GRAPHC[1]: a Spatial Portal for Collaboration in Primary Health Care Research*

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The Geographical Dimension in Primary Health Care

The importance of the geographical dimension as an input to research, planning and the delivery of primary health care (PHC) services is widely recognised in industry and academia. By its nature, GIS is an ideal tool for analysing disparities in health outcomes, availability of services, environmental risks and workforce shortages and other contemporary issues.

The adoption of GIS as a tool for policy development and service delivery planning and evaluation is becoming increasingly widespread. However, despite the great promise GIS holds for advancing health outcomes, a lack of required resources and expertise to build GIS capacity in-house remains a common barrier.

GIS and the Australian Primary Health Care Research Institute

The Australian Primary Health Care Research Institute (APHCRI) at the Australian National University (ANU) provides national leadership in improving the quality and effectiveness of primary health care in Australia. Funded by the Australian Commonwealth Department of Health and Aging (DoHA), APHCRI has a number of research foci including an interest in the use of geographic information systems (GIS) in primary health care research.

The national centre for Geographic & Resources Analysis in Primary Health Care (GRAPHC) was established in 2011, within APHCRI, to support geographic and location based aspects of primary health care research. In all its functions, APHCRI seeks to actively engage stakeholders and to develop their understanding of the role they can play in increasing the adoption of research evidence into policy and practice.

Spread across Australia and spanning all facets of primary health care, GRAPHC's stakeholders can be categorised into three broad groups: Research and Academia, Policy and Advocacy, Service Planning and Delivery. Web-based mapping holds the promise to deliver significant benefits for each of these stakeholder groups by exposing relevant functionality and capabilities underpinned by the integration of relevant spatial data and business and/or research data.

APHCRI's initial spatial engagement was through a tool developed by the Robert Graham Centre in Washington D.C. called HealthLandscape. Although this system provides some specific capabilities, it was necessary to establish a better understanding of stakeholder requirements before determining the future direction for GRAPHC.

Solution Assessment, Strategy, Architecture & Implementation Roadmap

Spatial Vision was contracted to undertake a solution assessment and develop a platform strategy and architecture. This engagement involved three core stages:

> **Stage 1 - Web Mapping Stakeholder Requirements**: This stage involved 20 in-depth interviews with representatives from the primary user groups from across Australia in order to determine what would constitute the 'ideal' PHC web mapping solution.

> **Stage 2 - Web Mapping Solution Assessment:** This included a desktop assessment of 15 web mapping applications looking at exemplars from within Australia and Internationally. The applications assessed spanned commercial off-the-shelf (COTS), open source and proprietary solutions. The purpose of the assessment stage was to gauge the suitability of products for the future Health Landscapes Australia platform.

Stage 3 - The Platform Vision and Solution Architecture: The outcomes from stages one and two informed the creation of a Vision for the web mapping system and capability:

> *To provide a data rich, interactive, highly functional suite of applications that meets a diverse set of stakeholder requirements. Access to these applications will be provided via GRAPHC's web portal which will also provide access to information on training, support, capacity development and spatial methodologies.*

Spatial Vision developed the solution architecture balancing APHCRI's practical constraints, e.g. cost and availability of technical skills with their desire to establish an ideal web mapping environment for the PHC community over the medium- and longer-term.

Due to the wide and diverse requirements of the stakeholder groups, the Strategy recognised that no "one single" product will meet APHCRI's and GRAPHC's long term objectives. The approach providing the greatest potential for success is one that is Application Programming Interface (API) agnostic. The mindset ensures GRAPHC will capitalise on a range of component products that deliver the most cost effective outcomes over the short, medium and long term.

GRAPHC Now and into the Future

GRAPHC accepted Spatial Vision's recommendations in full and are progressing towards achieving the goals laid down in the Strategic Plan. Now one year into the implementation GRAPHC has:

- Developed a web based geographic information portal which is readily accessed by the community and researchers, (http://graphc.aphcri.anu.edu.au)
- expanded HealthLandscape (Australia) functionality with additional tools to facilitate access to primary health care relevant data,
- loaded Australian demographic, socio-economic and public health data, now managed locally,
- deployed new infrastructure hosting ESRI ArcGIS and MS-SQL servers and the data.
- developed the G-Tag system that facilitates the application of location attributes to unit record data while protecting patient privacy.
- developed the G-ET tool that allows users to 'construct' their own tabular data based on spatial references from diverse datasets. This data can then be linked with research analyses and visualised using the GRAPHC QuickThemes Tool

GRAPHC is looking to enhance its value by developing a series of researcher focused 'use cases' and then targeting resources and facilities to address them. GRAPHC also acknowledges the importance of training and development and will be establishing formal tutorials and a user guide that describes the functionality and configuration of the tools and data sets.

GRAPHC currently hosts several "maps" in the ArcGIS Online environment, it is expected that engagement with this facility will be expanded.

The importance of data governance and metadata has been clearly outlined and although substantial progress has been made in these areas, there remains an opportunity to enhance and improve documentation and access to metadata.

**HealthLandscape (Australia) interactive visualisation tools:**
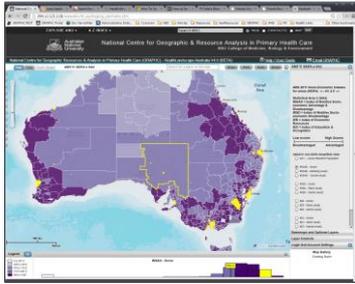
The Workforce Analysis tool, for example, enables users to investigate the distribution of medical professionals and identify potential resourcing gaps.

The Grant Mapper provides a quick and easy means for thematically visualising the distribution of program and initiative funding at a national scale. This tool allows users to construct complex definition queries.
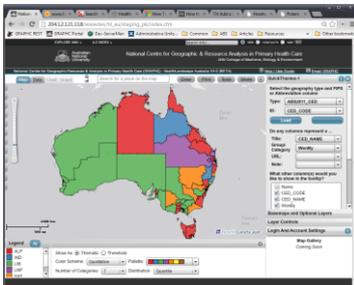
Mapping your own data using the QuickThemes tool is very simple and fast. This requires minimal understanding of GIS, but provides a spatially engaging interface to encourage new users.
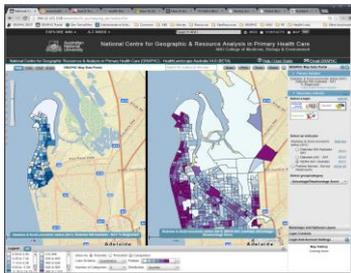
The GRAPHC Data Portal allows users to compare and contrast datasets including calculated comparison analyses. The tool offers users the ability to combine public demographic, socio-economic and health data with dynamic, interactive web maps.

Improving Decision Making in Primary Health Care

The implementation and continued development of the GRAPHC portal is unlocking health data for the national research community. GRAPHC is now making significant inroads towards equitable access to spatial analytical capabilities and tools typically reserved for the GIS specialist. As a result, geospatial analysis and visualisation capabilities are more readily available to drive better decision making and most importantly, to support improved health outcomes.