Official Statistics and the Politics of Sustainable Development

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Abstract: - Sustainable development is increasingly defined in terms of indicators and targets, notably to help put into practice the UN's 2030 agenda for sustainable development. All countries have committed to developing broader measures of progress to complement GDP. There are many challenges to be faced in designing and delivering indicators that will be relevant, reliable, usable and affordable. The official statistics system is envisioned to undertake this work, as a core part of its role to serve governments, economies and the public with data about the economic, demographic, social and environmental situation. Standards, quality control and international collaboration are essential features of official statistics. However, the crucial issue is how new indicators will be used. We look at political demands for new measures of sustainable development and discuss issues concerning their use. We consider the need for active engagement of official statistical offices as well as the involvement of the media, policy-makers and politicians. Will the publication of sustainable development indicators stimulate behaviour change, leading to more sustainable development by consumers and businesses, or will the indicators only be used to record our development?

Key-Words: - Indicators, Targets, Beyond GDP, National Statistical Systems, Statistics Users.

1 Introduction: Sustainable

Development

Some people and communities "have always lived closely attuned to nature and in ways that depend on an understanding and stewardship of the earth's natural resources" [1]. This awareness is apparent in classical literature and has been rediscovered from time to time over the millennia.

One example is from December 1940, early in the Second World War. The head of the Church of England and other religious leaders wrote a letter to The Times newspaper. They were looking ahead to the return of peace time. They listed five standards that they believed should be adopted in the organisation of society. One of these was that "The resources of the earth should be used as God's gift to the whole human race, and used with due consideration for the needs of the present and future generations". Reflecting on this 60 years later, Calder categorises it as one of a number of resolutions in which there was "nothing in the least novel ... and they have not had the smallest practical results" [2].

The concept of ecology that underpins an understanding of the natural world and its interaction with human activity was recognised in industrial economies in the 1860s. It was not until the 1960s and 1970s before interest groups, academia and the media started focussing seriously on the state of the natural environment in light of economic growth, production and consumerism.

The Brundtland Report of 1987, commissioned by the United Nations, set out the concept of sustainable development. This is characterised as development that contributes to the welfare and wellbeing of the current generation, without compromising the potential of future generations for a better quality of life [3].

Sustainable development is not easy to define or to assess. Wellbeing, welfare and quality of life are also difficult concepts to specify and to compare between places and over time. It will only be known in future times if the generations that follow us are enjoying a quality of life that is at least as good as ours today. But clearly, in the spirit of embracing sustainable development, while we have to leave it to them to find out, we must try to ensure that what we do today does not damage their chances of enjoying such a level of quality of life.

There has been much scientific and technological innovation, construction and delivery of manufacturing and energy production aimed at supporting sustainable development. Similarly, many sustainable development indicators (SDIs) have been designed over recent decades to help steer current development (eg see [1], pp. 69-75). The innovation, construction and delivery of indicators, along with more detailed analyses such as natural resource accounts, complements the scientific and technological ways of supporting sustainable development. The statistical work, though, has perhaps been less visible.

In this paper we focus on the use of SDIs, rather than on their methodology. In particular, we explore issues around what Opschoor and Reijnders were quick to realise were some of the characteristics of SDIs [4]. These include needing to indicate the condition of the environment in terms of its capacity to sustain economic activity, while only drawing on information available at that point in time. They also noted that SDIs are to help assess performance against "a desirable condition or goal", which needs to be specified. We should use SDIs to anticipate where our present journey is heading, rather than wait to see where we have arrived at.

Even with such principles in mind, one of the challenges facing the producers of SDIs is that the concept of sustainability is played out in many different ways. For some, the focus is on long-term sustainability for the environment. For others, it appears more important to agree how to continue current economic activity, or that both the economy and the environment are important. The OECD, for example, refers to "green growth", meaning "fostering economic growth and development while ensuring that natural assets continue to provide the resources and environmental services on which our well-being relies. To do this it must catalyse investment and innovation which will underpin sustained growth and give rise to new economic opportunities" [5].

There are many producers of indicators and analysis to help assess and steer sustainable development. SDIs have been designed and published by national statistical agencies, as official statistics, but also by international organisations, non-governmental organisations and academics.

We concentrate on the role of official statistics, because of their mission, as set out in the United Nation's fundamental principles for official statistics. These say that official statistics are to serve the government, the economy and the public with data about the economic, demographic, social and environmental situation [6].

This role was reinforced in respect of measuring progress and development by the 2007 Istanbul Declaration. This identifies national statistical authorities as "key providers of relevant, reliable, timely and comparable data and the indicators required for national and international reporting" [7]. We pick up the story with the United Nations agenda for sustainable development, agreed in 2015.

2 An Agenda for Change

In September 2015, the government of each country agreed to a plan of action for people, planet, prosperity, peace and partnership. The plan adopted in the United Nations runs through to 2030. The plan is anchored in the ambition of eradicating poverty of every kind. It has 17 goals, known as the Sustainable Development Goals (SDGs), and 169 targets.

One of the goals, for example, is to "promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all". This goal has 12 targets, some about putting policies in place and others about achieving certain outcomes, such as a substantial reduction in the proportion of young people not in employment, education or training [8].

Alongside the political process of adopting the agenda there has been a technical and a political process to define and agree 230 indicators to monitor progress towards the SDGs. This is also addressing how progress on meeting the goals should be reported to the UN General Assembly and what needs to happen to deliver the information needed to compile the indicators in every country. There are serious questions about building the capacity needed to construct and publish indicators. In part this might be helped by building partnerships between national statistical agencies and organisations that already collect relevant data.

Progress to date can be judged from the inaugural report on the SDGs published in 2016 by the UN Statistics Division. This suggests that there is a clear statistical picture of the present position, the starting point for this journey. However, "The data requirements for the global indicators are almost as unprecedented as the SDGs themselves and constitute a tremendous challenge to all countries" [9].

In addition to specific targets, the UN action plan also records universal commitment "to developing broader measures of progress to complement gross domestic product (GDP)" [10]. This follows a number of national and international initiatives about going beyond GDP [11].

3 The Role of Official Statistics

Official statistics are defined by their function to serve as "an indispensable element in the information system of a democratic society", according to the UN fundamental principles for official statistics referred to in section 1. The principles leave national governments to put in place appropriate mechanisms to deliver official statistics. In practice, this means that virtually every country has a national statistics office or similar agency.

Statistics, especially official statistics, have long been widely used in monitoring, planning and evaluating international development. Dudley Seers observed that "We cannot, with our own eyes and ears, perceive more than a minute sample of human affairs, even in our own country - and a very unrandom sample at that. So we rely on statistics in order to build and maintain our own model of the world. The data that are available mould our perceptions" [12].

With a statistical model or framework in place, we can add qualitative narratives to build a fuller and more recognisable picture. For example, after travelling through India, Aatish Taseer wrote convincingly about "a world increasingly divided between globalised elites with shared values and cultures, and heartlands which are culturally and economically dispossessed" [13].

The fundamental principles for official statistics reflect the importance of standards, quality control and international collaboration as essential features of official statistics, as well as their regulation and governance. All are essential. However, we suggest that "the test of practical utility" is a crucial issue in ensuring that official statistics fit the role envisioned for them in the fundamental principles.

In the context of sustainable development and the UN 2030 agenda, one core question is therefore, how are the SDIs to be used in - or indeed as - a political process?

4 Statistics, Politics and Social Change

Politics is often seen as about the way in which a country is governed. A slightly broader concept of politics is to consider all of the ways in which decisions are made that affect the citizens of a country. This allows for the rich complexity of decision-making that impinges on our lives. However, this also has the potential for making problematic any assessment of how a country is doing, what progress it is making, and how things

might be done differently. We will therefore start with government before widening the scope.

4.1 Politics and policy

Politics is often about change, the notion that something must be done about this or that, and that the government should be doing it. Some calls for action may remain unanswered. Others are what Kingdon has identified as containing "an idea whose time has come ... a fundamental reality about an irresistible movement that sweeps over our politics and our society, pushing everything that might stand in its path" [14].

The broad idea we are exploring here is to reposition economic growth, especially the year on year increase in GDP, as a means to an end, not as the end in itself. The goal should be the promotion of wellbeing, understood as the things that matter to people. This is not the first time that this idea has been promoted over the prevailing hegemony, that which is often characterised as only about maximising aggregate economic growth. Bache and Reardon describe and analyse an earlier ("first") wave of wellbeing, in which a social indicators movement emerged, but where little else changed [15].

Kingdon's definition of a significant change in the political and societal landscape sets the bar high. Taking a pragmatic view, then the UN's pursuit of sustainable development will only be seen as an idea whose time has come when there are clear and important policies adopted by governments that will lead to different outcomes. While politics can suggest directions and set goals to guide us, it is only through policy that we can seek and follow ways of attaining the goals. Some precision is needed in setting appropriate policy instruments.

Policy is generally thought to be a little easier to formulate when goals and targets are specific, measureable, achievable, realistic and time bound (SMART). This is not the place to critique the SDGs along these lines, even their measurability. Our concern here is the combination of attributes and processes that makes indicators useful and results in them being used. To meet the fundamental principles, indicators should be relevant not only to the delivery of policy but also to help hold governments to account for their performance in delivering policy and meeting political goals.

4.2 Measurement and policy

The UN agenda for sustainable development is both a vision and a political process, motivating

governments to put in place policies that will enable the SDGs to be achieved. This process includes a measurement policy, both to produce the 230 indicators (presumably for each country, so that global progress towards the goals can be assessed) and to come up with broader measures of progress, beyond GDP.

So far, there appears to be a framework, in which each indicator is defined and linked to one or more targets. Implementation is being planned, especially to help developing countries measure progress towards the SDGs in terms of the data for their country. This appears to have largely been a process in which statisticians have designed measures, albeit based on experience and methodology and with extensive consultation through the myriad UN organisations. There is little evidence that the use of the measures has been given as much thought.

Despite all the official statistics currently available, tracking progress towards the SDGs will require the collection, processing, analysis and dissemination of an unprecedented amount of data and statistics. As well as national level data, there will be needs to aggregate to regional and global levels, requiring standardisation in definitions and harmonisation in reference periods and data processing timetables. There may also be sub national requirements, for example to verify that noone is being left behind; the clarion call of the UN agenda.

Data and statistics will be derived from official statistical systems and from new and innovative data sources. There will be few if any national statistical systems (and their government funders) across the world that do not face major challenges in meeting the SDG requirements for indicators.

The UN Statistical Commission has established a High-level Group (HLG) for Partnership, Coordination and Capacity-Building for statistics for the SDGs. The HLG is currently working on a global action plan for sustainable development data. This will set out a road map to modernise and strengthen statistical systems and identify ways to mobilise necessary resources.

Johannes Jutting of PARIS21 and Shaida Badiee of Open Data Watch have estimated the large sums that are needed to help developing countries measure and monitor the SDGs, while noting that this amounts to only a small fraction of current levels of total aid. Specifically, "around US\$5.1 billion for the period until 2030 is needed in extra donor funding. This equates to some US\$340 million per year, which is less than 0.5% of Official Development Assistance. This amount will be slightly higher if the additional needs of the 67 IBDR countries are taken into account, which have an estimated cost per year of US\$85 million" [16].

Writing in the context of developing new measures of natural capital, Mayer has astutely observed that measurement "does not in itself [17]. automatically translate into policy" Measurement needs to be accompanied by a commitment to use those measures to guide public policies. Allin and Hand identify some potential uses of the UK measures of national wellbeing, but also note that a measurement policy "appears not to commit anyone to doing anything based on what new measures might show". In short, "Great idea, but what's the use?" [18].

The need "to move on from the measurement issue to deciding what governments should do" was recognised in the Legatum Institute Commission on wellbeing and policy [19]. It went on to suggest how specific policy areas could be developed. This makes the point that requirements for official statistics not only come from existing public policies; there are also emerging requirements to be anticipated.

As we have noted, the fundamental principles for official statistics put great emphasis on meeting user needs. However, over the years it has been apparent that one of the challenges to this is that statisticians can have a tendency to focus more on technical aspects of quality, such as accuracy, than on relevance. While is it important that official statistics offices attempt to represent the data they collect objectively, so that the data speak for themselves, this should be done in a way that permits accurate and relevant answers to user needs. Perhaps some rebalancing of effort is needed across official these aspects of statistics when implementing the fundamental principles.

One example of this is from Professor Sir Charles Bean's recent review of economic statistics in the UK Office for National Statistics. He recommended that ONS should refocus its culture "towards better meeting user needs ... Staff should be proactive, rather than reactive, in engaging with users and responsive to those users' needs" [20].

In marketing language, this is about recognising that building a better mousetrap does not mean that the world will beat a path to your door. This is not a wholly appropriate analogy for official statistics products. Here the issue is more about being able to provide better answers to a specific question by finding out what the question is beforehand. Pertinent data could then be collected, rather than collecting a general set of data, which could have a stab at answering any question but would be less good for any specific question. Nevertheless, it is helpful to consider what Mike Collins has set out as four questions for the developers of new mousetraps - and other products or services - to consider [21]. These do read across well to the development of new statistics and indicators.

The first question asks simply, what are customers' needs? At present, the needs that users of the SDG indicators will have are only beginning to emerge. They will include public policy formulation, business decisions and academic research, as well as the direct monitoring of progress towards the SDGs. This calls for active and on-going user consultation by national statistical agencies. It requires these agencies to identify and engage with their users and their potential users. It calls for customer relationship management.

Second, what about the competition? National statistical agencies do not have a monopoly on the publication of data and statistics relevant to the SDGs. Given the huge challenge of meeting the SDGs, it is reassuring that the UN talks about partnerships, including in data and metadata exchange. That still leaves competition in the form of non-official data and statistics that are unlikely to be joined in such partnerships, for example because of their limited or uncertain quality. Understanding this should give official statisticians insights on what users need and how to position and brand official statistics outputs.

Third, what is the value proposition of the proposed new product? Official statistics are often published free of charge. Even so, there should be serious consideration of the costs involved in collecting and processing the data, and the wider public value that results from disseminating the statistics and indicators.

Fourth, what does a market analysis reveal? This should help not only with understanding requirements but also how best to reach users once new statistical products have been developed.

As national statistical offices consider these four questions, they may also no doubt realise the need to factor in the role of the media. This embraces both the traditional news media and the newer arena of social media. It is in all of these places that official statistical outputs may be communicated, discussed or ignored, after outputs such as SDIs have been published by the national statistical office.

4.4 The media

As lawyer Anthony Lester has noted, "The control of access to information is a powerful weapon in the hands of our political masters" [22]. One of the ways of combating this is with a legal right for the public to know how government decisions are arrived at. The UK has a Freedom of Information Act to support this, albeit with limitations. Lester recognises that this Act is used mainly by journalists, rather than by individual members of the public, because "it is the crucial role of the press in a modern participatory democracy to act as a public watchdog alerting and informing the public about matters of public interest".

On a more prosaic level, we might also realise that the increasing number, variety and extent of media outlets drives an insatiable appetite for content. Official statistics help meet that demand. They are used in a variety of ways, from substantial analysis and commentary through to a statistic of the day. Official statistics, like many other news stories, are often therefore prepared with a news release and perhaps also a news conference.

Whether one of the many statistical releases is reported or not depends on rather opaque selection processes. The item may appeal to a journalist or an editor. There may be an expectation that, for example, the GDP figures are always covered. There was some consideration of how the BBC selects the statistics that it reports in a recent review of the impartiality of reporting by that public service broadcaster. The review notes it is "entirely reasonable" that selection from a huge volume of potential statistics should be based on the journalist's assessment of the credibility of the source and other factors, such as familiarity with earlier outputs, but the review "could find no guidance on how to make such judgements or how they should be applied" [23].

Official statisticians are turning increasingly to publishing in social media. Here the rules are still evolving, but they seem to be based mostly on the notion of adding content, with social media companies declaring themselves to be IT providers of platforms rather than publishers. Reflecting on the role of social media in recent elections and referenda suggests that it will play an ever increasing role in debate, although with perhaps a reduction in the scope for objectivity.

We should not assume that everything that is published in the media is true. The rise of factchecking services [24] suggests otherwise. Recent developments associated with social media, but found elsewhere in public discourse, are exemplified by the apparent acceptance of a new word, post-truth, and a growth of fake news sites.

As we noted earlier, the path for national statistics offices to tread is mapped out by the UN's fundamental principles for official statistics. The

aim of providing trusted and trustworthy statistics remains paramount, but statistical offices face increasing challenges in delivering statistics that stand out because of these qualities.

4.5 Social change

To reach a stage where "the time has come" for sustainable development requires a lot more than a set of reliable, trusted and usable indicators. Bache and Reardon have analysed what they describe as the "first wave" of interest in going beyond GDP [25]. They conclude that a lack of policy convergence, a lack of political commitment and events such as economic recessions drove a new macroeconomic paradigm and buried wider notions of what progress meant.

But are there any lessons from those times? Statistics and indicators have been given a role to play in supporting the new UN agenda. The indicators need to be directed towards politicians, policy makers, international organisations, businesses and the public, recognising also that their opinion is shaped by the media. Non-governmental organisations, both those talking mainly with businesses and those connecting with the public, also have the potential to encourage behaviour change.

We might also give some thought to the need to enhance quantitative skills of decision makers, advisers, the media and the public, as well as students. There is increasing awareness of why it matters to be able to ask questions about statistics and indicators, such as the source of the data and its representativeness, coverage, accuracy and timeliness. Quantitative skills programmes are also promoting reasoning and logic, new data sources and how to access them, analytical tools, using information technology and the value of checking the sense of a new fact against theory and real world understanding [26].

Statistics are frequently used in political debate. There are, however, only a limited number of ways in which politicians are supported by statisticians. One such example is the Research and Information Service in the UK Parliament. This is where members of Parliament can obtain the latest and most relevant statistics, including with an assessment of the quality of the statistics. Even with this service, there is a pronounced tendency for political debate to rely on a few, so-called killer facts, with little room for more nuanced discussion of what is likely to be the situation and what is likely to be more conjecture.

4.6 Will Big Data help?

Much has been written about the potential of Big Data, the digital content of commercial, government and other databases that is constantly accumulating as a result of transactions, communications and other interactions [27]. Harkness has explored the increasing use of behaviourist approaches by which individuals gather data on themselves and "try to take more control of their own lives". But rather than just use data in that way, she asks if can use the abundance of information that big data offers to rebuild democracy on new foundations.

Harkness sets out a familiar and reassuring case around evidence-based policy, where evidence is a trusted and trustworthy input. The enlightened policy maker should be looking for evidence of what works, and what does not work. However, Harkness emphasises that policy operates in a democracy, not a technocracy or statistocracy. She concludes "Politics should be founded in as true a picture of the real world as we can build, of course. But it should not be limited to that" [28].

There are echoes here of the argument used by Prime Minister Winston Churchill who, during the Second World War, founded the British Central Statistical Office. This was so that government ministers should not be arguing about the figures but about what should be done on the basis of a shared understanding of the state of the nation [29].

5 Conclusion

The naturalist David Attenborough put the position in a straightforward way: "The fundamental truth that Malthus proclaimed [in 1798] remains the truth. There cannot be more people on this earth than can be fed. Many people would like to deny that this is so. They would like to believe in that oxymoron 'sustainable growth.' Kenneth Boulding, President Kennedy's environmental advisor forty five years ago said something about this. 'Anyone who believes in indefinite growth in anything physical, on a physically finite planet,' he said, 'is either mad – or an economist'" [30].

Recognising the need to change is taking some time. We now have sustainable development goals and indicators. Nicolas Sarkozy has written that "We will not change our behaviour unless we change the ways we measure our economic performance". The work he commissioned on new measures embraces classical economics, quality of life, sustainable development and the environment [31]. Other politicians have spoken along these lines and the concordance reached with the UN's 2030 agenda is further endorsement of political will. Perhaps politicians include doing something with measures when they talk of measuring things differently. While measurement is necessary it will not be sufficient. We also need to be clear how indicators are to be used in politics, policy, business and everyday life. It is not yet clear who will do what, so that we set and follow development pathways that tunr out to be sustainable.

Not all personal, commercial and political decisions are made by humans acting as rational economic agents. There is an opportunity here for publication of sustainable development indicators to help stimulate behaviour change, leading to more sustainable development by consumers and businesses. However, if the indicators are only to be used to record our development, then surely they will merely confirm what will be known by then: was our development sustainable or not?

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References:

- [1] P.Allin & D.J.Hand, *The Wellbeing of Nations: Meaning, Motive and Measurement,* John Wiley & Sons Ltd., 2014.
- [2] A.Calder, *The People's War: Britain 1939-1945*, Random House eBooks, 2012, p482
- [3] World Commission on Environment and Development, *Our Common Future*, Oxford University Press, 1987.
- [4] H.Opschoor & L.Reijnders, Towards Sustainable Development Indicators, in O.Kuik and H.Verbruggen (eds.) In Search of

Indicators of Sustainable Development, Kluwer Academic Publishers, 1991.

- [5] OECD, *Towards Green Growth*, OECD Publishing, 2011.
- [6] <u>http://unstats.un.org/unsd/dnss/gp/fundprinciple</u> <u>s.aspx</u>
- [7] OECD, Measuring the Progress of Societies World Forum on Statistics, Knowledge and Policy: Istanbul Declaration, 2007, <u>http://www.oecd.org/newsroom/38883774.</u> <u>pdf</u>
- [8] United Nations, Transforming our world: the 2030 Agenda for Sustainable Development, 2015, <u>https://sustainabledevelopment.un.org/post2015</u> /transformingourworld
- [9] United Nations, The Sustainable Development Goals Report 2016, <u>http://unstats.un.org/sdgs/report/2016/The%20</u> <u>Sustainable%20Development%20Goals%20Re</u> <u>port%202016.pdf</u>
- [10] See para. 48 in [7].
- [11] E.g. see Appendix in [1].
- [12] D.Seers, *The Political Economy of Nationalism*. Oxford University Press, 1983, p.130.
- [13] A.Taseer, The Interpreters, *Granta*, Vol.137, Autumn 2016, pp.75-99.
- [14] J.Kingdon, Agendas, Alternatives and Public Policies, HarperCollins College Publishers, 2011.
- [15] I.Bache and L.Reardon, *The Politics and Policy* of Wellbeing: Understanding the Rise and Significance of a New Agenda, Edward Elgar Publishing, 2016.
- [16] <u>http://www.data4sdgs.org/master-</u> <u>blog/2016/9/26/financing-sdg-data-needs-what-</u> <u>does-it-cost</u>
- [17] C.Mayer, Unnatural Capital Accounting, 2013, https://www.naturalcapitalcommittee.org/discu ssion-papers.html
- [18] P.Allin and D.J.Hand, New Statistics for Old?
 Measuring the Wellbeing of the UK, *Journal* of the Royal Statistical Society, Series A, Vol.180, Part 1, 2017, pp.1-22.
- [19] G.O'Donnell, A.Deaton, M.Durand, D.Halpern, R.Layard, Wellbeing and Policy, Legatum Institute, 2014.
- [20] C.Bean, Independent Review of UK Economic Statistics: Final Report, 2016 <u>https://www.gov.uk/government/publications/i</u> <u>ndependent-review-of-uk-economic-statistics-final-report</u>

- [21] M.Collins, Building a Better Mousetrap isn't Enough, 2010, <u>https://salesandmarketing.com/article/building-better-mousetrap-isnt-enough</u>
- [22] A.Lester, *Five Ideas to Fight For*, Oneworld Publications, 2016.
- [23] BBC Trust, Impartiality Review: Making Sense of Statistics, 2016, <u>http://www.bbc.co.uk/bbctrust/our_work/editor</u> ial_standards/impartiality/statistics
- [24] E.g. Full Fact, <u>https://fullfact.org</u>
- [25] See [12] p.43.
- [26] <u>http://www.socialsciencespace.com/2013/05/st</u> <u>and-out-and-be-counted-quantitative-skills-</u> <u>and-social-scientists/</u>
- [27] E.Ruppert et al, A Social Framework for Big Data, 2015, <u>https://sloddo.wordpress.com/2015/09/16/a-</u> social-framework-for-big-data/
- [28] T.Harkness, *Big Data: Does Size Matter?*, Bloomsbury Sigma, 2016

- [29] R.Ward and T.Doggett, *Keeping Score: The First Fifty Years of the Central Statistical Office*, Central Statistical Office, 1991.
- [30] D.Attenborough, *People and Planet: RSA President's Lecture*, 2011, <u>http://www.thersa.org/__data/assets/pdf_file/00</u> <u>04/390307/Sir-David-Attenborough-speech-</u> <u>text-Planet-and-Population-10.03.2011.pdf</u>
- [31] J.E.Stiglitz, A.Sen & J-P.Fitoussi, *Mismeasuring Our Lives: Why GDP Doesn't Add Up*, The New Press, 2010.
- [32] <u>http://www.politicsofwellbeing.group.shef.ac.u</u> <u>k</u>