



Using Location Intelligence to Build Back Better

GIS in Healthcare



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Let's use location intelligence to make Building Back Better a practical 2021 option

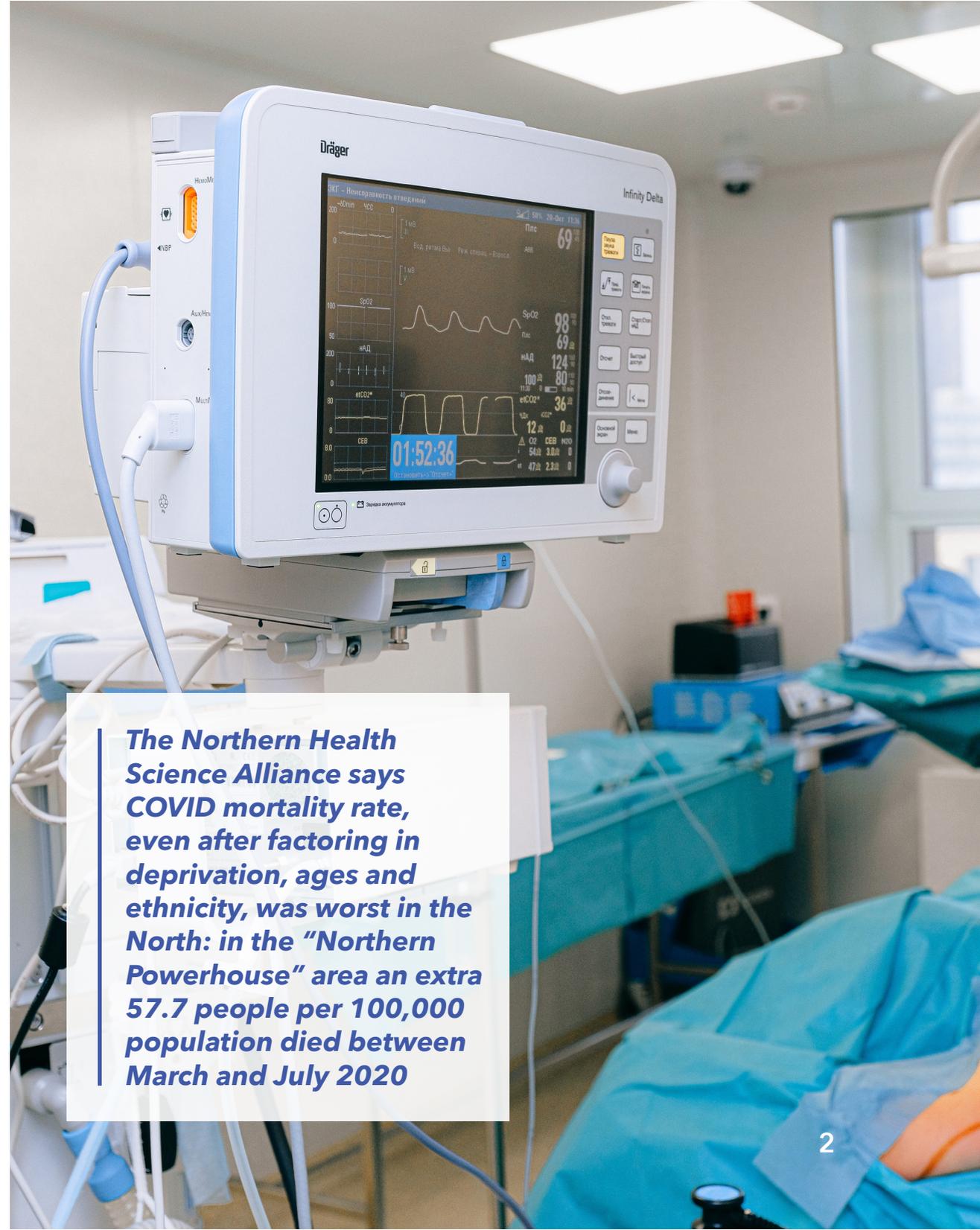
The news that the UK—which became the first country in the world to approve a COVID vaccine last December—is now delivering 2.5 million jabs a week allows us substantial optimism for the future.

That means the country can continue to make progress throughout 2021 and start to return to normal... but is 'normal' what we want? Many citizens and stakeholders, including the Government, say we should be aiming for better. Calls for a more equal society post the coronavirus crisis and for a greener and more digital economy with greater resilience are being made—and No 10 is very much receptive to such demands.

Central to any plan to 'Build Back Better' must be new thinking about how resources are allocated. Front and centre in No 10's plans for a revitalised, post-Brexit UK is the NHS, which has been doing amazing work throughout the pandemic and is now in the process of inoculating tens of millions of us.

For sure, COVID and Brexit present a considerable challenge to our Build Back Better plans—challenges made even stronger by already-present structural problems like:

- an ageing population
- pressure on NHS staffing
- the need to shift the NHS's orientation from an acute care/end of life helper to a genuine life-long national health service
- the issue of persistent health inequality and associated diminished life expectations for too many of us.



The Northern Health Science Alliance says COVID mortality rate, even after factoring in deprivation, ages and ethnicity, was worst in the North: in the "Northern Powerhouse" area an extra 57.7 people per 100,000 population died between March and July 2020



“We can’t do any of this if we don’t have the full picture”

The good news is there is an emerging perspective on how to meet all these challenges. It centres on an approach that, for decades, has been quietly aiding policymakers and industry across many sectors. We call this approach location intelligence—using geospatial techniques to attain the deep, fully data-driven, insight we need to Build Back Better.

Take the three Build Back Better priorities identified by the PM: increasing social fairness, strengthening Britain’s green economy and improving resilience. We can’t do any of this if we don’t have the full picture. How do we know where things currently are not fair, not green and not sufficiently resilient? How can we level up facilities in deprived areas (i.e. those communities that tend to have fewer, or less well funded, GP surgeries and opticians) if we can’t finally end the health service postcode lottery?

The key to answering these questions is using the proven geospatial ‘science of where’ to uncover hidden relationships. We’re not just talking about points on a map, but about using location data to surface hidden, structural relationships inside our health and social care datasets. It’s only by modelling the optimal places to deliver new services or strengthen existing services, based on where patients live and what’s really available there, that we can better resource our communities and start to solve inequalities.

Planning, operating and communicating in health using location intelligence has actually been happening for some time. That’s because it can help you map cases and disease spread, plus tell you where your most vulnerable patients are, where your resources currently are (or need to be), and so much more.

150 years of British location intelligence leadership

In 1854, a cholera epidemic gripped inner London, but finding the source of the outbreak proved impossible. Pioneering epidemiologist Dr John Snow decided on a new approach: mapping the specific locations of cases, to street and house number level. Based on the patterns that formed on his new disease map, Snow famously tracked down the source of the local outbreak to just one contaminated hand water pump.

By doing so, this British innovator had become the very first user of the world's very first healthcare Geographic Information System (GIS), the underlying approach that delivers location intelligence.

Snow's pioneering work has inspired generations of life, social and more recently data scientists, as well as policy makers. But leveraging the full power of geography to reveal previously unknown healthcare patterns, trends and relationships is still not being done enough in the UK at the moment, as the Cabinet Office's excellent recent work on what a national Geospatial Strategy could do for British society has highlighted. (Indeed, the Strategy specifically identifies location-based disease tracking and prevention as one of its nine suggested national focus areas for the country, arguing that new technology could be used to track the real-time spread of a disease during an epidemic, as well as the proximity of communities to healthcare services including "tracking the provision of resources, equipment and life-saving medical supplies".)



The extra costs to the NHS of health inequalities have been estimated as £4.8 billion a year from the greater use of hospitals by people in deprived areas



**Local government
spent £22.2 billion
on social care in
2018/19**

In fact, location intelligence is even more relevant to healthcare today than in Snow's day. GIS can do so many more things interactively and in real-time than Snow's static paper maps possibly could. That means that with location intelligence insights, geographical variations in health, under-spending on prescription drugs, availability of equipment, utilisation of estates and more can all be revealed and optimised--providing senior decision makers in the NHS, DHSC, and local authority social care teams with an unprecedented ability to draw together and make sense of a vast jumble of what seems to be unrelated (but really isn't!) information.

Location is an often neglected but vital contextual factor in interpreting remote health data. There is already policy debate around 'place-based healthcare' that can be enabled by the formation of the Integrated Care Systems (ICSs), for example. However, if we start to use it properly as part of a Build Back Better vision for the country, policymakers, budget planners and NHS leadership would be given the power to:

- know what is happening, and where it is happening, in real-time, at a great level of detail
- work off a single source of the truth for complete situational awareness, with all staff securely accessing data and visualisations in the way that makes the most impact to doing their job in the most efficient way
- move to better targeting of public health and social care services derived from intelligent pattern recognition and analytics-based prediction
- manage effectively with useful, data-rich, dashboards with the best KPIs for both decision makers and the public.

Just a few of the use cases that could come through here include:

- better collaboration between CCGs and local government to more precisely define boundaries and the best sites for intervention
- better community-level support through use of mobile apps and data collection at the patient level (cf. Track and Trace, but on a permanent level; this is already a concept in UK healthcare future plans with the idea of 'place-based', integrated care, of course)
- potential to take advantage of standards such as the FHIR (Fast Healthcare Interoperability Resources) Specification, to enable effective integration of EPR (electronic patient record) data.

Using data-driven, holistic views of patients in their social and familial context to end health inequality

Let's take another application of location intelligence that could have major positive outcomes in a surprisingly wide number of health and social care problems: improving air quality. As many as 36000 British citizens die prematurely each year because of man-made pollution; recent research commissioned by Public Health England revealed that the health and social care costs of air pollution (PM2.5 and NO2) in England could reach an annual drain on national resource of as much as £5.3 billion by 2035.

Location intelligence lets us start doing something about that at last. Once we have accurate, data-driven location insight into where air quality is at a concerning level, allied to identifying the source of the pollutants and what negative local health conditions it is creating, we then have the right platform to model the impact our interventions might have.

This fully aligns with ministerial thinking of what a truly proactive post-COVID social care system based on data-driven, holistic views of patients in their social and familial context needs to look like. Environment, and the care options and resources a patient has available in their specific real-world location must, going forward, include NHS and

social care being much, much better fused together than they are now. Indeed, data and location intelligence may finally be the glue we've been searching for all these years that enables us to finally connect a national NHS and fully local, accountable social care system.

We need to do that, because British health inequality is a significant national challenge, and in many ways COVID simply brought this into the spotlight. Males living in the least deprived areas can, at birth, expect to live 9.4 years longer than males in the most deprived areas. For women, this gap is 7.4 years.

As a matter of social fairness, cohesion and democracy, how deprived a family happens to live should not be a determinant of how long they live, or of how much of their lives are spent in good health in a Built Back Better, post-COVID UK. Here again, leveraging the power of geospatial analysis to derive better understanding of complex health and location relationships will be key to mitigating the causes of health inequalities, and end the danger of simply reapplying failed past solutions.



Making best use of another critical resource: clinician and patient time

Location intelligence will really help the NHS on the macro level, then. But it could also help it on the micro level. Consider the puzzle that simply getting a patient and a clinician together in the right room at a big Trust can be genuinely difficult--and lead to missed appointments and wasted time and resources.

Staff, contractors, patients and assets (medical equipment, bed pans--the stuff you need to work) are all located somewhere in your hospital. But if they're not all in the right place(s) at the right time, patient care does not get delivered, and staff end up wasting their valuable time.

Frustrated clinicians and Trust CEOs attribute a significant fraction of these kinds of issues to navigation problems, especially at larger facilities. To put cold hard taxpayer numbers on that, almost a billion

pounds worth of appointments get missed every year, equivalent to 257,000 hip replacements or 990,000 cataract operations. A practical, location intelligence-driven way that practitioners are starting to solve the problem is by building an exact digital copy, down to the minutest degree, of the campus. Doing this means you can revolutionise facilities management, optimally route patients and staff to where they need to be, and accurately track critical asset locations.

Sounds like science fiction? An American health system we've worked with calculated that time wasted by staff searching for assets in a relatively small (395-bed) facility was costing the equivalent of \$4,000 (£3,061) a day. A smart map of the building is now supplying the needed information instantly instead. Imagine what that could bring in terms of efficiency and improved patient care across a Built Back Better, post-COVID NHS.



Conclusion

In *Unlocking The Power of Location*, the Cabinet Office's landmark June 2020 vision of the next five years of geospatial thinking in the UK, Public Health—quite rightly—has its own chapter. There, we hear about the importance of the “huge potential” of location enabled technologies to improve public health outcomes. The good news is that the kind of location-driven use cases envisaged by the idea of a co-ordinated national approach to unlock economic, social and environmental value from geospatial data are happening today: and providers of location intelligence and GIS solutions like ourselves stand ready to help.

That's because we very much agree with the positivity of the Build Back Better plan. In the hugely complex social context of a UK setting out to forge a new post-EU identity and future for itself, we know that harnessing the power of location intelligence will be a huge asset for giving the nation the NHS it deserves and empowering national, regional and local leadership to create a healthier society, too.

So let's put location intelligence to work for all our benefits. Location intelligence gives us as a species a deeper understanding of where and why things happen. Let's use it to make Building Back Better a realistic project, as well as finally addressing health and social inequalities that have bedevilled the United Kingdom for far too long.



Esri is the global market leader in geographic information systems (GIS) and offers the most powerful mapping and spatial analytics technology available. Today, Esri software is deployed in more than 350,000 organisations including the world's largest cities, most national governments, local regional and national healthcare organisations, 75% of the fortune 500, and more than 7,000 colleges and universities. Esri engineers the most advanced solutions for digital transformation, IoT, and location analytics to create maps that run the world. In fact, the Forrester Wave™: Location Intelligence Platforms, Q2 2020 report highlights Esri as a leader in Location Intelligence.

In the UK, Esri UK supports the NHS and social care leaders and policymakers by a number of location intelligence-based approaches, from reducing the burden on front line staff by replacing paper processes with intuitive digital apps and dashboards to modelling the geographic spread of disease over time.

We are already working with many NHS and government health organisations across the UK, including South Central and West CSU and Public Health England. To explore how we can also help you to meet your strategic objectives, please contact us on health@esriuk.com or 01296 745599.



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