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Key Considerations for the Development of Internationally Comparable Statistics on Ocean Economic Activity

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Key Considerations for the Development of Internationally Comparable Statistics on Ocean Economic Activity

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1. INTRODUCTION

Many member countries and partner economies of the Organisation for Economic Cooperation and Development (OECD) are developing strategies to better measure their ocean economies (OECD, 2016; OECD, 2019; Jolliffe, Jolly & Stevens, 2021). Recent developments in such strategies were outlined during the Fifth International Symposium on Ocean in National Income Accounts, which was hosted by the National University of Ireland Galway and took place virtually in late March 2021. Much of the focus on the measurement of economic activity during the symposium related to the production of high quality statistics within countries.

Previous contributions to the topic include summaries of the key properties determining the quality of ocean economy statistics in different contexts by Colgan (2007), Kildow & McIlgorm (2010) and McIlgorm (2016). According to Colgan (2007), quality ocean economy statistics display the following attributes: they are comparable across industries, space and time; consistent in the theoretical approach taken; and are replicable by researchers and statisticians looking to build upon them into the future.

For the past eight years or so, the Ocean Economy Group of the OECD's Directorate for Science, Technology and Innovation (OECD STI Ocean Economy Group) has contributed to meeting the growing demand for improved ocean economy statistics to support decision-making. For example, OECD (2019) demonstrates that quality statistics covering the breadth and depth of ocean economic activity may best be realised through *satellite accounting* – an approach used by national statistical organisations and their partners to experiment with highlighting areas of the economy not readily visible in the present structure of the national accounts.

In general, official economic statistics such as those produced through satellite accounting are used by researchers in the private, public, and academic sectors, in the production of policy analysis, evaluations, and reports, in projections and forecasts of economic phenomena, and for many other purposes. Satellite accounts are also highly suitable vehicles for combining economic data with environmental information by accounting for environmental-economic linkages and broader ecosystem services (OECD, 2019).

The OECD STI Ocean Economy Group is currently pursuing a research programme focussed on developing international ocean economy statistics in a satellite accounting framework. This work complements other initiatives at national and international levels including, for example, the development of a System of Environmental-Economic

Accounting for the Ocean (SEEA-Ocean) and related work on national ocean accounts by the Global Ocean Accounts Partnership (GOAP).

An objective of the OECD work programme is to add value to efforts at national level by building a broadly agreed structure for an experimental account for international statistics. The values presented within the account tables will initially be estimated by the OECD Secretariat in close cooperation with pilot countries, with the long term intention that OECD member countries feed information into the process through an established data collection program. It will therefore provide an opportunity for countries to contribute to and benefit from harmonised ocean economy statistics and lay the foundations for future comprehensive ocean accounts that will include marine environment-economy linkages and ecosystem services.

This paper summarises some of the considerations surrounding OECD work on satellite accounting for ocean economic activities, with the aim to inform discussions on internationally comparable statistics. The contents presented here build upon and provide additional context to recent OECD outputs (e.g. Jolliffe, Jolly & Stevens (2021)), ongoing research and discussions with and between different OECD member countries, and efforts to produce international economic statistics by the OECD's Statistics and Data Directorate and the Productivity, Innovation and Entrepreneurship (PIE) Division of the Directorate for Science, Technology and Innovation.

2. THE OECD AS A SOURCE OF INTERNATIONALLY COMPARABLE ECONOMIC STATISTICS

Comparing economic statistics across countries allows their relative performance to be monitored and the causes of differences to be explored. But the production of internationally comparable statistics is a challenging endeavour that requires study and careful application. The OECD objectives to inform decision-making through evidence and internationally comparable statistics are the keystone from which all comparative data and policy analyses are performed. This section outlines some of the ways in which the OECD publishes and produces international statistics and sets standards for their quality. The remaining sections focus on key considerations for international statistics on ocean economic activity, including the role that high-frequency data may play in quality international statistics.

The OECD's Quality Framework and Guidelines for OECD Statistical Activities outlines eight dimensions of the quality of statistics (OECD, 2012). The dimensions – relevance, accuracy, timeliness, accessibility, interpretability, coherence, credibility, and cost-efficiency – are intended for use in the review of the statistics provided by the OECD. The dimension most relevant to international comparability is coherence. Coherence is defined as the degree to which data and data products are mutually comparable within datasets, across datasets, and over time. The greatest added value from experimenting with an OECD satellite account is likely to be generated through

the production of statistics on ocean economic activity that are coherent across countries.

Cross-country coherent economic statistics may look different to official statistics that are coherent at national levels. Among the several reasons for this is that most internationally agreed statistics are collected and published at a higher level of aggregation than is achieved at the national level. OECD member countries are committed to providing the international community with as much official information as possible, but national statistical systems differ in structure and purpose and will rightly pursue methods of data collection and publication that best represent national conditions. This makes it difficult to achieve international coherence at detailed levels without overburdening national statistical offices. The trade-off between national data collection approaches and international coherence normally means that agreements between countries on the concepts and classifications required to maintain international coherence are achievable only at high levels of aggregation.

Not only could statistics produced and made available at the national level look different when made coherent at international level, but the coverage of international economic statistics is also highly dependent on the data that can be provided to the international community by individual countries. Examples of the many procedural issues that may afflict the coverage of the data transmitted at international level include: Privacy concerns that prevent national statistical offices from making detailed data publicly available that may be easily linked to individual or small groups of enterprises; time schedules for the publication of statistics at the national level that differ from those of international data collection programs; and, inconsistencies between primary data sources used in different countries that result in statistics that are overly challenging to reconfigure. The latter includes the use of different classification systems for compiling statistics at industrial and firm levels of detail.

Cross-country coherence in economic statistics at the OECD

Despite the difficulties associated with producing internationally comparable statistics, there are multiple well known examples of statistical systems that have been broadly agreed and are relied upon to produce coherent international statistical information.

The system of national accounts (SNA), for example, represents the standardisation of official economic statistics by the international community. All OECD member countries compile their national accounts according to the methodological guidelines published in the 2008 SNA (OECD, et al., 2009) and various programmes pursued by international organisations target its adoption in national statistical systems more broadly. The OECD Statistics and Data Directorate regularly collects and publishes national accounts statistics for 38 OECD member countries plus the Euro Area through the *National Accounts of OECD Countries* publication series (OECD, 2021) and makes

the data publicly available on its online dissemination tool OECD.Stat[1]. The compilation conventions outlined in the 2008 SNA enable these statistics to be produced in a manner that is coherent within and across countries.

The 2008 SNA contains guidance relating to the entire sequence of accounts that may be expected of a system of national accounts. Of increasing interest to ocean economy analysts are a set of particular tables contained within the accounts that summarise the supply (including imports) and uses (including exports) of goods and services in an economy. Supply and use tables (SUTs) are fundamental tools in enhancing the accuracy of multiple indicators of economic performance such as gross domestic product (GDP) and industry level gross value added (GVA). (For an overview and depiction of SUTs, including illustrations of the tables and the different sections they contain, see Jolliffe, Jolly & Stevens (2021).)

Among the many parts of SUTs is a matrix describing the structure of domestic production and a matrix recording intermediate consumption with rows for products (or goods and services) and columns for activities. Activities are categorised according to a statistical classification system such as the International Standard Industrial Classification of All Economic Activities (ISIC). A system such as the Central Product Classification (CPC) provides the categories for goods and services. The latest version of the ISIC system, ISIC Revision 4, contains 419 activity categories at its most detailed level (four-digit class codes). The most detailed level of the CPC Version 2.1 contains 2,887 five-digit product subclasses[2]. The classification systems used by national statistical offices that are derived from or related to ISIC and CPC usually contain more activity categories and many more product categories according to the detail necessary to represent national conditions (although even these are not sufficient for capturing the full range of ocean economic activities).

In the detailed SUTs constructed by national statistical offices, the number of products generally outnumbers the number of activities so that these particular matrices are rectangular. The publicly available version of the OECD's Supply and Use Tables Database[3], on the other hand, has a symmetric structure containing 88 unique ISIC Rev. 4 activity codes (two-digit divisions) and 88 unique Classification of Products by Activity (CPA) Version 2.1 product codes. (Eurostat's CPA Ver. 2.1 system is used instead of CPC Version 2.1 as it is more closely aligned with the activity categories, although it would also be possible to use corresponding CPC Version 2.1 codes.)

[1] The OECD National Accounts database can be accessed through OECD.STAT at: https://stats.oecd.org/Index.aspx?DataSetCode=SNA_TABLE1

[2] The United Nations Statistics Division (UNSD) provides an online tool for quickly searching through the reference statistical classification systems. It can be accessed at: https://unstats.un.org/unsd/classifications/Econ/Structure

[3] The OECD Supply and Use Table Database can be accessed through OECD.Stat at: https://stats.oecd.org/Index.aspx?DataSetCode=SNA_TABLE30

In general, the product categories are closely related to the activity categories. The product categories describe physical attributes of goods and services produced while the activities are grouped according to production technologies for the production of those goods and services. For example, the first activity category appearing in the OECD SUT matrices is ISIC Rev. 4 Division 01 "Crop and animal production, hunting and related service activities" while the first product category is the CPA Ver. 2.1 Division 01 "Products of agriculture, hunting and related services".

The structure and the lists of activities and products presented in the database have been agreed by OECD member countries. The agreed level of detail represents a substantial aggregation from the SUTs constructed by national statistical offices, which could conceivably contain data broken down into every category of activity and product listed in the classifications used by that country.

The relatively high level of aggregation in the international SUTs serves several purposes. The categories chosen represent levels of aggregated activity that are deemed appropriate for many of the use cases and analyses that rely upon international supply and use statistics. It lowers the risk of statistics being withheld from the international community for privacy or security reasons. And, in general, it helps to negate some of the issues impacting the elements determining the quality of international economic statistics outlined in the previous section. Nevertheless many OECD member countries are not able to provide the SUT statistical series at the full two-digit level of ISIC Rev.4 or CPA Ver. 2.1 (this is most often the case for services).

The level of aggregation also enables the harmonisation of statistics across countries that would not otherwise be possible. The North American Industry Classification System (NAICS), for example, is different in design and structure from ISIC and the systems derived from it. However, in order to achieve international comparability as well as continuity in the statistics produced at national levels, the 2017 version of NAICS has been organised so that it is concordant with ISIC Rev. 4 at the two-digit division level at the very least (although in places a true concordance at the two-digit level is not yet possible). The two-digit division level of detail allows for many OECD member countries to contribute their official statistics to the international community in a harmonised manner, despite the differences between them that are inevitable in classifications and statistical information systems more generally.

Examples of detailed economic statistics at the OECD

Many use cases of international economic statistics can be satisfied with the level of detail provided by the OECD National Accounts and related databases. But the aggregations present in such statistics are not suitable for analyses that require more detailed economic data while maintaining a high standard of cross-country coherence. Areas of particular concern to OECD member countries are the measurement of industrial performance, international technology diffusion, and their impacts on productivity.

Analyses of activities conducting research and development with high intensity tend to be most meaningful at a more detailed level than that provided by internationally agreed official statistics, necessitating the development of more detailed datasets. The OECD Structural Analysis (STAN) family of databases serve this purpose. Originating in the 1990s, the databases are an attempt to provide more detailed data than that received through international submissions of official statistics while maintaining a high degree of cross country coherence. They do this in part through a process of continual update and improvement, reflecting the latest advances made at both international and national levels, and outlined most recently in Horvát & Webb (2020).

The principal data sources for the STAN databases include annual national accounts tables, annual survey data such as those presented in structural business statistics datasets, and the SUTs published by national statistical offices. The use of different sources beyond international submissions allows for greater detail to be presented but does not necessarily provide comprehensive coverage for each country contained within the datasets. Many of the statistics published in the databases are therefore estimated using common standards and routines for all of the countries present. As a result, the data are not "official" statistics of OECD member countries. They are released under the authority of the OECD Secretary General to serve analytical purposes only and to create experimental indicators of performance in a given year and changes in performance over time.

Relatedly, the OECD and its member countries have been at the forefront of efforts to produce reliable and cross-country coherent estimates of the contribution of the digital economy to economic performance. While digital technologies have become ubiquitous across economies of all income levels, established economic statistics have failed to highlight many of the transformations that have taken place. The OECD has therefore developed a framework for better recognising the digital economy in an internationally comparable manner (OECD, 2019).

Further thematic economic statistics that are monitored by the OECD for cross-country coherence include publicly available international statistics on trade, transport, fishing and agriculture, overseas development assistance, and environmental protection expenditures.

3. OCEAN ECONOMIC ACTIVITY AND THE CHALLENGE OF CROSS-COUNTRY COHERENCE IN INTERNATIONAL STATISTICS

According to the Quality Framework and Guidelines for OECD Statistical Activities, there are three elements to managing coherent statistics (OECD, 2012). The first relates to the use of common concepts, definitions, and classifications. The second to common methods and systems for processing data. And the third involves the confrontation and reconciliation of conflicting datasets.

Elements one and two are procedural in nature and are outlined in preliminary detail in Jolliffe, Jolly & Stevens (2021). An initial attempt at tackling the first is provided by a definition of ocean economic activities for international statistical purposes. The definition provides the means by which accounting for economic activity can begin. It sets the conceptual boundaries of what activities could be considered part of the ocean economy and helps to determine the types of activities and products that should be included in the construction of ocean economy statistics. The publication also contains lists of activities and products that may be considered part of the ocean economy, both as a whole and in part, according to the definition for statistical purposes.

> *Ocean economic activities are those that: take place on or in the ocean; produce goods and services primarily for use on or in the ocean; extract non-living resources from the marine environment; harvest living resources from the marine environment; use living resources harvested from the marine environment as intermediate inputs; would likely not take place were they not located in proximity to the ocean; or, gain a particular advantage by being located in proximity to the ocean.*
>
> ***Jolliffe, Jolly & Stevens (2021) Blueprint for improved measurement of the international ocean economy***

Jolliffe, Jolly & Stevens (2021) also outlines a data collection programme to be designed by the OECD for collecting statistics on the ocean economy across a supply and use framework. This goes some way to clarifying the requirements necessary to meet the second element.

The third element however poses substantial challenges to international ocean economy statistics. Much ocean economic activity is not visible in the system of national accounts or national statistical information systems more broadly. Where this is the case, the 2008 SNA recommends a satellite accounting approach in order to break down existing categories. The premise of this methodology is to be adapted for the experimental OECD ocean economy satellite account. The initial values will be equal to that available in the OECD's SUT Database and will include non-ocean activity. It will then be necessary to breakdown the share that meets the definition of ocean economic activity quoted above in order to arrive at ocean economy estimates. Ocean related value may therefore be defined as the share of activities in the SUT framework that is attributable to the ocean according to the definition of ocean economic activity.

Ocean related value coefficients and cross-country coherence

The detail required to make the adjustments that need to be made to existing statistics in order to isolate the share of supply and use attributable to ocean economic activity are provided by ocean related value coefficients. These coefficients are known by different terms in different countries. Portugal in their Satellite Account for the Sea and,

more recently, the European Commission use the term "splits". In the US, the term "partial" is used. The precise word used to describe the proportion of an existing category that is attributable to the ocean economy is not important for statistical quality. However, the method used to arrive at the coefficient is a crucial determinant of cross-country coherence.

Ocean related value coefficients may be arrived at in multiple ways. In certain cases, existing information can be used. Where coefficients are derived from the numbers already present within the SUTs produced by national statistical offices, they can be considered internationally coherent (relative to estimates produced outside the national statistical systems) due to the adherence of the statistics to the 2008 SNA.

One common method adopted in this case begins by studying the use table to ascertain the difference between the uses of certain goods and services by ocean economic activities in comparison to all others. A statistician might, for example, note that a particular product is used by numerous industries of which one, two or several are considered part of the ocean economy. The observation that this good or service is used as an intermediate input in ocean economic activity is an indication that the ocean share of its production should be counted as part of the ocean economy. The coefficient may, in this particular case, be calculated as the ratio of the sum of its use in ocean economic activities to total domestic supply of the good or service (i.e. production by domestic industries plus imports) as in the following equation where ORV_i represents the ocean related value coefficient for product i.

$$ORV_i = \frac{Total\ uses\ in\ ocean\ economic\ activities_i}{Total\ domestic\ supply_i}$$

An ocean related value coefficient estimated in this manner allows for the ocean proportion of the GVA associated with the activity producing the good or service to be calculated and included alongside all other ocean economic activities. Such methods allow for a more complete accounting of ocean economic activity in summaries of the ocean economy where previously estimates of this value added would not have appeared.

This simplified example requires information to be present within the existing SUTs. However, new information – in the sense that the data required do not presently appear in published SUTs – will often be required in order to provide meaningful breakdowns of existing categories for many areas of the ocean economy. Some of this information will be retrievable from the data collection programmes conducted by national statistical offices, but a proportion of it will not be available from the data sources typically used in the compilation of SUTs.

The data sources used to achieve the most difficult breakdowns in international statistics will be different for each country and there are likely to be a broad range of source types available for deciding upon the appropriate ocean related value coefficient.

Financial records published openly on company websites, industry-led reports into industrial activity, and specially commissioned studies from non-governmental organisations are just some of the examples of sources that may contribute. Such sources are unlikely to be harmonised nationally or internationally. The risk of the data pulled from sources outside of the national statistical system conflicting with the numbers published through the national accounts is therefore high. This implies that extra care must be taken in order to confront and reconcile all conflicting data used so that the statistics produced are as coherent across countries as is possible given the source material.

4. CROSS-COUNTRY COHERENCE AND NOVEL DATA SOURCES: HIGHLIGHTING GAPS AND INCONSISTENCIES

A key benefit of the Supply and Use framework is that it helps to highlight gaps and inconsistencies in estimates of economic activity. The balancing of the Supply and the Use side of the economy, of production and imports with consumption and exports, means that omissions from either side are easier to spot and investigate than in one-sided estimations. This aids national accountants in producing consistent estimates of GDP and other important indicators of economic performance (see Jolliffe, Jolly & Stevens, 2021, for a quick introduction to this process in an ocean economy context).

Furthermore, the national accounts are built on source statistics taken from a range of structural surveys conducted by national statistics offices (plus administrative records) including, but not limited to, business, household and labor force surveys. To ensure their suitability for inclusion in SUTs, national accountants perform a range of further checks, adjustments and reclassifications. These include: definitional adjustments to reflect differences between business accounting concepts and those outlined in the 2008 SNA; adjustments to correct for informal, hidden and illegal activities; adjustments to time series to reflect changes in source data, methodologies, and international standards (so called benchmark revisions); and, adjustments related to the balancing of SUTs (van de Ven, 2019).

The introduction of new information interrupts the usual checks and balances that are routinely performed by national accountants. Imbalances may be introduced to the SUTs with no obvious way to reconcile them due to the characteristics of the source data itself. The new additional source data may provide useful information for the Supply side but not the Use side or vice versa, for example. However, challenges such as these are partly why satellite accounts exist. Overcoming them improves the estimates generated through the satellite account but can also lead to secondary improvements in the core accounting system. This is one of the reasons why statistics produced using satellite accounts tend to be labelled *experimental*, at least until statisticians are able to confidently proclaim the new information used produces accurate estimates.

Exhaustive metadata are crucial for cross-country coherence

Transparency is key to maintaining coherence given the interruption of the usual checks and balances that determine the exhaustiveness of national accounts more broadly. The information used to construct each data point and the steps taken to modify and edit the numbers that are already published within existing tables must be methodically noted. Good practice is for descriptions of the data and their construction – metadata – to be provided alongside every statistic produced. Metadata should therefore be exhaustive of the statistical data, be published openly and, ideally, machine readable so that they may be searched quickly by analysts who require the information contained within them.

There are multiple examples of curated and openly published metadata within the OECD's statistical provisions. OECD.Stat – the OECD's open data portal – contains a metadata viewer alongside all of the tables published. The metadata normally contain a short abstract explaining the statistics, the statistical sources, characteristics such as how regularly the data are updated, the population and scope under study, and the concepts and classifications relied upon, among multiple other sections. To automate the process of collecting and sharing metadata, international organisations including the OECD, the European Central Bank, Eurostat, the UN and the World Bank have developed an International Organization for Standardization (ISO) Technical Standard called the Statistical Data and Metadata eXchange (SDMX). SDMX is used by the OECD among other organisations to collect national accounts data and metadata from its member countries.

Colgan (2016) lists the basic elements of metadata required in accounting for the ocean economy. The categories suggested include: location, taxonomies used, and survey and valuation methods. The use of international guidelines for environmental and ecosystem accounting are suggested as a framework for metadata standards. More recently, the Global Ocean Accounts Partnership has begun the process of drafting technical guidance for broad ocean accounts concerning environmental dimensions in particular that are aligned with international national accounting standards (GOAP, 2020).

For cross-country coherence, ensuring that the data introduced to the existing Supply and Use framework in order to better recognise the ocean economy are well documented is crucial. As a first step and as far as is possible, enabling the reclassification and readjustment of the data to conform with international classification systems such as those listed in Appendix I would be helpful to the international community. In practice, this would require the construction of correspondence tables between the classifications used in each particular study, the classifications used by the national statistical system, and the internationally agreed classifications. Where this is not possible due to the characteristics of the source data, then this too is important information that should be noted and included as metadata. Eventually, a system such as SDMX could be pursued for sharing statistical information for ocean economic activity.

5. INTERNATIONAL STATISTICS AND HIGH FREQUENCY DATA

National economic data are not monitored in continuous real time. Data are collected through sample surveys and population estimates are computed. A key benefit of relying upon national statistical systems in the production of ocean economy statistics is the accuracy and credibility of such estimates. But the production of trustworthy statistics on the scale of the national accounts is a time consuming process. In order to close the gap between the production of accurate statistics and up-to-date information, a number of techniques are being pursued by national statistical offices and the international statistical community. This section introduces work conducted by the OECD using high-frequency data in the context that these novel approaches may be applied to the ocean economy going forward.

National statistical offices often refine national accounts statistics over a one year cycle resulting in annual data. The timeliest measurements of GDP are usually produced quarterly (although the UK, Canada, and Sweden also release monthly estimates, and Mexico's monthly indicator for economic activity "IGAE" is a close approximation of GDP). Furthermore, fully verified statistics are often published with a time lag of a number of months for both the annual or quarterly accounts. The issues concerning timeliness in national economic statistics are compounded further at the international level, where data must be collected from individual countries, processed, and checked according to frameworks such as the Quality Framework and Guidelines for OECD Statistical Activities. Eurostat, for example, only require all European Union Member States to transmit supply, use, and input-output data to them within 36 months of the reference year in question (Eurostat, 2014).

For many established use cases and for entry into the historical record, this time frame is suitable if it is balanced with the other dimensions of quality statistics such as credibility, interpretability and coherence (including across countries). However, over the past few decades digital technologies have led to the availability of real-time information across many areas of economic life and expectations on the appropriate level of timeliness have changed. Recent events including the coronavirus pandemic and its effects on the economy have further compounded the demands on national statistical offices to provide statistics faster and at greater detail than ever before.

The need to produce accurate indicators of economic performance at a faster rate than official statistics are typically produced has resulted in new thinking about the way statistical information systems should function. The OECD Smart Data Strategy is modernising the OECD's approach to data collection, processing, analysis, and dissemination (OECD, 2018). A key part of this change is making use of non-traditional, higher frequency data sources and applying advanced data analytics in order to make sense of the data flowing from them. Crucially, the elements of the Quality Framework and Guidelines for OECD Statistical Activities – including the importance for achieving cross-country coherence – remain applicable.

Combining high frequency data with machine learning techniques has led to advances in the methods used by the OECD to build indicators normally reserved for

survey-based estimations. The OECD's Weekly Tracker of GDP Growth is one such example (Woloszko, 2020). The tracker uses Google Search data to nowcast weekly estimates of year-on-year GDP growth in 46 OECD member countries and partner economies. The model uses 215 variables of relevance to macroeconomic performance, including proxies for consumption, labour markets, housing, business services, industrial activity, trade, poverty and subjective feelings about the economic outlook.

Nowcasting tools such as the OECD Weekly Tracker are useful in as much as they target marginal additions to the suite of information available to decision makers concerning the economic climate in the present moment. The results of the OECD Weekly Tracker outperform models based purely on the historical record. They do not, however, improve upon indicators that incorporate the more standard (albeit less frequent) survey derived results into their construction. The two broad groups of indicators – high frequency and the more standard but slower survey based – therefore serve different purposes and could be considered complements rather than substitutes. But a trade-off remains. In this case it is that increasing timeliness is achieved at the expense of decreasing accuracy.

While the OECD Weekly Tracker and related high frequency indicators target overall economies, the same premise could be adopted for more detailed economic sectors such as those associated with the ocean economy. Should there be a demand for more high frequency indicators of ocean economic activity then techniques such as those used for the OECD Weekly Tracker could be adopted. Such efforts should, however, be complementary and additive to the compilation and publication of ocean economy statistics that perform well when measured against all elements of quality statistics – relevance, accuracy, timeliness, accessibility, interpretability, coherence, credibility, and cost-efficiency.

6. CONCLUSION AND KEY CONSIDERATIONS

In late March 2021, experts from around the world converged at the Fifth International Symposium on Ocean in National Income Accounts. The event highlighted the efforts underway in multiple countries and regions to better understand the ocean economy and its effects on the marine environment through the use and development of official statistics. Ultimately, how far the ocean economy can be separated from overall economies in international statistics will depend on various factors. This paper summarises selected ongoing OECD efforts and outlines some of the key issues of concern when considering the production of internationally comparable statistics on ocean economic activities. These include:

- International statistics should meet the standards laid out in the Quality Framework and Guidelines for OECD Statistical Activities. The eight elements of concern for quality international statistics are relevance, accuracy, timeliness, accessibility, interpretability, coherence, credibility, and cost-efficiency.

- Transforming data collected at national levels into international statistics that are coherent across countries can be a timely and complex process for even the most aggregated categories of economic data.
- Ocean economic activities that are not readily visible in national accounts represent a particularly challenging section of the economy to measure in a cross country coherent manner. This is in part due to the necessity to use information taken from outside of the national statistical system to breakdown existing aggregations.
- Each country will have a different profile of gaps and inconsistencies in the coverage of ocean economic activities within their national accounts data. Compounding the challenges generated by these differences is that the information used to perform the additional breakdowns will be derived from different sources in different geographies.
- The careful curation and publication of metadata (including information about the source data and its application in measuring ocean economic activity) that is exhaustive of the statistical data produced at national level is key to enabling more cross-country coherent international statistics.
- New approaches are emerging to tackle some of the problems related to the use of official statistics for measuring ocean economic activity. Smart data strategies that exploit high frequency data sources and machine learning techniques for generating statistics are complementary to more accurate survey-based data as long as they meet the necessary quality standards.

Such considerations will be at the forefront of the OECD STI Ocean Economy Group's research on developing international ocean economy statistics in a satellite accounting framework. The research programme is designed to complement initiatives at national and international levels. It will also lay the foundations for future comprehensive ocean accounts that will include marine environment-economy linkages and ecosystem services.

The programme will also provide a forum for countries to discuss other important questions with regards to international statistics. How best to include countries that do not necessarily have a coastline but play a role in global ocean economy value chains, for example. Or the correct approach to accounting for activity that takes place in international waters. There are no quick answers to such questions, but future research will be required to answer them if international statistics are to be of the quality necessary for making better ocean economy decisions.

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APPENDIX I. INTERNATIONAL STATISTICAL CLASSIFICATIONS OF RELEVANCE TO THE SYSTEM OF NATIONAL ACCOUNTS

Standard Industrial Classification of All Economic Activities Revision 4 (ISIC, Rev.4)	The international reference classification for productive activities. It groups activities according to homogeneous production technologies for a range of products.
Central Product Classification Version 2 (CPC, Ver.2)	Classification based on the physical characteristics of goods or on the nature of services rendered. It includes products that are an output of an economic activity, including transportable goods, non-transportable goods and services. CPC presents categories for all products that can be the object of domestic or international transactions or that can be stocked.
Standard International Trade Classification (SITC Rev.4)	Classifies commodities into different categories according to the nature of the merchandise and the materials used in their production as well as according to their stage of production, in turn suitable for economic analysis. The origin of SITC is the Harmonised Commodity Description and Coding System (HS) managed by the World Customs Organisation (WCO). SITC is the aggregated classification of transportable goods both for international trade statistics and for analytical purposes and is correlated with the subheadings of the HS.
The Classification by Broad Economic Categories (BEC) Rev.5	Designed to serve as a means of converting external trade data compiled using the Harmonised System (HS) into end-use categories that are meaningful within the framework of the SNA, namely categories approximating the three basic classes of goods in the SNA (capital goods, intermediate goods and consumption goods). Specifically, the subcategories of the BEC can be aggregated to approximate these three classes of goods. This aggregation enables external trade statistics to be considered jointly with other sets of general economic statistics, such as national accounts and industrial statistics, for national, regional or worldwide economic analysis.
Classification of Individual Consumption According to Purpose (COICOP)	Categories such as: food, health, education services, etc. COICOP has 14 main categories, the first 12 refer to individual consumption expenditure of households and the last two identify those parts of consumption expenditure by Non-Profit Institutions Serving Households (NPISHs) and general government that are treated as social transfers in kind.
Classification of the Functions of Government (COFOG)	Consistent with that proposed in the Government Finance Statistics Manual 2001 (GFSM 2001) (e.g. government expenditure). The units of classification are, in principle, individual transactions. This means that a COFOG code should be assigned to each purchase, wage payment, transfer, loan disbursement or other outlay according to the function the transaction serves.
Classification of the Purposes of Non Profit	Classifies individual outlays of NPISHs according to the purpose they serve. These outlays could be from health, education services,

Institutions Serving Households (COPNI)	religious associations, etc. The same outlays as for COFOG can, in principle, be classified according to COPNI.
Classification of Outlays of Producers According to Purpose (COPP)	Applies to all producers, whether market or nonmarket, although in practice, market transactions are the most interesting. COPP may provide information on 'outsourcing' business services, that is, on the extent to which producers buy catering, cleaning, transport, auditing and other services that were previously carried out as ancillary activities within the enterprise.

Note: The United Nations Statistics Division (UNSD) makes many of the statistical classification systems in this table available in multiple formats at: https://unstats.un.org/unsd/classifications/Econ/Structure.
Source: Adapted from Eurostat (2014)