

Can't see the wood for the trees?
Using statistical frameworks to draw the bigger picture.
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Abstract

This paper argues that in many areas of official statistics, the accessibility of the results can be improved substantially by the presentation of the statistics according to an appropriate presentational/analytical framework which is itself part of a wider suite of frameworks (conceptual, statistical, quality etc). This approach can help to align sources and results; to clarify underlying processes and interrelationships; and to demonstrate how particular statistical series or indicators relate to the 'bigger picture'.

The paper outlines some examples of different types of presentational frameworks – supply/demand, process; and cause and effect - including the labour market, migration, and criminal justice. It highlights some of the benefits of this approach in relation to making the underlying information in the statistics more valuable – for example, more accessible (and hence more trustworthy) to users. It concludes that international experience in the development and use of statistical frameworks might usefully be reviewed as an aid to international statistical comparability.

Introduction

Many official statisticians have a comprehensive and detailed understanding of their subject areas – the concepts underpinning the statistics, the data sources and the classifications and methods, international equivalents, and the uses made of their statistics. But in some cases, for example if statisticians are new to their subject, they may not have ready access to this sort of information; in other cases statisticians may be expert in a comparatively narrow aspect of the topic about which they publish statistics.

And whilst many *users* of official statistics know precisely what they want – for example, the latest figure from a particular table in a statistical release, others are not immersed in the detail. Instead they want an overview of the main messages in the statistics, including their coherence with statistics on related topics produced using different sources (perhaps by another organisation). The needs of such users are not always well served in the UK, although the process of Assessment¹ has stimulated many improvements in this area.

Both producers and users can benefit, therefore, from the systematic development and use of 'frameworks'. A framework, in the current context, is a set of concepts and organising principles which supports the compilation and presentation of a set of statistics:

- The structures and tables used for presenting them;
- The nature of the commentary that accompanies them – for example, the extent of explanation of the statistics, as opposed to simple descriptions of rises and falls, and the extent of comparisons – with other related statistics; over time; between areas within the country; and internationally.
- Accessible descriptions of the sources and methodologies used to derive them, including adequate description of any changes to methods and information about

¹ <http://www.statisticsauthority.gov.uk/assessment/assessment/index.html>

revisions; and information about the strengths and limitations of the statistics in relation to their use.

It is implicit that one would expect elements of conceptual², statistical³ and quality⁴ frameworks to be apparent within the 'presentational' framework. Developed and used in tandem, a framework-driven approach to the business of official statistics:

- promotes clear thinking about subject and purpose – what one is trying to measure and estimate, and why;
- helps to align the information need, the sources and methods and the results;
- identifies problems with coherence, consistency, gaps and duplication;
- enables the *presentation* of the statistics in ways that users will find most accessible – making clear the coherence and inter-relatedness of a particular set of statistics, clarifying the underlying processes, and presenting the statistics in context.

Examples of the intuitive presentation of statistics

Most sets of official statistics describe a phenomenon which can be characterised in one of the following ways:

1. supply/demand - such as the operation of labour or housing markets, or economic statistics such as input-output tables.
2. processes – such as the administration of criminal justice sanctions, or claiming welfare payments, or school examination results.
3. cause and effect – such as statistics about the environment.

The following section considers examples of each of these types of presentational frameworks in turn, from a UK perspective.

Supply / demand

Labour Market Framework

The wealth of labour market statistics can make it difficult to understand how effectively the market is operating and what the implications might be, not only for the labour market but the wider economy and society. In 2002, the UK's Office for National Statistics (ONS) published a report setting out how the relevant data sources – the Labour Force Survey, business surveys, benefit statistics, and earnings statistics – contributed to an overall picture of the labour market. This extended the internationally agreed approach to labour accounting – delineating the population into the labour market states of employment, unemployment, and economic inactivity – by positioning 'labour supply' against the demand for labour (in the form of jobs and vacancies) in a way that emphasises the price of labour (earnings, and other labour costs).

² Conceptual frameworks describe a particular statistical domain (eg housing) in relation to scope, concepts and definitions, and the relationships between elements of the domain in question and other conceptual frameworks.

³ Statistical frameworks help to align the information needs of users, including specific indicators, with the sources (including information about suppliers), classifications, methods and results.

⁴ Quality frameworks are a standardised approach to describing the quality – relevance, accuracy, timeliness etc – of a set of statistics. They will cover source data, processes, and outputs.

Annex A sets out a diagrammatic representation of labour market statistics. As well as the characteristics noted above, it also suggests how concepts such as ‘labour attachment’ and ‘underemployment’ can be presented.

In the UK this framework is implicit within the existing form of presentation – ONS’s regular release of these statistics includes information about the main aggregates, such as the number of unemployed, and the number of vacancies. However, the statistics are not quite brought together in a form that enables analysts to readily and quickly identify how the labour market is operating. The monthly statistical releases present considerable detail, but do not yet provide a narrative explanation of the sort that the presentational framework would seem to support.

However, this framework has been beneficial. For example, it has helped to clarify the distinction between ‘employment’ and ‘jobs’, and it has helped users to appreciate the importance of geographical location in understanding labour markets – for example, a demand for labour in one part of the UK not being matched by a potential supply in another – and of the need to ensure that people’s skills match those in demand by employers.

Input/output tables (in the National Accounts)

The framework of the National Accounts allows the compilation and presentation of complex economic measures in a coherent and balanced manner. It takes a multitude of different survey and administrative data sources and allows these to be related together, ultimately creating a balance of the three measures of GDP: the production (output), income and expenditure measures. Through the use of the *European System of National Accounts*, based on the *United Nations System of National Accounts*, this then goes further to allow comparable estimates to be considered on an international basis.

In effect, the framework presents something quite simple - a connection between the who - the agents participating in the economy (in effect, encompassing everyone) - and the what: the transactions taking place between them.

To make this a reality, though, it must draw together a huge number of elements. As shown at annex B, the Input-Output Supply and Use Tables provide a detailed framework within the National Accounts for the reconciliation of the low level components of the three measures to create an agreed, single annual measure for GDP. It integrates the components of gross value added, inputs and outputs and final demand with the supply and demand of each industry presented at a product level. The supply side of the equation shows domestic supply as well as imports, taxes and subsidies on products, and trade and transport margins. On the use side is the intermediate demand and final expenditures of Households, Government and Non-Profit Institutions along with Capital Expenditure, Changes in Inventories, Valuables and Exports. The table then also gives Compensation of Employees, Gross Operating Surplus and taxes and subsidies on production.

Processes

Criminal justice statistics

The detailed operation of the criminal justice system (CJS) in England and Wales differs from that in other countries, but at a level of abstraction the underlying processes are much the same across the world. Once people are arrested by the police, some will be tried in court; those found not guilty will be released, while those found guilty will be

sanctioned in some way (eg fined, or sent to prison). The nature of the CJS lends itself to the presentation of the relevant statistics in a way that enables the user to quickly gain an overall understanding, and to help them to put statistics about a single part of the CJS process into context. For example, anyone looking to reduce the size of the prison population is likely to want to look at the nature of the 'upstream flows' into prison, and the characteristics (such as crime types, and sentence lengths) of those imprisoned.

Annex C shows, in the format of a traditional flowchart, the numbers of offences and of defendants and the flow through the UK's criminal justice system. It is internally coherent and consistent, and elegantly contextualises key indicators such as the number of people sentenced to custody (prison) in a given time period. It could readily and helpfully be extended to show time series for different categories of interest, and information about cohorts – for example, re-offenders.

Population and migration statistics

In its July 2009 report *Migration Statistics: the Way Ahead*⁵, the UK Statistics Authority said:

“User understanding of the range of migration statistics may be enhanced by relating each of the sources to the underlying processes of international and internal migration through a conceptual framework, and explaining clearly how newly-published estimates update the ‘bigger picture’”.

The report recommended that the main government departments that produce migration statistics adopt a conceptual framework to enable users to understand how the different sets of figures relate to each other and to the process of migration more generally. To illustrate the Authority's thinking, the report included a draft framework – annex D. This illustrates flows of different types of migrants into and out of the UK, and within the UK, and shows the types of activity (such as education, or claiming welfare benefits) that provide relevant data to help build up the 'bigger picture'.

In response the Office for National Statistics⁶ (ONS) published *A conceptual framework for population and migration statistics*⁷. The preparation of this substantial report helped statisticians in ONS to enhance their understanding of the subject of migration, with obvious benefits to themselves and in turn to users of these statistics:

Population and migration statistics are produced to meet a diverse range of requirements relating to resource allocation, policy making, local service provision, commerce and research. They provide snapshots of population change over time, which is influenced by wider social, cultural and natural environments. This complexity is increased by the range of potential data sources from which population counts may be derived. The development of a framework is therefore essential to provide a structured way to link all the detail involved in translating requirements at a high level to a coherent set of outputs.

⁵ <http://www.statisticsauthority.gov.uk/reports---correspondence/reports/authority-report-4--migration-statistics-the-way-ahead.pdf>

⁶ Working in collaboration with the Southampton Statistical Sciences Research Institute (S3RI) and the School of Geography at the University of Leeds

⁷ <http://www.ons.gov.uk/ons/guide-method/method-quality/imps/latest-news/conceptual-framework/index.html>

The framework contains the key ingredients of concepts, data, processing and estimation and outputs. The concepts are the aspects of population and migration of interest; the framework highlights that information about location and time is also required to provide a complete definition. Data are any information gathered via censuses, surveys or administrative registers that may be of use in measuring the concept. Processing and estimation refer to the need to clean, impute, combine data sources and develop statistical models to give a closer representation of the concept than can be achieved with a straightforward count from a single data source. Outputs are the published statistics and are the product of the concepts, data and methods. Understanding of all these elements of the framework is necessary to make sense of how outputs can be designed to meet requirements.

Annex E shows the ONS' framework for population and migration statistics. It builds on the version suggested by the Statistics Authority by embedding the 'concepts' within a statistical production framework (data sources; processing and estimation; and outputs).

Cause and effect

Statistics about climate change

In its October 2011 report *The accessibility and coherence of statistics about climate change*⁸, the UK Statistics Authority noted that:

- *Official statistics about climate change are unusual in some respects, and in ways that affect their coherence and accessibility:*
- *The topic of climate change crosses a number of established statistical domains and this both increases the volume of relevant data and presents challenges in bringing them together.*
- *The statistics are based on more varied sources than most official statistics – financial information, scientific data, and the results of opinion surveys, for example. There are also differences in kind in relation to timescales, and geographical levels.*
- *Policy responsibility for different aspects of climate change [in the UK] is split between the Department for Environment, Food and Rural Affairs (Defra) – which has policy responsibility for climate change adaptation, and the Department of Energy and Climate Change (DECC) – which deals with climate change mitigation.*
- *There is no readily identified set of official statistics that clearly relates to 'climate change'.*

The report concluded that:

The non-specialist user's understanding of statistical information about climate change would also seem to benefit from its presentation as part of an agreed, accessible and intuitive framework. Improved understanding of the statistics, and the messages contained in them, are important in building trust in any aspect of official statistics; we think that this is particularly important in relation to climate change given the complexity and controversy that attend the topic ... Conversely, the

⁸ <http://www.statisticsauthority.gov.uk/assessment/monitoring/monitoring-briefs/monitoring-brief-7-2011---accessibility-and-coherence-of-statistics-about-climate-change.pdf>

presentation of statistics about topics as complicated as climate change in the absence of such a framework makes understanding them very difficult for non-specialists.

The development of a framework for climate change-related statistics was recommended in the ABS [Australian Bureau of Statistics] report⁹ to the UNSC [United Nations Statistical Commission]. The recommendation outlined the need for a framework for ‘identifying and assessing existing statistics and gaps relevant to climate change and for the organisation of climate change-related statistics’, and said that it should be developed ‘based on the scientific and policy framework established by the IPCC [Intergovernmental Panel on Climate Change] and UNFCCC [United Nations Framework Convention on Climate Change]. This framework should also make it possible for countries to identify a set of data items and statistics tables or indicators for compilation according to their national priorities and circumstances.’

National Well-being

The publication of the Stiglitz-Sen-Fitoussi report¹⁰ in 2009 has stimulated international statistical interest in the question of how to measure the progress of societies – economic performance, quality of life, and environmental sustainability – in a coherent way. One of the many challenges is how to address the fact that ‘quality of life’ – or well-being – is subjective.

Writing¹¹ in the Royal Statistical Society’s RSS News in February 2012, the former director of ONS’ national well-being programme said:

What do we mean by the well-being of the nation ... of citizens overall? This question needs to be answered before we can properly measure it. However, it is proving quite challenging to come up with an agreed definition and a conceptual framework to describe the well-being of citizens and what drives or influences that. Indeed, while some quarters continue to call for a conceptual basis, others take a more pragmatic approach and settle for a framework for what we are measuring: national well-being is, at this stage at least, defined by the set of measures to be presented as measuring national well-being.

The approach adopted in the Stiglitz-Sen-Fitoussi report, which we are following, is essentially to present a statistical description of all aspects of the economy, society and the state of the natural environment. In such descriptions, structure is provided by the three pillars – economic performance, quality of life/social progress, and the environment – and these pillars, especially quality of life, can be further divided into a set of domains. Cross-cutting issues, especially equality and sustainability might be seen as ‘dimensions’ to be analysed using the domain indicators. The national debate suggested that the main things that matter to people in the UK for their well-being, and for the national well-being, are health, personal relationships, job satisfaction and economic security. Following the national debate, ONS has been

⁹ <http://unstats.un.org/unsd/environment/fdes.htm>

¹⁰ Report by the Commission on the Measurement of Economic Performance and Social Progress http://www.stiglitz-sen-fitoussi.fr/documents/rapport_anglais.pdf

¹¹ http://www.rssnews.org.uk/wp-content/uploads/2012/01/RSSNEWS_FEB_2012_web.pdf

consulting on a set of proposed domains and headline measures of overall national well-being.

The ten domains and two dimensions proposed by the ONS for measuring national well-being are shown at annex F. Whilst some commentators have expressed reservations about ONS' proposed framework – for example, about how to interpret the two scales on the diagram; and uncertainty whether the relative positions of the text (eg 'governance' versus 'natural environment') has some meaning in terms of the two 'scales' – the current authors' view is that the diagram is a very helpful initial attempt to simplify a complicated issue, and – in response to discussion and challenge – is likely to be improved as thinking about the issue develops.

Conclusions

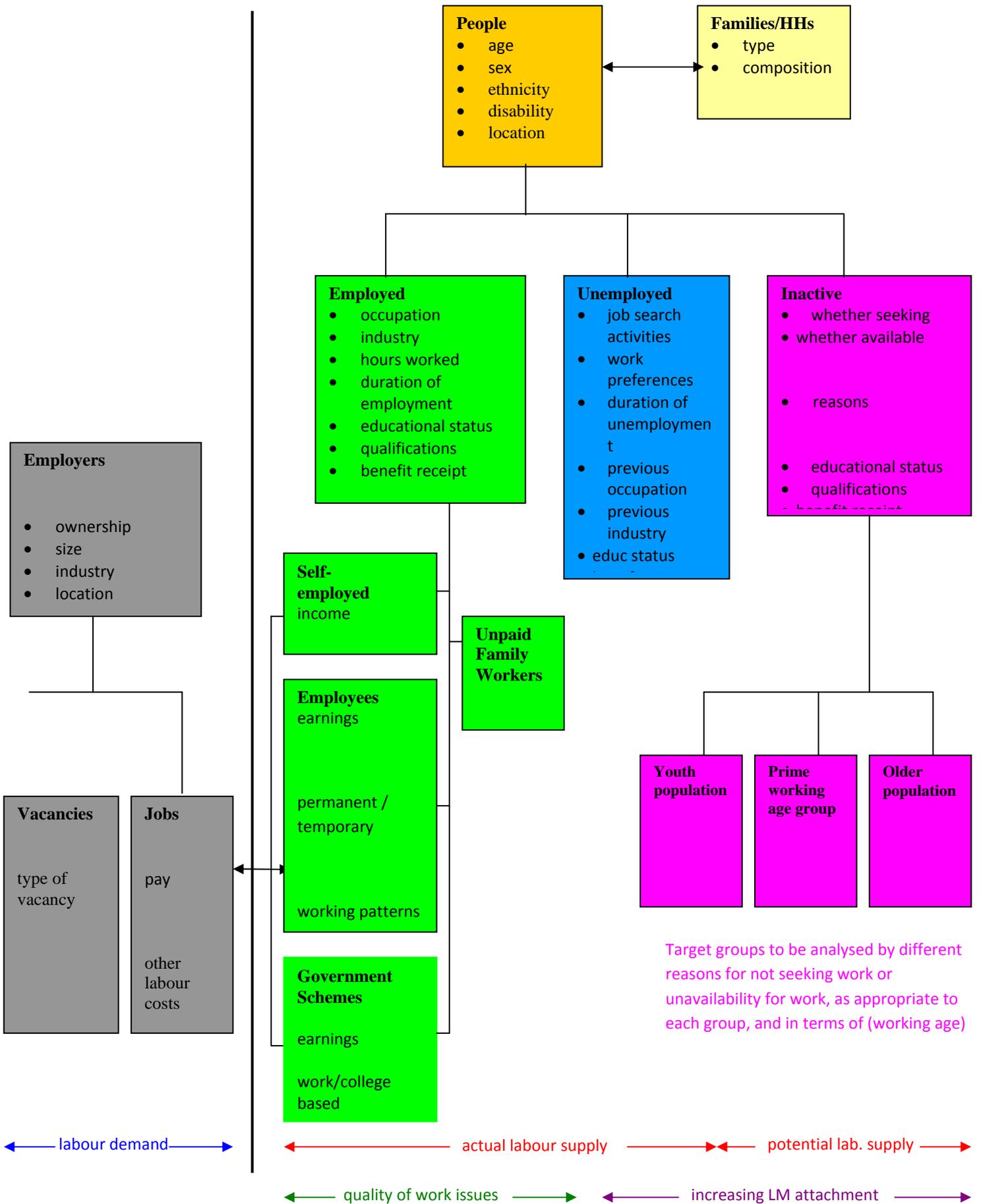
The appropriate, intuitive presentation of statistics can add considerable value for the user, in helping them to understand the 'bigger picture' before delving into the detail (should they need to do so). Putting a particular statistical series into context is likely to help users avoid drawing inappropriate conclusions based on a lack of expertise with the detailed subject matter. And the development and use of frameworks helps producers to understand better the statistics they produce, and presents an opportunity for producers to engage with users of their statistics

In the UK the development and use of presentational frameworks that follow an intuitive model is varied. Where it is done well – such as in Criminal Justice Statistics – it provides an overarching structure within which to present detailed statistics. Indeed, the near-universal publication of official statistics via the internet opens up the possibility of using such frameworks to enable users to 'drill down' in order to access time series or information about lower level geographies, and to highlight or link to information about sources, methods, and quality.

Several reports by the UK Statistics Authority have encouraged producers of statistics to develop approaches based on accessible, intuitive frameworks. The authors' understanding is that some producers have not been enthusiastic about meeting this challenge. For example, we have been told that "the subject is too complicated" to lend itself to a straightforward, high level presentation of the statistics about even the main indicators about a particular topic. We feel that it is these 'complicated' sets of statistics which particularly merit straightforward, accessible presentation. Imagine trying to understand how a country's economy is performing without using the structure of the National Accounts ...

Finally, we suggest that there might be merit in reviewing international practices in framework-based approaches to all aspects of statistical production and all statistical domains. The material presented above about population and migration statistics illustrates that different approaches or representations are perfectly possible; like many aspects of statistical activity, there would seem to be advantages to standardising them as far as possible. Based on a quick search of the internet, we found many examples of different countries' approaches to frameworks – see annex G for a list of some of these. Whilst some represent international efforts, others have been developed for national purposes and may have relevance elsewhere. A systematic review of the use and nature of frameworks would help to identify and share best practice and would be a step towards strengthening international comparability.

CONCEPTUAL FRAMEWORK FOR A UK LABOUR ACCOUNTING SYSTEM

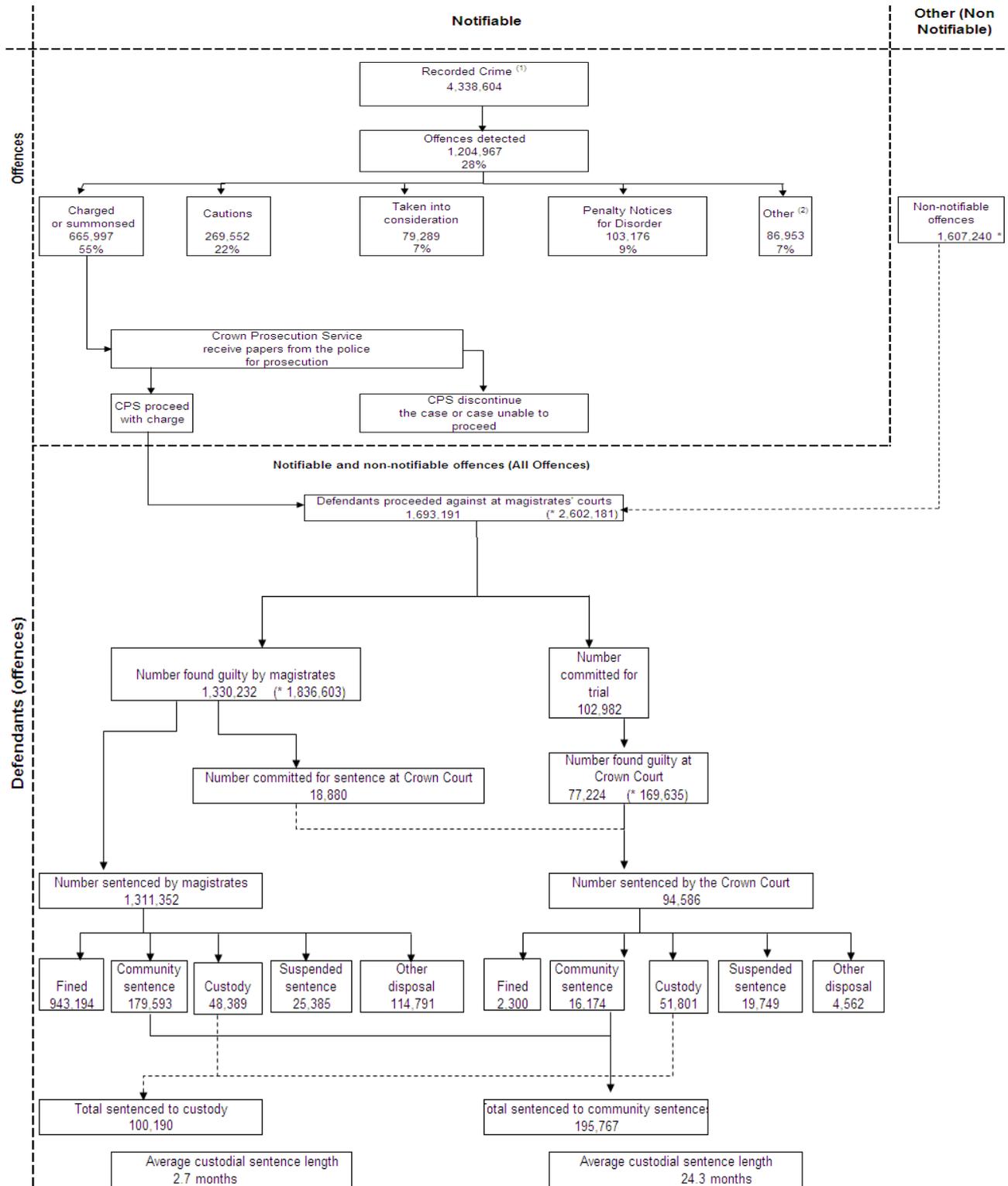


INPUT-OUTPUT SUPPLY AND USE

Supply		Use	
P R O D U C T	INDUSTRY	INDUSTRY	FINAL DEMAND at purchasers' prices
	<p>DOMESTIC SUPPLY at basic prices</p> <p>Note: Supply table industry / product detail is not available due to disclosure rules</p>	Imports - goods and services Distributors' trading margins Taxes less subsidies on products	<p>INTERMEDIATE DEMAND at purchasers' prices</p>
TOTAL OUTPUT	TOTAL SUPPLY	Total intermediate consumption Taxes less subsidies on production Compensation of employees Gross operating surplus TOTAL OUTPUT	TOTAL DEMAND

} GVA at basic prices (Primary Inputs)

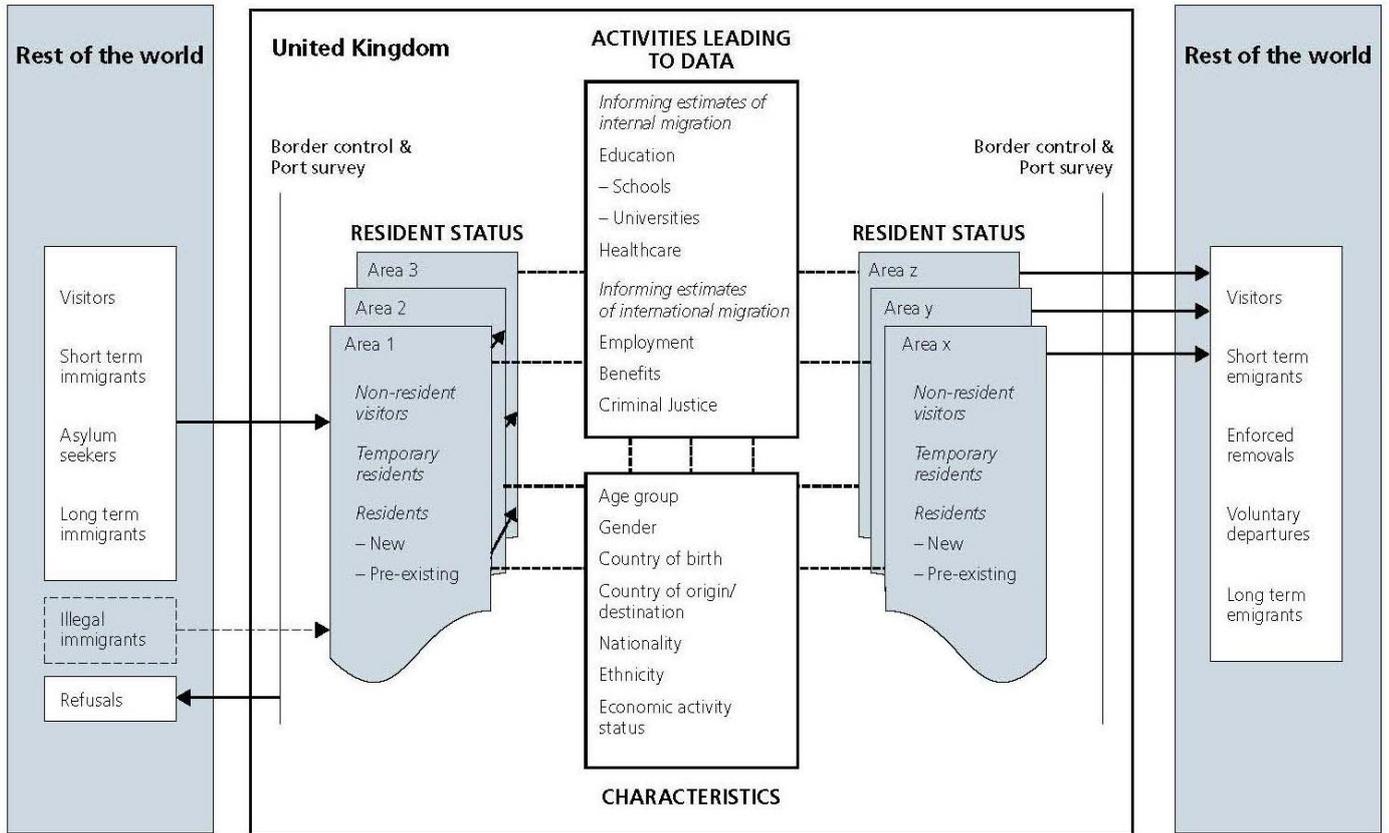
CRIMINAL JUSTICE STATISTICS



1. Covers all indictable, including triable either way, offences plus a few closely associated summary offences.
 2. Includes formal warnings for cannabis possession and non-sanction detections.
 * Total number of offences committed rather than total number of defendants based on a principal offence basis.

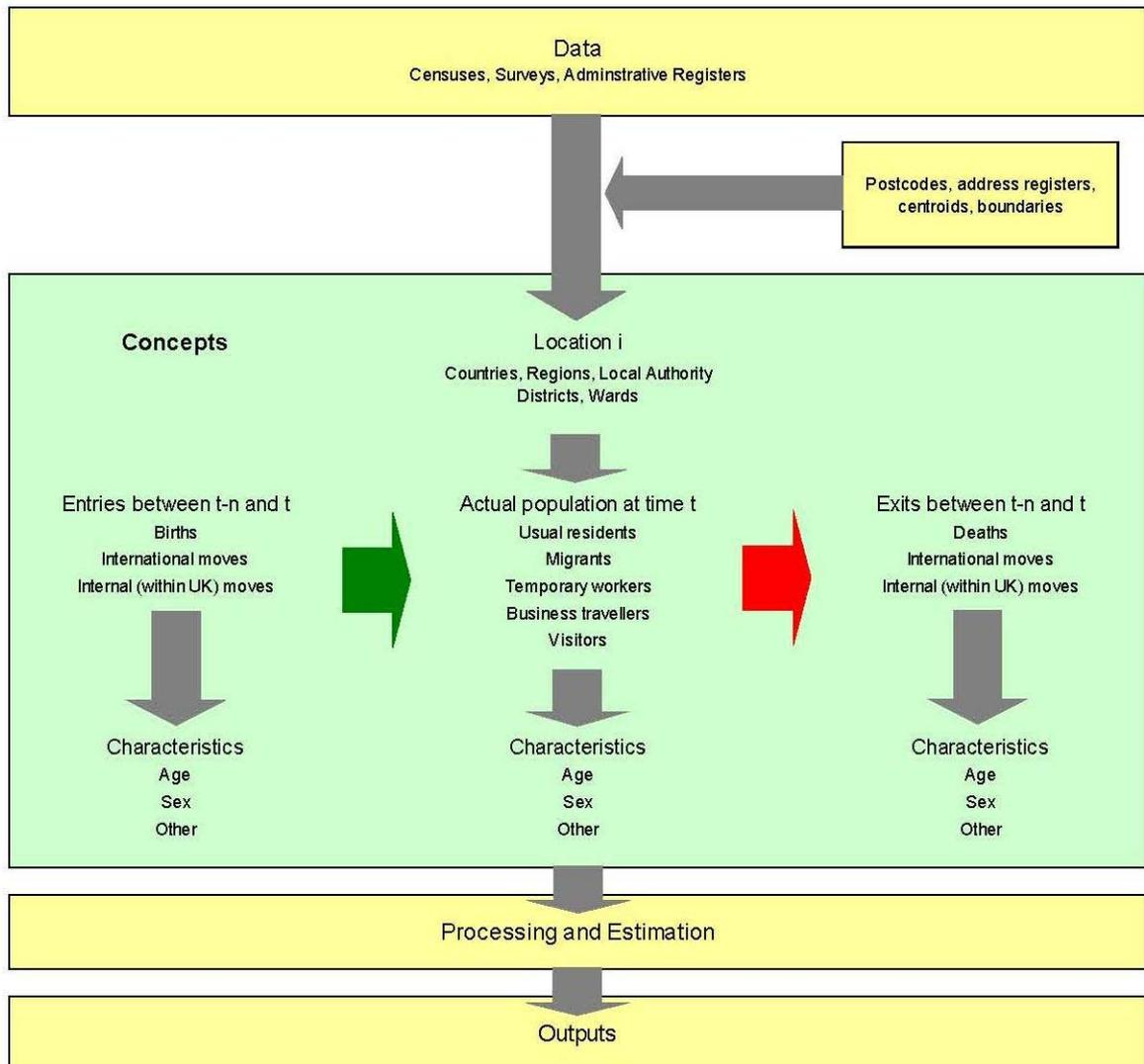
A FRAMEWORK FOR MIGRATION STATISTICS PROPOSED BY THE UK STATISTICS AUTHORITY

Framework for international and internal migration statistics

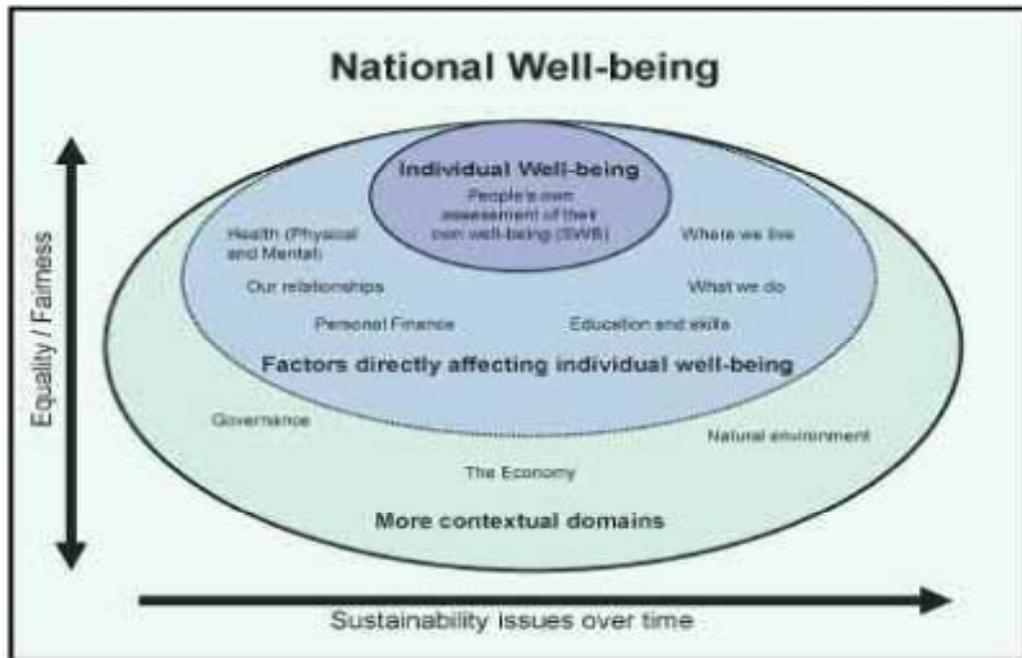


THE OFFICE FOR NATIONAL STATISTICS' CONCEPTUAL FRAMEWORK FOR UK POPULATION AND MIGRATION STATISTICS

A conceptual framework for UK population and migration statistics



THE OFFICE FOR NATIONAL STATISTICS' CONCEPTUAL FRAMEWORK
FOR NATIONAL WELL-BEING STATISTICS



**SELECTED INTERNATIONAL EXAMPLES OF THE
USE OF STATISTICAL FRAMEWORKS**

Culture statistics - Canada

<http://www.statcan.gc.ca/pub/87-542-x/87-542-x2011001-eng.htm>

Comparative education statistics - OECD

http://www.oecd-ilibrary.org/education/oecd-handbook-for-internationally-comparative-education-statistics/conceptual-framework-for-data-collection-on-education-statistics-and-indicators_9789264104112-3-en

Family and domestic violence - Australia

<http://www.abs.gov.au/ausstats/abs@.nsf/Latestproducts/4529.0Contents2009?opendocument&tabname=Summary&prodno=4529.0&issue=2009&num=&view=>

Monetary statistics - Pakistan

www.sbp.org.pk/departments/stats/.../Conceptual_Framework.pdf

Tourism statistics - WTO

<http://statistics.unwto.org/en/content/conceptual-framework-tourism-statistics-international-recommendations-tourism-statistics-200>

Statistics on the Information Economy - UN Conference on Trade and Development

unctad.org/en/docs/sdteecb20072rev1_en.pdf

Injury mortality statistics - USA

<http://www.cdc.gov/mmwr/preview/mmwrhtml/00049162.htm>

Child online protection statistics - International Telecommunication Union

www.itu.int/dms_pub/itu-d/.../D-IND-COP.01-11-2010-PDF-E.pdf

Balance of Payments - IMF

www.imf.org/external/pubs/ft/bopman/bopman.pdf

Māori statistics - New Zealand

http://www.stats.govt.nz/browse_for_stats/people_and_communities/maori/towards-a-maori-stats-framework.aspx

Gender and agricultural statistics - FAO

www.fao.org/fileadmin/.../APCAS-10-25_-FAO_Gender.pdf