A HEALTHY OPPORTUNITY

SPATIALLY ENABLED DATA AND TECHNOLOGY HAVE SO FAR HAD LIMITED IMPACT ON THE HEALTHCARE SECTOR. HAMISH ROBERTSON AND NICK NICHOLAS ARGUE THAT THE KEY TO CHANGING THIS IS FOR THE INDUSTRY TO CAPITALISE ON PERIODS OF CHANGE AND DISRUPTION

One of the major issues for the spatial sciences sector can be breaking into industry sectors that lack an established framework for the application of spatial science and technology. The health and medical sector has a very mixed history of understanding and applying spatial concepts methods and technology to its problems. The heavy focus on clinical practices and administrative data has limited the range of opportunities for and understanding of the value of spatial knowledge in this sector, despite a variety of innovative projects including the Dartmouth Health Atlas and the Spanish Cancer Mapping project that illustrate the value of spatially enabled data to healthcare.

So how can promoters, vendors, suppliers and others in the spatial sector create opportunities in industries where their success has been limited? One area of opportunity we suggest in this article is to capitalise on periods of change and disruption in these complex and bureaucratic industries.

Sectors in a state of flux can struggle to retain an over-arching view of their growing or changing customer bases and the various datasets that they normally monitor, which will have altered or expanded in scope and detail. For example, globally, many public, private and not-for-profit healthcare providers are implementing computerised health information systems, often for the very the first time. These programmes are frequently part of a larger digital strategy that attempts to provide a range of clinical and administrative benefits from digitisation and, more specifically, from a move away from older analogue systems of data collection, analysis and retention.

This strategic digitisation can provide an opportunity or series of smaller opportunities to emphasise the value of including spatial technologies – especially so if issues such as distance to care, population dispersal or systemic complexity are characteristic issues. Disruption is an opportunity because the rigidity of a health system becomes fluid for a period of time. Eventually, a new orthodoxy is very likely to be established but, until then, you have a chance to benefit from this fluid scenario by promoting and illustrating the potential value of the spatial perspective.

Electronic health records

A more specific example can be seen in the global growth and development of digital approaches to health informatics. These include the rapid developments in tele-health, mobile health and e-health. All

these strategies acknowledge the importance of distance and location in health-service provision, even if they are relatively passive in incorporating spatial concepts and methods. This is likely to improve over time but targeting such schemes early or promoting the role of geospatial technology directly to suppliers and clients of these systems has a great deal to recommend it. Once locked in, it can be difficult to find a basis for significant change to these systems because they become the new orthodoxy in their host environments. Healthcare can have very cumbersome change management processes and advocating your value to an advocate within these systems can be one way to get spatial issues on the agenda.

Electronic health records (EHRs) show how the diffusion of specific strategies and associated technologies tend to vary over space and time. In the US and elsewhere, governments have been major promoters of EHR software and systems because their value can be seen in providing a richer environment to track inputs, outputs, return on investment, quality and safety measures, and the like. While individual providers may not be so invested in these factors, governments and insurers can and are seeing value in being able to collect and analyse detailed, spatially enabled information.

Policy change and the role of the spatial

Broader policy shifts that offer opportunities for the spatial industry sector include changes in long-term care (LTC) for the aged, the implementation of national health insurance schemes where none previously existed or innovations, such as the extension of medical insurance programmes or the addition of significant new programmes. The policy domains that we usually understand as health and social care have often been quite separate in many countries, with very limited exchange of information between the two or even within the various systems covered by each domain separately. In many places, the healthcare sector rarely talks to the disability sector, for example, and childcare often sees no direct connection to aged care.

Many disabled people can have significant health concerns that limit their capacity to work, train or study; this in turn means that the disabled are often living close to or in poverty. Similarly, older people are characterised in much social and economic policy discourse as economically valueless and dependent cases when their contribution to volunteering, community work and, of course, free childcare is enormous in most societies.

The social patterns that these interactions between policy and people produce almost always feature significant spatial patterning. Major changes in the public policy domain are therefore major opportunities for the spatial information sciences.

The US

The Patient Protection and Affordable Care Act 2010 (aka ObamaCare) has changed the face of health insurance in the United States. Since its introduction, more than 15 million new enrolments have occurred. It now sits within a larger context that includes changes to state-based Medicaid programmes and the various other components of the American healthcare system, including the not-for-profit sector.

One of the implications of this has been a variety of flow-on effects to the providers of health insurance plans and the healthcare service providers who meet the needs of the newly insured. This is where spatial science and technology have immediate potential, as working with locational, real-time data is not a challenging issue for GIS and related spatial methods in the way it often is for cumbersome bureaucratic health information and administration systems.

Other research in the United States has already shown that many people with low or no health insurance are at high risk of acute hospital interventions due to spikes in their existing health conditions, often brought on by a lack of healthcare or the cost of same including the expense of prescribed medications. Acute admissions are high-cost and represent a sub-optimal treatment strategy for patients with these kinds of conditions. Early intervention and condition management are both cheaper and clinically better for patients – the combined problem of social disadvantage, especially low income or being on welfare programmes, combined with poor health status simply compounds to build a 'frequent-flyer' or 'super-user' cycle of illness that rapidly shifts from chronic to acute status followed by emergency department admissions.

The Robert Woods Johnson Foundation (RWJF) in the US has funded a range of projects that use geospatial technologies to support practical health interventions, including childhood obesity, matching service provision to community needs, asthma risk mapping and allergen exposures in rural low-income housing areas. These initiatives, when successful, destabilise accepted practices and extend the potential audience for geospatial science and technology applications.

In Australia

In Australia, a major social policy change is now being implemented: the National Disability Insurance Scheme (NDIS). This started with a number of trial sites in different states to test the proposed model and see how national implementation would likely proceed when it is scaled up, as well as to provide time for research, development and information system refinements to occur.

One of the key aspects of spatial science application involves tracking the patterns in trial areas between what was known before and after the implementation of the programme. For example, how many disability clients are located in a specific area and what services are they currently accessing? What pattern is emerging and being monitored as the new programme takes affect? What is the relationship between the expected or anticipated behaviour pattern (expenditure patter/service demand) and what we are seeing? Why is this occurring and are there geographic patterns or variations in the behaviours of people with disabilities?

Marketisation

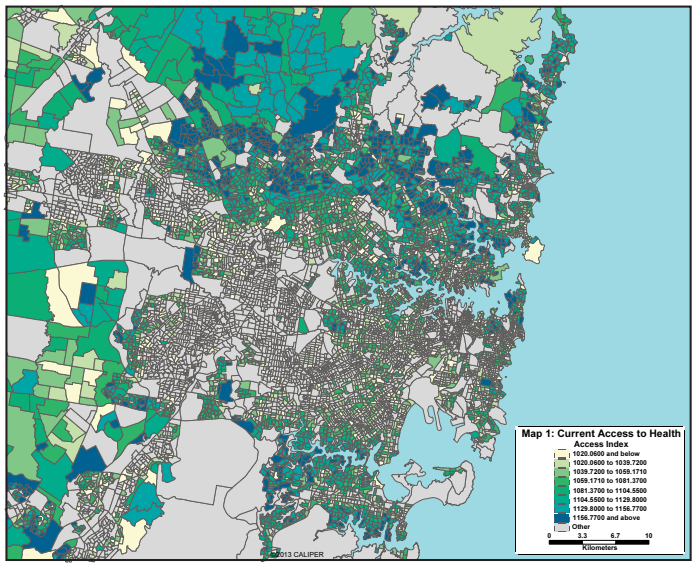
The application of spatial science has value in this context because it helps to both project expected patterns of access to and use of programmes in a newly marketised model and investigate variations from projected scenarios. Many policy changes by governments internationally involve an element of 'marketisation' – a shift from what might have been an entirely public social service provision to a more fluid and, in some cases, even commercial approach.

Here, too, the potential for spatial science and technology is obvious. Few other domains of science and technology permit detailed monitoring of complex systems and the visual representation and analysis of changes within those systems. Furthermore, the dynamic nature of the sector means that we are dealing with issues such as real-time data collection or dynamic monitoring systems in ways that add potential value to systems. Old strategies of waiting a year or so to collect and analyse data are simple inadequate in the current era. So too is hoping for a successful natural experiment by implementing systemic change first and considering significant variations afterwards. We have the capacity to address these types of concerns prior to, during and following implementation in ways that are highly visual. This has real benefits from change managers and analysts.

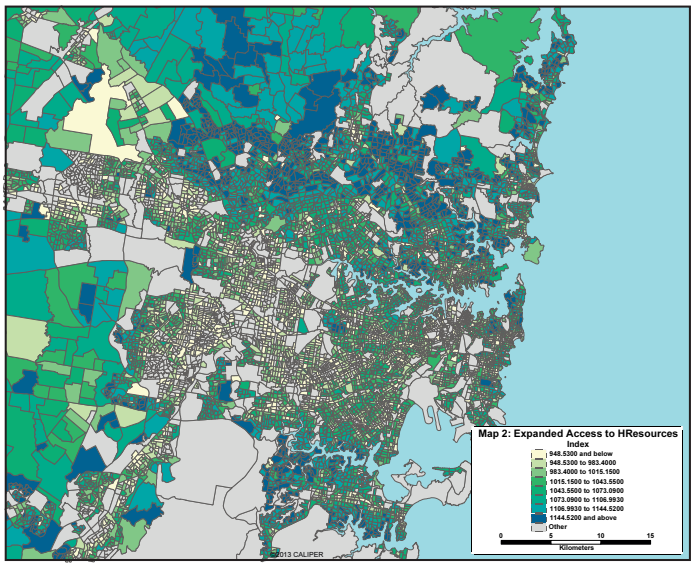
One of the areas of significant development in spatial science and technology lies in the visualisation of information for audiences who may not be familiar with or users of spatial software. Complex systems often require years of experience to build a coherent picture of their various interconnecting elements and their relations to one another. Disrupting those established patterns has consequences for internal and external knowledge of how those systems are operating under new conditions including policy changes.

Conclusion

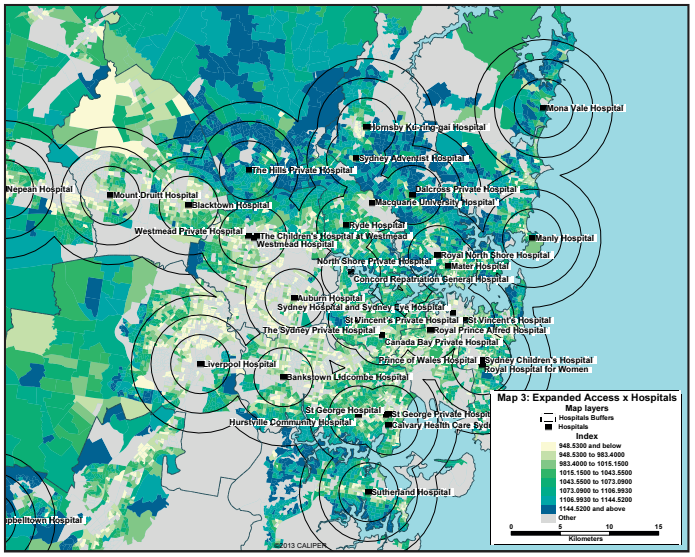
We have attempted to illustrate why and how moments of change within healthcare, represent significant opportunities for spatial science and technology providers. Obviously these opportunities sit within a broader context that includes formal education and professional development activities as well as standard marketing strategies and the mix of industry and academic research publishing that goes on. Our em-



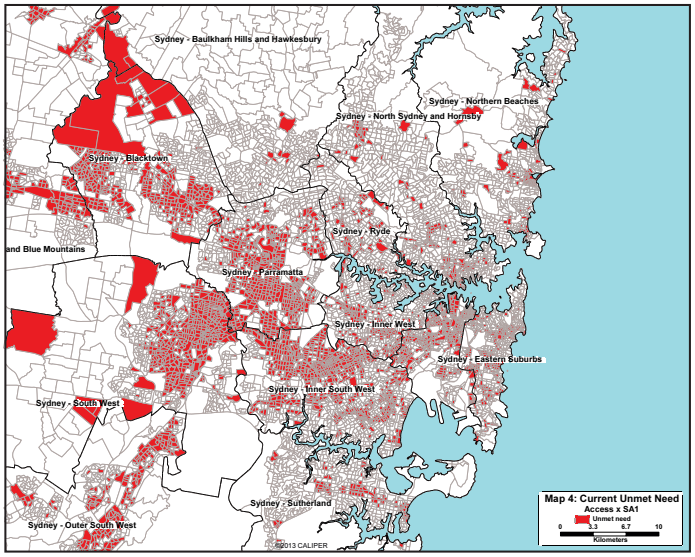
1. Established demand profile by established SES threshold



2. Demand after SES threshold change



3. Demand after change with hospitals



4. Map of new areas of demand from threshold change

These maps use the concept of a change in healthcare access to illustrate a shift in locational and quantitative demand profiles. We used the SEIFA index in Australia, a socio-economic classification index for the whole of Australia, to map theoretical examples for metropolitan Sydney. The initial setting for the access threshold is at just over 1,000 (1,020.06) but then we lower it to just over 900 (901.5). This results in a spatial and quantitative pattern change in (delimited) demand. We map: (1) established demand based on the original threshold; (2) new/additional demand brought about by the threshold change and: (3) the volume of potential demand still unmet due to the limited nature of the access change in the access threshold

phasis here has been on those points of rapid, dynamic change that affect large, complex systems at irregular intervals. Major policy changes have information science implications both in established bureaucratic systems and in places where these are in development.

Software vendors may compete actively through formal processes but proactively seeing these emerging moments as opportunities for specialist providers, such as spatial science and technology, requires more proactive initiative. These moments are relatively rare, because they involve system-level changes and disruptions to established patterns and processes. For those of us in spatial science and technology, these moments may represent a chance to influence and access systems that have not yet integrated the spatial perspective. They don't come often so making the most of them is crucial if we are to promote the benefits of established and emerging spatial science and technology.

What opportunities do you see emerging around you? What policy or practice changes are developing that offer room for the entry or addition of spatial science? How can this sector benefit from spatial science and technology and how best do we get that message through? These moments of disruption usually emerge because there is a specific agenda to improve current practices. There is an implicit and often explicit message of improving factors such as access, value, quality, safety, timeliness, efficiency and even fairness. All these factors exhibit spatial variations to some degree because they have a social dimension. The opportunity for spatial science and technology lies in showing how these and other factors can benefit from the addition of a spatial perspective.

THE OPPORTUNITY FOR SPATIAL SCIENCE AND TECHNOLOGY LIES IN SHOWING HOW THESE AND OTHER FACTORS CAN BENEFIT FROM THE ADDITION OF A SPATIAL PERSPECTIVE

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