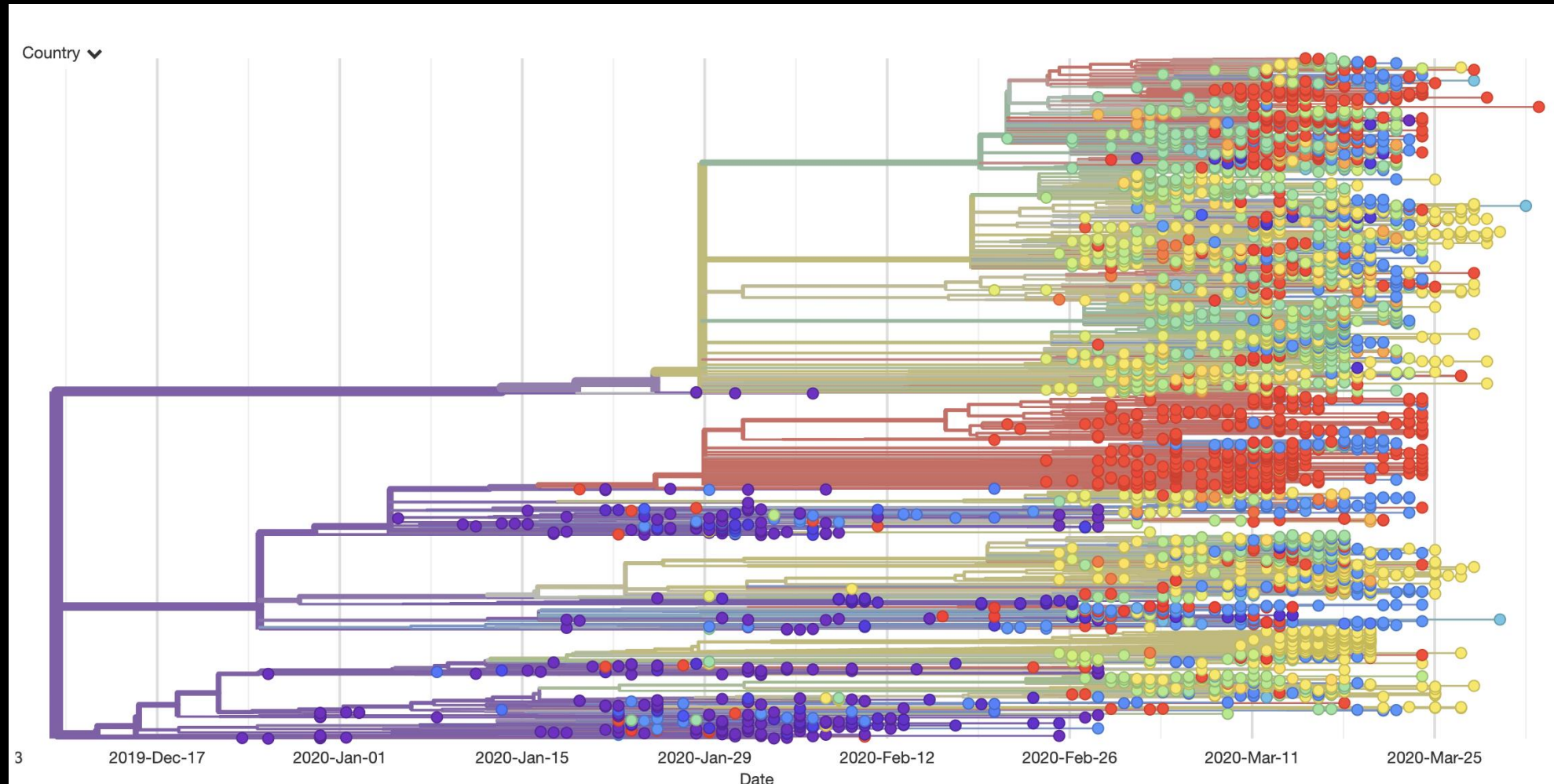
Alex Zhavoronkov, Vladimir Aladinskiy, Alexander Zhebrak, Bogdan Zagribelnyy, Victor Terentiev, Dmitry S. Bezrukov, Daniil Polykovskiy, Rim Shayakhmetov, Andrey Filimonov, Philipp Orekhov, Yilin Yan, Olga Popova, Quentin Vanhaelen, Alex Aliper, Yan Ivanenkov

Insilico Medicine Hong Kong Ltd, Pak Shek Kok, New Territories, Hong Kong

Computational Accelerated Reverse Vaccinology

Using Covid-19 strains, develop a model to predict COVID-19 mutation process.

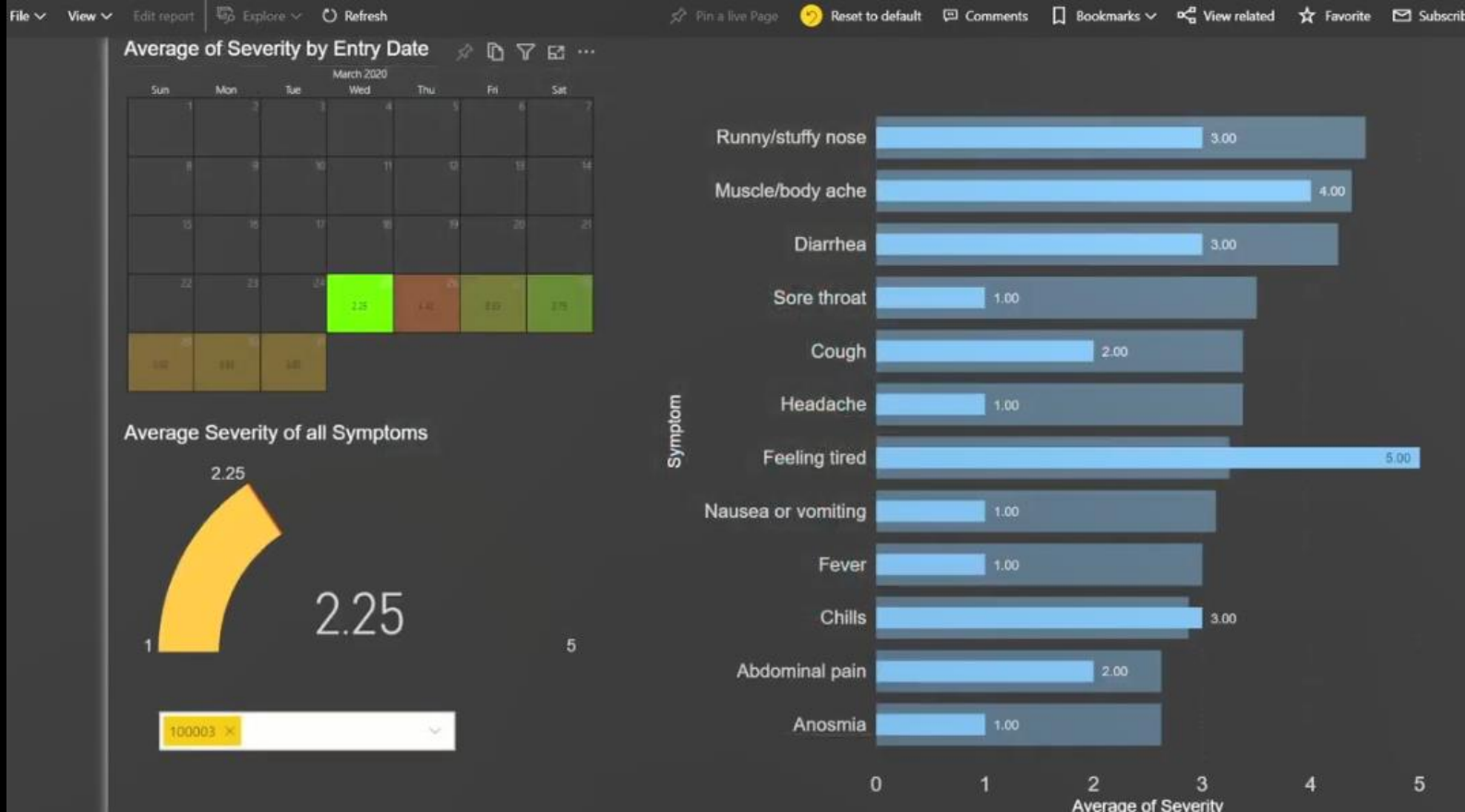
Using the predicted strains, narrow down the reverse vaccination problem space by predicting PPI (protein-protein interaction) and thereby shorten the vaccine development process.



A hand is pointing at a chest X-ray displayed on a tablet. The X-ray shows the ribcage and lungs. In the background, a stethoscope and a keyboard are visible. The entire image has a blue tint.

04 Health Information

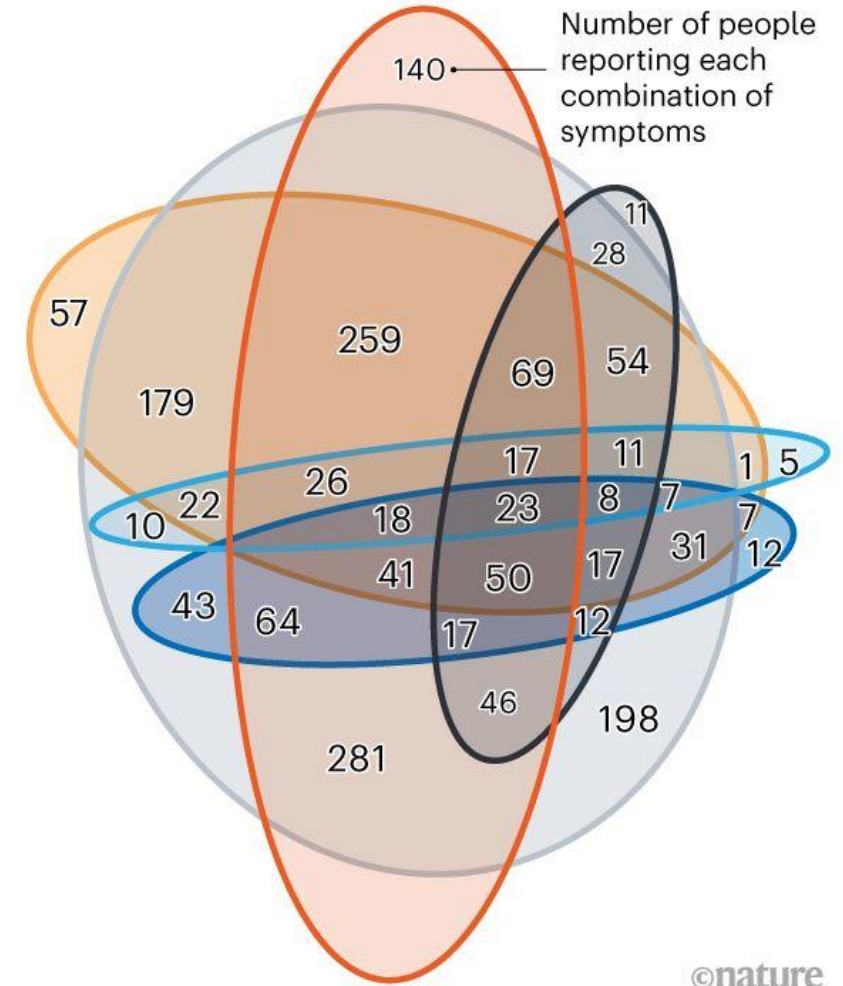
COVID-19 Daily Symptom Tracker for all



TRACKING SYMPTOMS

On 7 April, around 60% of app users who tested positive for COVID-19 and reported symptoms had lost their sense of smell.

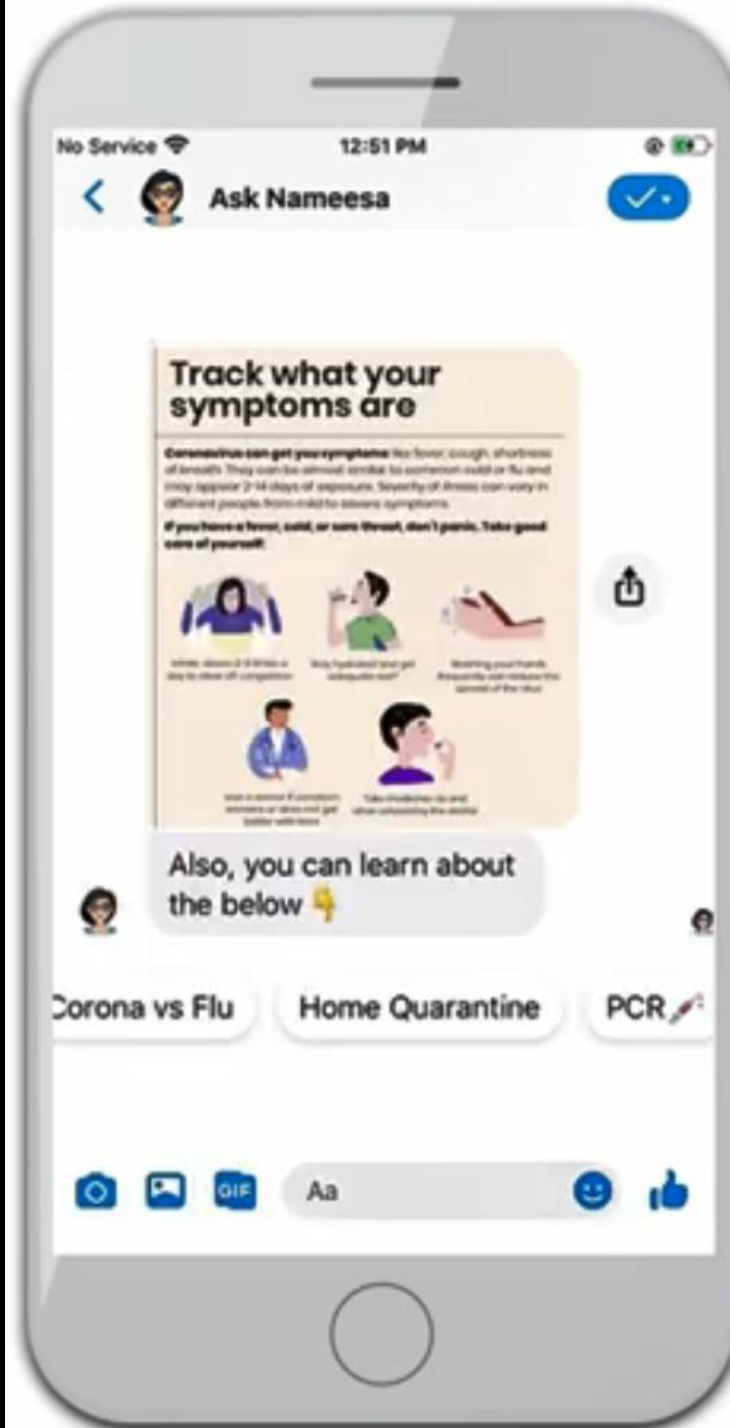
- Anosmia (loss of smell)
- Cough
- Fatigue
- Diarrhoea
- Shortness of breath
- Fever



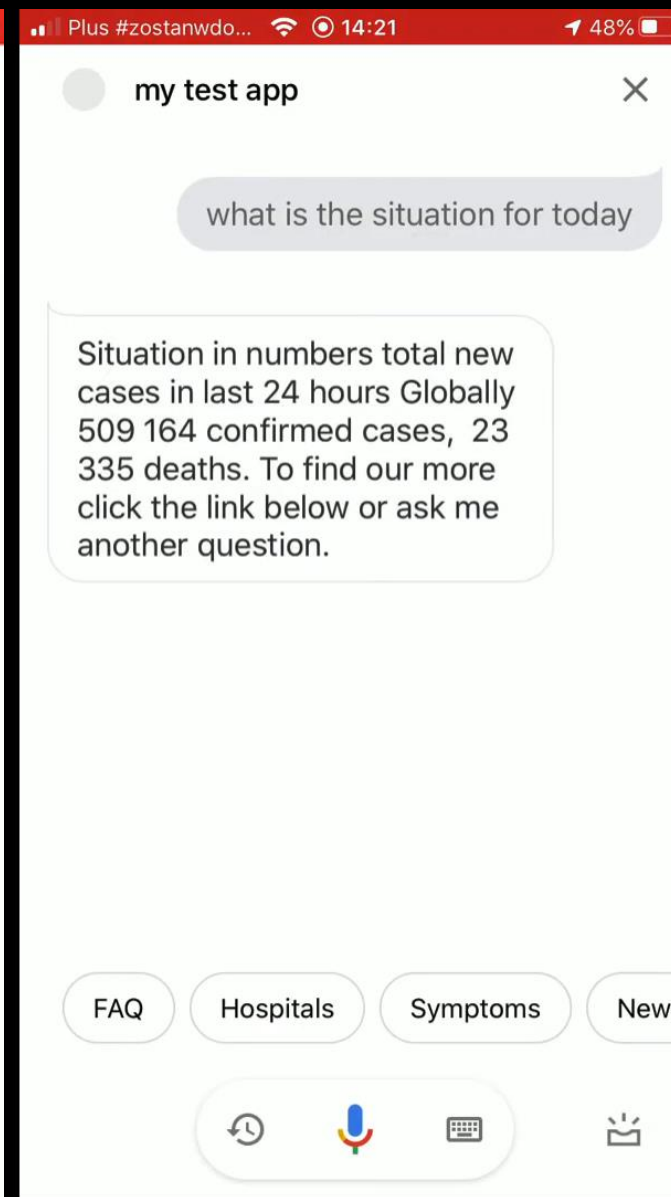
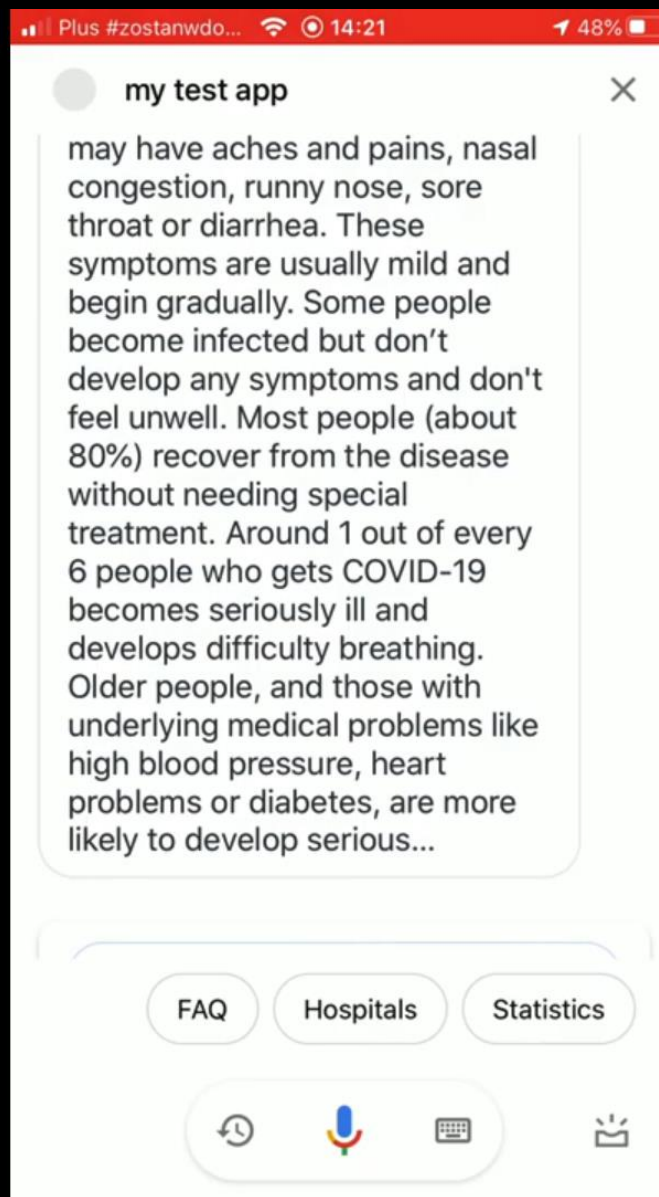
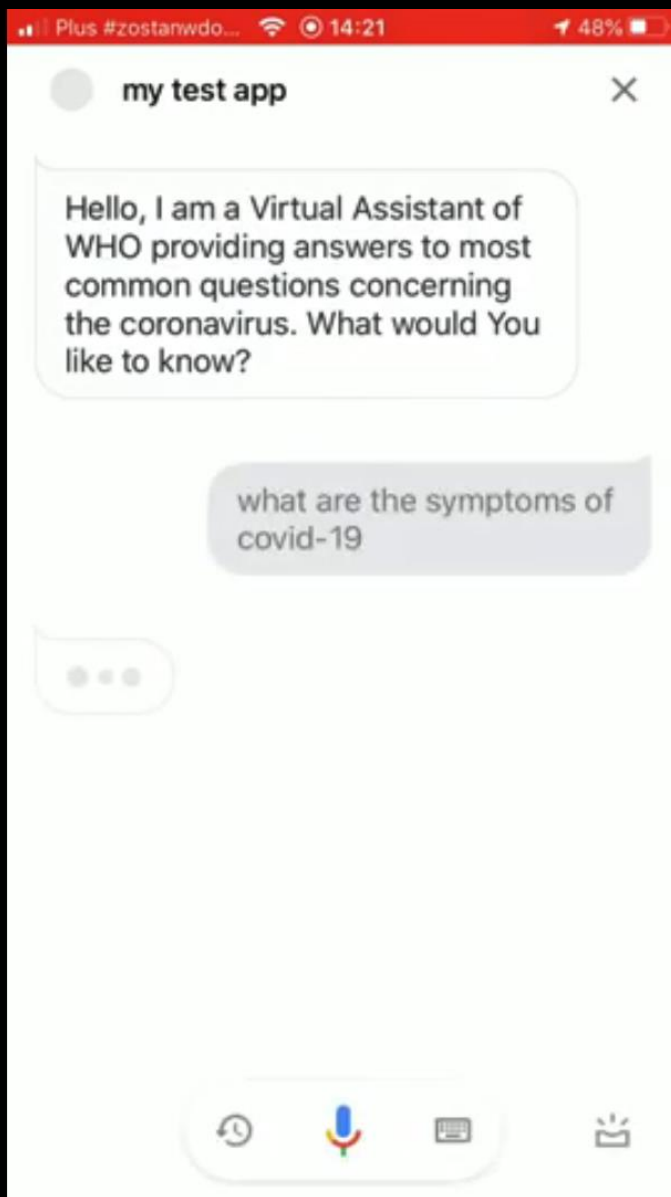
ASK NAMEESA

A Conversational AI about COVID-19,

The team have used AI powered NLP (Arabic and Latin based languages) engine to provide better healthcare decisions.

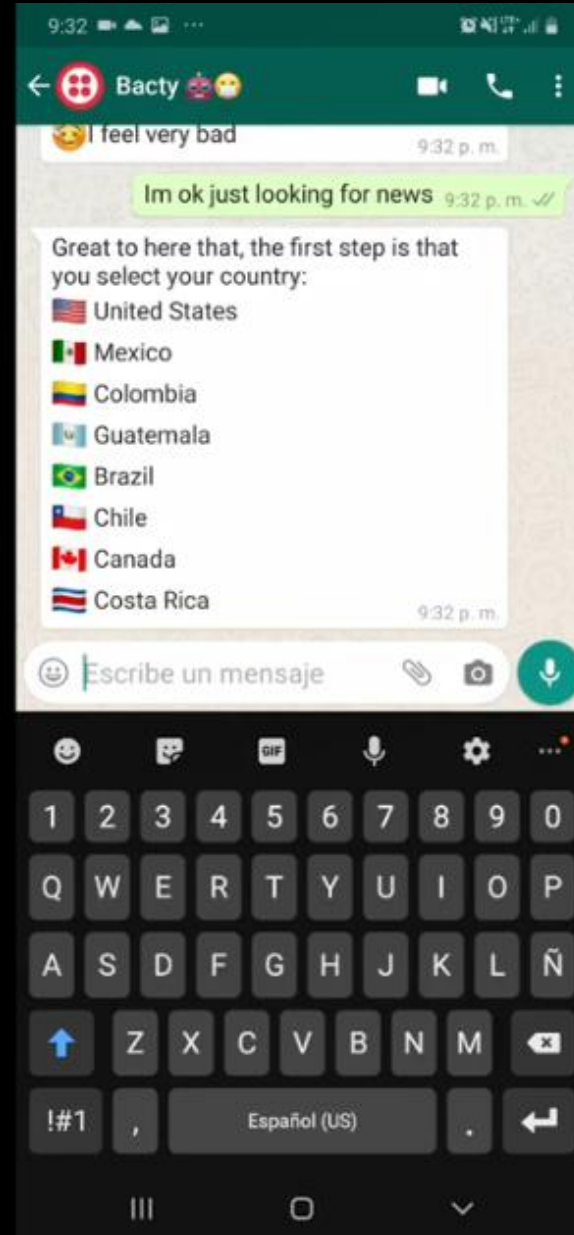
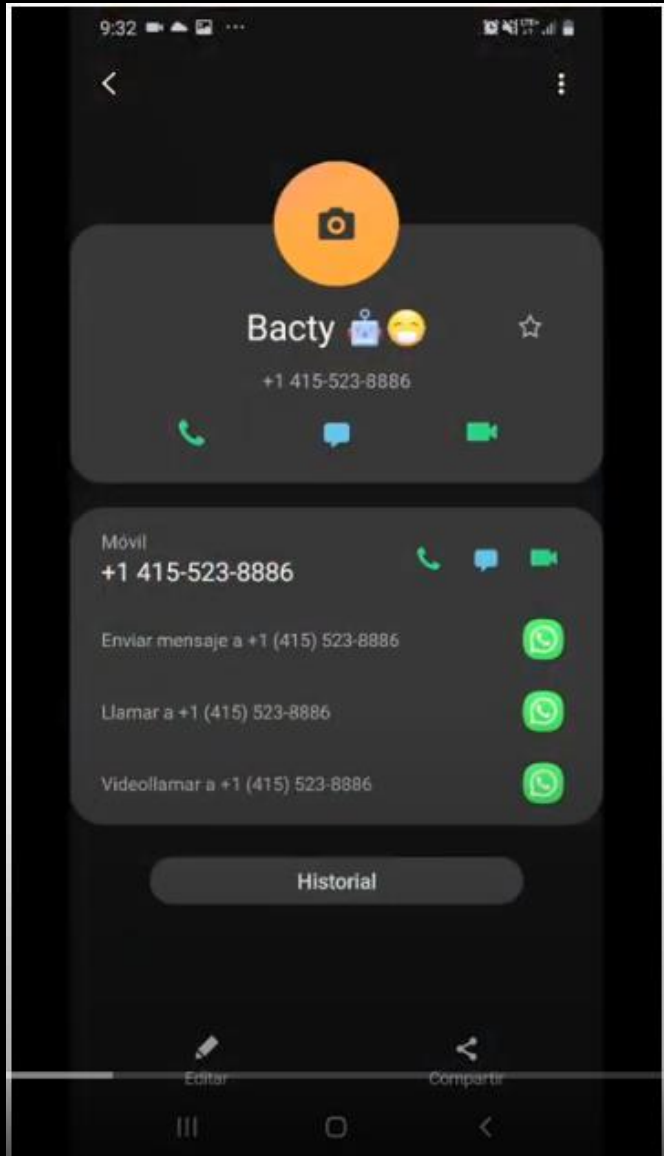


Voice & Text AI Virtual Assistant- Coronavirus Info



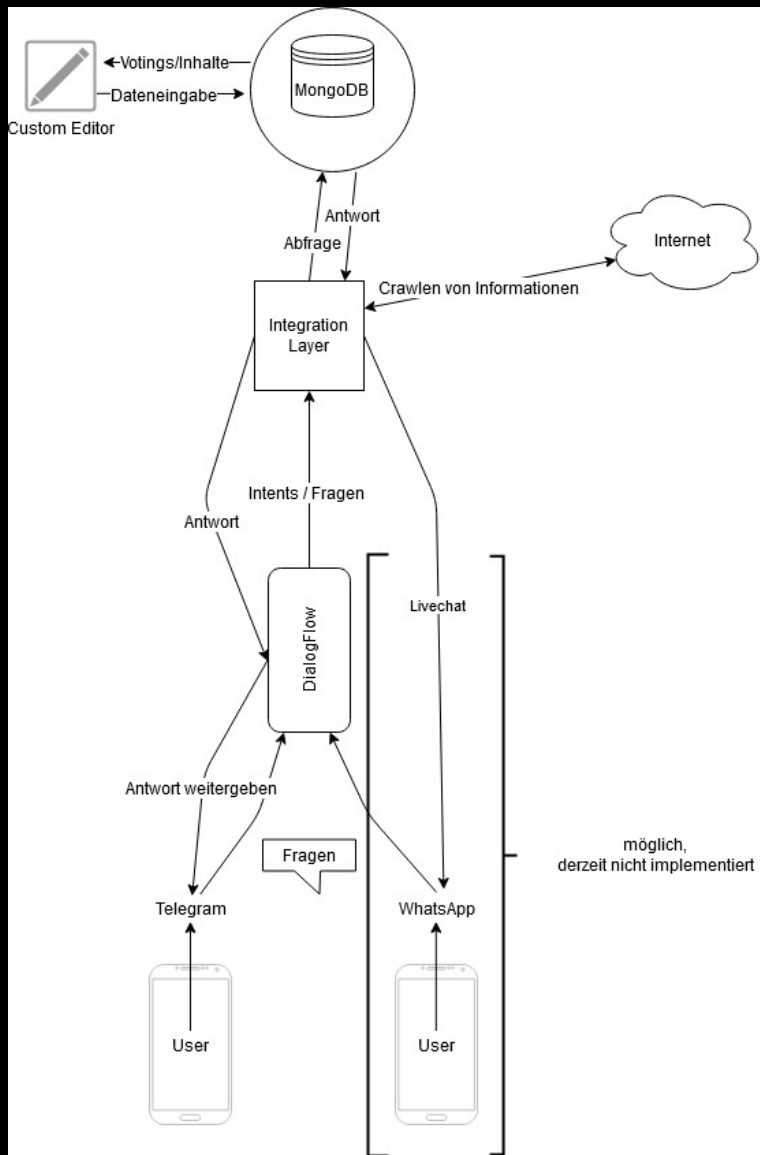
BACTY BOT

Connect volunteer health Professionals and possible COVID19 patients through Whatsapp & Messenger



CORONA LEGAL CHATBOT

Place to go to for all legal questions concerning Corona.



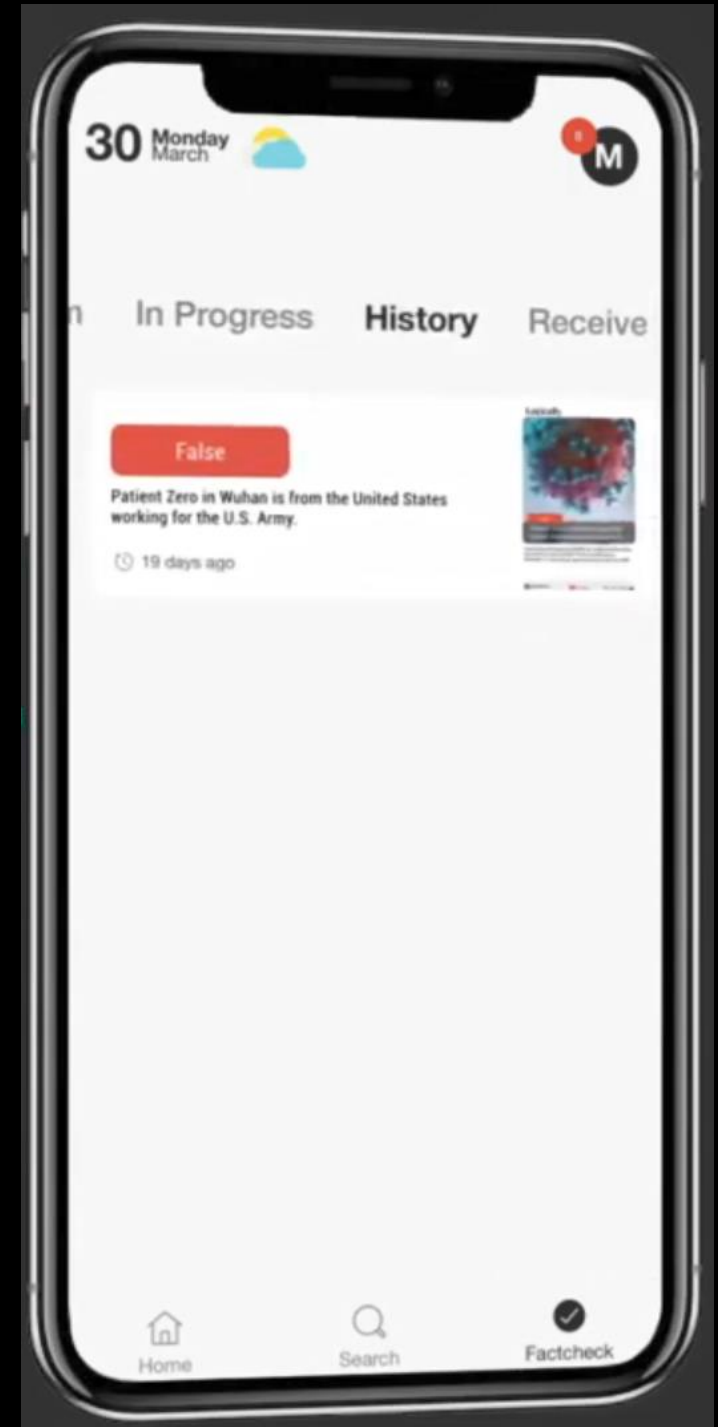
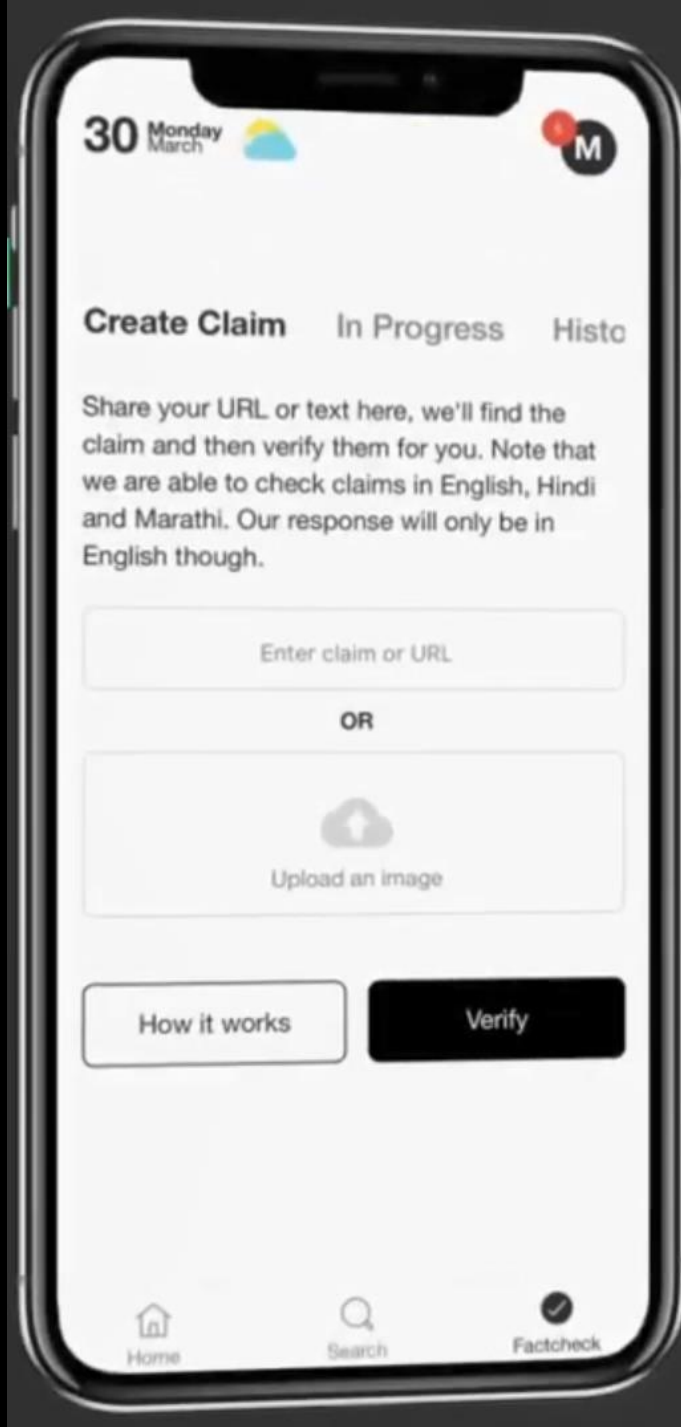
The screenshot shows a chat interface with a purple circular avatar labeled 'YO' and a red flower-like logo. The chat history includes:

- Yorrd** (14:58:11): wann kann ich kurzarbeitergeld beantragen
- CoronaLegalChatBot** (14:58:13): **Was sind die Voraussetzungen, um Kurzarbeitergeld zu beantragen?**
Der Arbeitgeber kann Kurzarbeitergeld bei der Bundesagentur für Arbeit beantragen, wenn die Voraussetzungen der §§ 95 bis 99 SGB III vorliegen. Der Anspruch besteht, wenn ein erheblicher Arbeitsausfall vorliegt, die betrieblichen Voraussetzungen erfüllt sind, die persönlichen Voraussetzungen erfüllt sind und der Arbeitsausfall angezeigt worden ist. Die Bundesagentur für Arbeit hat in ihrer Pressemi
- Buttons**: Weiterführende Informationen
- CoronaLegalChatBot** (14:58:13): **Fragebogen zum Corona Legal Chatbot**
Ich würde mich freuen, wenn du ganz kurz 2-3 Fragen beantworten könntest.
- Buttons**: zum Fragebogen
- CoronaLegalChatBot** (14:58:14): Konnte ich dir damit weiterhelfen?
- CoronaLegalChatBot** (14:58:14): Choose an item

The bottom of the chat shows a text input field with 'Nachricht', a 'SENDEN' button, and a row of emojis. Below the input field are three buttons: 'Ja, danke!', 'weiter suchen', and 'Kontakt aufne...'.

THINKLOGICALLY

The team have developed an hybridised process which supports the development of our fact-checking algorithms, enables the incremental adoption of our automated fact-checking technology as it matures, and enables efficient and high-quality fact-checking in the meantime.



COLLABOVID

Simplify exploring preprint publications regarding the coronavirus.

The screenshot displays the COLLABOVID website interface. At the top, the title "COVID-19 SARS-CoV-2 Preprint Explorer" is visible, along with navigation links for Home, Explore, Topics, and About. The search bar contains the text "Italy". Below the search bar, there are filters for "Publication Date" and "Sort by" (set to "Newest"). A dropdown menu is open, showing a list of categories: Allergy and Immunology, Anesthesia, Biochemistry, Bioengineering, Bioinformatics, and Biophysics. The "Biochemistry" category is highlighted. In the foreground, a preprint abstract is displayed with the title "Site-specific N-glycosylation Characterization of Recombinant Spike Proteins using High-Resolution Mass Spectrometry" and authors "Yong Zhang, Wanjun Zhao, Yonghong Mao, Shisheng Wang". The abstract text begins with "The global pandemic of severe acute pneumonia syndrome (COVID-19) caused by SARS-CoV-2 and intervention strategies. The densely glycosylated spike (S) protein highly exposed on the surface of the virus for virus binding and invasion into host cells as well as elicitation of a protective host immune response. We have characterized the site-specific N-glycosylation of the recombinant spike protein using high-resolution mass spectrometry." A "show full abstract" button is located at the bottom of the abstract. To the right, a line graph titled "Cases in Italy" shows a sharp upward trend in cases, with the y-axis ranging from 0 to 100k.

BIOSIGHT

COVID-19 cognitive search engine powered by IBM Watson

marketengine.parts/biosight/

Entities

[Click here to enter entity search terms]

parkin (35) Brady (11) bleomycin (10) NCBI (9)

Entities are real-world objects such as persons, locations, products, and such. Entities query can have operators that modify its behavior. Below are examples that illustrate the available search operators:

Operator	Finds Documents
bleomycin,parkin	Containing both "bleomycin" and "parkin".
bleomycin parkin	Containing either "bleomycin" or "parkin" (or both).
"Himalyan palm"	Containing the exact phrase "Himalyan palm".
!wuhan	Does not contain "wuhan".

Concepts

Use cognitive search powered by IBM Watson. Send natural language queries with metadata fields like concepts and entities.

Metadata Similarity

Same source as above

70%, confirming that 269 COVID-19 was genetically different [63]. Within the RdRp region, it was found that 270 another bat coronavirus, RaTG13, was the closest relative to COVID-19 and formed a 271 distinct lineage from other bat SARS-like coronaviruses [39, 41] ...

Paper ID: bb8e3d331bb2975e1c644c8729b842797da2d626

Metadata Similarity

Same source as above

In this study, we use MLDSP [51] and MLDSP-GUI [52] with CGR as a 82 numerical representation of DNA sequences to assess the classification of COVID-19 83 from the perspective of machine learning-based alignment-free whole genome 84 comparison of genomic signatures. Using MLDSP and MLDSP-GUI, we confirm that 85 the COVID-19 belongs..

Paper ID: bb8e3d331bb2975e1c644c8729b842797da2d626

Metadata Similarity

Same source as above

The trained models are then used to predict the labels of 29 COVID-19 333 sequences. As expected, all classification models correctly predict that the COVID-19 334 sequences belong to the RdRp families Table 2. The results are compared with 335 families 335..

Paper ID: bb8e3d331bb2975e1c644c8729b842797da2d626

Metadata Similarity

A nighttime photograph of the Taipei skyline, featuring the Taipei 101 skyscraper as the central focus. The building is illuminated with green and purple lights, and its spire is lit with a bright red light. The city below is a dense collection of lit-up buildings and streets, with a dark blue sky and some clouds in the background.

21,688 views | Sep 29, 2018, 10:10am

How Taiwan Is Becoming A Top Destination For Artificial Intelligence In Asia

Forbes

ICT科技防疫與趨勢



陳榮貴 博士
中華電信研究院/副院長
2020/04/29

Refresh your life

大綱

- ❖ COVID-19 科技防疫
- ❖ COVID-19 加速生活型態改變
- ❖ 5G時代之ICT發展趨勢



台灣科技防疫歷程 (1/2)

- 01/20 疾病管制署宣布成立「嚴重特殊傳染性肺炎中央流行疫情指揮中心」
- 01/21 指揮中心公布我國**確診首例**境外移入嚴重特殊傳染性肺炎個案
- 01/29 對2000多名居家隔離者展開**電子監控**，一旦擅離居所將立即連線警察機關，要求強制隔離
- 01/29 **Line@疾管家** 從10萬人急增至63萬人訂閱
- 02/06 **口罩販售實名制**上路，民眾可持健保卡至藥局購買
- 02/16 「旅客入境健康聲明暨居家檢疫電子化系統」上線
- 02/26 每日定時發送**雙向簡訊**給「居家檢疫」民眾，可透過簡訊回報健康狀況 (4/05增加「居家隔離」類)
- 02/27 疫情指揮中心提升至一級開設



台灣科技防疫歷程 (2/2)

- 03/12 口罩實名制2.0上線，民眾可透過健保卡、自然人憑證登入平台，或藉由健保快易通行動APP進行認證預購
- 03/19 所有入境民眾皆須配合居家檢疫14天，次日發布違反隔離、檢疫規定的裁罰基準
- 04/03 聊天機器人「疫止神通」LINE Bot上線。居家檢疫民眾可每日進行自主健康通報，並取得防疫相關協助資訊
- 04/04 透過「災防告警細胞廣播傳染病警示訊息發送系統」，提醒清明連假出遊請保持社交距離或配戴口罩
- 04/10 觀光景點、夜市及寺廟等實施人流管制
- 04/20 公布染疫敦睦艦隊官兵足跡，並對同時段出現在同地點的民眾發送提醒簡訊
- 04/26 透過「高速公路1968」APP發佈觀光景點人潮燈號



行動網路電子圍籬

- ❖ 以行動通信或手機GPS定位，估算居家檢疫者/隔離者之位置
- ❖ 一旦離開檢疫範圍，系統會發送「告警簡訊」給當事人、民政單位、衛政單位及轄區警察，以掌握當事人行蹤
- ❖ 可使用政府配發之防疫手機或當事人之私人門號手機

電子圍籬監測：
當用戶離開電子圍籬監控範圍，則發送簡訊通知



來去玩!

■892, 臺中市大里區

2020/02/18 09:41, 已離開居家範圍, 請儘速回家, 違反居家隔離/居家檢疫規定, 將依傳染病防治法處以罰鍰, 並依行政罰法進行強制安置。
嚴重特殊傳染性肺炎中央流行疫情指揮中心關心您,1

用戶申訴(抗告) 未離開居家位置:



我在家裡!



電信公司提供舉證資料:



我錯了!



抱歉 不是洋娃娃 我們是真的會罰
居家隔離罰鍰
開罰一百萬元
目前已有4人收到罰鍰通知



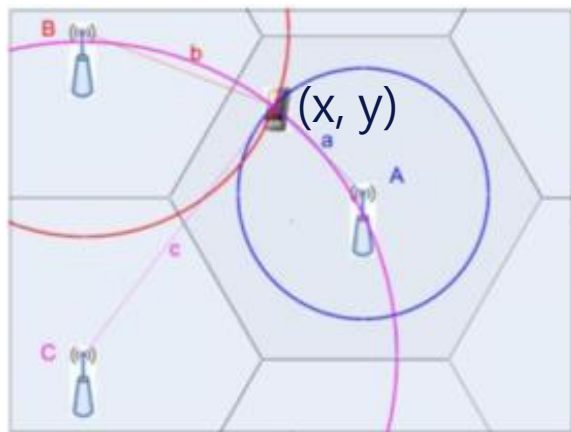
行動網路基地台定位技術

❖ CID(Cell Identity)：用戶手機目前連線基站



優點	<ul style="list-style-type: none">資料取得技術門檻低投資成本小
缺點	<ul style="list-style-type: none">用戶位置以基站信號涵蓋範圍估計，誤差範圍約200m(市區)~1km(郊區)

❖ CID+footprint：三角定位+移動軌跡輔助(機器學習)



優點	<ul style="list-style-type: none">定位誤差較低，取決於基站密度，市區優於郊區
缺點	<ul style="list-style-type: none">資料取得技術門檻高投資成本高

定位準確度：GPS > CID+footprint >> CID



電子入境

- ❖ 「旅客入境健康聲明暨居家檢疫通知書」電子化，避免手寫字跡潦草不易辨識，2/16起可於登機前利用線上填寫
- ❖ 透過「掃描QR Code、輸入資料、接收簡訊、出示手機」4步驟完成，節省現場登打、加快入境通關效率
- ❖ 避免資料輸入錯誤，以及資料不實的防疫漏洞
- ❖ 整合至14天居家關懷的「防疫追蹤系統」及追蹤告警的「電子圍籬系統」

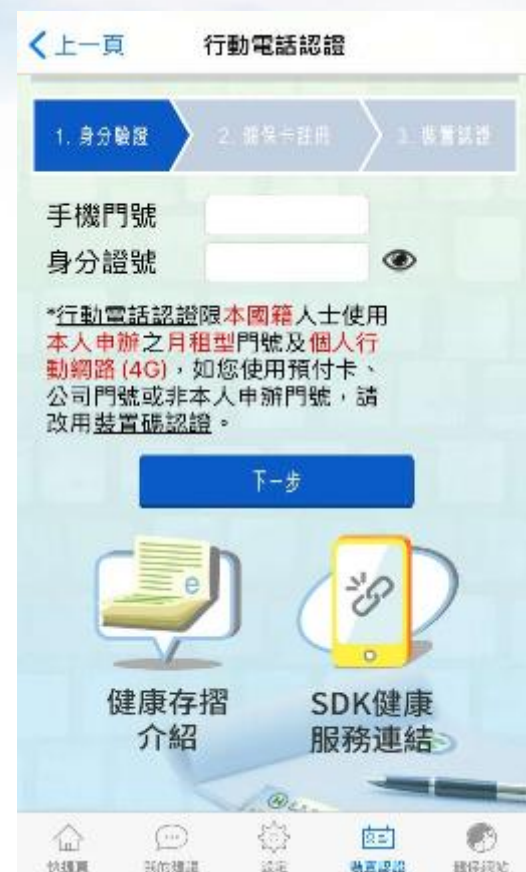


The screenshot shows the 'Quarantine System for Entry' interface. At the top, it features the logo of the Ministry of Health and Welfare (衛生福利部) and the system title in Chinese and English. The form includes a dropdown menu for 'Nationality' (國籍) with '中華民國 (TAIWAN)' selected. Below that is a field for 'Flight No.' (航班) with a separator. An example flight number 'BR-17, BR-9, BR-27, BR-11, BR-15, BR-51, BR-31, CI-3, CI-7, CI-23' is provided. A section titled 'During the past 14 days, have you been to?' (請問您過去14天去過那些地區?) lists several regions with checkboxes: China/Hong Kong/Macao, Japan/South Korea, Europe, Middle East, U.S.A./Canada, and New Zealand/Australia.



口罩販售實名制

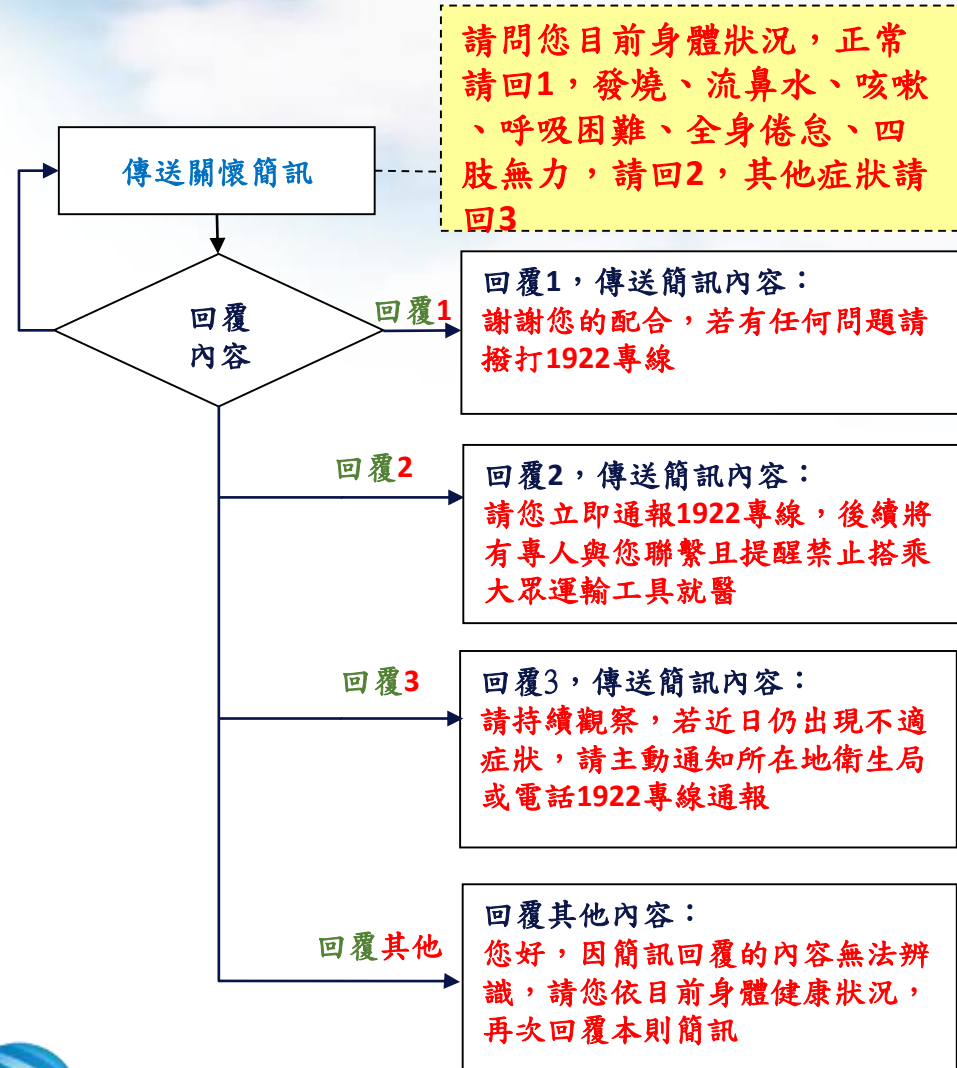
- ❖ 「口罩供應」在台灣防疫工作中扮演重要角色，除立即成立口罩國家隊，快速提升產能之外，並透過科技，公開、透明、公平的讓民眾購買
- ❖ 2/6 口罩實名制 1.0
 - 利用健保特約藥局既有「讀取晶片健保卡以認證領藥」之管道
 - 政府提供open data，供民間開發「口罩地圖」，結合地理資訊及即時剩餘量，供民眾快速前往藥局
- ❖ 3/12 口罩實名制 2.0
 - 網路預購：晶片健保卡/晶片自然人憑證或健保快易通行動APP (OTP實名認證) 登記
 - 線上預約完成後會以EMAIL通知繳款，再結合電信商簡訊通知將領取序號配送至用戶手機
 - 超商領貨：憑中籤序號領貨，兼顧便利和公平性
- ❖ 4/22 口罩實名制 3.0
 - 開放民眾持健保卡，到1萬多家超商門市，直接使用事務機預訂口罩，之後再到原超商領取



雙向關懷簡訊

衛福部居家檢疫者雙向關懷簡訊報通流程

- ❖ 2/26起針對居家隔離者 (有與確診者接觸史)發送，3/30再加入居家檢疫者 (海外回國)
- ❖ 以簡訊自動/互動表達關懷，既可收集其健康狀況，也可確認其手機不離身
- ❖ 被隔離/檢疫者所回覆健康資訊自動提供給衛服部人員進行追蹤管理
- ❖ 回覆資訊的統計數字提供衛服部人員掌握疫情狀況



熱門景點人潮警示

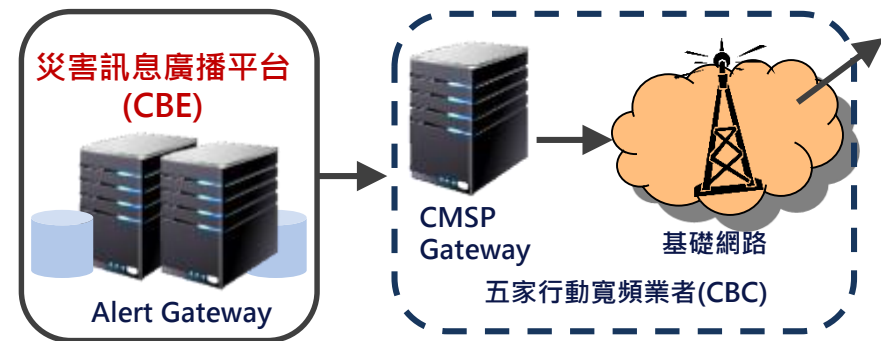
- ❖ 透過統計行動基地台連線之手機數目，估測全台各區域之**即時人潮數量**
- ❖ **清明節**4天連假各大景點人潮湧現，中央流行疫情指揮中心於4/4中午11點56分，透過「**災防告警細胞廣播傳染病警示訊息發送系統**」，針對11個風景區發出**廣播簡訊告警**，提醒民眾保持「**社交距離**」



中華電信人潮分析系統



災防告警細胞廣播傳染病警示訊息發送系統



國際案例 (1/2)

❖ 英國 - Keep Your Distance APP

- 提供城市中**POI(地標)**即時擁擠狀況，供用戶**評估外出與否**，包含地鐵站、超市、藥局等公共地點
- 建立在「**群眾外包**」的機制上，得益於民眾的即時回報，在歷史數據上進行快速更新
- 藉此讓民眾能夠避開人流較多的時段、地區，保持**社交距離**



❖ 印度 - Aarogya Setu APP

- 由印度政府電子和信息技術部NIC開發，5天內下載超過1千萬次
- 基於**GPS以及與藍牙互動**的數據，APP會生成社交圖，該APP會在用戶與被測試為陽性的人時聯繫提醒用戶
- 收集的數據以加密的匿名ID存儲在只能由印度政府存取的伺服器



國際案例 (2/2)

❖ 中國 – 健康碼

- 按風險程度分為綠、黃、紅三種APP二維條碼，許多地方都需民眾出示代表健康的綠色碼才允許進出
- 在手機上完成申請，輸入姓名、證件號碼、居住地址、最近14天的旅行經歷及健康狀況，系統會自動顯示健康碼結果
- 由阿里巴巴、騰訊與各省、市政府合作推出，各地有不同名稱的健康碼，測評標準也未統一



❖ 香港

- 向被隔離者派發印有「二維碼」的監察手帶(或藍牙電子手環)，並安裝一個用於監察的手機APP，隔離者在抵達隔離住所或酒店房間後，需要用手機掃描二維碼啟動程式
- 手機APP透過監察發射站訊號強弱改變，判斷隔離者有沒有離開隔離處



Bluetooth Low Energy Contact Tracing

❖ 新加坡 TraceTogether

- 新加坡政府科技處為健康部(MOH)研發的APP，至今下載超過100萬次
- 由MOH管控金鑰及上傳之接觸者加密資料

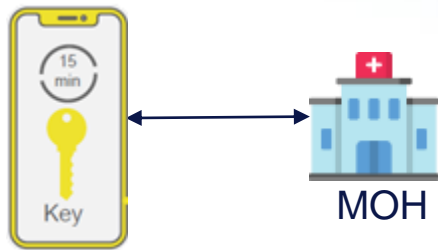
❖ PEPP-PT (Pan-European Privacy-Preserving Proximity Tracing)

- 由歐洲130多成員組成的非營利組織開發
- 可跨國際應用，具有隱私性符合GDPR要求

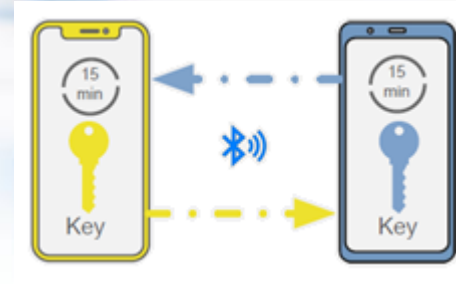
❖ Google & Apple Contact Tracing

- 由Google和Apple兩大業者合作，從系統底層提供低功耗藍芽接觸偵測技術
- 5月先釋出API讓政府機構開發系統，後續會直接內建到iPhone和Android兩大手機OS中

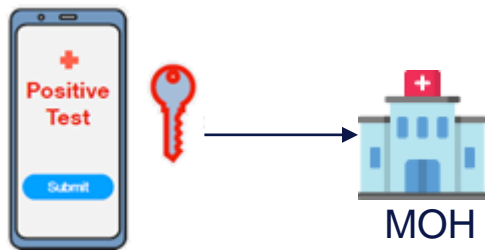
TraceTogether



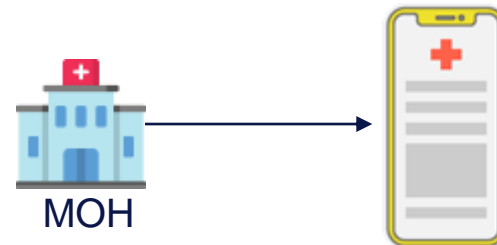
1. 安裝App，以**電話號碼註冊**，
並從MOH取得匿名ID(每日更新)



2. 透過藍芽交換匿名ID，
並記錄與手機內



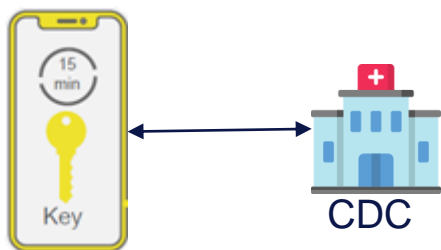
3. 在**確診者同意**下將與其接觸
的匿名ID上傳至MOH



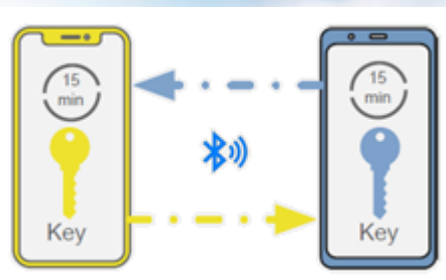
4. MOH解密後取得接觸者電話號碼，
通知接觸者進一步醫療處理



PEPP-PT



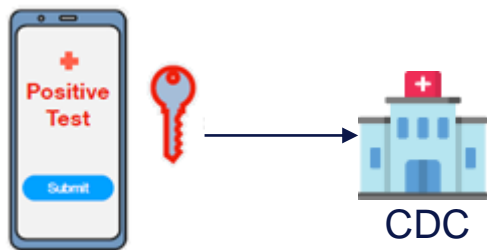
1. 安裝APP，註冊ID(可匿名)，CDC加密ID後，回傳給用戶(加密ID每小時更新，可預載48個)



2. 透過藍芽交換加密ID，並記錄於手機內



3. CDC提供認證碼給**確診者**



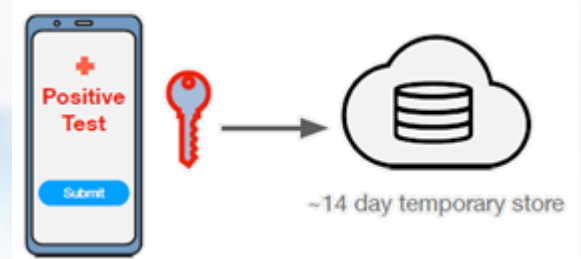
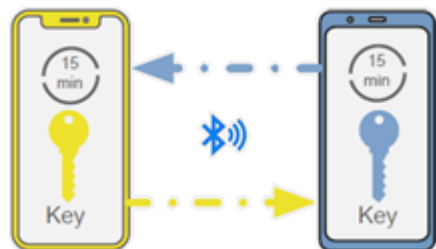
4. 在**確診者同意**情況下，**確診者**將**認證碼**及其接觸者的**加密ID**上傳至CDC



5. CDC驗證**認證碼**並解密接觸者ID，透過**APP Push通知**給接觸者，接受進一步醫療指示



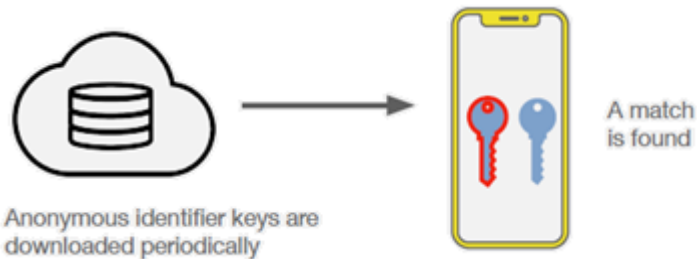
Google & Apple Contact Tracing



1. 安裝APP，以獨有金鑰每日產生日追蹤金鑰和每15分鐘產生滾動式接觸ID

2. 透過藍芽交換滾動式接觸ID，並記錄於手機

3. 在確診者同意下，上傳其14天內的日追蹤金鑰



4. 每個人定期下載該地區確診者日追蹤金鑰，與手機記錄的滾動式接觸ID比對

5. 若有接觸記錄，則顯示接觸狀況和時間(但無法得知距離、地點、身分) 及進一步醫療指示

註. 滾動式接觸ID(Rolling Proximity Identifier) 是一個16Byte的亂數值，以使用者日追蹤金鑰來加密，每15分鐘換新，因此無法用來持續追蹤同一支手機

低功耗藍芽接觸追蹤方案比較

比較項目	Trace Together	PEPP-PT	Google & Apple
上線時間	2020/3	2020/5	2020/5
提供方式	APP	原始碼	API
用戶註冊	電話號碼	匿名ID	不須註冊ID
判斷接觸者	後端運算	後端運算	終端運算
通知方式	MOH以電話通知	CDC以APP通知	APP自行偵測
隱私保護	符合當地法規	符合GDPR	符合GDPR
跨國追蹤	X	○	○
iOS背景運作	X	X	○



The Great Lockdown

**Worst Economic Downturn Since
the Great Depression**

World Economic Outlook, April 2020, IMF

COVID-19 加速生活型態改變

❖ 在家工作、遠距視訊會議、線上學習

❖ 宅經濟、線上經濟

- 電商
- 外送：foodpanda, Uber Eats
- 串流影視、直播
- 線上遊戲 (NBA 2K)

❖ 零接觸

- 行動支付、多元支付
- 遠距醫療、線上看診
- 聲控電梯、....



遠距會議

❖ Zoom, Google Hangout, MS Teams, Webex

❖ 資安議題

軟體問題

- 自動開啟鏡頭
- UNC (Universal Naming Convention) 造成 Windows 密碼外洩
- 安裝時載入其他程式，可能造成主機被加密勒索

個資外洩

- 傳送個資到 FB 或 LinkedIn
- 傳送個資到 China
- 帳密外洩

亂入

- 視訊會議會莫名被陌生人「亂入」

資安品質與管控不嚴謹

新建會議未設密碼、未管控與會成員



遠距會議/居家辦公 資安建議

安全建議七提醒 遠距會議

官網下載
視訊軟體

更新到最新版本

設定會議密碼與
會議成員限制

密碼與會議室連結以不同
管道分開寄以防止亂入

會議專用帳號

在電腦中新建一般權限的
使用者帳號，並用此
帳號參加會議

不使用公眾
免費WiFi

不隨意點擊
不明會議連結

資料共享
要注意

使用完畢關閉
攝影機/麥克風

安全建議五要素 居家辦公

1

確保終端設備安全
(防毒、更新)

2

登錄終端設備指紋
(企業認可的裝置才得連入)

3

使用多元身分驗證
連入VPN

4

管控終端設備與
使用者權限可連結的站點

5

終端設備與使用者
連結站點日誌查核



零接觸 行動支付/多元支付

行動支付

- ❖ 病毒會殘留在紙類上長達一天、銅板四小時，減少使用現金
- ❖ 以手機NFC或QR-code掃碼取代實體信用卡、票證卡
- ❖ Apple Pay, Google Pay, Samsung Pay
- ❖ Pi錢包、Line Pay、Taiwan Pay、街口、...
- ❖ PX Pay、My FamiPay、Happy go pay、銀行....



多元支付

- ❖ 收款方可用移動式多元支付機來完成無現金收款
- ❖ 涵蓋實體信用卡與票證卡、手機APP所乘載的電子錢包、虛擬點數等
- ❖ 可延伸到公車、輕軌、渡輪...等交通乘車付費



AR/VR + 遠距應用



VR看屋



AR/VR展售



VR會議室



AR/VR操演



AR/VR直播教學



AR視訊協作

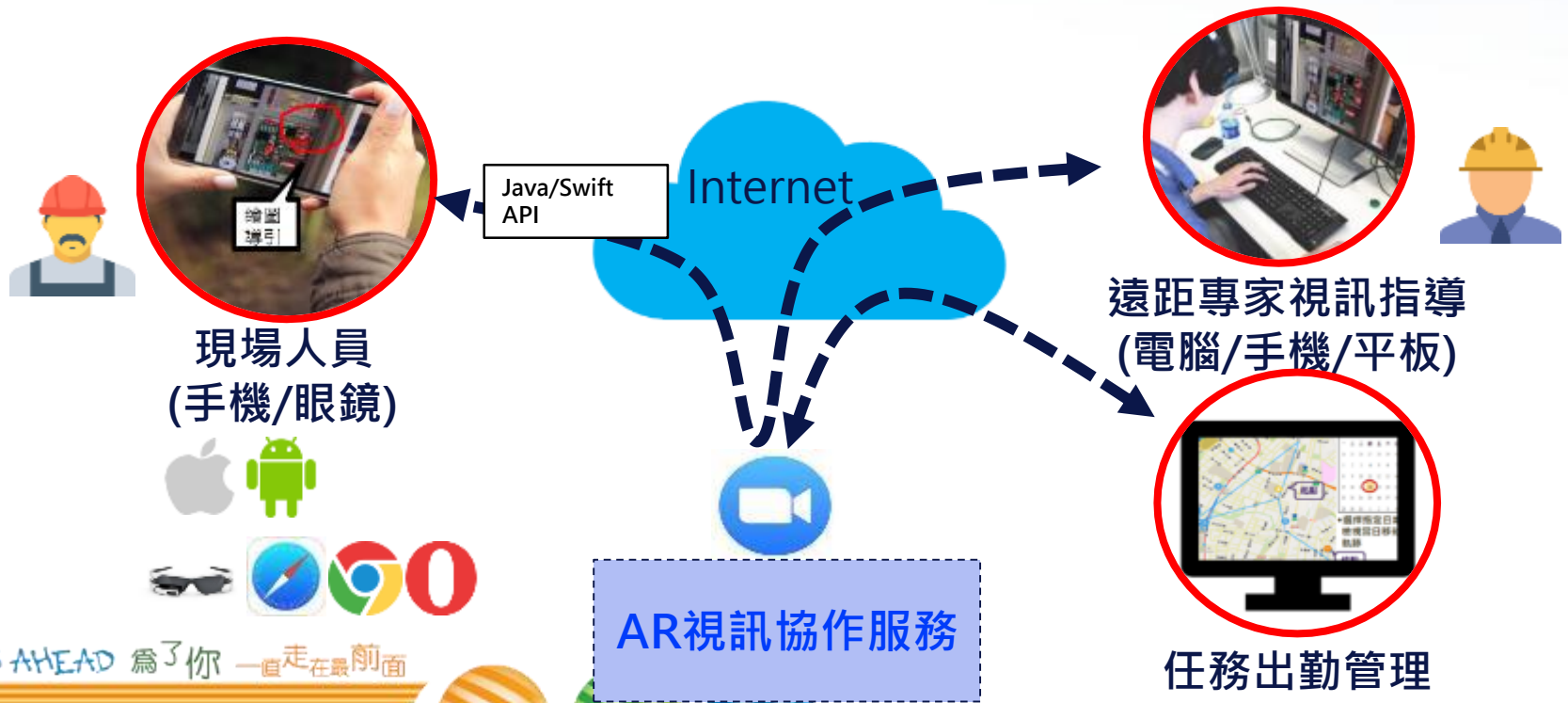
ALWAYS AHEAD 爲了你 一直走在最前面



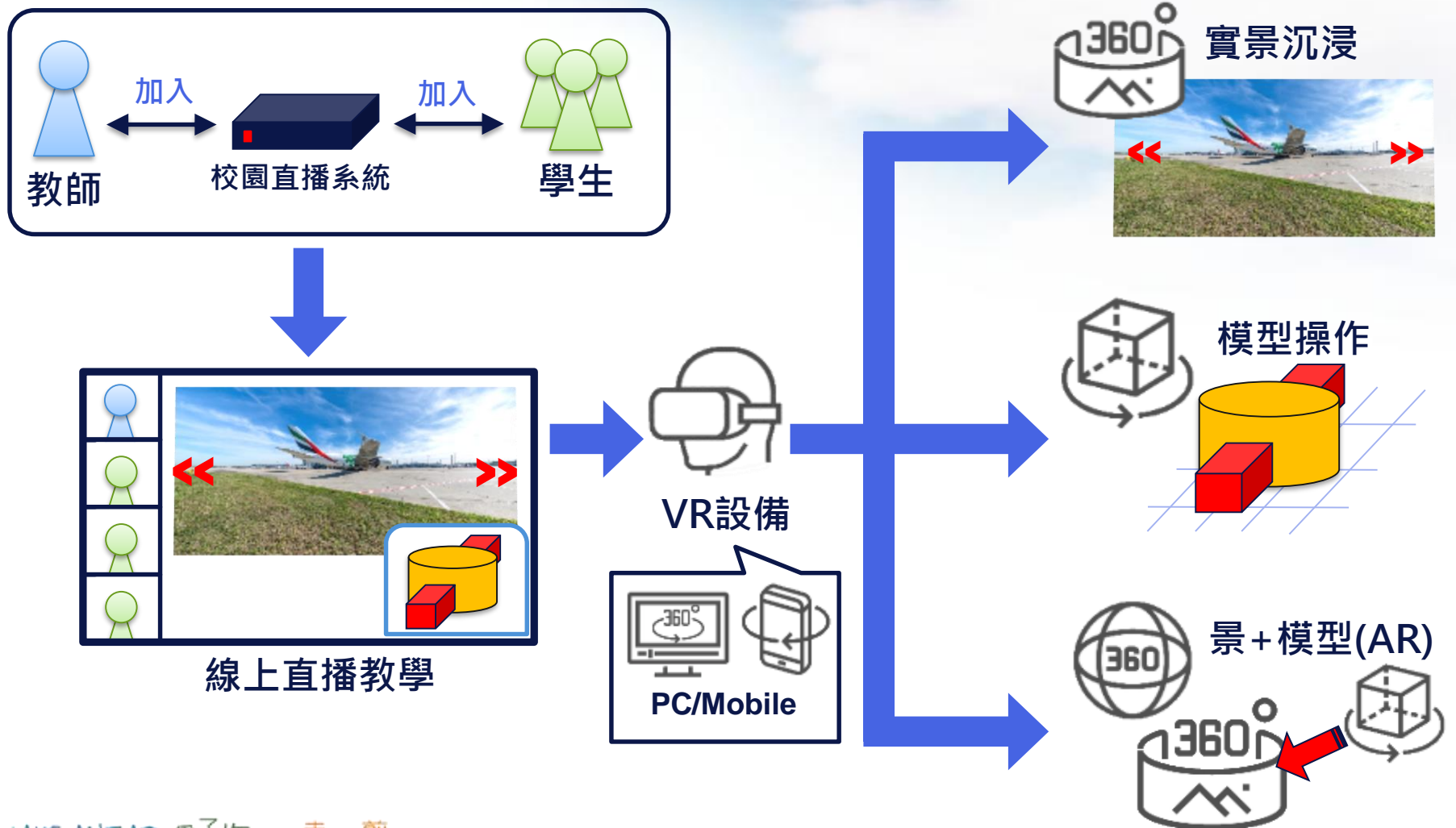
Refresh your life

AR視訊協作

- ❖ 提供企業現場人員與遠距專家透過手機/眼鏡/電腦，執行視訊通話(雙向、多人)、繪圖指引、文字訊息、拍照錄影與監控、任務派工等，以縮短工時及提升作業品質
- ❖ 可用於企業內部員工的溝通訓練，降低出差及面對面溝通的傳染風險
- ❖ 可用於客戶與技術人員之溝通，降低員工與客戶接觸的傳染風險



AR/VR + 直播教學



異地演奏會

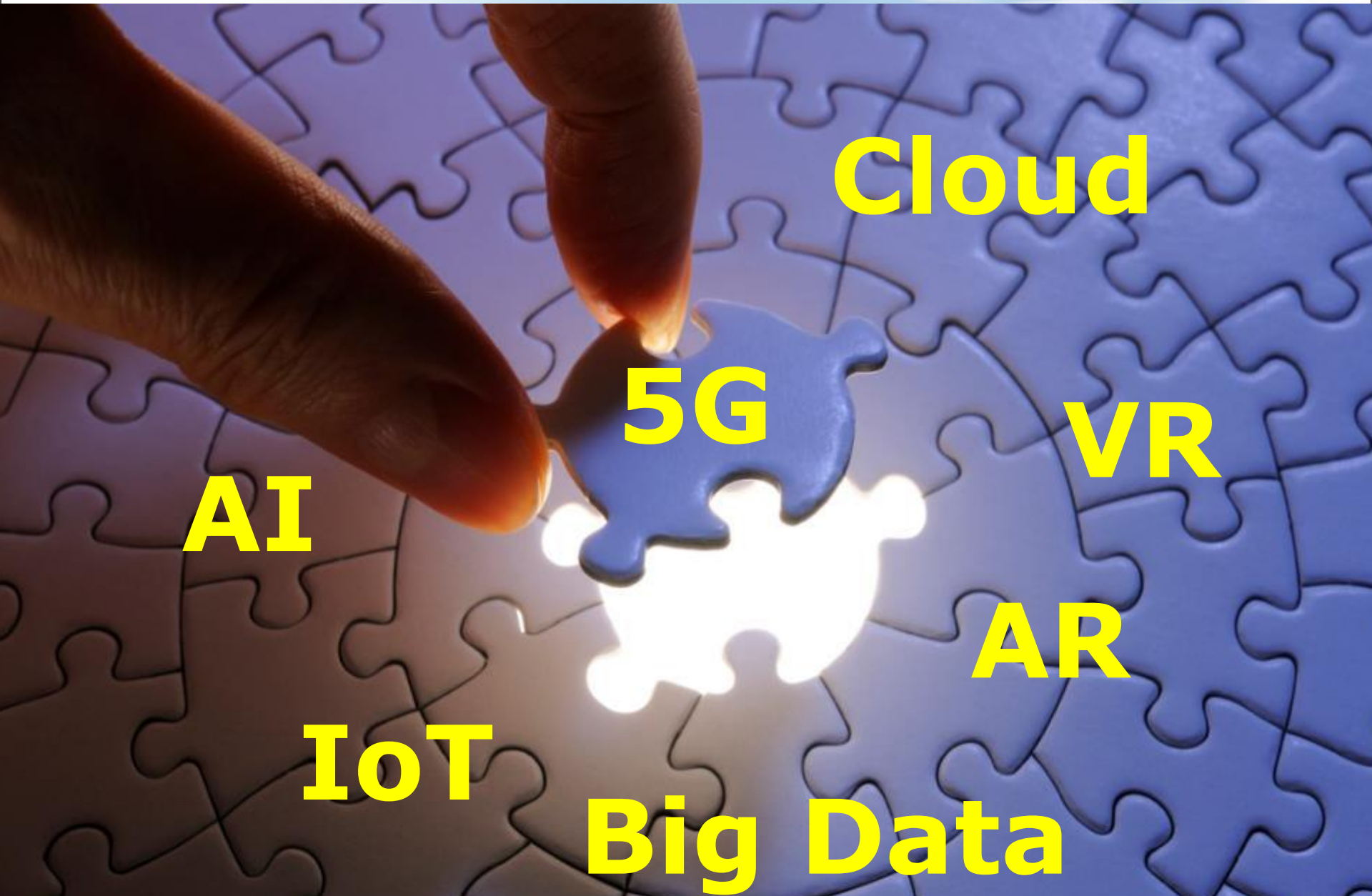
- ❖ 因疫情影響，歐美許多被居家防疫隔離的音樂家與歌手演出機會瞬間大減
- ❖ 透過 ICT 技術，許多合唱團與交響樂團轉而進行異地演奏會，藉以舒緩慰藉隔離民眾心情



Source :

https://www.youtube.com/watch?v=Sj4pE_bgRQI&feature=youtu.be&fbclid=IwAR0OeA2vm3AfTkHfdV5DIN4GIAOInHTaINZ1Mrn6hC6y0FOijNtuWcJazl

5G時代之ICT發展趨勢



AI

IoT

Big Data

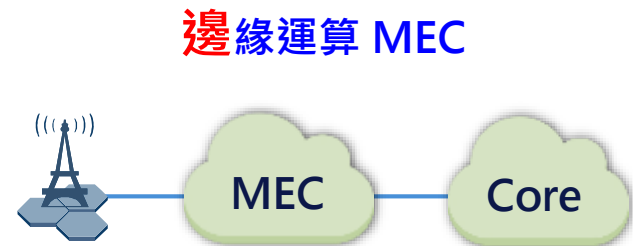
5G

Cloud

AR

VR

5G技術特性與應用



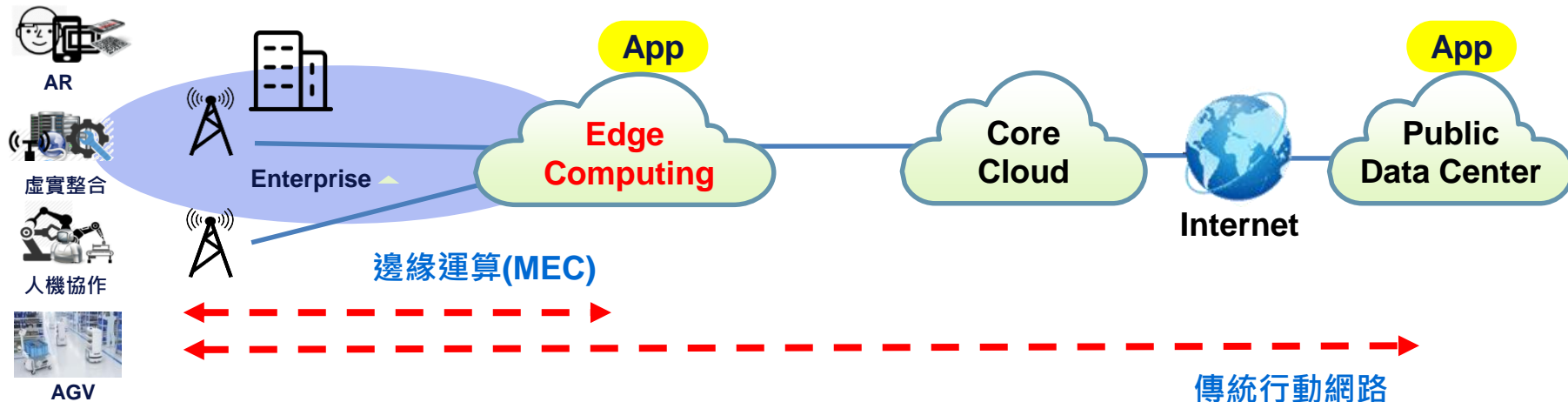
邊緣運算與企業專網

■ 行動邊緣運算

- ✓ 時間遲延較短
- ✓ 確保資料安全
- ✓ 可靠度及穩定性較高

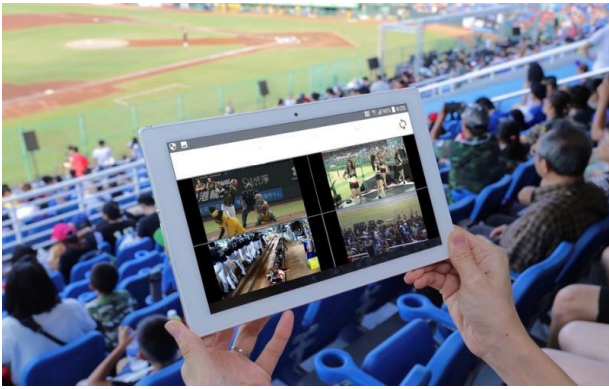
■ 企業專網

- ✓ 智慧工廠/智慧校園/智慧辦公室/智慧醫療
- ✓ 演唱會/運動賽事之多視角直播
- ✓ 景點/博物館之AR導覽

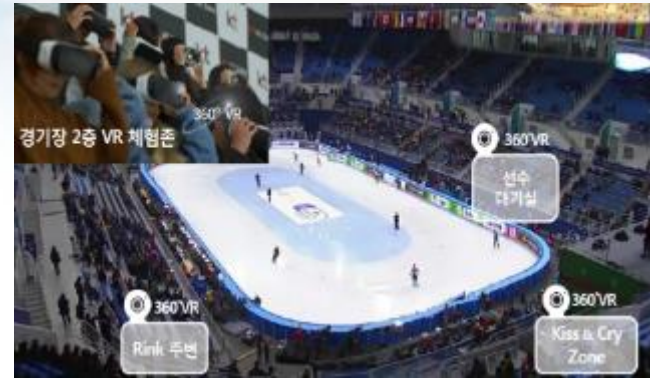


沉浸式影視體驗

多視角手機直播



360度環景影像



Cloud AR/VR



虛擬會議(全息影視)



5G XR 應用

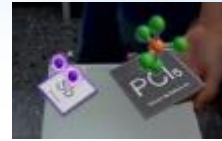
AR/VR
Innovation



娛樂: 遊戲 360°影音直播 擬真旅遊 社群
(3D 繪圖、高壓縮編碼轉檔、多重串流及穿戴裝置整合)



教育: 幼兒啟發 科學教育 藝術教育 醫療教學
(影像辨識追蹤、3D 繪圖、腳本化互動)



商務: 虛擬購物 不動產銷售 虛擬試衣 現場互動
(3D 建模技術、人體/手部姿態偵測追蹤、空間感知)



製造: 工作管理 倉庫揀貨 維修指引 虛擬訓練
(Marker/物件輪廓辨識追蹤、操控介面、空間感知)



5G遠距醫療應用

緊急救援



5G邊緣醫療雲

5G智慧救護系統

(智慧急救雲平台、車載急救管理系統、遠距急救會診指導系統)

遠距監護



生理參數檢測與遙測監護系統(一般民眾)
日常活動檢測系統(兒童、老年人、殘障)
病人生理檢測系統(入院病人)

遠距會診

4K/8K高清影像傳輸
VR/AR技術會診
醫學影像數據高速傳輸
遠距內視鏡會診

遠距超音波

遠距超音波檢查(會診)
遠距超音波手術(HIFU)

遠距手術

手術機器人
4K高清影像傳輸方案
VR/AR技術交互系統

遠距精準醫療

AI影像篩查軟體
遠距基因檢測

遠距查房

應用5G+AR技術之遠距查房系統

遠距病理

高速傳輸病理切片
AI輔助病理診斷方案

移動式診間

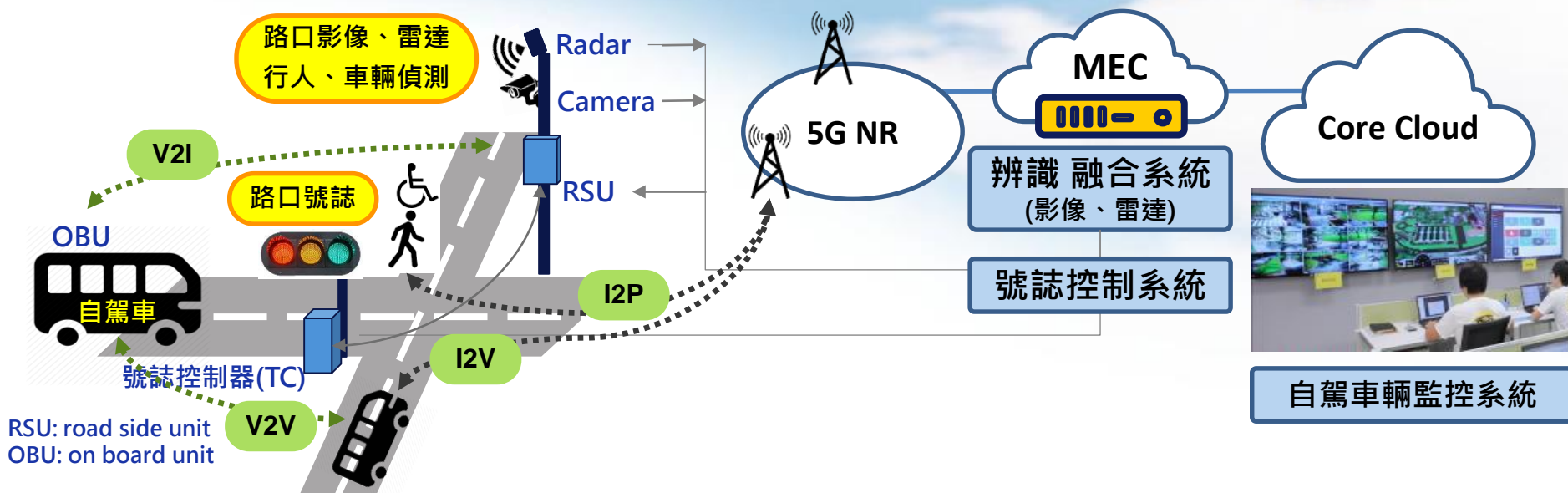
智慧型醫療攜帶設備(智能心電機、掌上型超音波)
智慧輔助診療決策支持系統
多病種多樣態智慧影像篩查產品
一站式健康管理系統

遠距示範教學

5G手術示範教學系統
5G醫學示範教學系統



5G 自駕車與C-V2X應用



- **路口號誌**狀態(燈色/秒數)透過C-V2X路側設備(RSU)傳送至自駕車(OBU)顯示，可**提前掌握前方路口狀況**，提高自駕車運行效率與路口通行安全

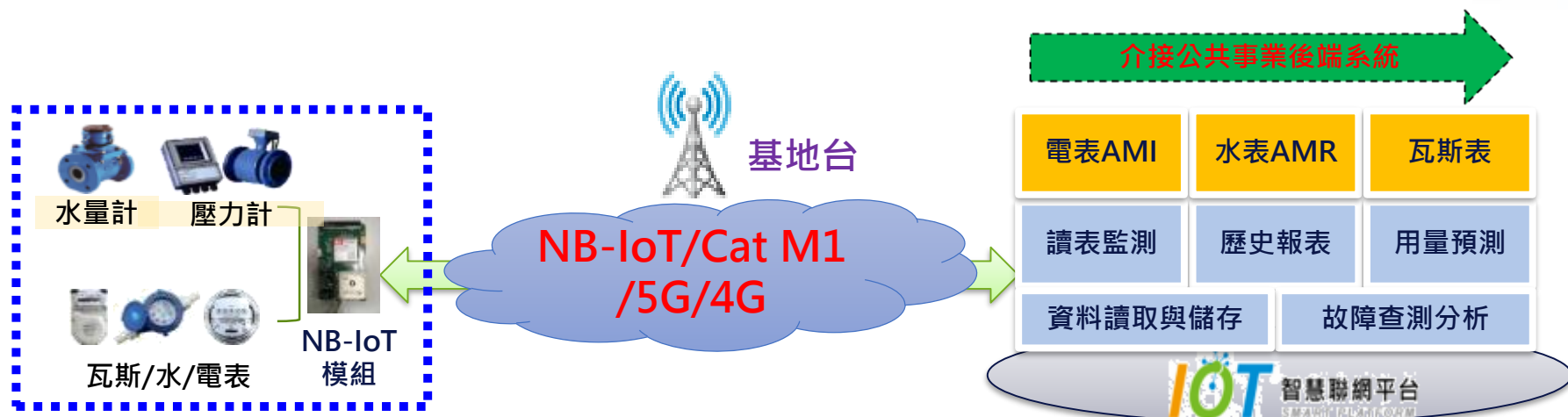
- **弱勢用路人預警**：路口攝影機及Radar偵測用路人/車，於**MEC**分析可能的路口衝突，透過5G通訊或C-V2X路側RSU通知自駕車、弱勢用路人

- **優先號誌控制**：運算分析自駕車通過路口時間，進行自駕車優先之路口號誌控制

- 行控中心透過監控系統掌握自駕巴士行駛動態
- 自駕巴士透過5G網路**回報行車資訊**(定位/感測/影像)至監控系統
- **路口號誌、路口影像**即時回傳至監控系統

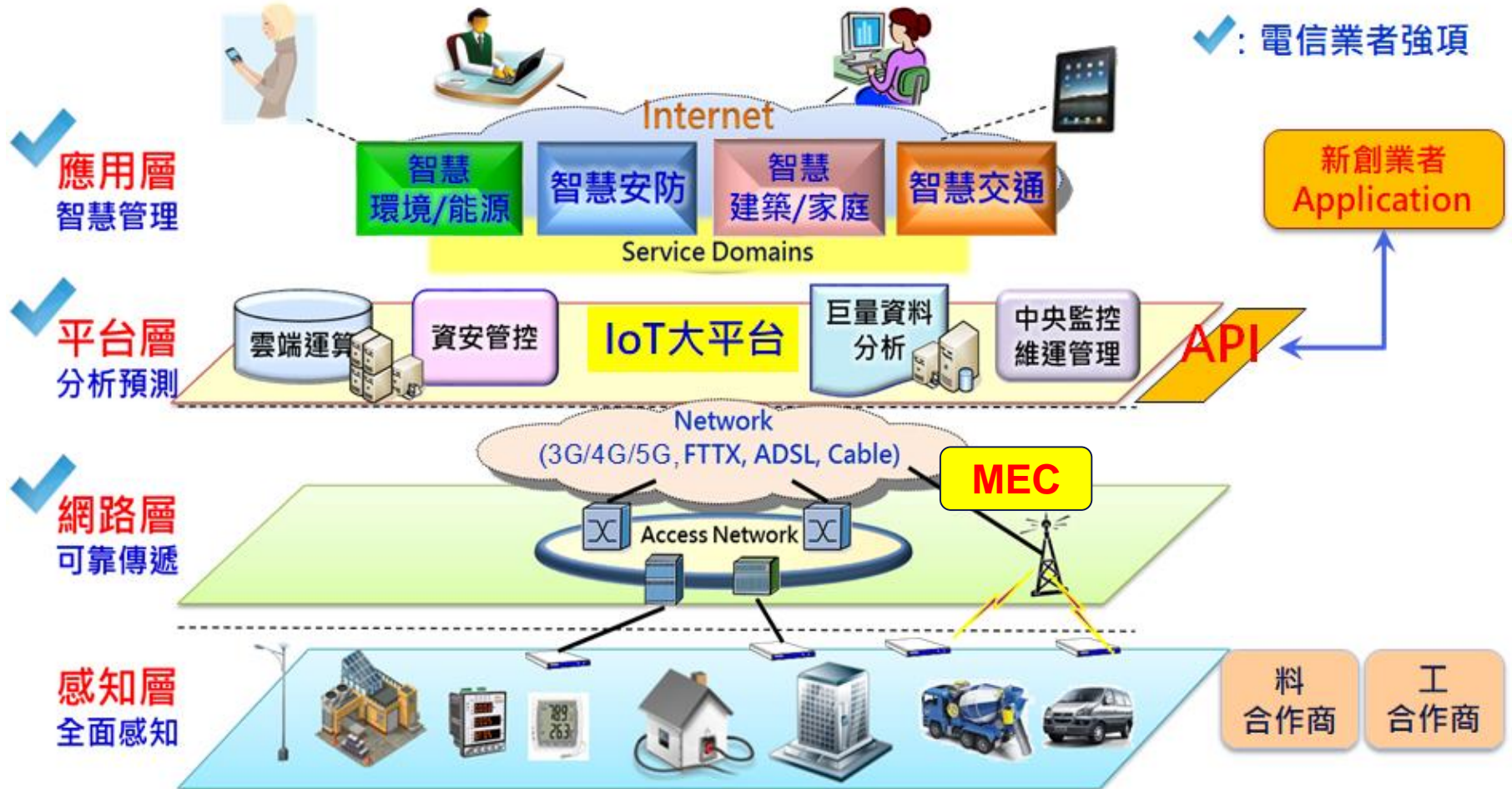
智慧三表(水/電/瓦斯)

- ❖ 透過5G NB-IoT/Cat M1大涵蓋及低成本優勢，連結公共事業與用戶(最後一哩路)
- ❖ 運用IoT平台收容自動讀表資料，取代人工抄錶
- ❖ 透過智慧分析進行增值應用，預知用戶行為提保管控



中華電信AIoT平台

❖ 結合AI、資安、大數據，掌握平台與應用服務價值鏈



ALL TIME BEST 網路 一直 在最 中國



Refresh your life

Who led the *digital transformation* of your company?

A: CEO

B: CTO

C: COVID-19