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OECD-WTO Handbook on Measuring Digital Trade

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This document presents Chapters 1 to 3 of the Handbook on Measuring Digital Trade being developed by the Expert Group of countries and international organisations convened by the Inter-agency Task Force Of International Trade Statistics.

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OECD-WTO Handbook on Measuring Digital Trade

Version 1

(Draft)

Foreword

In response to growing demand for coherent and comparable data on digital trade, in 2017 the Inter-Agency Task Force on International Trade Statistics created an Expert Group, drawn from international organisations, national statistics agencies and central banks, to develop a Handbook that provided:

- A conceptual framework to define digital trade, around which national efforts could be targeted; and
- A mechanism to bring together and share existing national and international efforts on measuring digital trade and/or dimensions of it, that could be used to identify and develop best practice.

This Handbook reflects the current outcome of the efforts of that group. As it shows, in many areas, work is still very much in its infancy and in some (for example with respect to the measurement and valuation of many forms of data) it can best be described as embryonic.

But progress is being made in these frontier issues, and it is hoped that this Handbook will help to accelerate and assist in those efforts, not least by highlighting their importance. In recognition that there remains significant work to be done, this Handbook is not designed to be, and cannot be, the final word, and so positions itself, from the outset, as a *living document* one that will be continuously updated (available on both the OECD, WTO and UN websites) as new national experiences emerge.

Acknowledgements (Version 1 of the Handbook)

To be added

Executive Summary

(to be added)

Chapter 1. Introduction

1.1. Introduction

The Internet and digitalisation are fundamentally changing the way people, businesses and governments interact. This has led to a new phase of globalisation underpinned, in particular, by the movement of data across national borders that has begun to transform international trade in goods and services.

Digitisation provides for a scale of trade in services that would have been unimaginable in an analogue world, for significant access to new markets, particularly by SMEs, and for new products, such as cloud services, whilst also having a significant disruptive and transformative impact on many industries.

However, despite the clear and growing impact of digitalisation, existing measurement approaches, on which this Handbook builds, have typically only been able to shed light on some, albeit important, aspects of it, and, in particular, its contribution to trade; hereafter referred to as *Digital Trade*.

Many of the existing initiatives have focussed on specific aspects of digital trade or on measures that provide insights on it. For example on measures of trade in ICT goods (as enablers of digitisation), measures of trade in ICT-enabled services[1] (*i.e*. those cross-border services provided in digitised form), or potentially ICT-enabled services (*i.e*. those that could be provided in digitised form), developed under the UNCTAD led Task Group on Measuring Trade in ICT Services and ICT-enabled Services (TGServ)[2].

Other substantive efforts, such as those of the OECD[3] and WTO[4], have focused on notions of electronic ordering (in the case of the OECD definition) and electronic delivery of goods and services (in the case of the WTO definition) to better understand e-commerce (although there remain challenges in measuring cross-border transactions, which this Handbook tries to shed light on).

Of particular relevance here, and symptomatic of the new challenges and difficulties presented by digitisation, is that efforts on e-commerce reflect a departure from conventional measurement approaches that typically look at groupings of products and/or industries. That is not to say that these characteristics (product and industry) are not in and

[1] See for example *International Trade in ICT Services and ICT-enabled Services Proposed Indicators from the Partnership on Measuring ICT for Developmen*t, UNCTAD/ICT4D/03, (2015) and M.Borga and J. Koncz-Bruner, "*Trends in Digitally-Enabled Trade in Services*", BEA, 2012.

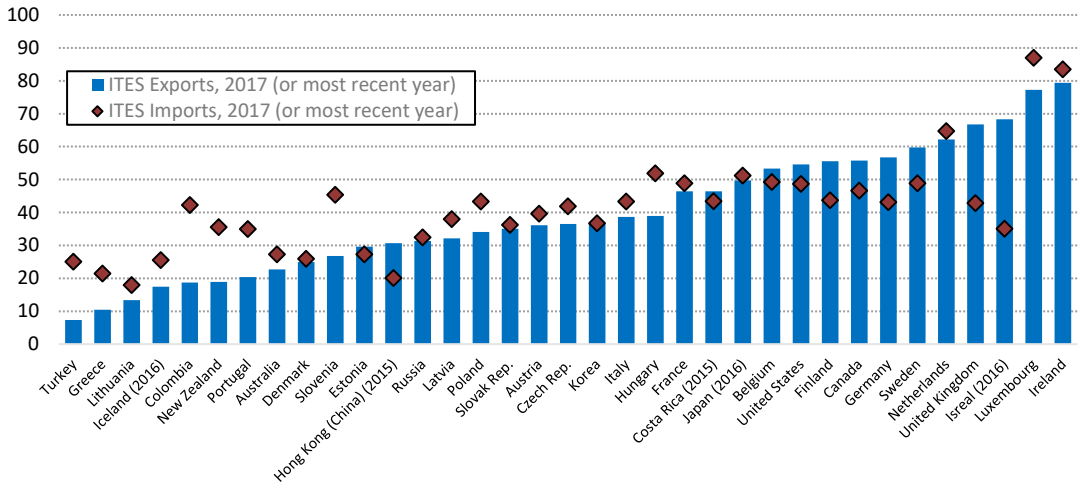
[2] With membership from ITU, OECD, UNCTAD, UNESCWA, UNSD, World Bank and WTO. See also, https://unctad.org/en/PublicationsLibrary/tn_unctad_ict4d03_en.pdf

[3] The OECD defines an e-commerce transaction as '*the sale or purchase of goods or services, conducted over computer networks by methods specifically designed for the purpose of receiving or placing of orders*'. The goods or services are ordered by those methods, but the payment and the ultimate delivery of the goods or services do not have to be conducted online. OECD Guide to Measuring the Information Society, 2011

[4] The WTO defines e-commerce as *the production, distribution, marketing, sale or delivery of goods and services by electronic means*. WT/L/274, 30 September 1998, Adopted by the General Council on 25 September 1998.

of themselves useful nor necessary but they struggle, on their own, to provide a holistic notion of Digital Trade; i.e. that reveals the contribution of digitisation to Trade.

Figure 1.1. (*Potentially*) ICT-Enabled Services (ITES), % of total trade in services



Source: OECD Trade in Services Database and IMF Balance of Payments statistics
Note: Potentially ICT-enabled services refers to services categories that can be delivered digitally (see also Chapter 5).

In this sense, the evolution of definitions of e-commerce around modes of ordering and delivery, rather than what is being ordered/delivered and who is ordering/delivering, in part, mirrors longer standing difficulties concerning the delineation of goods and services products and manufacturers and service industries; which digitisation has, in turn, exacerbated. Software for example can be delivered in hard form (a good) or digitally (service), and all firms, can, at least in theory, sell or order goods and services by digital means.

This Handbook builds on this considerable body of work, and defines Digital Trade as ***all trade that is digitally ordered and/or digitally delivered***[5]**.**

The definition, partly by design – to capitalise on existing measurement efforts and surveys - has similarities with existing definitions of e-commerce. It does however differ, or, rather, provide a broader perspective, in some important aspects; as described in more detail in the chapters that follow.

For example, many services (including for example telecommunication services) are delivered digitally but often without digital ordering, which are not included in the OECD definition of e-commerce.

This is not the only area where the scope of this Handbook differs from that covered by conventional notions of e-commerce. Chief in this respect concerns its ambition to capture non-monetary transactions, notably those related to data, where there is growing policy

[5] The conceptual framework is developed in accordance with existing statistical accounting standards, in particular the 6th Balance of Payments Manual (BPM6) and the System of National Accounts (2008 SNA).

demand, and, indeed, where there have been concerns that current statistics underestimate the size of trade.

Ambition is the operative word in this respect, as it is clear, as the Handbook illustrates, that there is much to be done in measuring transactions in non-monetary data, both in terms of thinking through categorisations, where work is largely its infancy[6], but especially in terms of their valuation, where there are considerable challenges.

To differentiate between digital trade and a broader notion of trade (that includes non-market transactions in data), the Handbook refers to this broader notion as '*Broad Digital Trade'*, defined as **'trade that is digitally ordered and/or digitally delivered, including services delivered at zero cost'.**

At the same time, it is important to note that the ambition of the Handbook is also restrained. The definition adopted in this handbook does not, nor does it attempt to, measure, in its broadest sense, the overall contribution of digitisation to trade (see also Section 1.3 below). Many firms for example increasingly use digital tools in one form or another to engage in trade, for example data to improve the production of goods that are subsequently sold through conventional, non-digital, channels. The definition adopted in this Handbook will not be able, nor is designed, to capture these transactions (especially if the digitised components that are contributing to exports are not traded).

However, the OECD has created an *Advisory Group on Measuring GDP in a Digitalised Economy*[7] that is developing a satellite account (see Appendix 1), (with whom this Handbook has been developed in parallel), and which will be able to shed light on these broader issues.

In addition the OECD's *Going Digital* project[8] includes a significant measurement component "*Measuring the Digital Transformation: A Roadmap for the Future*[9]" that describes and provides guidance and recommendations on a number of broader indicators, such as high-speed internet access, number of smart phones per capita, the use of digital tools by SMEs etc., and also includes recommendations in a number of areas covered in this Handbook (see Appendices 1 and 3).

In this sense, the Handbook, at least with respect to monetary transactions, adopts a definition of digital trade that can more accurately reflect the share of current cross-border trade in goods and services that has been digitally delivered and/or digitally ordered.

It is difficult to overstate the 'working' status of this Handbook. As noted above there are a number of areas of work where measurement is still in its infancy. While the Handbook is designed to provide an overall conceptual framework, around which countries can target efforts to achieve internationally comparable measures, capitalising on emerging best practice, it is also designed to provide a vehicle that drives momentum and kick-starts measurement in areas where significant gaps exist, such as on data. It is therefore **a living document;** one that will be continuously updated as measurement practices mature.

[6] See: "Introduction to data and analytics, Taxonomy, data governance issues, and implications for further work", paper circulated for consultation; OECD (2013).

[7] See N. Ahmad and J. Ribarsky, *Towards a Framework for Measuring the Digital Economy, 2018,* http://www.oecd.org/iaos2018/programme/IAOS-OECD2018_Ahmad-Ribarsky.pdf

[8] http://www.oecd.org/going-digital/

[9] https://www.oecd.org/science/measuring-the-digital-transformation-9789264311992-en.htm

The Handbook is designed to be as exhaustive as possible in its coverage of digitisation issues of relevance for trade statistics, but with discussions still evolving in a number of areas, this is not yet the case.

Four major areas where research is on-going but whose (current) exclusion from this report have no impact on the conceptual framework covered nor on the definition of digital trade concern: the need for improved guidance on the rules governing economic ownership of intellectual property assets; improved compilation guidance on the measurement of cloud services; complementary estimates that provide insights on intra-firm digital services not captured in cross-border trade statistics; and the treatment of crypt-currencies and crypto-assets (see Annex 6.A).

Regarding the first, the OECD created an informal reflection group to investigate the impact of globalisation on the national accounts and made a series of recommendations (see Appendix 2), including on the need for improved guidance on the rules for economic ownership for intellectual property assets.

Regarding cloud services, although payments will, at least in theory, be recorded in international trade transactions, free use of cloud services will not be. In addition, the nature of cloud based services means that it is not always evident from which country the services were provided, even if the country that receives the payment is known (See Appendix 3).

Finally, digitisation has blurred the lines between traditional trade in services (Modes 1, 2 and 4) and a broader notion of trade that includes delivery via foreign presence (Mode 3). In a digital world, firms can readily supply services via affiliates abroad rather than through traditional trade mechanisms. Sometimes these will be supported by intra-firm services provided by the parent or other affiliates, which are recorded as traditional trade, but often they will not be, and, instead, compensation for the provision of these services is recorded only, ultimately, as primary income receipts of the parent. Guidance on all of these areas will be covered in an update to this Handbook during the course of 2019.

1.2. Policy drivers

An important motivator for the development of this Handbook is the growing need for better evidence to assist analysts, businesses and policy makers in developing policies and strategies that can capitalise on, or manage the risks of, digital trade. Indeed, both the G20 Trade and Investment Working Group, and Digital Economy Task Force have placed significant emphasis on measurement under the recent Chinese, German and Argentine Presidencies.

The 2017 Digital Economy Ministerial Declaration[10], under the German Presidency, for example stated that:

> *To fully harness the potential of digitalisation for jobs and growth, it is critical that the digital economy is comprehensively included in our national statistics and when feasible, separately identified. There is also a need to continually review our statistical frameworks. This evidence will help us assess the impact that our digital strategies are having on the development of the digital economy. We therefore*

[10] http://www.g20.utoronto.ca/2017/g20-digital-economy-ministerial-declaration-english-version.pdf

> *welcome the work of international organisations and National Statistical Offices to improve measurement of the digital economy.*

This culminated in the development of a Toolkit for Measuring the Digital Economy (see Appendix 4) under the Argentine Presidency, and which asked for countries to:

> *Work towards improving the measurement of the digital economy in existing macroeconomic frameworks, e.g. by developing satellite national accounts*.

In addition, there have been significant and high-profile policy-driven national initiatives that have looked at both broad and specific aspects of the impact of digitisation on macro economic statistics. For example, the 2016 Bean Review[11] conducted to *assess the UK's future economic statistics needs in particular relating to the challenges of measuring the modern economy,* and the US Department of Commerce's 2016 initiative[12] on *Measuring the Value of Cross-Border Data Flows,* (Appendix 5).

Meeting the needs of policy makers is, of course, central to the design of new statistics and statistical standards and this Handbook is designed to respond, as far as possible, to many, summarily described below[13].

Market access

Trade market access refers to the rules and regulations – as established through WTO multilateral agreements such as the GATT (for goods) and GATS (for services), or via bilateral or regional trade agreements – that determine if, and under what conditions, products can be sold in foreign markets through trade. These rules may involve tariffs or quotas, but also behind-the-border measures. The multilateral trade rules have been developed to be technologically neutral, meaning that they apply regardless of the technology used to deliver goods or services. In addition, a moratorium on applying duties on electronic transmissions has been agreed since 1998 and regularly extended.

Digitisation has increasingly been a focus of attention in this area as it further blurs the lines between goods and services, where different rules apply (such as 'software on a disk' versus software delivered electronically) and moreover it creates ambiguities around the nature of the product being supplied. For example, in a recent case heard by the European Court of Justice (December 2017), the Court ruled that Uber was in the business of providing transport services (which are excluded from EU rules permitting freedom to provide services) and not (as argued by Uber) in the business of providing computer services, which are governed by the directive on services in the EU internal market. Although statistical standards do not have to follow these rulings, it is important that they are designed, wherever possible, in such a way that they are able to inform them (see also Chapter 4).

Trade facilitation

The ease of ordering online, including from abroad, has led to an increase in the number of small packages crossing borders. The treatment of small parcels, often by postal systems,

[11] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/507081/2904936_Bean_Review_Web_Accessible.pdf

[12] https://www.ntia.doc.gov/files/ntia/publications/measuring_cross_border_data_flows.pdf

[13] See also Lopez-Gonzalez and Jouanjean *Digital Trade: Developing a Framework for Analysis* (2017).

is different from the treatment of other goods (*e.g.* through shipping containers and warehouses), sometimes creating a consumer preference for foreign e-commerce retailers, sometimes for traditional domestic retailers. Very low *de minimis* provisions (the threshold below which no customs duties are collected), for example, can lead to longer customs clearance times and therefore to potential distortions in market preferences by consumers towards domestic rather than foreign retailers. In this context, and, indeed, as a result of the increased volume of small packages, *de minimis* provisions are currently being reviewed in countries, which will also impact on estimation methods currently used by statistical offices to estimate *de minimis* trade.

At the same time, the digitisation of information and the growing ease of data exchange paves the way for faster customs clearance procedures and improved risk management, facilitating international trade. Indeed, the World Customs Organization is currently investigating enhanced exchange of information between customs authorities for exactly these purposes, particularly for smaller-value packages ordered online.

Development impact

Digitalisation (including through local or foreign digital intermediation platforms) provides significant new scope for producers (particularly SMEs) to penetrate foreign markets but many developing economies still lag in terms of intellectual property protection, IT infrastructure and skills, and this digital divide may reduce their ability to fully participate in, and benefit from, digital trade.

A challenge here is to ensure that developing economies are not also left behind in their ability to produce evidence for policy-making. Chapter 6 of this Handbook describes a number of complementary indicators, that can provide important insights on digital trade and that can, in theory, be readily produced within and from existing statistical frameworks and surveys. The chapter also provides commentary on a number of related initiatives that could serve as important vehicles for providing evidence on aspects of digital trade.

Competition

With digitalisation, new players have emerged. Digital intermediation platforms have strongly impacted competition and the 'rules of the game' in their target industries. Although the position of relevant authorities is evolving rapidly, often these disruptive players are able to circumvent regulatory requirements that are applicable to domestic, 'non-digital' competitors: for example, hotels face taxes and regulations that Airbnb (and the suppliers it hosts) often does not; Uber gains part of its competitive advantage (in many countries) by considering its drivers as independent contractors instead of employees; and Amazon is able to book transactions through lower tax jurisdictions.

Since network effects and economies of scale are especially important for many platforms, there are growing risks of market dominance in an increasingly winner-takes-all environment. Despite the considerable challenges, being able to identify these disruptive and transformative firms, and their impact on trade, is a key aspect of this Handbook (Chapter 4).

Data flows: localisation, privacy, and monetisation

Digital trade is growing hand in hand with cross-border data flows, which enable seamless trade and create new opportunities to add value. The growing flows of data have also raised new concerns related to data privacy and security, and consumer protection, resulting in, for example, local storage requirements or restrictions on cross-border data flows. Such regulations may be trade distorting, and finding the right balance between measures

developed in pursuit of legitimate public policy goals and preserving the benefits from an open digital environment remains an important challenge to trade policy makers.

Some, perhaps most, data flows are not directly monetised and are therefore currently not considered as trade flows; for example personal information provided on social networks or data captured by firms within the 'Internet of Things'. However, even though these data are acquired for free they clearly have value to the firms acquiring and using them in production, whether to generate advertising revenues, supply-chain and risk management, production efficiencies, etc. Valuing these data, as this Handbook shows, is a formidable challenge, which is why non-monetary data are included under the broader measure of digital trade. Presently work in this area of measurement is very much in its infancy but the Handbook will be updated regularly as national experiences and guidance develop.

1.3. Initiatives from which this Handbook has drawn

As noted above, this Handbook has, and continues to, drawn on a number of earlier and on-going initiatives tackling measurement issues related to trade and more generally macro-economic statistics. Chief in this respect reflect those cited above, including: the OECD, WTO and UNCTAD work on defining e-commerce; UNCTAD's efforts on ICT enabling measures; the *G20 Toolkit on Measuring the Digital Economy*; the US Commerce Department's work on *Cross-border data flows*; and the OECD's broader efforts on measurement included in the *Going Digital* project, and, in particular, from long-standing efforts highlighted in its *Science and Technology Scoreboard* publications and its *Guide to Measuring the Information Society*.

The Handbook has also drawn inspiration from other related efforts that deserve special mention:

- UNCTAD has developed indicators of E-commerce Readiness[14], focusing on Business to Consumer (B2C) transactions with components reflecting the steps involved in completing an online shopping (B2C) transaction, measures of web presence, possibility to pay online, and delivery reliability.
- The World Economic Forum has developed a Networked Readiness Index[15] to measure the capacity of countries to leverage ICTs for increased competitiveness and well-being. The index is based on information from various international organisations as well as its own Executive Opinion survey to derive an index based on four sub-indices: the enabling *environment;* a country's *readiness* in terms of *e.g.* infrastructure and skills; the *usage* of ICT and economic; and social *impact*.
- The International Telecommunication Union (ITU) publishes a Global ICT Development Index[16], which aims to measure the information society by combining 11 indicators on ICT *access* (an indication of the available ICT infrastructure and individuals' access to basic ICTs), ICT *usage* (including intensity of use), and ICT *skills*.
- As a final example, the multi-stakeholder "eTrade for All" initiative, launched in 2016 at the UNCTAD Ministerial Conference in Nairobi, is a consortium of more than 20

[14] http://unctad.org/en/PublicationsLibrary/tn_unctad_ict4d09_en.pdf

[15] http://reports.weforum.org/global-information-technology-report-2016/report-highlights/

[16] https://www.itu.int/en/ITU-D/Statistics/Pages/publications/mis2017.aspx

international and regional organisations, national entities and development banks that aims to improve the ability of developing and transition countries to engage in and benefit from e-commerce. The Initiative has developed a tool for assessing the e-trade environment at the national level, consisting of a series of 30 e-trade indicators across seven key policy areas (ICT infrastructure and services, payment solutions, access to financing, e-commerce skills development, legal and regulatory frameworks, trade logistics/facilitation, and e-commerce readiness). The e-trade readiness indicators are published online in the World Bank Group data portal TC360[17], as well as in e-trade country profiles on the eTrade for all platform.[18]

1.4. Structure of the Handbook

As noted above, much of the work presented in this Handbook reflects work-in-progress as a way of motivating the development of new measures and indeed new approaches to measurement. Many of these efforts are very much at the frontier of statistical measurement and it is hoped they will be added to as experiences mature and are added to.

In that sense, Chapter 2 of this *living document*, is the prism through which these efforts should be viewed. It provides the unifying conceptual framework for digital trade that national efforts should target, which is crystallised via a simple reporting template setting out the key components of digital trade. Recognising that many of the measures required in the template require advances in measurement techniques, the template includes a number of complementary indicators that provide insights on digital trade, and that, importantly, can already be developed by many countries from available statistics.

Chapters 3 to 6 provide compilation guidance on specific aspects of components of digital trade identified in the conceptual framework, drawing on the responses of 74 countries to an OECD-IMF survey conducted over 2017-2018 (see Appendix 5). The chapters build on existing practices and pilot-tests in several countries and identify potential new data sources.

Chapter 3 focuses on the measurement of digitally ordered goods and services.

Chapter 4 focuses on transactions enabled by digital intermediary platforms.

Chapter 5 focuses on digitally delivered services.

Chapter 6 looks at a range of complementary measures that can be (or are already being) produced to provide insights on digital trade, including: trade in 'digital' products (*e.g.* ICT goods and services); trade in ideas, trade in ICT enabling services, and trade in potentially ICT enabled services.

Chapter 7 concludes with a series of key recommendations and next steps.

[17] https://tcdata360.worldbank.org/

[18] https://etradeforall.org/ressources/data-indicators/

Chapter 2: A conceptual framework for measuring Digital Trade

2.1. Introduction

Key obstacles towards internationally comparable estimates of digital trade have been the absence of an internationally agreed definition and an absence of a conceptual accounting framework.

Many significant initiatives, as described in Chapter 1 and in subsequent chapters, have provided important insights on aspects of digital trade, leading to a plethora of various statistical measures: e-commerce (defined in various ways), ICT-enabled services, digitally-enabled services, partially digitally-enabled services, cloud services and so on. Together they help to knit a tapestry of much of what we consider to be digital trade but, outside of an overarching conceptual framework, they can lack coherence.

That is not to say that these initiatives are not important. Far from it, they are all, to varying degrees, and as they should be, central to the development of the framework presented here. Many of these initiatives have motivated the development of new surveys, some of which have been in existence for many years, which this framework, mindful of practicalities and response burdens, tries to build on.

At the same time, it is also important to emphasise that the proposed definitions and the framework are intended for *statistical* purposes: while every effort is made to align the terminology with that used in other fora, differences may occur regarding the scope and precision[19].

Before presenting the conceptual framework in detail, it is useful to review some of the principal considerations that have shaped it, in addition to those described above, and, consequently, the definition of digital trade used in this Handbook.

The starting point in this respect is to define a concept that provides a measure of the overall contribution of digitisation to trade (also discussed in Chapter 1).

Digitisation, is commonly understood to reflect the encoding of information or procedures into binary bits that can be read and manipulated by computer, which can take many forms such as the translation of analogue measurements; encoding business and industrial processes; voice over Internet protocol (VOIP); social networks (as alternatives to face-to-face interactions) etc. Collectively, the changes produced by different forms of digitisation, the resulting applications, systems, platforms, and the effects on economic and social activity constitute "digital transformation"- or digitalisation.

But while there is an understanding that digitisation is a process that involves the encoding of information into binary bits, its use as the basis of a definition for digital trade is restrictive and, in any case, difficult to operationalise in a practical and meaningful way for measurement purposes.

Digitisation is key to the digital transformation (digitalisation) but valuing its direct contribution to that transformation is only part of what is required, when we think about

[19] For example, the definition of ecommerce used in WTO trade negotiations ("production, distribution, marketing, sale or delivery of goods and services by electronic means") is broader than the statistical definition of digital trade in this Handbook (particularly its reference to production).

digital trade. For example, the cost of digitally transferring data from a customer to a producer via a peer-to-peer ride-sharing platform has fallen dramatically in the last twenty years, so an approach that looked at the costs of digitisation would significantly under-estimate the value of digitalisation.

But while a focus on digitalisation is clearly preferable to a focus on digitisation, from a definitional perspective it remains non-trivial. Should, for example, digitalisation reflect the total effects of digitisation on trade, for example the total value of activity supported (*e.g.* including the value of taxi services in ride sharing platforms), or should it reflect only the intermediation fees charged for using these platforms? The two will give significantly different answers but both are relevant to the debate and both are important for policy making. The first, to some extent looks at overall impact, that can, albeit very crudely, be described as a consumption perspective, whereas the latter, and again crudely, is closer to a producer's perspective (*e.g.* output of 'digitised' industries). This multi-dimensionality is at the heart of the difficulty in defining a concept for digital trade.

An example can help to reinforce the point. While there may be broad unanimity that a digital book is a digital product, what is not clear is whether its whole value (which includes the author's contribution) should be included in a measure of digital trade or only that part of the value that reflects its conversion into bits and bytes and any charges/costs related to digital transactions, which excludes the author's contribution. Does it matter if the author originally typed the book on a computer, directly, into digital form? Are computers, enabling devices that when combined with digital platforms (such as the internet), are also part of the digital transformation, providing mechanisms to access readers and markets that would previously have been unimaginable.

A simple approach, of particular relevance for trade statistics, which remain, by and large, driven by considerations around the type of products that are traded, would be to identify categories of products[20] that could be defined as digital, (however these were defined, see also below).

However, such an approach is likely to omit large parts of what most users would want to see captured in a measure of digital trade. One of the most significant impacts of digitalisation has been its ability to shrink the space between consumers and producers, and indeed producers and producers, providing previously unimaginable access to new markets. However, even though goods increasingly embody digital characteristics, most of these transactions involve non-*digital* goods or services. They would therefore very likely fall outside the scope of a purely product-based definition of digital trade, unless the idea of a digital product was also based on how the product was ordered, for example non-digital goods ordered over the internet would be in scope but the same good purchased physically would not be.[21]

That being said, a definition that focused purely on whether products were *ordered* via digital channels, (for example following the OECD's definition of e-commerce), would

[20] One might also consider looking at trade conducted via a category of digital industries but this would also present significant boundary issues, *e.g.* would a shoe manufacturer selling all of its products on-line be in or out of scope, and even if this could be meaningfully resolved, how would the same manufacturer selling half of its products via conventional trade and half on-line be considered?

[21] That is not to say that delineations based on products are not worthwhile, indeed this Handbook demonstrates they are, but they cannot be the basis on which digital trade as a concept is defined.

also be deficient, as it would exclude many transactions in '*digitised services'*, (see also below). For example, on-line banking services, mobile communication services, and significant business-to-business transactions, such as software support and on-line call centres, ordered via conventional (physical) channels would be out of scope. Similarly, broader notions of digital trade that imputed values for non-monetary transactions, related to data or intra-firm deliveries of other digitised information (including knowledge), would also be excluded from a definition that looked only at digital ordering.

A defining characteristic of those *digital services* that may not be digitally ordered is that they are, to all extents and purposes, *digitally delivered,* (see also below). But, a definition that focused only on digitally delivered products would exclude any goods that were digitally ordered, so, like digital ordered, digital delivery also misses large parts of what would be commonly considered to be within a notion of digital trade.

However, an approach that married these two modes (ordering and/or delivery) can overcome these deficiencies; whilst also proving feasible as national and international efforts on measuring e-commerce and on digitally enabled services demonstrate (see below).

From a practical and conceptual perspective therefore, these two not-mutually-exclusive criteria form the underlying, and unifying, principle for the statistical definition of digital trade. That is to say, the statistical definition of digital trade is based on *the nature of the transaction*, and *not* on the nature of the product that is traded, and, so, this Handbook defines digital trade as ***trade that is digitally ordered and/or digitally delivered***.

Both of these two, overlapping, components are described, (and defined), in more detail below. One important overlap concerns transactions facilitated by digital intermediary platforms (described in more detail below), both because of their important role in digital trade as well as the fact that they raise specific compilation challenges, as this Chapter will demonstrate.

As such even if, in principle, all transactions through digital intermediary platforms are either digitally ordered and/or digitally delivered, they feature as a distinct component in the conceptual framework described below.

One of the key concerns driving the need for better evidence on digital trade has been the perception that large parts of trade are not being recorded because of digitisation[22]. These concerns are both practical – for example, in relation to the measurement of *de minimis* transactions, where there are concerns that approaches to estimate small parcel trade below customs thresholds may not have kept up with the pace of ordering through digital channels – and conceptual, notably with respect to the measurement of data flows that have no monetary transaction.

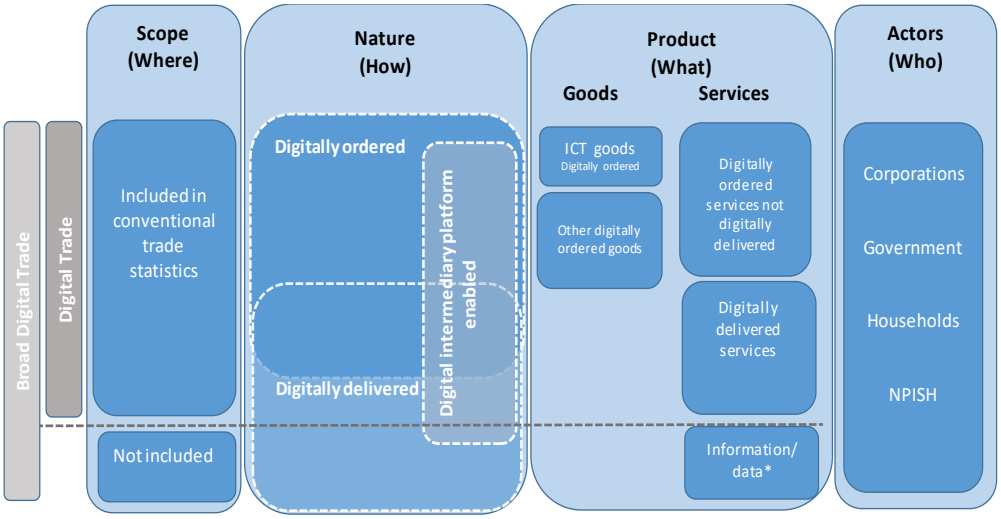
[22] There have also been concerns that the way that trade flows are routed has been significantly affected by a combination of digitisation and fiscal optimisation. The ability of firms to shift intellectual property from a high to a low tax jurisdiction, and, so, in turn, the location of production and exports, has been transformed by digitisation. Equally, parent companies are now able to organise the flow of many digitised services (including data) between affiliates that may have no monetary transaction, which further blurs the lines between trade in services and property income. Guidance in this area will be provided in future updates of this Handbook (expected towards the end of 2019).

Many of these (typically) invisible flows are outside of the conceptual production boundary[23] and so outside of conventional measures of trade but that is not to say they are not important (described in more detail below). As such, the conceptual framework and reporting template, described in this Handbook includes these flows as complementary items.

2.2. The conceptual framework for Digital Trade

As noted above, the nature of the transaction – digitally ordered and/or digitally delivered – is the overarching defining characteristic of digital trade. However, for trade policy purposes, any conceptual framework also needs to have a product dimension. Equally, because of the considerable interest in understanding who is engaged in digital trade, information on the actors is also needed. Figure 2.1 below provides a simple depiction of the framework proposed in this handbook (discussed in more detail in the following sections).

Figure 2. The Conceptual Framework for Digital Trade[24]



* Refers to transactions of information and/or data where there are no explicit monetary exchanges.

2.2.1 The Scope of the Framework (where)

The framework is primarily designed to provide a view of international trade in produced goods and services that have been digitally ordered and/or digitally delivered; which this Handbook refers to as Digital Trade. However, as described above, it also attempts to

[23] See N.Ahmad and P.Schreyer, *Measuring GDP in a Digitalised Economy*, 2016, for a full discussion of these issues and N.Ahmad and P.Van de Ven, *Recording and measuring data in the System of National Accounts*, 2018.

[24] Digital Intermediary Platforms are also an important component of Actors. Their current explicit inclusion in the nature of transactions (which may change depending on how measurement efforts evolve) reflects the scope for measuring modes of digital delivery and/or ordering through targeted surveys of DIPs.

respond to growing demand for information on non-monetary transactions not included in measures of conventional goods and services trade (referred to in the framework as transactions in *information and data*, see also below), which are included in the measure of Broad Digital Trade. Because no monetary transaction is made, a simplifying assumption is made that these elements are not digitally ordered and only materialise in the framework when they are delivered digitally, and, so, correspond to a Broad category of Digital Services (see also below).

2.2.2 The nature of the transaction (How)

2.2.2.1 Digitally ordered transactions

An important guiding principle in the development of this Handbook is that it should be practical and feasible. As such, by design, it builds upon existing and related areas of work, especially where measurement instruments exist.

Significant efforts have been made for a number of years now in the measurement of e-commerce[25] . This Handbook capitalises on those efforts and uses the OECD definition of e-commerce[26] to define 'digitally ordered' as shown below:

> *"An e-commerce transaction is the sale or purchase of a good or service, conducted over computer networks by methods specifically designed for the purpose of receiving or placing orders."* [27]

Some additional clarifications are provided in this definition. Specifically these state that the *payment and ultimate delivery of the goods or services do not also have to be conducted online. Transactions can involve participants from all institutional sectors, and cover orders made over the web, extranet or via electronic data interchange (EDI, see Box 2.1). Excluded are orders made by phone, fax or manually typed email.*

In developing its definition, the OECD emphasised: (a) its need to be *coherent*, *simple* and *pragmatic,* and explicitly acknowledged its focus on those electronic transactions that were *known*, *definable* and *important* at the time (2011). At the same time, in its deliberations, the OECD acknowledged that as new technologies evolved, new forms of e-commerce would need to be considered.

In the intervening period, many new mechanisms (particularly related to applications) have emerged and discussions with statistical compilers held in the course of developing this Handbook concluded that additional guidance was needed for a consistent interpretation of digitally ordered trade transactions and to clarify areas where ambiguities had appeared.

[25] The WTO definition on e-commerce includes both ordering and delivering modes.

[26] It is important to note that the definition measures the total value of the product being traded, whether that product has digital characteristics or not.

[27] OECD, Guide to Measuring the Information Society, 2011

Box 2.1. Electronic Data Interchange

Electronic Data Interchange is the computer-to-computer transmission of (business) data – such as shipping orders, purchase orders, invoices, and requests for quotations – in a standard format using agreed standards. The messages are composed and processed without human intervention, which increases the speed of order processing, and reduces errors. It is used in a wide variety of industries including food, retail, logistics, and manufacturing, o efficiently manage international supply chains (*e.g.* Just-in-time inventory management).

Responses to the second round of the OECD-IMF stocktaking survey[28], with more than 70 countries replying, concluded that[29] :

- Digitally ordered trade in goods and services should cover 'in-app' purchases (100% agreed)
- Digitally ordered trade in goods and services should include transactions via online bidding platforms (95% agreed)
- When a trade transaction is concluded via offline ordering processes, but subsequent follow-up orders are made via digital ordering systems, only the follow-up orders should be considered as e-commerce (80% agreed)
- Digitally ordered trade in goods and services should *not* cover offline transactions formalised using digital signatures (86% agreed)

2.2.2.2 Digitally delivered transactions

The second dimension of the nature of digital trade transactions is referred to as *digitally delivered*. The concept of digitally delivered transactions is based on the work of the UNCTAD led Task Group on Measuring Trade in ICT Services and ICT-enabled Services (TGServ)[30].

TGServ defined ICT-enabled services as follows, which this Handbook adopts as the definition for *digitally delivered* trade:

All cross-border transactions that are delivered remotely over ICT networks – i.e. over voice or data networks, including the internet, in an electronically downloadable format.

2.2.2.3 Digital intermediary platform enabled transactions

An important characteristic of digitalisation is the increasing role of firms such as Airbnb, Alibaba, Amazon, Booking.com, Uber and eBay that facilitate transactions in goods and services. These platforms nearly always have an electronic ordering component, and, typically, the goods and services advertised can only be paid for electronically. Even if in

[28] See Appendix 6.

[29] Some areas of ambiguity remain and are subject to further research. For examples, purchases of goods or services via online chat functions, such as WeChat. On the one hand, WeChat and related systems are typically not specifically designed for placing orders (as per the e-commerce definition), but instead receive manually composed messages similar to emails. On the other hand, rapid technological change has means that orders can now be handled automatically and, so, arguably, related transactions could be classified as e-commerce.

[30] With membership from ITU, OECD, UNCTAD, UNESCWA, UNSD, World Bank and WTO. See also, https://unctad.org/en/PublicationsLibrary/tn_unctad_ict4d03_en.pdf

some cases it is possible to make orders using analogue methods, the platform itself is the only mechanism through which consumers can see the advertised products.

Although, as shown in the framework, all digitally intermediated transactions are included in one or both of digitally ordered and digitally delivered, they are separately identified in the framework for three reasons. The first reflects the specific interest in the role of digital intermediary platforms (DIPs), and, in particular, their disruptive impact on the economy. The second reflects the possibility that a targeted focus on the DIPs themselves, including through dedicated survey vehicles that target them, may provide a meaningful approach to deliver earlier results on both digitally ordered and digitally delivered trade. The third, reflects the specific conceptual and statistical challenges they present, especially when platforms are not resident in the country where the intermediation services are consumed (See Section 2.3).

Firms classified as DIPs use many different types of business models to sell or deliver goods or services. The World Customs Organisation (WCO) as well as the OECD Tax Policy Cente[3132] have developed typologies of new, online business models. While the terminology differs (for example, the OECD[33] describes 'multi-sided platforms' while the WCO uses 'e-platforms'), both identify key criteria to define digital intermediary platforms, including:

- There are multiple buyers and multiple sellers that interact directly
- The platform itself does not own the goods nor does it supply the services that are being sold.

Based on these criteria, digital intermediary platforms can be defined as ***online interfaces that facilitate, for a fee, the direct interaction between multiple buyers and multiple sellers, without the platform taking economic ownership of the goods or services that are being sold (intermediated).***

In turn, because digital intermediary platforms may also provide other services, digitally intermediated platform services are defined as ***online intermediation services enabling transactions between multiple buyers and multiple sellers, without the platform conducting the intermediation service taking economic ownership of the goods or rendering services that are being sold (intermediated).***

It is important to note that digitally intermediated platform services differ from similar services provided by electronic retailers or e-tailers, who may also sell a wide variety of different products and operate exclusively online, but who own all the products being sold[34]. In addition because the platforms provide a means intermediating productive

[31] OECD (2018) *Tax challenges arising from digitalisation – Interim Report 2018*, Paris: OECD.

[32] UNCTAD (2018) is looking at classifications based on the overall business model (profit vs non-profit) and type of product involved (goods, payment services, social media, labour)

[33] Following, Hagiu, A. and Wright, J. (2015) 'Multi-Sided Platforms', *International Journal of Industrial Organization*, Vol. 43,

[34] Note that these two business models may co-exist within the same enterprise group, for example Amazon Ecommerce (an e-tailer) as opposed to Amazon Marketplace (a digital intermediary platform), and indeed the same firm, which is why an important distinction is made in this section between definitions of the platforms themselves (the firms) and the services they provide (the 'nature').

transactions between households, they may also have implications on the types of surveys used to measure trade flows (see Box 2.2).

Box 2.2.The sharing economy

A sub-set of digital intermediary platforms that is of particular interest and attention reflects those that facilitate consumer-to-consumer (C2C) transactions, often referred to as the *sharing economy*.

Growth in these platforms may present particular compilation challenges for measuring international trade, especially if the platforms are hosted abroad, as the producers of the products being intermediated are households, meaning they may be out of scope of most current survey mechanisms for international trade. Section X.X provides more detail on these challenges drawing on national experiences (UK and Canada).

ONS UK (2017) 'The feasibility of measuring the sharing economy: November 2017 progress update', https://www.ons.gov.uk/economy/economicoutputandproductivity/output/articles/thefeasibilityofmeasuringthesharingeconomy/november2017progressupdate

Statistics Canada (2017) 'The sharing economy in Canada', *Statistics Canada Daily,* https://www150.statcan.gc.ca/n1/daily-quotidien/170228/dq170228b-eng.htm

2.2.3 The Product (What)

2.2.3.1 Goods

As shown in Figure 2.1 products, as a whole, are split into the two conventional categories of goods and services. By definition, goods cannot be delivered digitally, and so the category of goods required for measures of Digital Trade includes only those goods that have been digitally ordered. In this respect, it is important to note that the category of goods included here should not be confused with notions of *digital goods*. For example, shoes can be ordered online (a digital transaction), but are in and of themselves difficult to conceive as digital products even if they have been developed with significant input of products that could be considered as digital (*e.g.* software, computer services etc.).

Figure 2.1 does however prescribe a separate breakdown of goods into Information and Communication Technology (ICT) goods that are digitally ordered and other goods that are digitally ordered, with the classification of goods included in the former (see also Chapter 6) corresponding to the OECD[35] definition:

ICT goods must either be intended to fulfil the function of information processing and communication by electronic means, including transmission and display, or use electronic processing to detect, measure and/or record physical phenomena, or to control a physical process

In addition, the reporting template, described in Section 2.4 below also includes an addendum item showing total trade in ICTs goods (digitally ordered or not).

2.2.3.2 Services

Services as a group are broken down into three distinct components in the Framework: *Digitally delivered services*, *Other services* (in the Goods and Services account), and a third category, reflecting non-monetary transactions not recorded in conventional trade statistics; referred to as *Information and Data*. Each of these categories is described in detail below.

[35] See OECD Digital Economy Outlook 2015

Digitally delivered services

As described in Section 2.2.2.2 above, digitally delivered trade follows the definition used in determining ICT enabled services developed by the UNCTAD TGServ Task Force. By design therefore, there is a strong overlap between those services included in the category of ICT enabled services and those referred to here as digitally delivered services (see also Chapter 5). However, the product listing used in defining ICT enabled services may require further enhancements, in particular in the light of the recommendations that have emerged to record payments for services provided by digital intermediation platforms.

Digitally delivered transactions passing through an e-tailer involve a trade margin that is included in the underlying value of the service (or goods) provided. However, for digital platforms intermediating services this Handbook (see below) recommends that the margin (or rather intermediation fee, implicit or otherwise) is shown separately, under services. There is currently no internationally agreed position on the product to which these transactions should be classified,[36] (requiring agreement and consultation with the national accounts and trade statistics community, see also below), and the recommendation provided in Section 2.3 should be seen as provisional.

The TGServ group also included a separate breakdown of ICT services (see also Chapter 5), and this Handbook recommends that these estimates, and estimates of ICT enabled services are produced as complementary items; not least as it is currently feasible to do so in many countries.

Other services (in the Goods and Services account)

Other services in the goods and services account refer to all services that are digitally ordered but not digitally delivered.

Information and Data exchanges outside of the goods and services account

The 1993 System of National Accounts (SNA) introduced the notion of databases, with further clarifications provided in the 2008 SNA that specified that databases should reflect only the value of the underlying database management systems and the costs associated with the digitisation of data. This recommendation reflected the view that the underlying value (information content) associated with the data itself was de facto a non-produced asset, with outright purchases of databases that included the intrinsic value of the underlying data recognised in the accounts as goodwill.

However, recent years have seen an explosion in the generation of data, and the use of these data, in, for example, advertising based business models. But because data are typically acquired for free, large parts of it (except those exchanges that are supported by an explicit

[36] Whether the intermediation service payments and the platform should be classified to the same industry whose products are being intermediated is the subject of debate within the UN Expert Group on Industrial Classifications, where it recognised that additional guidance is needed for platforms, not least because the practice varies across countries and industry. However, in provisional guidance (from its September 2017 meeting) concerning the treatment of platforms such as AirBnB there was support for the idea that the platforms should be classified to ISIC sector 79.90 "Other reservation services and related activities', recognising the parallels with other non-digital matching services such as high-street travel agencies.

payment, generally bundled in a different product) are de facto invisible in official statistics.[37]

These acquisitions of free data can support significant monetary transactions that may cross borders, for example through advertising revenues or significant improvements in production efficiencies (for example in supply chain management tracking goods). Social networking sites such as Facebook, or search engines such as Google, offer "free" services to users in exchange for data that can be used by these firms to generate targeted advertising (and hence revenues)[38]. There is no monetary transaction between Facebook or Google and consumers from whom they collect data but while cross border advertising services would be captured in trade statistics, the data flows upon which they depend are not. As noted in Chapter 1, understanding the scale (and potential value) of these data is of considerable policy interest.

In a similar manner, and because they are free, the international accounting system does not in general impute transactions related to the use of public goods (such as open-source or free software). The debate around measurement of these 'assets' generally revolves

[37] It is important to note that the decision not to treat the data as produced does not mean that data has no value. It clearly does, as recognised in the discussions preceding the 2008 SNA recommendation. Future benefits can very clearly be derived from data, either through the sale of a database (including the value of the data), or in creating additional value added in support of the production of other goods and services, such as advertising. In the former case the 2008 SNA captures the value of data as goodwill when a market transaction occurs (which de facto means that data are treated as a non-produced asset), whilst in the latter, although data remains in and of itself invisible, its contribution to production is accurately reflected. Although the contribution of data to production is always captured, data itself are only valued when market transactions occur (recorded as a transaction in non-produced assets). In this sense, data in the SNA, as a non-produced asset, is similar, at least in an accounting sense, but still different to, other non-produced assets, such as land. Like data, land is also used in production, and as a non-produced asset it cannot be readily identified as a separate factor production. However, unlike land, data are increasingly crossing borders and, in most cases, these exchanges occur without any observable market transaction taking place. This decision to only recognise data in the accounts when a monetary transaction occurs reflects the fact that the underlying value of data reflects its information or knowledge content. Valuing all data as a non-produced asset therefore, whether purchased or otherwise, would de facto require that all knowledge, including human capital, be treated as a non-produced asset. That is not to say that, conceptually, this shouldn't be done; there has been a long discussion over the years on human capital and indeed on other knowledge based assets, and whether these should be recognised in some form (including as produced assets), in the accounts. But to do so would require approaches to be developed that were internationally comparable, feasible and meaningful; and certainly with respect to human capital, recording the activity as production could run the risk that it would swamp GDP, and indeed measures of trade and render them unable to be used for macro-economic policy making, It was this realisation that the value of data was intrinsically related to the underlying knowledge it embodied that led to it being recorded as de facto non-produced (*i.e.* goodwill) when a market transaction occurred. To do otherwise would open the door to the inclusion of all kinds of information or knowledge. See also N. Ahmad and P Van de Ven, Recording and Measuring Data in the System of National Accounts, (2018)

[38] L.Nakamura, J.Samuels and R.Soloveichik, *Valuing 'Free' Media in GDP: An Experimental Approach (*2016), proposed that a new category of production should be included to reflect the value of free services provided to viewers and financed via advertising revenue. N.Ahmad and P.Schreyer, *Measuring GDP in a Digitalised Economy* (2016) highlight some of the complications in adopting such an approach.

around the potential implications for measures of material well-being and productivity but there are also concerns around competition policies, if the freely available software is designed to gain market share with a view to the introduction of subsequent 'priced' models.

Research is ongoing within the statistics community to better estimate the values of these flows[39], and indeed to consider whether they should be included within the production boundary for GDP and by extension, trade.

Imputations for data and open source software have been recommended in the supply-use tables for the digital economy, being developed by the OECD Advisory Group on Measuring GDP in a Digitalised Economy (see also Appendix 1), and significant advances on the broader measurement front, including on data, and on open source software, have been made as part of the OECD's *Going Digital Initiative*[40], and, in particular, the measurement strand of that effort[41]

Although measurement efforts are evolving rapidly, they remain very much in their infancy and so it is premature to provide guidance on these items in this version of the Handbook. However it is expected that this will be available during the course of 2019.

2.2.4 Actors (who)

Technological change has provided individual consumers (households) with increased possibilities to purchase goods and services from foreign suppliers, whilst also increasing their interaction as 'producers' when supplying services (for example accommodation services) via digital intermediation platforms. Similarly, the possibility to sell online has lowered – or has the potential to lower – the barriers to export, allowing especially smaller firms to market their products abroad. These aspects of digital transformation increase the need for trade statistics by type of user and producer but they also complicate the way that trade is measured in practice. For example, when households interact with each other via foreign digital intermediation platforms, conventional business surveys may not be able to capture the foreign dimension, increasing the relevance of household surveys.

The conceptual framework recognises these developments through its breakdown of actors by (SNA) institutional sectors: households, non-financial corporations, government and financial corporations. Work on linking trade and business registers provides an important vehicle here for identifying who the exporting and importing firms are (including by industry, size class, and more recently ownership patterns – *e.g.* foreign vs domestic ownership - and these efforts should be accelerated and capitalised on in developing statistics on digital trade. Within the corporate sector, it may also be useful to explore additional breakdowns of firms, such as those developed by the OECD Advisory Group on Measuring GDP in a Digitalised Economy, for example: *Digital intermediary platforms; ICT industries; Digital intermediary platforms (charging fees); Data and advertising*

[39] See for example: Li, Wendy C. Y. (2018), Typology of online platforms for future measurement of the value of data, presented at the 2018 OECD Workshop on Online Platforms, Cloud Computing, and Related Products, September 6th, OECD, Paris; OECD (2013): "Exploring the Economics of Personal Data: A Survey of Methodologies for Measuring Monetary Value", OECD Digital Economy Papers, No. 220; and OECD (2013): "Introduction to data and analytics, Taxonomy, data governance issues, and implications for further work", paper circulated for consultation; OECD.

[40] http://www.oecd.org/going-digital/

[41] Measuring the Digital Transformation: A roadmap for the future OECD, 2019

driven platforms; Firms dependent on digital intermediation platforms; E-tailers; Digital firms providing digital financial and insurance services; and Other producers only operating digitally. (See also Appendix 1).

Identifying transactions involving households (whether as producers or consumers) is more challenging however but there are a number of efforts on-going (see the following chapters) that indicate that progress can be made on this front.

Importantly, the institutional sector breakdown provides for an easy concordance with the terminology used in e-commerce surveys, such as the OECD Survey on ICT usage by Business, which try to identify transactions between: 'Business-to-Business' (B2B) (broadly corporation to corporation), 'Business-to-Consumer' (broadly corporation to household) (B2C) and 'Business -to-Government (corporation to government)[42].

2.3. Accounting principles

In all cases, the accounting principles for digital trade follow those of BPM6.

For transactions that pass through Digital Intermediary Platforms however, some additional guidance is required.

Many Digital Intermediation Platforms (and in the absence of data at this stage it is difficult to quantify the scale) intermediate between two non-resident parties (in the same economy as each other).

The related transactions could be recorded in two possible ways. The first is to record a domestic transaction between the two resident actors with corresponding intermediation fees paid by both or one of the parties to the foreign platform. The second is to 'follow the money' and record an import from the foreign platform by the end-consumer and an export from the producer to the foreign platform.

For digital intermediation platforms facilitating exchanges in goods, a strong argument can be made that the intermediary is never the owner of the goods and so the only international transactions that should be recorded are those relating to the intermediation fee. Where these charges are explicit, then they should be recorded as being paid by one or both of the resident producer and consumer depending on who paid the explicit fees. However, when the fees are implicit, complications may arise. In practice implicit charges are often incurred by both the consumer and the producer (and often these are made clear in the contract of intermediation) but imputing flows for both parties can create significant compilation difficulties for the national accounts.

Household based surveys, for example, are only likely to record the actual price paid by the final consumer, whereas business surveys may only record as output, the price paid by the consumer (excluding any taxes incurred by the consumer) before the inclusion of (implicit) intermediation fees incurred by the consumer. To resolve this issue, the current preferred approach advocated by the OECD Advisory Group on Measuring GDP in a Digitalised Economy is to record output of the producer as being equivalent to the purchaser's price (excluding any taxes incurred by the consumer), with all of the implicit intermediation fees incurred by the producer.

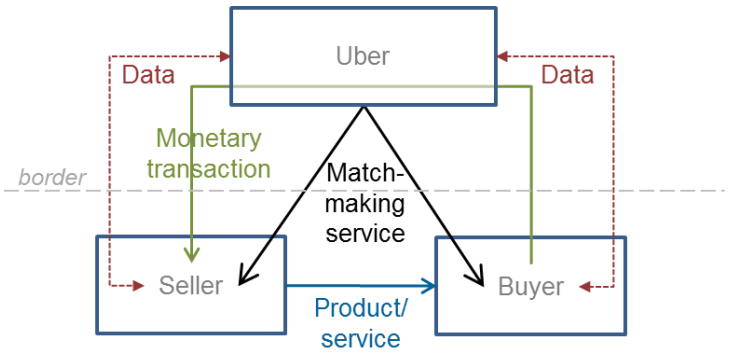
For digital intermediation platforms facilitating exchanges in services, it follows that the same rules should apply. It is important to note that this treatment differs from the

[42] For convenience Annex 2.A uses the terminology B2B, B2C etc.

recommendations given in BPM6 and the Manual on Statistics of International Trade in Services (2010) for subcontracting, which recommends that the flows are recorded on a gross basis, on the grounds that the arranger (of the subcontracted service) buys and sells the services. A similar argument could be made for digital intermediation platforms but the argument made in this Handbook is that subcontracted services involve a higher degree of engagement on the part of the intermediary than (typically completely automated) digital intermediation platforms.

To illustrate the complexities involved, Figure 2.2 describes the example of an Uber transaction. In the "physical world", a taxi would have to pass in front of a customer who would pay for the ride in cash or by card. However, the Uber App adds a new tradable digital service that enables the transaction by matching the car driver and the customer and manages the payment. The transaction between the driver (seller) and the rider (buyer) takes place in a particular country but the supporting transactions, that include the provision of the matching services, payments and insurance coverage, are potentially provided from another country. Furthermore, the consumer may be a non-resident, in the case of tourists, which adds another layer of complexity.

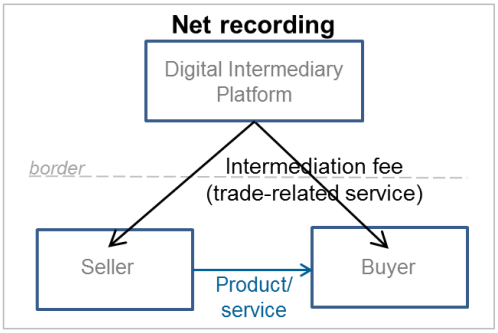
Figure 2.2. Example of transactions via digital intermediary platforms: unpacking an Uber transaction



Following the flows in Figure 2.2 and the 'ownership' principle that underpins the accounting frameworks, the only transaction that should be recorded in international trade statistics would be the cross border provision of intermediation services to both the seller and the buyer, in line with the intermediation fees charged (and it is assumed for simplicity here that the fees are explicitly paid by both the buyer and the seller).

This is also called a 'net recording' of the associated transactions, and is illustrated in Figure 2.3. Such a net recording is preferred because it avoids creating significant inflationary distortions to trade statistics and because it treats digital intermediary platforms facilitating exchanges of goods and services consistently.

Figure 2.3. Proposed net recording of trade transactions related to digital intermediary platforms



As the example above illustrates, the residency of the buyer, seller, and digital intermediary platform needs to be carefully considered in the recording of the associated trade flows. For example, the goods or services produced by residents may be intermediated via a non-resident digital intermediary platform, or via a domestic (resident) digital intermediary platform. At the same time, the goods or services purchased by a resident from resident sellers – traditionally not considered an international trade transaction – may be facilitated by a non-resident digital intermediary platform[43].

To illustrate the proposed net recording of these trade flows involving different countries of residency, Table 2.1 provides an overview of all possible combinations.

[43] As noted elsewhere, ITSS surveys may struggle to cover transactions involving non-resident digital intermediation platforms. Furthermore, even in cases where such digital intermediation platforms headquartered overseas have some resident commercial presence, these entities may only have narrow functions such as advertising, and therefore do not (or cannot) report statistics related to trade between consumers and the overseas DIP.

Table 2.1. Recording of trade transactions involving digital intermediary platforms

Seller	DIP	Buyer	Treatment of transacted product	Treatment of Intermediation services
If the seller pays the intermediation fee OR if no explicit intermediation fee is charged to the final consumer				
Ctry A	Ctry A	Ctry B	Import by country B from country A	None (domestic transaction)
Ctry A	Ctry B	Ctry B	Import by country B from country A	Import by country A from country B
Ctry A	Ctry B	Ctry A	None (domestic transaction)	Import by country A from country B
Ctry A	Ctry B	Ctry C	Import by country C from country A	Import by country A from country B
If the buyer pays the intermediation fee				
Ctry A	Ctry A	Ctry B	Import by country B from country A	Import by country B from country A
Ctry A	Ctry B	Ctry B	Import by country B from country A	None (domestic transaction)
Ctry A	Ctry B	Ctry A	None (domestic transaction)	Import by country A from country B
Ctry A	Ctry B	Ctry C	Import by country C from country A	Import by country C from country B
If both the seller and the buyer pay an intermediation fee				
Ctry A	Ctry A	Ctry B	Import by country B from country A	Import by country B (of *part* of the intermediation services) from country A (the remainder of the intermediation services reflect a domestic transaction)
Ctry A	Ctry B	Ctry B	Import by country B from country A	Import by country A (of *part* of the intermediation services) from country B (the remainder of the intermediation services reflect a domestic transaction)
Ctry A	Ctry B	Ctry A	None (domestic transaction)	Import by country A from country B
Ctry A	Ctry B	Ctry C	Import by country C from country A	Import by country C (of *part* of the intermediation services) from country B and import by country A (of the remainder of the intermediation services) from country B

This is not however the only complication presented by Digital Intermediary Platforms. There are also challenges concerning their industry of classification and, indeed, as a consequence[44], the classification of the product they provided. In a nutshell, the question, is should DIPs be classified to the industry in which they intermediate or should they be classified to a more generic industry providing digital intermediation services.

This remains a matter of deliberation. However the UN Expert Group on Industrial Classifications, provided provisional guidance (from its September 2017 meeting) concerning the treatment of platforms such as AirBnB where there was support for the idea that these platforms should be classified to ISIC sector 79.90 "Other reservation services and related activities', recognising the parallels with other non-digital matching services such as high-street travel agencies. By extension therefore, their (current) recommendation implies that DIPs that intermediate services transactions should be classified to the product in which they intermediate (and in turn their output should be considered to be output of the related product). DIPs intermediating transactions in goods would necessarily be classified to the wholesale and retail sector (under ISIC 4791 – *Retail sale via mail order houses or via Internet)*.

It's useful in this context to note this guidance is broadly in line with recent court rulings. For example, in a recent case heard by the European Court of Justice (December 2017), the Court ruled that Uber was in the business of providing transport services (which are excluded from EU rules permitting freedom to provide services) and not (as argued by Uber) in the business of providing computer services, which are governed by the directive on services in the EU internal market.

[44] Following the logic that firms are classified to the industry of the product that generates most of their revenue or value added.

Although statistical standards do not have to follow these rulings, the point well illustrates the nature of challenges for measurement, but also for trade policy, as commitments under GATS may differ by the type of service concerned. Also, whether the driver is considered an employee of Uber – a question all the more relevant as several legal cases have ruled that they should be considered as such – has potential implications for the classification of the service by GATS mode of supply (*e.g.* Mode 3 versus Mode 1).

2.4. Recommended reporting mechanisms

Each of the dimensions described above could be developed as separate blocks but the fact that there are overlaps requires some guidance on how they should be aggregated within a standardised reporting mechanism that could form the basis of digital trade accounts. Table 2.2 describes that reporting mechanism.

Table 2.2 Reporting template for Digital Trade

		Total	By Exporter/Importer		
			Corporation (by industry)	Government	Households/ NPISH
(i)	**Digital Trade** (ii+iv+vi)				
(ii)	Digitally ordered ICT goods				
(iii)	*of which via DIPs*				
(iv)	Digitally orderd goods (other)				
(v)	*of which via DIPs*				
(vi)	Digitally delivered Services				
(vii)	*of which via DIPs*				
(viii)	*of which digitally ordered*				
Addendum items					
(ix)	Digitally ordered total (ii+viii)				
(x)	ICT goods (total)				
(xi)	ICT enabled services				
(xii)	Potentially ICT enabled services				
(xiii)	Non-monetary transactions in information/data (imputed)				
(xiv)	**Broad Digital Trade** (i+xiii)				

Most of the items above have been described in detail above so require no further explanation[45]. Potentially ICT enabled services has not been described and so some additional explanation is given here (and in Chapter 5).

Recognising that reporting mechanisms may not currently be able to deliver estimates on ICT enabled services, TGServ also derived the concept of 'potentially' enabled as many countries (with well- developed services trade statistics should be able to provide these estimates without modifications to existing survey approaches). The rationale for the development of this complementary concept also explains the addition of a number of addendum items in the template that can also currently be delivered using conventional trade statistics (for example ICT goods).

Greater discussion on each of these concepts is provided in Chapter 6, including commentary on the potential afforded through linking trade and business registers to develop insights on the exporting/importing industries, and on the potential of using BEC (Broad Economic Category) classifications to identify importers.

[45] See also Annex 2.A.

Annex 2.A Examples of digital trade transactions

What	How: Digitally ordered	How: Platform enabled	How: Digitally Delivered	Who	Description	Transaction example
Good	Y	N	N	B2B	An enterprise in country A purchases a good directly from a supplier in country B.	A firm purchases a component used in its production via its EDI.
Good	Y	N	N	B2C	A consumer in country A purchases a good (for final consumption) directly from a supplier in country B.	A consumer purchases an article of clothing from a company's webshop.
Good	Y	Y	N	B2B	An enterprise in country A purchases a good from a supplier in country B via an online platform located in country A, country B or C.	A firm orders office furniture from another firm via eBay.
Good	Y	Y	N	B2C	A consumer in country A purchases a good (for final consumption) from a supplier in country B via an online platform located in country A, country B or C.	A consumer orders a physical book on Amazon.
Good	Y	Y	N	C2C	A consumer in country A purchases a good (for final consumption) from another consumer in country B via an online platform located in country A, B or C.	A consumer purchases second-hand goods via eBay.
Service	Y	N	N	B2B	An enterprise in country A purchases a service online directly from a supplier in country B, and the service is delivered physically.	A firm purchases a transportation service from another firm via a website.
Service	Y	N	N	B2C	A consumer in country A purchases a service online directly from a supplier in country B, and the service is delivered physically.	A tourist purchases a hotel stay via the hotel's website.
Service	Y	Y	N	B2B	An enterprise in country A purchases a service from a supplier in country B via an online platform located in country A, B or C, and the service is delivered physically.	A firm purchases standardised maintenance or repair services.
Service	Y	Y	N	B2C	A consumer in country A purchases a service from a supplier in country B via an online platform located in country A, B or C, and the service is delivered physically.	A tourist orders a transportation service through Uber.
Service	Y	Y	N	C2C	A consumer in country A purchases a service from another consumer in country B via an online platform located in country A, B or C, and the service is delivered physically.	A tourist purchases accommodation services via AirBnB.
Service	Y	N	Y	B2B	An enterprise in country A purchases a service online directly from a supplier in country B, and the service is delivered digitally.	A firm purchases standardised computer services.
Service	Y	N	Y	B2C	A consumer in country A purchases a service online directly from a supplier in country B, and the service is delivered digitally.	A consumer purchases a life insurance policy.
Service	Y	Y	Y	B2B	An enterprise in country A purchases a service from a supplier in country B via an online platform located in country A, B or C, and the service is delivered digitally.	A firm orders a logo design from a graphical design firm via a platform for graphical designers.
Service	Y	Y	Y	B2C	A consumer in country A purchases a service from a supplier in country B via an online platform located in country A, B or C, and the service is delivered digitally.	A firm subscribes to a music streaming service.
Service	Y	Y	Y	C2C	A consumer in country A purchases a service from a consumer in country B via an online platform located in country A, B or C, and the service is delivered digitally.	A consumer orders a knitting pattern from another consumer via Ravelry.

Service	N	N	Y	B2B	An enterprise in country A places an *offline* order for a service directly from a supplier in country B, and the service is delivered digitally.	A firm purchases bespoke consultancy services, or business process outsourcing (BPO), services.
Service	N	N	Y	B2C	A consumer in country A purchases a service *offline* directly from a supplier in country B, and the service is delivered digitally.	A foreign student purchases educational services with online lectures.
…	…	…	…	…	…	

Chapter 3. Compiling statistics on Digitally-Ordered Goods and Service

3.1 Introduction

Although there have been considerable efforts over the last decade, as noted in Chapters 1 and 2, to measure the scale and value of e-commerce transactions (and so, in turn, the scale and value of digitally ordered transactions), it is only in recent years that these have been expanded to begin to provide insights on (cross-border) digitally ordered trade.

In that respect, this Chapter, perhaps more than any other Chapter best illustrates the 'living' nature of this Handbook, reflecting as it does the current state of research at the frontier of measurement efforts.

Most existing efforts provide a measure of the size of e-commerce (digitally ordered transactions) at the whole economy level, typically attacking the issue from two not mutually exclusive fronts, i.e. separately targeting (surveying) firms and households, and it is through these existing mechanisms, via the addition of additional questions, that efforts to estimate cross-border digitally ordered trade are being pursued.

However, as this Chapter demonstrates, estimating the cross-border dimension is fraught with difficulties, as respondents may struggle to determine whether they engaged in a cross-border transaction, especially if the transaction was intermediated by a locally resident affiliate of a multinational firm (see also Chapter 5). Additional complications arise if the transaction was facilitated by a foreign digital platform intermediating between two resident actors.

Developing stronger guidance in these areas is of high priority. This Handbook attempts to do that but it cannot be over stressed that this current Chapter only reflects a step in that direction, with the expectation that significant additional guidance will be added as national and international efforts mature.

One important take-away from the Chapter reflects the need to be as innovative as possible in seeking solutions. As noted above, traditionally, statistical efforts have gravitated around conventional measurement vehicles, such as surveys of businesses and households. Important though these are, and are likely to remain, other complementary approaches, or indeed more targeted approaches that focus on key actors, should be, indeed, need to be, explored.

3.2 Enterprise Surveys

Business surveys such as the European Community Survey on ICT usage and e-commerce the OECD Model Survey on ICT Usage by Businesses and Canada's Survey of Digital Technology and Internet have been important mechanisms to compile statistics on e-commerce in many developed economies over the last decade or so.

However, until recently at least, these have focused almost exclusively on measuring the scale (and often size) of e-commerce transactions in the economy as a whole and not the cross-border dimension.

Typically, existing statistics drawn from enterprise-based surveys provide a view of the overall share of turnover derived from digitally ordered transactions. For example in 2018 17% of all turnover of enterprises with 10 or more employees reflected digital ordering, varying significantly by country and indeed industry.

In recent years, recognising the need for a cross-border dimension[46], these existing surveys have begun to be expanded to include additional questions on trade. The European Community Survey on ICT usage and e-commerce in enterprises for example was recently updated to include questions (albeit optional) on the geographical breakdown of turnover derived from orders placed via a website or apps, and through EDI (i.e. exports only), with results expected towards the end of 2019 (see Box 3.1).

Unfortunately, whilst these expansions will be able[47] (in time) to provide insights on the overall share of digitally ordered **exports**, there are no questions pertaining to purchases[48] by firms using digital ordering, and so for now at least, they will not be able to deliver information on digitally ordered imports.

Notwithstanding the absence of information on imports, it is also important to recognise some of the challenges inherent in the information that can be derived relating to exports, and where further evolutions in enterprise-based surveys should be explored.

[46] Motivated in large part by the recommendations described in UNCTAD's report: In Search of Cross-border E-commerce Trade Data, 2016.

[47] Indeed Statistics Canada Survey of Digital Technology and Internet Use is already able to do so providing data on the proportion of overseas Internet sales of all Canadian enterprises, broken down by B2B and B2C sales and by sales to the United States and to the rest of the world. A second survey used by Statistic Canada, Retail Trade and Annual Non-store Retail Surveys, reports retail e-commerce trade limited to the retail sector and can't provide estimates of expenditures spent by foreign consumers in Canadian online shops.

[48] The 2018 European Survey did include some information relating to purchases as a whole but these were significantly less ambitious than those relating to sales; restricting themselves to optional questions on whether any purchases were made using digital ordering techniques, and, if so, whether these constituted more than 1% of total purchases.

Box 3.1. Questions on cross-border digitally ordered transactions in the European Community Survey on ICT usage and ecommerce in enterprises 2019

Question F2. Please state the value of the turnover resulting from orders received that were placed via a website or apps (in monetary terms, excluding VAT), in 2018: _____ (National currency)

If you can't provide this value, **please indicate an estimate of the percentage of the total turnover resulting from orders received that were placed via a website or apps, in 2018:** _____ %

Question F7. What was the percentage breakdown of the turnover from orders received that were placed via a website or apps in 2018 by customers located in the following geographic areas?

(estimates in percentage of the monetary values, excluding VAT). If you cannot provide the exact percentages an approximation will suffice.

(a)	Own country	___ %
(b)	Other EU countries	___ %
(c)	Rest of the world	___ %
	Total	100 %

Source: Eurostat ICT enterprise survey 2019: https://circabc.europa.eu/sd/a/d9b1ab6e-a38f-485b-aeb5-8f7e2ce8d153/ICT-Entr%202019%20-%20Model%20Questionnaire%20V%202.0%20-%20after%20WG.pdf

3.2.1. Enterprise based estimates of Exports of Digitally ordered goods and Digitally ordered services

To avoid potential double counting, and because other approaches (see Chapter 4) may prove better, or at least complementary, vehicles to measuring parts of digitally ordered services (namely digitally delivered services that have been digitally ordered), it is important that estimates of digitally ordered trade derived from enterprise surveys are able to differentiate between at least goods and services,.

Although most current surveys on digital ordering (e-commerce) do not provide a breakdown by the type of product traded, they do provide breakdowns by the industry (at the 2 digit NACE level in the European Survey). Assuming that most of the production (and so exports) of these firms will be, in the main, in those products that form the main output of their industry, provides an important bridge that can link the estimates of digitally ordered exports obtained from these surveys to a view of the product exported (by country and region). This breakdown should be done on the basis of 4 categories of firms; those producing: *ICT goods*, *Other goods*, *Services that can be electronically delivered* and *Other Services, (see Appendix 7 for a description of industries).*

Indeed, for those countries that are able to link their trade and business registers, this approach can be further refined to do away with assumptions about the goods that are exported, as trade registers will be able to provide this information (notwithstanding difficulties relating to *de minimis* trade, see below).

***Recommendation 3.1**: Estimates of the share of products that are exported via digital ordering should be derived through linking the results of dedicated surveys on digital ordering with underlying business and trade registers. In turn, these dedicated surveys should ask firms to provide more detailed industry breakdowns (4 digit classification). Even if the results at that level of detail cannot be publicly disseminated, their use will greatly improve the quality of results on aggregate digitally ordered trade.*

***Recommendation 3.2**: Estimates of digitally ordered trade derived from enterprise based surveys (following recommendation 1) should be at least broken down into the following 4 categories: ICT goods, Other goods, Digitally ordered services in products that can be digitally delivered, and Other digitally ordered services.*

It is important to note in this respect a specific aspect of the design of current surveys and their alignment with underlying concepts included in trade registers. Many firms may sell goods via digital ordering to domestic intermediaries that subsequently take ownership of the goods and export them. In this respect the surveys will correctly reflect the fact that the transaction between a producing enterprise and the domestic intermediary was not a 'trade' transaction, whilst the subsequent export of the intermediary (if also digitally ordered) would be included in digital trade; both flows being completely consistent with what would be recorded in linking trade and business registers.

Where there may be difficulties however, concerns sales by the firm that were intermediated by digital platforms (DIPs, see also Chapter 5) that did not take ownership of the product being intermediated and exported. This matters because the firm conducting the intermediation service (the DIP) (whether resident or non-resident) may also record in its response to the survey its share of turnover (which may also include the value of the product that it intermediated) that was digitally ordered. There is a risk therefore of double counting; unless explicit corrections are made to adjust for transactions facilitated by DIPs.

As noted earlier (although they remain difficult to identify in national registers, see Chapter 5) DIPs engaged in transactions in goods would be classified to ISIC 4791 – *Retail sale via mail order houses or via Internet* - whilst (following the provisional guidelines of the UN group on Classifications) DIPs engaged in services would be classified to the service category they intermediate.

***Recommendation 3.3**: For Digital Intermediary Platforms (not taking ownership of the products they intermediate) estimates of turnover that are digitally ordered should reflect only revenues related to the intermediation services they provide and not include the value of the products intermediated.*

***Recommendation 3.4**: For Digital Intermediary Platforms (not taking ownership of the products they intermediate) estimates of turnover that are digitally ordered should reflect only revenues related to the intermediation services they provide and not include the value of the products intermediated. Exports of the intermediation services (when not charged separately) should be registered to the producer of the product being intermediated (and not the consumer).*

As noted earlier (although they remain difficult to identify in national registers, see Chapter 5) DIPs engaged in transactions in goods would be classified to ISIC 4791 – *Retail sale via mail order houses or via Internet* – whilst, (following the provisional guidelines of the UN group on Classifications), DIPs engaged in services would be classified to the service category they intermediate.

Whilst information on businesses purchases of goods and services is currently lacking in most surveys capturing digital ordering, many (include the European Survey) do include a breakdown of whether the products provided by the firms where made to consumers (households) or other business (including government), albeit not broken down by whether the consumer was resident or not.

However, household based surveys, (as shown below), can provide a means to derive estimates of digitally ordered imports. As such, by separately identifying digitally ordered exports between those that went to the businesses and those that went to households in enterprise based surveys, could provide the basis for mirror statistics to complement (and validate) a partner country's own estimates of imports by households (based on household surveys).

Recommendation 3.5 *Questions on digitally ordered exports by country and region should differentiate between type of consumer (household and business/government). In the short term, countries should derive these splits using information available for the whole economy.*

3.2.2. Enterprise based estimates of Imports of Digitally ordered goods and Digitally ordered services

As noted above, currently, very limited information is produced within current enterprise based surveys targeting digital ordering that can provide a view of imports. One obvious recommendation in this sense would be to include similar questions related to exports, as shown in Box 3.1, which reflected purchases via firms.

However, it is important to recognise that such an approach will add to response burdens and, moreover, given the challenges, it is not clear at this stage that the addition of such questions will be able to generate meaningful results. A key challenge in this respect reflects the fact that the enterprise may not always know whether the purchase was made via a domestic or a foreign intermediary. Many firms for example provide local domain websites for transactions even if they have no physical presence in the country, meaning that purchasing firms may record a transaction as domestic even if the entire transaction was conducted abroad. Equally, firms may incorrectly ascribe a transaction as being entirely foreign if most of the value was domestic, for example resident to resident transactions intermediated by foreign DIPs.

However, whilst these are considerable challenges, that is not to say that information providing a view of overall purchases by electronic means (particularly EDI) would not be meaningful, as it would, at the very least, be able to provide an estimate, albeit with some qualifications. Moreover, it is important to put the scale of these qualifications into perspective, as a significant share of digitally ordered transactions are made with EDI mechanisms.

Recommendation 3.6 *Enterprise based surveys should include questions on the share of purchases made by digital ordering, with a separate estimate for transactions via EDI, broken down into whether those transactions were for imported or domestically produced products.*

In the future, as the information set improves, additional questions on imports could be considered but at this stage it would be overly ambitious to include them in this Handbook.

However, one area where it may be feasible to gain additional insights on imports of digital trade now, concerns imports of intermediation services provided by DIPs. Because the recommendation in this Handbook is that any implied intermediation fees are accrued to the producer (and not the consumer), a measure of the value of these intermediation services can be derived from estimates of sales passing through (intermediated by DIPs). The European Survey already includes a similar question that could be used to estimate the value of these 'imports'[49] by applying an average intermediation fee to the overall turnover intermediated via these channels.

Recommendation 3.7 *Questions in enterprise based surveys that separately identify sales via digital intermediary platforms should be used to estimate the value of the underlying intermediation fee, using information on average intermediation (percentages) fees.*

3.2.3. Mainstreaming Enterprise based surveys of Digitally ordered goods and Digitally ordered services

Most of the current attempts to estimate digitally ordered transactions reflect complements (often ad-hoc) to traditional surveys of businesses. Given the emphasis placed on better understanding the digital economy more generally, and digital trade in particular, statistics offices should explore whether additional questions could be added to their conventional annual business surveys used to derive structural business statistics; particularly as most current surveys typically target larger firms (for example the European Survey is only voluntary for firms with less than 10 employees).

These additional questions could take as their starting point the existing questions in current surveys, coupled with the recommendations above.

Recommendation 3.8 *Efforts should be made to explore the feasibility of including questions in standard annual business surveys that ask firms to provide the following information relating to digital ordering: Share of total sales via own-website; Share of total sales via the internet or apps, Share of total sales via EDI; Share of total exports via own-website; Share of total exports via the internet or apps, Share of total exports via EDI; Share of total purchases via the internet or apps, Share of total purchases via EDI, Share of total imports via EDI.*

[49] Question F5: What was the percentage breakdown of the turnover from orders received via a website or apps in 2018 for the following: (b) via an e-commerce marketplace website or apps used by several enterprises for trading products? (e.g. Booking, eBay, Amazon, Amazon Business, Alibaba, Rakuten, etc.)

3.3 Household Surveys

One approach increasingly used to gain insights on digitally ordered transactions is through household surveys.[50] However, these remain very much in their infancy, providing very little information on the size of digital trade. For example, the Canadian Internet Use Survey does provide information on the share of overall expenditure that was digitally ordered but it does not provide an estimate of how much was on imports. The 2018 European Survey on ICT usage in Households and by Individuals, on the other hand, does provide an estimate of the percentage of households that digitally ordered goods and/or services from abroad but it does not provide a value of that trade.

This Handbook could make recommendations similar to those included for business surveys, *i.e.* to include a series of additional questions that were able to provide a view of the value of cross-border digitally ordered transactions but that would ignore the evidence suggesting that this is not (at least currently) likely to deliver meaningful results.

While the evidence suggests that meaningful results on digital ordering's share of overall household expenditure can be achieved, the Canadian experience also revealed that most households were not able to accurately determine if a transaction was cross border. This is, in no small way, complicated by the fact that while many platforms or online sellers appear to have a domestic presence (*i.e.* have a ".ca" website, show prices in Canadian dollars, French/English text, etc.) the transactions are in fact routed and processed by non-resident businesses, with the resident domain site merely serving to advertise products.

This appears to be an intractable problem, as it seems very unlikely that households will ever be in a position to determine whether they are ordering through a real resident platform or not.

That being said, one area where household surveys may prove useful concerns expenditures on digitally delivered products. There is some concern that some expenditures made by households, in particular on digitally delivered services (see also Chapter 4) may not be well captured in current trade statistics. Although the use of supply-use tables in most countries will be able to cast light on whether this is occurring in the raw data, allowing corrective adjustments to be made in definitive trade statistics and the national accounts (by comparing supply and demand estimates of specific products), explicit questions in household surveys asking consumers to identify the share of expenditures in certain products that were digitally delivered will be able to reinforce this balancing process.

> ***Recommendation 3.9*** *Household surveys should include questions asking respondents to identify the share of expenditures on digitally delivered services by specific product, following at a minimum the COICOP classification but preferably CPC or equivalent.*
> *COICOP, Classification of Individual Consumption According to Purpose; CPC, Central Product Classification*

Another potential area where household surveys could be exploited concerns expenditures abroad and tourist expenditures in the compiling economy. Specific questions asking households to identify the share of expenditures on accommodation and (separately) travel services that were digitally ordered may also help to identify potential underestimates in

[50] See for example the European *Survey on ICT usage in households and by individuals* and Statistics Canada's *Internet Use Survey*

these areas. Similarly, the same surveys could be used to ask households if they provided (and the value of) short-term accommodation services via digital intermediation platforms. Whilst this would not be able to differentiate between accommodation services provided to residents and those provided to non-residents, it would provide an order of magnitude (and upper-bound estimate, notwithstanding potential deliberate under-recording[51]).

> ***Recommendation 3.10*** *Household surveys should include questions asking respondents to identify the share of expenditures on accommodation and (separately) travel services related to foreign travel. Similarly, household surveys should also ask questions on short-term accommodation services provided by residents that were ordered through digital intermediation platforms.*

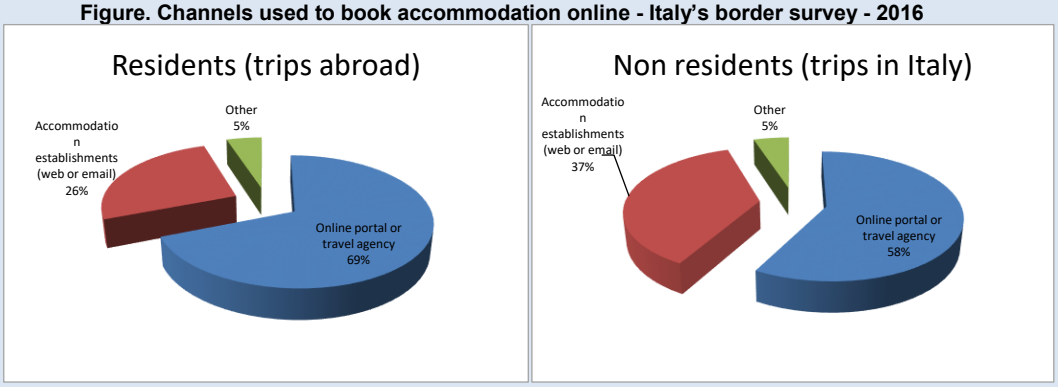
A variant of household surveys, also discussed in this section, concerns travel surveys (see Box 3.2 below), which can be a very important source of information on digitally-ordered tourism expenditures.

Box 0.2. Compiling digitally ordered travel transactions in the USA using credit card information

The Bank of Italy (BoI) has been running an extensive (face-to-face) border survey since 1996 providing information on various features of Italy's inbound and outbound international tourism, such as number and characteristics of visitors and visits, number of night stays, mode of payments used, etc.). Recently additional questions have been added to gather information on the use of online tools to book or buy travel services. Travellers are asked about a) online purchases of "all inclusive" travel packages and b) online booking of accommodation. The survey shows that, in 2016, expenditures on "all inclusive" trips booked online accounted for 14% and 18%, respectively, of outbound and inbound travellers' total expenditure on the product. For accommodation services, the equivalent figures amounted to 42% and 65% respectively.

A specific question addresses the channel used to book the accommodation online (see below).

Figure. Channels used to book accommodation online - Italy's border survey - 2016



Source: Banca d'Italia.

[51] Reinforcing the importance that household surveys make regarding confidentiality of respondents data and its use for statistical purposes only.

3.4 Credit card data

A promising area being explored by many countries, especially with respect to B2C cross-border transactions, concerns the use of credit card data, see Box 3.3 (The Israeli experience in using credit card surveys to measure cross-border online purchases), and Box 3.4 (the U.S experience with using credit card data to identify digitally ordered travel transactions), see also Annex 3.A.

Typically these approaches are able to differentiate between two main modes of transaction – those were the card was present and those were the card was not present – providing meaningful proxies for transactions that were not digitally ordered and those that were.

However, whilst these approaches are able to provide a relatively simple means to arrive at overall household expenditure that was digitally ordered, they can only provide a partial view of the product that was digitally ordered, as they depend greatly on the code of the merchant (Merchant Category Code); which will only closely align with the product ordered for specialised merchants and platforms.

For estimates of digital trade, additional complications arise. The merchant clearing-house (where the transaction is processed) may, for example, be located abroad but the transaction may ultimately reflect a resident to resident transaction; for example when the merchant is also a DIP facilitating a transaction in goods and/or services between residents, in which case only the fee for services provided by the DIP should be treated as cross-border trade. Moreover, even if the ultimate transaction is between a resident and a non-resident, the clearing-house may not be in the same country from where the goods and services are provided, meaning that bilateral estimates of digital trade may be distorted. Further, it is possible that the merchant clearing-house has a local presence but the actual producer is located abroad.

Box 0.3. Using credit card data to measure cross-border online purchases in Israel

Benefitting from the legal framework in place allowing access to credit card information, and a memorandum understating drawn up with three major companies, the Israeli Central Bureau of Statistics (CBS) has started to develop more robust estimates of digitally ordered purchases from abroad by consumers.

The credit card companies have since provided monthly or quarterly data covering the period from 2012 onwards, and currently report approximately two weeks after the end of the quarter.

Data are separately available showing expenditures by Israeli tourists abroad (providing a measure of tourism expenditures) and expenditures by Israeli residents cleared through foreign websites, providing insights on digitally ordered trade (see main body of Chapter 3 for some of the challenges involved).

Data are broken down by duty rates for imported goods set by the customs authorities, in order to distinguish goods that were cleared by customs (i.e. transactions > USD 500), and therefore already included in import statistics.

The data are classified according to the international classification of Merchant Category Codes (MCC) – a classification of businesses made by credit card companies – and relate to households only (business credit cards were excluded), and only those transactions where cards were not present (as these primarily refer to on-line purchases, although they may include purchases made by telephone or fax).

Notwithstanding the challenges involved, credit card data does appear to provide scope for meaningful estimates of household imports of digitally ordered trade, including for breakdowns of some categories of expenditure, such as accommodation services and travel.

Recommendation 3.11 *Credit card data provides considerable scope to estimate the total value of digitally ordered expenditures by households. Whilst there are some challenges involved in identifying that part that is cross-border, countries are encouraged to explore their potential, not least as they can be a cost-effective way of gathering data.*

Box 0.4. Compiling digitally ordered travel transactions in the USA using credit card data

In the mid-2000s, BEA explored the use of credit card to estimate trade in travel services as it offered several advantages over self-reported expenditure data, including that they did not rely on travellers' recall or expectations and they provided complete geographic coverage. BEA collected card data for transactions related to trade in travel via a quarterly survey of bank and payment card processors for 2008-2017.

BEA's original survey captured all cross-border purchases and cash withdrawals made with a card for both spending in the United States using cards issued by foreign banks and spending in other countries using cards issued by U.S. banks. The survey collected a breakdown of total transactions for six broad categories of travel-related purchases as well as detail on total transactions by country. BEA's initial concerns with the survey data were that it appeared to include e-commerce transactions and that classifications by spending category varied across reporters, while transactions unrelated to travel spending were being reported.

BEA attempted to address these concerns with a redesign of the survey in 2012. One of the most important changes included the separation of reported transactions by whether the card was or was not present at the time of the transaction. The vast majority of retail goods and services purchased without a card present were expected to represent e-commerce, and not in-person point-of-sale transactions thought to be typical of travel expenditures. E-commerce transactions could therefore be omitted from BEA's calculation of travel expenditures. The instructions were also modified to specify how each transaction's merchant category code (MCC) should be classified into the spending categories and to omit certain MCCs that did not correspond to the types of purchases made by travellers. In addition, transactions were collected by both spending category and country, which allowed for more detailed comparisons with alternative data sources.

The improvements to the survey were only partly successful because not all reporters could fully comply with the new instructions. In addition, survey reporters could only identify transactions by country based on the location of the bank that issued the card rather than by the country of residence of the traveller using the card. This identification not only affected the ability to correctly attribute transactions by country of the purchaser, but also whether transactions should be classified as resident/non-resident. Further, data from card transactions did not correspond with data from alternative sources on traveller counts and spending. When combined with traveller counts, the implied per person spending was significantly higher than self-reported spending from a survey of air travellers, even though it did not include purchases made without a card or international purchases channelled through entities in the country of residence of the purchaser (e.g. a U.S. resident booking a foreign hotel via a U.S. website). Furthermore, the country-level estimates of implied per person spending revealed unrealistic levels of spending and unexpected differences in spending across countries that are geographically close to one another and have similar traveller demographics.

Another concern with the card transactions data was that certain relevant card transactions would be missed by the survey due to the structure of the card-processing and card-issuing industries. For example, reciprocal agreements may allow a foreign card processor to process a relevant transaction, and relevant card payments on closed-loop or digital wallet payment systems may not be captured by the survey. Also, the categorisation by MCC may not correspond to the goods or services purchased because merchants may have one or a few MCCs per retail outlet, which does not allow for a high level of disaggregation by product type. In BEA's analysis, the level and seasonal pattern of spending for categories thought to be well identified by MCC, such as lodging, were quite different from self-reported spending on the traveller survey.

Since not all spending is done with cards and some transactions related to travel may be booked via intermediaries resident in the same country as the traveller, BEA planned to account for transactions made by methods other than cross-border credit card transactions using data collected on a one-time companion sample survey of international travellers. The companion survey provided information on the portion of total spending attributable to cross-border card transactions, but there were concerns over the quality of the data collected and its associated cost, so it was not repeated. BEA ultimately decided that the credit card data it collected was not a reliable basis to estimate trade in travel and discontinued the survey of card processors.

3.5 Using data from other payment processing firms

Other similar approaches are being adopted in some countries, drawing on information from specialised on-line payment companies. Although similar challenges arise as those for credit-card data, as shown below (Box 3.5) showing the experience of the Bank of Russia, meaningful results can be derived.

Recommendation 3.12 *Information from other specialised payment companies provides considerable scope to estimate the total value of digitally ordered expenditures by households. Whilst there are some challenges involved in identifying that part that is cross-border, countries are encouraged to explore their potential, not least as they can be a cost-effective way of gathering data.*

Box 0.5. Using online payment companies to measure digitally ordered trade transactions: the Russian experience

Digitally-ordered trade transactions are nearly always settled via specialized online payment companies. In Russia, both international companies such as PayPal, and national IT companies such as QIWI or Yandex operate in this market. Russian law requires such companies to have licenses to work as credit institutions and to notify the Bank of Russia when they begin transferring electronic funds.

The online payment companies are required to report detailed information to the Bank of Russia on a regular basis, including on e.g. direction of payment, the counterparty country and the currency of transactions. Due to the large number of small transactions (the average transfer amount is $20), the individual transactions are not categorized by type of goods and services. However, considering the growing importance of digital ordering, a quarterly survey was developed in order to obtain disaggregate information on transactions by major product categories. To reduce the burden on respondents, a list of the types of goods and services that account for the largest shares in international transactions was developed with input from the operators of payment systems, and only the three largest operators, which account for more than 80% of total international transactions, are surveyed. Categories identified in the approach include the purchase of goods; the purchase of services in the field of culture and recreation (computer games); computer services (content, hosting, domain registration); communication services (cellular communication and internet, IP phones, SIM cards for tourists, information services); participation in online casinos; transactions on the Forex market; and transfers between individuals.

The first survey was conducted in 2014. The results showed that imports of goods from online stores, participation in online casinos, and computer games made up the largest share of online cross-border transactions conducted by individuals. The practice of disaggregating e-commerce payment system reporting data through a sample survey has been considered successful and is currently used in the calculation of imports and exports of goods and services, personal remittances and other balance of payment items

3.6 *De minimis* trade

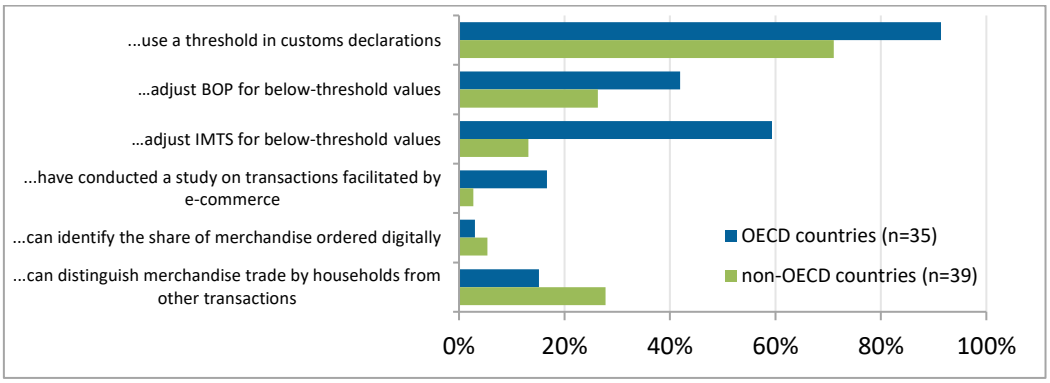
One area where there has been considerable concern that digitalisation may have led to mis-measurement, that is *underestimation*[52], relates to the estimation of *de minimis* trade, i.e. transactions below the minimum value (weight or size) on which duties are collected, and so are outside of the scope of conventional merchandise trade statistics. For example,

[52] It's important to note that the measurement issue affect exports less than imports, as exports under a de minimis regime will be recorded as output of the exporting firms and so any systematic underestimation will appear as supply-demand imbalances in compiling the national accounts.

the 2017 International Post Corporation E-commerce Shopper Survey found that 84% of cross-border goods purchased online weighed 2kg or less and almost two-thirds of them (66%) cost less than 50 euros. Moreover, while the number of cross-border online transactions is increasing, their average value is decreasing, including from some smaller businesses using 'just in time' inventory management systems, including through EDI.

The OECD-IMF stocktaking questionnaire showed that the *de minimis* thresholds currently in use vary strongly across countries. For example, among OECD countries, the threshold ranges from GBP 15 in the United Kingdom to USD 2500 in the United States. Some countries also apply a volume threshold and thresholds can vary for each tax or duty applied. Among non-OECD surveyed countries customs thresholds ranged from a minimum of about USD 25 (Belarus, Philippines, Mauritius) to USD 2,000 (or less than 50kg) for imports and USD 5,000 for exports in Colombia. A number of countries (7) also indicated having different thresholds for postal shipments or by type of transport, such as Russia, which applies different thresholds varying by mode of transport on duty-free imports by individuals. China on the other hand has no customs threshold.

Figure 3.1. Percentage of respondents to the OECD-IMF Stocktaking questionnaire that…



Note: It is likely that the lower number of non-OECD respondents making an adjustment to Balance of Payments figures compared to International Merchandise Trade Statistics is influenced by the organisations (central banks) answering the questionnaire.

Around half of OECD countries, as well as several non-OECD countries, produce estimates of de *minimis* trade for balance of payments purposes, using various sources, including from: the National Postal Service, administrative reports from Customs, credit card information or estimation models (See Boxes, 3.6, United States, and 3.7, Russia).

In most cases, *de minmis* trade amounts to around 1-3% of total trade but can reach as high as 15% in Azerbaijan (for Q1 2017). Countries that do not produce *de minimis* estimates often cite limitations in source data or consider these flows as insignificant.

While there is likely to be a strong correlation between the growth in *de minimis* transactions and growth in digital ordering it is important to note that not all *de minimis* trade will be digitally ordered,[53] and so some care is needed in interpreting the data as trade that is digitally delivered.

[53] Nor indeed will all *de minimis* trade necessarily have a value that should be recorded in the goods and services account. For example gifts have value but should in theory be excluded. In practice, however, no adjustments are made for gifts on the grounds that they are relatively insignificant.

Box 0.6. De Minimis estimations in the United States

Since the 1960s, the United States has promoted the reduction of trade flow processing costs by exempting low-valued transactions for both imports and exports from the burden of additional procedures and paperwork. The U.S. Census Bureau provides estimates for low-valued trade statistics below a *de minimis* threshold of USD 2,500.

Data for exports is based on the sum of two sources of information, gathered from small package courier company trade transactions and country-specific low-value trade estimates. Courier data is used to develop a "courier factor" based on the proportion of the low value trade to the total high value trade over several months. This factor is the same for all countries, and is multiplied with the courier data to produce courier low value estimates. Non-courier data is estimated by using a country-specific factor multiplied by each country's trade from the prior (or current, if available) month to produce low value estimates. This is done for exports to all countries except Canada, which is separately generated under the U.S.-Canada Data Exchange. These two data components are summed, by country, to produce monthly low value estimates.

In contrast, imports data is typically based on available low value import data rather than estimates, with two main methodological features. The first is a summarisation or "roll up" of excess electronically-filed data (comprising the majority of data) that is typically omitted from the original statistics, which increases the value of trade for certain commodities where lower valued trade is prevalent. The second is a revised low value estimation process with four components: 1) a low value total for electronically filed import data, 2) an estimate of low valued data filed via paper, 3) an estimate of courier low value data, and 4) a low value total for Foreign Trade Zone (FTZ) data filed either via paper or electronically. These four components are summed, by country, to produce monthly low value estimates.

Box 0.7. De Minimis estimations in Russia

Russia has a relatively high *de minimis* threshold (1000 EUR per person per month). Most goods are delivered through postal and courier services and are not included in customs statistics so in 2011 The Bank of Russia started to measure the value of these flows, using data on the volume of incoming mail received from the Russian Postal Service. A model was constructed distinguishing between three types of postal items (letters, parcels and express items) and partner country. Letter post (small packages of up to 2 kg) accounted for the largest share of postal shipments. This was due to the high demand in Russian households for cheap purchases from Chinese online shops (Alibaba, for example).

Subsequently, the average cost of each of these categories was determined using a household survey conducted by the Postal Service and estimates provided by experts. The total value was then estimated by multiplying the number of incoming mail items by the average value of one shipment in the appropriate category. Imports were adjusted to reflect FOB prices, and goods purchased by households for further resale.

While this approach resulted in reasonable initial estimates, it proved difficult to determine the average costs of one shipment, and especially because the survey did not cover information from private courier companies such as DHL and FedEx, the approach was abandonned in 2013 in favour of calculations using credit card information.

A key take-away from national experiences is that estimates based on information from postal delivery providers can provide relatively robust estimates of overall *de minimis* trade but only (as the case of Russia shows) if the estimation process covers (at least) the majority of postal and courier service providers, covering all transport modes.

Of course such approaches are not able to identify the scale of digitally ordered transactions that fall under *de minimis* trade thresholds but (as the Russian example shows, and indeed the examples for Israel above), credit card can provide a useful approach for estimating

digitally ordered trade below de minimis thresholds if credit card companies are asked to compile data showing the value of transactions below and above those thresholds.

Recommendation 3.13 *Countries should give greater priority to estimate de minimis transactions using a variety of sources. Information provided by postal and courier agencies can provide meaningful estimates as long as coverage of providers is high and all modes of transport are representatively covered. These efforts should be coupled with information from credit-card companies (and other actors providing payment services) that provides information on transactions below de minimis thresholds (where these are valued in monetary terms) to gain insights on digitally ordered de minimis trade in goods.*

Box 0.8. International efforts on digitally ordered *de minimis* trade

The Universal Postal Union (UPU), WTO, UNCTAD and OECD are currently investigate the scope to use postal data from the UPU to measure digitally ordered merchandise trade broken by B2B and B2C transactions. UPU postal data include information on e-commerce shipments, such as product options, track and trace and return options, and information on electronic customs declarations between postal operators. An update of this work will be provided in future versions of this Handbook.

3.7 Digitally ordered merchandise trade directly from customs statistics

More systematic efforts that may deliver significant results on digitally ordered (goods) trade in the short to medium term, including on *de minimis* trade, are in development.

A key pillar of these efforts reflects work led by the WCO, in collaboration with large ecommerce enterprises[54], to better identify and monitor digitally ordered trade in customs records: via improved (electronic) identification of origin/destination and content of packages, for example via the S10 bar code, or special (simplified) declaration forms for ecommerce

The WCO's work is governed by its "Framework of Standards" on cross-border e-commerce (See Box 3.9), which offers structural guidance on measuring ecommerce transactions, and aims to establish global standards in the e-commerce supply chain, including a harmonised approach to risk assessment, clearance/release, revenue collection, and border co-operation, from both trade facilitation and customs control perspectives.

[54] Who in turn may benefit from more efficient customs procedures.

Box 3.9. WCO Luxor Resolution on Ecommerce

The WCO's framework on standards is based on eight guiding principles for cross-border ecommerce outlined in the Luxor Resolution, (adopted at the 2017 WCO meeting) and includes one specific principle (V) on measurement and analysis:

i. Establish a set of common terminologies and reliable mechanisms to accurately measure and analyse cross-border E-Commerce in close cooperation with international organizations such as the WTO, UNSD, OECD, UNCTAD, UPU, ICAO, WEF, World Bank Group, as well as with national statistical organizations and E-Commerce stakeholders;

ii. Use Data Analytics (including "Big Data" modules) and the existing capabilities of international organizations, e-vendors/e-platforms, and other stakeholders, with a view to generating trends and analysis for evidence-based decision making to support the implementation of the Guiding Principles and the efficient and sustainable growth of cross-border E-Commerce;

iii. Establish mechanisms, including supporting legal framework, to capture data at item level to facilitate the development of E-Commerce trade statistics, while implementing simplified clearance processes, for example the consolidated simplified summary declaration."

Source: WCO 2017, http://www.wcoomd.org/-/media/wco/public/global/pdf/about-us/legal-instruments/resolutions/policy-commission-resolution-on-cross_border-ecommerce_en.pdf?la=en

Several countries have already started to implement these systems:

Japan

Japan has a regulatory framework on the clearance system for low-value goods, which includes a simplified tariff, manifest-based clearance, de minimis regime, and inspection, at express service providers' premises when needed. Their initiatives include the exchange of advance electronic information for postal items and the promotion of paperless environment.

Canada

Canada has initiated a postal modernisation initiative (PMI) which includes advance electronic data on small parcels and related systems such as a postal operations support tool (POST) and international conveyor systems (ICS). The Courier Low-Value Shipment Programme is also designed to expedite the processing of imported non-prohibited, regulated or controlled goods worth less than CAD2,500.

China Customs, which unlike many other customs authorities is also responsible for the publication of official merchandise trade statistics, is also making significant advances in this area (see box 3.10), supported by government policy aiming to create an environment conducive to e-commerce development. The government is strengthening five areas of e-commerce policy, including: 1) Customs clearance, 2) inspection and quarantine, 3) tax policy, 4) payment and settlement, and 5) financial support. Comprehensive test areas for cross-border e-commerce have been set up to conduct pilot regulatory systems and policies, beginning with Tianjin.[55]

More specifically, the initiative requests Chinese e-vendors to fill out extensive documentation of e-commerce transactions that can guarantee facilitation in the delivery of their goods. This includes the registration of e-platforms (advance information on the order, payment, and delivery), cross-border information management systems, consolidated

[55] Hongfei, Yue (2017). National Report on E-commerce Development in China. Inclusive and Sustainable Development Working Paper Series WP 17, United Nations Industrial Development Organization.

declarations, simplified tariffs, and ID requirements for personal shipments below *the de minimis* level.

The most important data elements include individual stock-keeping unit (SKUs) names and item numbers for the product, origin and destination, with breakdowns of the transaction price into its associated freight or other logistics costs and insurance fees, as well as firm-level information on the transacting enterprise, the e-commerce platform used, and the logistics or freight company transporting the product. In addition, Chinese Customs also requests detailed contact information on the payer or consignee and specific product details such as its name, commodity classification code, dimensions and weight.

Box 3.10. Measuring cross-border merchandise E-commerce using customs data in China

In recent years, e-commerce has flourished in China, and China has become the world's largest e-commerce market where all forms of e-commerce (including for example B2B, B2C, C2C, online-to-offline) have developed rapidly. This growth has brought challenges for accurately measuring cross-border ecommerce involving goods, related to high-frequency and low-value transactions. As the institution responsible for official Chinese merchandise trade statistics, China Customs has developed new approaches to ensure the statistical coverage of these transactions, covering both B2C and B2B.

For the B2C cross-border e-commerce transactions, China Customs has established a specialised clearance system named Cross-border E-commerce Information System (CBEIS). Specific customs regime codes (9610, 1210 and 1239) help identify goods that are cleared via CBEIS. Customs allow the release of B2C cross-border e-commerce goods via a simple declaration which combines and cross-validates the original orders, logistics and payment data, while e-commerce platforms declares summarized data to Customs afterwards for statistics and other purposes.

Since e-commerce platforms typically have high quality data management systems to oversee the entire chain of transactions, logistics and payments, information is easy to collect and report. China Customs uses the information on orders provided by ecommerce platforms both within and outside China to develop statistical estimates on the overall scale of cross-border e-commerce. By also incorporating administrative records of cross-border logistics and cross-border payments, using big data methodologies, China Customs can compare and cross-validate the data to improve the accuracy of measurement. This approach delivers complete, accurate and timely statistical information.

For B2C goods cleared as mail parcels and courier deliveries rather than through CBEIS, China Customs and the postal agency have carried out a pilot survey, using sampling methods to determine the proportion of e-commerce postal parcels, to estimate the scale of cross-border e-commerce merchandise trade via postal channels.

For the B2B transactions, China Customs currently encourages importers and exporters to declare whether the goods are ordered via e-commerce. This information will be used for a future statistical survey to further estimate and validate these data.

3.8 Data linking and private data sources

Another avenue to explore in developing statistics on cross-border digitally ordered transactions involves microdata linking, for example by integrating merchandise trade statistics with e-commerce enterprise surveys, albeit coupled with stylised assumptions relating to foreign/domestic e-commerce splits, or proportionality assumptions when applying the share of foreign sales that occurs via ecommerce equally to all products and trading partners. Further refinements could also be made in combination with Broad Economic Categories (BEC) classifications to provide estimates of the share of cross-border sales that can be classified as B2B and as B2C.

The OECD-IMF Stocktaking survey indicated that several countries have started concrete projects along these lines. For example, Germany is developing TEC data for NACE Rev.2 47.91 (retail sales via mail order), and others (Luxembourg, Netherlands, Slovenia) are exploring the ability to capitalise on ICT surveys. Each of these initiatives (and others) will be added to this section as they reach maturity.

New insights on cross-border digitally ordered trade can also be derived from linking administrative data with private data sources (see Box 3.11)

Box 3.11. Measuring cross-border ecommerce from webshops in the Netherlands

To measure expenditure by Dutch consumers at non-Dutch webshops located in the EU, Statistics Netherlands (CBS) used the Dutch VAT returns filed by foreign EU companies, which are mandatory across Europe for all traders exporting more than a certain threshold (EUR 35.000 or EUR 100.000 per year, depending on the member state) to another member state. To identify webshops among these VAT returns, the information was first combined with ORBIS data, to select those enterprises engaged in retail as their primary or secondary activity (and therefore to trade in goods only). In the absence of common identifiers, matching of records was done using company names. This process required significant editing to avoid false negatives due to e.g. differences in punctuation marks (dots, commas, dashes) or abbreviations (e.g. LTD versus LIMITED). In this process, CBS worked together with the University of Amsterdam and Leiden University to implement Big Data analytical techniques achieve faster and more accurate linking.

Subsequently, this overview of companies was paired with internet data collected through web scraping to identify the websites of the shops through which products can be ordered online. Webpages were identified on the basis of the company name, with sites checked (automatically) for the display of a shopping cart. This identification of webshop features was checked manually for the largest foreign companies in terms of turnover size in the Netherlands. Through these manual checks, a rough estimate was made of the measurement errors in the algorithm, which was approximately 5 percent of turnover. With the help of manual check results, the next version of the algorithms can be 'trained' using machine learning in order to further reduce measurement errors.

The results indicate that Dutch consumers spent over 1 billion euros (excl VAT) on products sold by foreign EU webshops in 2016, an increase of 25 percent relative to 2015, and a value 6 times higher than previously recorded with demand-side surveys among consumers. More than half of all online purchases were made at webshops located in Germany, followed by Great Britain, Belgium or Italy. Clothing and shoes were the main items that were purchased.

Source: Statistics Netherlands/University of Amsterdam/University of Leiden, see https://www.cbs.nl/en-gb/our-services/innovation/project/over-1-billion-euros-spent-in-foreign-eu-webshops , and https://www.cbs.nl/en-gb/news/2018/30/spending-in-european-webshops-up-by-15-percent. For the academic paper describing the approach in detail: https://arxiv.org/abs/1805.06930.

3.9 Conclusions

As highlighted in the opening remarks to this chapter, whilst there have been significant efforts over the last decade to measure digitally ordered transactions (e-commerce) in many countries, work is only just beginning to explore the trade dimension.

In virtually all cases, current efforts still need to overcome significant challenges. A key challenge affecting many of the current approaches, and in particular household based surveys, concerns the difficulty involved in determining from where goods and services were provided, (i.e. imports of digitally ordered trade).

The Canadian experience using household surveys, well illustrates the difficulties here: the presence of a site with a domain name in any country is not a sufficient marker to associate

that site as being the source of goods or services subsequently delivered. This can affect measures of bilateral trade but also estimates of trade itself. The same caveats in this respect also apply for other data sources, for example credit card data, where the merchant processing transactions may not be the location from where the goods and services were despatched.

That being said, measures of digitally ordered exports are less affected by these locational issues; as the starting point for measures of trade in this instance are enterprises with an economic presence in the compiling country, and so the use of enterprise surveys, and indeed **the mainstreaming of additional questions pertaining to trade and digital ordering are strongly encouraged**.

That is not to say however, that the current approaches to better measure digitally ordered imports are not worth pursuing. **In those countries that currently have no information on digitally ordered trade, data should be developed and disseminated despite the current caveats.** Certainly, this is a strong recommendation concerning the estimation of *de minimis* imports for all countries, but especially those who currently make no estimates.

Annex 3.A Extract from OECD "Measuring the Digital Transformation" Measuring e-commerce

Why do we need indicators on e-commerce?

E-commerce has been high on the agenda of policy makers since the mid-1990s. In 1998, the OECD Ministerial Conference on Electronic Commerce in Ottawa recognised e-commerce as a global driver of growth and economic development (OECD, 1998). In 2016, the OECD Ministerial Declaration on the Digital Economy called for policies to "stimulate and help reduce impediments to e-commerce within and across borders for the benefits of consumers and business" (OECD, 2016).

The e-commerce landscape has become increasingly dynamic in recent years. New players have emerged at the same time that established actors have taken on new roles; some barriers to e-commerce, such as Internet access have been greatly reduced, while new barriers, such as concerns about security and privacy, have become more prominent. Above all, new opportunities have arisen to unlock the potential of e-commerce to boost growth and consumers' welfare. (OECD, 2019a). As technological change and new business models are changing the e-commerce landscape, policy faces challenges in a range of areas, including consumer protection, tax, competition and environmental policy. Sound statistics on e-commerce are necessary to design, monitor and implement these policies. However, statistical information on consumer and operator behaviour and on the effects of online platforms is still scarce.

What are the challenges?

The OECD first developed a statistical definition of e-commerce in 2001. Based on this definition, data on e-sales and e-purchases by individuals and businesses are collected yearly in OECD and selected Partner countries, through two dedicated surveys on ICT usage. Both the e-commerce definition and model surveys are regularly updated to adjust to new technological developments and new usages.

Measurement of e-commerce through the ICT usage surveys presents methodological challenges that can affect the comparability of estimates. These include the adoption of different practices for data collection and estimations, the treatment of outliers, the extent of e-commerce carried out by multinationals, and the imputation of values from ranges recorded in surveys. Other issues include differences in sectoral coverage of surveys and limited measures concerning the actors involved (B2B, B2C, etc.). Convergence of technologies brings additional challenges for the treatment (and surveying) of emerging transactions, notably over mobile phones, via SMS or using devices that enable near field communication (NFC).

While ICT use surveys have been successful in measuring the diffusion of ecommerce among individuals and firms, collecting information on the value of e-commerce transactions and on the flows of cross-border e-commerce has proven more difficult. Individuals find it hard to recollect the value of their online expenditures and do not always know when they buy an item from a domestic or a foreign supplier; and the accounting systems of many businesses do not make it possible to split online and offline transactions nor to identify the location of **their customers and suppliers.** In addition, because Business to Consumer transactions include purchases of digital products, which are

increasingly downloaded or streamed over the Internet, it is difficult for the consumer to identify the country of origin.

Beyond survey data, several other sources have been used to approximate shipments in e-commerce, including across borders. These include the aggregation of data from company reports, payment data, parcel shipments or Internet traffic among others (UNCTAD, 2016). However, each of these sources usually only provides a partial and potentially biased perspective on e-commerce transactions.

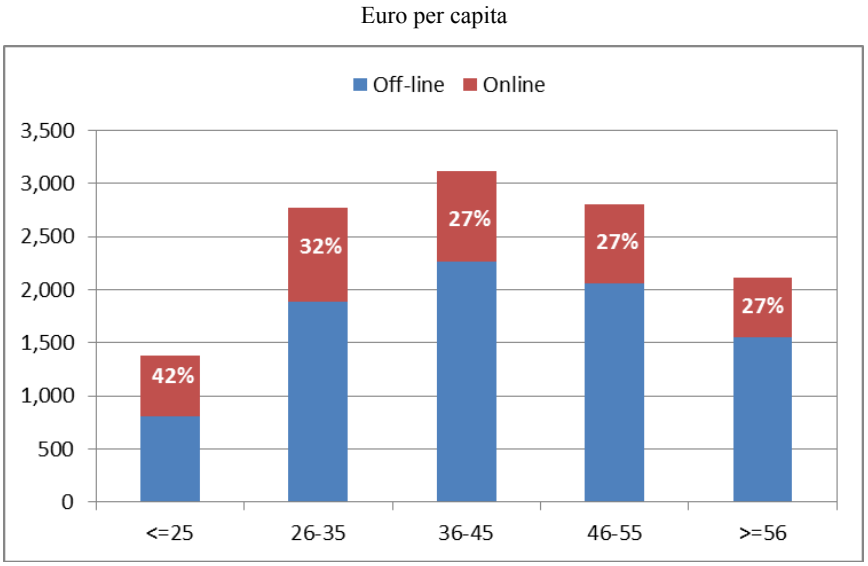
For example, the aggregation of company reports typically covers only a limited number of large firms, sometimes restricted to pure online retailers. Payment data is typically limited to a specific method of payment or might contain certain transactions that are not related to e-commerce (e.g. payments via Near Field Communication - NFC). Additionally, the geography of cross-border payments does not always reflect the geography of cross-border e-commerce, as the payment processing might have been outsourced to a third country. Parcel shipments only relate to physical products and mostly do not provide detailed information on the value of shipments. More importantly, not all parcel shipments are due to e-commerce transactions. Similarly, internet traffic, sometimes used as a proxy for cross-border transactions, is influenced by non-commercial transactions and rarely reflects the value of shipments.

Options for international action

International initiatives to improve measurement of e-commerce are being deployed along three main axes. The first is to improve the quality of the data collected through the ICT surveys. For example, a consortium of seven European countries led by Finland (Eurostat, 2017) has tested a set of new questions to capture new developments in e-commerce. The testing addressed issues related to the distinction between Web sales and EDI-type sales; demand-driven orders, e.g. an order sent automatically by the IT system of an enterprise; bookings and reservations, i.e.: the booking is placed online but the actual service is not ordered online; window shopping, e. g. customers visiting a website but placing their order by phone; the breakdown of web sales turnover from an enterprise's own website or apps vs. via an ecommerce marketplace website or app.; standing orders, e.g.: magazine subscriptions, cloud services, streaming services, etc.; as well as the treatment of e-commerce transactions among firms belonging to the same group. The findings of this work are being reflected in the European ICT usage surveys and could be considered for inclusion by other countries.

The second axis for international action is the inclusion of e-commerce questions in surveys that may be better suited to this purpose. In general, measuring the value of e-commerce requires detailed information that cannot be collected through ICT surveys. The framework of the Structural Business Surveys appears more appropriate for firms to report on the value of their e-sales and e-purchase (Eurostat, 2017). Similarly, it may be easier for individuals to record the value of their e-purchases as part of Household Expenditure Surveys, which typically include a diary of daily expenses. As both Structural Business Surveys and Household Expenditure Surveys are sources underlying the System of National Accounts and are harmonised among countries, international organisations can play an important role in developing these surveys to collect better information on e-commerce.

Figure: Off-line and online payments by age in Spain, 2016



Source: OECD, 2018.

Finally, private Big Data sources, e.g. from banks, credit cards companies, etc. may help to improve measurement of e-commerce in areas where surveys tend to be less effective. For instance, businesses, and especially individuals, buying online typically ignore the location of the seller, an issue complicated further by online platforms. In those circumstances, private source data may become a useful complement to official, survey-based statistics. It is important, however, that the official statistics provide the overall background, particularly in terms of statistical representativeness, , consistency, etc. that private source data, by their very nature, cannot not always achieve.

A collaboration between the OECD and the Spanish Bank BBVA provides a recent example of this approach. As shown in the figure, analysis of credit card transactions of BBVA customers in Spain provided novel insights into the consumption patterns of consumers online and the determinants of domestic and cross-border expenditure flows (OECD, 2019b).

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Chapters 4, 5, 5, 7 to be added here

Appendix 1: Extract from OECD "Measuring the Digital Transformation" The digital transformation and economic statistics

Why do we need to measure the digital transformation in economic statistics?

Digital technology, in its broadest sense, has had a significant impact on the economy in recent years - transforming and disrupting many production processes and activities, whilst also generating significant benefits to society at large. Consumers increasingly purchase goods and services online (e-commerce) and have access to a range of (typically) free services – search engines, social networks, media etc.; businesses are able to capitalise on digital tools, including in particular data, to boost productivity and penetrate new markets.

The pace of change has been unprecedented and in its wake, many have questioned the ability of statistical information systems and concepts to keep up. From a conceptual perspective the answer is that they have - at least with respect to the current GDP accounting framework, the 2008 System of National Accounts (see Ahmad and Schreyer, 2016). But it is also clear that some aspects of the statistical information system, notably concerning the classification of firms, products and transactions, have lagged behind the pace of the digital transformation. In addition, questions are being raised about the scope of the GDP production boundary, to capture for example new digitally-enabled services that households produce for themselves.

Notwithstanding the evidence that digitisation has exacerbated longstanding measurement challenges, particularly with regard to price and quality changes in rapidly changing industries and products, these effects are mitigated when looking at broader measures of economic activity and inflation, and cannot explain the current productivity slowdown (Ahmad, Ribarsky and Reinsdorf, 2017 and Reinsdorf and Schreyer, 2017). However, the inability to articulate the actual size of the digital economy – through references to actors, products, transactions etc. – in the core accounts continues to create questions about what is and is not captured in macro-economic statistics; in turn, fuelling the broader mis-measurement hypothesis. These challenges can be met with a digital satellite account that delineates key digital actors and transactions within the National Accounts Framework.

What are the challenges in developing a digital satellite account?

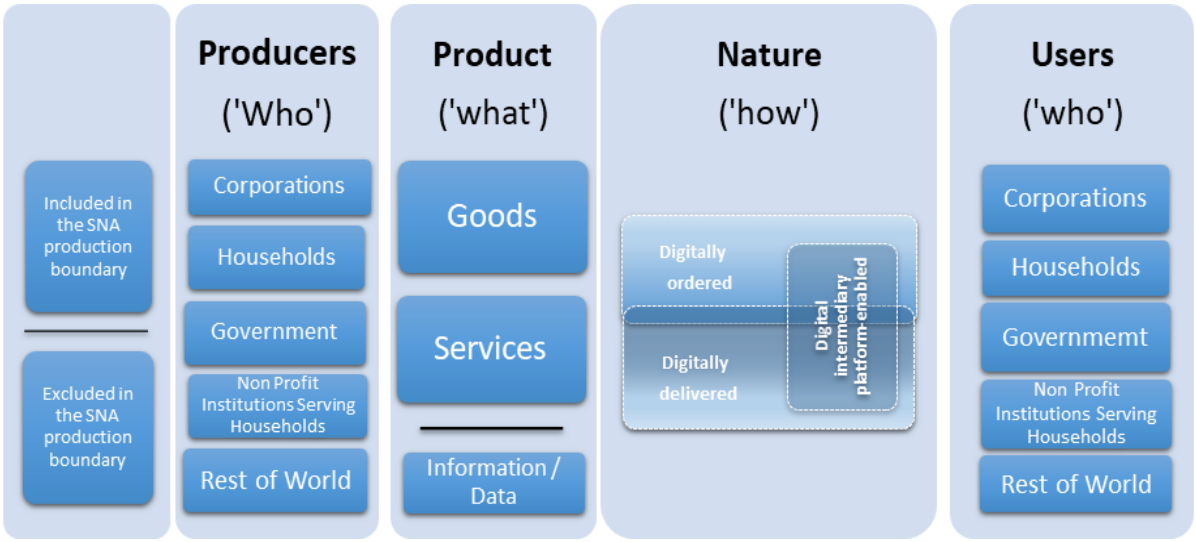
In response, in 2017, the OECD created an Informal Advisory Group on Measuring GDP in a Digitalised Economy (see OECD, 2016), to develop new classifications and accounting tools that are better equipped to show this digital reality and provide metrics that highlight the scale of digital transformation.

From the outset the emphasis in designing the framework was for it to be able to provide a broadly holistic view of the digital economy that could respond to the multitude of questions asked by analysts and policy makers; notably those that current mainstream statistical information systems cannot respond to.

The multi-dimensional nature of these questions meant that the framework could not be built exclusively around mono-dimensional aspects such as industries (producers), or consumers (households and industries), or products (digital and non-digital) or transactions (digitised and non-digitised), as each approach, on its own, only provides a partial view. That being said, a central unifying theme, broad enough to reflect the multidimensional policy needs, is elusive but revolves around the concept of digital transactions. A consensus

has emerged around the idea that any framework needs to be able to separately identify transactions based on their "digital nature", i.e. that are digitally ordered, digitally delivered, and/or digital intermediary platform enabled (partly because of their different economic impact but also because of the different ways in which transactions are recorded in the accounts). An overview of the conceptual unifying framework is described in the figure.

Figure: Conceptual unifying framework



Importantly the framework has been designed to capitalise on blocks that can, at least in theory, be readily derived from current information sets and in line with current international accounting standards. But, as depicted in the first column of Figure X, it also goes further through its inclusion of many non-monetary digital transactions that are typically not included in GDP but that may have important economic implications, for example in considerations of measures of welfare. A special mention in this respect concerns the explicit reference to data; see the third column of Figure X. In the current international accounting standards the acquisition of data without a monetary transaction is treated as "free", therefore, in the accounts much of these data neither appear as a good or a service. There is however considerable interest in monetising these flows, and indeed their value in the underlying databases (where they are included under the category of enablers) that support their business models to better understand how they contribute to production (see also Ahmad and Van de Ven, 2018).

The operationalisation of these principles to develop a digital satellite account builds on national supply and use tables (a core part of current national statistical information systems), which provide detailed information on the production process, the origin of various goods and services (supply) and the destination of these goods and services (use) (see Mitchell, 2018). The digital satellite account goes further by requesting more detailed breakdowns of goods and services based on the mode of ordering and delivery, providing more information on probably one of the most visible manifestations of digitalisation, i.e. electronic ordering (e-commerce), electronic delivery and platform enabled transactions; and recommending breakdowns and new groupings of producers more relevant for the digital economy, *e.g.* digital intermediary platforms, e-sellers, and firms dependent on intermediary platforms. In addition, the framework separately distinguishes digital enablers, in both the producers' and the products' dimension.

International actions to further promote the implementation of the digital satellite account

The proposed template for capturing information on the digital economy within a macro-economic framework, the digital satellite account, received positive support at the previously mentioned Informal Advisory Group of experts as well as the Advisory Expert Group (AEG) on National Accounts and is expected to gain formal agreement from the relevant OECD bodies in 2019.

Countries will be requested to start populating the proposed template in the beginning of 2019. Due to its complexity, and the novelty of information required, including the requirement to make new delineations in actors, and modes of supply (the "how" in the Figure below), it is not expected that countries will be able to fully populate the template at this early stage in the process. But the template is intended to motivate the up-take and development of changes in statistical information and classification systems that will be required in the medium term. That being said, even a partial approach in the short-term will be able to deliver significant new insights as the template deliberately builds on work already undertaken or initiated by countries and the international statistical community that aims to separately identify key elements of the digital economy. Some countries have already started to populate parts of the satellite account and have developed indicators on topics such as e-commerce, digital enabling industries, and consumer use of digital products and services.

Completion of the digital template, which is the first step in creating a more comprehensive satellite account, will be supported by exchanging country practices and information on ongoing initiatives aimed to address specific measurement aspects of the digital economy.

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Appendix 2: Recommendations from the OECD Informal Reflection Group on the Impact of Globalisation on the Measurement of GDP

GDP continues to be a useful aggregate but may require a more differentiated reading.

GDP remains key for production and productivity analysis. But there is a tension between the reality of modern production where labour, physical and intangible capital that are used to produce output can be located in different parts of the world, and our ability to measure domestic production in an economically meaningful way when the location of moveable assets, such as intangible capital, can be readily shifted from one country to another.

Nominal GDP maintains its interpretation as the income generated in a particular territory through the use of the factors of production, including intellectual property. Measures of the drivers of real GDP and of domestic productivity require a more cautious interpretation than in the past when MNEs use intangible assets. For instance, intellectual property assets may be accounted for in one country but provide capital services across affiliates abroad. This complicates the measurement and interpretation of the volumes of factor inputs, and by extension, of productivity (see also below).

Even a differentiated interpretation of GDP does not dispense with the thorny question in which country a particular activity and the incomes derived from it should be recorded in the first place.

This question arises in particular in conjunction with the management of intellectual property products (such as the sale of licences) or with factoryless management of physical production elsewhere.

Clear guidelines concerning statistical residency and economic ownership of assets are critical as intuitively appealing options such as proportional allocation, allocating all value-added entirely to the headquarters, or to the original producers of the asset, create other problems, including the disconnect (although not insurmountable) that taxes on income may be paid in one country but the actual income generated is shown in another in the national accounts. That said, of the various options the idea of allocating the activities of Special Purpose Entities to the country of their headquarters has some traction, although, even if fully implemented, it would not resolve all issues (for example the tax issue) and further guidance may be needed in identifying and determining SPEs, and indeed the 'headquarters' if such a recommendation was adopted. Incidentally, this is a question that also arises in a national context, for instance when R&D investment has to be allocated to sub-national entities.

Also of note in this context is the need to ensure that any guidelines and recommendations can be implemented in way that does not generate global accounting inconsistencies through asymmetric treatment by different NSOs or other inconsistencies in the well-established implementation of the SNA framework.

Recommendation 1: *A reflection on how to determine statistical residency of units should be undertaken, reviewing whether current criteria are still up to the task. Concerning more specifically production arising from moveable assets, such as intellectual property but also some tangible assets, clearer and more prescriptive criteria and practical guidance should be elaborated to determine in which country (or indeed countries for partitioned assets) an*

activity should qualify as production, who the economic owners of assets are, and when the activities should be instead recorded as accounting vehicles that do not enter the measurement of GDP. This entails working out an implementable definition of economic ownership with lists of criteria to establish the presence of production, such as managerial and strategic decision-making, financial planning etc.

Theoretically, from a production-perspective, the productivity of MNEs can only be properly measured at the level of the MNE, i.e. across national borders.

One approach towards conceptualising production within an MNE is to assert that the production function of an MNE is naturally defined over its entire operations, wherever these take place. Put differently, the only meaningful way of formulating the production process and of capturing in particular the role of movable and intangible assets is by considering an integrated production function that stretches across borders. While this does not help in the quest for a 'good' measure of domestic productivity, it points to the usefulness of constructing international 'MNE' accounts.

Recommendation 2: *Develop MNE accounts to track outputs and inputs – including Intellectual Property inputs – consistently and so draw a picture of MNEs' production processes in nominal and real terms. MNE accounts would complement conventional national accounts and, with breakdowns by the country of their affiliates, provide insights on the potential impact of relocations.*

The most promising avenues to deal with the impact of globalisation on the measurement of GDP and national accounts, and indeed other macro-economic frameworks such as the balance of payments, require some form of exchange of information and data between countries.

Just as it has become difficult to conceptualise domestic production in a globalised world, it has become difficult to carry out statistical operations on a purely domestic basis. A first step is ensuring coherence and consistency of treatment of similar transactions across countries along with an exchange of information between NSOs to develop a common understanding of ownership and structures of MNEs. In a second step, exchange and comparison of selected statistical data on MNEs may be envisaged to paint a full picture of the geography of production. It is important to ensure that the implementation of current and possible future guidelines (*e.g.* regarding Special Purpose Entities) does not result in accounting asymmetries.

Also, national accountants and international tax policy makers should engage in discussion on how far the tax base and GDP can meaningfully divert and how international information exchange in the context of the OECD's Base Erosion and Profit Shifting (BEPS) project and information exchange between NSOs can complement each other.

Naturally, any progress in international harmonisation of taxation itself (as under the BEPS Initiative) will also help the statistical case as there will be reduced incentives to shift assets for fiscal reasons in the first place.

Valuation of intellectual property assets remains a major challenge.

With the rising importance of intellectual property assets as a source of value creation, their measurement in countries' balance sheets and as an input is important. At the point of production, intellectual property products produced for own use are typically valued as the sum of costs, which is prudent. Subsequent changes in value are in theory captured as holding gains or losses but to what extent these revaluations are captured in practice is not clear. Although of limited consequence for GDP, this may not be the case for multi-factor productivity measurement. In addition, if the assets are subsequently transferred to an affiliate abroad, it is (a) not always clear how this is captured on the balance sheets of the exporting country, and (b) how the asset is subsequently depreciated in the receiving country – *i.e*. whether the relevant parameters (such as the remaining service life) reflect its age at the point of transfer. Both potential mismeasurements may affect sectors' and countries' level and changes in net worth.

Recommendation 3: *Improve methods to value investment in IP assets, i.e., the output of research and development activity and investigate methods for the treatment of internationally transferred assets (remaining service life, symmetry in treatment,…).*

Communication on what GDP measures and what it doesn't is more important than ever

It will be important to further enhance transparency about methods used and granularity of information provided for macro-economic aggregates. Key users of GDP such as Central Banks already focus on a wide variety of indicators and typically use many models to minimise the risk of reacting solely to any one indicator, but added break-downs of national accounts aggregates and methodological descriptions in particular for international transactions will add to these efforts.

Similarly, communication on GDP and other indicators may need reinforcing. At one level, this concerns the general concept of GDP as a measure of production and associated incomes but not a measure of welfare. At another level, communication relates to explaining the driving forces behind movements in GDP. One reason why the 'Irish case' did not transform itself into in a major political issue lay in the efforts by CSO Ireland to be transparent and pedagogical in its communication.

Recommendation 4: *Develop a common understanding for the most pertinent additional break-downs that should be provided in the national accounts. This would in particular include but not necessarily be limited to:*

- *a standardised break-down of key accounts, including institutional sector accounts and Supply and Use Tables into activities of purely domestic enterprises, affiliates of foreign MNEs, and domestic MNEs. The objective here is to identify the role of MNEs in domestic production, income and in the fiscal space and the possibility to develop aggregates excluding MNEs;*
- *a break-down of gross operating surplus into the value of capital services by type of asset. This is well established in the economics literature and conceptually recognised in the 2008 SNA, but only partially put in place in countries. Growth accounting with a well-developed set of capital services measures will, for instance, allow measuring the share of GDP growth that is due to IP assets, which will be even more powerful if coupled with breakdowns by the category of firms described above.*

Recommendation 5*: Elaborate communication strategies around GDP and other national accounts aggregates both new (such as those described above) and existing (such as net national income or household disposable income).*

Volatility matters from a practical perspective.

Volatility, in and of itself, does not necessarily make GDP wrong, if it reflects volatility of the underlying series and thus one type of economic reality. But volatility in conjunction with large revisions can be a source of concern for users, for instance if monetary policy were to target nominal GDP. Also, GDP has been used as a reference indicator for multiple purposes including of an administrative nature because production processes used to be largely domestically defined and relatively stable. As there is nothing inherent in GDP that qualifies it as the single or best scaling variable and as the national accounts offer a number of meaningful and potentially more stable alternatives, these should be considered. These should include concepts net of depreciation given the growing importance of quickly depreciating assets.

Recommendation 6: For certain administrative or analytical uses, *e.g.* tracking debt sustainability, broad stability of a reference measure is a valued characteristic, and it may be appropriate to use or develop alternative aggregates specifically designed for this purpose – for instance, an 'administrative GDP+/GNI+/NNI+'. These should be derived from existing national accounts.

Appendix 3: Extract from OECD "Measuring the Digital Transformation" Measuring Cloud Computing Services

Why do we need indicators on cloud services?

New technologies and business models are fundamentally changing the way businesses access and use software and hardware. Cloud services mark a paradigm shift in ICT provision, allowing businesses and individuals to access "on-demand IT services over a network". Data processing and storage takes place in a remote data centre which will typically have a scalable and resilient modular design. These can offer businesses, especially small and medium sized enterprises, cost reduction opportunities and increased flexibility.

While there are undoubtedly broader impacts for businesses, such as enabling wider access to the latest technologies by lowering barriers to adoption, the most important, fundamental impact of moving to cloud provision of business ICT is on cash flow. Simply put, firms can now access powerful ICTs on a "pay-as-you-go" basis, avoiding the need to finance large capital expenditures on servers, maintenance, and the like. For established businesses this makes managing their money much easier, and the scalability of cloud services reduces risk exposure. For new firms, this can reduce investment needs and lead to more start-ups securing funding.

As a consequence of this shift, ICTs may become less visible in firms' production costs while simultaneously becoming ever more vital for their productive activities. Alongside this, the shift to cloud is likely to reduce the efficacy of existing policies incentivising purchases of ICT equipment and software. It is vital that cloud services use can be measured so that their impacts on firm-level performance and aggregate productivity can be taken into account, as well as so that infrastructural needs (*e.g.* bandwidth) and other policy implications can be managed.

What are the challenges?

Statistical frameworks such as the System of National Accounts and the Balance of Payments Manual are founded on the principle that production is inextricably linked to a specific location. However, the nature of cloud services is that they can be used from anywhere with a reliable Internet connection, and could be "produced" from any one, or a combination of, the provider's datacentres anywhere in the world. Even where a given' customer's data is known to be housed in a given datacentre in a given location, it is also likely to be duplicated (e.g. backed up) in one or more other locations, with the network dynamically determining where the data should be accessed based on factors such as network traffic, the load on the each datacentre, maintenance, etc. This means it is likely to be very challenging, if not practically impossible, to identify the location of production of any given unit of cloud services. Furthermore, digitally traded services are known to be especially challenging to measure, even without locational ambiguities.

In addition, the capital-substituting nature of cloud services can have material implications for economic statistics including GDP. Fundamentally, businesses (and others) are using ICTs in their business processes as they have traditionally; using software and hardware for data storage, processing, access, analysis, etc. (although the scale, scope, tools, etc. have, of course, evolved greatly). However, the way they access these is changing considerably – from a model of local provision, to providing terminals locally from which

cloud services are accessed. In National Accounts terms, this implies a switching from investment in hardware such as servers to increased intermediate consumption expenditure, which reduces value added and GDP ceteris paribus. In practical terms it fundamentally changes the information that businesses report in surveys and there is a need to understand what is being reported as current and capital expenditure, and why. A challenge related to this is the lack of a specific product, or sub-product breakdown for cloud services in the Central Product Classification (CPC). Furthermore, source data and product categories do not always align well with common definitions of cloud computing. This makes it difficult to assess the pace with which cloud services consumption is increasing and how this compares to falls in firms' ICT investment.

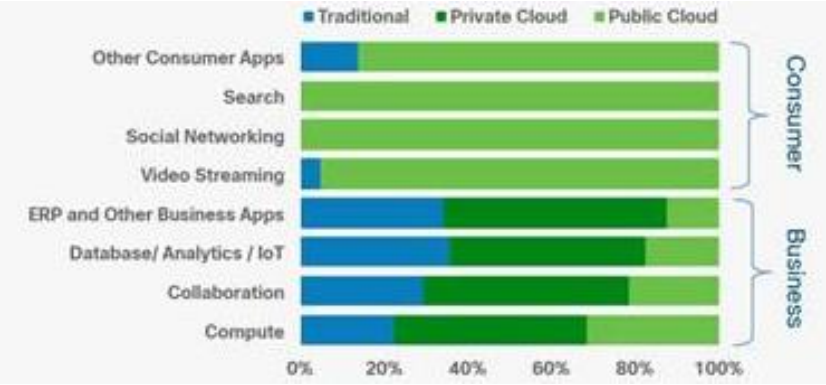
This shift also implies a concentration of ICT investment in the balance sheets of a relatively small number of cloud services providers; many of which have global operations with both service delivery as well as data centres in many countries. This capital formation needs to be appropriately captured in national statistics, with nuances such as whether a cloud service provider builds their own servers/datacentres (own account investment) or procures them from third parties taken into account.

Measures of price change are also an important; existing deflators do not always appear to be accounting for the rapid quality improvements observed in cloud services. By using archived online price lists and press releases from cloud services providers to construct a price index for cloud services, it has been shown that quality-adjusted prices are declining even more rapidly than nominal prices . Nevertheless, there are significant challenges with such an approach, including the wide range of different products offered by each provider, a lack of expenditure weights for these products, and the fact that quality improvements tend to be continuous. A further complicating factor is the proliferation of cloud computing services that are provided to end users free of charge or adopt a "freemium" model where basic service is free but payment is required for additional features such as extra storage. This is especially common in products are targeted at individuals rather than businesses, such as personal email services. Such services are likely uncounted in measures based on transactions and may also act as a substitute for paid software.

Business ICT use surveys give an indication of how many firms use cloud services in each country. Additional detail on services used and the perceived outcomes in terms of production costs, sales, and productivity can be collected to provide contextual and policy relevant information. Nevertheless, the extent and impacts of cloud services can only be understood by finding ways to measure the volumes of cloud services used, amounts paid, the extent of substitution from "traditional" ICT provision models toward cloud services, etc. ICT usage surveys are not seen as a good means for collecting reliable monetary data *e.g.* expenditure on cloud services. This would more naturally fit with the business expenditure component of structural business statistics. However, without a specific cloud services category in the CPC, such presentations are likely to rely on individual countries collecting experimental additional breakdowns.

Much relevant information might be available from cloud services providers themselves, including information on installed capacity, use volumes, and the types of applications using cloud services (**figure below)**. However, these large multinational companies can be challenging to gather data from and viable strategies which minimise the burden on them (*e.g.* by avoiding multiple countries making separate data requests) need to be identified. From the cloud service providers' side, the commercial sensitivity of such information is a key concern.

Figure: Global data centre workloads and compute instances by applications: Traditional vs. cloud (2016)



Source: Cisco Global Cloud Index, 2018
Note: In *traditional* data centres, one server carried one workload and compute instance. With increasing server computing capacity and virtualization, multiple workloads and compute instances per physical server are common in cloud architectures.

Options for international action

Given the evident role of cloud services a keystone digital technology, they have been distinguished separately in digital supply-use tables being developed by the OECD. Countries now need to collect separate data on cloud services and demonstrate the viability for of including a separate category for cloud services in a future revision of the CPC. Alongside this, it may be useful for the OECD and others to build upon previous work to establish internationally agreed definitions and classifications of types of cloud services for statistical purposes and to operationalise these in business ICT usage surveys to gain additional insight on the use of different cloud services.

In addition, it may be possible to agree with a number of the largest firms to provide standard data to the OECD under a non-disclosure agreement, which the OECD can then aggregate and publish to provide an overall view of the cloud services market. As it is likely that cloud services providers will have some knowledge of where their customers are based (*e.g.* based on the payment address), this approach might help to shed light on the flows of cloud services being provided into different countries.

Appendix 4: A Toolkit for Measuring the Digital Economy: Extract from the 2018 G20 Ministerial Declaration

Following the 2017 Ministerial Declaration that encouraged countries to reflect the measurement of the digital economy in national statistics in a comprehensive way and review existing statistical frameworks, the Argentine G20 Presidency, in collaboration with a steering committee of international organizations (IOs) led by the Organisation for Economic Co-operation and Development (OECD)[1], has produced a draft "G20 Toolkit for Measuring the Digital Economy". The toolkit highlights methodological approaches and indicators used to monitor the digital economy, and key gaps and challenges regarding digital economy measurement for further study. This Annex comprises an abridged version of this Toolkit.

Objectives and scope

The Toolkit aims to provide a first assessment that could serve to propose possible measurement approaches that support evidence-based policymaking, diagnoses the challenges and opportunities of the digital economy, identifies the issues that could be addressed by public policies, and serves as a potential guide for countries to implement standardized measurement activities.

Indicators and initiatives to measure the digital economy

Rather than producing new content, the document brings together more than 30 key existing indicators and methodologies produced by major international organizations to monitor and assess the size and penetration of the digital economy, organized in four themes: i) Infrastructure, including access to mobile and fixed networks, the development of Next Generation Access (NGA) networks, the dynamics of household and business uptake; ii) Empowering society, including access to and use of digital technologies, people's use of the internet, education, financial inclusion and interaction with government; iii) Innovation and technology adoption, including new digitally-enabled business models, the role of ICTs as an engine for innovation, and the adoption of ICTs and other emerging technologies by businesses; iv) Jobs and Growth, including indicators related to the labor market, employment creation, investment in ICTs, value-added, international trade, e-commerce, and productivity growth.

The toolkit also includes other studies, surveys, pilot initiatives, and various measurement efforts in G20 countries and international and regional organizations, to complement standard measures and potentially expand coverage to more countries or new areas within countries.

Gaps and challenges

Acknowledging that data are far from being comprehensive, country coverage is limited, timeliness is often an issue, and differences in data collection methodologies and approaches across countries persist, the toolkit identifies two types of gaps: methodological and availability.

Methodological gaps relate to what existing indicators measure, how they capture the digital economy and how to address issues such as the need to improve existing indicators, identification of new measures to be developed, or the review of data sources and collection methods.

- There are important difficulties in measuring data flows. G20 members may wish to explore ways to better utilize existing usable data sets.
- Although educational attainment and occupation indicators are available, there is a lack of widespread measurement of skills, abilities and competencies that would allow for cross-country comparison.
- Measures of the use and benefits of emerging technologies, such as artificial intelligence, internet of things, 3D printing, robotics, distributed ledgers or data science-based processes should be improved to capture their use in different industries and their impact on the change in aggregate and business-level value added.
- More emphasis should be placed on the development of methodologies to measure digitally-enabled trade and produce related indicators.
- The collection of e-commerce statistics involves methodological challenges such as differences in industry coverage, actors involved, and type of survey used to gather data across countries. Consistent and comparable data on the growth and adoption of e-commerce by both individuals and businesses in all industries is helpful in identifying barriers to trade.
- Existing indicators do not always allow for sex and age breakdowns to examine the use of new technologies, jobs, or potential biases in how society is affected by digitization.
- Existing indicators do not always reflect the socio-economic impact of the digital transformation. Having this type of indicators being developed could help to create targeted approaches to develop and implement digital technologies.
- The use of more diverse sources of data is another area where we see important challenges. The number of indicators produced jointly with the private sector and other actors of civil society is limited, and almost exclusively related to infrastructure. Interaction between businesses, government and actors from civil society to explore new sources of data, tools, and alternatives to exploit available data could have a positive impact on countries' measurement capacities.
- While household and business surveys are used in several G20 countries to measure the digital economy, the use of administrative records remains very limited.
- Information on the extent of regional disparities or dispersion within countries is often absent from key standardized measures of household or business uptake of digital technologies. Although surveys generally collect regional codes, indicators are usually not tabulated by that dimension in international comparisons. Collaboration between international organizations and G20 countries to make regional data available, for example by advancing on methods to make microdata more accessible, should help to make progress on this front.
- Current indicators may not adequately reflect the transformation unleashed by digitalization and the value added to national economies, particularly in developing countries. We see a challenge to report on the rate of growth of digitalization across various indicators to highlight the impact of digitalization along its various dimensions.

Availability gaps are closely linked to effective implementation. Even in areas where international standards to guide statistical collection exist, countries may lack the capacities and resources to implement them systematically, disseminate the resulting information openly, or make efforts to ensure that data are comparable.

There is a clear lack of coverage in developing countries compared to developed countries due to differences in statistical capacity among countries, or user needs and priorities for

statistical collection. Moreover, the timeliness of available data varies widely across countries for critical indicators.

Actions for improvement and forward agenda

New and more flexible approaches could be developed to meet the specific priorities and resources of G20 countries. To make statistical systems more flexible and responsive to the new and rapidly evolving digital era, G20 members could: i) experiment with concepts and data gathering within existing measurement frameworks, ii) exploit the potential of existing survey and administrative data, iii) add questions to existing surveys, iv) periodically augment existing surveys with topic-specific modules, v) develop short turnaround surveys to meet specific needs, vi) define policy needs and, in cooperation with other stakeholders, set priorities for internationally comparable measurement; and vii) work with stakeholders, including international organizations, to harness the potential of big data for developing indicators to measure the digital economy.

The toolkit identifies actions that could inform the measurement agenda of G20 members in the next few years, considering the rapid pace of change in the digital economy:

1. Promote a comprehensive, high-quality data infrastructure and collection tools for measuring the adoption of digital technologies at the individual and business levels, together with its associated risks and benefits, including collecting data on key characteristics such as sex, age, skills and education, region, as well as business size, sector, and location, where appropriate.

2. Work towards improving the measurement of the digital economy in existing macroeconomic frameworks, *e.g.* by developing satellite national accounts.

3. Foster more fluid communication and cooperation between international organizations and G20 countries to share national initiatives, adhere and disseminate international standards and best practices, improve comparability of indicators, and reduce differences in coverage and timeliness of the data, with greater emphasis on capacity building in developing countries where resources, both monetary and human, are scarce.

4. Encourage interactions among government, business and other actors of civil society to strengthen the evidence base and complement official statistics, improving the design of frameworks that facilitate and allow a better use of data in business-to-business (B2B), business-to-government (B2G) and government-to-businesses (G2B) contexts.

5. Enable the collaboration between the public and private sectors to plan and implement business surveys about innovation and the uptake of new digital technologies, including joint efforts to identify and anticipate the demand for skills and competencies.

6. Encourage development partners, in collaboration with international organizations, to assist less developed countries in the collection of relevant statistics needed to enable evidence-based policy making in this area.

7. Promote the use of interoperable tools and data formats that facilitate access to and sharing of public sector data, in an effort to drive innovation, and make government activities more open and transparent.

Notes: [1] The draft document "A G20 Toolkit for Measuring the Digital Economy" was produced by the G20 Argentine Presidency with the support of the International Telecommunication Union (ITU), the United Nations Conference on Trade and Development (UNCTAD), the European Union, The World Bank Group (WBG), the International Monetary Fund (IMF), and the International Labour Organization (ILO)

Appendix 5: Recommendations from the US Department of Commerce report: Measuring the Value of Cross-Border Data Flows (2016)

The US Department of Commerce's research on *Measuring the Value of Cross-Border Data Flows*, brought together 46 stakeholders, who developed the following recommendations to improve the availability and quality of statistics and economic analysis related to cross-border data flows and the larger digital economy. The full report is available at https://www.ntia.doc.gov/files/ntia/publications/measuring_cross_border_data_flows.pdf

- Improve the overall coverage and quality of the government statistics on the service-sector.
- Develop a standard nomenclature or standard definitions for concepts related to cross-border data flows, distinguishing between concepts such as digital economy, digitally-intensive, digitally-enabled economy, and ICT.
- Develop a greater understanding of how firms use cross-border data flows and what economic value the data flows provides. These metrics should cover the entire U.S. economy as well as specific sectors.
- Develop improved and consistent macro-economic statistics to measure the value of cross-border data flows and the digital economy, such as the contribution of data flows and the digital economy to GDP. These metrics should cover the entire U.S. economy as well as specific sectors.
- Continue the Department-private industry dialogue to facilitate data sharing and the linking of public and private datasets, where possible.
- Continue the collaborative efforts of the Department and international organizations to ensure that metrics on cross-border data flows and the digital economy are widely available for countries around the world

Appendix 6: OECD-IMF Stocktaking Survey on Measuring Digital Trade

As part of the collective efforts to address the broader measurement challenges related to digital trade, the OECD and the IMF conducted two stocktaking exercises, (in 2017 and 2018) to collect views of countries (statistical offices and central banks) on the conceptual and measurement framework for digital trade, as well on current measurement practices.

The first survey was developed and sent to OECD members (35) and OECD key partner countries and invitees (10) in early 2017, with 35 countries responding. The IMF sent out the same survey to 51 non-OECD countries, targeting institutions responsible for balance of payments compilation, from which 39 responses were received.

The joint results were presented at the IMF BOPCOM meeting in October 2017[56].

The second survey was conducted in early 2018 with 38 responses from OECD members and key partners and 38 responses from countries approached by IMF. The joint results for this survey were presented at the OECD WPTGS meeting in March 2018[57].

[56] More information about the survey questions and results can be found in the OECD-IMF paper presented to IMF BOPCOM, here: https://www.imf.org/external/pubs/ft/bop/2017/pdf/17-07.pdf

[57] More information about the survey questions and the results can be found here: http://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=STD/CSSP/WPTGS(2018)3&docLanguage=En