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Asthma UK Centre for Applied Research

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IoT – Medical Applications

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Usher Institute – Centre for Medical Informatics

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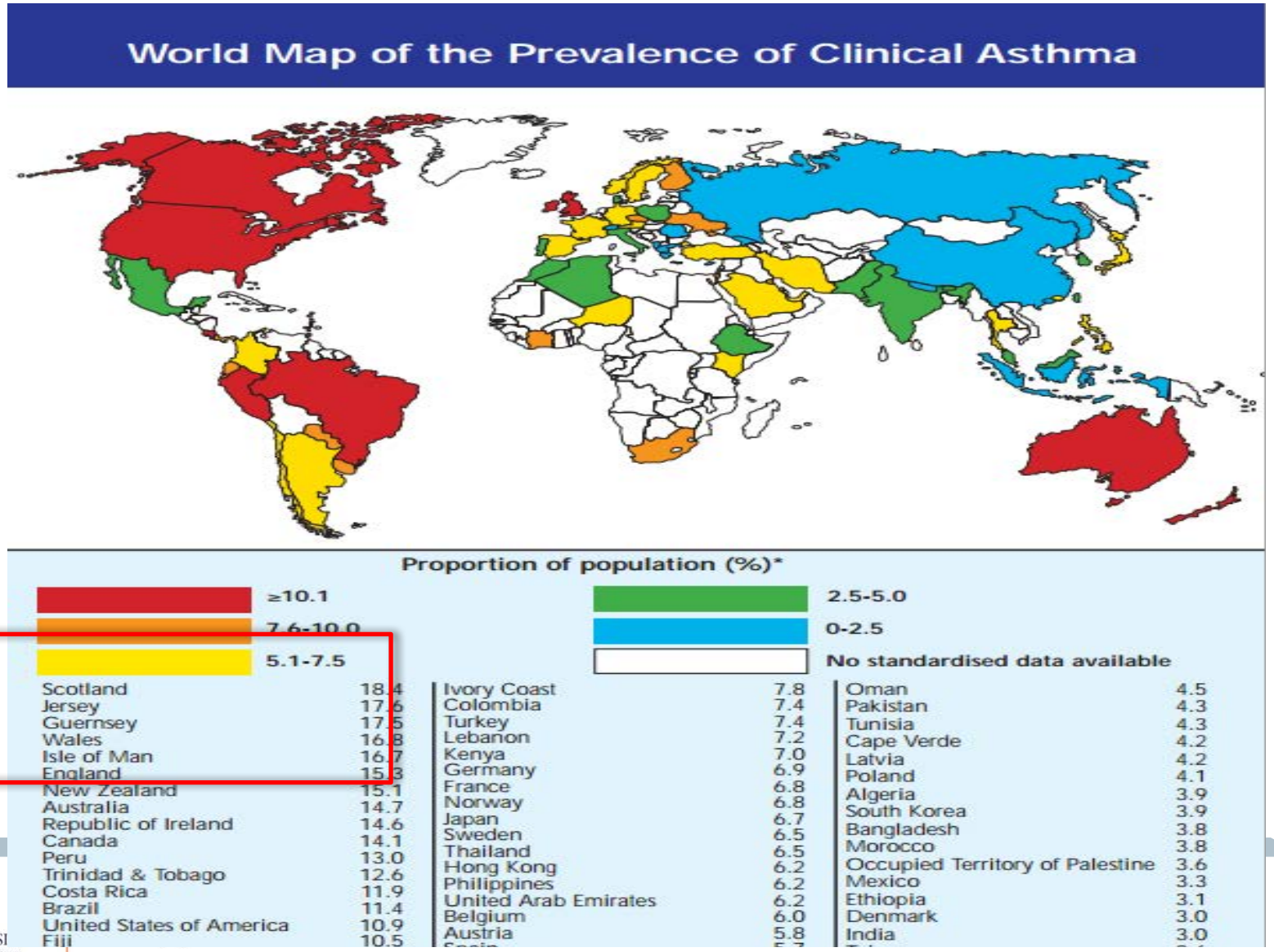
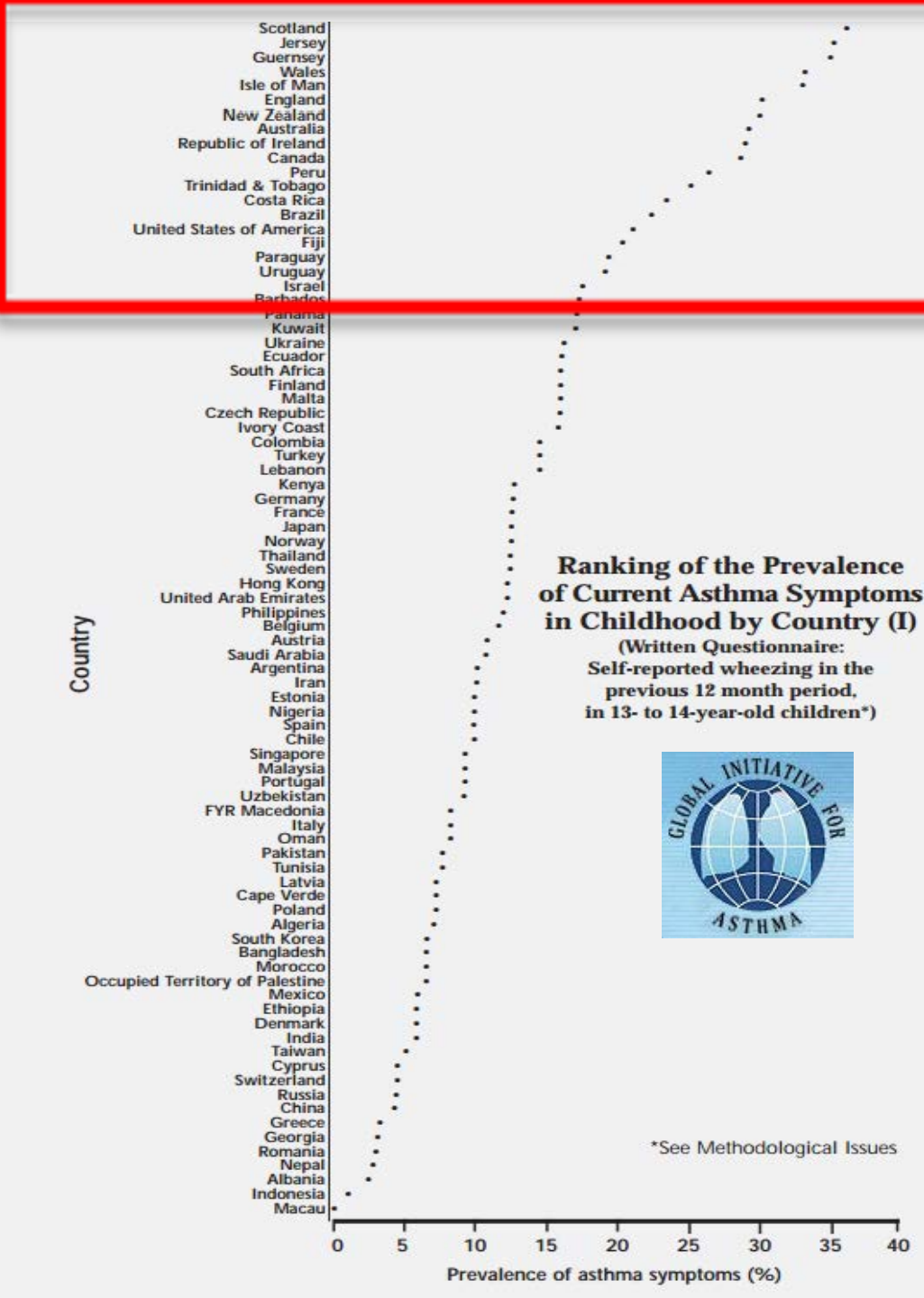
Health Services Challenges – Asthma

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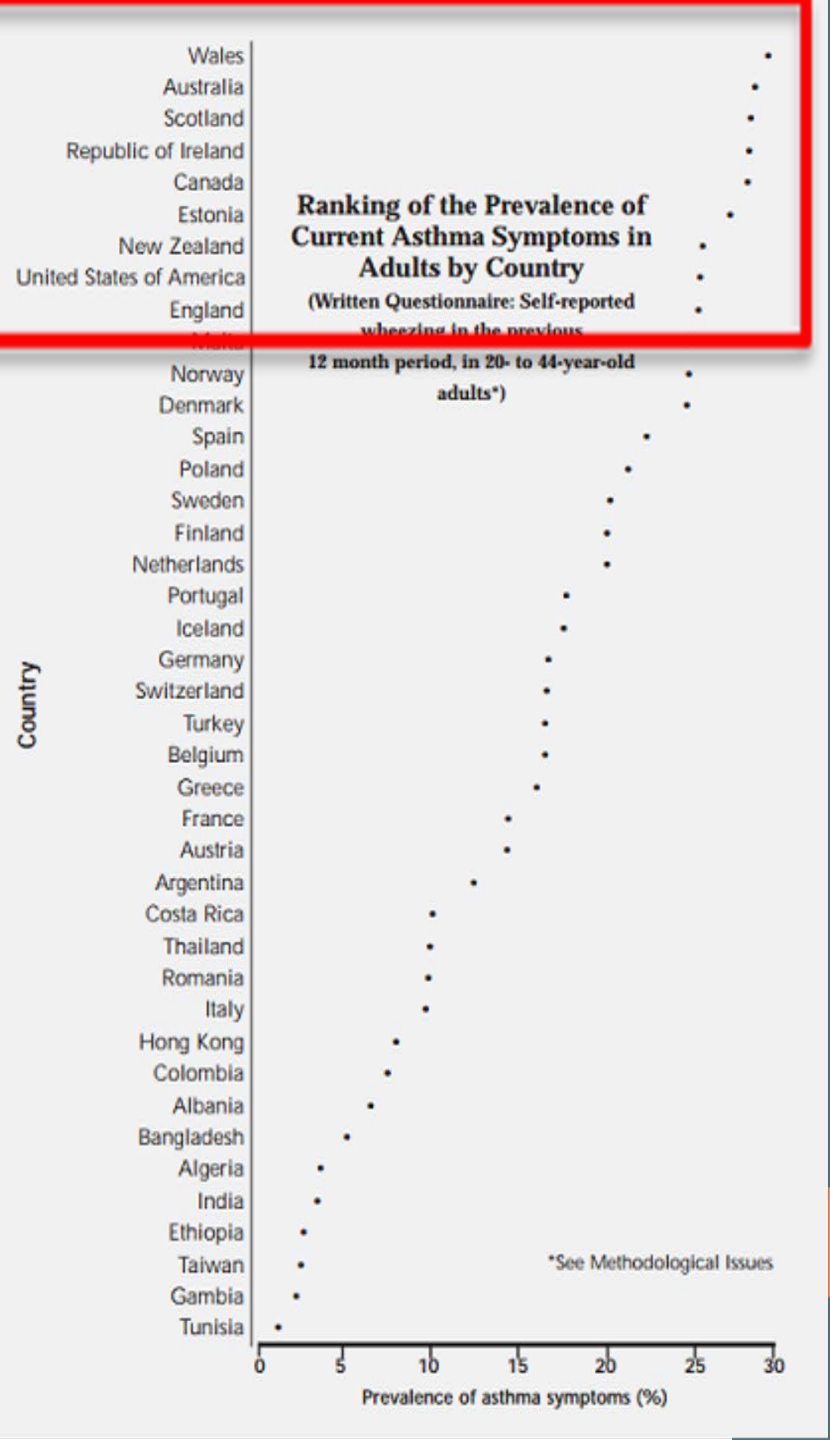
Prevalence of asthma symptoms (%)
Ranking of the Prevalence of Current Asthma Symptoms in Childhood by Country (I)
(Written Questionnaire: Self-reported wheezing in the previous 12 month period, in 13- to 14-year-old children*)
GLOBAL INITIATIVE FOR ASTHMA
*See Methodological Issues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Prevalence of asthma symptoms (%)
Ranking of the Prevalence of Current Asthma Symptoms in Adults by Country
(Written Questionnaire: Self-reported wheezing in the previous 12 month period, in 20- to 44-year-old adults*)
*See Methodological Issues

Asthma UK Centre for Applied Research

Asthma in Scotland

in 2011-12

1.3m people experienced symptoms indicative of asthma over a lifetime*

734k people were diagnosed by a physician over a lifetime*

0.4m people diagnosed with symptomatic asthma by a physician (reported by patients)*

0.5m people diagnosed & treated by a physician (reported by patients)*

0.3m people diagnosed & treated by a physician (reported by GPs)

505k GP and Nurse Consultations

5k Out of Hours Calls

8k ambulance conveyances (7k to hospital)

9k A&E attendance

8k episodes of hospital care

180 episodes of intensive care

94 people lost their lives to asthma

At least **£93m** was spent treating asthma

Data from national health surveys, primary & secondary care databases and administrative databases;
For year 2010-11*.

ECTU Farr

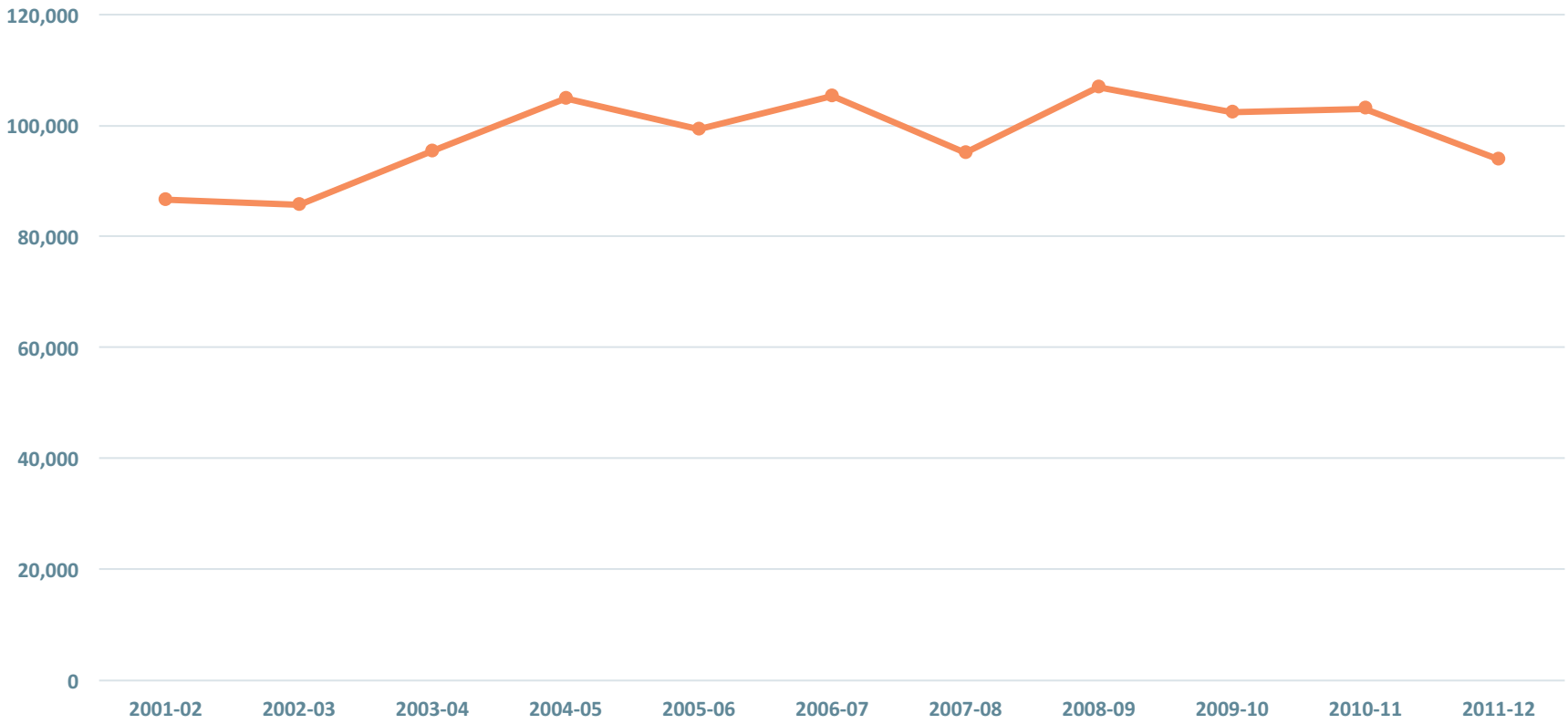
Source
The epidemiology, healthcare and societal burden and costs of asthma in the UK and its member nations: analyses of standalone and linked national databases; Mukherjee, M., et al; BMC Medicine, 14 (113), Aug 2016, DOI: 10.1186/s12916-016-0657-8.

Table 1: Incidence and lifetime prevalence rates of asthma 2001-2005

Year	Total patients	Patients with Asthma	Age-sex standardised rate per 1000 patient-years (95% CI)	Relative % change in standardised rate (from 2001)
Lifetime prevalence				
2001	2,864,938	285,941	100.5 (100.1-100.9)*	0
2002	2,89,0190	301,048	104.8 (104.4-105.2)*	4.3
2003	2,921,178	315,559	108.5 (108.2-108.9)*	8.0
2004	2,922,024	325,857	111.9 (111.5-112.2)*	11.3
2005	2,958,366	333,294	113.0 (112.6-113.4)*	12.4

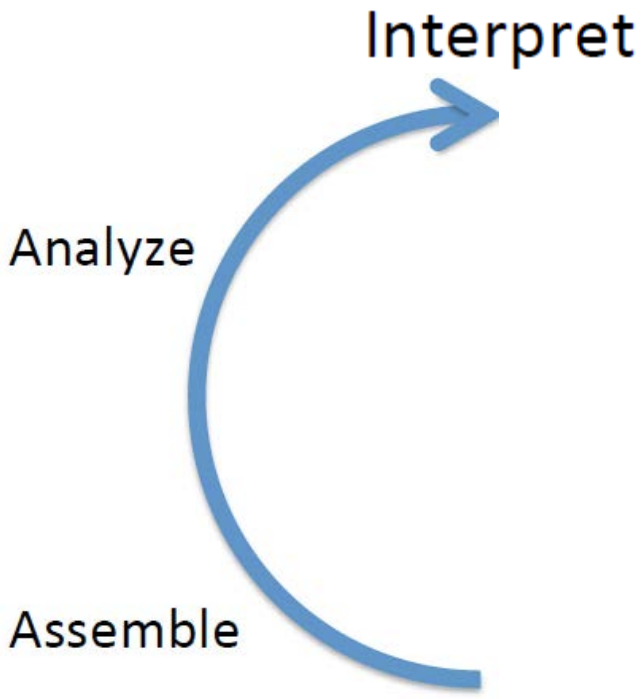
*** Age-sex standardised rate per 1000 patients (95% CI)**

Number of UK inpatient episodes with asthma as the primary diagnosis



Current situation

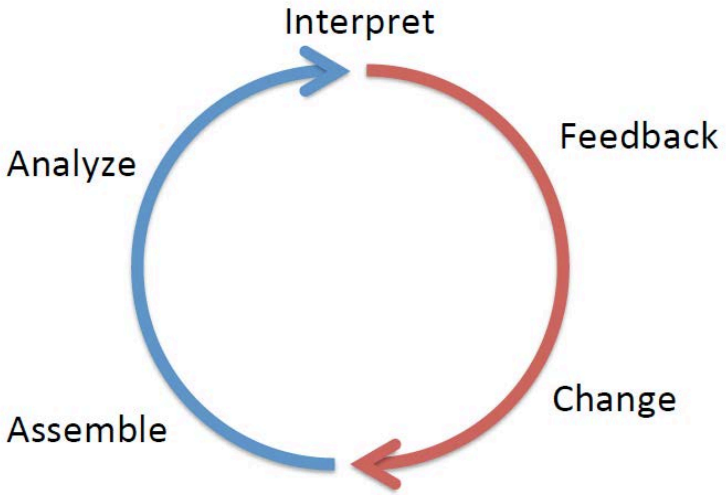
- Blue Afferent path:
  - Gathering and analysing data (big/large data)
- But…..
- High quality analytics – leading to national stats, high impact papers and emerging algorithms
- Difficult to judge direct impact on clinical practice



Where we want to get to:

- The Learning Health System completes the big data generation and analytics cycle
- Efferent (Red) side
  - Feeding back into the system what has been learned e.g. via decision support
  - Implementing change
  - Develop a continuously operating cycle of health improvement e.g. for people with asthma

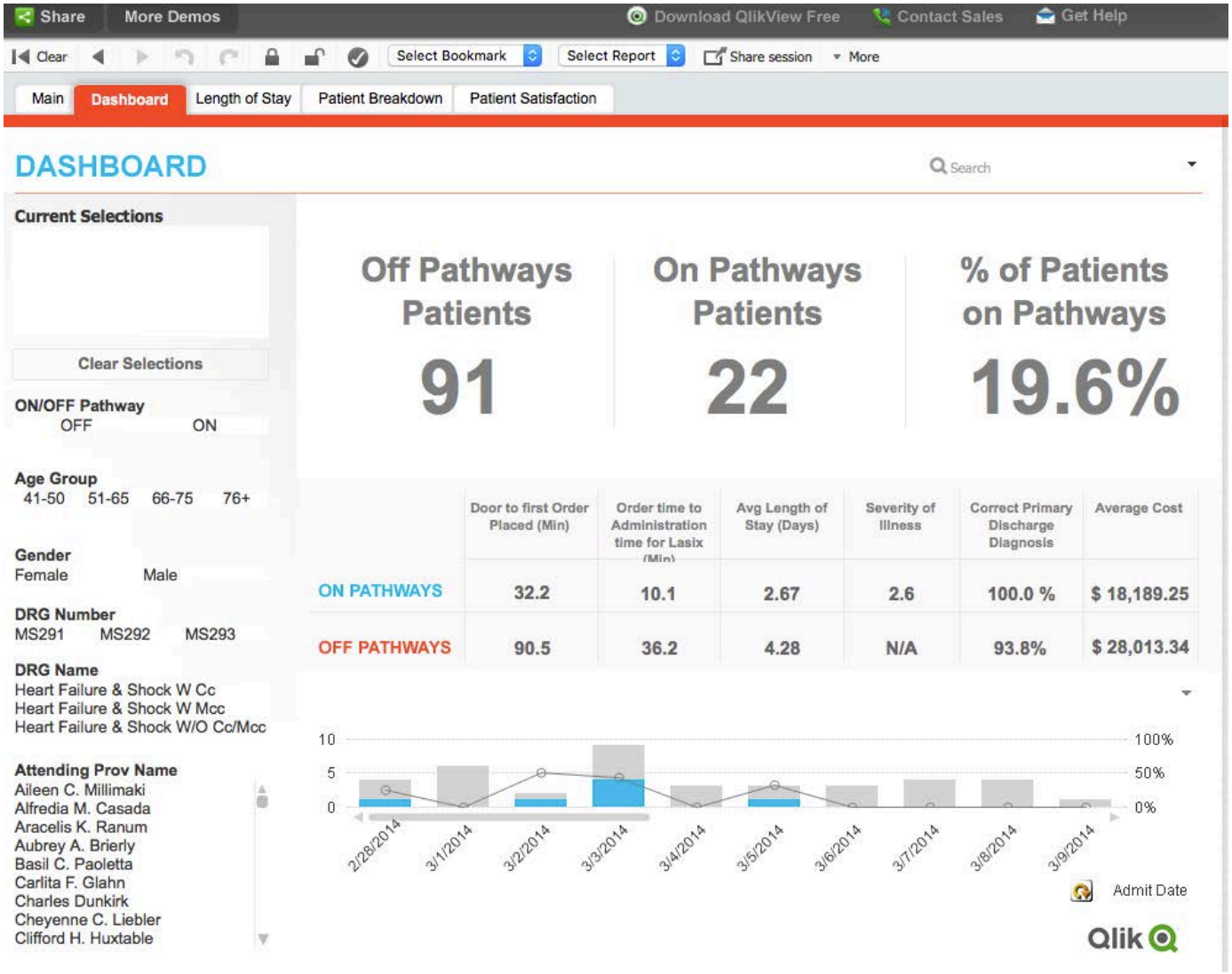
Figure 1.The learning cycle, as described in "Toward Complete & Sustainable Learning Systems" by Professor Charles Friedman, available at http://medicine.umich.edu/sites/default/files/2014_12_08-Friedman-IOM%20LHS.pdf (accessed 24/02/2015)



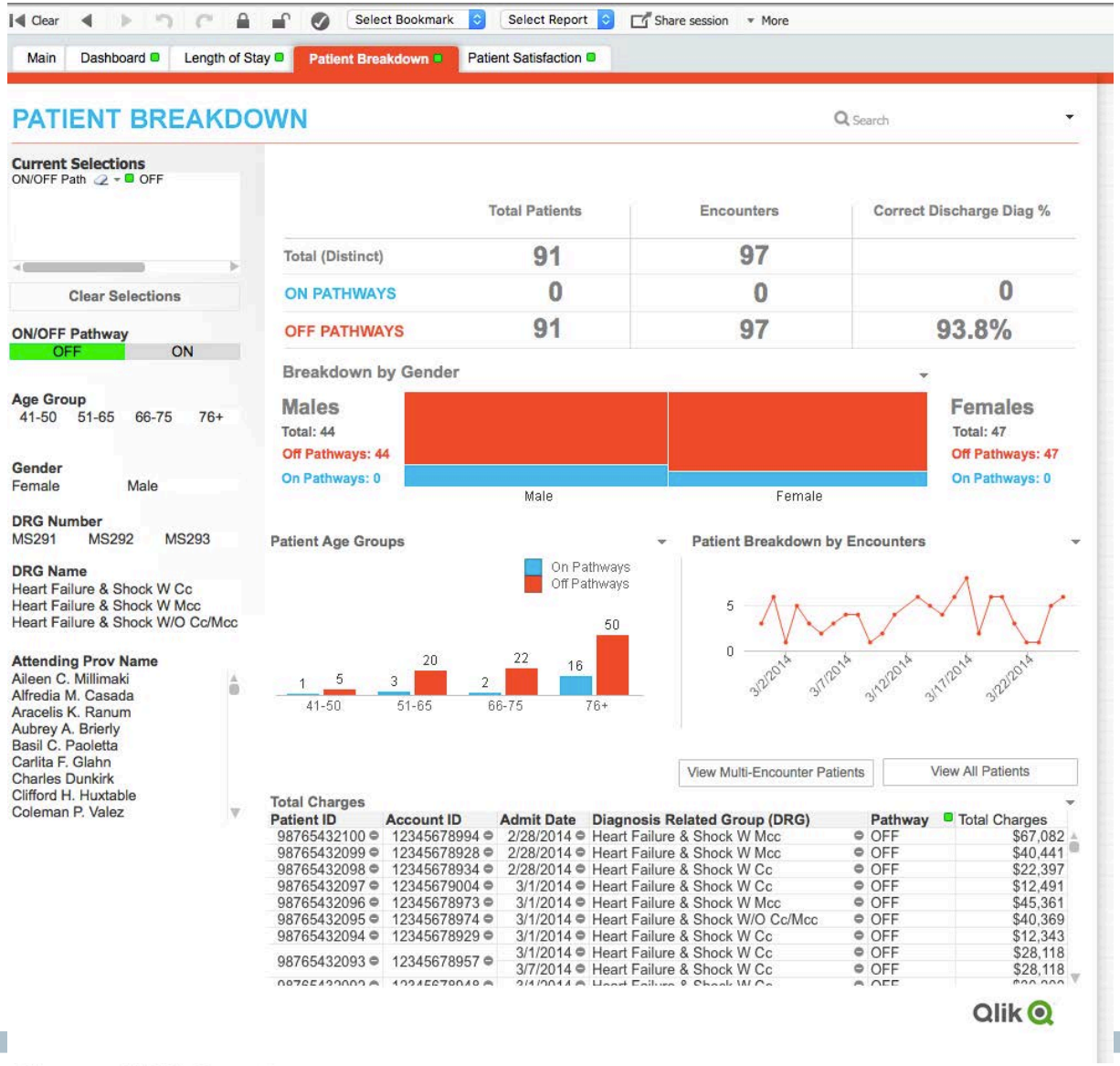
Our overall aims

- Build a data feed that enables intelligent analytics to identify patients at-risk of asthma attack – decision support
- Create visualisation and management support tools
  - iteratively improved with input from general practices and their staff
- Promote positive action in the management of people with asthma via feedback at various levels
- Education (patient & clinician, behaviour etc.)

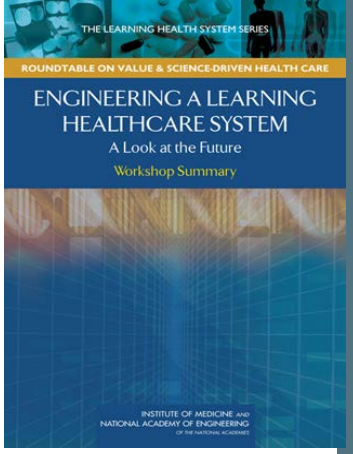
Visualisation Examples (diabetes)



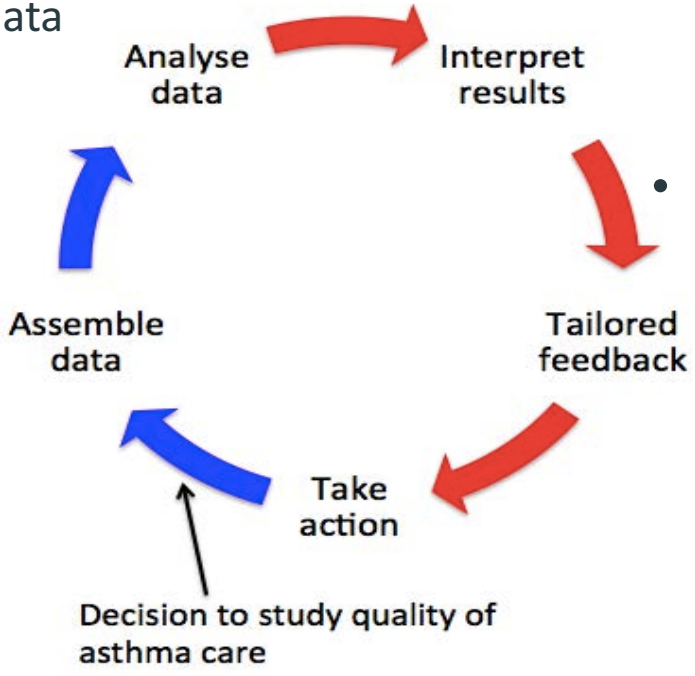
Visualisation Examples (diabetes)



A Learning Health System approach

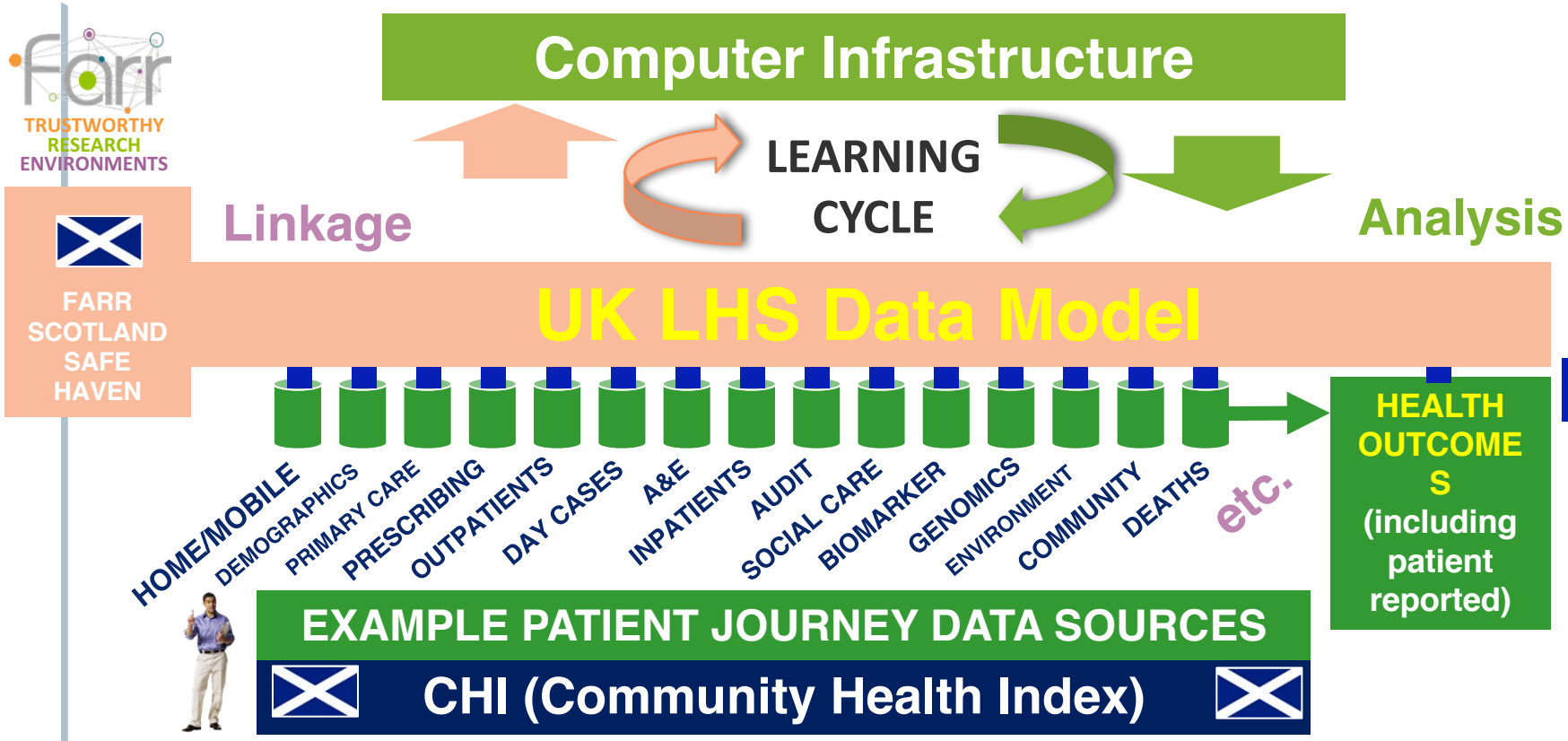


- Blue Afferent path:
  - Gathering and analysing data (big/large data

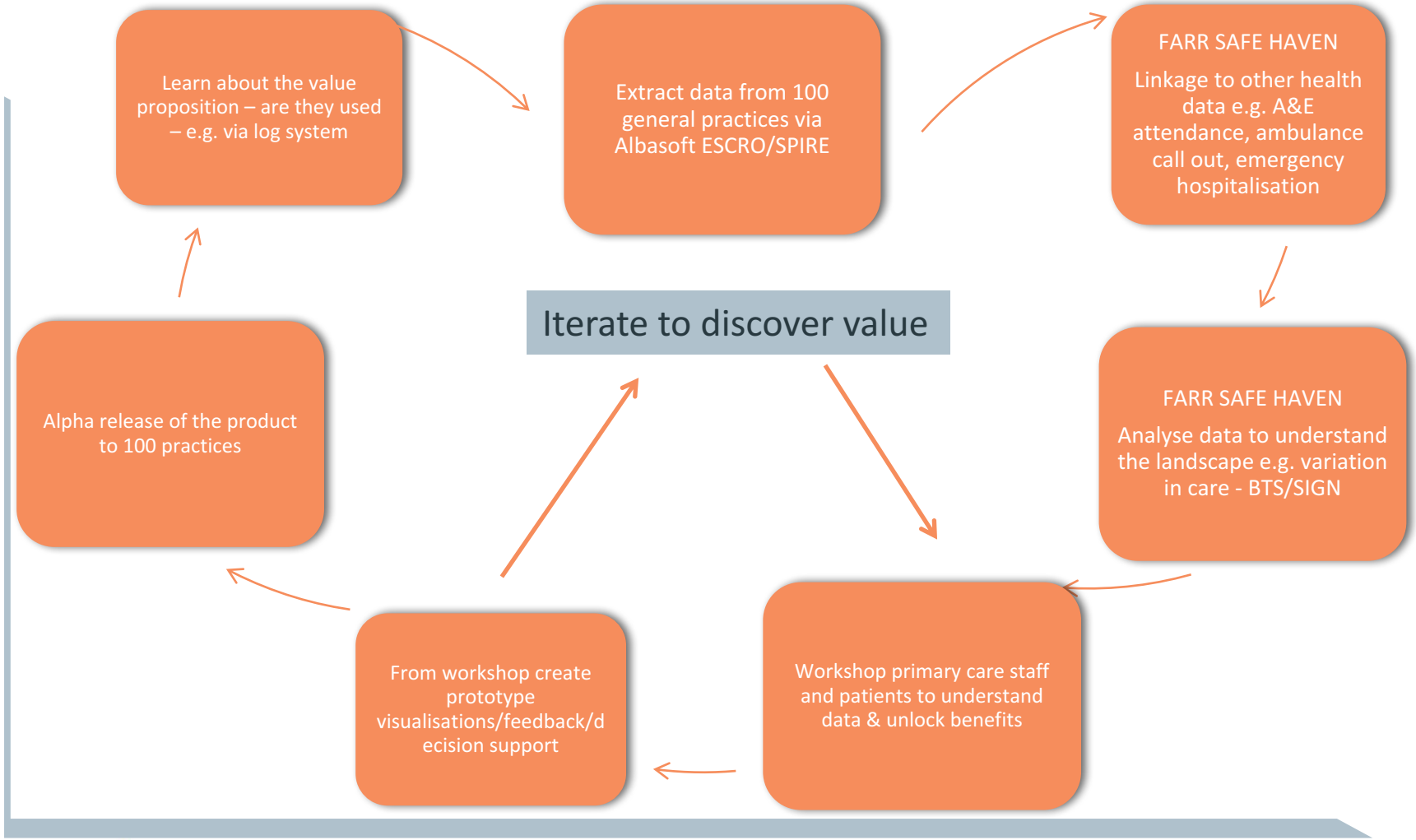


- Efferent (Red) side
  - Feeding back into the system what has been learned e.g. via decision support
  - Implementing change
  - Develop a continuously operating cycle of health improvement e.g. for people with asthma

Learning Health System - bi-directional flow



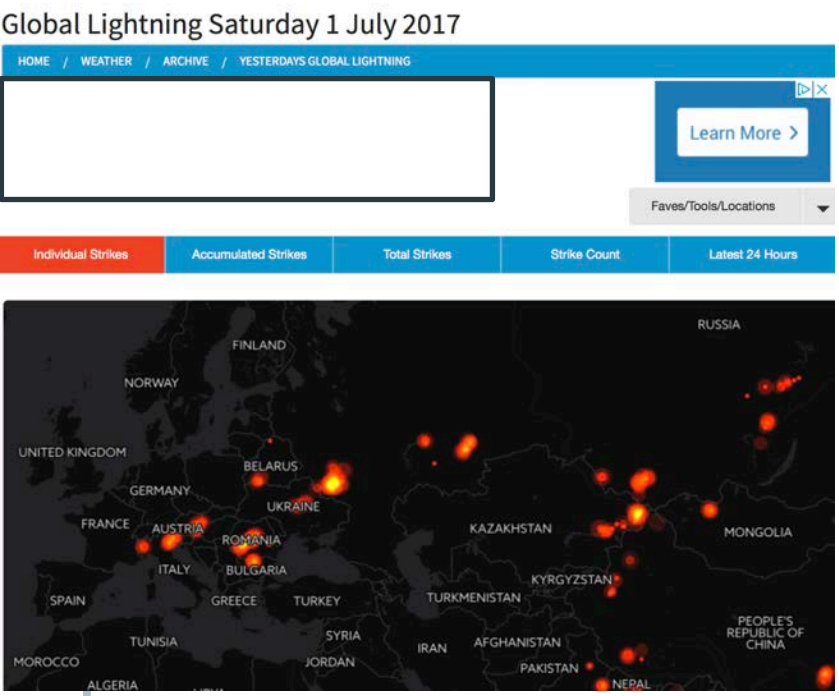
Prototype Learning Health System for Asthma

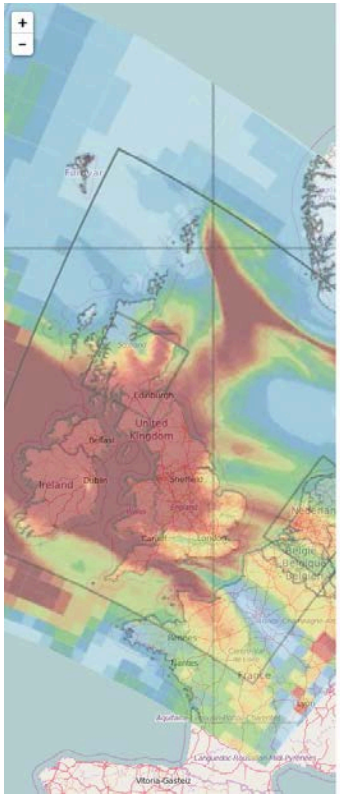


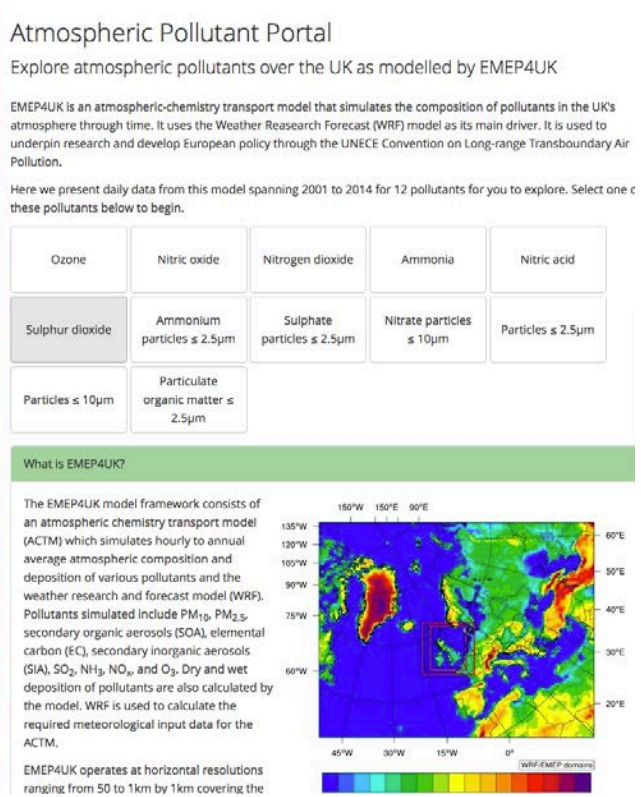
Farr Institute LHS for asthma prototype

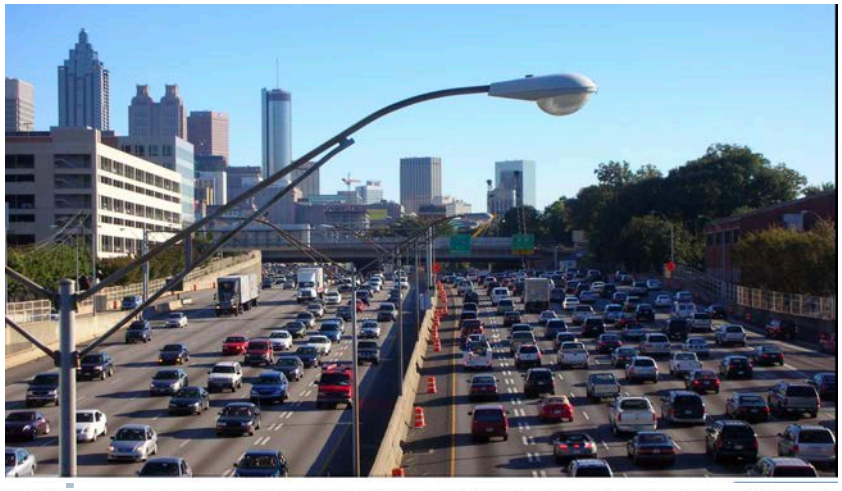
- Agree on data to be extracted and data integration approaches
- Secure governance permissions (September 2016)
- Recruit 100 practices – (October 2016) and establish data extraction procedures
- Create appropriate feedback using visualisation tools and establishing channels to feedback key -
- Create algorithms for identifying asthma attacks for decision support tool (and how this fits with workflow)
- Iterate via workshops

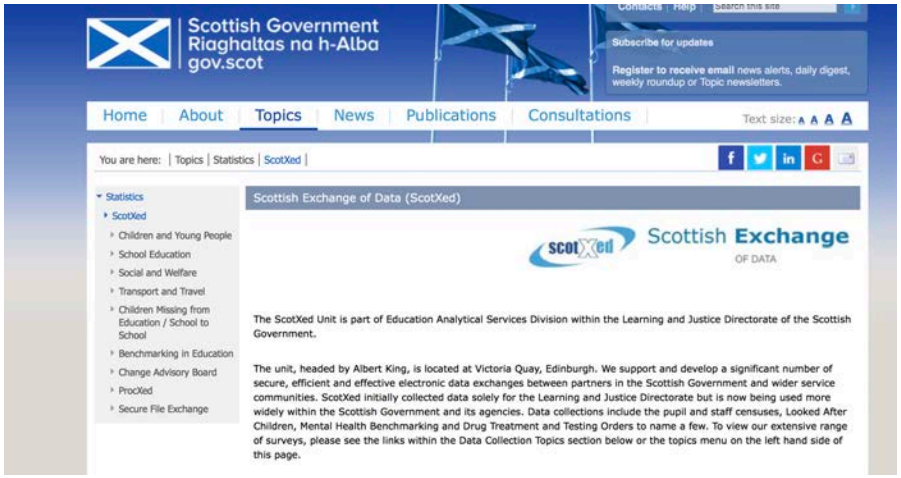
NERC Learning Health System project











Location of usual residence and place of work by method of travel to work

Table population All usual residents aged 16 and over in employment the week before the census

Interactive Visualisation

Chart showing the in-flows and out-flows for an area.

Choose an area

> choose area <

View

Explore in detail

Get data from this table for a range of areas and variables.

Query data

This dataset provides 2011 Census estimates of the usual residents of the UK aged 16 and over in employment the week before the census. The data classifies people currently resident in each local authority or higher area of the UK by method of travel to work and shows the movement between their local authority of residence and workplace. The estimates are as at census day, 27 March 2011.

Statistical Disclosure Control
In order to protect against disclosure of personal information from the 2011 Census, there has been swapping of records in the Census database between different geographic areas, and so some counts will be affected. In the main, the greatest effects will be at the lowest geographies, since the record swapping is targeted towards those households with unusual characteristics in small areas.

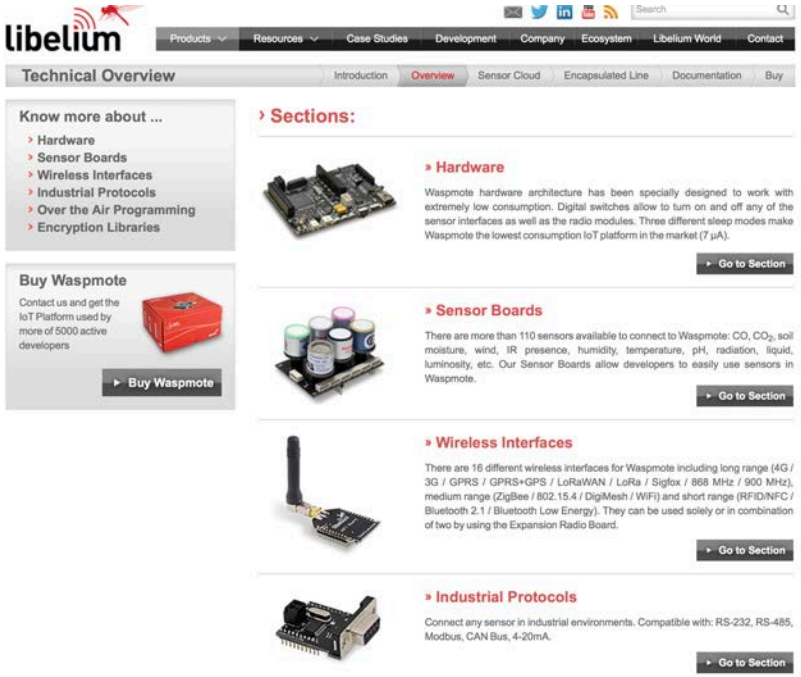
More details on the ONS Census disclosure control strategy may be found on the Statistical Disclosure Control page on the ONS web site.

Revisions and Corrections
2014-11-25 09:30

Table ID	WU03UK
Source	Census 2011
Units	Persons
Keywords	Commuting patterns, Workplace flows, Method of travel to work
Coverage	United Kingdom
Area Types	Local Authorities and above
Latest Data	2011
Last Updated	2014-11-25 09:30
Variables	place of work, Method of travel to work
Contact	Census
Email	census.customerservices@ons.gov.uk
Phone	01329 444 972
Website	http://www.ons.gov.uk/census

Future project 1. Incorporating wearable sensor data into a Learning Health System for Asthma – e.g.measuring night symptoms

Future project 2. Evaluating micro-weather measurement and air pollution sensors for use in a Learning Health System for Asthma



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Further Details: Colin Simpson

@DrColinSimpson

Collaborators

Asthma UK Centre for Applied Research

- Chuck Friedman – Professor and former CSO Office of the National Coordinator for Health IT (ONC) in the U.S. Department of Health and Human Services.
- Stefan Reis, Massimo Vieno CEH
- Hester Ward - Consultant in Public Health Medicine for ISD
- Sir Lewis Ritchie- University of Aberdeen
- Saturnino Luz Chancellor's Fellow- Machine Learning/Visualisation
- Dave Kelly, Albasoft Ltd
- Ed Conley - Chief Scientific Officer, The Farr Institute
- Kenny Fraser, Triscribe Ltd
- Mark Parsons, EPCC
- Steve Pavis, eDRIS
- Chris Dibbon, Tom Clemens, ADRC
- 14 AUKCAR Partners & Asthma UK

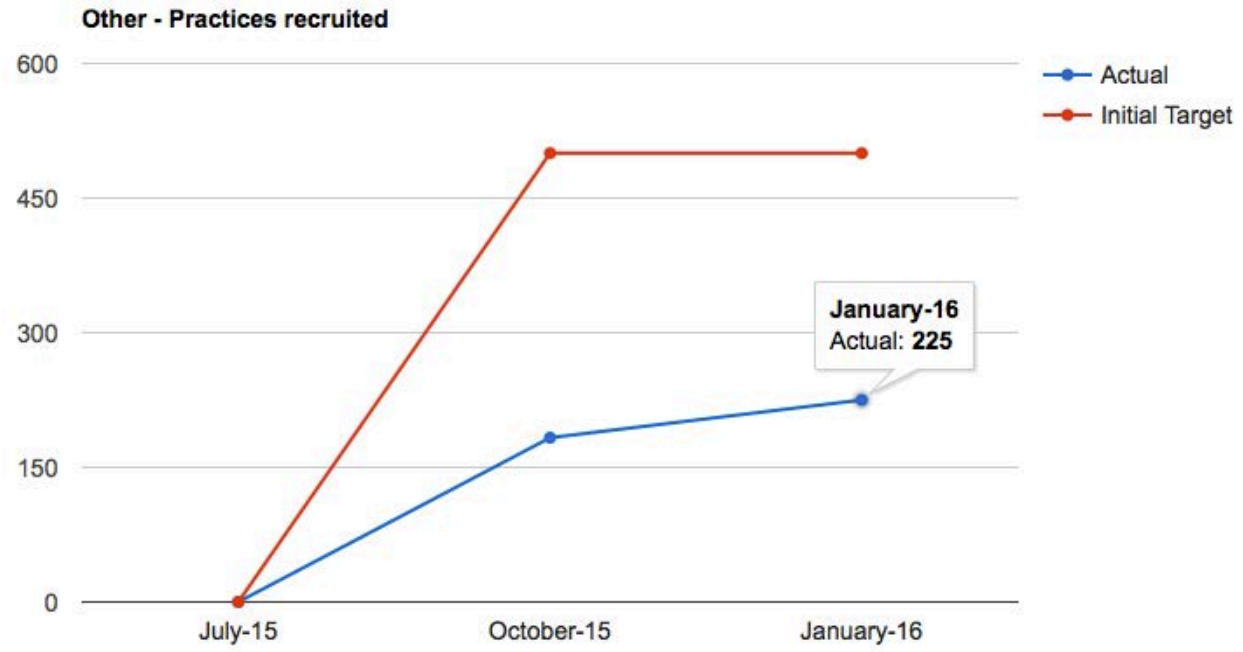
SIVE II

Evaluation, Trials and Studies Coordinating Centre

NHS National Institute for Health Research

Other - Practices recruited

Project Month	Month	Actual	Initial Target
10	July-15	0	0
13	October-15	183	500
16	January-16	225	500



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