Response to NHS Chief Executive’s Open Call for Evidence and Ideas

Respondent ID: 94

Organisation name: Esri (UK)

Type of response: Document
Geographic Innovation in the NHS

Esri (UK)’s response to the NHS Chief Executive Innovation Review
Contact

Dr Keith Wishart
kwishart@esriuk.com
Head of Business Development - Government for and on behalf of Esri UK

Esri UK
Millennium House
65 Walton Street, Aylesbury
Buckinghamshire, HP21 7QG

Email: info@esriuk.com
Tel: +44 (0) 1296 745 500
Fax: +44 (0) 1296 745 544
Website: www.esriuk.com
## Contents

1. **Executive Overview** ............................................................... 4  
2. **Introduction** ........................................................................... 7  
3. **Geography already supports innovations across the NHS** ... 8  
4. **Where can GIS further innovate across the NHS?** .............. 11  
5. **How to take this forward** ..................................................... 16  
6. **About Esri UK** ...................................................................... 17
1. Executive Overview

In response to the call for evidence as to how the NHS can engender innovation which significantly improves health and care wherever it is applied, this paper offers a view on the broader use of Geographic Information Systems (GIS) which are widely used across government and have recently been utilised in wide-ranging applications such as redesigning citizen service delivery within Westminster City Council, supporting ONS with the analysis of the 2011 Census and helping deliver the low carbon agenda in Nottingham.

GIS are already deployed extensively across UK Central Government, Local Authorities and Non-Departmental Public Bodies. A key benefit of GIS is the ability to visualise multiple layers of data from disparate systems without the need to permanently link legacy systems or records. There is a growing evidence base for GIS being a high return-on-investment and low implementation risk technology for government, for example Westminster estimate £4m pa savings through GIS-based service redesign.

Building on our ongoing work with the Department of Health, Public Health Observatories, the Health Protection Agencies, PCTs and other health bodies, we suggest that key linkages can be created with existing central and local government capabilities to support commissioning decisions, estate management and staff resourcing. This could be broadened to support improved patient choice, competition analysis and the monitoring of long-term conditions as part of a localised view of health care provision.

We have suggested ideas around the specific consultation questions (learning from best practice, national, local and partner actions) throughout the paper and would highlight the following:

**Learning from elsewhere about adoption and spread**

In this paper we have highlighted examples of national and international best practice that illustrate the potential to innovate with geographic information. These include using GIS for facilities management, efficient staff deployment, matching service delivery to patient needs and creating a patient-centric view of the world.

While there is much to learn from these specific examples there is also a bigger lesson to be learned from the spread of geographic innovation particularly in local government. Growth in this area has been driven by many factors including but not limited to:

- Capacity building, skills and human resources
- Networks and industry groups
- Availability of high-quality national and local data sets
- Well-developed commercial relationships both intra-government and public-private sector

Much of Esri’s experience and expertise allows organisations to optimise the configuration of services informed by geographic-based insights. This includes an understanding of how assets are distributed, as well as the behaviour of individuals and their movement between services. In order to make the most of these insights, it is important that services are able to adapt and change. To realise efficiency savings, this means phasing out unpopular and inefficient services in favour of more
effective deployments which are responsive to population demands. This change in the system can be challenging, but GIS can both provide insights which will inform decision-making and also enable advocates of change to articulate the case effectively.

**Actions at national level in the NHS**

We see national bodies as key enablers to the adoption and spread of innovation across the NHS. Specific opportunities include:

- Custodianship and distribution of key national indicator sets e.g. lifestyle data, healthcare demographics, long-term conditions, commissioning statistics etc.
- Systematic review and optimisation of the NHS Estate
- Cross-government coordination e.g. with local government

It is also essential that the NHS Commissioning Board and other national-level organisations are seen to be adopters of effective leading-edge practice. For example, the NHS Commissioning Board has an opportunity to utilise GIS technology to assist in the commissioning of local general practice services and to assess the fitness for purpose of local clinical commissioning groups. This will both improve the quality and performance of care providers and commissioners as well as acting as an example to local commissioners about how to deploy effective innovative solutions.

**Actions at local level in the NHS**

For local organisations many actions will be focused on achieving national priorities outlined through the outcomes framework and responding to the QIPP agenda. Specific actions include:

- Identifying local gaps in healthcare provision and commissioning additional services
- Managing local supply and demand factors
- Site-specific estate management e.g. across a single hospital
- Local staff resourcing

We know that the reconfiguration of local healthcare services can be especially contentious and as a result sub-optimal services are sometimes retained unnecessarily. GIS can help address this in two distinct ways:

- informing commissioning decisions so that they are based on quantifiable insights and easily demonstrable – i.e. enabling improved decision-making
- helping commissioners to communicate those decisions more effectively by engaging local stakeholders and the public – evidence compiled by the Health Foundation and others strongly suggests that primary care-led commissioners can be effective agents for service reconfiguration but only if they fully engage with the public to explain the case for change.

**Actions by NHS partners**

In terms of partner actions, the examples we have highlighted focus primarily on cross-government partners, notably local government. With local government’s emerging role in public health we see local authorities as key enablers to healthcare reform. Specific actions include:
• Knowledge transfer of geographic information best practice
• Reuse of technology platforms as shared-services to drive down costs
• Provision of the ‘final mile’ connection to the citizen/patient.

We illustrate these points through a series of examples which have been prepared in the context of the White Paper, *Liberating the NHS*, covering commissioning, estate management, staff resources, patient choice, long-term conditions and creating a patient-centred view.

The NHS could benefit significantly from a broader and deeper use of GIS as part of a revised health and care innovation programme with the specific objectives of using location based technologies to:

• Improve commissioning and reconfiguration decisions by mapping prospective demand and potential oversupply commencing with GP provision
• Improve estate management and identify under-utilised, duplicate and hard-to-access assets
• Respond to patient choice by modelling factors such as travel time & healthcare options for patients

These can be achieved via a programme which:

• Raises awareness of what already exists
• Explores and identifies key datasets to drive national and local policy
• Seizes the opportunity to work with local government

Esri UK is an SME and the leading provider of location based information technologies to organisations including the Department of Health, PCTs, PHOs and the Health Protection Agency.
2. Introduction

Ever since the father of epidemiology, John Snow\(^1\) used spot mapping to determine a water hydrant as the cause of the 1854 outbreak of cholera in Soho, geography has played an increasing role in analysing and visualising the causes and consequences of disease.

Today, we term the sophisticated ICT platforms that support this as Geographic Information Systems or GIS. GIS plays an essential role in helping public health organisations understand population health needs and thereby making better decisions. With the powerful tools and solutions that GIS technology brings the NHS can improve understanding of health needs and design effective interventions.

GIS technology offers varied solutions from improving field data collection and reporting to supporting disease surveillance and analysis with online mapping and spatial statistics. Maps, the visual product of GIS, improve the ability to communicate the evidence-base of a health situation, such as MMR take-up, to decision makers.

3. Geography already supports innovations across the NHS

The NHS is already using GIS to support effective healthcare. It is a tried-and-tested solution used across healthcare bodies and in some cases represents an existing capability that could be further exploited by other healthcare stakeholders. Examples² of where GIS is innovating in health today include:

SHAPE (Strategic Health Asset Planning and Evaluation)  
http://shape.dh.gov.uk/

SHAPE is a web enabled, evidence based application which informs and supports the strategic planning of services and physical assets across a whole health economy.

The Strategic Health Asset Planning and Evaluation application:

- Links national datasets for clinical analysis, public health, primary care and demographic data with estates performance and facilities location;
- Enables interactive investigations by SHAs, PCTs, NHS Trusts, GP practices, commissioning consortia and Local Authorities;
- Supports key policy initiatives such as QIPP, JSNA and Transforming Community Services;
- Provides a range of flexible capabilities; 'you drive it in the direction you want it to go'.

![SHAPE application image]

The SHAPE application identify appropriate assets to meet a user’s clinical needs

² The examples are all based on Esri technology
Public Health Observatories

There are 12 Public Health Observatories (PHOs) working across the five nations of England, Scotland, Wales, Northern Ireland and the Republic of Ireland. They produce information, data and intelligence on people’s health and health care for practitioners, policy makers and the wider community. The PHO’s expertise lies in turning information and data into meaningful health intelligence and here GIS and mapping play a vital role.

A PHO example highlighting deprivation analysis to better target resources

Cancer Registries

A similar approach to the PHOs is being adopted by various Cancer Registries e.g. the West Midlands Cancer Intelligence Unit. Using Geographic Information to support Cancer Information Provision:

- Facilitates the provision of cancer information and statistics to current and future organisations and is able to address requests for information about unusual groups of areas.
- Provides a vital link between cancer data and environmental and socio-economic datasets.
- Allows analysis of cancer data in spatial dimension addressing questions of proximity and distance.
- Identifies new ways to visualise cancer information.

The West Midlands Cancer Intelligence Unit provides a number of methods and examples of using GIS for cancer information here: http://www.wmpho.org.uk/wmciu/GIS4.htm#

Other examples

There are many other examples of how the NHS is innovating with GIS:
• The Health Protection Agency uses GIS to protect the public from threats to their health from infectious diseases and environmental hazards.
• PCT’s, for example Mid Essex use GIS to commission local health care provision
• Central NHS bodies use GIS to better understand their business e.g. NHS Counter Fraud and the Blood Transfusion Service.
• Specialist bodies such as the London Healthy Urban Development Unit (HUDU) uses GIS to improve communication and cooperation between the spatial planning and health sectors in London.
4. **Where can GIS further innovate across the NHS?**

Above are some excellent examples of how the NHS has innovated using GIS but it has not yet reached the level of penetration or maturity that can be exemplified in other parts of the public sector such as Local Authorities.

The examples below have been prepared in the context of the White Paper, Liberating the NHS. Each represents a significant opportunity to help solve some of the most significant challenges currently facing the NHS. They cover:

1. Better informed commissioning decisions
2. More efficient estate management
3. Better use of staff resources in the community
4. Patient choice and competition
5. Long-term conditions – the key to the NHS of the future
6. Creating a patient-centred world view

**Better informed commissioning decisions**

**Challenges**


Better ways of achieving the same health outcomes must be allowed to displace old, less effective ways of working if innovation is to flourish. This means understanding how to stop providing services as well as commissioning new services.

If the current NHS restructuring is to be successful, the new arrangements must be supported by an evidence base that allows for engagement by patients, public and professional groups. Commissioners also need a skill-set which draws on understanding of local geography and epidemiology.

**Solutions**

More meaningful and readily accessible information is needed by national and local commissioners to assess current provision, shifting clinical demands, emerging pressures from local patients and demographic changes. Mash-ups showing gaps and supply in local provision, changes in demographics (including forecasts if possible) and prevalence of major conditions will help plug these gaps.

**Potential partners**

The new National Commissioning Board has to commission genuinely local services including GP practices, community pharmacy, dentistry, and paediatrics, as well as more national specialist services.

At local level, GP consortia and those organisations to which they outsource commissioning need help identifying gaps in provision and oversupply. Similarly,
these insights would help local authorities including Health and Wellbeing Boards to become more effective in their new responsibilities.

**More efficient estate management**

**Challenges**

The 2009 McKinsey report commissioned by the DH suggested spare NHS land and buildings could be sold to recoup £8.3 billion.

We also know from pioneering examples such as the introduction of lean principles at NHS Bolton that a huge amount of time is wasted travelling within hospital estates both by patients and staff leading to inefficient care and less than ideal patient experience.

A typical modern acute hospital has an equipment base of several thousand assets worth £25-£40 million, yet much of this lies unused, broken and inadequately serviced.

The NHS can draw on both national and international best practice examples:

- Central government uses the electronic Property Management Information System (ePIMS) to manage the civil government estate. Creating key linkages with this system could enable the NHS to benefit from a cross-government approach to estate management
- In the US, forward-thinking hospitals such as The University of Kentucky Chandler Hospital are using GIS to store asset information, generate ward occupancy and integrate with their overall facilities management system.

**Solutions**

Use mapping solutions to

1. Identify areas of NHS estates that are underutilised and inconvenient for patients
2. Model internal traffic to reshape the location of care delivery within major hospitals to deliver better flow and more efficient care
3. Model the use of medical equipment to identify usage, redundancy and servicing – as required by the Care Quality Commission

**Potential partners**

- Acute and mental health NHS trusts with large estates
- PCT clusters looking to divest assets ahead of the new arrangements
- Independent sector organisations working across geographically dispersed areas may also benefit

**Better use of staff resources in the community**

**Challenges**
'Only 20 to 30 per cent of a district nurse’s time is spent on actually caring for patients’ – Dr Penny Dash, former head of strategy at the DH. In part this is due to the large variation in the number of patients visited by community nursing and midwifery staff. Some variation should be expected based on geography and case-mix, but not as much as seems to be happening in practice.

Many local and central government bodies are already addressing the problem of efficient remote worker deployment.

- An alliance of north London boroughs have used mobile GIS to proactively deploy Street Wardens and seen a near doubling of their productivity.
- The Meat Hygiene Service has used GIS to underpin a wide-ranging business transformation programme to redefine its mobile worker strategy

Solutions

- Use GIS technology to mash typical travel times and clinical case mix to:
  - More accurately identify the scale of the problem
  - Create benchmarking metrics at an operational level so community providers can assess their performance
  - Develop tools for community providers to improve their performance; this could include intelligent and dynamic rostering

Potential partners

- FTs with significant community-based staff
- New social enterprises set up from PCT provider arms
- Independent care providers – especially those working across health and social care provision
- Local authorities responsible for social care working closely with health providers

Patient choice and competition

Challenges

‘Our aim is to create the largest social enterprise sector in the world’ – Andrew Lansley addressing Parliament on launching the White Paper.

The transition to a more competitive provider marketplace will present challenges both for traditional NHS providers and new independent sector organisations. The recent report by the Cooperation and Competition Panel suggested that a significant number of NHS commissioners and established NHS providers are responding inappropriately to the introduction of greater competition.

Solutions

As the range of NHS provision opened up to ‘any qualified provider’ increases, providers and commissioners would benefit from insights provided by local models of patient choice. Vital intelligence could help improve access and service innovation by locating community-based access points that would attract patients on the periphery of care.
Other services could be developed including GP-based services and transport provision to encourage patient uptake based on analysis that mashes patient transport options with demographics and treatment requirements.

**Potential partners**
- All providers of care to NHS patients
- Health informatics analysts currently providing commercial advice to healthcare providers

**Long-term conditions – the key to the NHS of the future**

**Challenges**
There are around 17–18 million people in the UK living with long-term conditions. Treating long-term conditions is the largest single cost on the NHS and this is set to increase significantly because of lifestyle and demographic pressures. There are 8 million cases in total of diabetes, coronary heart disease and chronic obstructive pulmonary disease (COPD). Of these, many go undiagnosed – there are an estimated 2.8 million people living with undiagnosed COPD who by the time they present to their GPs will have far more severe symptoms and require costly treatment.

**Solutions**
The research overwhelmingly suggests we need to:
- Engage patients more effectively and promote better self-management
- Identify patients earlier
- Ensure patients comply with their treatment throughout the progression of their illnesses

We know the typical demographics and locations of undiagnosed patients with long-term conditions so mapping models could help identify those patients and ensure care provision is available for them.

**Potential partners**
- Local commissioners scoping care requirements
- Local authorities responsible for public health

**Creating a patient-centred world view**

**Challenges**
The White Paper rightly aims to put patients at the centre of care. To achieve this objective, NHS leaders need to raise their sights beyond immediate NHS organisational challenges and understand the world as seen by patients.

This approach has already been adopted by many local authorities:
- Westminster City Council have used GIS to better understand citizen needs and reconfigure service delivery accordingly
Many local authorities e.g. East Northamptonshire are publishing more and more map-based information to citizens. This both increases citizen choice and lowers the organisations operating costs.

Solutions
GIS could be used create a ‘patient’s view of the world’ to model options available. By contrasting this with a more traditional view of the world as seen by providers and commissioners it would become possible to reveal gaps in services and new opportunities.

Potential partners
Taking a systematic view of services and options available as viewed by patients has rarely, if ever, been thoroughly investigated in the past. It is therefore difficult to predict what this might reveal. However, if this can be modelled successfully it is likely to generate significant interest from public policy makers, health media as well as commissioners and providers who may be interested in the opportunities that the research reveals.
5. How to take this forward

It is proposed that the NHS broadens and deepens the use of GIS as part of a revised health and care innovation programme with the specific objectives of using location based technologies to:

- Improve commissioning and reconfiguration decisions by mapping prospective demand and potential oversupply commencing with GP provision
- Improve estate management and identify under-utilised, duplicate and hard-to-access assets
- Respond to patient choice by modelling factors such as travel time & healthcare options for patients

In order to successfully place ‘location’ at the heart of the NHS innovation strategy, the following key enablers will be required:

1. Raise awareness of what already exists
   
   Tools such as SHAPE are proven examples of how geographic analysis can improve the effectiveness and efficiency of decision making in healthcare. A programme is required to raise awareness of SHAPE and other relevant tools with the aim of embedding GIS services with those organisations which would most benefit from their use.

2. Explore and identify key datasets to drive national and local policy
   
   Lessons can be learned from initiatives such as the London Data Store which make datasets and indicators more available to the public rather than the current reliance on closed systems, databases and spreadsheets. Location based data can be used to refresh the relevance and utility of legacy data with a focus on healthcare outcomes rather than data collection.

3. Seize the opportunity of working with local government
   
   As the healthcare system reconfiguration proceeds, increasing numbers of healthcare practitioners will work in or alongside local government. Local government has a well-developed GIS infrastructure and skills base with which it is rapidly becoming more innovative. Recent examples include Nottingham City Council mapping all its properties to maximise low carbon energy opportunities and Westminster City Council spatially analysing the demographic spread of citizens and needs compared to from which facilities services are delivered. In examples such as these and many others we have quantified benefits studies than run to millions of pounds of savings.
6. About Esri UK

Esri UK is the leading provider of geographic information system (GIS) technology, helping businesses become more profitable and public service more efficient through a better understanding and analysis of location-based information. Esri UK offers an extensive range of GIS technology and professional services and is the only company in the UK providing a complete and entirely integrated GIS solution.

Esri UK has been providing GIS solutions for over 20 years to a wide range of markets including Central & Local Government, Commercial, Defence & National Security, Education, Public Safety, Utilities & Telecommunications.

Customers include Department of Health, PCTs, PHOs, Health Protection Agency, Birmingham City Council, Defra, the Environment Agency, Metropolitan Police Service, Ministry of Defence, Ordnance Survey, RSA Group, Scottish Power and The Crown Estate.

The examples provided throughout this document are all based on Esri technology.