

THE EVOLUTION OF NATIONAL STATISTICAL SYSTEMS: TRENDS AND IMPLICATIONS

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1. Introduction

The United Nations Statistics Division (UNSD) is now 60 years old. National Statistical Systems have evolved considerably over that time. International statistical agencies, particularly UNSD, and the United Nations Statistical Commission (UNSC) have had influential roles. But this paper is essentially about national statistical systems. There are two main purposes in the paper - (a) to identify the main trends over the last 60 years and discuss the key influences on official statistics; and (b) to identify some of the emerging challenges that are facing National Statistical Offices (NSOs).

Section 2 of the paper considers (a). It does not pretend to cover every change that has influenced the evolution of statistical systems. It concentrates on the main changes - the mega trends if you like. Each of the following sub-sections discusses these trends in more depth and speculates on future developments.

These are somewhat idiosyncratic views based on nearly 40 years of working in official statistics. They do not pretend to cover everything that is important. The views are not based on historical research but rather the recollections of the author.

Section 3 of the paper discusses some of the emerging challenges facing National Statistical Offices. These will not be uniform across all offices of course. Among other things they will depend on the state of development of the statistical system. They will also depend on the relationship between the Statistical Office and the Government or between the Statistical Office and the community. These relationships are vital no matter how developed the statistical office is. Section 4 briefly discusses some of the challenges facing the global statistical system.

The paper tends to focus on the trends in the more developed offices where the evolution has been faster but, where appropriate, special comment is also made on the trends and implications within developing countries. And statistical offices do have to evolve as expectations change and their environment changes. Sometimes major reform is needed.

The views expressed in this paper are personal and do not necessarily reflect the views of the Australian Bureau of Statistics.

¹ This paper was commissioned and commenced whilst I was Australian Statistician but completed after retirement.

2. Mega Trends

The last 60 years have been an incredibly interesting period. Statistical systems in most countries are barely recognizable from those of 60 years ago. What have been the main trends and main influences? These are listed below and discussed in more detail in the following Sections.

- (i) Economic statistics have become more integrated. The System of National Accounts in particular has become a widely accepted organizing framework for economic statistics. There have been other important contributions such as the Balance of Payments Manual.
- (ii) The development of household surveys has greatly increased the availability of social statistics. Previously social statistics were dependent on periodic Population Censuses and administrative systems. More recently, longitudinal surveys have become more prevalent.
- (iii) Environment Statistics did not exist 60 years ago but they are rapidly growing in importance. Some of the largest global issues revolve around the environment (e.g. climate change). Environment statistics are more challenging because a high proportion of the data is collected outside the NSO.
- (iv) The majority of countries are now conducting Population Censuses. They are increasingly seen as an essential tool for planning. But several countries, particularly those with reliable population registration schemes, have moved away from traditional Censuses. Technology has greatly aided effective data collection, processing and dissemination for Population Censuses.
- (v) Many countries have decentralized statistical systems. But even in centralized systems the trend is towards greater provision of statistics outside the NSO. These statistics are often based on administrative systems which potentially provide a rich source of detailed data. There is much greater interest in having a coordinated National Statistical System. Technology facilitates the provision of a federated system of official statistics. But co-ordination will only be effective if agreed arrangements are spelt out.
- (vi) User engagement has improved greatly in most but not all countries. This is positive—it must contribute to the strength of the statistical system. But it does put more pressure on National Statistical Offices. Users will want to get more involved in the design of collections. They will want access to more detailed data, including microdata, for research and analysis purposes. Furthermore, statistics are increasingly being used for political and administrative or regulatory purposes such as distribution of funds and indexation. These uses results in additional pressures on National Statistical Offices.
- (vii) There have been major changes in the way statistics are disseminated. Printed publications used to be the norm. Electronic media were introduced (e.g. magnetic tapes, CD ROMs, electronic data base systems) but the real revolution came with the internet.

The media has also become an interested and important disseminator of statistics. Besides the media, NSO web sites are becoming the most important way of disseminating official statistics to both the community and more regular users of statistics.

- (viii) The productivity of NSOs has increased greatly. The range of statistical outputs has increased substantially without the same level of increase in costs. Adoption of technology has been the major factor but the application of new statistical methods has also made a significant contribution. The widespread application of sample surveys has probably been the most important methodological contribution. Sharing of knowledge between NSOs, including the adoption of generalized software products, has greatly assisted the adaption of technology and methodology.
- (ix) There has been a trend towards giving National Statistical Offices greater autonomy and independence as part of what is seen as good governance arrangements. This has not happened in all countries. But where it has happened, it has led to greater trust in official statistics by both national and international users. But there are some countries where trust has been eroded and steps are being taken to address this.
- (x) Technology has made a major contribution to the efficiency and effectiveness of NSOs. Among other things it has
 - (a) facilitated new forms of data collection,
 - (b) greatly improved the productivity of processing,
 - (c) enabled information to be managed more effectively,
 - (d) facilitated easier access to data, and
 - (e) greatly improved communication both within the NSO and externally.

The main comparative advantage of NSOs used to be to run large statistical collections where our technology based systems were of great assistance. Increasingly, the comparative advantage is focusing on our abilities to provide coherence in statistics (through standards, classifications, statistical frameworks etc) and manage information. Technology is still important.

- (xi) Response rates in most but not all countries have tended to deteriorate. This has caused NSOs to look at different ways of collecting data to reduce respondent burden including greater use of administrative data. It also encouraged methodological developments to provide robust estimates despite non-response.
- (xii) National Statistical Offices have become more involved in analysis. On the one hand this involves them undertaking the analysis. This can take many forms - seasonal adjustment, written descriptions to highlight the main findings in statistical releases or the use of statistical models and the like to increase the value obtained from statistical collections. On the other hand, it involves providing access to detailed data, possibly microdata, to support secondary data analysis. Technology has enabled National Statistical Offices to do this more readily. In particular, access to microdata is increasingly being provided as a means of supporting analysis. But it provides its own challenges not least of which is the

protection of the confidentiality of the microdata. Another form of analysis that is becoming more prevalent is the linking of statistical data sets. These include longitudinal links through longitudinal surveys or administrative systems. They also include links across statistical data sets. Linking involves important privacy and confidentiality considerations as well as many methodological challenges.

- (xiii) There have been moves towards a global statistical system with many international agencies participating and the UNSC taking a key coordinating role. But significant problems still exist. One example is the lack of co-ordination of technical assistance provided at the country level.
- (xiv) In conjunction with the development of the international statistical system, there has been an increase in the availability of international statistical standards. These serve several purposes:
 - (a) to facilitate reliable international comparisons,
 - (b) to allow the creation of international data bases such as the MDG data base, and
 - (c) to avoid NSOs having to do this type of work—their national standards can be based on international standards.

Standards don't just apply to the statistical work of NSOs. Protocols on good practice have been developed in a number of areas including those that outline the way NSOs should work to preserve their reputation for integrity. The Fundamental Principles on Official Statistics are the best known protocol.

2.1 Economic Statistics

In the immediate post-war period, there was much greater emphasis on economic statistics. Prior to then, economic statistics were mainly based on administrative systems (e.g. customs, taxation, industrial tribunals, building approvals), economy wide censuses or perhaps censuses of important industries such as agriculture and manufacturing. Estimates of national income and balance of payments were compiled but they were largely experimental in nature. Price statistics were also compiled, especially consumer prices, by many of the more developed statistical offices. Public finance statistics were often compiled to enable assessment of the financial activities of government.

But there was a need for a framework that better demonstrated connection between different economic statistics. This was stimulated by several factors:

- (i) The failure of economic policies during the 1930s showed that a different approach was needed with more emphasis on macroeconomic policy and the connection between different economic phenomenon (e.g. employment and company taxation).
- (ii) The post-war reconstruction was reliant on quantification of the different elements of the economy and their interrelationships.
- (iii) Developments in economic theory, especially Keynesian economics, facilitated a new approach to economic statistics.

The early meetings of UNSC were an important stimulus to the development of a System of National Accounts and their widespread adoption. UNSC recognized the need by international organizations for comparable data about the economies of member nations. This was one of the key factors that led to the development and publication by the United Nations of a System of National Accounts in 1953. Richard Stone, who was a student of Keynes, was a major contributor. This was the first version of a system that has now become an accepted worldwide standard for producing national accounts.

Following very detailed consideration and some important developments in national accounting theory, the 1953 version of the System of National Accounts (SNA) was superseded by the 1968 version, which involved significant revisions and a much more comprehensive treatment of economic accounting. It expanded the scope of the accounts by adding input-output tables and balance sheets and by giving more attention to constant prices. The next version, referred to as SNA93, updated the System to reflect modern circumstances including the expansion of the production boundary and provided an improved alignment with the balance of payments. It also introduced satellite accounts for areas such as unpaid work, tourism and the environment. The 1993 System of National Accounts is currently undergoing a major revision to reflect the rapid increase in globalization in recent years. The continued monitoring and research into the relevance of the System of National Accounts demonstrates the increasing importance, in the modern era, of internationally comparable economic statistics.

SNA has been the major influence on economic statistics. It has provided an organizing framework for the presentation of economic statistics. Furthermore, the development of national accounts has led to a better understanding of the complex structure and inter-relationships of economic transactions. The inter-relationships that can be presented through the SNA have also supported macroeconomic analysis (e.g. national income forecasting) and therefore created much greater user interest in economic statistics. National Accounts have become an essential tool of policy making. This has continued to be the case even though economic theory has moved away from its Keynesian roots. This can only be to the benefit of the development of economic statistics and ensuring adequate budget support for NSO work on economic statistics.

But the adoption of SNA has not been uniform across countries. Some do not have any national accounts. Others have implemented SNA 68 but not SNA 93. A common problem has been the lack of availability of core source data. This has to be addressed before good quality national accounts can hope to be produced. This is a major challenge for many countries, particularly in the developing world.

The introduction of sample survey methods has had a profound effect on economic statistics. First, it has enabled the collection of more source data to support the SNA. Second, it has enabled the production of useful data in its own right. For example, many economic indicators are derived from sample surveys (e.g. retail sales). The consequence has been the increasing availability of economic statistics for a range of purposes. Their nature has changed over time however. The emphasis used to be on the production industries (e.g. agriculture, manufacturing) and distribution (e.g. retail) but more recently there has also been great interest in service industries although less so in developing countries. Also there is now

relatively greater interest in sub-annual compared with annual statistics driven to a large extent by the increased influence of official statistics on financial markets.

The development of service industry statistics has introduced new measurement challenges. The intangible nature of many service industries makes it more difficult to distinguish between the production and price components of the value of output for example. This was one of the stimuli for the so-called City Groups. The Voorburg Group was the first established City Group and it has examined a range of measurements issues associated with service industries.

More recently, there has been greater interest in understanding the relationship between business performance and business characteristics (e.g. research and development expenditure, adaption of ICT). Because of the dynamic nature of the relationships and the lag between cause and effect, this requires longitudinal analysis. For example, investment in research and development will not have immediate impact. There is great interest in having access to microdata for businesses to support this type of analysis. But such access results in significant confidentiality issues that have to be resolved.

The nature of price statistics has also changed. Sixty years ago price statistics, usually referred to as Consumer Price Indexes (CPIs) were primarily used for cost of living analysis. In fact, for many countries with centralized wage setting arrangements, they were used directly for wage adjustments. It was this emphasis on cost of living that meant CPI methods came under the jurisdiction of the ILO. But the use of the CPI has changed. CPIs are increasingly being used as an inflation measure and are used as a target for evaluating monetary policy by the central banks of several countries. Its use in wage policy has been diminished.

The introduction of systems such as the national accounts and balance of payments has resulted in problems with source data becoming more apparent. One such problem is the lack of integration of data sources. This has led to efforts to improve integration. This has taken several forms such as the introduction of a common business register to support the various business surveys that contribute to the national accounts or business statistics more generally. There are other important pre-requisites such as common classifications (e.g. industry), common business units and greater consistency in the statistical methods used in business collections. As an example of the latter point, even different treatments of non-response can result in inconsistencies in source data that would be otherwise consistent.

UNSC has had a major role on international classifications. In its early years it established international standards for classifications of industry and commodities. This type of work has continued and been very influential in the development of statistical infrastructure within countries particularly for economic statistics.

During the last 60 years, business reporting burden has become a bigger issue. Many countries have faced decreasing response rates, requiring more conciliatory approaches to achieving business co-operation in the pressure of source data. Furthermore concerns about red tape have resulted in pressures from governments to reduce reporting burden even though statistics is a relatively small contributor to regulatory burden. This has led to a number of

initiatives to reduce reporting burden. Some of those worth mentioning are the greater use of administrative data (e.g. taxation data) in lieu of data collection from businesses and steps to achieve greater harmonization with the concepts used for regulatory purposes. As an example of the latter, several countries have introduced business unit definitions that align more closely with the units used by businesses for reporting purposes (e.g. taxation) even though that might introduce a degree of statistical impurity.

Another clear trend has been the increase in user engagement on economic statistics. Financial markets have been a big influence and have also resulted in increased government interest as well as those providing analytical services to financial markets. In the EU region, targets on macroeconomic outcomes, established as part of the Maastricht Treaty, have increased the level of interest by Governments and others. But even in those countries where financial markets are relatively small, standards such as the IMF's SDDS and GDDS have resulted in much greater government interest in economic statistics. The main challenge for NSOs is not so much to create interest in economic statistics but to ensure their economic statistical outputs are of good quality, relevant, trustworthy, timely and do not place an undue reporting burden on the business community.

As to the future, the pressures on NSOs for good quality macroeconomic statistics, particularly the national accounts, are going to increase. The bar will be raised higher. Expectations will have to be managed to realistic levels but there is also a need to respond to major concerns. Often these will be with the source data. Continuing dialogue with key users of economic statistics and senior economic journalists will be crucial. Technology will no doubt provide ways of delivering data to respondents in more effective ways as it has in the past.

The national accounts can also be expected to be extended in various ways to facilitate analysis of the relationship between the economy and social and environmental outcomes by extending the use of satellite accounts.

For other economic statistics, the pressure will be for more detail in outputs (e.g. more detailed geographic and industry data). The best way of resolving this may be through combining survey based data sources with administrative data sources. There will also be pressures for access to the detailed data sets, even microdata, to support data analysis and modelling. This is described in more detail in Section 2.12.

As to developing countries, major challenges will be around developing their statistical systems so that core macroeconomic statistics can be produced to a reasonable degree of accuracy. The System of National Accounts should provide the integrating framework. Collaborative effort, particularly on training, is beneficial as was demonstrated for the latest ICP round. But possibly the most fundamental problem is obtaining source data of reasonable accuracy. Strong support from Governments is essential. This takes several dimensions—adequate resourcing, pressure on the business community to comply with statistical collections and promotion of the value of macroeconomic statistics. Structural business statistics will be important for studying economic drivers.

2.2 Social Statistics

Sixty years ago, social statistics were mainly derived from the periodic Population Censuses (for those countries where they were conducted) or administrative systems where they existed. This limited the availability of social statistics although the more developed statistical offices had reasonable range of population and demographic statistics.

Censuses and administrative systems remain very important sources of social statistics but it was not until the advent of household sample surveys that social statistics really expanded. Surveys also provided a less expensive source of social statistics (than censuses) for developing countries where administrative systems were often non-existent or in a very poor state.

The United States and India were among the early countries to develop household survey systems. The first major US survey was the Current Population Survey. It was a monthly survey primarily designed to produce monthly labour force statistics but it also supported a supplementary survey program that covered many social topics. The Indian General Household Survey was designed to cover a range of topics, including many social topics. These surveys provided models for many other countries that developed similar systems. From its early days UNSC commissioned a number of reports which provided guidance to countries on the development of household surveys (and population censuses). Some of the more important survey statisticians of the time were major contributors. The United Nations' National Household Capability Survey Program was an extension of this type of work and influenced survey development in many developing countries. It has continued work in this area with the recent release of Guidelines on Household Sample Surveys in Developing and Transition Countries.

A key factor in these developments was the design of a household survey sample framework, usually involving area sampling techniques, which facilitated the repetition of the surveys or the conduct of new surveys without necessarily going to the same households every survey without starting from scratch. For repeated surveys there was usually some rotation from one survey to the next to provide more accurate estimates of movement than if a completely new sample were selected. These frameworks also enabled other surveys to be conducted without setting up a completely new household survey framework. The link with Population Censuses is important. Censuses can provide resources that assist household surveys (e.g. maps, field staff) and benchmark data that can assist with estimation and the efficiency of the design. Population Censuses and household surveys should be seen as highly integrated projects not independent activities.

The development of household surveys has created a significant body of research both in NSOs and in research institutions. The International Association of Survey Statisticians was formed as a Section of the ISI largely to promote a greater sharing of knowledge of developments in this field. Interestingly the research has not been dominated by sampling theory and methods. It was soon realized that non-sampling errors could be just as important as sampling errors, perhaps more important, to the overall accuracy of the survey. So a lot of the research has been devoted to topics such as response errors, questionnaire design and minimization of non-response. Cognitive psychology techniques have played a role in this research.

The mode of data collection for household surveys has evolved over time. Face to face interviewing was mostly used in the early days of household surveys. Telephone interviewing was introduced as telephone penetration increased and techniques for accurate telephone interviewing developed. Often mixed modes were used (e.g. face to face interviewing used for the first interview in a repetitive survey but telephone interviewing used for subsequent interviews). Telephone interviewing led to other innovations such as CATI and random digit dialling. CAPI using small and low weight remote computing devices has been introduced in some countries to improve the efficiency of field interviewing. It is interesting to note that mail surveys have rarely been used for household surveys for official statistics. The low response rates are the major issue of concern.

The nature of household surveys has also changed over time. More sensitive but important topics are increasingly being canvassed in household surveys. There is also increasing recognition of the interconnection between different social outcomes and surveys designed to support analysis of this are increasing in prevalence. Over the last decade, NSOs have increasingly been involved in the conduct of longitudinal surveys. These create difficult methodological problems, particularly from a data analysis perspective, and this has been the subject of much recent research. Indeed microdata files to support secondary data analysis are becoming one of the more important outputs from all forms of household surveys.

The demand for household surveys is increasing in most countries and this is putting pressure on national household survey systems. For example, several countries are having trouble recruiting household interviewers in sufficient numbers. This is leading to some re-engineering of how household surveys might be conducted to meet this increasing demand and to reduce the pressure on those resources in shortest supply.

With some exceptions such as population statistics, international comparisons in social statistics have not been as prevalent as they have been for economic statistics but it is a field that is rapidly growing. The availability of international frameworks and standards is not as good as for economic statistics and this is a fundamental reason. Also, in the early years of the UN the emphasis was on rebuilding economies. There have been attempts to develop frameworks. The UN publication "Towards a Framework for Social and Demographic Statistics" was an ambitious attempt being heavily influenced by Richard Stone in an attempt to build on the SNA work. But despite the considerable intellectual effort it did not get the support the SNA did and so has had relatively little influence on social and demographic statistics. The Handbook on Poverty Statistics was a recent attempt to provide guidance on concepts and methods in a field of social statistics.

Several countries, and some regional bodies, have developed their own frameworks to support social statistics. Some are over-arching in nature and others are confined to particular social outcomes. But such frameworks are not common. What is more common is a move towards social indicators as an important output of social statistics. One influence was the OECD's Social Indicator Development Program which commenced in the 1970s. But indicators only tell part of the story. They can be useful for understanding major trends and capturing interest in the statistics but if they are interesting, analysts will want to understand why. They

will also want to understand differences between population sub-groups. This requires access to more detailed data sets or microdata in some cases. So the statistical system should be seen as a combination of the indicator data sets and the supporting data bases.

There has also been a move towards using social indicators for international comparison purposes. The MDG data base is one large and recent example—the majority of indicators are social in nature. Although MDG data base has greatly assisted the global reports of progress against MDGs, the report has also revealed deficiencies in the availability of indicators in many countries.

In light of the relatively low availability of international standards for social statistics to facilitate comparisons across countries, there has been an increase in international or regional surveys using common survey instruments and methods across countries as a means of obtaining better comparisons across countries. This applies to both developed and developing countries but particularly in the EU region.

Another feature of social statistics is that there are often many data sources on a particular social theme or outcome. For economic statistics many are brought together in a coherent way through the national accounts. No such approach exists yet for social statistics so thematic or compendia style publications that bring together data from the range of data sources are quite common in many countries. These publications tend to be far more useful if there is an organizing framework and some have been developed at the country level.

As to the future, the demand for internationally comparable social statistics is likely to increase as countries will want to better understand the effectiveness of their social policies. Comparisons with other countries can provide a very important base for understanding whether policy interventions are desirable or not. The data to support such analysis are increasingly likely to come from international surveys (e.g. PISA) or from national surveys with common survey modules used by participating countries (e.g. Eurostat uses this approach for EU surveys). Comparisons of indicators can only take you so far with this type of analysis. Work on internationally agreed frameworks is also important for facilitating more detailed comparisons across countries.

The 2010 round of Population Censuses is an excellent opportunity to advance comparisons on social statistics. But it will not happen automatically. There has to be a concerted effort to ensure this happens for those variables that are the most important for international comparisons. Development of statistical concepts for general use will be a big step forward. The ECE region has already taken some important steps in this direction. The Population Censuses may also be a good source of information about expatriate populations. But it requires (a) agreement by countries to ask a question on citizenship, (b) standardization on the classification of country of citizenship, as well as (c) sharing of (aggregate) data between countries.

Administrative data is likely to be used more often in production of social statistics in the future. Advances in technology will mean that it will be possible to access the full potential of these data sets - the linkages over time of an individual's transactions are particularly important for studying the dynamics of social outcomes. NSOs will have a role in assisting with

implementation, even if they are not the custodians of the data sets for statistical purposes, by assisting the administrative agency to design information models to support agreed statistical endeavours. The support of administering agencies in this work is essential if it is to be successful. This is more likely to happen if they are also a user of the system to derive statistics, either the outputs produced by the NSO or the data bases set up to support statistical outputs.

The interest of the media in economic statistics has assisted their development and funding. More needs to be done on social statistics. Too often the reporting is on the quirky rather than the really important. Relationships with the key journalists are important.

For developing countries, one of the big challenges for them will be to develop the core administrative systems (e.g. registration of births and deaths) to ensure they are of a good enough standard to support both administrative and statistical purposes. The demand for social data will increase so building up household survey capability will be important. Efforts will need to be made to take a more integrated approach across household surveys as well as with the Population Census. As these are often funded by international agencies it will require special negotiations with them. These will be much easier if there is an agreed national strategic plan for statistics.

The full value of these surveys is often not obtained at present because of limitations on the resources available for analysis so building up this capability, not just in the NSO but with the key users within the country, will be another challenge. One way may be to increase collaboration within research institutions in the countries or with those from outside the country that are providing special assistance to the countries.

2.3 Environment Statistics

Environment statistics barely existed 60 years ago and where they did exist they were not published by the NSOs. They started to get involved in the 1990s but it is now a rapidly growing field of statistics with its own particular challenges. Policy considerations can be regional, national or global. In fact global policy concerns and discussions on the environment (e.g. climate change) are relatively more prominent than many other fields on which statistics inform.

Environment statistics are different for several reasons:

- (i) The interconnection between the environment and human activity is possibly of more interest to policy makers than the environment in isolation. This works in two directions. First, human activity including economic and population growth has implications for the environment. Second the environment provides a number of services to support human activity which may not be able to be maintained if the environment deteriorates. But the nature of these services could change over time. For example, the impact of climate change and policies for adaption are key considerations.
- (ii) The source data often comes from outside the NSO. Whilst data collected by the NSO from businesses and persons can be important, in volume terms it is usually a relatively minor component of the total data set.

- (iii) The data is usually about units other than businesses or people (e.g. catchment areas).
- (iv) There is a strong need to provide spatial overlays of the data sets of interest.
- (v) The user relationships can be very different. Those concerned with advocacy on the environment are relatively more prominent than in other areas of policy. And there can be a propensity by some advocates to misuse statistics in order to achieve their goals.

NSOs have a comparative advantage in environmental accounting because of their experience in national accounts. Some NSOs have developed Environmental accounts. The System of Environmental and Economic Accounts (SEEA) has provided importance guidance. It soon became clear that environmental accounting is not a straightforward exercise so emphasis has been on producing accounts that focus on the high priority environment issues for individual countries. And these can vary considerably from country to country although there do seem to be some issues such as climate change and water which are of concern to many countries.

As to the future it is likely that more NSOs will be asked to host national centres for environment statistics as key users look to utilize the information management skills of NSOs to bring more cohesion and standardization to environment statistics. A networked approach which does not change custodianship is most likely to work, given the vast range of environmental data sources.

Statisticians have not been as involved in informing environmental policy as they might. Information fed into policy debate has tended to be influenced more by scientists. They sometimes use inadequate statistical methods. NSOs need to become more involved. Environmental accounting will become more important as much of the policy focus will be on the interaction between the environment and human activity (in both directions). This is new and difficult work so sharing of knowledge between countries will be invaluable. We can learn a lot from each other's experiences.

The environment is a very important issue for developing countries as well. One of the Millennium Development Goals is about ensuring environmental sustainability and it continues to have a high profile in UN activity. Statistical information will be a vital ingredient for planning and policy. But the capability of most developing countries is currently very low. Knowledge transfer will be essential. Given the cost of developing environmental accounts it is also important that effort be focused on informing on those environmental issues of most interest.

2.4 Population Censuses

Censuses have a long history and are known to have been conducted in biblical times. But 60 years ago, censuses were largely conducted in more developed countries. They were based on more traditional methods—either enumerators moving from one dwelling to another to record Census information or, in some countries, Census questionnaires were dropped off and picked up at a later date.

For the more developed countries, Censuses have evolved but not always in the same way. It depends on the particular circumstances of the country. Examples of data collection methods used include

- (i) Mail-out and/or mail-back of Census forms to reduce the reliance on Census enumerators. This has been driven by the need to reduce costs (but costs are increased in other areas, such as the creation of address lists), decrease reliance on enumerators (they can be difficult to recruit in sufficient numbers) and the need to reduce biases created by Census enumerators (demonstrated to the significant by the US Census Bureau in their 1950 Census).
- (ii) Introduction of sampling methods, e.g. long Census forms only being required of a sample of households with the remainder receiving a short form.
- (iii) For some countries the use of administrative data (e.g. population registers) either to complement data collected through a Census or as a substitute for the Census. The Scandinavian countries were pioneers but other countries, such as Singapore and the Netherlands have moved in similar directions.

Another more recent change has been for the so-called rolling Censuses where a sample of the country is completely enumerated each year. The US Community Survey is one such example (but US will continue to conduct a short form Decennial Census) and France has also developed a similar approach.

The internet has provided another option for mailing back, that is, electronically through the internet using a specially designed electronic form. This has now been used successfully by several countries and has considerable potential for reducing the cost and improving the accuracy of Census taking for those countries where internet access by households is high. But it does put more emphasis on the co-ordination of internet data collection with other forms of data collection.

For developing countries, more traditional methods of Census taking remain prevalent although sampling methods have been used in some countries where the cost of a full Census was not affordable.

Hierarchical approaches to Census taking are often used. Census taking is organized at the local administrative level and the results fed through intermediate administrative levels (e.g. provinces) to the national level. This works well in these countries.

Technology has already had a big impact on Census taking and has the potential to improve data collection in all countries. Past examples include

- (i) Data capture methods such as OMR, OCR or imaging
- (ii) Geographic information systems to produce maps to support Census enumeration
- (iii) Training of Census enumerators thereby reducing the need for travel
- (iv) GPS systems to record the location of enumerated dwellings

- (v) Personal computing devices (rather than paper questionnaires) to collect Census data from households
- (vi) The internet for data collection
- (vii) Electronic data communication to facilitate easier transfer of data between regional and national bodies.

The introduction of computers allowed electronic microdata files to be created from which special tabulations could be created with relative ease. This substantially changed dissemination strategies. Computers also enabled significant reductions in the cost of processing and reductions in the time required to process Census data. Subsequent developments in technology and application systems have further improved efficiency and timeliness. An important initiative has been the introduction of automatic coding or computer-assisted coding of variables such as occupation.

But it is with dissemination where the main changes have occurred. These are discussed in more detail in Section 2.7 in the general sense. But for the Census technological developments have been particularly important. It has improved community access to Census data - there is increasing interest in the communities in which people live. This together with increasing public policy debate on demographic issues (e.g. ageing) has the potential to create increasing public support for Censuses.

Technology developments have also enabled greater use of the Census for a range of analytical purposes. This in turn can lead to greater support for the Census. Geographic Information System (GIS) development has also facilitated greater use of Census data by providing a mapping capability for Census information. But the potential is to exploit GIS technology even further.

As to the future, Censuses still remain a very important data source to support planning, policy formulation and to satisfy general community interest in what is happening in their country, region or local community. As the desire to know grows within our society, so does the significance of the census. Today it is particularly important for providing information for small areas or groups. In a world where information abounds and there are several sources for similar information, in most countries there is still no source that comes close to competing with the level of detail available from a Census.

The form of Census taking will vary from country to country. Where population registers exist for many countries, there seems a move towards making greater use of administrative data in lieu of Census taking or to support Censuses. The form of Census taking will also evolve as the circumstances of countries change and with opportunities provided by technology. But in the more immediate future, Censuses will continue to be one of the most important statistical activities in NSOS. However, their success depends on strong engagement with key users, effective management of Census operations, public relations activities to obtain public support and careful management of privacy issues.

Collaboration across countries with the 2010 Round of Population Censuses provides an opportunity to obtain some internationally comparable social statistics and statistics on expatriate populations. This was discussed in more detail in Section 2.2.

For developing countries, the biggest challenge is to run good quality Population Censuses. It is a far more difficult task for them. Infrastructure, particularly communications, are not as well developed. The corporate memory is more limited as is access to the skills required to conduct a good Census. Furthermore, the geographic features of the countries can make access to dwellings much more difficult. But once data has been collected technology has the potential to make substantial impacts on processing and dissemination.

2.5 National Statistical Systems

Many statistical systems were redesigned after the Second World War partly in response to the challenges of reconstruction. Some countries opted for centralized systems whereas others opted for decentralized systems. The relative merits of both approaches have been debated elsewhere. It makes sense that these vary by country and their particular circumstances.

But the trend has been for the two approaches to come closer. For those countries with decentralized systems there has been a tendency to exert greater coordination to improve the reliability and cohesion of the overall statistical system. In some countries, statistical activities have even been transferred to the NSO. But in centralized systems the trend has been for greater provision of statistics by agencies other than the NSO. These statistics are often based on administrative systems managed by the agency. They can provide a rich source of detailed data so there may be strong pay offs from NSO involvement in ensuring good statistical practice to be followed in the use of these systems for statistical purposes.

In a National Statistical System, the NSO has important statistical leadership responsibilities. The bulk of the statistical expertise exists in the NSOs. And the trend will be for statistical leadership to become a more important activity as users seek cohesiveness across all statistics irrespective of the source. But implementing a NSS approach is not easy. Not all agencies will want to participate or commit to the degree desirable. Some countries have been able to strengthen their co-ordination arrangements and have developed agreed protocols for the participants in the National Statistical System.

The desire for greater cohesion has been driven somewhat by technology developments. It is easier to access data from different agencies and to compare and contrast. On the other hand, technology can be a great enabler of different approaches. In particular, it facilitates a federated approach to national statistics where a data network can be established across the different data providers in a field of interest although custodianship of the data remains with the respective agencies. This National Data Network approach is being implemented within Australia for example. It does require agreement on data standards particularly those that relate to meta data.

What are some of the activities NSOs have been engaged in, or could be engaged in, to facilitate a sound national statistical system?

- (i) Developing standard classifications and making them available to other providers of statistics together with appropriate support resources (e.g. automatic coding systems, coding manuals)
- (ii) Developing and promulgating statistical frameworks, standards and definitions for use by all providers of statistics
- (iii) Disseminating manuals of good practice and providing training programs to support them
- (iv) Developing agreed protocols for the National Statistical System
- (v) Developing meta data standards for describing collections, particularly the quality of statistics derived from these collections
- (vi) Developing directories of statistical sources.

As to the future, it could be expected that statistical leadership will become an even more important activity for NSOs. This requires a different skill set to more traditional NSO activity. For example, it requires good relationship management skills to truly engage with other statistical producers and to persuade them to adopt sound practices and participate fully in a (federated) national statistical system.

The issue is also very important for developing countries. It is perhaps even more important, given resource shortages, to have a cohesive National Statistical System.

2.6 User Engagement

Over the last 60 years user engagement has improved greatly in many countries. Statistics are being used more extensively to inform policy, especially economic policy. Statistics are also being used more for administrative purposes such as distribution of funds. They are being used more extensively for research and analysis purposes not just in research institutions but in government agencies, NGOs and the private sector. There is much greater community interest in statistics as well as increased media reporting. As a consequence media reporting of statistics has increased considerably over the last 60 years. Many NSOs have installed public relations units to help manage external relationships particularly with the media.

In some regions or countries, political and regulatory use of statistics has increased the level of user engagement.

Whilst these trends are, on balance, good for NSOs and their future, it does increase the pressure on them. If these pressures do not exist it could be concluded that the statistical services are not all that relevant. If this occurs, NSOs are more at risk of budget reductions.

User engagement works in two directions. NSOs should listen to the needs and interests of their key users. And they should try to respond to these needs particularly the most important needs. But there is also an obligation on NSOs to promote awareness of plans for statistical

development and the outputs of statistical work to stimulate user interest. As a consequence NSOs have to ensure they have good communication capabilities. This applies to all statistical offices including those of developing countries. But not all statisticians have expertise in communications so it may be necessary to bring in that expertise.

2.7 Dissemination

There have been major changes in the way statistics are disseminated. Sixty years ago statistics were only released by paper publications and the number of publications was relatively low compared with today. It was not long after this time that the demand for more statistical publications started to increase partly as a consequence of the higher economic growth in the post-war period.

But it was the advent of electronic data processing that had the most substantial impact. This made it possible to produce much more detailed data and with a reduced lag from the reference period for the statistics. Some of the detailed data were included in publications but mostly they were only available in not very user friendly media such as computer printout or microfiche. But that has changed over time.

Publications used to be primarily statistical tables with relatively little written material. Over time the amount of statistical analysis (e.g. seasonal adjustment) in publications increased to facilitate user interpretation; graphics were introduced to more clearly show trends or differences; explanatory notes on concepts, sources and methods were added; and information on data quality was added to aid interpretation. Furthermore media releases started to be produced to aid media reporting. Not surprisingly media reporting increased considerably in many countries. The media have become a very important intermediary between the NSO and the public. For much of the public, this is how they find out about official statistics. Libraries can also play an important intermediary role and, as NSOs became more client focused, they started working with libraries to provide another public source for accessing official statistics.

Not long after the advent of electronic data processing, there was a move towards the release of data on electronic media. Initially, magnetic tapes were used but they were cumbersome and generally required the support of a computer professional if the data was to be used. After CD-ROM technology became available in the 1980s, together with the introduction of PCs, detailed statistical data became much more accessible to a range of users. CD-ROMs often incorporated software and other facilities to improve the usability of the statistical data.

Electronic data base systems, especially time series data, were released by the NSOs of many countries. The national accounts time series were particularly appreciated by economic analysts and econometricians. Initially they were released on magnetic tape but more user-friendly ways of providing access began to evolve.

But the next real revolution came with the internet and the creation of NSO websites. This stimulated a significant shift to increased electronic dissemination as clients became more sophisticated users of technology. It became relatively easy to release much more detailed data. It also facilitated the publication of a range of statistical support material such as concepts

manuals. Beside the media, NSO websites have become the most important way of disseminating official statistics for many countries. Many publications are now only released electronically and, even when available as printed publications, many users are choosing to receive it in electronic form for timing and convenience reasons.

Secondary providers of statistical data have increased with the growing interest in statistical information. These are republishing NSO data but with value added services of various types. These specialist services can provide an important compliment to NSO services. For example, in many countries it is the wire service such as Reuters and Bloomburgs that provide key macroeconomic statistics seconds after the formal release by the NSO. They are better equipped than NSOs to provide the type of service where the time to release after embargo time is very short.

An important underpinning of these developments in electronic dissemination has been the introduction of data warehousing technology. By storing all publishable data in a warehouse, it is possible to ensure this data is used consistently in a variety of outputs whether they are paper publications, electronic releases, special releases or those provided to secondary providers.

The demand for detailed data for research and analysis purposes has generated much stronger interest in the provision of microdata. Initially released on magnetic tapes microdata later became available on CD-ROM. Now new arrangements are being developed for accessing microdata such as data laboratories and remote access facilities. The latter enable users to generate their own tables from microdata through secure web arrangements. Management of confidentiality is paramount in these new access arrangements both to ensure legal obligations are met and public confidence maintained.

Through this period of rapid change, there have also been changes in the organizational arrangements for many NSOs. There was usually a special unit established to manage the production of publications. But as the ways of disseminating data increased it became apparent that a new form of organizational unit was required to manage and develop the full range of information services in a coherent way. These units tended to have a strategic focus as well as a production focus. Marketing or promotion activities became more prominent in order to improve understanding of client needs to improve the awareness of the availability of certain statistics and, in some countries, raise revenue from statistical information services.

As to the future, the web will become even more important. Web technology will evolve and provide additional opportunities for dissemination of statistics. NSOs will need to keep abreast of these developments so that they can use them to their advantage.

Of course, the web site is only as good as its content. Data warehousing will continue to be a vital activity and technology developments are likely to make data warehousing easier to undertake. An increasingly important part of content is meta data. Management of meta data is much easier if NSOs have standards for describing and exchanging different forms of meta data.

Another likely trend is to expect NSOs to provide a window to all national statistics, not just those produced by the NSO. This is most likely to be achieved through a federated or

networked approach but standards and protocols for the operation of the network still have to be developed.

International data sets will also grow importance. The NSO may be expected to be a point of reference for the location of international data sets and their relative strengths and weaknesses. But they are also important providers of statistics to international agencies. This can be a burdensome task but developments such as SDMX provide the opportunity to reduce that burden.

Large volumes of information will become available through web sites. It could become more difficult for users to find their way through this mass of users. A key challenge will be to design web sites, and to utilize web services tools, to make it a good experience for users. An area of great potential is the use of emerging tools to provide new ways of presenting statistical data, and associated meta data, that makes it much easier to interpret. These tools also enable presentations of relationships between data sets and how they have changed over time.

The increasing availability and capability of mobile technology means that data services delivered to mobile technology also has to be high on the development agenda.

For developing countries, web technology provides opportunities for them to expand the availability of statistical output. But it does require the development of expertise in web technology although there is much to learn from other NSOs with more experience. An additional problem for developing countries is the relatively low level of internet penetration and communications that are not always robust. Intermediaries become more important. Libraries or other community facilities can play an important role in assisting with dissemination, particularly to the general public.

2.8 Productivity of National Statistical Offices

The productivity of National Statistical Offices has increased greatly over the last sixty years. This is most clearly evidenced by examining the volume of statistical output produced now compared with 1947. There has not been anywhere near the same increase in costs. For example, staff numbers have not increased to nearly the same extent as output. In fact many countries staff numbers have actually declined in more recent years without any commensurate decline in outputs.

Adaption of technology, particularly computers, has been a major factor. NSOs were among those who were able to take early advantage of the release of mainframe computers. They were also early adaptors of other significant IT developments such as generalized systems, personal computers, mobile computers, and the internet (including the development of web sites). But this doesn't happen automatically. It requires technology acquisition and investment in the development of IT skills, not just among IT professionals. This requires IT staff to have good knowledge of the statistical and business activities of the NSO and non-IT Staff to have some knowledge of the capabilities of IT. Where there has been close alignment between the IT and the business (or statistical) staff of the NSO, it has been more likely that successful IT applications will be developed including those that led to productivity benefits. Increasingly the

Chief Information Officer has become an important member of the Executive group of NSOs. And the executive has become involved in strategic IT planning.

Developments in statistical methods have been the other major influence on productivity. The widespread application of sample surveys has probably been the most important methodological contribution. It has enabled the production of statistical information about businesses and persons that was not previously possible. There have been many other developments on survey design especially around questionnaire design and minimization of non-sampling errors. As a consequence of these developments a sizeable research community has evolved. Participants have come from both NSOs and research institutions. This has been to the benefit of all countries involved in survey design. There has been a strong culture of knowledge sharing among the research community. As with technology, there is also a need for a close alignment between the methodology and business staff of the NSO. Where this has happened sample surveys have become a more effective source of reliable statistical information and statistical methods have played a pivotal role in the work of the NSO.

We have been fortunate that NSOs have been very willing to share knowledge. This has enabled NSOs to benefit from the experience of other NSOs. In many cases they have also developed close relationships with research institutions. For example, many countries have benefited from the pioneering work of the US Bureau of the Census in establishing a household survey system. Sharing of knowledge has taken many forms. Conferences and workshops have been organized by the international and regional statistical community, organizations such as ISI, IASS or IAOS, or even individual statistical agencies. These have helped build up both formal and informal contacts. Publications have been another effective form of information exchange as have study tours to other NSOs. Web sites are becoming an increasingly effective way of sharing information. Many NSOs make internal methodological reports available through their web sites.

Increasingly other ways of improving productivity are being employed. Training was always regarded as important and NSOs and/or international agencies devote considerable resources into making sure that their staff have the required skills. Technology developments have been a major influence on the type of training required. It has increased the skill level required for many jobs and the need for training. But on the other hand it has reduced the number of relatively low skilled positions involved in statistical operations so there has been an increase in the amount of training required per staff member.

There has been increasing interest in organizational design and good management practice as a means of improving productivity often based around opportunities provided by technology advancements. Senior managers in NSOs are becoming appointed not just for their technical skills but also their leadership and management skills. Again knowledge sharing has been invaluable as the external environment and pressures facing NSOs are very similar from country to country.

Knowledge transfer between developed countries has been very effective and much more active than what is the case for most other professional disciplines. But knowledge transfer to developing countries has had very mixed results despite the increasing financial and human effort being put into technical assistance. There are many reasons which I will not discuss here,

as well as many helpful suggestions on how to improve technical assistance, but there needs to be some agreement on what are the most effective ways of providing technical assistance and a genuine commitment by participants to commit to improved practices. Lack of co-ordination among donors and lack of alignment with national priorities tend to be the main criticisms. Exchange of knowledge between developing countries has increased, mostly through the efforts of international and regional agencies, but there are needs for further improvements.

Improved productivity will continue to be a focus for all statistical offices. We can learn a lot from our respective successes and failures.

2.9 Autonomy of National Statistical Offices

There has been a trend for more countries to give their statistical offices a reasonable degree of autonomy. It has been the case for some time for some countries and this is increasingly being seen as part of good governance promoted by bodies such as the IMF. Independent and authoritative statistical information facilitates good decision making by the government and others. The alternative is to rely on advocacy or anecdote or no information at all. Independent and authoritative statistical information also enables the community to make fact based judgements on the performance of government. This is particularly important for elected governments.

The community is an important audience for official statistics. The United Kingdom Government in the early 1990s commissioned a review of the government's statistical service which concluded that the objective of the Government's statistical service should be that the information should not be collected primarily for publication but because the Government needed it for its own activities. This doctrine was widely criticized and subsequently has been abandoned. It was concluded that the community is an important audience for official statistics.

The media plays a crucial role in relaying the main findings of statistical reports. This is one reason why NSOs have been upgrading their public relations activities.

One big influence was the introduction of democratic arrangements into the former Soviet countries. Not long afterwards there were moves to increase the autonomy of NSOs in the region. This was one of the main factors which led to the development and acceptance of the United Nations' Fundamental Principles of Official Statistics. These have provided an important guide to many NSOs as they have entered negotiations with their governments on the most appropriate organizational arrangements for official statistics.

It could be expected that greater community interest in information, and a desire for transparent government, should help NSOs to obtain appropriate autonomy. But maintenance of trust by all stakeholders, including the media, must be the goal. Appropriate behaviour and management of incidents that might reduce trust become very important if NSOs are to maintain the advantages of autonomy.

If that trust does not exist, NSOs will need to work with their governments to put in place the changes that are necessary to engender trust.

2.10 Technology

As already discussed technology has made a major contribution to the effectiveness of NSOs. Among other things it has

- (a) facilitated new forms of data collection,
- (b) greatly improved the productivity of processing and other activities,
- (c) enabled information to be managed more effectively,
- (d) facilitated easier access to data, and
- (e) greatly improved communication both within the NSO and externally.

But it has been an interesting journey. Sixty years ago computers did not exist in NSOs. But many NSOs had experience with mechanical tabulation facilities and experienced the benefits of this relatively simple technology. For these reasons statistical offices were fairly early adopters of digital computing. Statisticians tended to be comfortable and capable users of computing.

The US Census Bureau was the first statistical office to use a digital computer. This happened in the 1950s but it inspired a number of other statistical offices to follow suit. Early computers were mainframe computers and were expensive, large, cumbersome and slow by modern standards. Also, programming was expensive—generalized systems didn't really start to appear until the late 1960s and there was very little commercial software that could be used at that time. But the introduction of generalized systems, and subsequently commercial software packages (eg SAS) did start the trend to end user computing. This gave statistical staff much greater flexibility to undertake individual computing tasks without the involvement of IT professionals. Even small systems could be constructed using "end user software".

Partly because of the lack of commercial products, from early days there have been instances of NSOs sharing knowledge of software developments. In some case the software itself was shared and any charges were relatively low. The tabulation system TPL is an early example.

Mainframe computers became more powerful and more manageable but the next quantum leap was with the introduction of PCs in the 1980s. Initially PCs were used in isolation but soon networks were developed to provide much greater connectivity. Most of the more developed NSOs moved to a computing strategy which was based on three tiers - mainframe, mid-range servers (usually Unix based) and personal computers. In many NSOs, mainframes have largely been phased out but there is an increase in the range and size of servers used. PCs have become ubiquitous and in some NSOs exist on virtually every desk top. These changes meant that business processes could be redesigned and many statistical applications could be undertaken in much more effective ways. It was also an incremental change in the degree of control statisticians had over their applications. Laptop computers, graphical user interfaces, and integrated desk top environments are subsequent changes that have improved the productivity of NSOs. Mobile computers are also increasingly being used by field staff for a variety of tasks.

The advent of PCs has also made computing to support statistical activities much more accessible for developing countries.

Data management was becoming recognized as an important parallel aspect to information technology reflecting a growing understanding of value of managing and organizing statistical data. So it was not surprising that many NSOs took an early interest in data warehousing software systems and their application. Its introduction has greatly assisted electronic dissemination. It has also provided a mechanism for consistency across different forms of output whether paper or electronically based. It has certainly helped NSOs provide reliable content to their web sites.

Of course, the internet and the development of web sites has had a fundamental change in the way NSOs go about their dissemination activities. Whilst it has improved the productivity of NSOs, the biggest impact has been on the much improved access now available to official statistics. But it also has some new costs. For example, security has become a much bigger issue.

Returning now to applications of technology, on data collection we have moved away from complete reliance on paper questionnaires to a variety of means of capturing data electronically. CATI and CAPI are the most prevalent. Blaise, developed by Statistics Netherlands, has become a commonly used software tool for data collection activities. E-forms are also being increasingly used in censuses and surveys. In the more immediate future the use of languages such as XBRL to allow computer to computer data transmission will grow in importance especially if a common language and data schema can be agreed between the different bodies seeking data from businesses. Web surveys are likely to become more popular but they do face a number of methodological challenges especially to ensure population coverage is adequate.

The availability of commercial Relational Data Base Systems had the biggest impact on information management. Implementation also highlighted the importance of meta data. Better information management was a pre-requisite for being able to use web technology for effective dissemination of statistics. Section 2.7 discussed the evolution of different media for disseminating statistics. The web is now the main form of access for many users. Web technology is continuing to develop and NSOs should be well positioned to take advantage of this.

On data processing, the most significant change was probably the introduction of generalized systems. Distributed computing has enabled the redesign of processing systems with much more user friendly interfaces. The use of input data warehouse technology is now started to be applied by some NSOs. It facilitates the combination of data from different sources and re-engineering of statistical production processes. Data capture has also changed substantially - from keyboard entry to the use of imaging technology.

Technology has had a big influence on the comparative advantage of NSOs. Technology enabled NSOs to process large statistical collections very efficiently. Other organizations did not have that capability but that is no longer the case. Increasingly, the comparative advantage of NSOs is through a range of tasks related to information management, including improved

coherence across the different data sources, through statistical standards, classifications, meta data standards etc.

Our use of technology has benefited greatly from sharing knowledge. Technology will continue to provide ways of improving efficiency and effectiveness of statistical operations. But it is crucial that there continue to be a sharing of knowledge of relevant technology developments, particularly among Chief Information Officers. This should recognize that NSOs are at different levels of capability. But it is possible for developing countries to learn from the experience of the more developed statistical offices. Affordability can be an issue. The cost of software licenses can be a big problem for many developing countries. Open source software has the potential to provide a solution.

2.11 Response Rates

Response rates in most, but not all, countries have tended to deteriorate. There have been many factors but prominent among them have been negative attitudes to Government, concerns about privacy and the pressures of time on respondents. Also, if non -respondents are not followed through to be persuaded or directed to respond using compulsory powers where available, it can be expected that response rates will continue to deteriorate as those who are selected for surveys realize there will be no penalties if they don't conform.

This has caused NSOs to look at different ways of collecting data to reduce reporting burden. The use of administrative data, particularly taxation data, has been of great assistance when available. Some NSOs do not have access to taxation data. There may be legal constraints but, where taxation data has used, it has been with the support of the business community. Privacy arguments mounted by tax officials may not be supported by the business community when they realize the benefits including reduced compliance cost.

Other ways of reducing reporting burden have been introduced. Particular effort has been put into form design. There are two aspects - (a) obtaining reliable data not subject to reporting bias, and (b) making forms easier to complete by respondents. Cognitive psychology techniques are increasingly being used to understand what is a good form.

As a consequence of lower response rates innovative methods for adjusting for non-response have been developed and applied. But they only go part way towards overcoming the risk of non-response bias. Poor response rates lead to lower quality statistics and higher costs as a consequence of the greater effort involved in obtaining sufficiently large sample sizes so it is important that they be addressed.

As well as trust in the way the NSO operates (e.g. with respect to confidentiality) the perceived usefulness of the statistics it produces can be a big influence on response rates. Effort will need to be devoted to ensure that the way the NSO operates is regarded as trustworthy and means should be found for promoting this through the media and other key stakeholders. Similar efforts will need to be made in conveying messages about the usefulness of official statistics.

2.12 Analysis

Sixty years ago, NSOs published little in the way of data analysis in their publications - they were mostly books of detailed tables. There were some exceptions. For example, some published statistics such as demographic statistics and national accounts required a degree of analysis in their derivation. Things started to change in the 1960s when many NSOs started seasonally adjusting some of their time series. This was not without controversy. There were some who thought it was inappropriate for NSOs to undertake this type of analysis even though it was clearly making time series much easier to interpret.

But it was in the following decade when analysis really started to become a more substantial activity. It came in two directions. First, NSOs undertook the analysis work themselves and, second, there was increasing pressure to support external analysis (sometimes referred to as secondary data analysis) using data collected by NSOs. Within NSOs, the content of publications started changing. Explanatory notes and information on measurement errors, particularly sampling errors, were introduced to aid interpretation. Besides seasonal adjustment, other things were done to assist interpretation such as written descriptions highlighting main findings and the use of graphics. Compendium style publications, that brought together data on a theme from a range of sources, became more common.

Some NSOs set up Analysis groups where their main task was to add value to existing data sources using analysis methods (e.g. model based methods). Statistics Canada and Statistics Norway were two such Offices. Some of this analysis work involved setting up data sets to support modeling, for example, time series data bases to support econometric models for national income forecasting purposes, microsimulation models usually based around household income and expenditure surveys. Model based estimation methods were slowly introduced to support the work of official statistics. Small area estimation became a prominent application of model based methods although relatively little was used as official statistics. Technology, especially the availability of data analysis software, has been an important enabler for much of this work.

Also in more recent years, some surveys have been conducted mainly to support analysis. Longitudinal surveys are the most prominent of these. Often General Social Surveys fall into this category. These surveys have also resulted in pressure to find more innovative ways to support secondary data analysis whilst protecting the confidentiality of respondents. This is discussed more in the following paragraphs.

Going back a few years, demand for data for analysis purposes was largely satisfied by providing special customized tables. Some were very detailed and are now referred to as data cubes. These were only really useful if provided on electronic media so they could be used as an input into the analysis work being undertaken by users. Data sets to support modelling were also released on electronic media mostly magnetic tapes. But soon the pressure developed for access to microdata and several NSOs developed legislation to enable this to happen. The legislation also spelt out the protocols for protecting confidentiality. These changes had a fundamental impact on the use of social data but it took a while for the full potential to be utilized.

The use of microdata has become much more prevalent but some users found the confidentiality restrictions too limiting for some of the work they wanted to undertake. Also access to business microdata was generally not possible under the confidentiality restrictions that applied to microdata. This led to extensions to the way that microdata was released such as data laboratories and remote access facilities. This is a field where further exploratory work is taking place. One such area where there is growing interest is the linking of data using either exact matching techniques (but name and address data is not perfect or up to date so there is always some units that cannot be matched) or statistical matching or record linkage techniques. Links can be in one of two directions or both. Longitudinal links through linking longitudinal surveys, censuses or administrative data over time are important for studying the dynamics of particular situations. But links across data sets can also be important for enriching a data set and allowing more extensive studies of inter-relationships (e.g. the interconnection between different social outcomes). Linking involves important privacy and confidentiality considerations as well as methodological challenges.

Although not as powerful, cohort analysis methods can also be useful for studying longitudinal impacts.

Some NSOs restructured so that not all their statistical staff were organized according to the collection or collections they were responsible for. Some focused on particular areas of subject matter no matter what the data source or whether provided by the NSO or elsewhere. This, among other things, has led to partnerships with external analysts on research projects. Joint publications the result from this work.

The use of NSO data for research and analysis purposes is an overwhelmingly positive development even though it may create a few problems and tensions from time to time. It means the data is being used more extensively and more value is being obtained from the statistical collection effort. Feedback from these users is important and they can often provide valuable insights into data quality. It also results in a new group of supporters for official statistics which can be very important when budgets are being considered.

As to the future, the demand for access to official statistical data for secondary data analysis can only be expected to increase perhaps exponentially especially access to microdata. We have to find innovative ways of satisfying this demand whilst protecting the confidentiality of the data entrusted to us. Whilst this may be difficult we risk losing relevance to many users of official data unless we find ways of meeting the demand. There are other areas where the demand for microdata is not being satisfied. One important area is business microdata. Too many businesses are easy to identify even with a relatively small amount of identifying information. The other is the availability of microdata to international organizations to support national and international studies. Some possible areas of development include

- (i) research collaborations under specific conditions to protect confidentiality,
- (ii) data laboratories including secure arrangements for off-site data laboratories,
- (iii) further development of remote access facilities particularly ways of automatically identifying possible confidentiality breaches.

The international guidelines on Confidentiality and Microdata, being considered by UNSC, should help to develop good practice across countries.

Developing countries usually don't have the capacity to do much of the analysis themselves. They need to rely on others. Sometimes the data analyst resides outside the country. Or data sets might be archived outside the country. It is still important for protocols to be agreed on what is good practice and that the countries. Also changes need to be made so that the NSOs have the opportunity to benefit from this research.

2.13 International Statistics

The move towards a global statistical system first started back in 1947 with the establishment of UNSC and the UN Statistics Division. It has evolved since then, and there are many international agencies providing statistical services with both positive and negative developments. These are elaborated in the following paragraphs.

The UNSC has generally been an effective body since it has first met in 1947. It has reviewed its modus operandi from time to time to ensure it remains effective. It could rightly be regarded as the peak body of the international statistical system although there is scope for improvement as discussed below. Initially its focus was on statistical standards, the dissemination of international statistics and good practice guidance on the emerging field of household surveys. The main fields of endeavour were national accounts, international trade, industry and demography. In the following two decades there was also emphasis on capacity building particularly in the increasing number of developing countries that emerged as a result of decolonization. A number of important documents outlining good practice were published by UNSD during this period. Since then the work of the Commission has expanded into a wider field of statistics influenced to some extent by the various global conferences and summits. In more recent periods it has become involved in quality issues impacting on international statistics, the co-ordination of international statistical effort both from the point of view of identifying gaps and duplication, and the setting up the arrangements for developing statistical methods in emerging fields of statistics. It has also taken a strong interest in the management arrangements and planning for global statistical projects such as the Population Census rounds and the International Comparison Program. Throughout this period it has maintained its position as the peak body for the approval of international statistical standards.

International Data bases have become more prolific. And they are being used to a greater extent both by international agencies and countries. Access to this data has improved particularly since the advent of web sites. Comparisons with other countries often provide a valuable context for evaluating the efficiency of existing policy.

Co-ordination of the work of international agencies is important

- (i) to reduce reporting burden on countries,
- (ii) to avoid duplicated and wasted effort particularly in statistical capacity building,
- (iii) to ensure consistency in the application of statistical standards and concepts across countries,
- (iv) to enable the main gaps in international statistics to be identified, and
- (v) to enable countries to know what is happening so that they can plan accordingly.

There have been some successes, particularly in rationalizing data collection effort to reduce reporting burden in countries (perhaps more so on developed countries) but we are well short of a truly global statistical system. Some of the specialized agencies have little direct dialogue with NSOs and have shown little apparent interest in doing so. UNSC has no influence over these bodies except by cooperation. This makes co-ordination of the statistical effort extremely difficult.

The UNSC has commenced reviews of particular fields of statistics (e.g. services, social, energy, industry, education) and these have been helpful in identifying areas where lack of co-ordination is a problem. But it is probably fair to say there has been little effective change put in place since these reviews were considered. Perhaps that might change over time.

The UNSC has expressed concern about the demise of statistical bodies in the Regional Commissions but it has got worse since then. Only ECE and ECLAC now has an effective body for developing and coordinating statistics in their region. This makes it more difficult to conduct global projects and it is interesting that, in the current ICP round, most of the Regional Commissions did not play a role in its implementation in their region.

The UNSC commissioned a review into MDG indicators which revealed a number of shortcomings with the statistical content of the MDG data base. Specifically, the compilation of the data base to support analysis against MDG goals revealed a number of data weaknesses especially the non-availability of data for many countries (apart from imputations made by international agencies). This is in spite of the considerable effort put into capacity building. But the development of a MDG data base that brings together data from many international agencies is a very positive development.

As to the future, we need to move to a truly global statistical system. Hopefully the pressure from countries for better statistics will result in moves in the right direction. Some of the questions that should be addressed are (1) whether UNSC should be given authority over all statistical standards, (2) whether there is scope for more co-ordination at the country level on statistical capacity building activity and (3) should there be closer links between the UN Statistics Division and its regional counterparts?

The weaknesses in the global statistical system affect both developed and developing countries. But developing countries probably suffer the biggest impact because of their greater reliance on international agencies.

2.14 International Standards

In conjunction with the development of the global statistical system, there has been an increase in the availability of international statistical standards. These serve several purposes

- (a) to facilitate reliable international comparisons,
- (b) to allow the creation of international data bases such as the MDG data base, and

- (c) to avoid NSOs having to do this type of work—their national standards can be based on international standards.

Standards don't just apply to the statistical work of NSOs. Protocols on good practice have been developed in a number of areas including those that outline the way NSOs should work to preserve their reputation for integrity. The Fundamental Principles on Official Statistics are one of the best known protocols.

As outlined above, UNSC work on standards sixty years ago focused on areas such as national accounts, trade, industry statistics (particularly classifications) and demography. Some of the functional Commissions also developed statistical standards. ILO's standard definition for unemployment is one of the better known.

It was soon realized that standards were of little use unless data collection methods were also sound. A number of good practice guides were developed to illustrate good practice. These were helpful to countries implementing new statistical collections.

Standards have continued to be developed or updated. They involve considerable effort, particularly in getting international agreement. But there is considerable interest from countries indicating the value they place on this work. International comparisons are likely to become more frequently used for policy analysis. This strengthens the need for standards and ongoing debates about how standards are implemented. Having a standard is only part of the answer - they still have to be implemented in reasonably consistent way for international comparisons to be valid. One emerging concern is that political considerations, rather than statistical arguments, have too much influence on statistical standards.

This is difficult work so the focus should be on those areas of statistics where comparisons are of greatest interest. International surveys, with standard instruments and methods, properly validated, may play an increasingly important role in international statistics. This is reinforced by the success of surveys such as PISA.

3. Future Challenges for National Statistical Offices

The previous section we discussed trends and implications. This section talks about some of the more important challenges for the immediate future. It is useful to consider both the NSOs role as a statistics provider and as a statistical leader within the National Statistical System.

(a) NSO as a Statistical Provider

The core role will of course be to continue to provide a statistical service that is timely, relevant, responsive and respected for its integrity and quality. The users of this service will continue to expect the most appropriate sets of statistics will be provided and that they will be of a quality fit for their needs. But the mix of needs—in terms of statistical content, level of detail, timeliness, presentation media and form of access—will evolve. Their expectations will be for an improving service particularly as they compare with what is available from other data providers.

A key challenge will be to remain abreast of the changing needs of users and to respond to those needs appropriately.

This is core business and in many respects the most important challenge to meet. But it would be foolhardy to try to accurately predict future changes in statistical requirements over the longer term, but they are likely to be substantial. Maintaining relevance requires strong user engagement. This means arrangements will need to be put in place to ensure there is strong engagement with users and that the NSO is positioned to put in place appropriate follow up actions, some of which may require substantial change. Priority decisions will no doubt need to be made. It is preferable to make these decisions in the context of an overall plan or strategy for statistical development.

Many of the changes that might be expected in the future will pose particular measurement challenges. Producing statistics about a topic involves many facets. For the statistics to be meaningful, in particular, it is necessary to work closely with their users, especially the policy analysts, to better understand the underlying issues. Only then can appropriate statistical frameworks be developed to give context to the statistics and help to make them relatable to others. Such frameworks should not be developed in isolation. Where possible, they should be related to existing international frameworks such as the System of National Accounts. Other national statistical offices are often confronting similar problems. Collaboration with them is important, not just to share knowledge, but to facilitate the comparison of data across countries.

Reliable source data is crucial. Most difficulties with published statistics can be traced to problems with the source data. NSOs will have to give high priority to ensure their source data is reliable. Among other things, when censuses and surveys are involved, this will mean taking the steps required to ensure response rates are an acceptable level. This is also core business.

This involves many things as discussed in Section 2.11. Belief that confidentiality will be maintained is crucial. Studies have shown that reduced confidence in the protection of confidentiality will have significant impacts on response rates. But perceptions of the importance of the work the NSO is fundamental. Response rates will be higher if respondents believe they are contributing to something important. Promotion of the NSO and the importance of its outputs is very important for obtaining good response rates.

There will be also changes in the way data is collected. Until the 1950s most statistics were collected through censuses or from administrative systems such as the Customs system for international trade data or the registration systems to capture births, deaths and marriages data. Sample surveys, introduced midway through the last century, have led to an incredible increase in the amount of statistical information available, particularly on social topics. Whilst sample surveys will continue to be a major source for official statistics, technology developments have meant data from administrative systems are making something of a comeback as a source for statistics. They have always been used extensively in the Scandinavian countries, which have a rich history of registers of various forms. But for administrative data systems to be used successfully for official statistics there has to be a special relationship with the data provider. The

arrangements for NSO access need to be spelled out possibly in legislation or, at a minimum, in an exchange of letters at the most senior levels.

Because of the evolution of computer technology, data from a range of administrative and transactional data bases are now more readily available. In the past the NSO might have been expected to produce official statistics based on those systems. But this is no longer the case - administering agencies are often best placed to compile the statistics themselves but the NSO can provide a useful leadership and support role in several ways. This is discussed further under the statistical leadership heading.

Another method for compiling official statistics is likely to increase in prominence - the use of analytical or model-based methods. A number of innovative statistics have been produced in recent years using these methods particularly to obtain estimates for small areas that are not possible from sample surveys because of the size of sampling errors. These methods can be used to produce statistics that are relevant and responsive to user needs. The challenge is to be able to develop and assess the underlying models to ensure validity, and to describe them and their assumptions clearly so that users understand what is behind the statistics. It is also important to be able to describe data quality in a meaningful way. Subject to these preconditions, there is no reason why analytical methods should not become more prominent in the production of the official statistics for both developed and developing countries.

There are other ways of using analytical methods to enhance the value of existing data sets. What is increasingly possible is the ability to link data sets to make them much richer for statistical purposes. One such example is the linking of successive population censuses to provide a longitudinal data file and a rich source for medical research, lifecycle analysis and so forth. Linkages can also be performed across data sets reflecting the reality that different aspects, whether considering social outcomes or business outcomes, are interconnected. NSOs in some countries have started down this path of using linked data sets for statistical purposes. There are privacy issues that need to be carefully managed. This is one of the challenges. We should not do anything that would threaten the confidentiality of those that provided the data, nor are we allowed to by law. Also, we do not want to go further than what the public regards as reasonable. But the potential benefits are significant, so linked data sets are definitely a development worth pursuing. But they also introduce a number of significant methodology challenges which need to be addressed.

The use of analytical methods in NSOs is still in the experimental stage in many respects just as sampling methods were in the early days of UNSC. Clearly it is more advanced in some offices than others. But a major conference or workshop exploring the role of analytical methods in NSOs would be a worthwhile venture.

One big change in data collection will be the use of the Internet. Over the last 20 years, technology has changed the way in which data is collected and captured. Some of the more prominent developments have been Computer Assisted Telephone Interviewing (CATI), Computer Assisted Personal Interviewing (CAPI) Optical Mark Reading (OMR) and Intelligent Character Recognition (ICR) for data capture. But the big change will be to use the internet for data collection but in statistically robust ways. In respect of households, electronic forms have

been used in some population censuses and surveys. But this is still in its infancy and further changes can be expected over time. More businesses are interested in reporting over the Internet, especially if statistical returns can be automatically extracted from their own accounting systems. Languages based on XML principles make this increasingly feasible. Some national statistical agencies are examining these possibilities aggressively.

Technology has facilitated continued improvement in the quality and efficiency of statistical processing. This will continue to be the case. The challenge will be to take full advantage of the opportunities provided by technology and at the same time use it efficiently. One important step towards improving efficiency may be to move to a single architecture across all computer systems for the collection and processing of statistical collections. Among other benefits this will reduce maintenance costs and make technological change much easier to manage.

There would be benefits in our Chief Information Officers sharing knowledge of developments and potential developments and the recently established CIO Forum would be a good body to do this.

With regard to statistical outputs, it is hard to believe it is only a decade since many NSOs first established their websites. Now, apart from information provided through the media, accessing the website is how most statistical users obtain official statistical data including official publications. This trend will continue with the rapid increase in the demand for data. The internet has provided the means by which the NSOs might be able to satisfy this demand without undue impact on their resources. It also enables 'self-help' facilities which allow users to generate more of their own statistical outputs without relying on the services of NSO staff. Remote access facilities are one way of doing this. For example, registered users could submit statistical processing requests direct to microdata bases. It also enforces a range of confidentiality checks, supported by manual checks and audits. The use of these remote access facilities, and the types of services that are available, will continue to grow and enable much better access to detail for our more sophisticated users. We must meet this challenge to maintain relevance. It will require us to manage confidentiality issues carefully but differently than has been the tradition.

More generally, our sophisticated users are looking for improved access to microdata for research and policy analysis purposes. While NSOs should try to support it, they must continue to ensure that they maintain the trust and confidence of respondents. Without that trust, cooperation in our surveys would be much lower and the quality of the resulting statistics would suffer. This involves finding a continuing balance. While our legislation sets limits on disclosure, it may not always be sensible to go to the limits it allows. Access to microdata is an issue being debated internationally by national statistical offices. The outcome of this debate might provide the base on which countries can develop their own practices.

Statistical users are also looking for increasing detail (but not Microdata) to support regional analysis, industry studies and the like.

Again, NSOs could learn a lot from developments in each other Offices particularly if our software environments are similar. But it is also necessary to continually review the potential for

new technology. Strategically we should build our systems so that they can be relatively easily updated as technology evolves.

Increasingly, we find that users want to compare statistics for their country with those of other countries, to provide a context for national figures. Inter-country differences can often be very illuminating in evaluating the effectiveness of current policy or for assessing alternative policy options. International comparability of economic statistics is relatively well developed. Moves are now afoot to do more for the comparability of social statistics. The approach may be different - international surveys are likely to be a key source of internationally comparable data for social statistics.

NSOs play a vital role in both democracies and other forms of government - not just because they provide information which provides a mirror on society - but because that information is trusted as it is independent and authoritative. A challenge for NSOs will be to maintain trust. It can be easily eroded. Inappropriate behaviour or an inappropriate response to pressures from the Government or elsewhere can lead to a loss of public trust. Loss of confidence in the quality or integrity of data can also lead to loss of public trust. There will be incidents—they cannot be avoided given the large number of activities in which NSOs are typically involved. But the management of those incidents is of crucial importance.

Where trust exists it has proven important to governments as well. Discussions can then focus on what the statistics mean for policy rather than on the integrity of the statistics themselves. If we don't have trust, we risk becoming just another information provider and losing relevance, particularly countries where that capacity exists elsewhere. So maintaining trust, or rebuilding trust where there are problems, are among the most important future activities of the NSO.

The last but possibly most important challenge is to ensure NSOs have the skills to do the work. This is not straightforward. A high proportion of NSO staff should have strong conceptual, analytical and technical skills. Staff with these skills are in high demand elsewhere so recruitment can be difficult. This is particularly the case for developing countries where the pay discrepancy between what is offered by a NSO and what is available elsewhere can be quite large. Despite such difficulties, recruitment and training are extremely important activities

(b) The NSO as a Statistical Leader

Most NSOs have a responsibility for the coordination of official statistics across government agencies. But it has not been done well by most NSOs. Not surprisingly, this has become most apparent at the same time as the amount of statistical activity outside the NSO has increased.

Why should the NSO take a leadership role in the development of national statistics?

- Government agencies increasingly need to work in a "connected" way. This will only happen if they are prepared to share information, including statistical information which can be easily accessed.

- It is important that this information can be related—that is, we are using the same concepts and definitions to the extent possible. This requires leadership on standards and classifications, a role which the NSOs should be well suited to play.
- It is important that the range of statistics be of good quality—sound statistical methods should be used. Again the NSO has a constructive role to play.

What is meant by statistical leadership? Some of the possible activities are described in section 2.5. It is also important to maintain active networks among the key personnel involved in statistical activities through newsletters, seminars, social gatherings, etc.

Statistical centres of expertise for particular subject matters that have good knowledge of all statistics produced in particular fields, not just those produced by the NSO might be another way of providing greater statistical leadership. For example, a statistical centre for agriculture would be familiar with agriculture statistics produced by the NSO, the Ministry for Agriculture, and research institutes involved in agriculture. The statistical centre should also be interested in links with other fields of statistics (e.g. agriculture and the environment, agriculture and the household sector). One of their important activities would be the production of Information Development Plans, in collaboration with key stakeholders, that describe the availability of existing statistics, the major gaps in these statistics or the major improvements required, and a plan for further development in the field of statistics.

There are other ways of showing statistical leadership. Examples are Australian Bureau of Statistics' (ABS) National Data Network initiative or the US Census Bureau's Data Ferret initiative. The ABS Network will create a distributed library of data holdings relevant to policy analysis and research. These data holdings will remain held and controlled by their custodian organizations. Whilst data will be held by each custodian, the National Data Network will provide a complete catalogue of available data sources to allow users to easily search for, and access data holdings which have been published. In effect, it will provide a portal to official statistics. The National Data Network also provides access to a range of services to support the creation, management, integration and analysis of data.

Statistical leadership work is particularly challenging because it is different and requires the support of other agencies where statistics is often not part of their core business. Part of the challenge will be to work towards agreed arrangements for co-ordination across the National Statistical System. These will work much more effectively if they have the support of government.

4. Challenges for the Global Statistical System

Given the growing importance of international comparability, it is arguable whether the global statistical system is sufficiently well set up to make all the improvements required in the future. The OECD provides an excellent range of comparable data for member countries (and increasingly other large countries). The United Nations Statistical Office also produces useful

data on international trade, population and Millennium Development Goals. Other international data sets exist. But the demand will be for even more international data bases.

The mechanisms for setting new international standards for economic statistics have provided some good outcomes although the processes involved can be quite expensive. But implementation of these standards can provide a problem for many countries. The slow implementation of SNA 93 is a good example.

Another important role of the international statistical system is statistical capacity building. There is considerable effort going into this but the outcomes are very mixed. Co-ordination of effort within countries, and alignment with national priorities could be improved. It will be a challenge to provide this cohesion whilst respecting the core responsibilities of the international agencies.

There are other problems. There is a lack of co-ordination in the dissemination of statistical outputs. The establishment of the MDG data base was a step in the right direction but it also highlighted weaknesses in the content of the data base. A federated system appears to be the most likely solution but it does require agreement on standards (e.g. meta data).

There are some who doubt the ability of the global statistical system in its current state to play a more expansionary role.

“In my view the international scene is not in good shape at the moment and would not be capable of facing such challenges, being at its best chaotic and at its worst very ineffective.”

“Unfortunately the statisticians of the countries of the world have not played an important enough role in the management and development of international statistics policy.”

Bill McLennan (former Chairman of UNSC and Australian Statistician), ‘The development of official statistics in Australia, and some possible future challenges’, Year Book Australia, 2001.

There have been some changes and improvements since then but there is still scope for a lot more to be done. Changes will be needed in the future if the global statistical system is to be as effective as it needs to be. The national statistical offices have always cooperated with each other and with international bodies in the development of frameworks, standards and systems. There are signs of increasing cooperation, or at least information sharing, among the international agencies but some tensions remain within the UN family.

Member countries individually and through the United Nations Statistical Commission need to play a leadership role in the management and development of international statistical policy and practice. This is the key message in the McLennan quote. And when countries have voiced their concern at UNSC there has often been a satisfactory response from the international agencies. Some recent examples include the governance arrangements for the 2005 round of the

International Comparison Program, upgrading the quality of the Human Development Report and concerns about MDG indicators.

Recent recommendations on UN reform point out more generally the problems with duplication, lack of cohesion and operational effectiveness in the UN system. These also apply to the global statistical system despite recent improvements. The scope of UNSC is limited. Although its role includes the co-ordination of the statistical work of UN specialized agencies such as FAO, ILO, WHO and UNESCO it has no real authority except by co-operation. Sometimes that is forthcoming, sometimes it is not. But they are important players in the global statistical system.

There are many improvements possible in the global statistical system. The most desirable changes could be identified relatively easily by those statisticians who are familiar with the system. The challenge will be to get real commitment to making the necessary changes consistent with the "One UN" philosophy.

5. Concluding Remarks

NSOs will continue to evolve as they have over the last 60 years. They must if they are to provide a relevant and high quality national statistical service. They must if they are to be regarded as productive and well managed. User engagement is crucial to this and this requires NSOs to be able to respond in appropriate ways to the key messages they receive. One message they will hear will be improved availability and access to detailed data. This is a challenge because of there may be tensions between improving access and managing confidentiality. Maintaining good relationships with data providers, whether survey respondents or custodians of administrative data, will also be crucial as will the relationship with others who contribute to the national statistical system.

Among the key drivers for evolution will be the opportunities provided by developments in technology and the application of statistical methods. The benefits don't flow automatically. Developments have to be carefully managed and well resourced. They also require staff with the skills to undertake and implement these developments.

The global statistical system also needs to evolve to meet both current and future challenges. Many of the elements that are important to NSOs are also important to the international agencies. These include user engagement to ensure relevance and good relationships with data providers. Member countries are both important users and data providers. More than anything member countries need to provide strong direction on the improvements that need to be made to have a better performing global statistical system.