**Methodology: celebrating 21 years of innovation**

**John Pullinger**

I have my own methodology for preparing for presentations. But I thought that this of all occasions was one to innovate. So I sent out a call for thoughts drawn from your experiences. This talk is entirely crowd-sourced. All the content is things you have suggested I talk about. You gave me your answers to two questions.

1. Over the last 21 years, which innovations in methodology have had the greatest impact?

2. What are the questions we need methodologist to tackle over the next few years.

I had some great responses.

A common theme is about collaboration - the greatest successes have been the result of rich and deep relationships with colleagues across government, across sectors or across nations. And the future opportunities will require an intensification of this open approach.

On the first question here are the responses....

*0. There have been no significant methodological advances since 1934.*

This was only one response and I will not dwell on it. Here are the top five that came in....

*1. The One Number Census - 1996-2002*

The key point of this example is - answer the right question

- first and I think still the only country in the world to do it

- matching

- model based estimation

- approach to QA

- transparency of approach

This was followed for the next census with...

Reduction in variability in census response - 2006-2011

- response prediction

- field operations targeting

*2. Empirical approach consumer prices methodology*

The key point of this example is  - allow the data to speak so that you can test theories rather than be a slave of them

Very much in the public eye with direct impact on £100s bn gilts market, pensions, train fares, interest rates.

But what is a price?

- used high frequency consumer data to disprove long held economic assumptions about consumer behaviour and the impact on the price index formulae and things like the treatment of discounts

- empirical analysis of the sampling approach

*3. Time series*

The key point of this example is - sophisticated methods are needed to find weak signals in noisy data

Massive leaps forward in models available and how to optimise their selection

My own experience with retail sales

Health service post mid Staffs.

More recently work on weather

*4. Small area estimation*

The key point of this example is - we love geography because it matters

Driver from NeSS

Building on Harvey Goldstein at Institute of Education and Danny Pfefferman and Ray Chambers at Southampton.

Developed borrowing strength across space, time and supporting data.

And spatial analysis more generally has come on leaps and bounds

*5. Data visualisation*

The key point of this example is - our job is not done until the message hits home

The work of Alan Smith and many others has started something wonderful that would have been impossible when this conference first started.

**Challenges**

1. Free our minds and start from scratch to produce something new and better.

Thinking like R.

Being brilliant rather than either stuck in the past or seduced by the hype of big and cheap data

Key point - good science requires an open mind

2. Measuring new phenomena - or even just catching up on things we have been slow to get to grips with like many parts of the service sector, including the public sector.. Actually getting beyond GDP when we think about the economy

Key point - you will never get a good answer until you understand the question

3. New techniques that work with new data.

Design based to model based estimation - we can't just turn the handle and get unbiased results.

Statistics as detective work, piecing together a picture from many sources of (often unreliable) evidence.

Where is the real signal.

Key point - method must be the servant of analysis

4. Communicating uncertainty

Key point - make your claims hit home, but do not over claim

5. Skills - innovation labs of last couple of years, data science accelerators, apprenticeships, masters, PhDs, and data science campus coming soon.

Key point - learning is the key differentiator