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Seen Elsewhere

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MEASURING SOCIAL DISTANCE

The need for social distancing, (or should it be unsocial distancing?), is something that most, but not all, of the population have taken on board since March. But is it effective? How to assess how far the requirements are being followed? Researchers at Newcastle University's Urban Observatory developed a dashboard to help understand the impact of social distancing measures on people and vehicle movement within a metropolitan city in real time. Their analysis of over 1.8 billion individual pieces of observational data, as well as other data sources, with deep learning algorithms, informs and updates the dashboard in real time. They have produced models which can measure the distance between pedestrians in public places. Using a traffic light indicator system, the algorithm anonymously identifies and labels people who maintain safe distances, while flagging certain instances in red where social distancing measures are violated. This enables bottlenecks where social distancing cannot be maintained to be identified. For further details see http://bit.ly/MeasuringSocialDistance.

SHOULD THE MIDDLE SEAT STAY EMPTY?

In July Arnold Barnett, professor of management science and statistics at MIT and world-renowned expert on aviation safety, calculated that the risk of contracting COVID-19 from a nearby passenger is about 1 in 4300. Under the 'middle seat empty' policy, that risk falls to about 1 in 7700. Middle-seat passengers are at higher risk than others, though not that much higher, according to Barnett's calculations. He notes that 'when the plane is full, risk is also higher for passengers in the window and aisle seats'. The risk of actually dying from COVID-19 as a direct resulting of flying is 'probably less than one in 500,000', Barnett estimates, which, while small, is considerably higher than the probability of dying as a result of a commercial plane crash. See https://bit.ly/middleseatrisk.

Whole Systems Partnership

WORST CASE WINTER SCENARIOS

The Whole Systems Partnership (WSP) have been working with a number of local health and care systems using a COVID-19 simulation model developed using System Dynamics. The core SEIR (Susceptible, Exposed, Infectious, Recovered) model is complemented by estimates of impact on key services across hospital and community settings. The model is currently being calibrated to each local hospital system making it possible to explore the potential 'reasonable worst case' scenario over the winter.

In the host system WSP have worked since early April to refine the model assumptions using local actuals. This has given local planners greater confidence in planning services against nowcasting outputs, focussing on the short term (4-6 weeks), and against forecast scenarios looking several months ahead. The WSP team have been embedded in the local modelling team working closely with local analysts and planners from the Clinical Commissioning Group and the Local Authority. The model outputs are also informing local NHS 'restart' programmes for hospital and community services.

The importance of modelling at a local system level has been demonstrated in this work. Local demographics, the timing of the first wave and the nature of local services have all been shown to have an impact on local planning decisions. For further information please contact peter.lacey@thewholesystem.co.uk.

COVID-19 STRESSES SUPPLY CHAINS

Anna Nagurney's book, 'Networks Against Time: Supply Chain Analytics for Perishable Products', co-authored with M. Yu, A.H. Masoumi, and L.S. Nagurney, and published by Springer in 2013, analyses the impacts of a variety of supply chain disruptions. In March, the day after the World Health Organization declared the COVID-19 pandemic, her article, 'How coronavirus is upsetting the blood supply chain', was published in *The Conversation* (see http://bit.ly/Nagurney). It was subsequently updated and published as 'The COVID-19 pandemic and the stressed supply chain', in Coronavirus Chronicles in *Analytics* magazine (see http://bit.ly/Nagurney2).

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Supply chains have been especially stressed during the COVID-19 pandemic. The USA blood supply chain is stressed for numerous reasons, including fewer collection sites for donations due to closures of universities, and fear of coronavirus striking donors and those who labour in blood services. Food supply chains have also been negatively impacted by the pandemic, from meat and dairy to fresh produce supply chains. Many meat processing plants have had workers contract COVID-19, resulting in closures, subsequent sanitisation of facilities and redesign for physical/social distancing. Some dairy farmers have resorted to throwing out milk, and potato farmers their potatoes, because the supply chains are broken. Even freight service providers and warehouse employees have taken ill, further disrupting the supply chain networks. The cost is great to farmers and society as prices rise and children go hungry with increasing food insecurity. Many in the O.R./analytics community are making intense efforts to combat stresses in supply chains.

GOING UP?

In another article in *The Conversation*, published mid-August, Christian Yates, Senior Lecturer in Mathematical Biology, University of Bath, asked whether the Coronavirus cases in the UK are rising (see http://bit.ly/ChristianYates). He argued that, with the reopening of schools in the UK rapidly approaching, it was critical to know if cases of coronavirus were going up, because further loosening restrictions could significantly exacerbate the problem. His conclusion? Are cases rising? Well, maybe. But maybe not. Local hotspots, there was concern about areas in the North-West of England at the time, invite more intensive testing. If those tests pick up a higher proportion of people who test positive, then this could also lead to a rise in the proportion of positive tests across the country without the disease necessarily increasing everywhere. By the time this is read, we will know whether an increase in cases led to several local lockdowns, or even the reimposition of a national one.

DELIVERING HEALTH-FOCUSED DATA SCIENTISTS

As part of an Institute of Coding consortium, led by Coventry University, Lancaster University is launching a new programme to produce data scientists equipped to provide insights that will improve health outcomes. The 12-month conversion course will give graduates from a range of different academic areas expertise and insights into health-related data science - working towards an MSc qualification. The primary goal is to respond to the shortage of data science and AI specialists in the UK. The first cohort will be recruited onto the existing Data Science MSc programme in October 2020. The second and third cohorts will be recruited onto a new Health Data Science programme.

The programme is led by Professor Christopher Edwards, Education Theme Lead at Lancaster University's Data Science Institute, and Dr Deborah Costain, Associate Dean for Postgraduate Studies at Lancaster University's Faculty of Science and Technology.

Professor Edwards said: 'Our aim is to promote excellence and innovation in the training of current and future health data scientists at all career stages in both public and private sectors. This work will build on the success of our existing masters offering, underpinned by the interdisciplinary approach to data-driven research and education provided by the Data Science Institute'.

Lancaster University

ROLLS-ROYCE RESPONDS

Rolls-Royce's R2 Data Labs lead a data analytics alliance to aid COVID-19 economic recovery. In April, Rolls-Royce said its R2 Data Labs had 'assembled an alliance of leading companies across commerce, banking, travel, technology and research to use data analytics to find new and practical ways to support the global response to the virus'. Caroline Gorski, director of R2 Data Labs, said the aim is to 'bring together datasets from all across industry that have not usually been accessible to the public domain'. 'We believe that if we can contribute datasets that wouldn't otherwise be released outside a company or industry's domain, then we can open up the realm of possibility', she added. One goal is to look at a broad set of economic, behavioural and

sentiment data in the hope of offering insights and practical applications to the global COVID-19 response. A second objective is to find and nurture economic green shoots in the wake of the devastation virus lockdowns are causing to businesses worldwide. Gorski asked: 'Can we use [data] models to identify lead indicators signalling economic recovery cycles that global businesses can use to build operating confidence in investment and activities that shorten or limit recessionary impacts?'

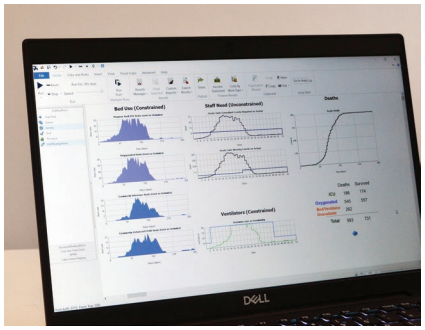
See http://bit.ly/RRResponse for more details.

COVID-19 MATHS

Richard C. Larson, Mitsui Professor, Post-Tenure, in MIT's Institute for Data, Systems and Society, published an article, http://bit.ly/TheRvalue, which sought to shed light on two mathematical quantities that have governed our lives in the battle against COVID-19. These are R0 ('R naught'), the basic reproductive number, and H, herd immunity. We all need to know about them and – most importantly – about our roles in determining their values. As we have been frequently told, R0 needs to be below 1, otherwise the number of infections will grow at an alarming rate. In the article, Larson demonstrates that herd immunity, a political hot potato in the UK at the start of the pandemic, is dependent on R0, so there is only one statistic we need to keep an eye on. Larson argues that the key is this: Past values of R0 are provided by historical data – depicting human behaviour and disease characteristics; future values of R0 are determined by you (and me and all of us).

DIY SIMULATION

Simul8 provided a free simulation model to help hospitals assess how many ICU beds and surge capacity will be needed to meet demand as case numbers rise. This simulation can tell how many ICU beds will be utilised as well as how many temporary surge beds will be needed to meet demand. There's also a facility to change the mortality rates in both these areas so the impact of having the appropriate type of beds on survival rates can be estimated. The simulation is populated with placeholder data but it's simple to update the parameters with any dataset. See http://bit.ly/Simul8simulator.



ISEE Systems have made available a simulator that looks at the spread of COVID-19 through a city. The simulator allows you to implement policies, change assumptions about disease and see the impacts in real time. See http://bit.ly/iseesimulator.

PROMISE THE MOON?

An article in the *Huffington Post*, http://bit.ly/HuffPostMoonshot, Operation Moonshot: Four Astronomical Hurdles The Government Must Overcome, responded to the UK Government's plans for a mass Covid-19 testing programme, with results available within minutes, to allow people to behave in a more normal way without ear of making others ill.

One of the hurdles discussed is the potential for false positives. According to Professor Sir David Spiegelhalter, Winton Professor of the Public Understanding of Risk in the Statistical Laboratory at the University of Cambridge, there is a "huge danger" with the project, because of the potential for a "very large number of false positives" that could leave thousands of people self-isolating unnecessarily. He told BBC Radio 4's Today programme that experts in his field were "banging their heads on the wall" at the proposal.

"Mass screening always seems like a good idea in any disease – 'Oh yes, let's test everybody'. But the huge danger is false positives – no tests are perfect, it is not a simple yes/no thing." He said the threshold would have to be set to a level that would "pick up anything that hints at being infectious", meaning that the tests would "always generate a very large number of false positives". "If you only have 1% false positives and you're testing the whole country, that's 600,000."

The other three hurdles? The technology doesn't actually exist, the manufacture and distribution of the tests, and the support network required.