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Item 4 of the provisional agenda
The next generation of statisticians and data scientists

Seminar on the next generation of statisticians and data scientists

Prepared by the Session Organizers (Finland and Eurostat)

1. The CES plenary session discussed the skills and capabilities needed to address the challenges arising from the new data-driven world where statistics should be better integrated to support policy and decision making. The seminar used twitter to engage with participants and supplement the panel discussions.

2. The key outcomes of the seminar were:

(a) In order to remain competitive and credible as the official data providers statistical organizations are required to significantly invest in modern statistical skills. The data revolution generates new user needs, and stiffer competition from the private sector;

(b) Advances in the statistical tools for (big) data analysis have allowed increased value to be added to data. The value added can be related to timeliness, improved precision, and coverage of "old" statistical output (economics, business, etc.), but also to new indicators;

(c) The combination of administrative, survey, geospatial, and new (big) data sources can add significant value, when successfully incorporated into statistics production systems;

(d) Statistical organizations adopting Big Data should critically assess the reliability and usefulness of the new data sources and applied methodology. Particularly, issues related to collection and management of big data for official statistics, big data privacy and protection, increasing data accessibility but maintaining privacy and confidentiality need to be addressed;

(e) Successfully developing the next generation of official statisticians will be one of the most critical objectives for the coming years;

(f) The skills that are impacted most by the emergence of new data sources are (i) statistical skills, (ii) IT (management) and (iii) other skills, including leadership, creativity and communication;

(g) These new skills will not be found on just one staff member. Statistical organizations should consider building and maintaining collaborative and multidisciplinary data science teams. Data scientists are able to understand the relevant applied mathematical and statistical tools, have programming skills and data storage know-how, domain knowledge and soft skills related to collaboration and team work, and also possess the ability to communicate and visualize data compellingly;

(h) Statistical organizations can benefit from the network of peers by sharing best practices. The UNECE High-Level Group for the Modernisation of Official Statistics (HLG-MOS) proposed a common competency framework of skill development that serves as a blueprint for all the statistical organizations looking to develop the data science toolbox;

(i) There are important examples of collaboration with the higher education institutions that could be emulated elsewhere. Some universities have masters programs in official statistics, and tight links to the statistical organizations;

(j) Universities are increasingly offering data science and business analytics programs. Statistical organizations can benefit from close collaboration with these study programs and can provide employment opportunities (internships, and other forms of practical training) for the students at different levels;

(k) Talented new graduates are interested in self-development, learning opportunities, fully utilizing their potential, and the societal impact they may have. Statistical organizations can stress these points when recruiting and attracting data scientists;

(l) Statistical organizations can communicate the importance of statistics in the “post-truth” era;

(m) Statistical organizations can pay particular attention to user needs that have evolved by the increased sophistication of data users. There is a demand for statistical output that are based on elaborate models and big data, if the corresponding statistical uncertainty is appropriately reported;

(n) The sophisticated user can be allowed to challenge common practices in statistical organizations, by allowing access to databases and codes that are used in the statistics production process. For instance, as a part of a scientific research project.

3. This conference has progressed towards that goal by delineating the necessary skills in order to produce high-quality statistics in the future, and discussed how statistical organizations can acquire, develop and maintain them. In particular, statistical institutions are encouraged to work more closely together, invest in key priority areas, and develop stronger links to educational institutions to ensure that the needed skills are available.

4. Further work in this area could include:

(a) Sharing country experiences in how to create an innovative culture where experimental activities are encouraged and rewarded;

(b) Investigating how capacity in new competencies (including soft skills) can be built in statistical organizations. A particularly useful avenue can be to build teams with both soft and hard skills. Even though the technical abilities will be increasingly important with the data revolution, the subject matter expertise should always be a core competence in a successful team;

(c) Sharing experiences in how to actively seek partnerships and other types of collaboration with the academic community, other government agencies, and private sector. Especially examples of partnerships that have supplied the needed skills for statistical organizations;

(d) Exploring possibilities of how statistical organizations can develop a reputation of being an attractive workplace for talented individuals;

(e) Strengthening the collaboration with universities by making formal high-level agreements;

(f) Statistical organizations can propose educational programs that directly serve the needs of official statistics. These programs could include the relevant data science courses;

(g) Engaging students at different stages of their training by providing internships, organizing hackathons and other opportunities to use data.

Contents

1. Introduction

A. Why these recommendations?

1. Official statistics have had an enviable track record over the last few decades. Furthermore, in an information age, the provision of reliable and high quality data and information by national statistical offices (NSOs) and other producers of official statistics around the world is increasingly important to our economies and societies. But this is absolutely not a license to be satisfied without making further effort. In particular, we need to recognise the implications of technological and other developments, which represent both opportunities and threats:

- Producers of official statistics are by no means the sole supplier of information. Indeed, the world is awash with data. There is a growing confusion between official statistics and less reliable data. This may give more weight to opinions and impressions. Official statistics need to stand out as a trustworthy source of information. This is also crucial for persuading respondents about the importance of replying to statistical surveys.
- Tightening budgets and proper public accountability have increased the pressure on NSOs to demonstrate how effectively they use public funds to meet the needs for statistical information.
- Technological advances have powered the Digital and Data Revolutions. These raise legitimate questions about how effectively NSOs are using these new possibilities to expand the benefits they provide to our societies.
- The challenge presented by Big Data. Every day, 2.5 quintillion bytes of data are created – so much that 90 per cent of the data in the world today have been created in the last two years.[1] Proper exploitation and correct analysis of the data is the key success factor in being able to make better decisions.[2]
- Demand for statistics is rapidly increasing. An increasingly globalized and interconnected world creates new needs for accurate information about economies and societies. As just one example, reporting on progress towards the 2030 Agenda on Sustainable Development will require hundreds of indicators to be produced in many new partnerships. These indicators should be measured fully respecting the Fundamental Principles of Official Statistics and human rights.
- Users' needs are becoming more complex and individualized, and more detailed information is needed for instance on small population groups and geographic localities. Just as in other areas, the public legitimately demands that their needs for information can be met conveniently and easily, and asks for more tailored products that are easy to use.

2. It is not over-dramatic to conclude that official statistics are at a crossroads. Responding to these developments will require modernisation of statistical work and its legal and institutional frameworks. There are opportunities presented by these developments, which if they are wise, official statisticians will take in order to build on previous successes. But there are also threats. Failure to recognise these or to react to them with complacency could have the most serious consequences. At

[1] "Apply new analytics tools to reveal new opportunities," IBM Smarter Planet website, Business Analytics page www.ibm.com/smarterpl/us/en/business_analytics/article/it_businees_intelligence.html

[2] "Performance and Capacity Implications for Big Data", IBM Redpaper, International Technical Support Organization, ibm.com/redbooks

worst, official statistics could find itself partly or largely replaced by other information and data providers.

B. Work process

3. In April 2014, the Conference of European Statisticians (CES) held a seminar "What is the value of official statistics and how do we communicate that value?". The Conference stated that the value of official statistics should be promoted as a global asset. The Conference called for joint actions at the international level to develop a common language and terminology related to the value of official statistics and to measure the economic value of official statistics through the collection of case studies.

4. To advance this agenda, the CES Bureau asked a group of interested countries and organizations to develop a road map to explore the key aspects to be covered in further work on the value of official statistics. Such a road map was prepared by a group composed of the United Kingdom (chair), Austria, Canada, Mexico, OECD and UNECE.

5. In consequence, the CES Bureau established a Task Force on the Value of Official Statistics in March 2015 composed of experts from the United Kingdom (chair), Mexico (vice chair), Canada, Ireland, New Zealand, Switzerland, Turkey, Eurostat, the Organisation for Economic Co-operation and Development (OECD) and the Partnership in Statistics for Development in the 21st Century (PARIS21). UNECE acted as the Secretariat, and the World Bank contributed to the work in substance. By virtue of its terms of reference, the Task Force's objective was to define what users, stakeholders and society value in official statistics, and develop ways to measure this value for better understanding and communication to society.

6. In October 2015, the Task Force carried out a survey of NSOs, jointly with the UNECE High-Level Group (HLG) Modernisation Committee on Products and Sources, to collate good and innovative practices which improved the relevance of official statistics, measured their value or persuasively advocated the value of investing in official statistics. Where respondents were happy to have such information shared, this Report mentions some examples. More examples are presented in the wiki on best practices in the value of official statistics.

7. The Interim Recommendations on the value of official statistics were discussed by the CES Bureau in February 2016 and by the CES plenary session in April 2016. The Interim Recommendations were circulated for electronic consultation to all CES members, and this final Report takes into account all the feedback received.

8. The Bureau reviewed the Recommendations in February 2017, and asked the Secretariat to submit them to all CES members for a final electronic consultation. In view of the high support received, the Recommendations are presented to the 2017 plenary session of the Conference of European Statisticians for endorsement.

C. The recommendations in brief

9. Based on its work over the last two years, looking at what has worked in other industries and sectors as well as in official statistics, the Task Force has made a number of recommendations appropriate to these circumstances. These are set out in full in Chapter 6. In summary, they are as follows:

1) We should exploit the comparative advantage of official statistics (the cornerstone of

statistical work): Official statistics are produced in professional independence based on scientific methods, rigorous quality criteria, including relevance, and the Fundamental Principles of Official Statistics. Upholding these principles is essential to any country seeking to understand itself and respect the rights of its people. This has numerous ramifications but we should exploit the "unique selling point" for official statistics.

2) We can improve the value of statistics by putting users of statistics truly at the centre: However expertly and professionally produced, official statistical products are of no use unless they meet someone's needs. That requires understanding users (and non-users who are potential users) and their information needs. It also means recognizing that these needs will not stand still and will change over time.

3) Statistics need to be designed for everyday life: Design is crucial for official statistics, no less than for other sectors. This is not just about logos or graphics but fundamentally about providing products and services that meet the needs of our users. Different users have different needs and statistical production should recognize this. A recurrent theme is that often users no longer want just the numbers but also the story that goes with them and their implications.

4) Statisticians need to innovate to remain valuable. The world is not standing still – anything but. Requirements made of NSOs are changing and growing. Technologically, so too are the means to satisfy these needs. Investment in innovation is therefore indispensable.

5) We can go further with the right strategic partners. NSOs are experienced in working in partnership with others. But historically, our range of partners has sometimes been limited. We should seek out new partnerships whenever these can offer strategic value. New forms of partnership internationally and with the private sector involving new technologies and design, new products and new dissemination channels all offer ways of tapping hitherto unexploited potential.

6) Building the official statistics brand and gaining visibility would take us further. Excessive modesty about official statistics is dangerous. We can realize the potential value of what we produce only if users recognize what we have to offer and turn to us to meet their needs. Official statistics have a strong comparative advantage, its unique selling point noted above. Explicit brand recognition and promotion strategies for each NSO would advertise our strengths.

7) By measuring outcomes, the results of using official statistics, we can achieve a greater impact. The judge and jury on the value of official statistics is whether our outputs lead to better outcomes for our economies and societies – that they lead to decisions by governments, companies or people which are better informed and well based. All of the previous recommendations are designed to help achieve this end. But, to date, statisticians have not been good at assessing and measuring such impact. This has hampered our ability to promote the value of official statistics. This includes the need to:

    - Take steps to improve our knowledge of what our statistics are used for, and the impact that they can have. Share good examples of uses of statistics and the positive outcomes to the public.
    - Measure the value of official statistics with a dashboard of indicators and a regular user survey.

- Develop approaches to calculate monetary values of official statistics. This report describes the most frequently applied methodologies to monetize the value added of official statistics. By gaining more experience, these methodologies can be refined, and more examples and evidence of the value of official statistics can be collected. Monetary measures of the value of certain statistic or statistics in general can provide a convincing case for defending official statistics.

8) We need to share and learn and stay abreast of best practices across the statistical community. The threats and opportunities facing official statistics are constantly changing. However successful we have been in the past, the future can be assured only by actively responding to these changing circumstances. The Task Force was struck in the course of its work by how many existing good practices could be identified in individual NSOs or in other industries but which were not widely known. It, therefore, oversaw the construction of a wiki on best practices of statistical offices in value creation, measurement and promotion. The Task Force recommends the wiki should be maintained and actively used.

D. Blueprint for the way forward

10. These Recommendations can be only the start of ongoing action. As an aid to helping take forward that ongoing action, and in the light of the CES's reaction to the Interim Recommendations on the value of official statistics last year, the Task Force has produced several "co-products" to go with the final report. These are:

- A wiki for the sharing of best practices among statistical offices in value creation, measurement and promotion: www1.unece.org/stat/platform/x/FQRXBw (See recommendation 8).
- A generic user survey with potential questions for reviewing the subjective value of official statistics as perceived by users of statistics (See recommendation 7 and Annex 3).
- A note setting out various useful information and arguments to act as a quarry from which to construct presentations for particular uses and stakeholders, as required, to demonstrate the value of official statistics and to argue for increased investment. (See Annex 2).
- A shorter version – not much than a page – derived from this material, representing "key facts" to persuade interlocutors of the value of investing in official statistics. (See Annex 1).

11. More specifically, the Task Force makes the following proposals to take the agenda forward with the impetus it warrants:

- All NSOs should take forward the agenda defined by the recommendations. NSOs will, of course, be at different points on the various dimensions of the recommendations.
- UNECE should host and maintain the best practices wiki that the Task Force has created. NSOs should supply their own relevant material to the wiki updated in the light of experience in taking the work programme forward.
- The updating of the wiki should be accompanied by a UNECE meeting of relevant experts. The meeting would review progress with the overall agenda and consider whether the recommendations needed amending or updating in the light of experience. This could be linked to the work of existing expert groups under the Conference of European Statisticians.

- The work to generate better information on measurement of the value of official statistics is both urgent and where the statistics community generally starts from a low base. "Pathfinder" NSOs should, therefore, undertake work in line with the proposals in Chapter 5 to share their experiences with the rest of the statistical community.
- In part, the UNECE wiki could provide the means of sharing. But this mechanism could be enhanced by organizing meetings to discuss and share experiences. NSOs could also be encouraged to host or co-host these events to help overall progress.

E. Structure of the report

12. Chapter 2 of the Recommendations discusses the nature of the value added that NSOs are seeking to generate. It notes that genuine value implies products being of use to those that consume them, in particular for purposes of informing evidence based decision making – not only in the public sector but across user segments also for informing commercial and household decisions, as well as the academia and social sector. It also notes that changing circumstances means that what is of value also changes. So, NSOs need constantly to review and renew what they offer to ensure the added value is maintained.

13. Chapter 3 portraits the current practices of NSOs and other industries in generating, promoting and measuring the value. It identifies the United Nations Fundamental Principles of Official Statistics as the cornerstone of what we do. Adherence to these, if properly implemented and supported by statistical legislation, should guarantee the quality and reliability of our outputs and independence of any policy or other interests, in distinction to most other information providers. This is a strong comparative advantage which should be promoted more assertively. The Chapter uses the results of the UNECE survey carried out in October 2015 to portray NSOs' current practices. The Chapter also looks at the practices of a selection of other organizations and industries, which also have the potential for adoption by NSOs. The analysis of practices in other industries turned out to be very useful for cross-fertilizing with the practices of NSOs.

14. Chapter 4 surveys and discusses partnerships that NSOs have set up or are engaged in. Some 57 such partnerships are analysed in 25 different countries. There is plenty of scope for mutual learning. There appear to be areas where the potential for gain has not yet been fully exploited: (1) building of shared production systems and frameworks between NSOs; (2) greater attention in assistance to developing countries to support the value of official statistics; (3) stronger partnerships to maximise the gains from administrative and other new data sources; and (4) the largely untapped potential for collaboration with the private and commercial sectors, not least in creating new products.

15. Statisticians measure almost every aspect of society, but not their own value added. Chapter 5 considers how to measure the value of official statistics and identifies three parts of a measurement framework with indicators on the value of official statistics consisting of: (1) observable indicators, (2) subjective indicators from surveys and (3) experiments to monetize the value of official statistics. The Chapter makes recommendations on how to get started with the measurement task.

16. Chapter 6 sets out some recommended actions for promoting and increasing the value of official statistics for NSOs. It recognises, however, that in a changing world, a single snapshot would quickly lose relevance. The Task Force has, therefore, established a wiki platform to give NSOs the ability to share their good practices and experiences for mutual learning. The wiki

provides concrete examples of each recommendation to showcase how to increase, promote and measure the value of official statistics.

17. Chapter 7 draws some conclusions, and makes proposals for next steps.

2. The current position

A. What is value?

18. Value is a central but sometimes slippery concept for any business or service. The Oxford English Dictionary defines value as "the importance, worth, or usefulness of something". It may have a material or monetary dimension: how much could be charged for the particular output or service. But, for a public organisation in particular, it is also likely to have a wider component – the value that the organisation contributes to society, regardless of whether all of its contribution could or should have a price tag.

19. There is also a dynamic element insofar as an output or service is rarely timelessly of intrinsic value. Value often depends on changing circumstances and needs. Oil lamps lost value after the advent of gas and then electric lighting, as did steam power when more efficient means of propulsion became available. Putting this in another way, and in the context of official statistics, value has to be assessed and re-built continuously.

20. Quality of statistics is one of the key features of data that influences the value that users experience. Quality could be seen as "fitness for use" which includes many dimensions, such as relevance, accuracy, timeliness, accessibility, comparability and coherence. Quality is by no means a monopoly of official statistics. Private data providers may even be able to provide users with some better quality features, for instance better timeliness. But it is undoubtedly true that the value offered by official statistics is supported by their legal and institutional framework that ensures the compilation of objective and independent statistics that are not subject to inappropriate influence.

21. In less abstract terms, one of the strongest motivations for producing data and information is its usefulness in evidence based decision making. Relevant statistics fulfil one or several of the following characteristics: they have many users, are essential to the fulfilment of the mandates of several organizations, facilitate trade or development, their release causes reactions at the markets and their unavailability creates inequities or asymmetric information.

22. When resources are limited and choices need to be made as to how they should best be deployed to maximum effect, reliable evidence is at a premium. This applies whether it is a governmental decision at local, national or international level, a business decision or a personal decision that is at stake. Conversely, official statistics are arguably of little value in themselves unless they help the making of well-based decisions. Or, in convenient summary:

23. **Data are the lifeblood of decision-making and the raw material for accountability. Without high-quality data providing the right information on the right things at the right time; designing, monitoring and evaluating effective policies becomes almost impossible.[3] So, too, does the ability of businesses and people to make well-based decisions. As the volumes of available data increase, quality should become the decisive factor when choosing a data source.**

B. Who are the users of official statistics?

24. Statistics are produced to be used and to make an impact on society through a higher degree of openness and transparency, avoiding misuse of data, ensuring confidentiality and equal access to information as part of human rights. The result of using official statistics should be a

[3] A World that Counts: www.undatarevolution.org/report/

society with more empowered people, better policies, more effective and accountable decision making, greater participation and stronger democratic mechanisms.

25. Statistics need to be developed with users in mind. User needs differ depending on circumstances. Some users will not express their data needs[4], and some requests could be mal-intentioned. Statistical offices have a responsibility to consider the relevance of statistics to society and to the rights of its members. It may be useful to identify user segments so that it becomes possible to develop products and services that meet specific user needs better. Users may be classified into different groups. Some NSOs have established user segments or personas to improve customer service.

26. Similarly, the European Statistical Advisory Committee (ESAC) has noted the importance of identifying different types of users of statistics, understanding their needs and creating a strong communication strategy. ESAC classifies users into institutional users, such as international organizations, agreements or initiatives, and non-institutional users. Non-institutional users are further divided into subgroups according to their interest in statistics.

27. Based on this work, the Task Force suggested a segmentation of users (see figure 1) as a basis for constructing well-based production and communication of statistics to meet different groups' needs. Figure 1 describes how detailed or aggregated the data needs of different groups are. It generalizes the user segments for illustrative purposes: the wider the box for the user segment, the more detailed are the data needs of those users. The Task Force identified the following user segments:

1) Users with a general interest (e.g. economic growth)
- Citizens
- Media and journalists
- Students and teachers

2) Users with a pre-defined/structured interest (e.g. certain set of indicators)
- International policies and monitoring frameworks
- International organizations

3) Users with a specific subject/domain interest (e.g. health)
- Decision makers
- Policy makers and analysts
- Marketing analysts
- Experts in a specific field
- Private businesses
- NGOs and associations

4) Users with a reuse and reproduction interest (e.g. other statistics or products)
- Other producers of official statistics
- Private or government organizations providing information services/products
- Other providers of information services (e.g. App builders)

5) Users with a research interest (e.g. innovation in enterprises)
- Scientific community – academics and researchers

[4] See for instance: Convention on the Rights of Persons with Disabilities, www.ohchr.org/EN/HRBodies/CRPD/Pages/ConventionRightsPersonsWithDisabilities.aspx

- Consultants and researchers in the government or private sector

Figure 1. Users of official statistics and their data needs

28. Users can be also classified into heavy users, light or occasional users and non-users. Non-users merit explicit attention. Non-users of official statistics may not have any needs that official statistics could meet. But it is equally possible that the situation arises from lack of available statistics which would meet legitimate needs and requirements or from user ignorance as to statistics that are available and would have value for non-users. Either way, NSOs would be well advised to develop an understanding about non-use and to act accordingly.

29. It is also of interest as to how different user segments value statistics, and what possibly influences their views. Some statistical offices have collected examples of the uses of statistics by different user groups and showcase them on the NSO's website. The next two sections will look at these issues.

C. What surveys show about users' views?

30. Overall, official statistics currently retain pleasingly high appreciation. The Task Force received 49 replies[5] to its survey in October 2015. Two thirds of NSOs who responded reported that the citations of their statistics have been increasing, and only 3 offices record a decreasing trend. While user confidence is often already at a high level, more than half of NSOs nevertheless reported that the trend is rising further (the rest do not have the information available). Two thirds reported that the importance of their statistics among users is increasing, while the other third does not have information on this parameter.

31. This is, though, a story at aggregate level. Getting below the surface points to further issues: some positive, some neutral and some more doubtful.

[5] The following countries and organizations responded: Armenia, Azerbaijan, Belarus, Bosnia and Herzegovina, Bulgaria, Canada, Chile, Colombia, Croatia, Estonia, Finland, Georgia, Greece, Hungary, Iceland, Ireland, Israel, Italy, Japan, Kazakhstan, Kyrgyzstan, Latvia, Lithuania, Luxembourg, Mexico, Moldova, Netherlands, New Zealand, Norway, Poland, Portugal, Romania, Russian Federation, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Tajikistan, Turkey, Ukraine, United Kingdom, United States Energy Information Administration, United States Social Security Administration, United States Bureau of Labor Statistics and CIS-STAT, Eurostat and ESCAP.

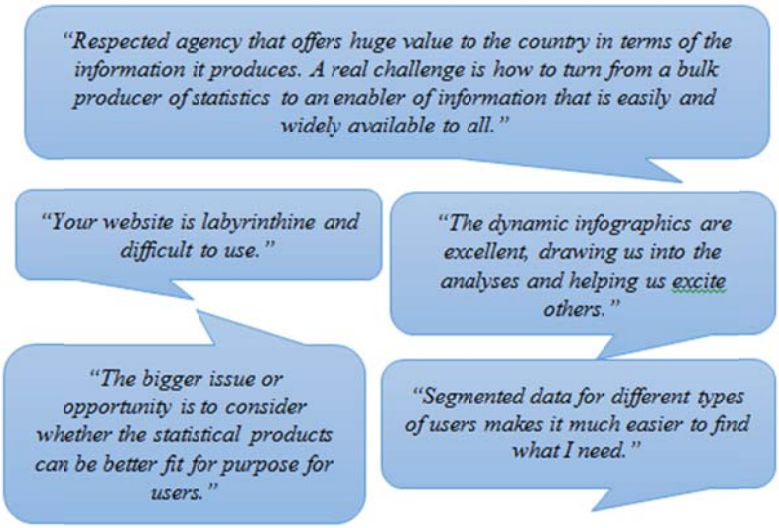
32. Based on individual countries' user surveys, on the credit side of the balance sheet:

- **More frequent users** seem to value statistics more highly. A gradual trend of an increasing proportion of less frequent and first time users can be seen.
- **Users who trust** official statistics most also seem to value them most highly. For example, in **New Zealand** 92 per cent of those who completely trust official statistics are satisfied, and 85 per cent of those who feel statistics are completely free of political interference are satisfied with official statistics. In **Mexico**, 90 per cent of the population that have used official statistics in their activities, believe it to be essential for sound decision making.

33. At the same time, less positively, user surveys show that:

- Users who were **not satisfied with timeliness were less satisfied** with the overall quality of statistics.
- Users see **increasing data sharing as an opportunity** to create value, but an opportunity that is not always taken.
- The number of users who are **looking for simple and quick answers** is growing. These users tend to apply the logic of web search instead of being prepared to spend more time to browse through large data tables or to look in traditionally printed publications. On average, **50 per cent of users report that it is not easy to find statistics**.
- Users of international databases emphasize the importance of **international comparability**, often wishing that this was improved.
- Business **users and decision makers** tend to value and trust official statistics less than government users.
- Users are asking more frequently about the **status of statistics provided**. They do not exactly know what "official statistics" entails in terms of sources, methods, reliability, comparability, etc., and often do not know how to obtain this information.
- Users are increasingly **looking for stories and context to the figures**, whereas often they are just presented with statistics in vacuum.

34. Some of these points are illustrated by various quotes within the feedback received.



35. **All in all, the conclusion is that official statistics start from a good base and that the overall trends are still favourable. Nevertheless, there are warning signs that we would ignore at our peril.**

D. Official statistics and decision making

36. The UNECE survey collected cases on the value of official statistics for decision making from NSOs. The responses showed a remarkably wide range of decisions that were assisted by official statistics. Some of the uses of official statistics for decision making included: calculations of minimum wage, fuel surcharges, policies and strategies to reduce poverty and unemployment, population and labour force forecasts, property prices and the rental market analysis, regional development and city planning, union negotiations, transport infrastructure, education infrastructure, subsidies, quotas, government representation and electoral boundaries, health services, immigration, trade, quality of life comparisons, interest rates, budgets and finance, local, national and international strategic planning and development, crisis management and investment.

37. Furthermore, the survey suggested that where NSOs monitored the use and value placed on their statistics, there were positive trends. There were improving trends both in media citations and also in feedback about the trust and usefulness of official statistics.

38. There were also plenty of concrete examples as to where official statistics were supporting and enabling good decision making throughout societies. Case study material from **Ireland**, **Finland** and the **United Kingdom**, and from many other countries, have been collected into a wiki of best practices.

39. At the same time, there was **considerable evidence of misuse, lack of use or misunderstanding of official statistics**. The harmonized index of consumer prices (HICP) was misunderstood adjusting rent on property (**Hungary**), immigration statistics were misused in an election campaign (**Switzerland**), the public perception of immigration did not match with the information available (**Italy**) and the purported "vanishing advantage of a university degree"

(**Canada**). All of these examples point to a lack of statistical literacy or at least a lack of knowledge as to what relevant and potentially useful statistics were available.[6]

40. At the least, this suggests that **NSOs would be unwise to be satisfied without making further effort**. There is clearly more to do to improve public debate and decision making and the contribution of data and official statistics to supporting them. One lesson seems to be that NSOs need to move increasingly beyond just producing statistics but also to set those statistics in context and to bring out the implications and the story that those statistics tell.

41. While we live in an information age where provision of information is at a premium, there is no pre-ordained reason why NSOs alone can provide that information. Potential users will take the information from *any* provider if it is perceived to have value in the terms described in previous sections. Certainly, official statisticians have considerable comparative advantage but competing information providers have advantages, too. Sometimes, they will have resources available to them that dwarf those available to most NSOs.

[6] Janssen and Forbes (2014) further illustrate this point in their paper on "The Use of Official Statistics in Evidence Based Policy Making in New Zealand"

3. Existing practices to generate, promote and measure value

42. As discussed earlier, official statisticians should be able to learn not only from good and productive practices in other NSOs but also from other industries. While it is true NSOs generally have no "bottom line" to guide and motivate their approach, commercial concerns can generally also expect to make sustained profits only if they are perceived to add value. Generating value is therefore a common objective.

A. Current practices in statistical offices

1. Generating value

43. The previous section looked at what value means to users of statistics, so that NSOs can generate value. NSOs need to consider the capabilities they have, such as the organization, people, processes and technology, to improve the value of statistics. Often we talk about technology, and also more and more often about standardization of processes, but less often about the role of staff. Yet, human resources are the key to generating value in statistical offices. Now NSOs are increasingly considering how to develop their staff, the necessary skills and capabilities to generate more value to society.

44. The exact ways in which official statistics are provided and their scope differs from country to country. But the Fundamental Principles of Official Statistics apply to everything statisticians do. Upholding these principles is essential to any country seeking to understand itself and respect the rights of its people. The principles were developed over 20 years ago by the CES to help define what constitutes a good system of official statistics and what role the statistical system should play in countries. Their message[7] in simple terms is:

- **We are impartial:** we publish relevant findings without fear or favour.
- **We are professional:** we have rigorous quality assurance practices.
- **We are scientific:** we facilitate a correct interpretation of data by using scientific standards.
- **We are vocal:** we provide information on the use of our statistics and interpretation of our statistics.
- **We are flexible:** we draw information from many sources.
- **We protect confidentiality:** we operate in secure physical and digital environments.
- **We are transparent:** we fully disclose our methods and standards.
- **We collaborate:** we work with statistical agencies within our country to uphold a consistent and efficient statistical system.
- **We promote efficiency:** we continually review and update our methods, processes and systems.
- **We are global:** we cooperate with international partners to ensure best methods.

[7] Modernstats-HLG video on the Fundamental Principles: www.youtube.com/watch?v=uxb3iOnVr1Y This generalized video was produced based on Statistics Canada's promotional video, published in 2013

45. Adherence to these principles has given official statistics a number **of major advantages**:

a) Official statistics have **solid institutional and legal basis**. Combined with competent, impartial and professionally independent production standards, NSOs generally have strong and respected reputations and images.

b) NSOs usually have **respected mandates to collect data**, which might be more difficult for agencies which might be seen as having ulterior motives.

c) By the same token, due to the **strong data confidentiality protection** by NSOs, respondents are more likely to provide accurate information without fear of any consequences.

d) Furthermore, the mandate given to NSOs ensures that data are collected and published **consistently over long periods** which allows for comparison of social, environmental and economic phenomena overtime.

e) More generally, official statistics are seen as being produced **with the sole aim of generating truthful and accurate information**. NSOs have no additional special interests to forward, as might be perceived to be the case with some other information providers.

2. Promoting value

46. Most NSOs - 94 per cent in our survey - took some action to **explain and promote the value of the statistics to their stakeholders**. In many cases, this was helped by the repeated use of key messages or phrases to embed the value of the official statistics in the public perception. Some NSOs also used a single phrase or slogan with most or all of their releases to emphasize their purpose and what they stood for.

47. NSOs are increasingly **using new ways of presenting statistics**, in order to reveal more clearly their value. Visualisations and infographics are increasingly used as experience of their use increases.

48. **Ireland** provides an interesting Educational Outreach Programme aimed at promoting awareness of statistical products and services, and their value to society as a whole. They offer training towards an Institute of Public Administration (IPA) Diploma in Official Statistics for Policy Evaluation to educate policy makers and evaluators in the use of official statistics. The Office visits schools, colleges and government departments to showcase their website and Statbank and explain how their statistics can be accessed and used.

49. In **Romania**, specific attention is paid to convincing respondents about the importance to respond to statistical surveys. Those who participate in the field work explain that "the calculation of the Consumer Price Index is very important for measuring inflation, determining the purchasing power of incomes, wages and pensions; negotiating wages and indexing pensions and allowances, supporting decision making in the social field; calculation of real interest; deflating value indicators in retail trade and services for international comparisons".

50. In 2014, **Mexico**'s National Institute of Statistics and Geography (INEGI) developed an ad hoc training program for strategic users to facilitate the understanding of statistical concepts, data analysis and communication. As a result, INEGI signed more than 290 cooperation agreements and trained 19,785 users.

3. Assessing value

51. NSOs generally take steps to assess the perceived value of their outputs. **Measuring and monitoring citations** is a particularly widespread practice. Almost 90 per cent of responding NSOs monitor citations in the media to their office and to their statistics and services. Only 5 NSOs reported not doing this. Many offices have outsourced media monitoring to commercial entities. Two out of three offices report an increasing trend in citations, and only three offices report a decreasing trend.

52. Citations are used to review how statistics are used, perceived and that they are correctly interpreted. Some offices classify the citations into those that have either a positive, negative or neutral impact on the value and image of official statistics. Some offices reported peaks in citations around releases of statistics that are high on current political agenda of the country.

53. Since 2013, Statistics **Lithuania** has calculated a composite indicator, *an index of public interest in official statistics and services*. It covers changes in the number of unique visits on the Official Statistics Portal, the website of Statistics Lithuania and in the e-Statistics system, registered by hit counters, newly registered Portal users, individual enquiries, and cases of quotation in the monitored media, with the year 2013 taken as the base year.

54. In **Mexico** a report "INEGI in the Media" reflects the monthly institutional positioning of INEGI in the media, its impact and an estimated market value.

55. A further widespread practice (78 per cent of responding NSOs) is the monitoring of **user confidence (or trust) in the NSO and/or its outputs.** More than 50 per cent of offices reported an increasing trend of trust in official statistics, while most of the others report a stable position. Only one office reported a decreasing trend.

56. The questions in the user surveys measure confidence in the NSOs, whether users find the statistics objective or politically neutral, whether users trust official statistics, whether statistics are considered accurate or reliable and how users evaluate the image of the office. Some offices ask questions that relate directly to certain statistics such as "Do you have trust in statistics like unemployment, population, national accounts, foreign trade, industrial production which are produced by our Institution?" These surveys are typically carried out annually, or every second year or every third year.

57. The **U.S. Bureau of Labor Statistics** (BLS) and the **U.S. Census Bureau** have a daily trust survey that enables interesting analysis of the impact of different events or comments concerning official statistics on users' trust in statistics[8].

58. More than 80 per cent of NSOs measure the **usefulness or importance of their statistical products and services to the users**. Two offices out of three reported an increasing trend of perceived usefulness of official statistics, while the rest do not have information about the trend.

59. The **United States Energy Information Administration** reports as useful simple questions on *why users came to the website*. This provides interesting information on the use of statistics, such as for writing a report, making an investment, teaching a class, educating themselves or briefing a decision maker.

[8] "Maintaining Credibility in an Increasingly Skeptical World", Michael Levi, Morgan Earp, Daniel Toth (Bureau of Labor Statistics, United States) at the UNECE Work session on the communication of statistics: www.unece.org/fileadmin/DAM/stats/documents/ece/ces/ge.45/2015/BC53_Maintaining_Credibility_in_an_Increasingly_Skeptical_World_edited-_Levi.pdf

60. Statistics **Canada** and **Spain** mention that they monitor *media coverage of statistics* by statistical themes, including census, business, demography and labour, among others. The purpose is to collect information on the use of different statistics. For instance, Spain reported over 14 million accesses to the INE database in 2014, and more than 22,000 followers of their twitter account (@es_INE).

61. The **Italian** National Institute for Statistics (Istat) provides a possibility for *user feedback on each page* of the website. They ask users whether the content is useful and enable them to write comments.

62. Statistics **Estonia** uses a *recommendation index* as an indicator of user satisfaction. On the rating scale 0-10, those who give 9-10 points are considered recommenders and those who give 0-6 points are considered non-recommenders. The recommendation index is calculated as the share of non-recommenders subtracted from the share of recommenders.

63. Much less common have been attempts to quantify the monetary value of statistical products. In principle, cost-benefit analysis would be a powerful means of measuring and promoting value of statistics. In practice, the difficulties of realising such an approach have been substantial. Nevertheless, both the New Zealand and Spanish NSOs have carried out pioneering work.

64. Statistics New **Zealand** assesses the economic value of some of its statistics:

- Population Census[9]: Despite difficult quantification, census delivers benefits well in excess of its direct costs (a net present value of close to $1 billion over the next 25 years). Every dollar invested in the census generates a net benefit of five dollars in the economy. The economic value was calculated based on a thorough review of the main uses of census data in health, education, social development, resource allocation, policy making and research by central and local government, the private sector and the academia.
- Experimental work has been undertaken on measuring the economic value of the Consumer Price Index (CPI) and tertiary education data in the Integrated Data Infrastructure (IDI) to develop a methodology and capability for measuring the economic value of statistics.
- Customer Measurement Framework: a project to develop a framework and indicators to measure users' awareness, access, use and satisfaction with statistical products and services.

65. Since 2012, the **Spanish** Statistical Office (Instituto Nacional de Estadistica, INE) has been measuring the *economic impact of statistical information in the media* to have a more accurate perception of how the public values official statistics and to know about their interests. INE evaluates news regarding their office and its statistical activities in 1,327 written publications (newspapers, magazines and supplements), 18 radio stations, 28 television channels and 6,410 online platforms. Based on this, the value of INE operations in the media is estimated to have increased to €372 million in 2014.

B. Practices in other industries

66. The previous sections make clear that NSOs can learn about good practices from each other. But the fundamental issue of generating value is no different from that faced by other

[9] "Valuing the Census", Statistics New Zealand, July 2014: www.stats.govt.nz/methods/research-papers/topss/valuing-census.aspx

industries, especially by other government agencies but also businesses. It is therefore important to consider what we can learn from practices in other industries.

67. Cross-industry benchmarking has been successfully used across business sectors but also between government and private sectors, such as across healthcare and car industry. Furthermore, many budgeting and quality management practices developed for businesses have been adapted to the public sector. Innovations from altogether different industries may bring inspiring ideas that can be well implemented in our own sector.

68. The findings presented in this section are based on case studies of a selection of companies and industries. These were chosen to include a mix of different types of company/industry, and include both well-established, and newer and more innovative enterprises. The case studies include organizations specialized in software, information industry, electronic trade, pharmaceuticals, meteorological services, cars and chocolate. The compilation of the case studies was based solely on internet research.

69. The following companies/industries were selected and case studies prepared:

- **Apple** Inc – designs, develops and sells electronics, computer software, on-line services, and personal computers.
- **Amazon** – electronic commerce and cloud computing.
- **BMW** – luxury car producer.
- **Google** – technology company specializing in internet-related services and products.
- **Meteorological organizations** – responsible for the provision of weather information and forecasts.
- **The UK pharmaceutical industry** – develops, produces and markets therapeutic drugs.
- **JH Whittaker and Sons** (Whittaker's) – a New Zealand confectionery company specializing in chocolate.

70. The full case studies are included in Annex 4. The following discussion is based on an analysis of the case studies to draw out key themes relating to the delivery and communication of value across the selected companies/industries.

1. Generating value

71. Analysis of the case studies reveals several key themes in the way these businesses generate and promote value:

(i) Customer focus

72. **Staying relevant to the user is crucial to all of the businesses considered**. Put simply, if a business does not produce products that provide value to its customers, then it will cease to exist. Understanding what customers do and do not value allows businesses to innovate products, services and capabilities to fit these needs, to the business's advantage.

73. At **Apple**, the culture is fundamentally designed to put the customer at the centre of everything it does, from the design of its products through to the design of its retail stores. 'We put ourselves in the customer's shoes'. Apple is constantly working, as it says, to delight customers with the release of new products, as well as in evolving its products and in its store design.

74. **Amazon** also has strong customer focus. 'Our vision is to be earth's most customer-centric company'. The philosophy is that what is best for the customer ultimately turns out best for the business. Developers focus first on what value is to be delivered to the customer, and only then how to do so, instead of building technology first and only then thinking about how to use it.

75. **Google** has the same approach. 'Worry about the money later, when you focus on the user all else will follow'. Early in Google's history, it released some of its products as 'beta launches' and then made iterations as customers fed back what they wanted more and less of. Google continues to listen carefully to user feedback after each launch and revise products based on what it hears.

76. **The Meteorology offices considered** have also learned that simply providing the best weather forecast or climate outlook is no longer sufficient. 'A weather forecast only has value if it can be used to make decisions that yield attractive benefits to users'. Increasingly, meteorological offices are seeking to build relationships with customers to ensure that they are providing the information needed to reduce uncertainty and improve decision-making.

(ii) Good design

77. Design is also a recurring feature and aligns naturally with customer focus. Having identified what it is potential users want, the natural next step is to **design products and services that fit the need**.

78. The effective use of design is a valuable source of differentiation, and gives customers a reason for buying from a firm and not its competitors. Design also adds value to products and services and improves their accessibility to users. Customers are often willing to pay more for well-designed products that can offer benefits such as greater usability, improved functionality and improved aesthetics.

79. **Apple** is one exemplar. Its design philosophy is to make complex things simple, and produce products that are intuitive and easy to use. Apple products are designed to work together and use the same basic architecture. In addition to using design to make its offerings more valuable, Apple has also used design in the location and layout of its retail stores. The stores are strategically located in high traffic urban shopping districts to attract customers.

80. **Google** has also made design a priority to ensure its competitive edge. 'Our goal is to design everything so that it is beautifully simple. Each product should have an intuitive, simple and beautiful design that delights users every time they visit'. Unveiled last year, Material Design, Google's evolving language for mobiles, tablets and desktops, offers consistency in interactions, invisible rules that govern everything, so that every app feels familiar, and provides 'beauty in service and function'.

(iii) Determined innovation

81. Design may be critically important but it needs to have something to work on. For this reason, **concentration on innovation** is a further recurrent feature of the case studies in how the businesses generate value. Creativity and innovation can lead to new and more attractive products, more efficient and effective work processes and, in consequence, to increased sales and customer satisfaction.

82. Each year, **Google** invests billions of dollars in technology and research and development projects. It encourages blue sky thinking by giving employees 20 percent of their work time to

pursue projects that they are passionate about. Many wind up as new products or product improvements.

83. **Apple** has also invested heavily in research to underpin good design. The company believes that focused investments in research and development are critical to its future growth and competitive position in the marketplace and are directly related to new and enhanced products. It also fosters innovation through its HR practices. Apple rewards and recognises employees for energy and enthusiasm in innovation.

84. Innovation is also an integral part of BMWs product development. It spends around 25 percent of its profits on research and development, which it believes have led to products that continue to attract the public's approval

85. At **Amazon**, experimentation and willingness to invent is a strong part of the culture. 'If you double the number of experiments you do per year, you're going to double your inventiveness'. Amazon has created its own internal experimentation platform called 'Weblab' that it uses to evaluate improvements to its website and products.

86. In the **pharmaceutical industry**, research and development is critical to the development of new and effective medicines for patients, across a huge range of diseases and conditions. Without research and innovation being at its core, the industry would have stagnated.

(iv) Productive partnerships

87. The fourth recurrent theme from the case studies is the importance attached to formation of well-considered partnerships. **'For generations companies built moats between themselves and their competitors. Today, the most successful companies build bridges'.** Firms taking advantage of strategic partnerships can utilise the counterparty's strengths to make both firms stronger in the long run. Teaming up with others enables businesses to generate value and gain competitive advantage through access to a partner's resources, including markets, technologies, capital and people.

88. **Weather offices** are increasingly forming partnerships with academic institutions and software companies to improve their efficiency and impact. For example, in the UK, the Met Office has established a Met Office Academic Partnership to bring together the Met Office and leading universities in weather research (Universities of Exeter, Oxford, Leeds and Reading).

89. **Amazon** has been able to consolidate its strength in different sectors through its partnership arrangements and through using technology to facilitate product promotion and distribution via these partnerships. The Amazon retail platform enables other retailers to sell products online using the Amazon interface and infrastructure through their 'Syndicated Stores' programme. For example, in the UK, Waterstones, a large traditional bookstore, entered into a partnership arrangement where Amazon markets and distributes its books online in return for a commission. Such partnerships help Amazon to extend its reach into the customer base of other suppliers, and customers who buy in one category, such as books, can be encouraged to purchase in other areas such as clothes and electronics. So both sides benefit.

90. **Whittakers** has also collaborated with other companies where there is a link to chocolate. For example, it produced a co-branded product 'Lewis Road Creamery Chocolate Milk Drink' that has attracted a huge consumer following. It has also entered into partnerships with commercially successful brands such as L&P and Jelly Tip.

91. **BMW** recognises that future generation cars cannot be built without more input from telecoms and software companies, so is exploring deeper relationships with companies such as **Apple**.

2. Promoting value

(i) Brand management and recognition

92. All of the businesses in the case studies place great weight on brand recognition as a means of delivering and communicating value. They see this as no less important than the goods and services they produce. **Successful pursuit of brand recognition can generate major value for a company**.

93. It is probably best taken, however, as being not an independent ingredient of success but rather something that builds on the potential value from customer focus, good design, innovation and from focused partnership working. A branding exercise based on purported reliability or user friendliness would be unlikely to be successful if the underlying product or service did not have such attributes. Brand promotion is, rather, about communicating and promoting these underlying ingredients of value. Different businesses have adopted varying approaches to this.

94. Both **Apple** and **Google** have achieved brand success by courting media coverage. Being aggressively global has also been important to the success of these brands.

95. Some companies strive for recognition of their brand by using external evaluations and taking part in award competitions, to achieve third party endorsement. Apple, for example, has been the recipient of repeated awards from the US National Academy of Television Arts - "Tech Emmys" - that it believes have helped its branding. A study by Hendricks & Singhal of the University of Western Ontario and Georgia Institute of Technology confirmed the validity of such an approach. Award winners outperformed the control group on profitability, return on sales, growth in employees and growth in assets.

96. **BMW** has used external evaluation to increase the performance and value of the company.

97. 'Through the EFQM assessment we receive objective, valuable and helpful suggestions about our strengths and - even more important - potentials. We use it in the strategy and target process to decide about 'doing the right things'.

98. This assessment has been confirmed in objective measures of increased value.

99. In New Zealand, **Whittakers'** has been listed the most trusted brand in the Readers Digest Survey of Most Trusted Brands for four consecutive years. The company has increased its market share in each of those years. Whittaker's marketing head says that the award helps with the company's marketing strategy.

100. 'Each year many brands use these little winner badges on their packaging. **As a consumer facing a shelf full of items, it's human nature to make comparisons and look for signals, so why not use the one with a little medal on it**'.

(ii) Impact and outcomes

101. Ultimately, as discussed earlier in this report, organizations in both the public and private sectors generate value via their impact on social and economic outcomes. Whereas previously, most companies focused on assessing value in terms of the bottom line, there is now, for good commercial reasons, **a stronger focus on demonstrating value in terms of impacts on society**.

102. **Meteorological offices**, for example, promote the role they play in reducing loss of life and economic damages. Many businesses - construction, agriculture, retail and manufacturing, and leisure and tourism, for example - rely on weather reports that directly affect their profitability and contribution to the economy.

103. **The pharmaceutical industry** also underlines the contribution it makes to the health and wellbeing of the population, and to the economy. In the UK, the pharmaceutical sector's contribution to the balance of trade was the third greatest of nine major industrial sectors. On the social side, medicines developed by the pharmaceutical industry have helped the prevention or cure of previously life threatening diseases. In other cases, they have changed acute 'death sentence' illnesses to manageable chronic conditions. The industry also points to its impact in reducing the burden on national health systems.

3. Assessing value

104. Information on how industries and companies measure value is often not freely available because they see this as commercially sensitive information. However, from publicly available information, measurement is focused on the following dimensions:

(i) Financial metrics

105. Most of the industries and firms included in this study **use a range of conventional financial measures to monitor their progress**. These include metrics such as revenue, profitability, sales growth, return on invested capital, market share and shareholder value.

106. Companies such as Apple, Google and Amazon publish most of these metrics regularly in annual reports.

(ii) Customer satisfaction

107. A range of customer satisfaction measures are also used to help track how companies are performing.

108. **Apple, Amazon and Google** all use the American Customer Satisfaction Index (ACSI) **customer rating to compare themselves to their competitors.** The ACSI is a cause and effect model with indices for drivers of satisfaction (customer expectations, perceived quality and perceived value), satisfaction (ACSI) and outcomes for satisfaction (customer complaints and customer loyalty, including customer retention and price tolerance). Company, industry, sector and brand provide benchmarks. ACSI clients gain access to in-depth perspectives for their own company as well as for industry peers and competitors, which gives them strategic insights into their organizations' customer relationships and its competitive stance in the marketplace

109. **Apple** also uses the **Net Promoter Score** (NPS) to track customer satisfaction and loyalty. This is based on asking customers a simple question: **'How likely are you to recommend our company, products or services to a friend or colleague'**? Those who respond with a score of 9 or 10 are called promoters and are considered likely to exhibit value creating behaviours, such as

buying more, remaining customers longer, and making referrals that are more positive to other potential customers. Those who respond with a score of 0 to 6 are labelled detractors, and are believed to be less likely to exhibit the value creating behaviours. Responses of 7 and 8 are labelled passives and their behaviour falls in the middle of promoters and detractors. The NPS is calculated by subtracting the percentage of customers who are detractors from the percentage who are promoters.

110. **Amazon** tracks its performance against about 500 measurable goals, nearly 80 per cent of which relate to customer objectives. Details of the full suite of customer-based measures are not readily available but include metrics such as percentage of orders from repeat customers and growth in the number of customer accounts.

111. **BMW** constantly measures product-based satisfaction and satisfaction with sales and services. A sample of services or new vehicle users is surveyed for satisfaction with the dealer's performance after every visit to the dealership. In addition, the company runs regular market research studies to track customer satisfaction.

(iii) Innovation

112. **Apple, Google and Amazon** all **track the value generated by innovation**, because of its importance to them. Measures used include percentage of revenue spent on research and development (R&D), percentage of revenue coming from new products, and R&D expenditure as a percentage of net sales.

(iv) Economic impact

113. With increasing pressure for accountability for use of public funds, meteorological offices are increasingly **seeking to quantify the impact** of weather variability on the economy or different sectors of the economy, such as agriculture, retail sales, and aviation. For example, it has been estimated that weather variability accounts for as much as 3.4 per cent of GDP in the US, and that a third of economic activity is impacted in some way. The extent to which accurate forecasting can mitigate these effects is therefore an important measure of success.

114. The **pharmaceutical industry** has also sought to demonstrate its value by using **measures that quantify the industry's contribution to the economy**. Measures used include the contribution of the industry to GDP and national income, and its impact on the country's trade balance and employment.

C. Comparison of statisticians' and other industries' approaches

115. NSOs use a range of approaches, both to measuring the value and impact of their outputs and to promoting that value. We can all learn from other NSOs good ideas and practices. Other industries have similar concerns about value and how to promote generation of it. A significant difference in emphasis, however, is the extent to which the other industries described above have embedded value generation and promotion into their overall business model. Customer focus and brand recognition, being supported by emphasis on cultures and modes of operation, are likely to feed value generation and promotion and appear much more central to other industries' operations.

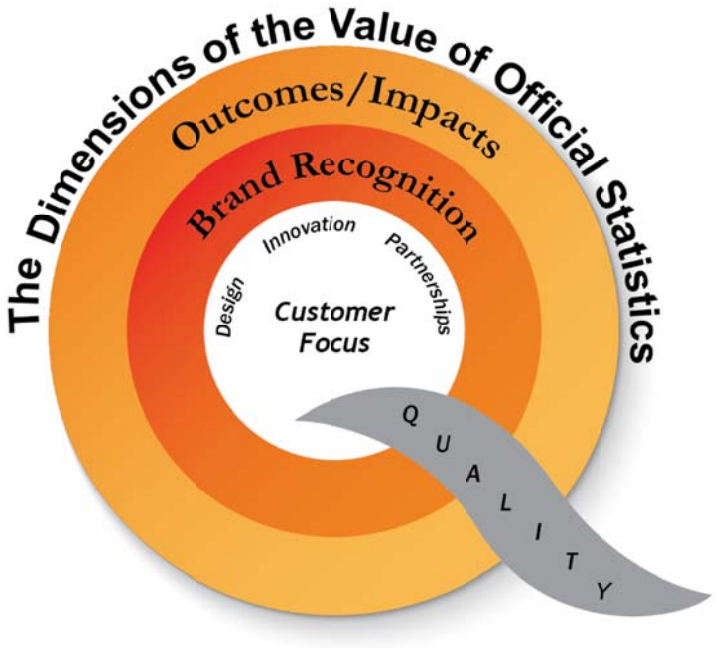
116. Exactly how large such differences are, is a question which can be reasonably debated. But what is undoubtedly true is that these **other industry approaches are a fertile ground for NSOs' attention**. We can learn from them, just as we can from each other.

117. As a high level summary, one might think of a paradigm for the generation and promotion of value in the following terms:

- Begin with a firm **focus on the customer**/user and his/her needs.
- Place stress on **design** of products and services to meet those needs, based on continuing **innovation** and on the fruits of well-chosen **strategic partners**.
- **Invest in brand recognition and promotion** so that those well designed and innovative services are well known and trusted.
- In this way, **generate beneficial outcomes** and impacts on society…

… which in turn are widely recognized as having added value. The unique quality in the case of official statistics is the cornerstone and an outcome of applying the Fundamental Principles of Official Statistics.

Or, in terms of a diagrammatic representation of concentric circles:



4. Building value through partnerships

118. Indeed, NSOs already engage in extensive partnerships of different kinds. In 2014, the High-Level Group for the Modernisation of Official Statistics carried out a survey which identified 57 such partnerships in 25 different countries or organizations. **The most common type of partnership is with data providers especially in the government sector, followed by analytical partners.** A few partnerships are with data consumers, design partners and technology partners. This indicates that access to data is currently the main reason for engaging in partnerships. NSOs are able to use partnerships with the public and private sector, civil society organizations, academia, and other stakeholders to meet the needs of users better:

- At an operational level, **partnerships fill a range of needs**: funding, knowledge sharing, advocacy, development of reference materials, outsourcing of services as well as supporting the data production and access to data. Recently, to a degree, NSOs' business models have expanded to include Big Data and "crowdsourcing" as components of partnerships.
- Strong strategic **partnerships also yield more visibility** for statistical agencies. Collaborative outreach can be a powerful tool to encourage the use of official data and engage with specific audiences. Strategic partnerships with other government agencies are critical for effective statistical production, especially with data providers.
- By sharing successes and challenges in pursuing partnerships, agencies can work together to promote the value of official statistics and **establish governance models** while maintaining the independence and public trust that are central to the work of a statistical agency.

119. This discussion is based on the in-depth review carried out by Statistics Canada for discussion at the CES Bureau in October 2015.

A. Partnerships with stakeholders

120. Partnerships with the public sector contribute to official statistics by supporting data acquisition, advancing statistical business processes, and developing information technology infrastructure, tools and software. These partnerships increase the value of statistics by supporting existing programs and addressing data gaps.

121. Partnerships are also crucial for the coordination with the providers of administrative data. A prevalent theme among statistical agencies is to reduce response burden by **taking a whole-of-government approach to data collection and production**, including the sharing of government-held data to reduce duplication.

122. Internationally, **data exchanges between statistical agencies** are long standing. They can help triangulate, for example, information about trade or capital flows, or indeed in a globalised world, about international production sequences.

123. Partnerships with commercial organizations are likely to become more prevalent as statistical agencies venture into Big Data and crowdsourcing. In most cases, private sector partners are both data providers and data users.

124. One **promising avenue is the use of private sector administrative data** for the purposes of constructing official statistics – for example, using credit card company information or utility company records to yield information about residency or lifestyle.

125. A number of NSOs have agreements with software or wider IT companies to provide **information technology services**. Such service agreements can have both reactive and proactive dimensions. Reactive services ensure addressing critical issues that could affect the business systems with high priority. Proactive services ensure that systems are in place that move to, or towards, industry standards and best practices.

126. Other partnerships take the form of **structured relationships with users**. The NSO might offer advice and training in the use of its products. Conversely, users have the opportunity to provide feedback or, more actively, to help shape the development of existing or new products. A number of NSOs have agreements with software companies to provide information technology services.

127. Partnerships with civil society **foster better response rates** from the business sector, which will translate into better quality data, thus increasing the value of official statistics. Moreover, the use of official data among key decision makers adds credibility and augments the public trust necessary for statistical agencies to function.

128. Existing partnerships of this kind embody collaboration on statistical business processes and for data acquisition, as well as for funding purposes, knowledge sharing and mutual exploration of strategic issues.

129. NSOs often engage in partnerships with the media. This can take different forms, from occasional press conferences to daily services to media to facilitate news drafting based on statistical releases. For instance, Statistics **Netherlands** provides a modern media centre to support effective dissemination of statistics by the media.

130. Partnerships with the scientific academic and research communities are carried out to support fundamental and applied research, **facilitate microdata access**, promote the use of analytical tools, influence academic curricula, establish joint professorships and share knowledge. They contribute, among others, to substantially increase the availability of public-use data files and improve access to official statistics.

131. Several national statistical agencies have partnered with universities **to extend their capabilities and improve their data-gathering practices**. Other initiatives have aimed at partnership with secondary schools to increase statistical awareness and literacy amongst the pupils. It shows also in user surveys, carried out by many NSOs, that those users that are experienced in using statistics appreciate them most highly. Therefore, it is of strategic importance for NSOs to work for better statistical literacy and sufficient education on the use of statistics.

B. Partnerships through engagement activities

132. Engagement activities help to accomplish various goals, such as encouraging respondent participation, gaining support from influential bodies, showcasing the value of official statistics and promoting their use by giving access to data and tools, and offering training and support.

133. Engagement is generally an ongoing relationship which can be more or less strong and more or less structured. It might, for example, embody ongoing partnership between an NSO and its respondents, aimed at securing required information in the least burdensome way. Also common are engagement mechanisms with users incorporating briefings, presentations and workshops aimed at ensuring maximum understanding and exploitation of the value of official

statistics. An extension involving one particular class of users is **joint events with outside experts, with the goal of improving public debate** and decision making regarding key issues.

C. Partnerships to leverage Big Data

134. The advent of Big Data, with its potential impact on the core business of statistical organizations, points up the potential of partnership arrangements to drive this agenda forward. Due to the uncertainty, complexity, velocity and size of Big Data, many NSOs may not have internal expertise in design, analysis, and technology that would be needed to exploit the opportunities in full. **Partnership working to assemble the full portfolio of skills and experience that will be needed** for using Big Data seems an obvious option. Candidates for such partners could be found amongst the academic sector research institutes, technology providers, data consumers, data privacy protectors and businesses.

135. Apart from other advantages, such partnership can also pay dividends in more intangible ways. These derive from the coming together of different backgrounds, cultures and skills of the various parties.

D. Crowdsourcing

136. While historical examples can be cited of crowdsourcing over several centuries, its modern use for assembling statistical information from a disseminated group of active participants is still in its infancy. In principle, however, it is a technique that could locate and assemble information, analyse existing information, seek help to find an empirical solution, and evaluate public taste or public support.

137. **Its potential is as a low-cost partnership that produces timely and relevant data**. It also potentially unites diverse resources and people, helping organizations to innovate and achieve better results.

138. There are currently only limited examples of such partnerships involving NSOs. But it is an avenue that should be kept in mind.

E. An assessment and going forward

139. NSOs currently engage in many partnerships, in diverse ways and with diverse counterparties. There is a rich palette available for mutual learning amongst NSOs.

140. There is clearly a need to further develop NSOs' engagement in partnerships that help to increase the value of official statistics. However, it will be important for NSOs to ensure their professional independence when engaging in close strategic partnerships with other organizations. It is possible to discern **areas where the potential for gainful partnerships has not yet been fully exploited**:

- One relates to the **building of shared systems and frameworks in collaborative development among NSOs and other stakeholders**. The **Australian** Bureau of Statistics and the **Dutch** Central Bureau of Statistics have highlighted the efficiency that can be achieved through international collaboration in business architecture development. This would benefit **technical assistance programmes** for developing countries. For example, Statistics **Canada** is sharing common tools with its International Statistical Fellowship Program in countries in Africa, Latin America and the

Caribbean, and **Mexico**´s INEGI is developing spatial data in member countries of the Association of Caribbean States.

- In some countries **stronger partnerships with data providers from the government and business sectors and non-government organizations** will be needed to gain access to new data sources and to possibly adapt them to the needs of official statistics.
- **Collaboration with the scientific community** can be beneficial for methodology development and to increase the use of NSOs' rich datasets and thus increase the value for society.
- There would seem to be substantial untapped **potential for collaboration with the private and commercial sectors**: (a) in developing and sourcing new types of information; (b) developing technologies for data collection, measurement and dissemination; and (c) creating new products based on statistical data.

5. Measuring the value of official statistics

A. Towards a framework with a set of indicators

141. Official statisticians are undoubtedly at a disadvantage in defending and promoting our industry with the lack of a recognised and persuasive means of computing the value on the outputs that we produce. At the very least, it leaves us open to the taunt that while we seek to measure all kinds of other outputs, we do not measure the value of what we ourselves produce. Furthermore, it weakens our ability to promote official statistics and argue for further investment in them since we are not able to show conclusively how their value exceeds the cost.

142. At the same time, measuring the value of official statistics needs to be done rigorously within a disciplined and principled framework. Ad hoc indicators, based on individual "bright ideas" could give misleading results and, in the process, undermine the credibility of the overall endeavour. Accordingly, this section discusses and sets out a proposed framework within which NSOs might work to measure the value of their outputs. In doing so, it takes into account the conclusions of previous sections, and in particular: (1) the dimensions of the value of official statistics, as summarised in the diagram at the end of Chapter 3; and (2) how other industries approach this issue.

143. The proposal is that the framework should contain three elements:

- **Observable "objective" indicators**: indicators like the number of downloads, the number of citations by type of media, etc. that can be collected from existing sources are relevant for analysing the value of official statistics. Each of these indicators will provide information on a specific aspect of the value of official statistics, thus not being representative of the full value. Further, subjective choices in the selection of the vast array of possible indicators, need to be made in order not to drown in a plethora of them. As such, the representativeness of the indicators and the need to make an appropriate selection of a limited set of indicators are in tension.
- **"Subjective" indicators derived from user satisfaction surveys:** indispensable to assess the value of statistics in terms of the user confidence and trust in official statistics, the usefulness and accessibility of official statistics. Dedicated surveys could be done on a periodic, say annual, basis, or could be addressed to a sample of visitors of the website on a more continuous basis.
- **Methodologies trying to value/monetize the value of statistics:** being able to put a monetary value to official statistics would provide a very powerful and convincing tool for demonstrating its value. Some attempts have been made to apply such a monetary valuation but so far not with great success. A key issue to be addressed, in the absence of observable prices, is finding convincing ways of determining appropriate shadow prices to underpin the calculation of value. A further issue is to avoid missing part of the output or double-counting some output elements.

144. The rest of this section discusses and develops each of these elements in turn. In respect to all of them, while the diagram on dimensions of value is a good starting point, we recommend that the approach should be informed by a number of other precepts and principles:

- For the reasons discussed earlier in this report, it is important that the brand of official statistics is recognized. **But the value of official statistics may go beyond the value of the brand, and it is important that the measurement should encompass this wider field rather than just the value of the brand itself.** People may know the name of the statistical office and its logo, but they still

often do a Google search, if they need statistics on a certain phenomenon. In an event at a university in Ireland, when asked how many knew the statistical office, almost everyone did. But when asked how many had visited the website of the statistical office, only two hands out of 200 came up.

- Furthermore, however innovative and well designed the statistical outputs we produce are, self-evidently **if they are not recognized and used by the public, they have no value added**.
- The **ultimate focus should be on users' experiences and perceptions**: are the data they are looking for available, are they available at the right level of detail, sufficient quality and in the right format? How many users do we have? How do they use our statistics? How useful are our statistics for them? In this respect, design, innovation, partnerships and brand recognition are important intermediate stages in generating value from official statistics. But the value to be measured must be based on the actual use made of official statistics, their accessibility and their perceived quality and usefulness. One way of encapsulating these thoughts is to ponder whether users perceive we are providing them with a valuable service, over and above the value of the statistical products we publish.
- Having **indicators on the inputs** (e.g. hours spent on development work) **may be useful as a management tool but these do not tell us anything about the impact of statistics**.
- Furthermore, **the measurability of the indicator is an important criterion**. For the subjective indicators, this implies having available means to survey user satisfaction on a regular and reliable basis. It would also be desirable to arrive at a set of indicators that allow for international comparison. Although difference in the outcomes across countries may (heavily) depend on cultural differences, international comparison may provide useful information for mutual exchanges of experiences and best practice.
- Finally, it is **important to know more about potential users who presently are not using statistics**. We should be interested not only in the actual value of official statistics, but the greater potential value if non users who would derive benefit from official statistics were in fact to do so. This raises obvious questions. Why are they not using official statistics? Are they not aware of the statistics we offer? Are our statistics not useful to them? Are the statistics not in the right format or timely enough? The same holds for the need to improve our knowledge on what kind of statistics people are looking for, to have more knowledge of what it is that our users actually need and value.

B. Objective indicators

145. When looking at possible objective indicators, one would typically look for indicators that reflect the actual use of official statistics in the various domains (policy, research, media, general public, etc.). In addition, one could include indicators which reflect the adherence to the Fundamental Principles of Official Statistics.

- **Use of statistics:** These include indicators such as the number of visits to the website and data downloads, by topic. These indicators and their developments over time would provide a fair reflection of (the changes in) the actual use of official statistics. They can also reflect the acquaintance of users with the statistical office. Obviously, one would like to have more information on the type of users, and whether or not the users could (easily) retrieve the relevant data, and whether or not they are satisfied with the results. Such information could be collected via the surveying of visitors on a sample basis (see subjective indicators) or using a Customer

Relationship Management System (CRM).

- **Relevance of statistics**: The number of citations in the main newspapers/news-websites, radio and television channels is an important indicator, for example related to press conferences, releases, and other specific communication channels. This indicator including the development over time provides a good indicator of the impact of statistical "news", its relevance for public debate, the branding of and the trust in official statistics. The number of citations in research and policy would provide a different cut on the degree of relevance and trust in official statistics, but now for more specific groups. An analysis of the alternative data sources used may provide additional information on what reasons users have not to use official statistics.
- **Transparency of statistics:** One indication of transparency would be the publication of an advance release calendar, and the publication of an indicator reflecting the adherence to this calendar would be a possible indicator of the quality of statistics in terms of punctuality. In addition, one could collect information on the availability of metadata and other materials and resources about statistics.
- **Quality of statistics:** The most obvious summary would be the magnitude and direction of regular revisions in economic growth or a continually updated list of international best practices implemented by the NSO. As economic growth is based on a whole array of underlying data sources, it may also provide an indication of reliability beyond the remits of national accounts. Such indicators would have to be used with care, however, given for example differences in revision policies between countries.

146. The key indicators that are available in each office could be grouped into a dashboard of indicators on quality, transparency, use and relevance. The exact indicators to use depend on each country. Examples of possible indicators are given in the following dashboard.

Table 1. Dashboard with possible objective indicators on the value of official statistics

Quality	Transparency
punctuality of statistical releases (share of punctual/late /cancelled releases)	timeliness of metadata (average "age" of metadata on the website)
share of error free statistical releases	share of statistics released with metadata
quick correction of errors (average delay of corrections in days)	number of blog posts by official statisticians
accuracy of statistics (average revisions)	number of users/journalists trained
timeliness of statistical releases (weeks from the reference period)	number of articles explaining statistics
number of new visualization tools introduced	number of open data solutions featuring statistics
innovation or quality awards received	number of partnership agreements
availability of quality descriptions (share of statistics released)	number of data cells in online statistical databases

Use	Relevance
number of website visits	number of citations by media
downloads of statistical data by domain	number of citations in research/policy work
visits to the digital library/website of publications	most cited statistics
number of followers in social media	most used/downloaded statistics
number of news feed subscribers	number of retweets
number of stats apps downloads	number of tailored services by user groups
number of chat contacts	number of new end-products/services
number of agreements to use microdata for research	working time used for development
number of agreements for chargeable services /sales of products/services	number of papers/presentations/inputs that contribute to international statistical work
sales/number of publications requested	number of international study visits hosted
number of responses to international requests	number of memberships in international expert groups

C. Subjective indicators – a generic user survey

147. It was earlier suggested that indicators should not be chosen on an ad hoc basis but as part of a disciplined framework. In the case of subjective indicators, the obvious source of information is a survey of users. This section, therefore, proposes the form and coverage that such a survey might take. Indicators on more subjective perceptions could relate to the following topics. Some of the questions are more generic in nature, and thus intended for all users. Other questions, such as the ones on innovation, may need to be more targeted at specific, better informed, user groups. In parallel with obtaining information of these issues, it would be desirable to establish ways of generating more information on the users of official statistics (age, gender, level of education, etc.) and the use of official statistics (how often do they use official statistics; for what purpose do they use the statistics; and from where do they typically get data?)

- **Satisfaction with products and services.** First, one would want to know whether the user did manage to find an answer to his/her question(s), whether or not the relevant information was easy to find (e.g. accessibility of statistical databases), and to what extent the information needs were met. This analysis could be further deepened by asking questions on what the user considers the most important characteristics of official statistics or statistics more generally (e.g. timeliness, accuracy, trustworthiness, (inter)national comparability, etc.), and how he/she rates official statistics on each of these characteristics. Questions on preferences for type of access (online, phone, in person), device type(s) used and preferred media further inform the picture of our customers.
- **User Support:** Under this heading, questions could be asked in relation to the general perception of user on whether or not we are doing well, and what the user thinks we could do better in serving users.

- **Design, communication and metadata:** Here, questions could be raised on the design of the official statistics website in general, and the statistical warehouse in particular: how easy/difficult it is to navigate and find the relevant information, how satisfied the user is about the visualization of official statistics (videos, infographics, maps, graphs, indicator sets), etc.
- **Relevance, responsiveness and innovation:** How effectively does the statistical office inform the public debate on current issues affecting our country, to what extent do you think that we are innovative in the way we work (e.g. using new technologies, methods and data sources), how important are official statistics in helping to understand societal developments.
- **Awareness of brand and message:** Under this heading, questions could be raised on the trust in official statistics, the perceived lack of political interference, and the overall satisfaction with the statistical office and the understanding of its remit.
- **Specific products and services:** Have you heard of a particular statistical product; how satisfied are you with the quality of the product or service; have you used public use files or anonymized micro data and for which domains would you need them mostly; do you think there are benefits for you or your organization from increased sharing of anonymized data, etc.

148. The above represents a generic skeleton that individual NSOs could use to develop their surveys, with survey questions tailored to their own specific circumstances. A more detailed generic user survey is provided in Annex 3 of this report. Useful guidance for defining and measuring customer satisfaction is provided for instance by the International Organization for Standardization (ISO 10004)[10].

149. In addition, NSOs are recommended to conduct or participate in occasional targeted surveys in addition to the main user survey. Targeted surveys could include, for instance:

- **Government-wide surveys** on how well people recognize different agencies, their logos and mandates, including the NSO.
- **Online surveys that appear on the NSOs' website** with a couple of targeted questions on the usefulness of the website and its functions.
- **Key stakeholder surveys** to find out about their specific needs. This would be a useful tool for developing effective partnerships **and** reinforcing the communication strategy.

D. Monetizing the value added of official statistics

150. Output indicators such as the number of downloads from the official databases, the number of references in the media, and the number of quotations in policy and research papers can provide very valuable insights into the use of official statistics, especially when monitoring developments over longer periods of time. Comparing a weighted index of these use indicators with a volume index of the resource inputs may also provide an indication, albeit an imperfect one, of the developments in the productivity or efficiency of producing official statistics. However, as noted at the beginning of this section, a more powerful and convincing story on the value added of official statistics can be generated by putting a monetary value on (the impact of) statistics. This section discusses a variety of possible valuation methods. Subsequently, the following approaches will be covered:

- cost-based approaches

[10] www.iso.org/obp/ui/#iso:std:56869:en

- market (equivalent) pricing
- stated preference methods
- revealed preference methods
- impact assessments

151. Each of the following sections will provide a short description of one of the above approaches. Also the main pros and cons of each methodology will be discussed. In the final section of this Chapter, a summary of main conclusions and recommendations will be provided. Before starting the discussion on the monetization methods, it is worth noting that the availability of high quality input and output indicators could support this process to a significant degree.

152. The approach outlined in the first section is somewhat different from the later ones in that it considers the costs of producing official statistics and then assumes that the value is equal to the cost. This differs from the other approaches which seek to value official statistics from direct evidence.

1. Calculating the cost-base

153. One approach to put a monetary value on official statistics would be to calculate the total costs spent on the production of these statistics. In the area of national accounts, this is a commonly applied methodology for measuring the output of services (in current prices) for which market prices are not available. In this respect, one could also look upon the total costs for the production of official statistics as being equivalent to the value that a society is willing to pay for these services, as implicitly agreed via democratic procedures.

154. But there are obvious drawbacks to this approach. By definition, such a cost-based method does not take into account differences in quality and productivity, when comparing data over time or across countries. Similarly, since the cost and value are deemed by definition to be equal, this can give no guide as to whether and to what extent investment in official statistics was worthwhile. By the same token, the methodology can say nothing about productivity movements since, by definition, this would be always unchanged. In the field of national accounting, when measuring developments over time, recent Systems of National Accounts (SNAs) have been advocating moving away from “output equals inputs” approaches wherever possible. It is, therefore, not advocated that this approach should be used to monitor developments over time of the value of official statistics.

155. At the same time, there are a number of good reasons why NSOs should assemble reliable and comprehensive data on their costs:

- Costs data enable the relatively low costs of official statistics to be demonstrated, certainly when expressed in per capita terms. One could argue that, for example, €15 per person per year is a true bargain for compiling a wealth of high quality information to support evidence based research and policy making.
- An analysis of the costs over time, either or not adjusted for price changes, would also allow for showing the often decreasing patterns in the budgets spent on official statistics. Combining the volume-index of these costs with the development of a genuine measure of the constant price value of statistics makes it possible to assess productivity or efficiency gains over time.
- The data would also allow for a comparison across countries, for example by analysing either the costs per capita or the costs as a percentage of GDP. That said, in international comparisons, it is obviously important to compare like with like. As discussed below, that may be easier said than done. Nevertheless, with care, such exercises are not impossible.

- Last but not least, comparing the cost base with the results of output-based valuation methods can produce interesting insights both between countries and over time.

156. In calculating the cost base, one can distinguish two basic methods. The first one is the pure cash recording, in which the relevant cash payments in a year are used for costing official statistics. The other method is the full accruals method. In this method, one tries to allocate the costs as much as possible to the years in which they add to the production of official statistics in that year. This methodology is especially relevant in cases where the budgets allocated to official statistics vary to a considerable extent over the years, an example in case being significant special budget lines for conducting a national census in certain benchmark years. New Zealand has applied this method in valuing the annual costs for their census. In doing so, Statistics New Zealand has made assumptions on the service life and the depreciation pattern of the census results[11]. It is clear that these assumptions are not always that straightforward. It may therefore be more convenient to simply allocate the average costs to the years from the relevant census to the next census, either or not adjusting them for price changes. The same method could be applied for other one-off budget lines, although here too one needs to make assumptions on the allocation of these costs to future years, which may be less trivial than in the case of a census. Whatever the chosen solution, such an accruals method is clearly preferable in principle to applying a pure cash recording.

157. A final issue relates to which costs one should include in the estimates. As in calculating the cost base for other industries, it is proposed to take the following expenditures for the compilation of official statistics into consideration: compensation of employees, purchases of goods and services, and depreciation costs (for example, related to ICT-equipment and office buildings owned)[12]. Secondly, it is important to be clear about the delineation of official statistics. In most countries, this is not confined to the national statistical institute, as there may be other statistical authorities involved in the production of official statistics, such as the statistical department of the national central bank. More generally, one would like to include all national institutes that in some way or another are involved in conducting statistical surveys, processing data and disseminating statistics, all preferably confined to what generally is considered part of "official statistics". This approach would also provide better internationally comparable costing data, as organisational arrangements of official statistics can differ substantially across countries.

158. Note that in the first instance, in the interests of practicability and simplicity, it is proposed to include neither the costs of respondents to complete statistical surveys nor the costs of producing administrative registers or private databases used in the compilation of official statistics[13]. It is also proposed to exclude costs for users to access the information. However, in a more advanced methodology, one would want at a later stage to include these latter categories, thus enabling to monitor the possible impacts of, for example, shifts from surveys to administrative data, or the enhancement of dissemination systems.

159. Some countries, such as Estonia and Ireland, are using the Generic Statistical Business Process Model (GSBPM)[14] as a tool to estimate the cost of producing official statistics. An extension to the GSBPM to cover the non-data activities of statistical organisations, namely the Generic Activity Model for a Statistical Organization (GAMSO)[15], now provides a comprehensive tool for cost estimation with non-data

[11] For this and other methods for valuing the census statistics, see Statistics New Zealand (July 2014), Valuing the Census. Available at: www.stats.govt.nz/methods/research-papers/topss/valuing-census.aspx

[12] One could add interest payments, but here it is proposed not to exclude them. In addition to the direct interest payments being negligible in most cases, it may also depend on national arrangements for debt financing of government units. Furthermore, the proposed method nicely aligns with the method for the measurement of government services in the system of national accounts.

[13] It may also be quite problematic to make an estimate of the extra costs to make these data available for statistics.

[14] For more information about GSBPM: www1.unece.org/stat/platform/display/GSBPM

[15] For more information about GAMSO: www1.unece.org/stat/platform/display/GAMSO

activities also included. One advantage of this approach is an increased international comparability of cost break-downs.

2. Valuation by market (equivalent) pricing

160. In national accounting, market prices are the basic reference for monetary valuation. However, as in the case of many public services, market prices are not directly observable for statistical outputs. In the absence of market transactions, the main reference for valuation of such outputs should, as a general rule, be the market price that would have been received, if the statistical outputs had been sold in a market environment. One way to implement this approach is to approximate the market price by looking at the market prices of similar services or products which are actually transacted in a competitive market environment. If relevant data are available, such a market equivalent pricing method seems to be attractive for the monetization of the value of official statistics.

161. As a first step, the application of the market-equivalent pricing method would require the collection of extensive information on how private companies sell statistical information on the information market. The following examples of statistical products developed by private operators in various statistical areas can serve as an illustration of this methodology:

- Consumer price indices:
  - Premise commercializes data on food inflation for a number of developing countries. Its business case is based on the fact that a large amount of economic data for developing countries is out of date for institutions to base their decisions upon. Premise publishes for example food staple indexes for Argentina, Brazil, China, India and the US. According to the company, food staple indexes can predict food trends up to 25 days in advance of the official monthly releases. Price data are tracked and collected through a network of contributors on the basis of observations made directly on the ground, notably through photographs[16].
  - Pricestats is another example of a company providing updates on inflation for a number of countries on a daily basis using web scraping technologies collecting online prices[17]. It also publishes purchasing power parities for a number of targeted economies.
- Business data
  - Bureau van Dijk provides a wide range of company information and business intelligence at national, regional and global level. It also offers data on mergers and acquisitions and other economic information. One of its flagship products is Orbis, a database providing extensive information on private companies around the world. Its databases contain data for approximately 200 million companies based on more than 140 different sources[18].
- Macro-economic statistics
  - The Global Database provided by CEIC contains over 2.5 million time series covering countries from all over the world (G7 countries, Europe, Latin America, Middle East, Africa, Asia), offering quick country references on key indicators such as GDP, CPI and Foreign Direct Investment (FDI), as well as more detailed information on key economic sectors.
  - Another example of a private information broker providing macro-economic statistics is Haver Analytics, which commercial offer covers more than 200 databases with long-time

[16] See the article "Photos are creating a real-time food-price index", published in Wired, April 2016, at www.wired.co.uk/article/premise-app-food-tracking-brazil-philippines.
[17] For an example of the use of Pricestats data, see the article "Straw in the wind", published in The Economist, July 2016, at www.economist.com/news/britain/21702225-forget-financial-markets-evidence-mounting-real-economy-suffering.
[18] See www.bvdinfo.com/en-gb/our-products/company-information/international-products/orbis.

series, from over 1,350 government and private sources, ranging from Balance of Payments (BoP) statistics to labour force survey data.

- Statistical information of a more general nature
  - Statista.com presents itself as one of the world's leading online statistics portal, claiming to have 3 million users every month. It provides market data, surveys and statistics of all kinds, allegedly on more than 80,000 topics from more than 18,000 sources, covering 170 industries and 1,000,000 statistics, 20,000 studies, etc. They focus on visualization tools, notably attractive infographics.

162. All these examples show an active and dynamic information market where private companies not only provide their customers with traditional statistical products (which is greatly facilitated by the free dissemination of official statistics and policies encouraging the reuse of public information for commercial purposes), but also develop increasingly innovative statistical products with, apparently, commercial success.

163. The above examples of private data brokers may be useful in providing market price information to monetize the value added of official statistics. On the other hand, the limits of such an approach are also clear, as its validity relies on the similarity between the outputs produced by official statistical authorities and the products sold on the information market. In most cases, this is not that straightforward. The relevant private companies typically create competitive advantages by exploiting commercial niches where official statistics are not adequate or not timely enough[19]. These niches can be quite specialised and of interest for an extremely limited number of potential clients. Furthermore, the relevant statistical products are often marketed together with additional services such as instruments for data analytics, visualisation tools, and dedicated customer support services. Only in some cases it may be possible to observe equivalent products (e.g. EU-aggregate Balance of Payments). Another problem may be related to the fact that the relevant market services are often limited to some specific areas, thus not providing prices for the whole scope of official statistics. It is also limited, by its nature, to the price that customers are willing to pay on the market, thus underemphasising the value added from the (free) use of official statistics for research and public policy purposes. Finally, in applying this approach, one may be confronted with some practical problems, mainly due to the difficulty of getting access to the pricing policy followed by the private information providers.

164. While attractive in its principle, the approach of market equivalent pricing for establishing a monetary value of official statistics clearly has its limitations, both from a conceptual and a practical point of view. It is, therefore, recommended to work towards applying this methodology where this is practicable but recognising that this is likely to be for only a limited number of clearly identified statistical outputs (e.g. well established macro-economic statistics or key indicators with similar geographical and time coverage). That said, practical experience gained on a case by case basis may lead to greater scope for such methodology than is apparent as of now. It is, therefore, important that NSOs share their experiences of this approach.

3. Valuing with stated preference methods

165. There may be more scope for computing the value of official statistics from the stated preference method, sometimes referred to as the contingent valuation method. It relates to a survey-based approach used for the valuation of non-market goods and services, asking people directly about the values they

[19] In some cases, their business model is based on the absence of trust in official statistics, as a consequence of which the application of the market equivalent pricing methodology seems to be at odds with the reality of the (perceived) quality of official statistics.

attach to statistics. (It thus differs from the "revealed preference method" discussed in the next section, where values are inferred from the choices people make.). The contingent value of a non-market good or service is the amount that users are "willing to pay" for it, or "willing to accept" in return for not having it. The key difference between willingness to pay and willingness to accept is that the former is constrained by a person's ability to pay (i.e., typically a person's disposable income) and the latter is not.

166. In stated preference studies, randomly selected samples or stratified samples of individuals are selected from the general population and given information about a particular problem. They are then presented with a hypothetical occurrence, such as the provision of a specific good or service, and asked how much they would be willing to pay for the relevant product or the amount of compensation they would be willing to accept to give up the good or service. The actual format may take the form of a direct question ("how much") or it may be a bidding procedure (ranking alternatives) or a referendum vote (yes/no). The studies can be undertaken as face-to-face interviews, telephone, or mail or internet surveys.

167. The stated preference method was one of several methods used to explore the economic value of the UK Economic and Social Data Service (ESDS)[20]. The ESDS is a distributed service which aims to promote wider and more informed use of data for research and teaching in social sciences. It has around 23,000 active users and an operating budget of £3.3 million. In the ESDS study, a user survey was undertaken in which respondents were asked to express their willingness to pay in terms of an annual (subscription) fee and on a pay-per-access basis. Responses were weighted by type of use, and the use-weighted means multiplied by the three year annual average number of active registered users.

168. This resulted in an estimated willingness to pay of around £25 million per annum among the survey population. The same survey also asked respondents what they would be willing to accept in return for giving up all access to the ESDS for one year. Some respondents were willing to accept nothing, because they believed that data should be free. Including these responses, the use-weighted mean of the individual willingness to accept was £5,333, and excluding them it was £6,154. When the data were multiplied by the three year average number of active users, the responses suggested a willingness to accept of around £111 million per annum among the survey user community. The results from this study illustrate the typically lower contingent values obtained when based on willingness to pay compared to willingness to accept, reflecting the budgetary constraints associated with the former.

169. Like all valuation methods, the stated preference method has advantages and disadvantages. The main advantage is that it is extremely flexible, as a consequence of which it can be used to estimate the economic value of virtually anything, albeit that it is best able to estimate values for goods and services that are easily identified and understood by users and that are consumed in discrete amounts. It is also the most widely accepted method for estimating total economic value, including all types of non-use and "passive use" values. Furthermore, the results are relatively straightforward to analyse and describe. Monetary values can be presented in terms of a mean or median value per capita, or as an aggregate value for the affected population. It is therefore not surprising that the method has been used successfully in a variety of situations and that the methodology is being constantly improved to make it more reliable.

170. On the other hand, the estimates of non-use values are difficult to validate externally. The method also assumes that people understand the product in question and state their preference in the contingent market just as they would in the real market. However, some respondents may be unfamiliar with the product being valued and may not have an adequate basis for articulating its true value. Furthermore,

[20] For more information, see Charles Beagrie Ltd and The Centre for Strategic Economic Studies (CSES), University of Victoria (March 2012), "Economic Impact Evaluation of the Economic and Social Data Service". Available at: www.esrc.ac.uk/files/research/research-and-impact-evaluation/economic-impact-evaluation-of-the-economic-and-social-data-service/.

respondents may fail to take the questions seriously because the financial implications of their responses are not binding. The expressed answers to a willingness to pay question in a contingent valuation format may also be biased, because the respondent is expressing views about the desirability of the scenario, rather than answering the question as intended. Finally, the method can be expensive and time consuming, because of the extensive pre-testing and survey work needed to arrive at adequate results.

4. Valuing with revealed preference methods

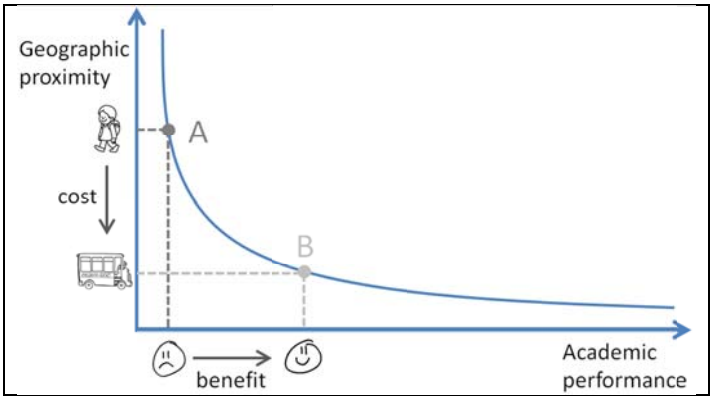
171. The revealed preference theory, pioneered by Paul Samuelson[21], aims to understand consumers' preferences for attributes when choosing among a bundle of goods or services when their choices are constrained by their available budget. In this sense, the method is similar to stated preference methods in that it exploits the trade-off between attributes. An example for this trade-off is the choice of schools based on available statistics on school quality and on commuting distance. The method is different from the stated preference method in that it does not use specifically designed and controlled surveys (or choice experiments), but attempts statistical inference based on observed real-world behaviour.

172. By way of illustration, the following text describes briefly two examples of the revealed preference methodology, the important ones.

173. The first relates to school choice. In this context, revealed preference methods are used to evaluate the trade-off between choosing a school based on academic performance (published in annual school league tables), geographic proximity (in terms of commuting time) and other attributes. In figure 2, the trade-off between geographic proximity (on the vertical y-axis) and academic performance (on the horizontal x-axis) is illustrated in the form of the average parents' indifference curve that connects all x-y combinations of schools that yield the same utility to the parents. In this example, the parents' indifference between schools A and B allows us to infer that they are "willing to pay" the higher price of commuting to the more distant school B, because they expect a better education for their child. If the commuting cost is monetized in the form of fuel prices or parents' wage-equivalent time then this method gives the monetary value of the educational statistics. This monetization method is currently being implemented in an ongoing project on school choice by the Hungarian Education Office and OECD. Previous research for the United Kingdom and the Dominican Republic has pursued similar questions. Burgess et al.[22], for example, show that most English families have strong preferences for secondary schools' academic performance published in annual school performance tables. Parents also value schools' socio-economic composition and distance, which may limit the potential of school choice to improve academic standards. Less advantaged parents have weaker preferences for academic performance. Jensen[23] finds that the perceived returns to secondary school in the Dominican Republic are extremely low, despite high measured returns. Students at randomly selected schools given information on the higher measured returns completed on average 0.20-0.35 more years of school over the next four years than those who were not.

[21] Samuelson, P. (1938), "A Note on the Pure Theory of Consumers' Behaviour", Economica, 5 (17): 61-71.
[22] Burgess, S., Greaves, E., Vignoles, A. and Wilson, D. (2015), "What parents want: school preferences and school choice". The Economic Journal, 125(587): 1262-1289.
[23] Jensen, R. (2010), "Impact of Information on the Returns to Education on the Demand for Schooling in the Dominican Republic", Quarterly Journal of Economics, 125(2): 515-548.

Figure 2. Preference trade-offs in revealed preference methods



174. The second example infers the value added of official statistics from the media coverage of statistics. It aims to evaluate the trade-off faced by a publisher who decides between two sources of revenue: placing advertisements (that have zero or even negative value for readers) and placing substantive content (to attract a wide readership and increase sales). It can then be assumed that, if a publisher places content instead of an advertisement, the value this content has to readers (in attracting additional readers) must at least be equivalent to the revenue that would have been generated from the advertisement. The value of statistics content to the readers can thus be approximated by the cost of placing an advertisement of the same size as the content. Good examples of this method have been elaborated by the Mexican and the Spanish statistical office (INEGI and INE). Both institutes publish the impact of official statistics in the media as part of their monthly communications reports. In the case of INE, the analysis is undertaken by the media company Kantar Media. INEGI produces the statistics in-house for some media types and outsources the remaining tasks to an external consultancy. See box 1 for further details.

Box 1: Use case of the valuation of official statistics in the media

To estimate the value of statistics in the media, INE Spain currently searches for three keywords in the various media types (printed media, radio, television, internet). Based on these searches, they publish three statistics:

1. number of references;
2. impact: number of references times the audience (i.e. circulation of the newspaper, number of viewers);
3. market value: cost of placing an advertisement of the same size (for print and internet) as the article that contains the reference (at the same time and section). For radio and television content INE and INEGI use the rate per second.

INEGI Mexico obtains the total market of references to statistics as the sum over all media types.

The estimate by INEGI amounted to US$ 151 million in an average month in 2015 (see figure 3a). For INE, the total value increased from EUR 46 million in May 2015 to EUR 47 million in May 2016 (see figure 3b). This value can be broken down by statistical product. For INE, for example, the GDP statistics in May 2016 were estimated to have a public value of EUR 9.95 million per month, followed

by the CPI (3.35 million) and the census (2.07 million).

Figure 3. Newspaper advertisement methodology

a) Monthly valuation of references to INEGI Mexico

Media	Notes	Impact	Market Value
Television	425	71M	$41M
Printed Media	2,976	50M	$31M
Radio	786	23M	$72M
Internet	5,324	91M	$6M
Total	9,511	236M	$151M

b) Monthly valuation of statistical products of INE Spain

Statistical product	Value in May 2015	Value in May 2016
GDP	€6.76M	€9.95M
CPI	€3.59M	€3.35M
Census	€1.77M	€2.07M
...	...	...
Total	€46M	€47M

Source: INEGI Mexico (Iñigo Suárez Gómez-Urquiza), INE Spain (Donald Peña Martinez) and authors' own.

175. Revealed preference has a number of strengths as a tool for valuation. It relies on actual behaviour as opposed to what respondents say hypothetically as a way of computing observed value. Like stated preference, it is also a methodology which has been used in cost benefit analysis and economic appraisal for many years. Its use in the context of assessing the value of official statistics would, therefore, be lent credibility by the fact that it is such a standard tool, rather than something the official statistics community had invented itself or which could be used for special pleading.

176. At the same time, there are also undoubted caveats and limitations. Approaching a comprehensive assessment of value requires being able to locate revealed preference evidence relevant to all of its dimensions. For example, the media value approach practiced by INEGI and INE throws light on the value of official statistics as perceived by the general public. But it will not relate the value that would be placed on them by, say, policy makers or commercial decision makers in running their enterprises. It may sometimes be possible to find additional evidence of revealed preference that would take the assessment of value towards a more complete picture. Nevertheless, such evidence may not always exist or, if it does, be easily accessed.

5. Impact assessments

177. A third methodology for valuing official statistics relates to impact assessments, which aim to assess the causal effect of data availability on economic and social outcomes. There are many examples of impact assessments. Analysing differences in interest rates of debt securities issued by government across countries that have or have not high quality statistics may provide an indication of the costs of higher risk premiums in the absence of statistics. Another example relates to the impact of not having statistics, e.g. as a consequence of a partial government shutdown as was the case in the United States.

More generally, it is possible to contemplate exercises to assess the costs of having no or unreliable statistics, by analysing the costs of wrong policy decisions, or by estimating the impact of lost trust in statistics on government decision making, international relations and the business environment. While it is not always straightforward to isolate the impact of the statistics alone, nevertheless careful analysis will often be capable of yielding useful information.

178. In this section, a concrete example of impact assessments is presented for school statistics, based on the work of Burgess and his colleagues. Annex 5 to this report lists a number of references to other available case studies measuring the value of data or statistics. Public school choice is a well-established instrument to allow parents to choose the right school for their child. It has the potential to increase the accountability of schools, reward them for good performance and thus improve educational outcomes[24]. Building on a unique policy experiment in England and Wales[25], two exercises, as set out in Box 2, are summarised here that quantify the return-on-investment of official school statistics. The first estimates the effect on economic growth. The second quantifies the cost-savings from avoiding more costly investments in other areas, such as cutting class-sizes by hiring more teachers.

179. The publication of school league tables in England come at a cost of approximately £150 million per cohort. Burgess et al conclude, however, that this cost is more than offset, by a positive school accountability effect on student achievement that is equivalent to (i) an estimated increase in economic growth of £2.4 billion per year; and (ii) a class-size reduction worth £2.9 billion per cohort. Every £1 invested in providing school statistics thus results in a £16 to £18 return, depending on which of the two methods is used. Thus, this example demonstrates that substantial gains can be derived from investing in and publishing school performance information.

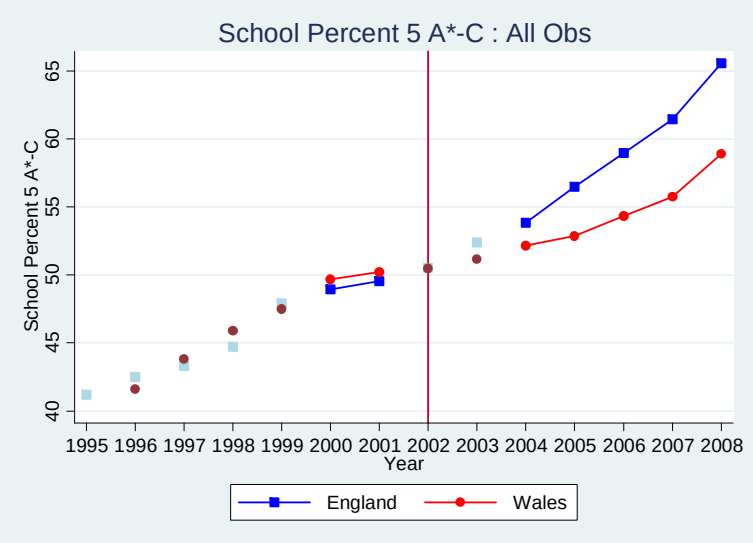
180. It is clear that impact assessments can allow calculation of the wide value of providing statistics, often on a monetized basis. As such, they can provide very strong evidence for the value added of (official) statistics. On the other hand, impact assessments can only be conducted where circumstances imply an event which can be evaluated. So, their application will be restricted to such circumstances. Nevertheless, where such exercises are possible, they allow thorough assessment of the value of the statistics concerned, often providing a very compelling case.

[24] See e.g. Hatfield, J. W., Kojima, F. and Narita, Y. (2012), "Promoting school competition through school choice: A market design approach", Working paper, Department of Economics, Stanford University; and OECD (2008), "Measuring Improvements in Learning Outcomes: Best Practices to Assess the Value-Added of Schools", OECD Publishing, Paris.
[25] See footnote 20.

Box 2: England/Wales experiment on the impact of educational statistics

Exploiting a rare, exogenous policy change that results in the provision of official school statistics in England but not in Wales, Burgess et al.[26] find a significant and sizeable negative effect on pupil progress in Wales, as illustrated in national exams (see figure 4) and PISA scores. Based on the results of this research, it is estimated that every £1 invested in the examination system and the subsequent production and dissemination of school league tables results in academic improvements equivalent to an £16 increase in GDP or, alternatively, cost savings of £19 compared to cutting class sizes to achieve equivalent improvements. These results are on a par with even the most optimistic "value for money" investments for the targets of the Sustainable Development Goals[27].

Figure 4. National Exam Performance in England and Wales



Source: Burgess et al., 2013

Impact on economic growth

Following a policy change in 2001, as a consequence of which Wales stopped publishing school league tables while England continued the publication, it is possible to compare a composite measure of cognitive skills (the aggregated PISA scores of Mathematics, Science and Reading) for England and Wales in 2003 (baseline[28]) and 2009 (end line). The difference-in-difference of 10 test

[26] See footnote 20.
[27] See e.g. Copenhagen Consensus Centre (2015), Online supplement to "The economics of optimism: The debate heats up about what goals the world should set itself for 2030", The Economist. Available at www.copenhagenconsensus.com/post-2015-consensus/economist
[28] The baseline year is 2003 as separate PISA results for 2000 for England and Wales are not available.

scores corresponds to a standard deviation of 0.1 on the PISA scale. Hanushek and Woessmann[29], and OECD[30] estimate that an increase in PISA scores by a standard deviation of 0.1 yields a 0.174 percentage point increase in GDP. Given England's GDP of £1.38 trillion in 2015, this results in an estimated improvement in economic production of £2.4 billion (= 0.00174 x £1.38 trillion) per year. In relation to the cost of the examination system at about £300 per student (i.e. £300x500,000=£150 million[31]), this results in an estimated "return on investment" of 1500% (=(£2,400-£150)/£150 million) from producing the league tables.

Cost-savings potential

Burgess et al.[32] find the effect size of publishing school league tables on national exam results to be eq to a 30% reduction in class size (based on previous results in Angrist and Lavy, 1999). This effect is con to a 30% reduction of the current UK student-teacher-ratio from 16 down to 11.2[33]. Holding the nu students fixed at 500,000 per cohort, this reduction would require hiring 13,390 (=44,640-31,250) ad secondary school teachers at the average annual salary of £36,200[34]. Putting the overall cost savin hiring these additional teachers at £484 million per year (13,390x£36,200) in relation to the cos examination system results in an estimated "return on investment" for six years of secondary scho 1800% (=(6x£484-£150)/£150 million) from producing the league tables.

6. Summary and conclusions on monetizing the value of statistics

181. The preceding sections have discussed a number of approaches to placing a monetary value of official statistics. One of these – calculating the cost of the statistics – cannot really be regarded as giving evidence of the value of statistics, certainly not when monitoring the evolution over time, and suffers from a number of drawbacks in this guise. Nevertheless, there are good reasons why NSOs would be well advised to construct comprehensive information about their cost base. Such information is useful in itself and can also be used in conjunction with genuine information about value to assess efficiency and productivity, either on a comparative basis at a point of time or their evolution over time.

182. But, as discussed, there are a number of other methods – market equivalent pricing, stated preference, revealed preference, impact assessment – which can be used to generate well-based and convincing information about value. Each of these has strengths and weaknesses. None can be employed universally but only in particular circumstances. Nevertheless, together they have been used successfully to produce good information about the value of outputs other than official statistics, in appraisal exercises over many decades. There seems no reason, therefore, why NSOs should hold back from using the same techniques in our own field. Furthermore, experience of using such techniques will itself show how they can be used to increased effect.

[29] Source: OECD PISA databases for 2003 and 2009, available at www.oecd.org/pisa/pisaproducts/

[30] See Hanushek. E. and L. Woessmann (2012), "Do better schools lead to more growth? Cognitive skills, economic outcomes, and causation", Journal of Economic Growth, 17, 267-321; and OECD (2010), "The High Cost of Low Educational Performance: The long-run economic impact of improving PISA outcomes", OECD, Paris. Available at www.oecd.org/pisa/44417824.pdf

[31] In the UK, GCSE exams are organised by competing providers that charge a minimum of $250 per candidate. The examination system in England (of which the publication of school league tables is only a small part) is therefore estimated to come at a cost of 500,000 pupils x £300 = £150 million per cohort.

[32] See footnote 20.

[33] For state-funded secondary schools in the UK, the class size over the period 1978-2011 oscillates around 21 and the average student-teacher-ratio around 16. The difference between both statistics remains constant at 5 over the entire period and it is therefore a conservative assumption to equate a 30% reduction in class size with a 30% reduction in student-teacher ratio. See Department for Education (2011), Class Size and education in England evidence report, Figure 1-6. Available at: www.gov.uk/government/uploads/system/uploads/attachment_data/file/183364/DFE-RR169.pdf

[34] Department for Education (2011), School workforce in England: November 2011, Tables 1d and 9a. Available at www.gov.uk/government/uploads/system/uploads/attachment_data/file/219297/sfr06-2012v6.pdf

183. All in all, if one would like to arrive at a relatively complete coverage of official statistics when trying to monetize their value added, the stated preference method and the revealed preference method (advertisement method), in addition to having data on the cost of producing official statistics seem to be the most promising. However, it is also clear that the more compelling results can be derived from the other revealed preference method (the example of school choice) and the impact assessments. Whatever one's preference, it would be good to gain more experience in the practical application of the various methods for monetizing the value added of official statistics. Countries are therefore encouraged to compile (experimental) estimates and share them with other countries. For the purpose of the latter, it is proposed to set up a repository as part of the best practices wiki.

E. Conclusions on measuring the value added of official statistics

184. In the above sections, various approaches to generating information about the value added of official statistics have been described. Three sets of actions by NSOs are recommended:

- Setting up a standard set of directly observable, "objective" indicators on the use of statistics. Such a dashboard of indicators could include, for example, standardized indicators on the number of downloads, the number of quotation in the news, etc.
- Having a regular user survey, from which can be derived the perception of users about the compilation and dissemination of official statistics. The collection of such "subjective" indicators will provide good feedback about the current perception of official statistics. But it will also provide information as to how the perceived value and usefulness can be improved in the future.
- Working to compute a monetized value of official statistics. In other fields, the available methodologies for monetizing value are becoming more and more developed, and are deployed to good effect. Official statisticians should not baulk at a similar endeavour. This is likely to involve use of a combination of techniques. Their practical usefulness is likely to increase with experience of their use. It is therefore important that such experiences are systematically shared between NSOs.

6. Recommendations

185. NSOs start from a position where usage of their outputs is generally increasing and where user confidence and trust is rising, often from already high levels. However, the official statistical community would be unwise in the extreme to regard this as a prescription for being satisfied without making further effort. Changing needs and circumstances present numerous challenges. The world is not short of information: on the contrary, it is awash with it. Many bodies would claim to generate useful information and official statisticians have no monopoly on that. Developments in technology are likely to underline rather than detract from this conclusion. The challenge for official statistics is to demonstrate that they nevertheless continue to add, and indeed add growing, unique value.

186. This leads to a number of more specific recommendations for the way forward. The first recommendation relates especially to the comparative advantage of official statistics, discussed in Chapter 3.

Recommendation 1 – Exploit the comparative advantage of official statistics (the cornerstone)

187. Official statistics are produced in professional independence based on scientific methods, rigorous quality criteria, including relevance, and the Fundamental Principles of Official Statistics. Upholding these principles is essential to any country seeking to understand itself and respect the rights of its people. Modern statistical legislation supporting the application of Fundamental Principles is an important element in ensuring the position of NSOs as a trusted information source that is independent from any policy or other interests. It could be said that **the value of official statistics, as compared to any other statistics or data, is "the difference induced by the Fundamental Principles", therefore:**

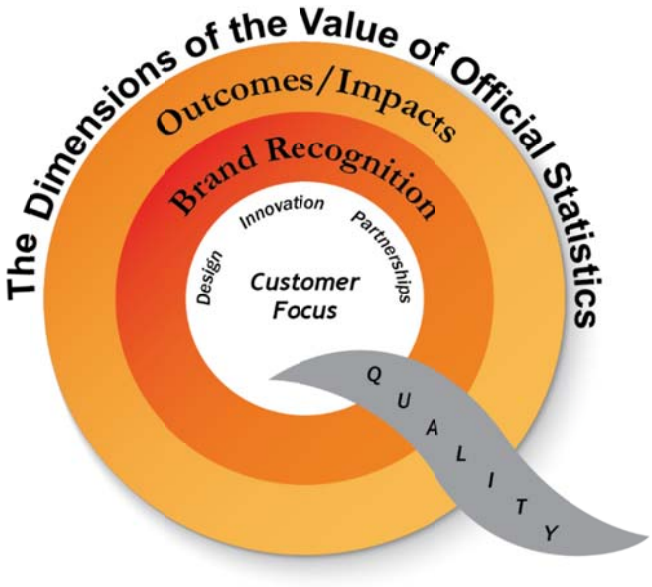
- **Data security and confidentiality protection become increasingly important to ensure** as the work of statistical offices is changing, especially through increased data integration, exchange and reuse of data between producers of official statistics nationally and internationally and the use of various new data sources.
- **Trustworthiness represents perhaps the highest value of official statistics** compared to other data sources. The Fundamental Principles emphasize that official statistics are impartial and scientifically compiled based on professional considerations only. Quality assurance is essential for building the value of official statistics, as well as a key element to increasing the users' confidence. Quality is by no means a monopoly of official statistics. However, NSOs have a unique legal and institutional framework that ensures the compilation of objective and independent statistics that are not influenced by any interests. We publish relevant findings without fear or favour, and we fully disclose our methods.
- All NSOs should have a **Quality Assurance Framework**, available to users, in order to ensure the quality of the statistics they produce and disseminate. NSOs should make a clear and concise quality statement that summarizes **how they implement the Fundamental Principles of Official Statistics**, thus guaranteeing the reliability, objectivity and high quality of the products they produce, in distinction from other data providers that do not apply the Fundamental Principles rigorously.

- To fully benefit from their comparative advantage, NSOs need to consider the capabilities they have, such as the organization, people, processes and technology. The statistical infrastructure that NSOs create and maintain, including statistical frameworks and classifications, provide coherence and enable users to obtain meaning from data. **Human resources are the key to generating value in statistical offices.** NSOs need to develop their staff, their skills and capacity to be able to respond to new challenges and to generate more value to society. At the end of the day, staff is the key resource that will make the recommendations happen.

188. **Further recommendations relate to the generation and promotion of value, discussed in Chapters 3 and 4:**

- Begin with a firm focus on the customer/user and his/her needs
- Place stress on design of products and services to meet those needs, based on continuing innovation
- Invest in brand recognition and promotion so that those well designed and innovative services are well known and trusted
- In this way, generate beneficial outcomes and impacts on society…

… which in turn are widely recognized as having added value.



Recommendation 2 – Put users of statistics truly at the centre

189. We produce data and statistics as a service to users. **We need to listen deeply to users and be user-centred in everything we do** to unlock the benefits of our vast datasets and ensure our relevance. NSOs should reduce users' burden by providing products and services that meet their needs better at reasonable costs, are easily available and effectively communicated. We need to understand and respond to the different needs of our users. Users should be segmented to meet user needs better (see Chapter 2 b) - some users just want access to datasets, some want tailored analysis and some want tools to make the underlying data easier to understand, for instance:

- **Data is not the whole story**. We are best placed to provide the context to data by analysing our vast datasets to describe what is actually happening in the dataset behind the statistical

aggregates. According to their role, NSOs would produce objective analysis based on data, not any subjective analysis, views or speculation. We have what it takes to find fresh insights to data and reuse existing data sources in new ways.

- **We need to redefine our products and services to move away from bulk data provision** towards higher value outputs that correspond with what users truly need. Businesses are among the least satisfied users of statistics. We need to find out what kind of statistical services users really need. Decision makers use dashboards with headline indicators on a daily basis to review progress towards their policy goals. They should have our apps providing the latest "headline statistics" ready for use and up to date with the freshest statistics. Some NSOs have organized events where data users demonstrate benefits from using official statistics and practical uses of data. This has proven useful for developing more user oriented services.
- **We cannot simply say "no" to new trends and demands**. Ten years ago statisticians debated whether measuring sustainable development was part of our tasks or not. Now the SDGs are here and we need to measure them and help others to do so in line with the Fundamental Principles of Official Statistics. We need to look at how our data can be used for analysing climate change, reducing vulnerabilities and building resilience.

Recommendation 3 – Design statistics for everyday life

190. Many statistical offices already use distinctive design to give official statistics a look and feel of a branded product. **Design is much more than logos, typography and graphics – it is about keeping users of statistics engaged with our statistics and improving their usability.** NSOs should improve ease of use and ease of access to statistics, for instance:

- **Data are everywhere, statistics are not**. We should encourage a more open access to non-confidential statistics so that they can be used in various devices, apps and analytical tools by the private sector. This does not mean that everything should be available free of charge. NSOs' resources are limited and they cannot pre-compute all possible data combinations. Therefore, chargeable statistical services could be provided where the service is tailored to individual data needs. This also promotes wide use of existing datasets. NSOs also need to translate raw data into information and develop new kinds of products that people may use in their daily lives. Greater emphasis needs to be put on digital communication, such as user-centred design and user friendly interfaces, and increasing the use of infographics, data visualization tools, stream of articles, social media posts and tweets. These services should be interactive to encourage feedback and development ideas from users.
- **Encourage design innovation and engage users in developing new products and services**. Use grants and competitions to create incentives for staff to come up with ideas for new designs to unlock the value of statistics. Set up catalyst projects to experiment with new thinking. Send your design innovations to open competitions to win awards from the media, the academia, the private sector or other stakeholders. Announce an award competition in statistics: statistical Olympics or "Hackathons" to invite programmers, software developers, graphic and interface designers and project managers to collaborate intensively on product development. NSOs have also done beta launches of new products so that customers can provide feedback which feeds into new iterations of the product.
- **Users look for data points to answer their specific questions**. Too often statistics are presented in ways that are not easy to understand. Users no longer have the time to browse through massive data tables or printed publications. They are becoming impatient and are looking for

quick answers. We need to re-engineer access to statistical information, and consider, for example, creating "Stats engine" services to provide statistical figures as answers to users' questions and develop the use of geospatial tools. Statistics should be repackaged and disseminated by topic, population group or geographic area rather than by data source or collection.

Recommendation 4 – Innovate to remain valuable

191. Finding the best ways to measure the changing reality requires constantly innovating - to power and underpin the well-designed products by which we stand or fall. While we want to maintain our traditions, long time series and quality standards, **we have to be flexible and adaptable - innovate at a faster pace than ever before** to maintain and increase our value to society, for instance:

- **Take the time to stop and think what we are really aiming at**. Statisticians are too busy with ongoing producing: collecting data, editing and compiling aggregates, creating tables and disseminating the results. Innovation is not only about technology, it is also about what we do and how we do it. Standard-based modernization of statistical production could free resources for innovation from statistical production.
- **Make the best use of technological opportunities** for data extraction and integration, and exchange between producers of official statistics, stemming from the Data Revolution and Big Data. On one hand, we need to fully utilize the good methods and abilities that we already have, e.g. to improve timeliness using nowcasting, assessing the accuracy, consistency and usefulness of the results produced from Big Data and incorporating the relevant digital data sources in statistical production to meet user demand, including the growing demand for real-time data. Timeliness continues to be a central consideration since in NSOs' surveys users that were not satisfied with timeliness were also less convinced of the value of statistics. On the other hand, we should recruit and train staff for data analytics and data science and in using new data sources, technologies and applications. We can offer challenging work to analyse the widest range of datasets together with digital data.
- **Invest at least 10 per cent of working time in innovation and research**. We can no longer just maintain the status quo; we need to search for new solutions, ask questions, collect ideas, test them and evaluate them. We should not settle for trite answers. While we safeguard our traditional values and image, we should be curious about how to unleash the potential of statistics to improve lives. This could entail hosting "stats hack" sessions that bring together a diverse range of staff and other experts to create ideas for new products or improvements to existing products. Having an innovation website to host new experimental statistics and products may be a good way to seek feedback from users.
- **Consider and explore the evolving roles that NSOs should expect to fill. It will increasingly not be enough for NSOs just to produce statistics**. They will need, for example, to move towards become "knowledge hubs", if they are to be able to produce the information that decision makers need, combining statistics and other data sources and drawing out the implications. In another dimension, the reporting on SDGs, for one thing, will call for a strong coordinator of work, with NSOs reaching out to data producers they have not worked with before, and not just producing outputs on their own. In this sense, NSOs' role in quality control, accreditation, standard setting and methodological guidance will become more prominent than before. Some statistical offices have already gone further and started the transformation into a "statistical

data hub" that will offer a data management platform with access to all open data in the country.

Recommendation 5 – Go further with strategic partners

192. We work in strong partnerships in the statistical community and engage with data providers. Strategic partnerships with other government agencies are critical for the efficient production of official statistics. In engaging in strategic partnerships, be it with public or private organizations, NSOs need to consider possible risks to their professional independence to avoid any loss of trust. Partnerships we engage in should be of mutual benefit and add to the value of official statistics to society. The combination of tight budgets and rapidly increasing data needs, especially for the reporting on SDGs, calls for **seeking new partners to leverage expertise and add value**. If we fail to team up with the right partners, somebody else will step in to deliver on our behalf, therefore:

- **Partnerships with the private sector still represent a largely untapped source of innovation**. They could open access to source data that may replace or complement traditional surveys. Partnerships may enable access to new tools and technologies, design knowledge, product ideas, dissemination channels and networks. We should make our data available for use in new products of private companies, thus, increasing the reach of statistics. Effective partnerships with the media could also help to communicate and reach the users of statistics better.
- **Experiment with "Statslabs" and new models of international partnerships** within and outside the statistical community. For example, set up "Statslabs" with experts from statistical and other offices to work in product and design development. This would help address resource constraints and spread new innovations by "copying and pasting", thus, increasing our capabilities.
- **Look for, and make the most of, opportunities to influence stakeholders' work.** For example, some statistical offices have worked with administrative data providers to adjust their data collection slightly to reduce direct business surveying or to modify their work in a manner that would allow the use of administrative data in a virtual population register to complement or replace the current head count census.
- **Get at the centre of decision making, making a reality of strategic partnerships with such users, whether in the public sector with policy making or resource allocation, or in private sector decision making**. We can do our jobs well only if we understand the issues facing decision makers and which the information we provide is intended to inform. Such involvement is in no way inconsistent with our professional integrity – to the contrary, it is an important part of our professionalism.

Recommendation 6 – Build the official statistics brand and gain visibility

193. Excessive modesty about official statistics is dangerous. Like other industries, we need not only to generate value but to demonstrate and publicise that we are doing so. One element of this is **relentless promotion of the comparative advantages of our adherence to the Fundamental Principles of Official Statistics** characterized by high quality standards, professionalism, globally agreed methods, unwavering impartiality and credibility. More generally, brand recognition should be an explicit objective, based on the usefulness and quality of what we do and bolstered by concrete examples of the value of official statistics, therefore:

- **Be more assertive about out adherence to the Fundamental Principles of Official Statistics and the value that this generates**. This together with the reliability and quality that this endows in our products is a genuine comparative advantage that official statistics enjoys and we should exploit it as such. Official statistics have intrinsic value for democratic societies and for human rights in terms of the equal right to information[35] and accountability of decision making through the measurement of economic, social and environmental development. International human rights mechanisms are increasingly calling for the use of relevant statistics and the involvement of national statistical offices in human rights reporting[36].
- **Promote and publicize how official statistics around the world have added value**. As previous sections illustrate, there are many examples of where official statistics have generated value to societies and economies. Again, "concealing our value" is not a virtue in this domain. Official statisticians should find means to publicize such successes, not least as a way of helping identify further instances of where official statistics could add value. We should share examples which showcase the value of statistics in decision making and how they help people decide where to locate a business, what products to sell, where to build roads, schools and hospitals, and to know how families, women, men and children are doing, what is our quality of life, status of environment, economic conditions and performance. Why not write a series of articles on the uses of statistics, innovation, design and product development?
- **All NSOs should formulate and implement explicit brand recognition and promotion strategies**. While the general precepts apply across all official statistics, the circumstances and conditions facing individual NSOs will differ. Statistical offices would benefit from organizing staff training on effective outreach and hiring communications professionals. There are many but varying means by which NSOs can achieve greater brand recognition and visibility and individual NSO strategies could draw on these, as appropriate to their particular context.
- **Take steps to cater for a wider and probably less informed range of users.** The range of users of official statistics is expanding, not just to include professional analysts, researchers and public officials but to embrace a wider range of citizens looking for data to inform their decisions. In itself, this is welcome but it also means the average user is liable to be less well informed. One consequence is that NSOs need to consider how to make their outputs and their implications more accessible – what was appropriate for expert users will not be so for less expert but nevertheless fully legitimate ones. Furthermore, NSOs should consider practicable steps, perhaps working with other agencies, to educate users in numeracy and statistical literacy. This is of strategic importance for increasing the appreciation of official statistics and their value in society.

194. A further recommendation relates to the measurement of the value of official statistics, coming from the discussion in Chapter 5.

Recommendation 7 – Measure outcomes to achieve greater impact

195. Statisticians measure almost everything except themselves. To have a greater impact on society and decision making, actions need to be taken along the lines of previous recommendations, but we will also need to measure our results and impact. Furthermore, this

[35] See Article 19: www.un.org/en/universal-declaration-human-rights/ and Article 19 www.ohchr.org/EN/ProfessionalInterest/Pages/CCPR.aspx
[36] See for instance: www.ohchr.org/Documents/Publications/HR_PUB_16_1_NMRF_PracticalGuide.pdf

would itself help drive forward the agenda. **If we measure ourselves, we will be better able to prove our worth**, communicate with stakeholders and clarify ourstrategy, therefore:

- **Take steps to improve our knowledge of what our statistics are used for, and the impact that they can have**. Statistics should not just be produced for self-service. With the increasing supply of statistics available online, our users risk becoming less well known to us. If we do not know what we are needed for, we will fail in communicating our value. Statisticians are at the crossroads also with the "do more with less" approach and the need to invest in reliable, impartial and high-quality statistics needs to be recognized if the increasing data needs are to be met. NSOs have little freedom to rethink their products as the majority of resources are needed for producing statistics required by international or national legislation. Measuring the value of our work can help justify why investment in official statistics is important, and what the benefits of those investments will be.
- **Measuring the value of official statistics with a dashboard of indicators and a regular user survey** (see Chapter 5) would help us gain insights into where to invest to generate higher value. The metrics could include a mixture of measures of the economic value of official statistics and operational measures relating to user awareness, satisfaction, access to and use of official statistics. Stakeholder and partner surveys would be useful for identifying our weaknesses and strengths, and they could guide us towards partnerships that are more effective.
- **Develop approaches to calculate monetary values of official statistics, based on existing techniques applied in other fields.** This report describes the most frequently applied methodologies to monetize the value added of official statistics. By gaining more experience these methodologies can be refined, and more examples and evidence of the value of official statistics can be collected. Monetary measures of the value of certain statistic or statistics in general can provide a convincing case for defending official statistics.

Recommendation 8 – Share and learn to stay abreast of best practices

196. The world does not stand still. The phenomena that compete with official statistics are active and constantly changing. The challenges that a statistical office faces in one country will not necessarily be the same as the challenges faced by another statistical office in another country. Analogously, strategies to address these challenges that are successfully implemented may not necessarily apply, or be successful, in another statistical office.

197. One final recommendation on international work stems from discussion in many parts of previous sections. **There is great value in NSOs learning and applying best practices, both from other NSOs but also from other organizations.** Indeed, part of the purpose of this report is to assemble such examples of good practice, therefore:

- The official statistics´ community needs an interactive and dynamic model to implement the practical applications of the recommendations listed in the previous sections. The Task Force on the Value of Official Statistics has developed **a wiki on best practices of statistical offices in value creation, measurement and promotion.** The wiki provides a catalog of best practices for the above recommendations to be used for ideas by all statistical offices. NSOs could select interesting practices from the wiki that are relevant to their circumstances and they could also add their particular good practices and share their experiences for general use through the wiki.
- The Task Force recommends that the wiki be hosted by the UNECE Statistics Division. **NSOs would be invited to update the practices annually in connection with a relevant UNECE expert**

meeting, such as to the network of experts on communication and dissemination that often discuss value proposition and value creation. In the longer term, the wiki could be **extended to include a library of recent studies and research** on the value of data and statistics. It could also be **extended to cover some selected best practices of other industries**, besides statistical offices, that provide ideas on successful strategies that address similar challenges from which we can all learn.

7. Conclusions and next steps

198. The recommendations set out in the preceding Chapter are all based on the Task Force's view that official statistics stand at a crossroads. The Task Force believes that action is necessary now to ensure the continuation of previous success to take advantage of the unique opportunities that present themselves, and to deal decisively with the threats that are also evident.

199. That NSOs should give themselves better information about the value generated by official statistics is a particularly pressing part of the recommendations. The lack of such information presents a particular risk at a time when public expenditure on all activities, including official statistics, is under intense scrutiny. Recommendation seven proposes various measurement approaches to address this issue.

200. The Task Force urges NSOs to take forward the recommendations and to share the experience of so doing. Active sharing of experiences in practical implementation of the recommendations will greatly speed up the progress.

201. In February 2015, when the Task Force was set up, the CES Bureau identified the following work strands related to the value of official statistics:

- Making strategic recommendations on how to promote and communicate the value of official statistics and measure their impact, to be led by this Task Force.
- Promoting and marketing the value of official statistics to be led by the High-Level Group for the Modernisation of Official Statistics (HLG-MOS) and be discussed at the regular Work Sessions on Dissemination and Communication of Statistics.
- Valuing the costs of producing official statistics to be led by the HLG-MOS, especially to share current experience and practices in using the HLG standards as a basis for cost estimation.

202. In this light, the Task Force proposes the following:

- All NSOs are invited to implement the Recommendations, and make use of the related tools, including the practical examples provided in the wiki, the generic user survey and the annexes with persuasive talking points. NSOs will, of course, be at different points of development and will need national actions plans to implement the strategy highlighted in the Recommendations.
- The Task Force has created the best practices wiki noted in Chapter 6. UNECE should host and maintain this wiki and invite NSOs once a year to supply their own relevant material to the wiki and update it in the light of experience. Such updates could also be made whenever there was new information to share. The annual updating could be accompanied by a UNECE meeting of relevant experts for which the wiki could serve as a repository of interesting practices for discussion.
- Over the years, the UNECE Work Sessions on the Communication and Dissemination of Statistics have discussed many issues related to these recommendations, such as customer focus, design, innovation and brand recognition as well as the value proposition of official statistics in general. This or another dedicated meeting of experts could be asked to promote and review progress with the recommendations and consider within 4-5 years' time whether the recommendations needed amending or updating in the light of experience.
- The work to generate better information on measurement of the value of official statistics is

both urgent and an area where the statistical community generally starts from a low base. We, therefore, propose the following to kick-start this agenda: "pathfinder" NSOs are invited to undertake work in line with the proposals in Chapter 5. At least four or five such pathfinders should be sought though there should be no upper limit. They would undertake to share their experiences with the rest of the statistical community within 2-3 years.

- In part, this sharing could be done by the means of the UNECE wiki. This mechanism could be enhanced by asking the HLG-MOS to promote and support the use of GAMSO and other HLG standards as a basis for comparable cost estimation. For instance, analyzing the cost-efficiency of NSOs' statistical production versus other producers in the public and private sectors could provide convincing evidence.
- In addition, UNECE and other international bodies, such as Eurostat, OECD, PARIS21 and the World Bank, are encouraged to advance specific areas of these Recommendations.

Annex 1 The value of official statistics in a page

Official statistics help us understand who we are, have been and are becoming
Official statistics tell the stories of our countries – on population, health, crime and the economy. Over time, they weave a compelling narrative that charts the pace and nature of change in society.

Better official statistics make for better decisions, and thus better outcomes
Statistics constitute the indispensable evidence base for high quality decisions – for public policy, service delivery, for companies taking commercial decisions and for people deciding about their everyday lives.

Good official data support trust in government and other institutions
The evidence is that when government decisions are made transparently and on the basis of sound official statistics, citizens are more likely to trust the political process. Official statistics give the basis for holding public and corporate bodies to account.

Official statistics help promote equality
Access to information is a democratic and constitutional right. An open and transparent system of public data can help empower citizens across all of society.

Official statistics are not the only source of information. On the contrary, the danger is of drowning in data. **But official statistics have a number of key and sometimes unique advantages, based on the United Nations Fundamental Principles of Official Statistics, which makes them indispensable:**

1) Official statistics are trusted because they are impartial: Good official data are produced free from political or commercial influence. Those who compile the statistics have no vested interests and are bound by a strict professional duty of impartiality.

2) Official statistics are produced to recognized standards: Official statistics are based on open methodologies and produced to internationally recognized standards, and are thus internationally comparable. They are produced transparently so that users can assess their accuracy and reliability.

3) Official Statistics are firmly based on evidence: They are generally based in survey and/or administrative data sources which are larger in scale than most non-official statistics. They are conducted and resourced according to national need rather than commercial expediency.

A global network of experts develops official statistics
Statisticians have a strong network to share and develop methods and practices internationally. We profit from countries' best experts coming together to provide faster and better statistics on traditional as well as new areas – human capital, household services, climate change, globalization and many more.

The benefits of official statistics vastly outweigh their production costs

1) Official statistics are cheap: In the United States, the production of government data is estimated to cost three cents per person per day. In Australia, the costs represent around 0.03 per cent of the overall size of the economy. Such costs are typical.

2) They are an efficient use of resources: Official statistics represent a reusable public good and their use does not reduce the amount of information available to others. On the contrary, the "network effect" of their being available to all potential users increases their value and benefit.

3) Benefits of official statistics are of an order of magnitude higher than their cost: The time and attention given by fiscal and monetary authorities around the world attests to the importance of the information official statistics convey. A study in New Zealand estimates that every dollar invested in the census generates a net benefit of five dollars. Benefits of a similar multiple were demonstrated for the 2011 Census of Population in the United Kingdom.

Annex 2 Why official statistics are valuable?

As set out in the main report, in a competitive world, it would be foolhardy to assume that official statistics will continue to be valued and funded as a matter of course. Official statistics offer many benefits that can be adduced to demonstrate their value. Nevertheless, a proactive approach is needed to conveying these points, not least to make the case for continued and increased investment in them.

This annex is intended as a repository of helpful material for use in this regard, based on the Task Force's deliberations and case studies identified in the course of the work. The annex is not intended as a document to be used directly but rather one which can feed into presentations made in a variety of contexts for different audiences.

A. General value of official statistics

Official statistics are inherently about providing relevant information and become ever more important in the information age. Official statistics provide an indispensable element in the information system of a democratic society, serving the government, the economy and the public with data about the economic, demographic, social and environmental situation:

- They enable decision makers to function on the basis of high quality information – whether in the public sector for policy making or service delivery, in the commercial sector or people making decision in their everyday lives – thus leading to better outcomes.
- They allow citizens to hold public and other bodies to account. They enable understanding society by providing relevant information while respecting the rights of people described in statistics.
- They facilitate research and analysis to proceed on the basis of a comprehensive evidence base leading to innovation and improved economic and social outcomes. It is a Fundamental Principle of Official Statistics to honor people's right to information and secure equal access to statistics for everyone.

"Imagine the world without statistics. Governments would fumble in the dark, investors would waste money and electorates would struggle to hold their political leaders to account. This is why The Economist publishes more than 1,000 figures each week, on matters such as output, prices and jobs, from a host of countries"[37].

Official statisticians have by no means a monopoly on producing statistics, let alone the wider information base. Nevertheless, they do have numerous comparative advantages and unique selling points, as compared with other statistics and information:

1. **Official statistics are impartial and free from political or commercial influence.** Statistical legislation gives official statisticians guaranteed professional independence, thus ensuring objective and unbiased information. Methods and procedures for collection, compilation and dissemination of statistical data are based solely on professional considerations, ethics and scientific principles, as well as internationally agreed concepts and methods. This is a unique feature of official statistics.

[37] The Economist (2012): *Don't lie to me*, *Argentina*, available at: www.economist.com/node/21548242

2. **They are of best professional quality.** These same arrangements ensure that official statistics are of high quality. Professional peer pressure and review acts as a strong mechanism to maintain and improve the quality of official statistics, so they come with this assurance.

3. **Provision of uniquely comprehensive information that is consistent over time.** Non-official producers of statistics generally act in accordance with their own needs and circumstances. This means they often have little or no incentive to maintain statistics which are produced and consistent over long periods of time. Furthermore, official statistics generally cover topics, regions, types of activities and other groupings that are essential to our societies but for which non-official producers of statistics may have no incentive to operate. Examples include statistics on economic development, construction, (un)employment, prices, human capital, housing, health, wellbeing, agricultural supply and demand, business performance, international trade, and many similar. Statistics needed for public policy and service delivery, measuring national progress, legislative requirements and international reporting obligations are among priorities. Without official statistics these needs would be largely unmet.

4. **Assured equal access to official statistics.** It is a Fundamental Principle of Official Statistics to honour people's right to information and secure equal access to statistics for everyone. By contrast, non-official providers of statistics and information may often have a commercial or other incentive structure which means they will not want to share all statistics which they compile. In the absence of official statistics, this would lead to seriously suboptimal economic and social outcomes[38].

5. **Official statisticians are trusted guardians of data and confidentiality.** Statistical offices have a uniquely strong legal setting for ensuring strict confidentiality of individual data, as well as a reputation built up over many decades of the same. Individual data are not given to any other authorities and cannot be used for any other purposes than statistics and selected scientific research projects. Consequently, business and households are prepared to provide information to official statisticians that they would not be prepared to give to other statistical providers.

Benefits of official statistics greatly outweigh their costs.

- Official statistics are cheap. In the United States, the production of government data is estimated to cost three cents per person per day[39], and the costs of producing official statistics represent around 0.03 per cent of the overall size of the Australian economy[40]. Such costs are typical.

- They are an efficient use of resources. Official statistics represents a reusable public good and their use by one user does not reduce the amount of information available to others. On the contrary, the "network effect" of their being available to all potential users increases their value and benefit.

- Benefits of official statistics are of an order of magnitude higher than their cost. The time and attention given by fiscal and monetary authorities around the world attests to the importance of the information official statistics convey. (See the Economist quotation above.) But the effect is much wider, after taking into account the additional benefits to commercial and other parts of society.

[38] Amparo Ballivian and Fenohasina Rakotondrazaka Maret: *Measuring the Value of Data*. Working paper, Development Economics Data Group, The World Bank.
[39] *Fostering Innovation, Creating Jobs, Driving Better Decisions: The Value of Government Data*, available at: www.esa.doc.gov/reports/fostering-innovation-creating-jobs-driving-better-decisions-value-government-data
[40] www.abs.gov.au/websitedbs/d3310114.nsf/home/Australian+Statistician+-+Speeches+-+ABS+Delivering+Public+Value

- A study carried out in New Zealand suggests that every dollar invested in the population and housing census generates a net benefit of five dollars in the economy. Benefits of a similar multiple were demonstrated for the 2011 Census of Population in the United Kingdom.
- A study comparing developments in Wales and England, after Wales stopped publishing school performance statistics in 2001 while England continued, noted that publishing performance statistics by schools contribute to better learning outcomes, as measured by the PISA test. Implicitly, every British pound invested in producing school statistics resulted in 16 pounds' increase in GDP.[41]

B. The value of official statistics to different stakeholders

1. Value to the general public

Official statistics help us understand who we are, have been and are becoming. Official statistics describe our lives and the circumstances surrounding us. They give a basis for thinking about the future, grounded in good information about the present and the past.

High quality information, available easily and free of charge, underpins well based public debate. The use of official statistics is demonstrated every day in the newspapers, social media and websites, radio and TV. Without official statistics public debate would be markedly poorer. NSOs are increasingly exploring ways of providing easier access through closer collaboration with the media, development of data finders, better layouts, easier navigation, interactive graphs and maps, more insightful analysis and thematic releases looking at official statistics in a new light.

Evidence leads to sustained improvement in people's lives. Statistics provide a story that describes how we make our living, what kind of products we consume, how much money we spend, what are the prices we pay, where do we live and work, what kind of enterprises produce the services and products we buy, are they multinational or local, how many people do they employ, how many people are unemployed, what is the quality of housing, how much mortgage do we have, what is our income level, how healthy are we, how long do we live, what kind of social services do we use, how are we educated, do we participate in decision making or voluntary work, do we live in one place or move to another city or another country etc.:

- Such information means that people can make better decisions affecting their lives, everyday ones as well as longer term ones regarding, for example, financial planning.
- It also means that needs and social pressures can be identified more accurately and quickly. Good local data, for example, on population and housing makes it possible to plan and target government services better, such as schools and health care facilities, and thus avoid unnecessary spending of scarce public resources.

Official statistics raise community awareness. Statistics inform individuals about the communities in which they live and thus empower them to participate in democratic processes. People may seek to understand job opportunities in a particular location, compare house prices and costs of living and see how their country compares internationally. Having reliable official statistics has been compared to having 'clean water' or 'sound money' – things without which society starts to fall apart. Being informed is critical to the freedom of speech.

[41] See Chapter 5, section D of this report for more detail.

Official statistics facilitate scrutinizing and holding government and commercial institutions to account, and thereby add value.

- Studies have shown that increased public transparency and disclosure of data generate confidence in the markets. Statistics can also enhance political accountability and reduce corruption. This was shown for instance by the audits of local government[42] in Brazil.
- Official statistics assist people in holding to account those elected to represent them. Statistics help to monitor the effectiveness of decision making and shed light on the consequences of such decisions.

Providing guidance on statistics and preventing their misuse and misinterpretation. By virtue of their independence and professional standing, it is becoming more common for NSOs to take part in topical debates to help guide the correct use and interpretation of statistics, or at least to avoid incorrect ones. This is an important role in underpinning well-based public debate, which official statisticians are uniquely well-placed to take.

2. Value to international policy and development

Comparable and harmonized official statistics are a powerful tool. International policy frameworks are increasingly evidence based and come with a measurement framework. This is true for the 2030 Agenda for Sustainable Development, human rights reporting under international human rights treaties, the Paris Climate Change Agreement, the Sendai Framework for Disaster Risk Reduction and many others. They are all reaching out towards official statistics to provide the basis for the reporting and monitoring, impelled by the strong international comparability offered by official statistics. The international statistical system has effective mechanisms for agreeing on standard definitions, classifications and methods to be used across countries. This makes meaningful comparisons possible, and enables linking new data with the rich datasets of statistical offices.

Consult a statistician on how to measure it. After the lessons learned from difficulties to measure the Millennium Development Goals, early engagement of the statistical community has become a common practice. Policy makers ask statisticians how to formulate measurable targets, and especially which indicators to select and what kind of methodologies, concepts and definitions to use. The purpose is to enable meaningful monitoring of progress and reduce the need for costly additional investments.

The statistical network is effective in filling data gaps. The international statistical system works in collaboration, thereby bringing the best experts together to develop new statistics and statistical methods. For instance, statisticians developed guidance on measuring sustainable development years before SDGs were chosen as the next global development benchmark. Where important gaps exist in international reporting, statisticians can efficiently fill them by developing practical guidance that can be shared with and used by many countries.

NSOs provide the pathway to national statistics. The pressure to increase coordination within the national statistical system is coming from users, including the government and international organizations, who are looking for compatibility, high quality and easier access to the required information. NSOs increasingly engage with other data producers within the official statistical system and in the civil society, academia and the private sector, and are called to provide advice on methods to ensure high quality of statistics. NSOs have been asked to coordinate the data flows on SDG indicators to provide easier access to data, but also to review the quality.

[42] Ferraz, Claudio, and Frederico Finan (2011): *Electoral accountability and corruption: Evidence from the audits of local governments*. The American Economic Review 101 (4), pp. 1274-1311

Official statistics as a reliable measure of progress. Official statistics provide an independent and impartial means for assessing progress (or the lack of it!). (1) They can provide the baseline: how many people live below the poverty line; what are the social, economic and environmental conditions; and what kind of infrastructure, health and education services are lacking. (2) They can be used to measure consequences and outcomes, for instance to evaluate whether maternal mortality has decreased through investment in health care or whether more children are attending school through better planning of school facilities and increased training of teachers.

Building statistical capacity supports social, economic and environmental progress.

- Statistics support evidence based policy and provide information for analysing civil, economic, political and social rights[43]. They also feed people's right to information and thus support participation in society.
- National statistics are essential for developing public-oriented policies. NSOs' coordination role helps to bring key stakeholders together to define shared needs and identify gaps. Availability of robust statistics by age, gender, income and geography inform aid donors and governments so that resources are targeted more effectively.

3. Value to decision makers

Official statistics provide the right information to inform decisions. Policy makers, businesses and individuals all make decisions and are affected by decisions based on official statistics:

- Availability of trustworthy and timely statistics is crucial, for instance for a correct assessment of the monetary and economic situation of a country. Census data inform decisions to allocate resources across programmes and plan public services, such as building new hospitals, schools or roads. Statistics influence the direction of fiscal, economic and trade policies, social welfare and environmental policy decisions, and target efforts to improve efficiency and productivity, and identify cost savings.
- Almost 90% of businesses[44] say that access to data is critical to being competitive. Official statistics underpin fundamental decisions, such as investment planning, risk assessment and market analysis, and to consider where to base the business and how to meet customers' needs. According to estimates, in the United States government data guide trillions of dollars' worth of investments each year[45].

Wrong decisions are costly. According to a British manager[46]: "The investments involved in deciding about the location of stores are just too large to rely on gut feeling only. The immediate financial costs and long-term losses caused by poor location decision cannot be overestimated". Inability to access well-based statistics leads to increased costs in the public sector too. For instance, in New Zealand reactions to short-term population change without full consideration of the ongoing demographic transition resulted in a surplus of schools in some regions and a shortage in others. In one area,

[43] United Nations Office of the High Commissioner on Human Rights: www.ohchr.org/Documents/Issues/HRIndicators/StatisticsAndHumanRights.pdf and www.ohchr.org/EN/Issues/Indicators/Pages/HRIndicatorsIndex.aspx
[44] A survey of 200 senior executives of businesses in the United States, Europe and Asia, available at: www.freshfields.com/uploadedFiles/Locations/Global/Data/content/dealingwithdata.pdf
[45] *Fostering Innovation, Creating Jobs, Driving Better Decisions: The Value of Government Data*, available at: www.esa.doc.gov/reports/fostering-innovation-creating-jobs-driving-better-decisions-value-government-data
[46] Alison Green, Sainsbury's Strategic Development Manager in Location Planning in *The 2001 Census and its Significance for the Commercial World*, BRC Solutions, 2004, p. 57

underestimation of pre-school children led to a shortfall of approximately 40 million USD in government funding during one year[47].

Official statistics help towards an efficient and consistent evidence base for decisions. In the absence of official statistics universally available, commercial and other decision makers would need to assemble their own statistical and information bases. This would result in duplication and inconsistency. User surveys show that decision makers rely on the fact that official statistics are produced impartially using internationally agreed scientific methods.

Availability of official statistics relating to a wide range of domains and coverage means that interactions can be exploited with consequent economic, environmental and social gain. NSOs provide uniquely rich datasets that integrate data from direct statistical surveys, government datasets and other sources. NSOs work actively to improve timeliness and coverage, amongst others by increasing the use of new data sources: business information, trade transactions, scanner data, geodata, social media, web scraping etc:

- Use of these official statistics databases helps to save resources, reuse information and reduce the burden on respondents.
- In addition, the ability to exploit these integrated datasets opens up valuable new insights at modest additional cost, spanning key economic, environmental and social concerns.

Official statisticians can provide reliable guidance and analysis. Statisticians' professional skills, experience, and the detailed knowledge they have by virtue of compiling their outputs, means they have the ability to appraise and draw out the implications of their statistics in ways which users and decision makers find increasingly valuable. This is evidenced by the growing requests to official statisticians for guidance in using their statistics and to confirm correct conclusions. Similarly, official statisticians are increasingly asked to inform decision makers as to the story told by the statistics, not just to provide some numbers.

4. Value of official statistics to the information industry

While official statisticians need to be aware that they are no more immune to competition than any other sector, they should also be aware of the opportunities for partnership and collaboration. In particular, official statistics are often the foundation stone for a vibrant and productive industry more widely.

Official statistics are available for reuse as Open Data. A number of information producers, in the public and private sectors, use statistical data as input to their own products and services. NSOs provide their data free of charge and more so in easily reusable machine readable formats. Reuse of existing data improves the efficiency of the whole information industry, and reduces costs and burden caused to respondents as less direct data collection is needed. NSOs also source a large part of their data from sources other than respondents, already providing integrated datasets for wider use. Governments promote Open Data as a driver of economic growth and job creation. Studies show that fast-growing economies often base their success on rich information, which translates into knowledge and more complex and diverse products[48].

Use of official statistical data can trigger innovation. Official statistics lend validity to private data as a reliable benchmark. Estimates using big data and other sources are compared to official statistics to test comparability and as a sense and reality check. Private companies, in search of data that deliver the

[47] http://icots.info/9/proceedings/pdfs/ICOTS9_5A1_FORBES.pdf
[48] Hidalgo, Cesar (2015): *Why Information Grows. The Evolution of Order, from Atoms to Economies.*

most relevant and pertinent insights and adds value to their products, increasingly access official statistics for this purpose. Examples of innovative products include, for example applications facilitating transport benefit from data on public transport schedules, population densities, traffic patterns, locations of real estate and land use.

Industrialization of official statistics has wide benefits. The information industry greatly benefits from the common standards, definitions, classifications and methods developed by the statistical community. Statistical offices are creating environments that facilitate reuse and sharing of components, processes and data repositories. NSOs actively promote the wider acceptance and use of these standards to enable new products and services to be created. The UNECE High-Level Group for the Modernisation of Official Statistics is driving such development internationally, in partnerships with other players in the information industry, and recently finalized a project that developed machine readable common metadata standards that facilitate data integration, linking and reuse.

Official statistics are commercially valuable. Official statistics are a key input to a wide variety of commercial products and services in the economy. Private businesses value data as a strategic asset and invest important amounts in data to find their competitive advantage. In the United States, an estimation based on a very short and incomplete list of firms that rely heavily on official statistics, suggests that government data help private firms generate revenues of at least $24 billion annually, many times greater than spending on official statistics. McKinsey Global Institute estimates[49] the potential global economic benefits of open government data as 3 trillion dollars annually.

Official statistics grow key data science skills. In order to be able to carry out what is required to produce and disseminate modern official statistics, NSOs increasingly invest in high level statistical and data science skills. They provide training and development to their staff and also encourage the supply chain of new skilled recruits. Such skills are often crucial for the data science industry as a whole, as well as businesses such as banks, insurance companies, ministries, research institutes and other sectors. In the short term, there may be competition between NSOs and the rest of the economy for such skills. But in the wider picture, the investment NSOs make in these skills is in the general interest.

5. Value to research

The research community is an essential adjunct to economic innovation and improved social and environmental outcomes. Much of the sector's work is possible, however, only because of its access to wide-ranging official statistics. Testament to this fact is underlined by the pressure from research institutes in many or most countries for availability of further statistical information.

New research insights from integrated datasets. Statistical offices serve researchers by providing them with wide, complex and easily linkable datasets in technically advanced environments. Integrated large unit-level datasets enable universities, policy analysis institutes, research institutions, ministries, municipal agencies and individual researchers to do empirical analysis to inform future decisions. The datasets assist in studying complex problems that have multiple causes and cut across many areas of government, such as productivity, innovation, gender pay gap, income deprivation, climate change, joblessness, homelessness etc.

Services to increase the efficiency and productivity of research. NSOs typically provide researchers with data already collected, classified, combined, edited and corrected in the compilation of official statistics. Data come from multiple sources, such as censuses, surveys and population and business registers, tax registers, school systems, social protection and health systems, and as such enable a multitude of

[49] McKinsey Global Institute (2013): *Open data: Unlocking innovation and performance with liquid information*

longitudinal and cross-sectional analysis. Accessible metadata together with a suite of research tools, applications and software are offered for processing and analysing data. These services enable researchers to focus on the key issues with which they are concerned, rather than on the preparation of the data itself.

Using official statistics' data adds credibility. Official statistics are trusted because of the use of rigorous scientific methods in treating, editing, combining and checking data carefully. They are thus regarded as a reliable basis for research findings. Statistical datasets also offer more consistency of concepts across sectors and are available for sufficiently long time periods to make more reliable conclusions. It may also be possible to compare the specific findings of a research project to related official numbers.

Stronger research capacity by working together with statisticians. Statistical offices, universities and research institutes have a long record of working closely together to develop statistical methods on one hand and empirical research on the other. An example of joint investment in capability is the European Master in Official Statistics, a network of Masters programmes providing post-graduate education in the area of official statistics. Additionally, many NSOs offer traineeships to students and carry out training on survey techniques and statistical methodologies, again adding to the overall endowment of research capability.

NSOs work internationally to provide wider possibilities for researchers. NSOs have developed common principles and tools for access to microdata for research purposes and are sharing best practices across countries. Eurostat provides researchers with several public-use files containing data from EU countries, and other international organizations have similar projects aimed at promoting this type of exchange. The survey on income and living conditions (EU-SILC) is a good example where the microdata is an end-product of its own and can be accessed by researchers globally. Such initiatives increase the scope for productive research on international phenomena and allow for comparative analysis across a range of subjects.

Annex 3 Generic user survey questions for statistical offices

Introduction to respondents:

Welcome to the User Survey of the National Statistical Office (NSO) [replace with a name of the office]. The NSO is committed to compiling quality, independent, objective and trustworthy official statistics.

Satisfaction of users is a priority for the NSO and our goal is to provide our users with the best service required to meet their needs.

In order to help us find out whether we are satisfying your needs and expectations, we would appreciate your help by taking a few moments to complete this survey. Your comments are appreciated and will help us to learn about what we are doing well and what we need to do better. Please be assured that your responses will be completely anonymous.

We appreciate your taking the time to participate in this survey which should take about xx minutes to complete [replace with an estimate that takes into account the duration of the national survey including common questions and specific national questions].

Please respond to all questions in each section which are relevant to you as a user of statistics.

You can submit your survey by [indicate how].

Thank you.

Optional user survey questions:

Characteristics of data users

1. Please tell us <u>about you</u>.

(We will not publish any personal information.)

Age group	Dropdown list
Gender	Female / Male
Highest level of education attained	Dropdown list
Sector /Industry	Dropdown list

[Replace dropdown lists with nationally relevant versions.]

Primary school
High school
College
Master's degree
Doctorate
Other (please specify)

Academic or student
Central government
International organization
Local government
Media
Non-governmental organization
Political party or organization
Private business
Private user
Trade association
Other (please specify)

Use of statistics

2. When did you last contact the NSO or use its statistics?	Dropdown list

Earlier today
Yesterday
2-3 days ago
About a week ago
2-3 weeks ago
About a month ago
2-3 months ago
4 months or more
I have never been in touch with the NSO

2b. [if an option more than a month ago selected] **Why have you not contacted the NSO/used the NSO statistics in the past month?**	Dropdown list

I have had no need for any statistical information
I have found another website/source to use that suits me better
I find it difficult to navigate the CSO's website
I prefer the design of another website/source
I prefer the infographics/reports provided by another website/source
I had not known about the CSO before now
Other (please specify)

3. How <u>frequently</u> do you usually use NSO statistics?	Dropdown list

If **Never**, please specify why? _____

Daily
Weekly
Monthly
Quarterly
Annually
Less often
Never

4. For which <u>purposes</u> do you use statistics? Please select all that apply.	Dropdown list

Work in general
Business or market analysis
Education
Legislative work
Media use
Modelling or forecasting
Negotiations
Personal interest
Policy formulation/monitoring/evaluation
Regional analysis
Reports or publications
Research
Reuse in other products
Service planning
Other (please specify)

4A. [Optional] **How important are the NSO's statistics for the purpose you mentioned?**
[Displays only those purposes that were selected]

	Essential	Important	Background information	Of minor importance	Of no use	Don't know
Work in general						
Business or market analysis						
Education						
Legislative work						
Media use						
Modelling or forecasting						
Negotiations						
Personal interest						
Policy formulation/monitoring/evaluation						
Regional analysis						
Reports or publications						
Research						
Reuse in other products						
Service planning						

5. Which statistics do you <u>use most often</u>? Please select all that apply.	Dropdown list Population (e.g. census, education, migration, gender) Labour market (e.g. employment, productivity, earnings) Health (e.g. life expectancy) Income and consumption Education Energy Justice and crime Travel and tourism National accounts (e.g. GDP) Business (e.g. construction, industrial production, retail trade) Globalization (e.g. trade, foreign affiliates, balance of payments) Prices and costs (e.g. consumer and producer prices, living costs) Science, technology and innovation Environment and climate Sustainable development Regional Other (please specify)

Accessing statistics

6. <u>How</u> do you usually access NSO statistics and information? (Select 1-3 options)	Dropdown list NSO website StatBank NSO Twitter NSO Facebook Contact NSO staff Email NSO staff Phone NSO staff NSO Application Programming Interface (API) NSO Anonymised Microdata Files (AMFs) NSO Research Microdata Files (RMFs) Printed publications Press Radio Social Media Statistical releases TV Other (please specify)
7. How do you <u>become alerted</u> to the latest NSO statistics?	Dropdown list NSO Calendar NSO website NSO twitter NSO Facebook NSO email contact Press / newspapers Radio TV Other printed publications Social Media Other (please specify)
8A. Which device do you use to access statistics? *8B.* [Optional] *If more than one: What is your preferred device to access statistics?* **8C.** [Optional] **Which device do you use most often to access statistics?**	Dropdown list **(select all devices used)** Laptop Desktop Mobile phone Tablet Printed Media Other (please specify)

User satisfaction

9. How satisfied are you with the extent to which the NSO statistics you use…

	Very satisfied	Satisfied	Neither satisfied nor dissatisfied	Dissatisfied	Very dissatisfied
Meet your needs					
Are accurate					
Are trustworthy					
Are free from political interference					
Are clearly presented					
Are easy to find					
Are easily understood					
Are timely					
Are detailed enough					
Are clearly documented					
Enable comparisons					
Are up to date					
Are frequent enough					
Are visually appealing					

[Optional for the issues with which the respondent is not satisfied]

Please provide us with details of suggested improvements relating to NSO statistics (Q9) in…:

Relevance and innovation

10. To what extent do you agree with that the NSO…?

	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
Is independent					
Provides a quality customer service					
Has knowledgeable and competent staff					
Collects and dissemination useful statistics					
Protects confidentiality of individual data					
Explains data sources and methods clearly					
Supports the interpretation and use of statistics					
Visualizes information well					
Communicates clearly					
Meets your information requirements					
Is active in developing new services					
Is actively present in Social Media					
Helps people understand our country					
Effectively informs public debate					
Provides valuable services and statistics					
Is trustworthy					

11. Please tell us:

What you think the NSO is doing well?	
What you think the NSO could do better?	
What the NSO should do to inform your work that it does not currently do?	
What the NSO currently does that you consider obsolete or not useful?	
What are the most important outcomes or benefits resulting from using our statistics or services?	

12. Please select the choice that applies:

NSO statistics and services are	Dropdown list	for my work or studies

Essential
Important
Background information
Of minor importance
Of no use

13. Have NSO's statistics and services helped inform any decisions or policies made by you (or by your organization) over the last years?

Yes	No	Don't know/NA
[If yes] Please provide examples:		

14. Do you think NSO statistics differ from other data and statistics, and how?

Yes	No
[If yes] Please explain briefly the difference:	

15. The NSO as country X's national statistical office is responsible for collecting data and producing official statistics that help people to understand better their country – its population, resources, economy, society, environment, culture etc. The NSO conducts about X studies on all aspects of our lives.

15. Would you say the NSO work makes a	**contribution to the wellbeing and life of in our country?**

major
moderate
little
no

Awareness and trust

16. How well informed are you about the work of the NSO?	Dropdown list

Very well informed
Fairly well informed
Not very well informed
Not at all informed
Don't know/not sure

17. To what extent do you trust the NSO statistics?	Dropdown list

Trust them greatly
Tend to trust them
Neither trust nor distrust
Tend not to trust them
Distrust them greatly
Don't know/not sure

18. How would you describe your overall view of the NSO?	Dropdown list

I would speak highly of NSO, without being asked
I would speak highly of NSO, if someone asked
I would be neutral about NSO; if someone asked
I would be critical of NSO; if someone asked
I would be critical of NSO; without being asked

19. How likely is it that you would recommend the NSO statistics and services to a friend or a colleague (using a scale from 0 to 10)?	Select a value

Specific products and services

20. How satisfied are you with the following NSO products and services?

	Very satisfied	Satisfied	Neither satisfied nor dissatisfied	Dissatisfied	Very dissatisfied	n.a.
Articles and stories on statistics						
Online statistical releases						
Maps and infographics						
Methodological descriptions						
NSO Twitter						
NSO Facebook						
NSO news alerts						
NSO website						
NSO data explorer						
Public use files and microdata						
Release calendar						
etc.						

[Optional] **Please provide us with details of suggested improvements relating to NSO products and services (Q20)?**

Additional comments:

21. What, if anything else, would you like to say about the NSO or its statistics?	

Additional considerations outside these survey questions:

Questions currently not included and often asked in user surveys:

- Have you ever been asked to reply to an NSO survey? Yes/No
- Quality ratings of individual statistics
- How important the various quality dimensions are (Question 5)?

Not covered by this survey are surveys:

- For partners and key stakeholders – see below some additional questions
- On website functionalities – could be a separate online survey for page visitors
- On NSO's image compared to other organizations – separate survey on all government
- For customers on chargeable services – separate short survey sent to customer afterwards

A separate stakeholder survey could include some of the following questions:

- The NSO takes the time to understand the data needs of your organization
- The NSO gives you the opportunity to discuss NSO's priorities and plans
- The NSO works collaboratively with you
- The NSO seeks your feedback and responds to it
- The NSO keeps you informed about its work

A website functionality survey could include some of the following questions:

- How satisfied are you that the NSO's website is… (scale 1-5)?
  User friendly / Easy to navigate / Clearly presented / Sufficiently detailed / Up to date /Innovative /Interesting / Well visualized
- What information are you typically looking for (open)?
- Do you usually obtain what you are looking for? Yes/No
- How long does it take to find the information you are looking for (dropdown list)?

Annex 4 Case studies of other industries' approach to generation and promotion of value

Cases studies were assembled on the approaches used by the following 7 organizations or industries:

- Apple Inc – a company that designs, develops and sells electronics, computer software, on-line services, and personal computers.
- Amazon – an electronic commerce and cloud computing company.
- BMW – a luxury car producer.
- Google – a technology company specializing in internet-related services and products,
- Meteorological services – responsible for the provision of weather information and forecasts.
- UK Pharmaceuticals – develops, produces and markets drugs and pharmaceuticals for use in medications.
- JH Whittaker and Sons (Whittaker's) – a New Zealand confectionary company specialising in chocolate.

1. Apple Inc

Apple Inc is a multinational technology company that designs, develops and sells electronics, computer software, on-line services, and personal computers. Its best known hardware products are the Mac line of computers, the iPod media player, the iPhone smartphone, the iPad tablet computer, and the Apple Watch smartwatch. Its online services include iCloud, the iTunes Store and the App Store. Apple's consumer software includes the OS X and iOS operating systems, the iTunes media browser, the Safari web browser, and the iLife and iWork creativity and productivity suites.

Founded in 1976, Apple is today the world's second largest information technology company by revenue, the world's largest technology company by Total Assets, and the world's third largest mobile phone maker. In 2014, Apple became the first US Company to be valued over $700 billion. Today it employs 98,000 full-time employees, maintains over 450 retail stores in 16 countries, and operates the on-line Apple store and iTunes store, the latter of which is the world's largest music retailer.

Apple enjoys a high level of brand loyalty. According to the 2014 edition of Interbrand Best Global Brands report, Apple is the world's most valuable brand with a valuation of $118.9 million.

Key features of how Apple delivers value are through its:

- Dedication to customer service
- Commitment to quality, innovation, design and simplicity
- People and culture
- Consistency and product integration

Customer service

Apple's whole culture is designed around delivering a superior customer experience. The company puts the customer at the centre of everything it does, from the design of its products through to the

design of its retail stores. Generating customer value means building a business model that ensures that value is created repeatedly.

'At Apple our goal is to delight customers when they purchase a product and keep them happy through the life span'.

'We put ourselves in the customer's shoes'.

The company believes a high quality sales experience with knowledgeable salespersons who can convey the value of the company's products and services greatly enhances its ability to attract and retain customers. As such, Apple's employees are not just focused on designing and selling products that will satisfy customers, but on providing a first class retail experience that delights shoppers. They make visitors to their stores feel appreciated and customers connected to more than just a transaction. They empower them by letting them play with the products and stay as long as they like. They make them aware that they are always welcome to comeback for advice after their purchase.

Apple has invested in self-service tools that allow customers to schedule their own appointments and shop on-line. It is constantly evolving its store design to make it easier for customers.

The company's retail stores are typically located in high traffic locations in high quality shopping malls and urban shopping districts. By operating its own stores and locating them in desirable high-traffic locations, the company is better positioned to ensure a high quality buying experience and attract new customers.

Commitment to quality, innovation, design and simplicity

Apple is committed to producing quality products that 'change people's lives'. It believes that excellence comes from doing a few things and doing them well, rather than trying to be all things to all people.

"We believe that we are on the earth to make great products in markets where we can make a significant contribution'.

'We don't settle for anything less than excellence'.

Apple's products are the result of extensive research and strong design. It carefully considers what customers are looking for, including not only what they want now, but what they will need later. Whenever it releases a new product, customers trust that it will be attractive and easy to use, and will improve the way that they communicate, work and spend their leisure time.

The company believes in making complex things simple. The products have to be intuitive and easy to use. Apple proved that consumers would pay for music that they would otherwise obtain free from sites such as Napster, simply because the iTunes experience is that much simpler.

The principle of simplicity permeates Apple, from its products to the limited range on offer.

'The popularity of Apple's products is largely due to their simplicity and intuitiveness, making them accessible to tech-savvy consumers, but also to kids and seniors'.

Because the industries in which Apple competes are characterised by rapid technological advances, the company's ability to compete successfully depends heavily on its ability to ensure a continual and timely flow of competitive products, services and technologies to the marketplace. The company continues to develop new technologies to enhance existing products and to expand the range of its product offerings through research and development.

People and culture

The people that Apple employs are very carefully selected and trained. The employees truly believe in what Apple is doing and are deeply entrenched in and committed to the customer's experience.

'Creating a successful business isn't just about having a stand out product, true success ultimately comes down to having a team of stellar people'.

Apple pays a lot of attention to how culture is infused in its employees. Culture is what knits people together into a society that operates with a singular mission and focus. And, because Apple's culture is based on a passionate commitment to delivering superior customer value, it has become not only the glue, but the engine that drives the company to even greater value.

'Apple Campus is an exceptionally tight ship, full of driven individuals who are held to very high standards to make the next thing that everyone is going to be talking about'.

Consistency and product integration

All of Apple's products have the same basic architecture. Because of this consistency, customers who already own Apple products know what they will be getting. Using the same architecture also facilitates ease of use of the products.

Apple products are designed to work together. They are part of an ecosystem that makes offerings more valuable. For example, the introduction of the iPhone was coupled with the opening of an on-line applications store.

Value metrics

Customer satisfaction metrics are an important way in which Apple tracks its value. The Net Promoter Score and American Customer Satisfaction Index are two key metrics that it uses.

The company also uses conventional financial metrics to monitor its performance. Examples include net sales and profits, net income, share of world-wide market etc

Innovation is monitored using measures such as percentage of revenue spent and R&D expenditure as a percentage of net sales.

2. Amazon

Amazon is an American electronic commerce and cloud computing company. It was born in 1995 as a place to buy books because of the unique customer experience the Web could offer book lovers. The name reflected the vision of Jeff Bezos, to produce a large scale phenomenon like the Amazon River. Just eight years later, Amazon passed the $5 billion sales mark – it took Walmart 20 years to achieve this. By 2008, Amazon was a global brand with over 76 million active customer accounts and order fulfilment to more than 200 countries.

Amazon.com expanded to offer customers more types of products. It also offers platforms that enable third parties to sell products off its websites. Today, more than two million small businesses reach new customers by leveraging the power of the Amazon e-commerce platform.

Launched in 2006, Amazon Web Services (AWS) began exposing key infrastructure services to businesses in the form of web services – now widely known as cloud computing. Using AWS, businesses can take advantage of Amazon's expertise and economies of scale to access resources when their business needs them, delivering results faster at lower cost.

In 2007, Amazon introduced the first kindle, the revolutionary portable e-reader that wirelessly

downloads books, magazines, newspapers, blogs to a high-resolution electronic display that looks and feels like real paper.

Customer focus

Amazon has made good customer service a cornerstone of the business. Jeff Bezos, the CEO, is a firm believer that what is best for the customer ultimately turns out to be best for the business. He has forced developers to focus on value delivered to the customer, instead of building technology first and then think about how to use it.

'Our vision is to be the world's most customer-centric company'.

'We are not competitor obsessed, we're customer obsessed. We start with the customer needs and we work backwards'

'If we can arrange things in such a way that our interests are aligned with our customers, then in the long-term that will work out really well for our customers and it will work out really well for Amazon'

'Focusing on the customer makes a company more resilient'.

Achieving customer loyalty and repeat purchases has been the key to Amazon's success. This focus on the customer has translated into excellence in service, with the American Customer Satisfaction Index, giving Amazon a consistently high score.

Innovation

Amazon has a culture that encourages innovation. It believes that experimentation is imperative for inventiveness and innovation. Experimentation and willingness to invent is therefore a strong part of the culture.

'If you double the number of experiments you do per year you're going to double your inventiveness'

Bezos is a strong believer that innovation can only come from the bottom. He believes that everyone must be able to experiment, learn and iterate. He values it in his employees. He looks for people that like to invent and is always looking for ways to make products better.

'Those closest to the problem are in the best position to solve it'.

'The day we stop exploring is the day we commit ourselves to live in a stagnant world, devoid of curiosity, empty of dreams'

Amazon has created its own internal experimentation platform called 'Weblab' that it uses to evaluate improvements to its website and products.

Applying new technologies has been used to give Amazon a competitive edge.

'All the effort we put into technology might not matter that much if we kept technology off to the side in some sort of R&D department, but we don't take that approach. Technology infuses all of our teams, all of our processes, our decision-making, and our approach to innovation in each of our businesses. It is deeply integrated in everything we do'.

Partnerships

As Amazon has grown, it has formed partnerships with a range of companies in different sectors. Examples include Drugstore.com (pharmacy), Living.com (furniture), Pets.com (pet supplies), Wineshopper.com (groceries), and Kozmo.com (urban home delivery). In most cases Amazon purchased an equity stake in these partners, so that it would share in their prosperity. It also charged

them fees for placements on the Amazon site to promote and drive traffic to their sites.

Amazon has been able to consolidate its strength in different sectors through its partnership arrangements and through using technology to facilitate product promotion and distribution via these partnerships. The Amazon retail platform enables other retailers to sell products online using the Amazon user interface and infrastructure through their 'Syndicated Stores' programme. For example, in the UK, Waterstones is one of the largest traditional bookstores. It found competition with online so expensive, that eventually it entered into a partnership arrangement where Amazon markets and distributes its books online in return for a commission online. Such partnerships help Amazon to extend its reach into the customer base of other suppliers, and customers who buy in one category such as books can be encouraged to purchase into other areas such as clothes and electronics.

Another form of partnership is the Amazon Marketplace which enables Amazon customers and other retailers to sell their new and used books and other goods alongside the regular retail listings. A similar partnership approach is the Amazon Merchants@ program which enables third party merchants to sell their products via Amazon. Amazon earns fees either through fixed fees or sales commissions' per-unit. This arrangement can benefit customers who get a wider choice of products from a range of suppliers with the convenience of purchasing them through a single checkout process.

Amazon has also facilitated formation of partnerships with smaller companies through its affiliates programme.

Metrics

A common theme in Amazon's development is the drive to use a measured approach to all aspects of the business. The company has a culture of metrics. Each site is closely monitored with standard service availability monitoring, site availability and download speed. It also monitors per minute site revenue upper/lower bounds.

At Amazon, 'automation replaces intuitions' and real time experimentation tests are always run to answer questions since the actual consumer behaviour is considered the best way to decide upon tactics.

Amazon uses around 500 metrics to track its performance, around 80 percent of which are related to customer objectives. They include measures such as percentage of orders from repeat growth, growth in the number of customer accounts. Amazon also uses the ASCI to benchmark itself against other companies.

3. BMW

BMW is a luxury car producer and is seen as one of the most prestigious, stable and admired companies in the world. It continues to be one of the best players in the luxury automobile industry. It believes in excellence in everything it does: service, product quality, customer relationships, and product and brand recognition. BMWs goal is to be a leading provider of premium products and premium services for individual mobility.

Long-term thinking, strong investment in research and development, ecological and social responsibility in the value chain, and an effective speed and agility in responding to changes in the market are some of the reasons for BMWs success.

Brand recognition

Brand has had a strong impact on BMWs performance. Brands are characterised through consistent quality, craftsmanship, recognisability, exclusivity, reputation, distinctive variation, timing, and heritage. The key to BMWs success is consistency and authenticity of their marketing strategies and policies. With such a strong brand, the company has been able to earn some of the highest margins in the industry.

Design and quality

Design and quality are strong points behind BMWs success. BMW achieves a higher quality of engineering than is usual in production cars. While most car assembly has been taken over by robots or workers from low wage economies, BMW maintains a skilled labour force, and employs double the number of workers than any other company in the automobile industry. It puts the product before anything else and is deeply committed to that principle.

The tradition of quality permeates all work processes of the company. A comprehensive, multi-level management system ensures quality in all work processes, as well as components and materials, and ultimately its products. Above all, BMW orients its quality management system to the needs of its customers.

'Customer oriented thought and action is part of corporation philosophy and anchors our goal of achieving perfect results in all manufacturing areas. Our employees' attitude to quality from the very beginning, continuing along the entire process chain, prevents mistakes and ensures continual improvement'.

Innovation

Innovation is an integral part of BMWs product development. It spends around 25% of its profits on research and development. Innovation enables the company to keep at the forefront in a competitive environment.

BMWs continued success is its strategic focus on developing customer friendly innovations, coupled with an approach to innovation management which is unique within the automobile industry. One of its keys is a constant focus on the culture of innovation – making professional innovative processes a strategic and cultural constituent of every area of the company.

This focus on culture is a guiding principle within BMW. It ensures that all departments in the organization are focused on innovation, including sales and marketing, human resources and product development.

Everyone working for the company, from the factory floor to the design studios to the marketing department, is encouraged to speak out.

'Ideas bubble up freely, and there is never a penalty for proposing a new way of doing things, no matter how outlandish'.

BMW's management structure is flat, flexible and entrepreneurial. This helps innovations to be developed quickly to improve internal processes and for the marketplace.

The company uses cross-functional teams which are more effective at problem solving. This lateral ability to communicate across divisions and silos, facilitate speedier innovation.

The German car maker has always been able to respond to the attacks of its competitors with an increasingly level of technology and innovation that characterises its products.

Customer focus

BMW uses customer profiling to understand its customers. It goes beyond pure demographic statistics and carefully tracks the personalities, lifestyles and tastes of its customers. The information is used across all areas of the business, from the design and development of the cars, through to the premium pricing of all elements of the marketing mix. BMW is very clear about its targeting. It only targets the premium priced cars and does not strive to compete with every segment of the auto industry. It avoids the high volume market of middle of the road vehicles and focuses strictly on the luxury sector. BMW is an example of excellent consumer research, matched to segments that were targeted by very suitable and successful cars.

'That means having a clear understanding of customer behaviour and recognising trends'.

'A company must know what the public wants and maintain a keen interest in the relationship with their customers and value their thoughts. That's why BMW is where it is today, so far ahead of the others.'

'What it really needed

BMW understands the importance of making the purchase of one of its cars a special experience for the customer. The sales associate spends as much time as it takes for the purchaser to understand how to operate their new car. It's all about the customer and the car and making the customer feel special. The BMW staff are passionate about the brand and what it stands for.

Partnerships

BMW has used partnerships to help maintain a competitive edge in the market. For example, it partnered with Clemson University to build a multi-million dollar International Centre for Automobile Research in South Carolina, US.

'What it really needed was a specialised talent funnel – students with graduate level training in automotive engineering with an emphasis on integrating the smart systems emerging in the industry'

Located on the Clemson University International Centre for Automobile Research campus, the Information Technology Research Centre (ITRC) is an integral part of BMWs research and development network. It provides an important platform within the BMW Group for joint innovation projects with leading IT companies in the US. At the ITRC, mechanical, electrical and computer engineers and students – from BMW, the IT industry and the university – work together in an open innovation model on proof of concept and pilot projects where IT innovations push automotive solutions forward.

BMW is exploring deeper partnerships with software computer companies, such as Apple. It recognises that future generation cars cannot be built without more input from telecoms and software companies and is aware that Apple has been studying how to make a self-driving electric car. Both companies would need to profit from the cooperation or it will not last.

Metrics

BMW uses satisfaction measures to monitor performance.

The company undertakes regular assessments of customer satisfactions following sales and services. It also commissions market research to gauge customer satisfaction.

BMW has also strived for recognition of its value by using external evaluations and taking part in award competitions. The company has undertaken the EFQM assessment and won the EFQM

Excellence award in 2013. The award is organized once a year and is designed to recognise Europe's best-performing organizations, whether private, public or non-profit. It recognises industry leaders with an indisputable track record of success in turning strategy into action and continuously improving their organization's performance.

4. Google

Google is a multinational, publicly traded organization, built around the company's hugely popular search engine. Google search is the most used search engine on the world-wide web, handling more than 3 billion searches each day. It was originally developed by Larry Page and Sergey Brin in 1997. Its use is very simple and provides the best search results of all search engines.

Google is today one of the most valuable brands in the world. The success of Google is directly connected to the efforts of the company to fulfil its mission statement and vision statement.

Its vision is to 'provide access to the world's information in one click'.

Its mission is to 'organize the world's information and make it universally accessible and useful'.

Ever since its beginnings the company has focused on developing proprietary algorithms to maximise effectiveness. It continues to focus on ensuring that individuals can access the information they need.

Brand recognition

The Google brand is very simple and has resulted in a very large number of customers who interact with the brand very often. Like Apple, Google has achieved brand success by getting huge splashy press every day. Google continues to get into the news by having a large number of consumer-facing products that are constantly updated. Google has asserted its branding images on its own websites, on mobile, on TV and in movies. Being aggressively global and appealing influential groups has also been important to the success of the brand.

Customer experience

Product decisions at Google are driven by optimising for the user experience first and for revenue second. The company firmly believes that the better the user experience, the more easily the money will follow.

"Worry about the money later, when you focus on the user, all else will follow' 'Create a great user experience and the revenue will take care of itself'.

'Since the beginning, we've focused on providing the best user experience possible. Whether we're designing a new internet browser or a new tweak to the look of the homepage, we take great care to see that they will ultimately suit you, rather than our own internal goal or bottom line. Our homepage interface is clear and simple, and pages loaded instantly.'

A huge part of Google's success can be attributed to the push from 'Marissa Mayer' to implement the user experience of Google, which can be summarised in one word – simplicity. The simple homepage, common-sense research function and digestible search page layout made Google and immediate go to for finding information fast and reliably.

At Google, software developers are taught that the best products 'include only the features that people need to accomplish their goals.'

'Scores of design features in every Google product have been refined based on user logs'.

'Expect any product rolling off the line to have some association with bettering the user experience behind their search algorithm. No matter if that's building stronger ties through information gathered on Google Plus, product receipts that hit Gmail, or even the hours of cat videos you watch on YouTube, it all leads to a better graph connecting searchers to the results that matter most to them'.

Design

Google made design a priority in 2011. To ensure that it could compete with Apple's tech cachet, Google's products had to be well designed.

'If designed poorly, new-fangled interactions can be jarring, unsettling, even scary.'

Today, Google produces better designed software than any other tech company. Unveiled last year, Material Design, Google's evolving language for mobiles, tablets and desktops – offers consistency in interactions, invisible rules that govern everything, so that every app feels familiar, and beauty in service and function.

'Our goal is to design everything so that it is beautifully simple'.

"Larry has raised the bar for everything that we do in design…Everything now has design as a fore element'.

'Each product should have an intuitive, simple and beautiful design that delights users each time they visit.'

Innovation

Google has used innovative strategies to maintain its leadership in the industry. Each year it invests hundreds of millions of dollars in technology and research and development projects. It is investing more than its rivals and because of this, it provides more products to people than any other tech company. Examples of its products are Gmail, Google maps, Chromebook, Glass and Nexus.

At Google, employees are given 20 percent of their work time to pursue projects that they are passionate about, even if they are outside of the core job or core mission of the company. Many wind up as products or product improvements.

Eight principles have guided innovation by Google:

- Have a mission that matters: Google has a simple mission that is used to guide all of its decisions. It makes sure that all its employees feel connected to it and empowered to help achieve it.
- Think big but start small – 'No matter how ambitious the plan you have to roll up your sleeves and start somewhere'. 'The notion of "10x thinking" is at the heart of how we innovate at Google: true innovation starts when you try to improve something by 10 times rather than by 10%'.
- Strive for continual innovation, not instant perfection – 'Early in Google's history we released some of our products as "beta launches" and then made rapid iterations as users told us what they wanted more (and less) of. Today we continue to listen carefully to user feedback after each launch and revise products based on what we hear. The beauty of this approach is that you get real world user feedback and never get too far from what the market wants.' 'The first version of AdWords released in 1999, wasn't very successful – almost

no one clicked on the ads. Not many people remember that because we kept iterating and eventually reached the model that we have today. And we're still improving it; very year we run tens of thousands of search and ads quality experiments, and over the past year we've launched over a dozen new formats. Some products we update every day'.

- Look for ideas everywhere – 'At Google we believe that collaboration is essential to innovation and that it happens best when you share information openly. 'As leader of our Ads products, I want to hear ideas from everyone – and that includes our partners, advertisers, and all of the people in my team'.
- Share everything – 'by sharing everything you encourage the discussion, exchange and re-interpretation of ideas, which can lead to unexpected and innovative outcomes'
- Spark with imagination, fuel with data – 'We try to encourage blue sky thinking through 20% time – a full day per week during which engineers can work on whatever they want. Looking back at our launch calendar over a recent 6 month period, we found that many products started life in employees' 20 percent time'. 'Data … can either back up your instincts or prove them totally wrong'. 'At Google data is a big part of every choice we make. We test and measure almost everything we do so that we have a continuous data stream to inform decisions'.
- Be a platform – 'There is so much awe-inspiring innovation being driven by people all over the globe. That's why we believe so strongly in the power of open technologies. They enable anyone, anywhere, to apply their unique skills, perspectives and passions to the creation of new products and features on top of our platforms'.
- Never fail to fail – 'People remember your hits more than your misses. It's okay to fail as long as you learn from your mistakes and correct them fast. Trust me, we've failed plenty of times. Knowing that it's okay to fail can free you up to take risks. And the tech industry is so dynamic that the moment that you stop taking risks is the moment you get left behind'

Metrics

Google uses the American Customer Satisfaction Index (ACSI) to benchmark its performance against other companies.

5. Meteorological services

Meteorological offices provide the public with the information they need to make informed decisions to protect their health, safety and security in the face of changing weather and environmental conditions. Accurate and timely forecasts and warnings are also critical to the optimum functioning of the economy, where many industries including agriculture, energy production, transportation and forestry are directly affected by weather conditions.

Optimising the use of weather and climate information requires an active partnership between the producer and consumer of meteorological services. It is clear that reliance on simply providing the best weather forecast or climate outlook is not sufficient. Meteorological information acquires value through its influence on the decisions of the users of that information. It is used to reduce

uncertainty and improve economic and other decisions.

'Information about the weather only has value insofar as it affects human behaviour'.

'A weather forecast only has value if it can be used to make decisions that yield attractive benefits to users'

Meteorological offices deliver value include by enabling better informed decisions which reduce risks and increase opportunities. They achieve this by:

- ***Tailoring products and services to customer needs*** – the need for different types and levels of detail of weather information is dictated by how the information is to be applied. Meteorological offices are increasingly seeking to build better partnerships with customers who utilise their products and services, so that they can better understand the extent and shape of their needs and tailor products and services to meet those needs. The driver behind this service concept is ensuring that people and institutions are positioned to act on the information provided and make 'smart' decisions and build resilience in communities. Most meteorological offices do not have the extensive capacities to meet all of their customer needs, and must therefore be selective around where they will be able to deliver most value.
- ***Ensuring information is accessible*** – good communication and dissemination of weather and climate information is an intrinsic element in maximising the overall benefit – or value – of weather information to society. The benefit of weather information to society is only maximised when the greatest number of people receive the information and act upon it when making decisions.
- ***Building awareness of the value of meteorological information*** – promoting a better understanding of the valued role of meteorological offices in reducing loss of life and economic damages, and the benefits of improved use of meteorological services. In this way it raises awareness of the opportunities that weather and related information offer. A growing number of meteorological offices are attempting to promote a better understanding of the value of weather and climate information to society and the economy through calculating a monetary estimate of the value of the information. For example, it has been estimated that weather variability accounts for as much as 3.4% of GDP in the USA. Most studies tend to focus on a particular sector, such as agriculture or transport.
- ***Research and development*** – to understand meteorological and climatological cycles and their impacts better, and develop new or improved products and services.
- ***Partnerships*** – increasingly weather offices are forming partnerships with academic institutions and software companies to improve their efficiency and impact. For example, in the UK the Met Office has established a Met Office Academic Partnership to bring together the Met Office and institutions that are among the UK leading universities in weather and research (Universities of Exeter, Oxford, Leeds and Reading) to tackle key challenges with weather prediction. The aim of the collaboration is to draw together world class expertise around a focused programme of research to tackle key challenges in

weather and climate science prediction; and to maximise the return on the UK' investment in research and development in its leading research institutions.

In the UK, the Met office is also working in partnership with the oil and gas industry to enhance its weather forecasting. Weather data reports obtained from over 104 oil and gas platforms and mobile installations across the North Sea in real time, enable forecasters to predict and analyse weather patterns more accurately and provide bespoke forecasting advice. 'Helimet is an internet-based weather data network originally designed to share data between UK installations and helicopter operators. This collaboration is a great example of how cutting edge data technology, driven by the oil and gas industry can be of great value to other areas. Helimet uses a network of automated weather stations located on offshore oil and gas platforms and mobile installations. They provide detailed reports of cloud, visibility, and weather in some instances, information on wave conditions. These data are fed into a network allowing more accurate definition of the weather across the North Sea, an area prone to adverse weather conditions. 'Helimet makes a significant contribution to the Met Offices ability to accurately monitor and provide weather advice. Accurate guidance is critical to the safe and efficient operation of not only the oil and gas industry but also the wider offshore renewables, shipping and aviation activity.'

In NZ, Metservice invested in MetOcean, a leading NZ oceanographic services company helping maritime and offshore industry clients to improve decision making and improve operational efficiencies. In NZ close commercial partnerships have been instrumental in bringing new weather services to the public. For example, the Metservice Marineapp has been designed in partnership with Maritime NZ and the Metservice Snow weather app which includes vital information about road and ski conditions was developed jointly with the Department of Conservation.

Metrics

Meteorological offices are increasingly seeking to quantify the value of weather information in monetary terms. The main ways they use to estimate the value of forecasts are by:

- Modelling of decisions, with and without forecasts, and of the expected consequences of these decisions (eg for agriculture, electricity generation, fisheries etc)
- Using surveys to obtain value estimates
- Using data from actual events ie observed weather phenomena with and without forecasts or warnings (eg use of observational data for valuing hurricane and heat wave warnings)

6. The United Kingdom's Pharmaceutical industry

The pharmaceutical industry develops, produces and markets drugs and pharmaceuticals for use in medications. It is subject to a variety of laws and regulations that govern the patenting, testing, safety, efficacy and marketing of drugs.

Pharmaceutical companies deliver value through:

- ***Undertaking research and development*** – this enables the development of new and innovative medicines for patients, across a huge range of diseases and conditions, which make an essential contribution to the health and wellbeing of the population. Medicines developed by the pharmaceutical industry have helped to change the healthcare landscape through the

prevention or cure of previously life-threatening diseases, such as HIV and AIDS.

- ***Contributing to efficiencies and savings*** – many chronic conditions place a huge economic burden on society through employee absenteeism and lost productivity due to illness; the long-term medical, in-patient hospital and surgical costs associated with late treatment and disease; the significant cost to the National Health System through disability; and the societal costs associated with illness. Appropriate use of medicines can deliver patient benefits and consequent cost savings.
- ***Making a vital contribution to the economy*** – by most measures the pharmaceutical sector is Britain's most successful research-based industry. For example, Gross Value Added (GVA) per employee in the industry is significantly higher than high and medium-tech sectors such as chemicals, motor vehicles and computer products. Over the past decade the industry has consistently generated a large trade surplus for the UK, and its contribution to the balance of trade was the third greatest of nine major industrial sectors.
- ***Being a source of highly skilled jobs*** – the industry employs around 73,000 people directly in the UK, almost a third of which are in highly skilled research and development roles. In addition, the industry generates thousands of jobs in related industries, such as the biotechnology, medical technology and diagnostics industries.

Metrics

The pharmaceutical industry in the UK uses Gross Value Added (GVA) to measure the contribution of the industry to the UKs national income. To measure the GVA the value of output generated by the industry is calculated and from this the cost of goods and service involved in production is deducted.

The UK pharmaceutical industry also tracks the return from pharmaceutical innovation on a regular basis. Two key measures are used: static internal rate of return (IRR), which provides a yearly 'snapshot' of returns performance, and dynamic returns, which provides a year-on-year assessment of the key drivers of changes in IRR over time.

Other measures that are used to assess the value of the industry are:

- Sales of prescription medicines
- Retail and Producer price indices for pharmaceutical products
- Pharmaceutical industry's contribution to the trade balance
- Employment in the pharmaceutical industry
- Pharmaceutical industry's contribution to improving health outcomes

7. Whittaker's

JH Whittaker's & Sons Ltd (Whittakers) is a New Zealand confectionary company specialising in chocolate. The company controls its entire manufacturing process, calling itself a 'bean to bar' manufacturer. It has been a family-owned business since 1896, with third-generation family members still the sole shareholders in the company.

Whittaker's has built a strong culture around the brand. In 2011, it was listed as New Zealand's third most trusted brand by a Readers Digest survey. It improved its standing to first in 2012, and retained this standing in the next four consecutive years.

Key aspects of how Whittaker's delivers value include:

- ***Brand recognition*** – the brand provides premium quality at an affordable price. It is recognised as being trustworthy and reliable, and for consistently delivering a strong experience in terms of product quality, variety, price and availability. Whittaker's have used the same label designer since 1984.
- ***Quality*** – the company is dedicated to only using ethically-sourced ingredients of the highest quality. It is committed to ensuring quality by undertaking the whole production process in the manufacture of its products, and investing in good quality equipment. "It's a core company value that we will never compromise on'.
- ***Innovation*** – Whittaker's is constantly seeking to surprise and delight customers by producing new flavours and products. For example, it recently introduced a new artisan range of chocolate with ingredients sourced from New Zealand artisan producers.
- ***Collaborating with other companies*** – the company has shown a keenness to advance itself by collaborating with other company's products where there is a link to chocolate. For example, it produced a co-branded ice-cream product 'Lewis Road Creamery Chocolate Milk Drink' that has attracted a huge consumer following. It has also entered into partnerships with commercially successful brands like L&P and Jelly Tip. 'The collaboration of two desirable boutique brands that have a loyal following – so it appealed to the fans of each brand and it appealed to the kiwi origin."
- ***Communications/marketing*** – Whittaker's have made smart use of communications channels, especially social media, and have invested heavily in paid media like television.

Metrics

Whittaker's has been listed the most trusted brand in the Readers Digest Survey of most trusted brands for the last four consecutive years. The company has increased its market share with every year it has been voted the most trusted brand.

Annex 5 Studies that use statistics to achieve development impacts

1. Education

IMPACT OF INFORMATION ON THE RETURNS TO EDUCATION ON THE DEMAND FOR SCHOOLING IN THE DOMINICAN REPUBLIC

WEBSITE: JPAL
LOCATION: República Dominicana
SAMPLE: 2,250 eighth grade boys
TIMELINE: 2001 - 2005
THEMES: Education
Labor Markets
POLICY ISSUE: Student Participation
PAPER CITATIONS: Jensen, Robert. 2010. "Impact of Information on the Returns to Education on the Demand for Schooling in the Dominican Republic." **Quarterly Journal of Economics** 125 (2010): 515-548.

EXAMINING THE EFFECT OF INFORMATION ABOUT FINANCIAL AID FOR HIGHER EDUCATION ON SCHOOLING OUTCOMES IN CHILE

WEBSITE: JPAL
LOCATION: Santiago, Metropolitan Region, Chile
SAMPLE: 6,233 eighth-grade students in 226 low-income schools
TIMELINE: 2009
THEMES: Education
POLICY ISSUE: Post-Primary Education; Student Learning; Student Participation
PAPER CITATIONS: Dinkelman, Taryn, and Claudia Martinez. "Investing in Schooling in Chile: The Role of Information About Financial Aid for Higher Education." The **Review of Economics and Statistics**, Forthcoming.

THE ROLE OF INFORMATION IN SCHOOL CHOICE: AN EXPERIMENTAL STUDY WITH LOW-INCOME FAMILIES IN CHILE

WEBSITE: JPAL
LOCATION: Chile
THEMES: Education

2. Health

COMMUNITY-BASED MONITORING OF PUBLIC PRIMARY HEALTH CARE PROVIDERS

POLICY ISSUE: Public health care quality
INTERVENTION: Through two rounds of village meetings, localized nongovernmental organizations encouraged communities to be more involved with the state of health service provision and strengthened their capacity to hold their local health providers to account for performance.
RESULTS: A year after the intervention, treatment communities are more involved in monitoring the provider, and the health workers appear to exert higher effort to serve the community. The study documents large increases in utilization and improved health outcomes—reduced child mortality and increased child weight—that compare favorably to some of the more successful community-based

intervention trials reported in the medical literature.
PAPER CITATIONS: Björkman, M. and J. Svensson (2007). Power to the People: Evidence from a Randomized Field Experiment on Community-Based Monitoring in Uganda. **Quarterly Journal of Economics**, 124(2): 735-769.

HIV/AIDS PREVENTION THROUGH RELATIVE RISK INFORMATION FOR TEENAGE GIRLS IN KENYA

WEBSITE: JPAL
LOCATION: Western Kenya
SAMPLE: 328 Primary Schools in Kenya's Western Province
TIMELINE: 2003 - 2005
THEMES: Education; Health
POLICY ISSUE: Gender; HIV/AIDS
PAPER CITATIONS: Dupas, Pascaline. 2011. "Do Teenagers Respond to HIV Risk Information? Evidence from a Field Experiment in Kenya." **American Economic Journal**: Applied Economics 3(1): 1-34.

THE ROLE OF INFORMATION AND SOCIAL LEARNING ON RISKY SEXUAL BEHAVIOR IN CAMEROON

WEBSITE: JPAL
LOCATION: Cameroon
SAMPLE: 4,200 13-year-old girls
TIMELINE: 2009 - 2012
THEMES: Health
POLICY ISSUE: HIV/AIDS

INTEGRATED MEDICAL INFORMATION AND DISEASE SURVEILLANCE IN PRIMARY HEALTH CENTERS IN INDIA

WEBSITE: JPAL
LOCATION: Karnataka, India
SAMPLE: 350 primary health centers in five districts
TIMELINE: 2010 - 2011
THEMES: Health; Political Economy & Governance
POLICY ISSUE: Healthcare Provider Attendance
PAPER CITATIONS: Dhaliwal, Iqbal, and Rema Hanna. “Deal with the Devil: The Successes and Limitations of Bureaucratic Reform in India.” NBER Working Paper No. 20482, September 2014.

3. Targeting

EFFECTIVELY TARGETING ANTI-POVERTY PROGRAMS IN INDONESIA

WEBSITE: JPAL
LOCATION: North Sumatra, South Sulawesi, and Central Java provinces, Indonesia
SAMPLE: 5,756 households in 640 villages
TIMELINE: 2008 - 2009
THEMES: Political Economy & Governance
POLICY ISSUE: Targeted cash transfer programs have become an increasingly common tool for poverty reduction, but identifying the poor can be challenging as governments often lack reliable information about incomes. Cash Transfers; Community Participation; Transparency & Accountability; Ultra-Poor Programs
INTERVENTION: RCT evaluating targeting of poor households using (i) proxy means testing (PMT) based

on census data versus (ii) a community based and (iii) a hybrid method.
RESULTS: The PMT incorrectly classified 30 percent of households, while the community and hybrid methods classified about 33 percent of households incorrectly.
PAPER CITATIONS: Alatas, Vivi, Abhijit Banerjee, Rema hanna, Benjamin A. Olken, and Julia Tobias. 2012. "Targeting the Poor: Evidence from a Field Experiment in Indonesia." **American Economic Review** 102(4): 1206-1240.

IMPROVING TARGETING OF A CONDITIONAL CASH TRANSFER PROGRAM IN INDONESIA

WEBSITE: JPAL
LOCATION: Lampung, South Sumatra, and Central Java provinces, Indonesia
SAMPLE: 400 villages
TIMELINE: 2010 - 2012
THEMES: Political Economy & Governance
POLICY ISSUE: Cash Transfers
PAPER CITATIONS: Alatas, Vivi, Abhijit Banerjee, Rema Hanna, Benjamin Olken, Ririn Purnamasari, and Matthew Wai-Poi. 2014. "Self-Targeting: Evidence from a Field Experiment in Indonesia." Journal of Political Economy, forthcoming.

SOUTH AFRICAN OLD AGE PENSION SCHEME

INTERVENTION: The South African Old Age Pension scheme is a means tested, unconditional cash transfer scheme for women above 60 and men above 65 years of age.
RESULTS: Edmonds (2006) finds that these pension transfers are associated with a decline in hours worked per day of a child living with an elder. A complementary rise in school attendance rates is also seen among these children. Duflo (2003) finds that women receiving pensions in South Africa significantly improves the health and nutritional status of their granddaughters. Duflo's estimates suggest that the pensions received by women helps their granddaughters to bridge the entire gap in height for age scores with American children.
PAPER CITATIONS: Duflo, E. (2003). Grandmothers and Granddaughters: Old-Age Pensions and Intrahousehold Allocation in South Africa. **World Bank Economic Review**, 17(1): 1-25. Edmonds, E.V. (2006). Child labor and schooling responses to anticipated income in South Africa. **Journal of Development Economics**, 81(2): 386-414.

4. Governance

INFORMATION DISSEMINATION CAMPAIGN AND VOTERS' BEHAVIOR IN THE 2009 MUNICIPAL ELECTIONS IN MEXICO

WEBSITE: JPAL
LOCATION: Jalisco, Morelos, and Tabasco, Mexico
SAMPLE: 2,360 voting precincts
TIMELINE: 2009
THEMES: Political Economy & Governance
POLICY ISSUE: Corruption; Transparency & Accountability

VOTER INFORMATION CAMPAIGNS AND THE DELHI MUNICIPAL COUNCILLORS 2011 ELECTION

WEBSITE: JPAL
LOCATION: Delhi, India

SAMPLE: 240 municipal wards
TIMELINE: 2010 - 2012
THEMES: Political Economy & Governance
POLICY ISSUE: Community Participation; Corruption; Urban Services

POLITICIANS, PUBLICLY-RELEASED AUDITS OF CORRUPTION, AND ELECTORAL OUTCOMES IN BRAZIL
WEBSITE:
LOCATION: Brazil
SAMPLE: 669 Municipalities
TIMELINE: 2005
THEMES: Political Economy & Governance
POLICY ISSUE: Community Participation; Corruption
PAPER CITATIONS: Ferraz, Claudio, and Frederico Finan. 2008. "Exposing Corrupt Politicians: The Effects of Brazil's Publicly Released Audits of Electoral Outcomes." The **Quarterly Journal of Economics** 123(2): 703-44.

5. Agriculture

FUTURES PRICES AND RISK HEDGING IN GUJARAT, INDIA
WEBSITE: JPAL
LOCATION: Rural Gujarat, India
SAMPLE: 108 villages in 4 districts of Gujarat
TIMELINE: 2007 -
THEMES: Agriculture; Finance & Microfinance

VALUING PUBLIC INFORMATION IN AGRICULTURAL COMMODITY MARKETS: WASDE CORN REPORTS
WEBSITE: AgEcon
THEMES: Agriculture