Witness Name: David Halpern
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UK COVID-19 INQUIRY

WITNESS STATEMENT OF DAVID HALPERN

Introduction

1. I, David Halpern, Chief Executive Officer of the Behavioural Insights Team, will state as follows.

2. I make this statement in response to the Inquiry's request for evidence dated 12 December 2022, in order to provide an overview of the role I played in the UK Government's response to the Covid pandemic. In accordance with the Inquiry's request, I have attempted to focus on what I perceive to be the key events relating to core political and administrative decision-making in the period from 1 January 2020 to 24 February 2022, as known to me.

Background and Experience

3. I am the Chief Executive Officer of the Behavioural Insights Team (**"BIT"**), a position I have held since 2014. From 2010, when it was first formed, to 2014 I served as Director of BIT. From 2013 to 2022 I was also the UK National What Works Advisor, a one day a week role based in the Cabinet Office. The What Works Network and (currently) fourteen What Works Centres are organisations that work with the UK Government and public sector workers to generate, translate and encourage the adoption of more evidence-based and effective practices and policies. I worked in Government under Tony Blair from 2001 to 2007 as the Chief Analyst to the Prime Minister's Strategy Unit. I have had no other roles within government. I was the Founding Director, and Research Director of the Institute for Government (an independent think tank) from 2008 to 2010.

4. I am originally an academic. I was awarded lifetime tenure at the University of Cambridge and have held posts at the University of Oxford and Harvard University. I first came to work for the Government on loan from the University of Cambridge in 2001.

Behavioural Insights Team

5. BIT was established in 2010 as part of the Cabinet Office ("**CO**") to provide the Government with a better understanding of human behaviour applying to policy challenges and issues. BIT works with various organisations throughout the world, to provide behavioural insights to assist people, communities and organisations through developing better systems, policies, products and services.

6. In 2014, the CO ran a competition to find a partner to co-own BIT. Nesta (which originally stood for National Endowment for Science, Technology and the Arts), a charity focussed on innovation and social good, won this bid and a five-year contract was set up to give continuity of service to the CO. This contract ended in 2019 and was then recompeted. BIT was awarded a follow up core contract for three years initially, with the option of an additional year which was taken ("**Core Contract**"). BIT is now fully owned by Nesta.

7. BIT's role in Government is to provide a behavioural perspective on Government issues based on empirical evidence. An example of a project BIT has worked on is the sugar levy. We recommended and advised the Government ("**HMG**") on the design of the tax.

8. For the avoidance of doubt, whenever 'we' is used in this statement, I mean it to refer to work or viewpoints I and BIT did or held as one.

BIT and the Cabinet Office

9. BIT holds no decision-making power and its role is principally advisory in nature. BIT receives requests for input from multiple Government departments. Typically, in response to these requests we supply notes, run experiments to help predict behavioural responses to policy options and, when requested, take part in policy or analytical discussions.

10. BIT's level of involvement in advising the Government on policy has depended on the Government and the Cabinet Secretary at the time. In the period 2010-2014, BIT was physically based within CO. Post-2014, BIT has been based outside of CO. The team was originally also conceived to act as a 'skunk work' team. By this I mean we were a team with licence to develop innovative ideas by thinking 'outside the box', albeit by bringing in a distinctively 'human centred' perspective on policy and delivery challenges.

Scope of involvement in Covid work

11. The work I and BIT undertook in relation to Covid was primarily done under the BIT Core Contract with CO, though some work was commissioned directly from the Department for Health and Social Care ("**DHSC**"). Formally, BIT would report to the Cabinet Secretary who at the time was Lord Mark Sedwill. However, in the early period of Covid, requests tended to come from multiple and evolving sources, such as Dominic Cummings or, in the early period of Covid, Matt Hancock. In the early period I had little involvement with the CO and was much more involved with the DHSC including matters being led by Matt Hancock, Sir Patrick Vallance (Chief Scientific Adviser, "**CSA**") and Chris Whitty (Chief Medical Officer, "**CMO**") and Scientific Advisory Group for Emergencies ("**SAGE**"). Later, with the evolution and formalisation of the Covid Taskforce, DHSC became the main 'customer' for BIT work relating to Covid.

12. From approximately 2 March 2020 onwards, I attended several DHSC daily Covid meetings. The times varied.

13. With the evolution of the Covid Taskforce, BIT would normally attend the Monday morning weekly overview meetings to ensure we were supplying timely analysis. I was asked to be on the advisory review of social distancing measures. Later I often took part in the 'red teaming' sessions that the Covid Taskforce organised to introduce more challenge to Covid policy and operational options. I was on the Scientific Advisory Group for the 'moonshot' programme on testing through DHSC. I attended a considerable number of meetings with Matt Hancock and DHSC generally at his or his private office's request. I was also present at a number of SAGE meetings in the early period of Covid.

14. During peak times, BIT had between 15-20 people working on Covid. Hugo Harper (health lead) and Mark Egan (researcher in quantitative, predictive online testing platforms) attended meetings on mine and BIT's behalf.

15. To the best of my memory, we were not sighted on advice that was given by others to the CO or the Prime Minister, other than verbal reports such as the ones via the Covid Taskforce, or personal conversations I had.

16. Throughout BIT's work on Covid, we ran 57 online experiments, four field experiments, provided 41 policy notes, and were involved in eight longer projects **[DH/1 - INQ000182189]**. We also conducted a small number of additional studies that we internally funded within BIT on issues that we felt were important, and conducted some commissioned work on Covid in other countries such as on the relative effectiveness of different messages for vaccination in US cities, prompts to encourage handwashing in Asia, and testing the efficacy of 'chat-bots' in Latin America.

Timeline: January 2020 – March 2020

17. I first became aware of Covid in my official capacity in January 2020.

18. I became formally involved in Covid on 14 February 2020 when I received a call from Chris Wormald (Permanent Secretary at DHSC) informing me that Matt Hancock wanted me to assist with the behavioural aspect of how the public would engage with the Government's response to Covid. Our brief was primarily to provide advice on how the Government would communicate Covid-related messaging so that the public recognised the severity of the virus, whilst avoiding public panic. In particular, Chris Wormald requested that a member of BIT staff should work closely with the communications team to offer ongoing behavioural insights support **[DH/2 – INQ000129006].**

19. At 3.30pm on 17 February 2020, I had a call with Wendy Fielder (Director of Communications at DHSC) and people from her communications team at DHSC regarding possible campaigns and public awareness. The early focus was in relation to 'no regret' public health messaging which were messages encouraging behaviours such as hand washing or being aware of symptoms. These behaviours were titled 'no regret' because they would encourage the public to take an action that was likely to do some good and would certainly not cause the public harm. The key messaging around

this time was in relation to handwashing. BIT reviewed literature and conducted its own research to determine the effectiveness of such messaging, including between 27 February and 2 March 2020 running a series of rapid trials which compared comprehension of the messaging across different types of posters **[DH/3 - INQ000129009, DH/4 - INQ000129098, DH/5 - INQ000129011, DH/6 - INQ000129033 and DH/7- INQ000129044].**

20. At 3.00pm on 18 February 2020, I attended a briefing on communications at DHSC. From memory, it would have been DHSC reporting back on how people had responded (in focus groups) to the images and text in alternative content, as was the normal way of testing campaigns. Again, from memory feedback included that people were not sure what the image was on early versions of the DHSC handwashing posers (earlier versions used images of multiple hands holding onto a rail in the tube, glowing with green fingerprints).

21. At 5:00pm on 18 February 2020 I had a call with Chris Whitty. One of the main points of discussion was what was currently known about the Covid transmission mechanism. The purpose of this was so BIT could understand the science behind Covid and transmission. BIT could then focus efforts on behaviours that would be effective to encourage in society, notably to reduce transmission.

22. At 11:00am on 20 February 2020 I attended a meeting at DHSC. This meeting concerned the "Comms Plan".

23. At 12:00pm on 20 February 2020 I attended another meeting, also at DHSC. The purpose of this meeting was to go over a Government publication outline that would set out publicly what we knew, what we thought would happen, and what we planned to do about it. The discussion included what level of detail to include on death rates from previous pandemics, going back to 1919, to be open about the range and possibility of what might happen. Following discussion, a table summarising the impacts of previous pandemics that was originally pencilled in for an appendix was thought better to be placed up front. The Contain-Delay-Mitigate-Research framework was discussed as the central element of the document. The strong expectation in the room from the medical experts was that the 'wave' would be unstoppable once community transmission occurred, i.e., once the 'contain' phase was left.

24. Between 22 and 24 February 2020 I travelled to Abu Dhabi for other BIT work. On my arrival back at Heathrow Airport, I was surprised at the lack of messaging around Covid throughout the airport. I searched specifically and the only messaging that I found was one pile of leaflets and one poster that was tucked away. Given previous discussions about raising public awareness, and actions to take, I was surprised not to see much more extensive signage as Heathrow was likely to be a key vector through which Covid would arrive in the UK **[DH/8 - INQ000129008 and DH/9 - INQ000129007]**.

25. On 25 February 2020 I had a meeting with Ben Warner (data scientist and aide to Dominic Cummings). The main focus of the meeting was non-Covid matters (industrialising quantitative methods in Government) but we took the opportunity to compare notes and share concerns.

26. On 26 February 2020 I attended a private breakfast seminar at the Royal Society of Medicine **[DH/10 - INQ000129097]**. The purpose of the meeting was to discuss the question of quarantine as it related to the current Covid outbreak. During the session I had a private discussion with Simon Wessely (President of the Royal Society) on key points that could and should be communicated to the public, and areas of uncertainty in aetiology and transmission of the virus.

27. On this day we also had a BIT team lunch with Hannah Fry (Mathematician) who presented a real-world simulation of how a virus could move through the population, using mobile phone data. I thought that this simulation could be utilised to inform where the limited testing could be placed.

28. Around this time, I expressed to Patrick Vallance and Matt Hancock, partly based on the Fry et al model, that testing should be deployed in targeted areas of high traffic that would be disproportionately predictive of the likely spread, such as Islington tube station and Heathrow airport.

29. At 9:30am on 27 February 2020 I attended a meeting in the Cabinet Room at No 10, chaired by Matt Hancock. **[DH/11 – INQ000184892]** I can see from my notebook entry key actions ('products') needed for that week included: comms strategy; plan to deal with issues, such as excess deaths and 'red rag issues'; as well as a legislative bill for the end of March. We discussed that a plan needed to cover the 'reasonable worst case'. I argued for urgent setting up of testing at key 'pinch-point' locations and to conduct simulations. Patrick Vallance asked me to join SAGE due to my work with BIT, and behavioural and technical expertise. I also think I was asked to join SAGE to

ensure there was a single view being put forward rather than alternative views being raised.

30. On this day there was also a 4pm data meeting at No 10. I believe this was with Ben Warner and others, including seeking to identify 'hyper local level' data and how it could be better linked to modelling, predictions and possibly policy actions.

31. On 28 February 2020, I had a call with Neil Ferguson (epidemiologist and member of SAGE) and Hugo Harper (health lead at BIT) to go through detail of the models, and especially with respect to transmission, mitigations and uncertainty. This meeting was suggested by Patrick Vallance after BIT said they needed to understand the models so that we could focus our efforts most effectively. According to Patrick, Neil was "about the best" of the SAGE modellers. In this meeting we were able to ask Neil a range of questions, such as if we run a campaign for people to wash their hands, will that change transmission levels and your modelling? We wanted to understand the knock-on effect various behavioural interventions might have, as suggested by the models. We were also keen to understand how far the modelling was able to look not only at an aggregate level, but also at individual level, such as the extent to which at-risk individuals could protect themselves, and how this might in turn lower overall impacts and deaths. At this time, the phrase and concept of 'herd immunity' was in use by the modellers, such as Neil, with particular focus on how to dampen the epidemic so that it did not 'overswing', i.e. the fewest people were infected necessary to end the pandemic. After our meeting I sent an email to Neil summarising the points of our discussion [**DH/12 - INQ000129010**]. I also sent an email to Chris Wormald on February 28th, which summarised the briefings received from the modellers, where we had been told 'basically you need to get to herd immunity, but you can get that at circa 50% (vs 80%) and if we can manage and slow it, that's potentially a lot of lives' **[DH/13 - INQ000182183]**.

32. At 3:00pm on 28 February 2020, I attended a meeting in No 10 arranged by Dominic Cummings. The meeting discussed issues about transmission and communications with the public. This may also have been the meeting at which Dominic Cummings pressed medical experts on the viability of rapidly training volunteers, including himself, to assist with medical care and tasks such as ventilation.

33. We also heard insights from commercial campaign companies, i.e., the reaction focus groups had to NHS and HMG brands, hand washing messages etc. We would have

also shared BIT's work on handwashing, including the use of large-scale online testing to refine and improve public comprehension of content. Dominic Cummings was keen for clear and simple messages, which were also generally found to perform better in our quantitative work.

34. At 6.20pm, on 1 March 2020, I wrote to Wendy Fielding (DHSC) and Jonathan Van-Tam (Deputy CMO) and others, in light of the Dominic Cummings meeting and further meetings due on comms the next day, about the need for an 'integrated message' that covered the range of things that we were asking the public to do, noting that at press conferences, 'people were struggling to combine the messages' **[DH/14 - INQ000182184]**. I argued that it 'needs to be something like: 'Wash – bump – stay…keep Covid away'. The classic rule is 3 items, and in memory span (can be stretched through rhyme). More detailed messages and info can then sit inside this framework, i.e.: Wash hands more often! Bump don't shake or hug! Stay home if feeling flu-y!' I noted: ''The 'stay at home' if sick message is also the one most likely to change if/as we move into later phases, when it will evolve into 'stay at home if vulnerable – i.e., 'cocoon' the frail and elderly'.

35. At 7.31am on 2 March 2020, Jonathan Van Tam responded expanding on the details of what he thought the 'stay at home' message needed to communicate **[DH/15 - INQ000182185]**. He also drew attention 'that SAGE is considering the science around a range of non-pharmaceutical interventions we may need to deploy. One is home isolation (as I've described above) which is good advice anyway. But another is Home Quarantine. This means when one person is ill they go home immediately as above; but in quarantine, all household members also need to retreat to the house when one person is ill and remain there for 14 days. You might want to just bear in mind that possible angle which could emerge.'

36. In or around March 2020, I discussed with Matt Hancock and others issues including the possibility of people wearing wrist bands to indicate if they had already had Covid (and would therefore have a higher degree of immunity and be unlikely to be infectious or vulnerable), as part of ongoing work around a possible need to reduce risk in clinical and work settings.

37. On 2 March 2020 at 8:15am, Matt Hancock held a meeting in his office. These meetings in Matt Hancock's office would typically occur daily and I would often attend. We would go through daily Covid numbers in the UK and abroad and discuss actions

with key advisers. These meetings would also cover substantive issues such as ventilator numbers. The attendees varied but included officials and advisers.

38. At 10:00am on 2 March 2020 there was a Scientific Pandemic Insights Group on Behaviours ("**SPI-B**") meeting with other academics including James Rubin (Kings College, London) and others **[DH/16 - INQ000129014**]. I agreed with Hugo Harper that he would generally attend SPI-B meetings and I would attend SAGE meetings.

39. At 3:00pm on 2 March 2020, I attended a meeting at No. 10 with Dominic Cummings, Lee Cain and others to discuss communications. Also present may have been two main commercial teams engaged in working with focus groups, such as Saatchi and Saatchi.

40. At 6:15pm on 2 March 2020 I met Clara Swinson (Director of Strategy at DHSC). Chris Wormald had asked her to lead on key aspects of Covid strategy.

41. At 6:39pm on 2 March 2020, I received an email from Mark Egan summarising Dominic Cummings had asked BIT to conduct a range of tests on best practice in Covid communication materials from around the world. The email stated that BIT was in communication with the American Centre for Disease Control ("**CDC**") and the World Health Organisation ("**WHO**") regarding this **[DH/17 - INQ000129012].** In response to Dominic's request we conducted testing on public comprehension on different posters and information on handwashing trials **[DH/18 - INQ000129099].**

42. At 6:12pm on 2 March 2020, I sent an email to Duncan Selbie (Chief Executive of PHE), asking whether the Public Health England ("**PHE**") lab was going to or could run tests on handshaking versus alternatives such as fist bumping to test whether it would reduce transmission of the virus **[DH/19 - INQ000129013]**.

43. At 6:39pm on 2 March 2020, Mark Egan from my office sent an email to Duncan Selbie which provided summary findings from an experiment run by BIT on testing seven different handwashing posters on a representative sample. In March, BIT ran an experiment involving 2,600 adults across the UK which tested seven posters from the UK, Singapore, Italy, South Korea, Spain, Taiwan, and the World Health Organisation and tested how effective each poster was in relaying the key message. We presented the findings of this experiment in our paper titled "Testing the efficacy of coronavirus messaging" dated March 2020 **[DH/18 - INQ000129099]**.

44. On 3 March 2020 I attended my first SAGE meeting **[DH/20 - INQ000061520]**. During the meeting I believe we discussed the efficacy of reducing the transmission of Covid, including a previous and encouraging study Lucy Yardley (Professor of health psychology) et al had conducted on the efficacy hand washing[1].

45. At 9:45am on 4 March 2020 I attended a meeting with Matt Hancock. At this meeting we discussed further behavioural interventions and also discussed wanting to run studies to show what interventions were effective. Following the meeting, I sent an email to attendees listing some of the urgent questions that needed answering in areas being worked on by BIT, many of which could have significant policy implications, such around more rapid testing, understanding and reducing transmission, and providing practical support to people being asked to self-isolate **[DH/21 - INQ000129016]**.

46. At 2:56pm on 4 March 2020, I received an email from NR of PHE regarding testing alternatives to fist bumping. In this email, Richard indicated that PHE had agreed to run some trials to test transmission involved in social greetings involving touching, however that PHE had a steer from Peter Heneghan (Deputy Director of Digital and No 10/CO) via Peter Graham, not to pursue the fist-bump work as it may distract from the hand washing messaging **[DH/22 - INQ000129017]**.

47. At 6:13pm on 4 March 2020, I sent an email to Ben Warner providing the above correspondence from Richard Amlot and offering my recommendation that the science needed to be separated out and then afterwards it was for, No 10 and Matt Hancock could decide whether they wanted to pursue the policy implications **[DH/23 - INQ000129018]**.

48. On the morning of 5 March 2020, Matt Hancock asked us to lead on the creation of a FAQ page about coronavirus for the public. I provided my initial thoughts the same day **[DH/24 - INQ000129019 and DH/25 - INQ000182186]**.

49. At 1:00pm on 5 March 2020 I attended a SAGE meeting **[DH/26 - INQ000061521].** In the meeting we were provided with a situation update, and projections including discussion on milestones which would trigger certain responses and behavioural interventions. In these projections, reasonable worst-case scenarios and the proposed response were discussed. Practical issues were also discussed, for example, how

[1] 'An internet-delivered handwashing intervention to modify influenza-like illness and respiratory infection transmission (PRIMIT): a primary care randomised trial', Lancet, 2015 Oct 24, https://pubmed.ncbi.nlm.nih.gov/26256072

older people would get online shopping deliveries. In addition, we considered how to communicate in a way that would be effective and would not panic people.

50. On 5 March 2020, I received an email from Matt Hancock's office regarding an urgent commission for a meeting with the Prime Minister that afternoon. 'Moving to contain phase [comms:] What does delay phase mean for me?' i.e., for public and various professional groups. I was specifically asked to move forward on a: 'Well-developed Q&A for public (single website) David Halpern to provide questions for clinical leads to respond to.' **[DH/27 - INQ000129020]**.

51. At 7:20am on 6 March 2020 I appeared on the Today Programme to discuss public messaging around hand washing. Generally, when we were approached for television and radio appearances, we contacted the communications team at the CO/No10 and DHSC. Typically, the communications teams would say no. However, in this case it was considered necessary to clarify with people why handwashing was important. During this interview, I discussed the importance of hand washing particularly in the context of how much people touch their face with their hands. Following this interview, I was asked by Special Advisors to do more comms in the following days.

52. At 2:00pm on 6 March 2020, there was an urgent meeting at DHSC with Ben Warner and others in attendance. At this meeting we discussed developing a mobile app to assist with contact tracing. Ben Warner and I held the same view that an app should be built and that it was of sufficient potential importance that multiple versions and approaches should be taken forward in parallel, given how critical it could be to help suppress the virus.

53. On 6 March Lee Bailey, Director of Communications at PHE emailed to ask me to review PHE's draft Covid guidance (following a request from SoS office). The guidance was due to be sent to public bodies such as schools about what they could do to help avoid infections. Advice included washing door handles, washing floors, washing hands and what to do if you had a suspected case. BIT were involved in this work because we could assist in writing it in a way the public would understand and make it more likely that clinically important behaviours would be adopted **[DH/28 - INQ000129022].**

54. I responded the following day by email. I suggested that the advice should be as specific as possible, the key risks should be more prominent, and the guidance should

explain to people why they were being asked to do certain things **[DH/29 - INQ000129038]**.

55. At 2:36pm on 6 March 2020, I received an email from Tim Leunig of HM Treasury regarding reducing the number of people infected, not just slowing the progress **[DH/30 - INQ000129031].** At 4:20pm on 6 March 2020, I responded to Tim Leunig in relation to this **[DH/31 - INQ000129037]**. I provided my opinion on various issues, noting that the vaccine would still be some time away. In this email I raised possible strategy issues as were currently being discussed, including:
    a. Flattening the curve;
    b. The use of anti-virals (not vaccines) which have been regarded as promising;
    c. Herd immunity (50-60%) without overswinging to 90%, the key bit being to direct the virus away from the most vulnerable; and
    d. Identifying and encouraging ways of getting immunity that was less harmful.

56. Around this time, I was discussing with Patrick Vallance about working on creating a 'Wikipedia/Reddit-like' question and answer board for the public, as requested by Matt Hancock, where unknown questions could be put and researchers and professionals could seek to answer (or conduct further research to answer). Patrick Vallance preferred that we instead get Mark Walport, who runs UK Research and Innovation ("**UKRI**") to produce a website of existing research. At 12:38pm on 6 March 2020, I was copied in on an email from Mark Walport to Louise Wood at DHSC and others, which provided a preliminary specification of the website **[DH/32 - INQ000129032]**.

57. At 4:30pm on 6 March 2020, I responded providing my opinions and recommendations for the website. I suggested:
    a. Including a mechanism in which people can ask questions;
    b. Having a private area of the website which could be accessed by key commentariat (i.e., including experts and well-informed media commentators); and
    c. Including behavioural as well as medical questions, such as will or did people comply with social distancing **[DH/33 - INQ000129036]**.

58. At 4:58pm on 6 March 2020, Mark Walport responded agreeing that behavioural issues would be included and indicating that the website would be released in three stages, first putting out a minimal viable product, then a second phase with deeper content and then finally a maintenance stage, with the recommended Q&A function to be included

early in the second phase. He indicated it was unclear whether a confidential section would be included **[DH/34 - INQ000129030].**

59. On the weekend of 7 and 8 March 2020 I spent time going through Covid public health guidance for multiple settings such as education **[DH/35 - INQ000129034],** social or community care and residential settings **[DH/36 - INQ000129023],** shipping and sea ports **[DH/37 - INQ000129024]**, transport **[DH/38 - INQ000182187],** prisons and other places of detention **[DH/39 - INQ000129025]**, employers and businesses **[DH/40 - INQ000129026]**, cleaning of non-healthcare settings **[DH/41 - INQ000129027]**, hotels and hospitality settings **[DH/42 - INQ000129028],** tourist and visitor attractions **[DH/43 - INQ000129029]** and leisure and community settings **[DH/44 - INQ000129035]**. I was considering issues such as whether guidance was written in plain English, as well as whether the suggested guidance would work (from a behavioural or human perspective). For example, if there was a suspected case at a school, guidance to isolate a child in a room by themselves for long periods looked problematic as this would cause distress and might not be a viable option (e.g. the child was likely to require some comfort, say from an adult in PPE).

60. On Sunday 8 March 2020 I did an interview on Sky, on hand washing.

61. At 10:30am on 10 March 2020 I attended a SAGE meeting **[DH/45 - INQ000061522]**. At this stage there appeared to be a view within SAGE that Covid was an unstoppable wave and containment of the virus would not be a viable option.

62. At 2.45pm on 10 March 2020 I did an interview with BBC reporter Mark Easton. The main focus of this interview was to show how we were testing messages to improve legibility and public comprehension. In this interview I made a comment about the potential need to 'cocoon' the elderly and most vulnerable in the weeks to come, and unwisely referred to the phrase 'herd immunity'. This is a phrase that had previously been used in the briefing we had received from Neil Ferguson at SAGE meetings and by Patrick Vallance at a press conference.

63. Following this interview, I was called to No 10 as Jack Doyle (Deputy Political Head of Communications) was not happy with my use of the word 'cocoon'. There was no issue with the use of 'herd immunity'.

64. On the issue of 'fatigue', on 9 March, Chris Whitty said at a press conference: "It is not just a matter of what you do but when you do it. Anything we do, we have got to be able to sustain. Once we have started these things we have to continue them through the peak, and there is a risk that, if we go too early, people will understandably get fatigued and it will be difficult to sustain this over time." Then on 12 March, he stated "An important part of the science on this is actually the behavioural science, and what that shows is probably common sense to everybody in this audience, that people start off with the best of intentions, but enthusiasm at a certain point starts to flag." I do not know whether Chris had specific evidence in mind when he made these remarks, or was drawing on clinical experience, but it was not from us. Indeed our view - and that of James Rubin (chair of SPI-B) - with respect to the literature on quarantine was that people would endure and sustain behavioural change measures over a considerable period of time provided that there was a clear and authentic justification for those measures. To drive home this point, on 13 March I sent a paper[2] to Chris and Patrick showing that during the 1918-20 flu pandemic ("Spanish flu"), people tolerated lockdown multiple times, and compliance only dropped in later lockdowns (and in a context where people had no TV, Netflix, or radio to distract them - and often in stifling heat) **[DH/ 46 - INQ000187622]**. It was certainly not our view therefore, that concerns about 'fatigue' were an empirically rooted justification for delaying lockdown or other measures.

65. At 10:00am on 6 March 2020 I attended a meeting in Matt Hancock's office on Social Care **[DH/47 - INQ000129039]**. At 1:57pm on 11 March 2020, I sent an email to Sharon Peacock (PHE expert lead on testing) regarding pushing on testing capacity **[DH/48 - INQ000129042]**. I received a response from Sharon **[DH/49 - INQ000129041]**. At 11:50am on 12 March 2020, I sent an email to Hadley Beeman of DHSC and others with key action points following my conversation with Sharon Peacock earlier that day regarding expediting test results and mass testing **[DH/50 - INQ000129049]**.

66. At 12:15pm on 12 March 2020 I attended the update meeting in Matt Hancock's office, with the usual invite list of CMO, Perm Sec, officials and others. By mid-March I remember a lot of meetings were flowing into each other, and I would often be asked to stay on after one meeting into another, which meant meetings I did attend were not always scheduled in advance in my diary.

[2] 'Behavioural responses to influenza pandemics: what do we know? PLoS Curr. 2009 Sep 9, Behavioural responses to influenza pandemics - PMC (nih.gov)

67. At 3:11pm on 12 March 2020, I received an email from Hadley Beeman with a proposal for widespread communications with the public about Covid and the science underpinning strategy **[DH/51 - INQ000129043]**. At 3:17pm on 12 March 2020, I sent an email to Hadley Beeman indicating that Patrick Vallance was getting something sorted out with UKRI and Mark Walport, however I expressed my concern at the speed in which this would be rolled out **[DH/52 - INQ000129048]**.

68. At 3:49pm on 12 March 2020, I sent an email to James Rubin, Will Warr, Hadley Beeman (and other BIT internal personnel) pressing for more concrete social distancing measures and providing concrete examples of measures that could be taken **[DH/53 - INQ000129047]**.

69. At 5:49pm on 12 March 2020 I sent an email to Chris Wormald, Patrick Vallance, Chris Whitty, Jonathan Van Tam, James Rubin, Matt Hancock, Ben Warner, Will Warr, and Hadley Beeman. This email expressed my concern at the limitations of the SAGE modelling and provided my recommendation that there should be concrete advice on general 'social distancing' as well. In this email I produced a draft guidance note **[DH/54 - INQ000129046**].

70. I was not the only one puzzled at why SAGE was not recommending stronger action. For example, James Rubin (Chair of SPI-B and on SAGE) wrote to me at 23.44 on 12 March: 'I wanted to talk about those modelling papers. I am not a modeller and know my limits. But they suggest that social distancing is beneficial? Why are we not recommending it?'

71. At 6:06pm on 12 March 2020, I sent an email to Hadley Beeman and Emma Dean of DHSC with my comments on the earlier email exchange with Mark Walport from 6 March 2020. I expressed my concerns regarding the form of the website and the speed at which it could be rolled out. I provided recommendations for extra content to be used **[DH/55 - INQ000129045]**.

72. At 3:30pm on 13 March 2020, I attended what I consider to be a key SAGE meeting which was held at the Department for Business, Energy and Industrial Strategy ("**BEIS**") **[DH/56 - INQ000061523]**. In the meeting, I recall there was a graph of an inflection wave over time, with a red-line to represent the NHS capacity with the objective to keep the wave under the red-line in line with the mitigate-delay messaging. However, during the meeting it became clear that there were different understandings of capacity (the 'red-line'), whether number of beds or number of ventilators.

73. Additionally, during the meeting Stephen Powis and Patrick Vallance questioned the modellers on why they were so sure that suppression of the virus, in line with what was being done in China and South Korea, was not viable. The response from Graham Medley and John Edmonds was that suppression was not viable because as soon as a lockdown was lifted the virus would spike back up, implying there was no point. Graham Medley and John Edmonds, both stated that they were 100% sure about this. This gave me great concern as, in the world of probability, no one would ever say that they were 100% sure. It indicated over-confidence in the model, and they were discounting any possibility that we might be able to get in place a more sophisticated form of suppression (such as a functioning app or measures such as I had suggested in my emails over previous days). Due to this, the confusion regarding the NHS capacity, and other issues such as the very low level of testing capacity and ambition, I wrote in my notebook 'WE ARE NOT READY'. A No 10 colleague leaned over, crossed out 'NOT READY', and wrote 'Fucked!' **[DH/57 - INQ000129100]**.

74. I was under the impression that the penny had dropped at that meeting for several people in the room, that the anchoring in the SAGE modelling was problematic and others in the room also felt that we should have been pursuing suppression strategies.

75. Following the meeting, I sent a text message to Matt Hancock who was not present (at the SAGE meeting) asking whether he received a readout; Matt Hancock had not. He called me back to speak about what happened. I told Matt that I felt that the penny had dropped that we really needed to do something about suppression and locking down. When I said this to Matt, he said words to the effect of "that is the best news I have heard all week". My impression was that Matt was relieved the penny was dropping as he felt that stronger and more immediate action was necessary and we could not just wait for the unstoppable wave.

76. On 14 March 2020, I sent an email to Will Warr, Keith Willett, Patrick Vallance, Duncan Selbie, Sharon Peacock and the private secretary for Matt Hancock, regarding incentivising car manufacturers to assist in making ventilators **[DH/58 - INQ000129051]**.

77. On 14 March 2020, I was copied on an email from Will Warr indicating that John Bell was offering to give a Roche testing machine which did 5000 Covid tests per day and asking how many machines would be required. I also received an email from Patrick Vallance indicating FDA approval of the Roche test. In my response I noted that it was

a good development but 'still not the order of magnitude we're really after' **[DH/59 - INQ000129052].** Will Warr and I worked closely over the coming days to mobilise support for a substantial expansion in testing. This was both to improve our ability to track and trace Covid, and because of evidence from BIT work that testing would increase compliance with requests to self-isolate.

78. On 16 March 2020 I emailed Mark Sedwill to say BIT was going to prioritise Covid issues **[DH/60 - INQ000129055]**. Mark Sedwill replied in agreement **[DH/61 - INQ000129054]**. On the same day, a member of BIT, attended a meeting with DHSC and NHSx (Government unit with responsibility for setting national policy and developing best practice for NHS technology, digital and data), to discuss alerting members of the public of Covid emergencies via their mobile phones **[DH/62 - INQ000129053]**.

79. On 17 March 2020 I attended a Testing Summit at No 10 in the Cabinet Room **[DH/63 - INQ000129056]**. The first 30 minutes were chaired by Matt Hancock. The meeting was then chaired by the Prime Minister. There was a real concentrated effort on our and Will Warr's part to get this Summit to occur. Up to this point, there had not been a big focus on testing because the view in SAGE was that Covid was an unstoppable wave. Will Warr and I had spent a lot of time over the previous weekend on calls with Duncan Selbie and Sharon Peacock to go over what was viable, and in particular how we could go beyond the limits of current PHE testing. By the time of this meeting, the focus had shifted from whether to test, to how to test. At the Summit, the Prime Minister asked whether testing would encourage people to comply with requests to self-isolate, and I was able to share the headlines of the BIT/Predictiv trial result that showed this was the case.

80. At 9:21am on 18 March 2020 I sent an email to Mark Sedwill and Dominic Cummings (copied to Chris Wormald and Ben Warner). In this email I expressed my opinion that the SAGE models and assumptions were wrong and that they never really considered the possibility that a sufficiently effective global lockdown could be achieved to shut down the virus **[DH/64 - INQ000129061]**. At 1:12pm on 18 March 2020, Mark Sedwill responded. At 1:46pm, I responded to Mark Sedwill **[DH/65 - INQ000129058]**.

81. Also on 18 March 2020, at 10:30am I wrote to Jeremy Farrar, Director of Wellcome and also on SAGE: 'at SAGE, I'm going to press for discussion of total lockdown for 3 weeks, globally coordinated. I feel that SAGE discussions, and the modellers, in essence have presumed that global shutdown could not be done, and even if close to

achieved, that a massive secondary peak is inevitable (you will recall that when pressed on this re China, they said '100%'). I don't think the behavioural assumptions are correct. And importantly, in 3 weeks time we could have the testing and tech enabled contact tracking to contain more focused outbreaks.' I wrote to Jeremy because I thought he also had doubts about the SAGE position, and as a respected medical researcher he might help carry the argument **[DH/66 - INQ000129060]**.

82. At 2:00pm on 18 March 2020, I attended SAGE in person **[DH/67 - INQ000061525].** I and others argued that a sufficiently effective lockdown could be achieved to shut down the virus. This was also the meeting of SAGE that Dominic Cummings brought two external data scientists – Demis Hassabis (Deep Mind) and Mark Warner (Faculty) – to reinforce the point that there was uncertainty in the modelling, particularly at the early stages of an exponential, and urging action. Neil Ferguson had by then put out a paper saying a series of lockdowns would be viable and could suppress the virus over a long period of time – this was a change of tune. My impression following the meeting was that a lockdown was now on the cards.

83. At 2:20pm Chris Wormald responded to my email of 9.21am that day with further questions about the possibility of a global lockdown and the issues around timing of a global lockdown. At 8:42pm I responded to Chris Wormald **[DH/68 - INQ000129059]**.

84. Summarising the above, from 16 March 2020 to 18 March 2020, I sent several emails to Mark Sedwill, Chris Wormald, Dominic Cummings, and Jeremy Farrar in advance of the SAGE meeting on 18 March, expressing my concern that 'SAGE has never really considered the possibility that a sufficiently effective global lockdown could be achieved to shut down the virus. Literally all the models assume that there will be a full-blown epidemic…' These exchanges may have influenced Dominic Cummings to bring outside analysts to SAGE, or may have reflected a convergence of views from a number of senior figures that SAGE had become stuck. For example, Mark Sedwill responded on 18 March to my email noting 'So on your underlying point, it would be worth testing whether those and others were properly explored' **[DH/65 - INQ000129058]**.

85. At 4:28pm on 19 March 2020, I sent an email to Will Warr, Ben Warner, Hugo Harper, Hadley Beeman, Duncan Selbie, Clara Swinson, copied to Matt Hancock, Lee McDonough, Alex Aiken, permanent secretary (DHSC), outlining which issues BIT would be focused on **[DH/69 - INQ000129065]**.

86. At 6:50pm on 19 March 2020 I sent an email to Patrick Vallance, Dominic Cummings, Chris Whitty, Neil Ferguson and Will Warr referring to an Italian study which provided one of the earliest estimates of asymptomatic cases, as well as updated age-adjusted fatality rates through repeat testing of an Italian population **[DH/70 - INQ000129064]**. BIT worked in a number of countries, and had a very international staff, and we believed that it was very important to learn lessons from other systems and countries. For example, this particular study was published in Italian only at that time and was unusual in that it involved having tested Italians on two occasions to provide a direct estimate of the number of people who had Covid asymptomatically. We felt this was important behaviourally – and for SAGE – since much of the focus had been on getting people with symptoms to stay at home, but was potentially missing the importance of people who had Covid but weren't aware of it. When we had information that seemed of use and relevant, such as with data or practices from other countries of with a novel perspective, we would share it as I did here.

87. At 6:54pm on 19 March 2020, Neil Ferguson replied saying he had seen the study and indicated that it did not change severity estimates (infection/ fatality ratio) which were grounded on swabbing of people on repatriation flights **[DH/71 - INQ000129063]**.

88. On 20 March 2020 I attended a meeting in Matt Hancock's office on testing. By this time, Matt Hancock generally had daily meetings on testing. At this stage meetings were generally held online. After the meeting Matt Hancock's office sent an email at 2:39pm which set out the key decisions and action points from the meeting **[DH/72 - INQ000129066 and DH/73- INQ000129067].**

89. On 20 March 2020, we were asked to give DHSC 'A behavioural insights view (in terms of messaging and behavioural change) as to whether there is a downside of going for whole of England/UK lockdown?' London was ahead in infections, and there was therefore a case measures to be brought in earlier there, but to be more focused so as to reduce economic damage more widely. We were asked to give a behavioural view on:

    a. is it better to do London now then other places in stages as needed later or everywhere nationally now? and;
    b. is it better to take people out in stages or a single end nationally? Is it better to move in stages now, or better to move out in stages later?

90. We responded that we thought London could and should be locked down immediately, and phasing would work provided that it could be 'authoritative' in the sense of being backed by clear data on infections. As I recall, this advice was requested urgently in advance of a meeting between Matt Hancock and the Prime Minister.

91. On 21 March 2020, I sent an email to Lee Cain and Will Warr with advice on messaging surrounding supermarkets: including panic buying and prioritising home deliveries **[DH/74 - INQ000129068]**.

92. At 12:30pm on 23 March 2020 I attended an online SAGE meeting **[DH/75 - INQ000129072]**. I recall many people struggling to access the meeting, since the system didn't seem able to handle the number of people on the call. I believe this was the last SAGE meeting I attended. I was never formally or officially dropped from SAGE, but at some point around then I stopped getting invitations to meetings. SAGE does not keep the same membership and it is for the GSA and the SAGE secretariat to decide who has the best expertise for the given challenge it is wrestling with.

93. At 12:30pm I received an email from Tim Leunig showing estimates indicating large numbers of excess deaths **[DH/76 - INQ000129069].** I forwarded this email on to Martin Clarke at the Government Actuary's Department, providing my view that 'the modellers in SAGE seem to have a remarkably thin grip on the deaths caused by externalities – in other words from behavioural or system side effects such as people being too afraid to seek treatment for other conditions' **[DH/77 - INQ000129070]**. In this email I provide my comments on the current decision-making structure, noting that the recommendations from SAGE should be balanced against other considerations including economic factors.

94. At 4:26 pm on 23 March 2020, I sent an email to Matt Hancock's office and Kathy Hall regarding getting an urgent fix on the levels of asymptomatic people infected as the answer would greatly affect strategy and communications **[DH/78 - INQ000129071]**.

95. On 23 March 2020, the Prime Minister announced the first lockdown. People were, in effect, starting to lockdown prior to the Government's announcement.

96. On 24 March 2020 I had a discussion with the Director of Sainsbury's to discuss how to support vulnerable and isolated people to access food. On the same day at 8:09pm on 24 March 2020, I sent an email to Mark Sedwill and Dominic Cummings copied to William Warr, Ben Warner, Tom Shinner, Tim Leunig and Hugo Harper with a note on

Post-Lockdown options **[DH/79 - INQ000129074 and DH/80 - INQ000129075]**. I believe this note was done of my own volition, I.e., there was not an over commission to draft it. The main conclusions were contained in the email. The note covered the implementation of the lockdown and whether the public would generally comply. It also covered how different countries were likely to respond in different ways depending on cultural factors, such as high social capital versus low social capital societies (tight versus loose society) and how that could inform messaging. The note drew out the implications for the UK, given that it was mid-table in terms of social capital (and tight-loose) as a society, compared to a South Korean society which is classified as a relatively 'tight' and high social capital society and more likely to abide by the rules with less formal enforcement and messaging, versus a more loose society like Italy, who would require stronger messaging. Mark Sedwill responded at 21.51: 'Please dock into the strategy work being done in CO and DHSC. My office then followed up with Tom Shinner the next day to set up a call to make sure we 'dock in' with the work he was starting to lead.

97. At 8:19pm on 24 March 2020 I sent a further email which contained my recommendation for the next press conference to make a clear request for people with symptoms to register on 111 digital **[DH/81 - INQ000129073]**. This was so that we could get better data on which localities were having surges in cases (if postcodes were gathered), could enable more personalised follow-up and support (especially if mobiles were recorded), and the more refined data on symptoms by postcode area could provide valuable data on whether our measures were working.

98. At 11:00am on 25 March 2020, I attended a meeting with NHSx and Polly Bishop (operational lead for NHSx). In this meeting I expressed my concern that NHSx had made a mistake in backing only one app developer. Other issues being discussed were whether the app could be connected to 111 and how to get tests to people who were reporting symptoms or that they had been in close contact with someone who had symptoms.

99. On 25 March 2020, I received an email from Polly Bishop which forwarded an email chain with Diane Baynham (at NHSx) regarding the NHS platform 111. In this email chain, Polly sent an email to Diane at 11:25am on 25 March 2020 indicating that she was on a call with me, enquiring about the viability of asking the public to log onto the NHS 111 platform and to provide postcodes, mobile phone numbers and symptoms **[DH/82 - INQ000129076]**.

100. In this email chain, Diane responded at 11:55am on 25 March 2020 indicating that the platform did not have that capability – in other words that postcodes, mobile numbers or symptoms were not being captured. Further, to cope with the traffic, the architecture of the platform would need changes. I sent further emails around that time regarding this issue **[DH/83 - INQ000129077 and DH/84 - INQ000129078]**.

101. By 25 March 2020 I was no longer on the SAGE formal attendees list. As such, if there was any material that I thought should be considered at SAGE, I would send it to Patrick Vallance or others, for example, on how apps other countries were evolving, including colour coding areas based on transmission rate so that the public could adjust their behaviour according to rates (c.f. pollen counts or extreme weather warning), and how other countries were using a variety of approaches to achieve more sophisticated suppression.

102. At 11:00am on 26 March 2020, I attended a meeting with Matt Hancock and NHSx to speak further about the app.

103. At 11:05am on 27 March 2020, I sent an email to Sarah Wilkinson from NHS digital emphasising the need to capture as much data as possible **[DH/85 - INQ000129080]**.

104. At 4:45pm on 27 March 2020 I had a call with Tom Shinner. My understanding was that Tom was brought into No 10 to get a stronger grip in the centre of government on the Covid strategy, including creating a framework and conditionality for how the UK would exit lockdown, and manage suppression.

105. At 10:00am on 31 March 2020 I had an in-person meeting with Tom Shinner. We discussed social distancing and Tom shared his strategy. In advance of the meeting, we shared a summary of the main work and papers that BIT had produced so far. I had also forwarded Tom Shinner the email note on 24 March entitled 'Getting ready for the next phase against Covid19'. In the wake of the meeting, Tom asked Ollie Ilott (No 10) to share their 'flowcharts' and to set up a call with me to go over their thinking.

106. On 31 March 2020, my team and I prepared and shared a note on 'Why the UK general public should use facemasks'. This was an internal note, shared with No.10, which argued that the UK position on facemasks at that time was wrong, and they

should be considered as part of the strategy to unlock the UK **[DH/86 - INQ000129082]**.

Timeline: April 2020 to February 2022

107. By April 2020, I no longer attended SAGE meetings. My direct involvement with No 10 reduced from this point onwards also. In light of my more limited input at this time, the timeline below is restricted to the key junctures between April 2020 and February 2022.

108. During the non-priority period my team conducted a great deal of studies as per **[DH/1 - INQ000182189]**. Within this witness statement I have focused on what were the bigger projects in terms of time and/or cost. We continued to provide advice on suppression, lockdown and on SAGE modelling.

109. On 31 May 2020, I sent a letter titled 'The Reset' to Simon Case, Dominic Cummings, Munira Mirza and others setting out what I saw were the urgent policy opportunities and lessons to learn at that juncture **[DH/87 - INQ000129083** and **DH/88-INQ000129084]**.

Spring 2020: Using behavioural insights to create a 'digitised Covid service'

110. In or around March 2020 we were commissioned by NHSx to assist with the Covid text service for the NHS by providing behavioural insights. I did not agree with the strategy that was being adopted for the app – which was to develop only one version of a digital aid to assist with tracking and tracing. My strong view, expressed to Matt Gould (NHSx) was that tech-enabled suppression was potentially so important, both in health and economic impact, that NHSx should pursue a portfolio of approaches so that we would be much more confident of at least one of them being ready by the end of the first lockdown. Specifically this would have included: setting up at least two teams in parallel for the 'internal' app development; seeking to 're-skin' a version of a Singapore style app or fob (helpful for less tech savvy people); and a non-app version that relied more heavily on less precise but existing commercial tracking capabilities. I also shared these concerns with Matt Hancock, who also came to share them, such as in our Whatsapp exchange on 30 April 2020. At least we did succeed in getting a pilot trial of the tech in place on the Isle of Wight, working with Nadine Dorries

and the local MP, which proved extremely helpful in identifying glitches and operational and behavioural issues with the early app.

111. In the event, there were major and repeated delays in the delivery of the NHSx app – which was 'one or two weeks from completion' for months. This is no comment on the dedication of those involved, but it greatly reduced our capacity to drive more sophisticated and effective suppression. My views on the NHS app are set out further in the lessons learnt section below.

112. We also had major battles getting information gathered through other NHS assets that could have helped track and suppress the virus. An example was the difficulty we had in getting NHS 111 to collect information from people calling with Covid like symptoms such as mobile phone numbers, or even basic geographical data, such as the first 4 characters of postcodes (that would have created a powerful early source of information about where the virus was spreading, rather than waiting for the very lagged data from hospital or ICU admissions, or death rates). Despite Secretary of State approval, there was deep resistance in NHSx about collecting such data, as they were nervous that it jeopardised a principle of anonymity in emergency healthcare (though people could have been given the option of declining to share more specific information, such as mobiles).

113. We also engaged with NHSx to help identify which text messages, or other design choices, worked better (often known as 'A/B formatting' in the digital world). For example, it was likely that millions of people would be sent text messages, asking them to self-isolate in the event of being identified as having been in contact with someone who has Covid. This testing was ultimately done, in at least a few examples, such as later work testing variations in which form of wording was most likely to lead to someone turning up for their Covid vaccination (eg: 'you have reached the top of the queue'). In earlier phases, my team and I liaised back and forth with NHSx and others with regards to the wording which outlined the steps those infected should take. This is evidenced in an email exchange between myself, my team, NHSx, DHSC and No.10 on 25 March 2020 **[DH/89 - INQ000129079]**.

Contact tracers

114. In or around April 2020, we assisted with training for contact tracers. We did not have time to run a Predictiv trial, since tracers were immediately being employed and put to work, therefore we prepared some training modules and helped put together

the induction for the tracers. This included hearing from others who had done the role successfully already and a module on how human memory operates and how most effectively to prompt members of the public to remember where they had gone, and who they had seen. We were not commissioned to do this – we made this offer of our own volition to Duncan Selbie and Michael Brody (who had been drafted in to rapidly recruit and train circa 20,000 tracers), who were very pleased to have the help.

115. We continued light touch work to identify how contact tracing could be improved or supplemented through technology, particularly given delays and technical problems associated with the NHS proximity app. For example, we joined a call with Lord Bethell and Julian Granville (Borden), on 19 May, to explore the viability of using existing tracking capabilities built by the commercial sector using mobile phone data. This is a type of tracking that was used in South Korea and elsewhere to help their contact tracers work more effectively. It was not ultimately used in the UK, to the best of my knowledge.

Immunity including notion of 'Passports'

116. There was recurrent interest from late March 2020 in whether and how to distinguish people who had had Covid from those who had not. On 28 March 2020, Lord O'Shaunessy emailed about a group he had assembled to look at this issue. It also arose in discussions with Matt Hancock, including early discussions about whether in healthcare settings and elsewhere we might need to link Covid 'immunity' status to IDs visually or digitally, such as by a wristband for example.

117. This led to various linked commissions. Matt Hancock asked Nadine Dorries in April 2020 to lead on work on medical and behavioural aspects of 'immunity'. James Kent (ex-No 10 health lead) was also asked to work up how a system might operate. BIT was commissioned to look at behavioural aspects, such as whether people who thought that they had had Covid might take excessive risks; how their behaviour might affect others; or if people might deliberately seek to catch Covid in order to get the benefits that might be associated with having an 'immunity passport'. For example, Matt Hancock's office asked us for advice on immunity on 30 March 2020 **[DH/90 - INQ000129081]**.

118. BIT drew on a combination of the existing literature and testing with samples of the public to explore likely behavioural reactions to the policy options. This work

identified significant risks around the language and implication of 'immunity' triggering riskier behaviours. We found considerable evidence and support for using Covid-status ('immunity') to help people and institutions distinguish who could safely discharge certain responsibilities (such as care for the elderly). In contrast, there were behavioural issues, and public concerns, about approaches to Covid-status that unlocked 'fun' activities (such as going to the pub).

119. In general, the policy judgements around this area were reasonably well calibrated, though issues and delays with the NHS app and other enabling technology ruled out some of the policy options until well into the summer 2020 (see above). Questions around Covid status or 'immunity passports' were revisited as testing capacity expanded in by late summer 2020, and again as vaccination came on stream. We believed there were potential benefits to clinical staff and others from a system that could signal Covid-status. We vocalised this, for example, to Helen Dickinson and Emma Payne within an email chain dated 17 November 2020 **[DH/91 - INQ000129094]**.

Spring 2020: Ways other countries were using technology to fight Covid

120. Also in or around April 2020 BIT researched how South Korea and other countries were managing Covid (notably its tracing operation and support for those self-isolating). This project was self-funded. We would share the content found if we thought it was valuable; either by informally sharing with Chris Whitty and Patrick Vallance, DHSC, or Tom Shinner and the emerging CO Covid Taskforce.

121. In general, we felt that the UK was slow to learn lessons from the 'NPIs' that appeared to be working in other countries. These included: sending care packages to people asked to self-isolate; checking in person that people were indeed staying at home (and if they needed extra support); and the use of tech-enabled tracing systems, such as using commercial mobile phone data to assist with tracing people's movements to aid virus suppression.

'Partial unlocking' trials

122. In April 2020, I suggested that 'partial unlocking' trials should be conducted in a small town of approximately 20,000 people. This would enable a whole package of measures to be tested in one full part of the UK. The point was to test the viability and

effectiveness of more tech- and behaviourally-informed approaches to suppression. Discussions regarding this continued through Summer 2020, and also about the viability of having different levels of measures in different places, according to the level of virus in order to pursue effective suppression.

123. It was our view that it was better to have a small number of 'levels', each with a clear set of regulations and behavioural expectations, than to have a continually changing set of national level requirements. The balance of this argument also hinged on the extent to which infection varied between different parts of the country, as well as the need to build a clear 'if-then' (habit) loop at area and individual level, i.e., 'if the Covid alert in this area is amber this week, then I need to…'

Understanding compliance with social distancing guidelines

124. Between late Spring to Autumn 2020, BIT carried out a study into the public's understanding and compliance with social distancing guidelines. This study was commissioned by DHSC. We looked at local alert levels and whether people understood the level of alert in their area. In relation to medium/high risk areas we raised the importance of 'habit loops', and whether these had been sufficiently established. These have the form of 'trigger' (it's raining), 'response' (bring an umbrella), and 'reward' (stay dry). During Covid, HMG was trying to introduce new habits. For example, whenever you go out the door, you take your mask with you. Did people understand the rules? Were people aware of what they had to do and not have to do? Had our messaging, and cues in the local environment, successfully created these new habit loops? Our concern was that these had been only weakly established (and that the concept was not well understood in Whitehall).

125. We concluded that many people did not even understand the rules, such as around when, where and who you could mix with. We also concluded that 'segmentation' was extremely important – understanding the behaviour, motivation and risks associated with different segments of the population, and adapting our messaging and strategy around these segments. For example, our work identified a relatively small segment of the population (less than 1 in 10) who we termed 'super-spreaders' who were in high contact with other people, but were not very careful or worried about Covid. We considered that these people required a different approach to, for example, the 'worried well', who were being very careful and avoiding contact with others.

Social distancing review

126. In the summer of 2020, BIT was formally commissioned to participate in the CO-led social distancing review, alongside Patrick Vallance, Chris Whitty, Clare Lombardelli and others. This review was tasked with looking at the range and efficacy of complements or alternatives to the two-metre rule.

127. The review was a large piece of work. BIT conducted a number of supporting trials and shared policy notes and advice linked to it. These ranged from testing how accurately people could judge standing 1 or 2 metres apart from other people, through to lists of suggested policy actions and communications that were likely to work from a behavioural viewpoint to help suppress the virus, while ideally minimising the economic and social impacts of the measures necessary to hold the reproduction number at or below 1.

Lack of systematic experimentation and information sharing – Joint Bio Security Centre and test and trace

128. I was frustrated that the Joint Bio Security Centre ("**JBC**") was not adequately linked to the test and trace system. We felt that the test, trace and isolate system ("**TTI**") needed to act as the eyes and ears of JBC – to continually refine our understanding of which populations and segments were most likely to have the virus, including which occupations and activities were more likely to drive spread. The TTI also needed to test variations in its own practice to refine the JBC models, and crucially, to identify the most effective way of suppressing the virus, and that should in turn guide policy and practice. Most specifically, I felt that the TTI system should be using some of the Covid testing capability to 'probe' where the virus was, such as by testing samples of first and second degree contacts, and establishing the risk profiles for those who were most likely to be spreaders. But it seemed that the TTI system was not being allowed to operate in this way, as any changes to operational practice had to be agreed outside TTI (by CMO office or SAGE), who would not agree to such variation in practice without prior evidence – which of course could not be provided without this kind of experimentation. This was raised on a number of occasions, such as in my email on 17 July 2020 to Simon Ridley **[DH/92 - INQ000129088]**, or indeed as part of a longer email to Simon Case and others on 20 July 2020 **[DH/93 - INQ000182188].**

Ventilation

129. With CO communications, BIT had developed the 'Hands-Face-Space' message, and it was an email from me to Simon Case on 31 July 2020 that led to the PM using the phrase in the original press conference and subsequent messaging **[DH/94 - INQ000129092]**. From early summer 2020, as the evidence for the importance of ventilation strengthened, we pushed for a more overt incorporation of ventilation in Government messaging. Our trial and survey evidence was strongly suggesting that people did not understand, or were not aware of, the relatively large reduction in risk of transmission when meeting outside, or from opening windows inside. I tried and lost the argument to update the phrase 'hands face space' to include 'air'. Research shows that 'earworms' have a rhythm to them – your articulatory loop – you are able to play back the last two seconds of what you heard. 'Hands - face– air - space' is still within those parameters and we think it could have been used as part of a recalibrated comms campaign. We did not win that specific argument but at least we did work with CO comms to get ventilation communications substantially increased including in visual graphics such as the Covid television advert with vapour permeating around a room.

130. We also pressed for better ventilation, and awareness of it, in restaurants and other commercial contexts. The central idea was that a 'Covid secure' rating system could be developed akin to the 'scores on the doors' rating system that is used for food safety, or the rating system for employers 'investors in people'. By an email sent on 20 July 2020, I proposed that we should put signals in place, which would advise consumers when somewhere was Covid secure but also enable a mechanism which would allow consumers to provide feedback if they felt that place was not Covid secure. I suggested it could be somewhat aligned with a Tripadvisor-type website **[DH/95 - INQ000129089]**. These arguments were running over the summer and in the period up to the second lockdown. Our experimental work also showed that consumers would indeed prefer to go to outlets that showed overt signs of being 'Covid secure', and that these effect sizes were larger than offering vouchers or discounts to eat out. We did share this work with HMT (e.g. note to Tom Scholar on 15th July 2020 **[DH/96 - INQ000187623].** However, these discussions were overtaken by the "eat out to help out" scheme. The Covid secure scheme, or equivalent, was never rolled out. Our view is that this was a policy mistake, since the pursuit of a 'Covid secure' model would have both boosted economic activity (the Treasury's intent) and also incentivised commercial outlets to reduce transmission (the DHSC intent).

131. By late summer 2020, BIT was not centrally involved on a lot of issues. I would go to the Covid Taskforce on Monday morning, but I did not attend meetings with the Prime Minister, the more senior groupings or Covid-O. Nonetheless we continued to work with DHSC, respond to Covid Taskforce requests, and share findings with key figures where relevant. For example on ventilation, emailing James Bowler and Simon Case on 16 December 2020 **[DH/97 - INQ000129095]**.

Financial Incentives

132. We thought there was a strong case for using some financial incentives to support people to self-isolate when identified as having Covid or having been in contact with a case. A specific concern was that low income, and less securely employed individuals were being put off testing and isolating given the impact on their financial situation. This was flagged in our early summary note to Dido Harding in recommendations for the TTI system, and can be seen in my email of 17 July 2020 to Simon Ridley and others, which summarised some "quick thoughts on estimating impact of paying people to self-isolate" **[DH/98 - INQ000129087]**.

133. In July 2020 we looked at (and found) evidence that infection rates in care homes were affected by whether staff were financially supported when sick. Specifically, we found that care homes that paid sick leave immediately when someone had to self-isolate, had Covid case levels around 13% lower that care homes that did not. This was an important result because it made the case for paying immediate sick pay for care home staff with possible Covid, and more generally for paying high risk, low income workers to self-isolate. We drew this evidence to the attention of various figures, including in an email at 8.06am on 28 July to Gila Sacks, who had been asked to lead in DHSC on work looking at incentives for people to get tested **[DH/99 - INQ000129090]**.

134. We also shared advice with the Covid Taskforce, such as via Will Green (Chief of Staff at the Covid Taskforce), on financial incentives that could be used in their discussions with HMT, who were leading on this work in late July 2020 **[DH/100 - INQ000129091]**. This included how financial support could be offered via contact tracers, and the finding in our own trials that by this point 87% of the public supported financial support for those asked to self-isolate.

135. When vaccination was well underway, we conducted detailed work on whether financial incentives might be an effective way of encouraging the minority who had yet to get vaccinated to get a jab. This was arguably one of the most sophisticated pieces of behaviourally-informed policy work done during Covid, working with the Covid Taskforce and BIT. It rested on an empirical segmentation of the unvaccinated, distinguishing three key groups. In sum, it showed that while financial incentives would encourage the 'intenders' (those who had nothing against vaccination, but just hadn't got around to it), it was likely to backfire badly in the other main segments. Furthermore, it was likely to lock people into an expectation that vaccination should be financially incentivised, and that had a high risk of reducing the take-up of later boosters. This is not to say that financial (or other) incentives should never be used to encourage vaccination; there is clear evidence that they can help in some populations and phases. But it was an important piece of research that arguably prevented a significant expenditure that would have had limited and potentially negative effects.

Mass testing

136. In Autumn 2020 we sent one of our team, with Will Warr (No10 health lead) to Slovakia to view their testing programme. Our reading of the evidence was that mass testing in Slovakia, at least initially, was highly successful in suppressing Covid because it identified who was infected and took them out of circulation. Some detailed work was done by us, based on these results.

137. In fact, a bad version of this model was conducted – and with the wrong lessons learnt. A 'mass testing trial' was tried in Liverpool, that offered a test to anyone who wanted one. Our view was that this was almost the worst of all worlds. Only around 15% of the population came in for testing. These were in effect the 'worried well', as was reflected in their low positivity rate. The segment you really wanted to test were those people out and about who were walking past the queues of those waiting to get tested. In contrast, the Slovakia model was compulsory in the sense that people had to show they had a clear test in order to be able to work or travel on public transport the next week. So unlike Liverpool, the Slovakia model focused on the most at risk – those who were in contact with other people - while the worried well who were not working or going out didn't need to test.

138. Will Warr and I had a discussion with Dido Harding and Matt Hancock as to whether the UK could organise mass testing before Christmas 2020. In effect, the idea

would be to use a surge in testing – ideally focused on the most at risk – to suppress the virus in advance of Christmas. This might help to motivate people to take part, giving enough time for those who were positive (including the asymptomatic) to isolate, recover and still be able to enjoy Christmas with friends and relatives. Though a major effort, we thought it might be able to prevent having to do another lockdown. A nationwide lockdown is inefficient because you are telling everyone not to go out, but most of those people don't have Covid. An occasional version of mass testing, most obviously focused on geographical areas with high prevalence, was a logical extension of a smart test and trace system. Indeed, it could actually help improve the sophistication of the TTI model by systematically identifying which segments and occupations in the population were found to be likely to have Covid. Preparatory work was done for mass testing, including getting the Royal Mint to prepare prototype watermarked certificates. In the event, the UK did not pursue a mass testing program before that Christmas, nor did the TTI system build the kind of systematic experimentation that would have helped improve the efficacy of the UK's suppression of Covid. We were then faced with another 'circuit breaker' in the form of a national lockdown.

Transmission trials and facemasks

139. In or around June 2020, we arranged Porton Down trials which considered individuals standing at a distance, spitting or coughing, with or without masks to understand transmission. This was discussed within an email chain dated 7 June 2020 **[DH/101 - INQ000129096]**. This was part of a wider body of work that BIT conducted on facemasks. There was considerable scepticism about the efficacy of face masks in Spring 2020 by senior medical figures, partly because they thought that people would keep touching them, and not wear them properly. Early on, there was also concern in DHSC that if the public decided they wanted to wear them, it could take valuable supplies away from clinical settings (the CO actually supported a program to encourage people to make home-made masks). For this reason, we explicitly got Porton Down also to test the efficacy of homemade masks which showed they were, if anything, more effective. We considered the Porton Down trial results sufficiently important that I sent them directly to Chris Whitty, Patrick Vallance, and Simon Case at 9.56am on 19 June **[DH/102 - INQ000129086]**. We also shared our evidence on 19 June, including from Germany and elsewhere with Clare Lombardelli (HMT), stating our view that 'the UK scientific com[munity] has underestimated their effect for a while',

to which she responded 'The UK govt scientist position on masks has been baffling from the start' **[DH/103 - INQ000129085]**.

Impact of breaches of rules by Ministers, officials and advisers on public confidence

140. The Dominic Cummings incident was very unhelpful. The half-full version is that it didn't show up as badly as might have been feared in some of the behavioural data – i.e., the public for the most part carried on trying to do the right thing. But from a behavioural point of view, it was almost a textbook example of what not to do.

141. Later breaches, especially the No 10 parties as they leaked out, fit in the same mould. Public behaviour is generally much more influenced by what people see others doing (declarative norms) than by what the formal rules are (injunctive norms).

Vaccine take-up

142. We played some role in supporting efforts to encourage vaccine take-up. At the most basic level, this included testing alternative messaging on text messages and reminders to people that they were now eligible for a vaccination, which were tested at large scale. At the more sophisticated end, this included segmentation work (including on likely impact of financial incentives, see above). This led to important insights around why some people had yet to get vaccinated, including that only a small minority of the unvaccinated were 'anti-vaccers'. This helped to avoid a potential major mis-step in policy and comms - treating the un-vaccinated as hostile, when mostly we just needed to make it easier.

143. As in other areas, we did not win every argument. One particularly puzzling failure was to get across the message that vaccinations did not become protective for around two weeks or more after having the jab. We found clear evidence that this message had not got through, including among the over 50's many of whom were found to be socialising extensively in the wake of getting vaccinated. We raised this with the Vaccines Minister (Zahawi) and urged that this be made much clearer at vaccine centres, on written documentation, and in DHSC comms. The Minister agreed strongly, and more than once, but as far as we could tell, the changes never occurred.

Legislation and regulations

144. In general, BIT had a relatively limited role with respect to legislation. We did take part in some red-teaming later in the pandemic around staff in care homes. At least one of these sessions was on the case for hardening requirements for those in care homes to be vaccinated. We thought that one way of bringing forward mandatory requirements, given resistance to legislation, was that care staff might be required either (a) to get vaccinated, or (b) to have to continue wearing extensive PPE. This would preserve choice for those who had very strong views, and avoid some 'backfires', but would generally prompt the majority of the vaccine-hesitant to get vaccinated.

Reflections and lessons learned

145. In July 2020 I provided Helen MacNamara and Alex Chisholm with my opinion and criticisms on the initial response to the virus from a behavioural perspective in a document titled 'Institutional Lessons from Covid'. This document was originally in hard copy only. I was later asked to provide this electronically, which I did on 28 September 2020. My views on the lessons to be learnt from Covid remain broadly as I set out in that document **[DH/104 - INQ000129093].** For the purposes of this statement, I have reflected further on the events that followed and provide my updated views below.

146. My reflections are made by reference to three broad phases (set out in more detail in Appendix):

a. Phase 1 (Jan - March 2020). Expert overconfidence and early misstep
b. Phase 2 (March - Dec 2020). Operation failures and political hesitation
c. Phase 3 (Jan 2021 onwards) A system generally working, and vaccines kicking in.

147. Overall, I consider that the seriousness of the Covid threat was understood early in the core of DHSC but not necessarily across the whole of the UK Government. Dominic Cummings was the main figure in No 10 who seemed to be early to realise the seriousness.

148. Before turning to the lessons to be learnt, I would first like to start positively, with where I consider behavioural science was followed to good effect. I would also acknowledge the extraordinary efforts by many people across the health services, the

research community, and of course the public, to help lessen the terrible impact of Covid.

Where behavioural science did help shape policy

149. I feel that my colleagues and I at BIT did achieve at least some significant results during the pandemic, which we hope contributed to saving some lives, including:

a. Simplifying and improving the efficacy of public communications, including the 'hands, face, space' message, and sophisticated segmentation.
b. Working with No 10 colleagues to organise the testing summit and re-booting the testing program in March 2020.
c. Promoting the use of facemasks, including organising the early Porton Down Experiments to test their efficacy.
d. Introducing experimentation into the test and trace program, such as testing the relative efficacy of texting people versus calling them in person.
e. Advising on financial incentives.
f. Providing a large volume of rapid, empirically based advice on behavioural aspects of Covid policy and practice.

Overview

150. The remarks below offer a personal view on Covid missteps, albeit situated in previous work on institutional weaknesses and failures, including *Behavioural Government* **[DH/105 - INQ000182190]**, King and Crewe's *The Blunders of our Governments*, and Eggers' *If We Can Put a Man on the Moon*. The summary points are:

1. Anchoring - the early misstep. Early overconfidence and anchoring in our expert medical community led to a presumption that Covid would be a flu-like wave, blunting the pursuit of near-suppression as a viable option and an expanded tracing system in particular. Our scholarly decision-making process was vulnerable to systematic error, in particular around failures to update around innovative human-engineering focussed approaches to suppression. This was most pronounced in phase 1 (the unstoppable wave presumption), but arguably was also seen in less dramatic forms in phase 2, notably around excessive scepticism around a range of 'NPIs' such as masks and fist bumps.

2. 'How?' There was mistaking academic enquiry for policy. This occurred in dramatic fashion in Phase 1, when much of the policy community appeared frozen, awaiting a steer from SAGE on policy. This persisted in a neglect of the 'engineering' and behavioural aspects of effective delivery, such as how do you get people to self-isolate (including support packages); how do you identify the 'super-spreaders'; how do you make tiers work; how can you improve ventilation; and how can you get people to be jabbed?

3. Don't put your eggs in one basket. Where daring punts were made on single solutions, such as the first NHS app, they generally failed. In contrast, when multiple solutions were tried, eventual success was achieved, notably the harnessing of multiple technologies and approaches to drive up testing volumes, and of course the later great success of the vaccine programme under Kate Bingham. A more subtle and widespread version of this was the repeated failure to build systems designed to 'test, learn and adapt'. The TTI system was a glaring example. Again and again, it adopted practices ('policies') on an a priori basis, implementing them everywhere, instead of continually testing variations in practices to identify more effective ways of testing, tracing, and isolating. The absence of A/B formatting (testing variations) in messaging and comms was another recurrent example.

4. 'Authoritative' versus 'authoritarian'. The policy and comms strategy sought to occupy a position of 'soft authoritarianism', based on simple, rigid rules yet with weak enforcement. Arguably, we would have done better going for an 'authoritative' approach: risk and principles-based guidance that could be flexed in context. For example, we could have published much more detailed information about local area variations (and on transport routes, places of work), along with driving up awareness of disease vectors and actions people could take to lower their risk.

5. Putting humpty together. A strong biomedical perspective was not effectively tempered with robust behavioural or economic analysis, and a weak central process failed to give adequately balanced advice to the Cabinet or the Prime Minister. This was especially true in the first six to nine months. Behavioural and cultural factors ultimately explained very substantial amounts of within and

between country differences in contracting and death rates in Covid, but these relatively little attention compared with their impact.[3]

6. Political wobbles, hesitancy and optimism bias. While politicians dutifully 'followed the science' in phase 1, considerable optimism bias and hesitancy appeared to creep in by phase 2 (summer 2020). This was arguably manifest in the "eat out to help out" intervention, the hesitancy around tiers, and in the delays in the second and third lockdown.

151. Many of these issues are not unique to Covid. Academic and policy thinking often is subject to having overly strong presumptions (Kuhnian paradigms) and various forms of groupthink ('anchoring'). The policy versus delivery split is a notorious source of failure, from Gordon Brown's tax credits to the Coalition's Green Deal, with seemingly elegant policy foundering on operational factors (the 'How?'). And the failure of policy and public services to incorporate a culture of empiricism, testing and adapting is so widespread that it is essentially taken as normal ('eggs in one basket').

152. The Covid crisis stressed and laid bare these weaknesses particularly brutally. It was near self-evident that the countries that had been exposed to SARs over the previous decade appeared to have learnt from this experience, and reacted better to Covid. It is to be hoped that the UK also would do better if faced with a similar crisis in the future.

153. The institutional and systemic lessons that can be learnt have much more general applicability than being ready for another pandemic. I hope we will learn these lessons, though I fear that many are already fading.

The puzzle

154. A central puzzle, at least with respect to the earlier phases of Covid, is how the UK brought together a world class group of experts, alongside a world class civil service, that together led to such an un-world-class outcome. By late summer 2020, the UK was in the 'top-10' worst national performers by per capita death rates, despite being seemingly 'well-prepared' and having had the benefit of a lagged start.[4] By

[3] Eg Gelfand et al https://www.thelancet.com/journals/lanplh/article/PIIS2542-5196(20)30301-6/fulltext

[4] The HMG Coronavirus Action Plan (March 2020) opened with the reassurance that 'The UK Government and the Devolved Administrations, including the health and social care systems, have

autumn 2020, if the data is to be believed, many other countries had achieved 10-fold, or even 100-fold, lower per capita death rates than the UK (614)[5] – such as Norway (48), Australia (35), South Korea (7), NZ (5), Singapore (5).

155. With Covid largely behind us, the data indicate that the UK did manage to improve its rankings. By July 2022, the UK was at 25th in the rankings of worst death rate (2,688 per million) – a fractionally better performance than Belgium, Italy and Greece; somewhat better than the USA at 15th (3,100 per million), and well ahead of the worst performers such as Hungary (4,785), Bulgaria (5,376) and Peru (6,482). Nonetheless, others appear to have achieved ultimate death rates 5-fold or less than the UK, such as Norway (635); Australia (406); Singapore (253), Japan (250), UAE (235).

156. Significant data questions remain, and there is an argument that at least some of these differences might reflect different recording practices across countries. Analyses of excess death rates from January 2020 to December 2021 do tell a somewhat different story, with the UK coming in mid-table at around 127 excess deaths per 100,000 versus a global average of 120 (noting that these figures are strongly influenced by the age profile of the population). For example, while our close neighbours such as France (2,115) and Germany (1,707) achieved significantly lower death rates on recorded Covid deaths, their excess death rates are very similar to that of the UK (124 and 120 respectively). The UK does perform a lot better than countries such as Italy (227), Portugal (202), Spain (187), and Belgium (146) – and dramatically better than East Europe (345) and Latin America (254). On the other hand, the higher performance of a number of countries in recorded Covid deaths is replicated in the excess mortality data, such as: Austria (107), Switzerland (93), Sweden (91), Finland (80), Canada (60), Israel (48), Japan (44), Ireland (12.5), Norway (7.2), S Korea (4). Indeed some countries actually achieved net *reductions* in excess death rates over the two years, such as NZ (-9), Singapore (-15) and Australia (-38).[6]

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planned extensively over the years for an event like this, and the UK is therefore well prepared to respond in a way that offers substantial protection to the public.' https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/869827/Coronavirus_action_plan_-_a_guide_to_what_you_can_expect_across_the_UK.pdf

[5] These were numbers as of late 2020. Debate continues as whether these numbers should be taken at face value. For example, not all countries recorded Covid deaths in the same way.

[6] The excess death rates used here are from the Lancet paper, and summary table here: https://www.thelancet.com/action/showFullTableHTML?isHtml=true&tableId=tbl1&pii=S0140-6736%2821%2902796-3

157. Presumably, this is something that the Inquiry will look at – ie how well or badly did the UK really do? But the broad parameters look reasonably clear. We underperformed in Phase 1 and 2, but – probably due to decent performance on the vaccine roll out – the UK managed to somewhat 'close the gap' in Phase 3. Nonetheless, a clutch of countries that had strongly outperformed us in 2020, were largely the ones that achieved dramatically lower death rates at the end of the epidemic. If we had achieved Norwegian or South Korean levels of performance – a tough ask – could we have saved 75% of the lives lost, or about 130-140,000 extra lives?

158. The 'easy' response is to blame the politicians. Doubtless this case will be made, at least in later phases and the delays in later lockdowns. But arguably the failure was more extensive, and more subtle – and varied between phases. Weaknesses in the UK response fit with James Reason's 'swiss cheese' account of failure[7]: an alignment between multiple institutional and human weaknesses, as seen in historic failures from 'Three Mile Island' to 'Deepwater'.

159. It is also important to examine the counterfactual – countries or parts of our own system that performed better. In contrast with organisations or processes subject to 'swiss cheese' failures, Reason et al noted the characteristics of 'highly reliable' organisational forms: highly complex organisations, such as aircraft carriers or air traffic control systems, that are subject to multiple and varied challenges yet do not fail.

The early misstep: overconfidence and anchoring

160. Arguably the most fundamental misstep in the UK response was the presumption that Covid would be an unstoppable flu-like wave. This presumption was built into the Contain-Delay-Mitigate-Research strategy published in early March. It also underpinned the early position on winding down test and trace; that there was little point in closing borders or restricting large events (as seeding was presumed to have already happened); and the early view of modellers on the inevitability of 'herd immunity'.

161. It is important to see that this presumption was not based on ignorance, but on a century of prior knowledge and assumptions. SPI-M had sophisticated models

[7] https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1117770/

drawing on data going back to the 1918 flu showing the dynamics of previous epidemics. Chris Whitty had prior field experience of epidemics, and was extremely concerned to get the 'wave' landed before winter pressures that he knew well as a clinician. Jonathan Van-Tam wrote the textbook on flu, and had strong views on the likely modes of transmission and spread. Patrick Vallance knew that vaccines would not be available till the end of the year at the earliest.

162. All this massed expertise converged on the conclusion in early 2020 that, once early containment had failed, a flu-like wave was inevitable. As such, the best that could be done was 'to flatten the curve'. This would take the worst of the negative effects out by (a) preventing the NHS being overwhelmed, (b) stopping the epidemic over-swinging (i.e., achieving 'herd immunity and around 60% instead of 90%), and (c) protecting the most vulnerable until the wave had passed.

163. But there was an alternative. The world – and more specifically Asian countries – had found another strategy: to build sophisticated test and trace systems strong enough to suppress the virus, at least for long enough to enable treatment and vaccines to be developed. This is not just a matter of hindsight bias. There were a number of us – generally outside the biomedical bubble – who highlighted and argued for this alternative strategy in late February and early March [c.f. emails to Chris Whitty, Patrick Vallance, Mark Sedwill and Dominic Cummings]. At least some Ministers, senior officials, and behavioural experts such as James Rubin were puzzled at suppression policies not being pursued in the early period of the pandemic. BIT studied the responses and techniques employed by South Korea, Singapore and others from the outset, including the particular techniques they used to do the tracing, and which of these might be transferable to the UK context. This led us to question the limited ambition of the central 'delay' phase, though we found ourselves quietly dismissed as not really understanding the science.

164. If there was a single top lesson to be taken from the 2018 Behavioural Government report **[DH/105 - INQ000182190]**, it was 'beware over-confidence'. Humans are fundamentally prone to overconfidence in their own beliefs, systems and groups. This overconfidence tends to become more serious the more senior we become.

165. Experts and academics are prone to the same fallibility. Despite a century of statistical methods to directly estimate error and confidence, large parts of the

academic world remain characterised by overstatement and overclaiming. Indeed, whole careers are built on battles between rival academics overstating their cases in the pages of academic journals, with corresponding overestimates of effect sizes from publication bias (including around human behaviour).

166. There were multiple examples of such 'anchoring' in the early days of the pandemic, with early hypotheses and views stuck with, despite mounting evidence against. Early evidence of low German death rates was repeatedly dismissed as being the result of cases occurring in 'fit skiers', and that their death rates would shortly converge on the UK numbers. The role of aerosol transmission and corresponding importance of ventilation was underplayed. Asymptomatic cases, and their policy implications, were understated. The growing evidence on masks was very slow to be taken on board.

167. At the same time, a proposal (supported by Matt Hancock) to create an open wiki-style list of questions, or known unknowns, was taken in a subtly different direction. Instead, a website was organised to publish existing research: a shop-window of what we already knew, rather than a pinpointing of what we didn't. Ironically, the pride in our science and our capabilities, may have slowed our ability to learn lessons from other countries. Under cover of variations of 'it is very different there', there was more than a touch of hubris that we knew better, and would do better, alongside criticisms of how badly other countries – such as Japan – were doing on containment. This did later change, but was very striking in the Phase 1 period.

168. This seemingly unshakable conviction of the SPI-M modellers in early March 2020 as an important example of that overconfidence. The modellers '100%' certainty in the second week of March (see above) that immediate rebounds in cases were inevitable in Asian countries, directly fed the view that a sustained holding down of Covid prevalence – was not a viable strategy. They were totally convinced that as soon as the lock-downs in Wuhan, South Korea and elsewhere were eased, cases would immediately surge again. (Of course, one can argue, at least for China, that ultimately was true - albeit long after, and with more infectious strains.) But that belies the point: the early overconfidence of the modellers created a blind spot to the viability of sophisticated long-term suppression and inhibited its pursuit in the crucial early period.

169. Nothing in science, and certainly in statistical modelling, is 100%. Let alone in the face of the data already emerging from the Asian experience. People were under enormous pressure, and under these conditions their thinking tends to narrow.

Nonetheless, this edged into overconfidence and away from humility and openness. Headline lessons include:

Don't: get carried away with your own models (and ego).

Don't: shut down counter or heretical views, or seek an overly early 'single view of the truth'.

Do: use scenarios that ensure your policy is robust to a range of possibilities, and/or supplement with 'red-teaming' to challenge strong priors.

Do: have key meetings chaired by intelligent generalists; seek to develop alternative viewpoints, and use mechanisms to keep questions on the table.

'How?': science versus policy and delivery

170. One of the very striking aspects of the early key phases of the Covid crisis was the extent to which the traditional policy community became passive. Partly this was driven by the political mantra to 'follow the science'. It led to an extraordinary level of paralysis across operational areas and 'normal' civil service policymaking. Every question or decision had to be passed up to SAGE and/or for clearance by CMO, literally down to the wording of posters.

171. As Chris Wormald remarked (in early March), SAGE was focused on 'what' not 'how'. We (BIT) saw this in our own line-by-line analysis of SPI-M models. These models were full of assumptions about what level of reduced contact different measures might lead to, and presumed levels of compliance. But the models themselves did not tell you how these levels of compliance or outcomes were going to be achieved – for example, the guidance, operational changes, legal requirements, system capabilities that would be necessary – let alone whether higher levels of compliance could be achieved. It was 'abracadabra' delivery.

172. Testing and tracing illustrates the situation. While the UK split hairs over the pros and cons of mathematical models, from how many lines of code the Imperial model had versus the London School or Warwick models or the exact level of lagging in the ICT data, the Germans sharpened their already impressive testing and tracing systems. Other countries also realised that, even without mass testing, they could still

press ahead with mass tracing based on symptoms and case clusters. We did high science, they did engineering. That high science ultimately helped to deliver vaccines, but in the early period it appeared a mixed blessing.

173. 'Analysis paralysis' persisted deep into our operational practice. Important questions on the design of the track and trace systems, and later the Joint Bio Security Centre, were passed to SAGE and SPI-M that they had no way of answering. These questions should have been answered within the TTI system. To give a concrete example, there were always key questions about where the track and trace system should deploy its spare marginal capacity, particularly once the initial surge past 100k tests a day was achieved. Track and trace's director of policy believed that it was worth testing more asymptomatic cases (that were judged high risk, to uncover more cases and shut down the associated transmission., Similarly, and other senior figures in the program believed that there was a strong case for exploring test and release strategies for people late in isolation (both to increase compliance and reduce economic costs). But there appeared to be little room for anyone within TTI to sign off such testing or experimentation, so policy was instead referred for decisions by SAGE and CMO office. This created Kafka-esque loops. For example, on asymptomatic testing, the position was received back from SAGE and CMO office that such testing should not be done unless there was clear evidence that the incidence or prevalence was higher than in the general population. But the only way this could be determined was to conduct testing in that population, which was of course not being allowed.

174. The lack of interest in 'how' continued into Phase 2 and even 3. For example, we felt there was evidence from very early on that ventilation (and airborne virus) was playing a major role. This raised very practical 'engineering' style questions, such as how well did different types of masks work (including home made); how well did it work to open a window; which kinds of ventilation were effective; and could the virus be rendered inert by certain ventilation systems. Such enquiry into 'how' needed to include empirical 'engineering' of system design and behaviour, such as what was the relative efficacy of different ways of asking for, or incentivising, self-isolation; what were the technically viable and behaviourally acceptable ways of doing contact tracing; or how much were vaccine rates affected by distance to the vaccination centre.

175. Delivery was also dogged by HR issues – a carousel of people at both senior and junior levels in the TTI system and elsewhere. We don't swap out our CSA every month or two, but we did exactly that across swathes of our delivery apparatus.

176. Headline lessons include:

Don't: mistake discussions over aetiology for being policy or delivery – the 'how' matters greatly.

Do: bring operational, economic and other policy-relevant issues into the room, and build and keep a talented delivery team who you are prepared to listen to and respect.

Don't put your eggs in one basket: diversity and innovability

177. Anchoring and rigidity were not limited to our core epidemiological assumptions. We generally succeeded when we set higher level functional goals and challenged innovators to deliver. We generally failed when we over-specified the objective and the means to deliver it, and then bet the bank on a single solution.

178. The decision by NHSx to put all its eggs in one NHS App basket was a particularly grim example. When the idea was proposed for an app (March 6th) we, along with Ben Warner from No10, strongly supported it being taken forward, but also strongly recommended that this be done as part of a portfolio. We argued that more than one approach to the app should be developed (such as setting up 2 or three parallel teams, at least up to an early gateway); a re-skin of an existing app be attempted (eg Singapore); and non-app based approaches should also be pursued (eg SQREAM). NHSx not only pursued only one (internal) option, they persisted with this as deadline after deadline passed. As lockdown commenced, we were promised an app within 2 weeks – a potentially game-changing development that could enable the UK to leave lock-down with a viable tool for long-term suppression, at relatively modest economic cost. In fact, it would be many months before a viable app was delivered, with many dead-ends along the way.

179. This was a serious policy and delivery failure. A version of a tech-enabled app should, and could, have been delivered to be ready for the end of the first lockdown (when its value really would have kicked in). The app, delivered by a separate team after the first was mothballed, was delivered around six months after the original target date.[8]

[8] The NHS app was finally launched in late September 2020. For a summary timeline, see https://www.digitalhealth.net/2020/04/timeline-what-happened-with-the-nhs-Covid-19-app/

180. In contrast, a relatively early and successful move – though highly contentious at the time – was to break the internal monopoly of PHE on the delivery of testing. This was kicked off with the No 10 summit where we brought in multiple industry players and challenged them to deliver volume Covid testing (17th March). While some of the early tests failed to reach an adequate standard (notably the first batch of pinprick antigen tests), in general volume and quality was delivered across multiple platforms, and it led to the development of faster, more user-friendly, and low-cost testing techniques that became a key tool in the battle against Covid.

181. Vaccine purchasing later proved an even higher profile success for 'eggs in many baskets': Kate Bingham's strategy was to make multiple bets (and support the infrastructure necessary to deliver these).

182. The real test of this approach is whether you build it into your day-to-day practice. This means building in experimentation and deliberate variation (inc A/B formatting) into delivery. Even with the greatest minds and good intent, 'world class' is not launched on day one, but is evolved and shaped through a relentless search for improvement.

183. A good Phase 1 example of this experimental approach is how we tested variations in the early public health messages on samples of several thousand people, systematically enhancing levels of comprehension and intent to comply across interactions (as opposed to plumping for what a couple of designers thought looked cool). Similarly, a good Phase 2 delivery-based example is how we tested variations in approach within the test and trace system to follow-up with contacts to increase compliance. Alongside business as usual, we tested with several thousand cases the efficacy of (a) follow-up texts, (b) follow-up calls in person, and (c) a combination of texts and calls. The results were clear and had immediate operational implications for the service. Calls boosted compliance. Texts, if anything, reduced compliance. Calls and texts were less effective than calls alone. A good Phase 3 example is how we tested variations in the texts that were sent to millions of people to tell them that it was time to get vaccinated. The most effective messages, in terms of the percent who actually got jabbed, used the phrase 'you have reached the top of the queue…' (very British – we found different messages worked better in other countries).

184. Unfortunately, such experimentation remained the exception, not the rule. If you are running at 100mph to deliver, it can seem a luxury to test variations. But if we

want world class, or even top quartile, we have to build systems and practices that are designed to experiment, learn and get better. And if we're not running at 100mph – as in the case of most HMG delivery – there's truly no excuse not to 'test-learn-adapt'.

185. Headline lessons include:

Don't: put all your eggs in one basket, or prematurely shut down delivery options or questions.

Do: promote and test multiple alternatives, and design systems with constituent elements as modular and interchangeable as possible so that as better alternatives are identified they can be swapped in with minimal cost and friction.

'Authoritative' versus 'authoritarian' (and local versus central)

186. One of the deep issues that the UK and other countries had to wrestle with was the extent to which our Covid policy, and communication, needed to be kept simple and uniform, versus more complex and varied – across geographical areas, time, and risk segments.

187. This was not an easy call. In general, the UK and No 10 leaned towards keeping it simple, at least in the early phase. 'Stay Home' and the initial lockdown was simple and uniform. This broadly lined up with the evidence that the UK had been exposed to multiple seeding events and community transmission was relatively widespread. There was discussion about a more differentiated approach, such as London entering the lockdown early, but confusion of message and the Italian experience of displacement across boundaries were real and appropriate concerns.

188. There is a case, however, that the UK became stuck on a version of a (soft) 'authoritarian' approach: simple rules, with the implication of punishment for violations of those rules. This is in contrast to an 'authoritative' approach: a relatively small set of principle-based guidelines, around which there are explanations of 'why' these principles apply. An authoritative approach implies that instead of the person following the rule in a rigid way, they understand the underlying principles and can apply them flexibly according to the circumstances. Countries following what we might call an 'authoritative' approach included Canada and Japan.

189. To illustrate, 'stay at least 2 metres apart' (or else) is a clear simple rule (authoritarian). A more complex approach is the Japanese '3 Cs': avoid closed spaces, crowded places, and close-contact settings (authoritative). The Japanese authorities never set a specific distance to stay apart, but instead sought to help people understand the underlying risk factors. The problem with the 2m rule is that it was almost certainly too harsh in outside environments, and not effective or harsh enough within closed spaces.

190. Arguably, the UK tried to have its cake and eat it, and sometimes ended up with neither. 'Stay Alert' was an example. It was simple and blunt, yet not directive enough to give a clear steer as to what to do nor what the underlying risk factors or principles were. Indeed, the 'Stay Alert' message failed to follow multiple principles of contemporary behavioural science, and is a strong candidate for be a text-book example of what not to do for future campaigns. It provokes fear and anxiety, but with no clear call to action, while at the same time implying that the rules of the game have just changed. Behaviourally, it is literally the worst possible combination.[9]

191. Similarly, a number of UK policy and rule changes sought to maintain simple messages (eat out to help out), but didn't communicate to the public a coherent underlying principle of safe behaviour. The Cummings incident was also extremely unfortunate (to put it mildly): Dominic's response would have made sense if the UK had pursued a principle-based or authoritative strategy, but it blew a huge hole in the rule-based approach, and in turn undermined the credibility of HMG in what it was asking (or demanding) of the public.

192. In phase 2, despite having more understanding of the specific disease vectors, HMG communications and policy approaches continued to stick with the soft authoritarian approach. There was a persistent in ambivalence towards giving the public more precise risk estimates, and enabling them to make informed judgements, resulting in a strategic no-man's land. The NHS app, for example, gave the user a risk score for the area they live (or wherever they entered their postcode as being initially – noting that people sometimes chose a postcode other than their own), but it didn't

[9] There was almost immediate concern expressed about the 'Stay Alert' message from psychologists, including many on SPI-B. Frustratingly - given our internal advice, and that we didn't have anything to do with campaigns such as 'Stay Alert' (or 'look into her eyes') BIT was later blamed for encouraging HMG to pursue fear-based campaigns. I explained n January 2021 when I gave evidence to a Parliamentary Committee (along with Stephen Reicher) why fear-based campaigns that neither connect to specific actions nor reinforce people's agency are not effective, with more than one meta-analysis having reached a similar conclusion.

allow the user to enter: the postcode of where they work; the travel route and mode they take (such as car or tube); any personal or health factors that might affect their vulnerability (such as age or obesity); their risk of spreading Covid to others (such as living with an elderly relative); or the behaviours they engage in (eg always washing hands or wearing a mask). Furthermore, the risk level on the app didn't line up with the partial lock-down areas, nor did it provide users with a list of what the rules are in that area… .[10]

Regional differentiation

A related issue we continued to wrestle with throughout the summer of 2020 and beyond is the extent to which Covid policies should be overtly varied by geography or, better still, risk segment. Though local lockdowns pulled us towards variations, this tended to be a local or regional variation of the national 'authoritarian' position. It was not, for example, backed by South Korean style hyper-local information about a case having occurred in your street, neighbourhood, or local shop, and linked action you should take. Similarly, HMG did not pursue getting messages (or anything) to second degree contacts of index cases – who we could, and in my view should, have been sending more personalised warnings and requests to curtail their non-household activity.

193. Ideally, one of the many reasons we wanted to have had the app ready for the end of lockdown is that it would have allowed a more fine-grained and authoritative approach to unwinding lockdowns and maintaining sophisticated suppression of the virus. For example, we could have said that areas with hight case-loads would be able to come out of lock-down once they had achieved a given level of app downloads, enabling a step-down into a much less burdensome form of Covid suppression.

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[10] This functionality was possible. For example, Nicola Blackwood, the tech-savvy former Health Innovation Minister had pulled together a team with a working prototype of an app that enabled users to put in both their home and work postcode, and that would show Covid risk in both locations and, contingent on travel mode, the Covid risk of the journey too. We thought this work very promising, not least because it was relatively straightforward to add on functionality to enable users to see how they could reduce their risk by altering their behaviour: such as by altering their working habits, meeting outside, maintaining distance etc. Nicola couldn't get it funded, nor incorporated into the NHS app.

I had thought we finally managed to get a prototype trial of this approach agreed to be done in the new Track and Trace lighthouse, but essentially it didn't appear to happen – and certainly was not tested as a family of ongoing systematic trials as should have been done - a significant failure and missed opportunity.

194. By mid-summer 2020, there were some variations in measures operating across geographical areas related to local prevalence levels, but our view was that we did it too late and not confidently enough, creating a complex tapestry of rules that people struggled to follow. If you are going to differentiate between areas, you have to be clear on what the rules are, and why. If you are saying to one area they are subject to tougher conditions than another, there needs to be clarity about what the trigger points are, what you have to do, and how you exit that 'level'. If there was clarity on the 'if-then rules', a reasonably simple set of such 'levels' and signalling (e.g. green-amber-red), and an authentic and comprehensible reasoning behind them, then we thought these work behaviourally, as well as fit with the advice of the modellers (c.f. 'habit loops' above). On the face of it you don't help the outbreak in Rochdale by locking down Shetland.

195. Of course there were challenges. One key behavioural (and moral) point was whether it mattered that everyone experienced the same, i.e. that people were 'all in it together' (though our advice was that if there was with clear 'if-then' rules it would be accepted and complied with). Another concern – as seen in Italy – was how you manage boundary issues between areas with different levels of restrictions. This regional differentiation issue ran as a policy and behavioural question from the first lockdown forward. Though not simple, our view and advice was that a clearer cut three-tier system would have worked if implemented with confidence and clarity from the exit of the end of the first lockdown or early summer.

196. Finally, the presumption of a simple rules-based (versus principle-based) approach is that there are also clear sanctions. The UK was slow to get these in place, or failed entirely. As Simon Case once remarked to me, while his friends in Germany relayed how their police would stop people travelling during lockdowns to ask where they were going, and often send them home, while we remained extremely hesitant on enforcement. For this reason, I coined the term 'soft authoritarian' to characterise the UK's communication and enforcement approach in notes to Covid Taskforce colleagues during Phase 2. We were authoritarian in how we held to rigid rules, but with weak enforcement. This contracted to an alternative approach that could help the public make more nuanced risk judgments and adjust their behaviour accordingly.

197. Though I acknowledge that this is one of my more speculative conclusions, this 'soft authoritarianism' is a space that is particularly hard to occupy. Our judgement is that an 'authoritative' approach would generally have been more effective – and that

the British public would have been able to handle it. Of course, where possible messages should be kept simple, and ideally be clear calls to action (cf 'hands, face, space'). But in general – particularly when rules are likely to have to flex and change – we are better off making clear what the underlying principles and vectors are; giving the public, businesses and local areas as much personalised risk information as we can, along with support to comply; and then reserving the application of sanctions to especially high visibility and egregious examples of problematic behaviour.

198. Similarly, BIT argued for a much more high-profile pursuit of a business and consumer focused 'Covid secure' campaign and labelling, that would have enabled people to distinguish between, for example, a 'gold' Covid secure pub where staff always wore masks and all the seating was outside, spaced or highly ventilated, versus a 'bronze' secure pub with tables inside and a lower standard to 'Covid security'. The former might charge customers more, but it is where you would meet your mother – and would help to drive home what 'good' looked like. The latter would be where 25 year olds would go to, keeping other sections of the economy going with a base standard of protection.[11]

199. Finally, in such a model, variations in practice can be a major asset in allowing learning about more effective practice that can be scaled across a system (see 'eggs in one basket').

200. Headline lessons include:

Don't: go for simple, rigid rules if you think you are likely to have to vary them, or have limited ability or intention to enforce them. People inevitably end-up breaking such rigid rules, often by accident: nothing happens, their compliance drops, and they become 'rule-breakers' more generally.

Do: seek to be 'authoritative' in your guidance and policy, laying out clear principles, 'calls to action', and data to inform individuals and businesses risk judgements, with room for appropriate interpretation and agency at local and individual level. Your real

[11] I also tried to persuade Chris Whitty and Patrick Vallance to apply some of the same principles in their press conferences, and particularly to try to focus attention on causal vectors that people could do something about. For example, they were putting up graphs showing risk by age and separately vaccination rates. But they were not drawing out how much lower the death rates were among people of given ages by vaccination rate. Why was this important? People cannot change their age, but they could vaccinate – and especially ought to want to do so when aware of how it could alter their death rate. Focus on the information that relates to what people can act on it!

test is what people do when you're not watching, and when they have to make judgements in novel or edge-case situations.

Putting humpty together: grip, the cuckoo and the aristocrat

201. It is hard at the best of times to pull together the worldviews of different academic disciplines and government departments. It was that much harder when racing against the exponential of an epidemic – and without a Jeremy Heywood at the centre to pull it all together.

202. In late February, Chris Wormald did a beautiful impromptu masterclass for Matt Hancock about how Covid decision-making would work. SAGE would meet, and Patrick Vallance would report its conclusions. Chris Whitty would advise Matt as CMO to the SoS for Health. Mark Sedwill would look across the range of the advice, plug gaps, and advise the Prime Minister. These views would be brought together, along with economic and other analysis at COBRA. The Prime Minister and Cabinet would then make final decisions.

203. The clunking reality felt very far from this beautiful model, at least in Phase 1. SAGE meetings were dominated by a biomedical perspective (e.g. no economists were present)). Patrick Vallance and Chris Whitty would literally run from Victoria Street over to Whitehall for COBRA, with no time for even the most rudimentary economic analysis or consideration of delivery challenge. If Mark Sedwill was holding other meetings, I never saw them, nor evidence of their impact. It was only with the arrival of Tom Shinner, and later Simon Case, that anything approaching a broader analysis appeared to be attempted.

204. When SAGE got caught in vacillating around its models in early March, or when Chris Whitty and Patrick Vallance became uneasy about going back to the PM with changed advice, the only way out seemed to be to invade the pitch – as Dominic Cummings did by bringing in non-medical modellers to inject an alternative perspective and shake it out of its stupor (later criticised, for inappropriate political interference). My own increasingly desperate and specific emails in March to Chris Whitty, Patrick Vallance, and Mark Sedwill – in particular to move forward urgently and early with Nordic-style social distancing measures based on the evidence we had collated from elsewhere – seemed to have limited impact, with no clear place to land.

205. Countries that did better moved fast. One of the factors seems to be that such countries had smaller, but more balanced decision-making circles. Jacinda Ardern, for example, did rely heavily on a medical epidemiologist that she had known for years, alongside a small circle that she gathered around her. She did not have twenty medical experts important though they were!), and everyone else in the waiting room.

206. Covid exaggerated a problem that has become quite deeply embedded in our research landscape. The UK elite is very proud of our science base. However, its narrowness and academic character were brought out in the Covid crisis. In particular, our science base is extremely skewed to the bio-medical. This is reflected in the profile of UKRI spending, within HMG expenditure, and even the character of 'science' with the Chief Scientific Advisor ("**CSA**") network. Arguably, bio-medical research has become the 'cuckoo' in the Research and Development ("**R&D**") nest, that has eaten much of the food from the other chicks. The Councils that dominate the UKRI budget (£7.5bn) and voice are biomedical. Across Whitehall, and the start of Covid the only departments left with significant research budgets were the MoD (£1.6bn), health (£1.1bn), and DFID/FCDO (£0.3bn).

207. Equally importantly, as we entered Covid, our key R&D positions were dominated by the biomedical community. Our CSA was bio-medical (Vallance). The Head of UKRI during the crisis (and previous CSA) was bio-medical (Walport). The architect of UKRI was biomedical (Nurse). The deputy CSA – though CSA at MoD with its sizable budget – was biomedical (Maclean). The DFID had a CSA from London School of Tropical Medicine (Watts, a mathematical epidemiologist), and the DfID CSA predecessor was of course the current CMO (Whitty). Similarly, our largest research foundations, such as Wellcome, are bio-medical. To be clear, these are generally outstanding people and scholars in their field – but the field from which they are drawn is relatively narrow.

208. Even when there were discussions of overtly non-biomedical policy measures to contain the virus, these were referred to as NPIs – 'Non-Pharmaceutical Interventions', which is like the Department for Transport referring to cycling, roads, and aviation as 'non-train-based travel'.

209. This excessive dominance is self-reinforcing, as these huge budgets, networks and institutions supply people to fill key posts, and steer committees. And all this is

against a background where the returns to this research have been halving every 7 years for more than half a century.[12]

210. I acknowledge that the strong biomedical research assets of the UK are of great value – to the UK and the world. These assets helped to deliver vaccines in unprecedented speed, as well as helped deliver evidence-based improvements in treatments before the vaccines arrived. It should also be noted that Patrick Vallance has sought, perhaps more than any CSA before him, to broaden the science base, including seeking to bring in a range of disciplines into the CSA community. But in the early phases of the Covid crisis, the massive imbalance in the research assets and people concentrated in biomedical arguably became expressed in skew in the aetiological and policy focus of the UK response.

211. The real problem is in truth the weakness of other disciplines. Alongside all the key medical judgements were behavioural and economic judgements. The 'first lines of defence' against Covid rested heavily on shifting behaviour: getting people to wash their hands, maintain (unnatural) social distance, wear masks and so on. Behavioural factors were also key at the 'second-line of defence': getting the right people to come forward to get tested, convincing them to share and prompting their memories of contacts, and then getting people to comply with self-isolation. Even the success of the ultimate and hard medical 'third line of defence' – vaccines and treatments – rested heavily on behavioural factors, such as whether people were put off vaccination by social media scare stories, or whether they would understand and comply with treatment and vaccine schedules.

212. A further issue is that people are prone to think that they have a better hold on human behaviour than they do. After all, we are all human, so surely we understand ourselves? This is sometimes manifested in people making behavioural predictions or claims, without subjecting them to the same empirical testing that they would other claims. A high-profile example were the remarks made by Chris Whitty at an early No10 press conference on 'fatigue' in a medical context which somehow morphed into a notion called 'behavioural fatigue' discussed by various elements of the media. This was at times incorrectly associated with us. Not only did we not introduce This concept, but the behavioural evidence – modest though it was – was strongly indicative that most people would comply, and for potentially long periods.

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[12] EROOMs law.

213. Were our behavioural and economic analyses up to the job, or even in the room for the key decisions? The Treasury engagement was certainly erratic – sometimes barely involved at all (such as in the SAGE-dominated Phase 1 and early Phase 2), and at other times a hard block (such as around providing financial support for self-isolation). Perhaps reinforced by the lack of a strong central process, HM Treasury seemed to be in its 'aristocrat' mode. Requests could be sent into the black box of the Treasury, with no indication of any outcome. A fortune might be spent on the furlough scheme, but a fraction of that to reinforce the key behaviour needed on self-isolation was a hard no.

214. SPI-B was not much better. I went only a few times (our BIT health lead, Hugo Harper attended). James Rubin (academic at King's College London, mentioned previously) did his best to organise the group, and James wrote a couple of solid reviews, such as a good early review on the extent to which people generally comply with isolation to contain infectious spread. But in general, the wider group was prone to producing vague and not always well-evidenced papers that policymakers and SAGE were underwhelmed by, such as that it was important that policies were seen as 'fair'. The BIT view was that many of the operational and policy behavioural questions needed answers that were much more specific, and required rapid and tailored research to answer.

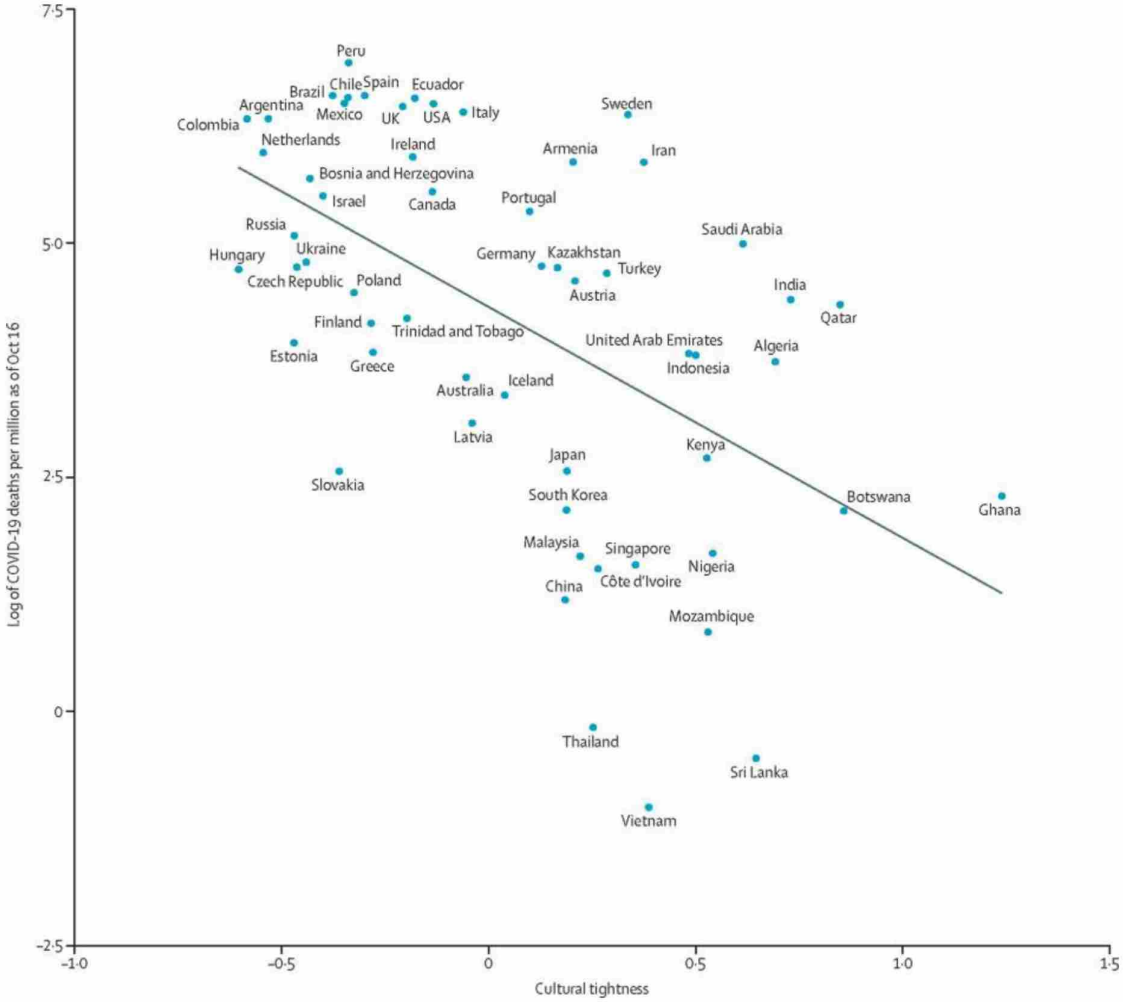
215. A parallel can be made with medicine. It was clear almost immediately that a good solution would be to develop vaccines. But the medical community did not stop with the general argument that what was needed was a bit of genetic material that could be injected into people's arms to prime their T-cells to recognise Covid. Rather they set to work immediately with developing specific vaccines that would do the job, and indeed swung into action almost immediately with well-funded randomised control trials to identify what existing drugs might help treat patients. In contrast, SPI-B members just stuck with the generalities of the existing behavioural literature. But just like vaccines, you need to do more than say 'communications should be clear and easy to understand'. You have to roll-up your sleeves, do research – and ideally randomised control trials – to find out exactly which messages are easy and correctly understood; exactly which incentives work best and at what marginal costs; and which frictions matter, and for who, and what you can do about it. An effective SPI-B would have been immediately pushing for, designing and organising, hosts of such experiments. BIT did its best, organising and running more than 60, but we really should have done 10-fold

that, and others should have done the same. Like medicine, effective applied behavioural science cannot be a spectator sport.

216. There was arguably an even greater neglect of social and cultural factors, or large-scale behavioural influences. For example, we wrote a note to Mark Sedwill at the start of the first UK lockdown exploring the extent to which enforcement would likely be necessary (see also discussion on 'authoritarian' vs 'authoritative' above). We explored how national differences in social capital (networks and trust levels between citizens) and 'tightness' versus 'looseness' of societies would drive national differences in compliance. We then explored how these differences needed to be factored into our compliance and enforcement strategies. Later work showed that these factors were indeed highly impactful, and explained a substantial amount of the eventual cross-national differences in both cases and deaths from Covid. However, it is not at all clear that this evidence and angle on human behaviour was factored into UK policy.[13]

Log of national Covid death rates versus cultural tightness, October 2020. (Gelfand et al, (2021) Lancet. www.thelancet.com/journals/lanplh/article/PIIS2542-5196(20)30301-6/fulltext

[13] BIT analysis, using the latest sweep of the World Values Survey, has confirmed that the excess death rates of different countries did indeed differ substantially by national levels of social capital. The social capital is estimated by answers to the question: 'generally speaking, do you think most people can be trusted?!



217. I hope that one of the abiding lessons of Covid, is that we recognise the lacunae in our expertise along with our failure to integrate the behavioural, economic and social science knowledge we did have. There is an extraordinary skew in our research base to bio-medical, in our key R&D institutions, and in our thinking. We shouldn't respond by shutting down our medical labs, but by applying the same methodological rigour and at least a little resource to raising the quality of our behavioural and economic sciences.

218. The UK is now approaching being an 80% based service economy – including more than £1 trillion a year spent on public services. What is the right kind of research base that we need for such an economy? And what are the catastrophic threats that we need to be ready for? Another pandemic is surely on the list, including being ready for the behavioural and economic aspects too. We also need to be ready for, and ideally prevent, other kinds of catastrophe. Current estimates are that there is around

a 1-in-6 chance of a catastrophic or near-extinction event within the next century.[14] Most of the risks are human induced, such as nuclear war or climate change.[15]

219. However one looks at it, we must not have a central policymaking machinery that is caught napping; lacks expertise in the range of disciplines necessary to address most crises, including behavioural science; or is waiting for someone else to 'put humpty together' to offer coherent policy that balances a full range of considerations.

220. Headline lessons include:

Don't: let a single perspective or discipline dominate policy – or indeed our R&D and the way we think.

Do: ensure a range of perspectives, with robust underpinning, are brought together to provide Cabinet and the PM a balanced policy perspective.

Do: in the wake of Covid, re-balance the UK R&D base to systematically strengthen our behavioural, economic and operational science (and don't presume the existing institutions are up to the job).

Do: dust off the 'behavioural government' report, and use the civil service reform to drive a widespread improvement in the methodological skills of civil servants, including the ability to interrogate the empirical robustness of expert claims.[16]

Political wobbles, hesitancy and optimism bias

221. Popular narratives around Covid often 'blame the politicians'. My own sense is that such narratives tend to overstate the blame with respect to the moment-by-moment judgements, but understate it with respect to longer term, more systemic failure, including institutional design.

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[14] For accessible accounts of this literature, see Toby Ord (2020) The Precipice. or Andrew Leigh (2023) What's the worst that could happen? MIT Press.

[15] The Commission on Climate Change estimates that around two-thirds of actions we need to take to avoid catastrophic climate change involve behavioural change, from tech adoption to dietary change.

[16] The establishment of the CO-HMT Evaluation Task Force is recent and important development in this space.

222. My strong sense was that in Phase 1, the politicians were generally dutifully 'following the science'. Indeed, through February and early March, at least some Ministers – certainly Matt Hancock – were quite frustrated and were ready to act more decisively.

223. I think it is also fair to say that No 10 and the Government felt both exhausted and slightly triumphant in January to February 2020. The Government had, after all, just come through a national election (Dec 2019) where the PM had increased his majority, alongside a series of bruising battles over Brexit.

224. I was very struck by a call I had with Matt Hancock after the SAGE meeting on the evening of 13 March. I was absolutely exasperated at: the dogmatic certainty of the modellers that suppression was impossible; the confusion about where the 'red line' of NHS capacity was; and the lack of testing or recommendations to act. The only positive appeared to be that it felt like others were also seeing the cracks, and the emotional and political reality was breaking through. As I said to Matt Hancock, I felt the reality was dawning that it was untenable to keep pushing on at speed with no capacity to stop. But Matt Hancock remarked that this was the best news he had had all week. In this sense, a dawning realisation on SAGE that maybe there were other options, and even that the numbers did not add up, was actually a relief.

225. It felt that political factors, and arguably misjudgements, loomed larger as we moved into the Summer and the mid to later parts of Phase 2. The most obvious of these mis-steps, most medical modelling experts would probably agree, was (a) the HMT push on 'eat out to help out' coupled with (b) resistance to the 'circuit breaker' lockdown in early autumn. I would probably add to this the considerable vacillation around the concept of tiering, and linked confusion about the associated asks of the public, such that by the time Ministers finally decided to go with tiering, it was really too late and a full lockdown became hard to avoid.

226. At this point, the Covid Taskforce was up and running, and in general it felt like there was much more of a Whitehall machine at work. Nonetheless, we found it quite hard to get key results or policy notes listened to (see appendix). For example, we found a clear result that people would strongly prefer to go to restaurants that showed evidence of being 'Covid secure.' Yet the fact that these effect sizes were larger than offering people vouchers did not seem to influence the 'eat out to help out' scheme. Similarly, we struggled to win arguments about improving the efficacy of test and trace;

the case for providing stronger financial support for low income workers to self-isolate; or for the public ability to understand tiers and indeed risk-calibrate more generally.

227. The big political calls – and high profile delays – seem to echo a central finding of BIT's 'Behavioural Government' report of 2018 **[DH/105 - INQ000182190]** This documented problems of 'optimism bias' (thinking that positive or favourable outcomes are much more likely than negative ones), alongside 'confirmation bias' (disproportionately seeking evidence that supports you priors or favoured solutions, and a failure to seek out counterarguments); and 'calibration errors' in judgement (in particular, underestimating the levels or error and uncertainty in judgements). Our report noted how these biases tended to get worse the more senior people were in government (not just in the UK).

228. In essence, it felt like Ministers wanted to believe the most optimistic scenarios as numbers started to rise. The net result was that by the time action was taken to contain the autumn outbreak, and later the third lockdown around Christmas, baseline cases were already extremely high. In other words, UK policy repeatedly intervened to achieve a reproduction number of 1 when baseline cases, and strain on the NHS, was already high. Other countries moved earlier, so that they achieved their reproduction number of 1 or less at lower case levels - and with fewer deaths.

229. By late phase 2, the Covid Taskforce began to introduce policymaking tools designed to buttress against some of these political, and, systemic failures. Serious work began to be done not just on prediction (always uncertain), but on scenarios (ie testing whether your policy is robust to a range of possible pathways). Similarly, the Taskforce began to use 'red-teaming' (partly encouraged by BIT as well as MoD), which involves bringing draft policies to a group of people deliberately tasked with pulling apart why it might not work.

230. The UK political system can make decisive changes in direction, but is also prone to bluster and overswings. In contrast, Northern European democracies are much more anchored in coalition, cooperation and corporatism. They tend to be slower and more deliberative, but more considered and consistent.

231. It is an open question whether the UK political policymaking in phase 2 was dogged more by delays per se, or by dogmatism and the political leverage of minorities within the governing party, that were expressed in the form of delays. The behavioural literature strongly suggests that individuals and groups with strongly held, simple but

elegant theories ('hedgehogs') make for engaging pundits and popular politicians, but for very poor forecasters. In contrast, those with more complex and multifaceted theories are much less fun to listen to, but they are much better at predictions ('foxes'). One can argue that we have a political system that tends to produce hedgehogs, but Northern European coalition systems tend to produce foxes. Covid needed foxes.[17]

232. Headline lessons include:

Don't: let hubris, optimism bias, or one voice become overly dominant.

Do: sharpen the prediction and calibration skills of senior policymakers, and buttress these skills with institutional mechanisms such as 'red-teaming' and scenario-based policy testing.

Conclusion

233. The UK emerged from Covid bloodied, bruised and poorer. The 'good news', if we dare call it that, is that many thousands of premature deaths were ultimately prevented relative to a plausible worst case scenario, albeit at immense cost.

234. The Covid Inquiry will surely identify alternative paths that could have been pursued to achieve better outcomes. Indeed, it is likely that some of these can be quantified, in terms of years of life saved and perhaps economic cost. But the tougher test is what was knowable at the time, and even more importantly, what institutional lessons can be learnt to reform and improve our government, public services, and knowledge eco-systems to enable others to do better in the future.[18]

235. It seems unlikely to be a story of simple villains. The vast majority of the key actors were good people, trying to do the right thing. I also do not buy simple blame games that put it all on the politicians, and certainly with respect to the early UK missteps.[19]

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[17] The terminology of 'hedgehogs' and foxes', and the research on human fallibility in forecasting, comes from Philip Tetlock.

[18] On lessons for the global evidence system, it may be worth looking at the Global Commission on Evidence. https://www.mcmasterforum.org/networks/evidence-commission

[19] Though I am sure others will point to concerns over what happened in social care and the issue of nosocominal infections, which merits picking apart in its own terms.

236. At the core of the UK's mediocre performance in the period of particular interest to the Inquiry – January to March 2020 – looks to be a classic 'Swiss cheese' failure: an alignment of multiple circumstances and institutional weaknesses that together led to a bad outcome. If the UK had had experience of SARS, we would have been better prepared. If our experts were not so fixated on models based on historic flu outbreaks, they might have avoided the presumption of an unstoppable wave, and grasped the opportunity to pursue an extended suppression strategy and mass tracing (even before testing was available). If Jeremy Heywood had not died, there might have been a stronger grip in the centre. If Brexit struggles and the need to recover from punishing elections and parliamentary battles had not been running, perhaps Ministers might have moved earlier. If there had been more focus on engineering and behaviour rather than pure bio-medical science, perhaps we would have done a better job on delivery.

237. For many of us, and particularly those at the edge of the infamous policy vortex, we were left wondering what more could we have done. I certainly had many sleepless nights of frustration and anger. It was not just a matter of hindsight. Some good advice was given. It just did not seem to win through often enough, or at least too slowly: such as the case for earlier social distancing measures; the rapid scaling of tracing (and testing); the earlier adoption of masks; weak support for self-isolation and enforcement; the use of more targeted messaging; headline messages with clearer calls to action; the use of trials and experimentation to optimise comms and delivery; the tracing of second degree contacts; the development of more than one alternative to the app; the use of prediction and delphi tools to build a better risk model; and clearer messaging at the point of vaccination on the two week lag till effective to name just a few.

238. Of course, we can all tell ourselves a story of 'if only'. For all I know, our advice, even if adopted in full, would have made no difference. But I do think that there are important 'no regret', quite deep, institutional lessons that we should learn (and indeed I wrote to Alex Chisholm and Helen MacNamara to this effect in July 2020).

239. If I had to choose one enduring lesson from Covid, it is that the evidence base, and quality of (non-biomedical) analysis advice, in our policymaking is not good enough. This is not unique to Covid, but the Covid experience laid it bare. Just before Covid, Michael Gove's Ditchley speech highlighted how only 8 percent of HMG major programs have even a basic impact evaluation. Institute of Government and NAO reports have repeatedly highlighted evaluation as a weak link in policy. The Vallance

review noted the almost total hollowing out of HMG R&D. At the same time, UKRI (academic) research funding remains highly skewed towards biomedical and theoretical interests, leaving a yawning gap around applied, non-biomedical research.

240. In its most damning, but everyday, form, this gap is expressed in the lack of a rapid 'test-learn-adapt' approach in the design of operational and delivery systems, and in policy. The rigidity of the test and trace system, and the lack of a drive from either the policy community or SAGE to make it a learning system, was central to HMG failure to deliver sustained suppression of the virus. But it is also central to the failure to achieve improvements in many areas of public service, and indeed to flatlining UK public service productivity more generally.

241. We must seize the opportunity to make our civil service more methodologically sophisticated. We should pursue this through the Civil Service reform work, through embedding evaluation and experimentation via Spending Reviews, and through delivering on the political interest expressed through Gove's Ditchley speech to reshape the empirical sophistication of the centre.[20] I believe that if we had this in place, some of the key early policy missteps might have been avoided, and in particular a more methodologically-confident policy profession would not have ceded decision-making so fully. Almost for sure, more strength in this area would have avoided the 'all eggs in one basket' around the delivery and operationalisation of policy, and would have helped us deliver – rather than merely aspire to – 'world class'.

242. I have also sought on a personal and professional level, in the wake of Covid, to redouble efforts to reinforce the quality and strength of applied behavioural science – both in government and academia. I actually briefly discussed this with the then-PM (Boris Johnson) in the No 10 lobby at the tail end of Covid. I drew the parallel to the events that made the British government realise that its engineering was not up to scratch in the 1850s, including the very public and notorious embarrassment over the failure of the funeral gun carriage for Wellington. We should have similar embarrassment about models that skipped over key assumptions about human behaviour; unfounded claims about 'behavioural fatigue'; experts that do not do experiments; unempirical 'stay alert' campaigns; and policymakers choosing smiling

[20] The development of the Evaluation Task Force, including its backing by HMT, is an important development. So too are the UK's 'What Works Centres', increasingly eyed by other national governments as a significant innovation.

nurses over faces in pain on the basis of a focus group over well-constructed trials of thousands.

243. The fact is that most policy involves behaviour. This is certainly true with respect to both the causes of, and reactions to, the type of crises that end up at COBR. But it is also true of most of the 'wicked problems' that kill far more people, but in slow motion. Smoking alone kills about the same number of people per year as died from Covid. Lifestyle factors cut a further near decade off life of the average Briton. Climate change, threatening existential destruction, requires changes the majority of which rest on behaviour. Conflict, perhaps our biggest threat of all, rests fundamentally on humans falling out with each other. It is a kind of madness that we spend hundreds of billions every year on picking up the pieces of wicked problems, but so little on prevention. We spend billions developing medical treatments but spend perhaps a hundredth of that on research and development to address the upstream behavioural, social and economic factors that cause most illness, let alone wider challenges. And then, when we finally decide we need that expertise, we find we don't have it.

244. There will be another Covid. We must make sure we are ready.

Statement of Truth

I believe that the facts stated in this witness statement are true. I understand that proceedings may be brought against anyone who makes, or causes to be made, a false statement in a document verified by a statement of truth without an honest belief of its truth.

Signed: **Personal Data**

Dated: 19th May 2023

Appendix: three phases of Covid

Phase 1 (Jan - March 2020). Expert overconfidence and early misstep

- overconfidence and false sense of UK being much better prepared than others
- early anchoring within expert medical community in UK on view that Covid would be an unstoppable wave. This inhibited pursuit of viable suppression [cf battles in and around SAGE: email to Patrick Vallance et al on 12th March urging adoption of measures to slow spread, including a draft list of suggested measures; email to Sedwill and Cummings, on 18th of March 'I think SAGE has never really considered the possibility that a sufficiently effective global lockdown could be achieved to shut down the virus'
- policy community, especially in centre, holding back, waiting for policy advice from SAGE (which wasn't a policy or operational decision making body), while centre was tired and exhausted from political battles of late 19 - early 20
- Overly dismissive of 'NPIs', from fist-bumping to tracing
- Desperate struggle to 'catch-up' mainly driven by DHSC
- Positives: Patrick Vallance general grip and overview of evidence, and intellectual ability to course correct; together with CMO helped maintain public confidence
- relative openness and transparency of UK government compared with many countries; and generally clear comms, such as March plan to handwashing and other public messages

Phase 2 (March - Dec 2020). Operation failures and political hesitation

- operational and system design failures, notably around systems for pragmatic suppression:
    - design of Track and Trace (& Joint Bio Security Centre) that failed to build in experimentation - either nationally or locally
    - NHS app - all eggs in one basket, and gross misprediction by NHSx about when it would be delivered
    - Battles over getting postcodes or mobiles collected via 111
    - Weak practical support for self-isolation [vs eg S Korea]
    - care homes transfers and staff support
- [Cf BIT trials and advice, such as note to Dido 3 June, through to note to Pitt et al, 16th October]
- behavioural and messaging mixed successes and failures, part depending on who won the particular argument. Bad examples include: failure to adopt the more effective messaging and posters to get people to go in for 'normal' medical treatment (face in

pain), versus the smiling face of a nurse, 22 April 2020], to the notorious 'Stay Alert' campaign and messaging

- weakness of the 'Covid secure' business drive and brand, inc issues such as ventilation
- misjudgements and arguments around strategy in late summer, esp with tussle with HMT, leading to 'eat out to help out' and failure to get second lockdown in place ('circuit breaker') until cases were already v high. Many feel that this was arguably a more serious error than the early mistake. [Cf BIT self-funded trial in July 2020 showing attractiveness of 'Covid secure' - which would have given a double win of safer venues and public confidence, versus cash vouchers, which had lower effects on confidence and higher cost to HMT]
- arguably hesitancy around the tier system (and local lockdowns), twinned with operational weakness, led to drift into necessity of second national lockdown
- opportunity for a more effectively (likely locally focused) form of mass testing missed before xmas 2020
- positives: successes around standing testing back up, inc Matt Hancock drive to 100k in wake of the testing summit in No10 (organised by Will Warr and me)
- getting PM to run with the 'Hands, Face, Space' message, which despite initial ridicule cut through and gave a clear call to action
- Covid Taskforce creation and build up to organise policy processes (eg social distancing review), legislation and regulation
- purchasing of vaccine

Phase 3 (Jan 2021 -) A system generally working, and vaccines kicking in

- unnecessary errors esp routed in underweighting of behavioural and operational factors, such as lack of communication about delay in effectiveness of vaccine and under-appreciation of importance of 'friction' and need to get the vaccine delivered as locally as possible (and/or at workplaces)
- Vaccine delivery!
- Generally vaccine delivery and sequencing to at-risk
- Improved segmentation of the unvaccinated to better direct efforts and avoid potential policy missteps (cf BIT work on strong likely backfire effects of paying unvaccinated people to get jabbed - and therefore correct decision not to proceed)
- Red-teaming
- Modelling, and Covid Taskforce generally working well by end game.