



Towards a Framework for Measuring the Digital Economy

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Introduction

The digital economy in its broadest sense has transformed the way societies work and play. Firms today are able to capitalise on digital tools to revolutionise production processes and/or to sell goods and services to markets that were previously out of scope, providing significant benefits to consumers through greater choice and cheaper prices. And these benefits go further, “data” has become the new oil required by many business models in the digital economy, providing, in turn, an explosion in “free” services provided to consumers.

However, despite the scale of these transformative effects, you would be hard pushed to see them in the current international accounting standards and frameworks. Many fingers continue to point to this lack of visibility as proof of mis-measurement but whilst it is clear that digitalisation has clearly created significant challenges for measurement - especially concerning prices – and, indeed, concepts¹ - notably the treatment of data - the reality, at least for current price measures of activity, is that most of what we perceive as the digital economy is recorded in accounting frameworks²; the problem is we just can't readily (separately) see it.

The key problem in this respect, despite their significant improvements in recent years, is that the current classification systems set up to identify and classify firms and workers reflect a pre-digital world. As criticisms go, this is perhaps a little unfair however. Classification systems cannot be all things to all people; they are essentially a form of pragmatism writ-large. In an ideal world they would be designed such that all salient characteristics of the observation units were accounted for. For example in the case of firms, one might wish to have a classification that differentiated between those that sold via the web and those that sold via physical shops, firms that had an army of contractors and those that had employees, firms that had high digital intensity and those that had low digital intensities, self-employed workers working in the 'analogue' economy and those in the digital or sharing economy, and so on.

All of these are in theory 'do-able' but not, of course, without costs: in a material sense, as the criteria (however they were determined) would require wholesale changes to the information systems and surveys currently in place to classify firms and workers, as well as for users, as confidentiality restrictions might prohibit dissemination.

However, that is not to say that improvements cannot be made to our current accounting standards through refinements to current classification systems and/or a better articulation (e.g. through measures of digital intensities) of actors in the current accounting standards.

¹ OECD Statistics Working Paper 2016/07, (<http://dx.doi.org/10.1787/5j1wqd81d09r-en>)

highlights that in many areas where conceptual concerns have been raised about the scope of GDP, these often confused concepts of consumer surplus and household consumption and in turn measures of consumer welfare and household consumption in GDP. The key conclusion of the paper was that the conceptual basis for GDP (the 2008 System of National Accounts, SNA) is still sound.

² OECD Statistics Working Paper, 2017/09, (<http://dx.doi.org/10.1787/a8e751b7-en>)) suggests that any potential mismeasurement is not sufficient in scale to explain the widespread slowdown in measured GDP growth or multi-factor productivity growth that has given rise to the mismeasurement hypothesis.

This paper sets out to do that through the elaboration of a satellite account for the digital economy that characterises firms, what they produce and sell, and how, within current international accounting standards and with recommendations for refinements to classification systems where necessary. Section 1 begins by providing more background on the digital economy and challenges for improved visibility. Section 2 lays out the conceptual framework for measuring the digital economy. Section 3 operationalises the framework within a satellite account. Section 4 introduces the United States Bureau of Economic Analysis exploratory digital economy estimates showing how one country has tried to operationalise the framework. Section 5, provides some concluding remarks.

*"Everything that can be digital will be"*³

Section 1. Background

Perhaps the biggest cause of confusion surrounding the digital economy is the lack of a commonly understood definition. Where there is unanimity is in relation to *digitisation*, i.e. the encoding of information or procedures into binary bits that can be read and manipulated by computers and that 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 the digital economy 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 the contribution it makes to that transformation is only part of what's required when we think about the digital economy. For example, the cost of digitally transferring data from a customer to a producer, for example 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 economic and social activity, 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 value of the enabling platforms, e.g. the intermediation fees charged for using digital 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 the digital economy.

To reinforce the point, while there may be broad unanimity that a digital book, for example, 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 the digital economy or only that part of the value that reflects the digital transformation (i.e. digitisation, its conversion into bits and bytes and any charges/costs related to

³ Razorfish slogan 2000

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.

Similarly, estimates of e-commerce, in many quarters a byword for the digital economy, are often given by the value of sales of products (the basic price of the product, taxes, distribution costs and retail margins) but one could equally argue that the value of e-commerce should reflect only that part of the overall sale attributable to the digital tools that facilitate e-commerce transactions (for example the margin charged or value-added generated by an *e-tailer*).

From a national accounts perspective the issue appears uncontentious. From the purchasers' perspective, consumption will be recorded at market prices for the entire transaction (including any consumption taxes or subsidies), while from the output side, output will be recorded in the distribution sector and also in the sector producing the good (whether domestic or imported). But, and this is partly why there are criticisms that current estimates of GDP are not able to capture digital transformation, the digital economy component will be largely invisible (with the possible exception that output by purely on-line retailers may be visible within very detailed classification systems). The accounts would not for example be able to show that a certain percentage of consumption (and on what) was facilitated by e-channels. This is not, of course, the purpose of the SNA but it is an area of growing policy interest – among many others – and, so, is of relevance when considering what should be in scope for a satellite account for the digital economy.

Such examples bring in to stark contrast the inherent definitional challenges, and in particular, different views on the size of the digital economy depending on the perspective.

All of the above, to some extent, views the discussion on a definition through the conventional prisms of products and production. But another way, of particular relevance for digitalisation, is through the mode of ordering and delivery. This perspective tallies with perhaps the most visible manifestations of digitalisation, namely electronic ordering (e-commerce) and electronic delivery. However, useful as the concept is, it is important to note that here too the prism does not provide an exhaustive view of all aspects of the digital economy, for example the use of intermediate digital tools to improve the production process.

All things considered, given its multidimensional nature and indeed the multidimensional nature of the policy questions, it makes sense to approach the issue of the construction of a satellite account in a way that embodies this multidimensionality: in other words through a categorisation of transactions, mechanisms and actors that is broad enough to provide a variety of views to give a variety of perspectives, and indeed that is feasible. This necessarily suggests a framework or satellite account that provides the basis to respond to the following range of questions:

- What is a digital product?
- Who are digital producers?
- Who are digital users?

- What is the number of employees/employment in digital producing firms?
- What is the average compensation of employees in digital producing firms?
- What are the enablers of digitalisation?
- What is the impact of digitalisation on measures of consumer welfare?
- What proportion of sales/consumption are digitally ordered?
- What proportion of sales/consumption are digitally delivered?
- What is the value of data?

Section 2 below develops such a framework, reflecting in addition the views and feedback of countries and institutions represented on the OECD Advisory Group on Measuring GDP in a Digitalised Economy⁴ and those represented in the OECD-WTO Task Force on International Trade Statistics looking at digital trade.⁵

⁴ See OECD (2017c) for feedback from the Advisory Group can be seen in “Summary of Responses of the Advisory Group: Survey of Digital Economy Typology” STD/CSSP/WPNA(2017)1

⁵ The earlier framework, including the motivation behind the design, is described in Annex 1 of OECD (2017c), Summary of Responses of the Advisory Group: Survey of on Digital Economy Typology STD/CSSP/WPNA(2017)1 and in OECD (2017b), Measuring Digital Trade: Towards a Conceptual Framework, STD/CSSP/WPTGS(2017)3.

Section 2. The conceptual framework

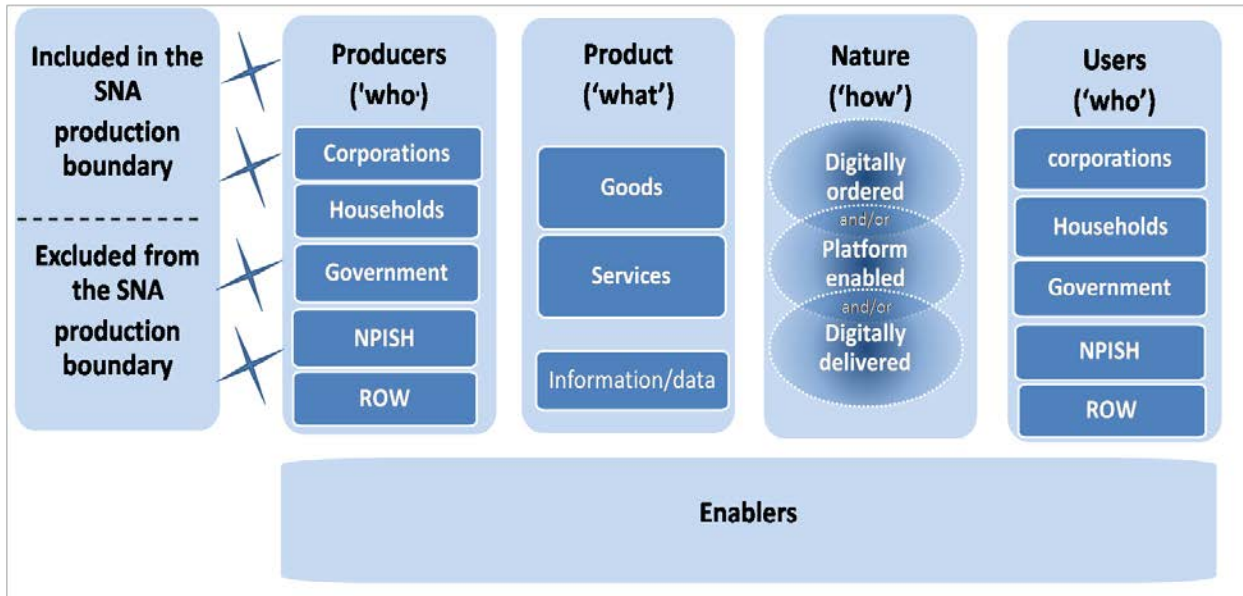
Taking into account the multidimensional nature of the digital economy and the need to have information across a wide range of areas, the conceptual framework developed below provides a simple and broad overview of delineations required in developing policy relevant statistics: actors, products and transactions that are in scope and of relevance for the measurement of the digital economy (Figure 1).

In addition, recognising the fact that many “transactions” in the digital economy are non-monetary (and free), the framework includes variables that are currently outside of the SNA production boundary, and also recognises that information on the enabling environment for the digital economy (e.g. investment in ICT products and data in databases) is also an important part of the information set; even if these products are in and of themselves non-digitisable nor the outcome of a digital production process.

The overarching framework therefore includes a number of blocks, many of which can be readily derived from current information sets and in line with current (2008 SNA and BPM6) accounting requirements, including: delineations of producers and consumers into the standard units used to classify these actors (institutional sectors and industrial activities); the types of products (goods and services); whether the transactions are included in the production boundary or not; and also whether the transactions are supported by enablers, e.g. investment in ICT products. But there are also some innovations in the framework that go beyond what is currently required from these accounting standards (for example with regard to “free services”) and indeed beyond what is typically collected via conventional structural business and household surveys (used to estimate GDP), namely, information on the nature of transactions, “the how” (see below) .

A special mention is required for data. Although central to the business models of many digital firms, such as Google and Facebook, in the SNA the acquisition of data that is acquired without a monetary transaction is treated as free, and so 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. As such the third column of Figure 1 below, “product”, introduces information, or data, as a separate product to consider in addition to goods and services.

Figure 1. Dimensions of the digital economy



Source: OECD

Describing the conceptual framework

Digital Nature of Transactions (4th column)

Leaving aside the nature of “enablers”, whose scope is perhaps broader than the four central components of the framework, one of the defining features and principles of the framework revolves around the digital nature of the transaction (i.e. the “how”), that distinguishes between those transactions in the central framework (i.e. not including enablers) that should be considered “digital” and those that should not.

By definition therefore (again ignoring enablers for now) the underlying principle here is that only transactions that are electronically ordered and/or electronically delivered are in scope. Given its central place in the framework it’s perhaps useful to elaborate on the reasoning here.

It’s fairly easy to argue why these should be two of the determining criteria (noting that the reference to platform enabled transactions fall into one or both camps, which is elaborated on below) but what is less clear is whether this provides for sufficient coverage of the main issues and indeed the basis for practical measurement.

By definition a focus on these two modes excludes any transactions (again ignoring enablers for now) that are not digitally ordered or digitally delivered. For transactions in goods it is difficult to argue that this doesn’t provide for sufficient coverage of relevant transactions. Even if, for example, the goods themselves have significant digital content (such as internet enabled fridges), by definition they cannot be delivered digitally (see also below on 3-D printing) and if they are not digitally ordered then it is hard to rationalise for their inclusion. For services the issue is similar, albeit more opaque. Digital service

products for example are only those that can be delivered digitally (see also below) and non-digital service products (e.g. a haircut) cannot be delivered electronically, so are only in scope if ordered digitally.

Before elaborating on the definitions of the three components – digitally ordered, platform enabled, digitally delivered - it is important to stress that the categories are not mutually exclusive, and all three overlap.

Digitally ordered

The first element involves those transactions that are digitally ordered, that is, transactions in goods and services that reflect e-commerce, which in turn is generally defined as follows:

*“An ecommerce 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. The goods or services are ordered by those methods, but the payment and ultimate delivery of the goods or services do not have to be conducted online. An ecommerce transaction can be between enterprises, households, individuals, governments, and other public or private organizations. To be included are orders made over the web, extranet or Electronic data interchange. To be excluded are orders made by phone, fax or manually typed email.”*⁶

Platform enabled

An important characteristic of digitalisation is peer-to-peer services intermediated by digital intermediary platforms (“sharing economy”, “gig economy”, “collaborative economy”) such as Airbnb, Uber, eBay, that facilitate transactions in goods and services. These platforms (nearly) always have an electronic ordering component (even if in 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) and typically the goods and services advertised can only be purchased electronically.

The reason for a separate distinction of platforms from pure e-commerce and e-delivery is the underlying nature of the business model and in particular the matching nature of the platforms, which is of particular analytical and policy interest, especially because the platforms are often located abroad, where particular measurement challenges may arise.

But it is also important to note that there are in effect two key types of platforms; those that are set up purely to act as intermediaries, matching buyers and sellers, where typically one or other pays an intermediation fee; and those that are set up as electronic retailers (e.g. Amazon Retail as oppose to Amazon Marketplace, which would fall under the intermediation category) – i.e. who own the products

⁶ OECD, [Guide to Measuring the Information Society](#), 2011. The OECD started to develop definitions and statistical guidelines for measuring ecommerce transactions in 1998. Those guidelines, as well as the OECD definition of the ICT sector and Content and Media sector, and model surveys of ICT use and ecommerce for the [business](#) and [household](#) sectors, are periodically reviewed and revised to reflect policy needs in this area.

being sold. Such a distinction matters because, at least for now, how corresponding flows are recorded in the accounts necessarily differs.

In the case of e-tailers for example, the treatment in the accounts is no different from the treatment of conventional retailing. The e-tailer sells products via its platform, on which a distribution margin is applied (the difference between basic and purchasers prices) and paid by the final purchaser. For matching platforms on the other hand the business model differs: the platform does not for example take ownership of any of the goods or services it merely provides a matching service charging commission fees that may be implicit (i.e. not separately identifiable by the final consumer) or explicitly highlighted on the invoice. Often (for example in the case of Uber) both the buyer and the seller pay these matching fees, even if the buyer is not necessarily aware, as the intermediary processes the full payment passing to the provider of the service what's left after deducting the buyer and seller commission.

This creates a number of conceptual challenges. From the buyer's perspective, the purchasers' price is the final price paid, which differs from the basic price charged by the producer, ergo it would appear that the difference reflects a margin charged by the intermediary. But, if so, what is the basic price? For the sale of a good, one could assume that this reflects the final price received by the producer but, for digital intermediation platforms (i.e. those that only facilitate exchanges but don't own the goods being exchanged) this is not strictly speaking in line with the SNA, which states that a good must be *purchased for resale* for a trade margin to occur. The SNA is clear that wholesale and retail margins are only applicable to goods⁷, paragraph 6.146 says: "*A trade margin is defined as the difference between the actual or imputed price realized **on a good purchased for resale** and the price that would have to be paid by the distributor to replace the good at the time it is sold or otherwise disposed of*".

As such it would appear that the appropriate treatment would be to record the fees charged by platforms intermediating the sale and purchase of goods (whether implicit or explicit – which is already the case for explicit transactions) as directly payable by the seller and/or purchaser. From a practical perspective in a supply-use table (because the value paid by the purchaser would be viewed as the purchasers' price), this would require that the output (broken down by product intermediated) of the intermediation platform would necessarily record the fees charged to the final consumer as output of the product whose sale was being intermediated.

Although on the surface onerous, the information requirements would be no different to those required to treat the output as a trade margin (as a series of adjustments in the margin column of the supply matrix). For the output of the unit selling their goods through the intermediation platform, their basic price output (assuming the goods were produced by the unit in the accounting period) would be equivalent to the purchasers' price minus the commission paid (and separately invoiced transport costs) minus taxes plus subsidies. The payment by the producer to the intermediation platform (typically classified under ISIC 4791 – *Retail sale via mail order houses or via Internet*) would therefore be recorded under its intermediate consumption.

⁷ Although, at the same time, it is likely that in practice some services are included, such as e-books and on-line software.

The jury remains out on the preferred treatment. Conceptually, to align the treatment of sales of platforms intermediating sales of goods with those of conventional retailers and e-tailers, it makes sense to treat the commission (implicit or otherwise) charged to the consumer as margin (although this would require an amendment to the SNA to remove the clause that trade margins are only applicable to goods purchased for resale). The arguments for an aligned recording are even stronger when one considers that in many cases e-tailers operate just-in-time systems where they purchase a product on behalf of a final consumer only after the consumer's payment has been processed, which, at least from a risk and reward perspective, is not significantly different from models used by intermediation platforms.

Further discussions will be needed within the national accounts community on this particular issue. That being said, the lack of a preferred treatment at this stage makes no material difference to the discussions on the framework below. The important point is that platforms intermediating the sale of goods should be recorded under ISIC 4791, preferably with a new sub-code that allows them to be separately identified as digital intermediation platforms as opposed to e-tailers; reflecting the fact that they do not own the goods being sold and that they charge commission fees to sellers and/or buyers.

Whilst this may resolve the issues concerning digital platforms intermediating sales of goods it still leaves open the question of the treatment of flows by platforms that intermediate sales of services, as the SNA explicitly mentions only *goods* in its reference to trade margins.

As before in cases where the contractual fees are explicitly stated and shown separately on the invoice, no conceptual issues related to margins apply (as these are treated as actual payments for intermediation services). That being said practical challenges remain, for example household surveys on services acquired through matching services are very likely to reflect the total price paid and not a separate price for the basic service and a separate price for the commission.

Considering the treatment of the implicit payments for intermediation services, four options arise:

Option 1

One potential way of recording these flows would be to "follow-the-money" and assume that the intermediation platform, de facto, purchases the services being intermediated before selling them on to the consumer (which can be referred to as a "gross approach"). The price charged by the producer of the services being intermediated would be equivalent to the final purchasers' price minus the (implicit) commission fee payable by the consumer (minus any taxes/subsidies) with a corresponding payment from the producer to the intermediary for intermediation services provided to the producer.

But such a recording violates the ownership principle of the accounting framework, since it imputes temporary ownership of the services to the intermediation platform (note too that it would also mean that cross border flows of the full value of the intermediated services would arise if the platform was located abroad, even if the producer and final consumer were located in the same economic territory, thus inflating trade flows, see Figure 2).

Option 2

Another approach (more akin to a *net* treatment), that overcomes the need to impute a change of ownership, would be to treat the purchasers price paid by the consumer as being received by the producer of the services being intermediated (after accounting for taxes/subsidies) with a corresponding entry of intermediate consumption by the producer that reflects the matching fee paid both by the producer and the consumer⁸ to the intermediary platform; this is the approach advocated by a recent Eurostat Task Force.⁹

Option 3

Another 'net' approach, similar to the above but violating the SNA, would be to extend the concept of distribution margins to intermediated services¹⁰, such that the commission paid (implicit or otherwise) by the final consumer reflects a trade margin but with the commission paid by the producer remaining a payment for intermediation services.

Option 4

A variant of the approach that does not imply a trade margin, and is closer to the economic reality, would be to record a separate payment by the consumer to the platform (the commission, implicit or otherwise, paid by the final consumer), a payment by the consumer to the producer (the purchasers price minus taxes/subsidies and the consumer's commission), and a payment (the commission fee paid by the producer) from the producer to the intermediary.

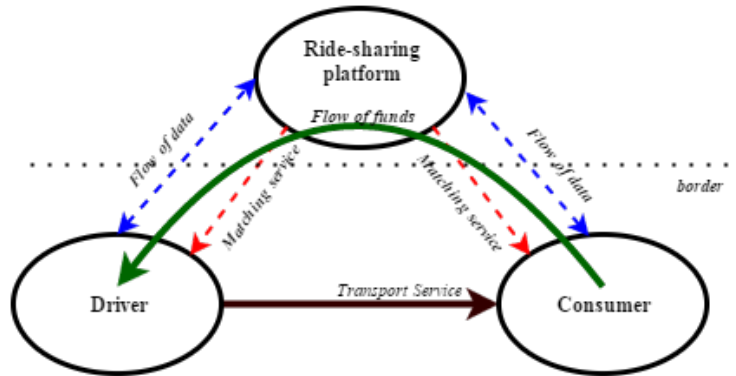
Consultations with the OECD Advisory Group did not result in unanimity on the preferred treatment, but a significant majority argued for a "net" recording but not with trade margin flows. This leaves Options 2 and 4, which are discussed in further detail below.

⁸ It is important to note, compared to the first variant, that the two approaches may generated different patterns of bilateral trade relationships, for example if a resident in A purchases services from a producer in B via an intermediary in C.

⁹ See the Uber example in "Price and Volumes Measures in Times of Digitalisation"
https://unstats.un.org/unsd/nationalaccount/aeg/2017/M11_4_2_Price_Volume_DE.pdf

¹⁰ Note that similar conceptual challenges have arisen in the context of the merchandising of services: see UNECE Guide to Global Production.

Figure 2: Potential transactions involved in ‘cross-border intermediated’ ride-sharing services



Source: OECD

Classification of digital platforms intermediating services

One additional complication arises here however, which concerns the activity of digital intermediary platforms (intermediating services), i.e. where they should be classified, which is considered in more detail below.

Almost by definition, a gross recording of the flows (i.e. imputing ownership of the intermediated service to the intermediation platform) would necessarily result in the firm being classified to same sector as the service being intermediated (in order to align with the customer’s view of what they purchased). This (and indeed to some extent the gross view of recording) aligns with some recent legal decisions¹¹, which are also, increasingly, viewing individuals operating in the gig-economy as employees (or outworkers in SNA terminology) of the intermediation firms¹². It is possible of course to classify the firm to the sector being intermediated but with its core output appearing under a completely different product heading (reflecting intermediation services) but this would create a number of interpretive complications in the accounts, as consumers would subsequently be seen as consuming intermediation services (gross of the service being intermediated) rather than the underlying service being consumed. With a gross recording system; therefore, the preference should be for the platforms to be recorded within separate and new sub-categories of the service activity that they intermediate. Such a system would also help in populating the rows of the proposed satellite account, which differentiate expenditures on the basis of whether they were intermediated or not.

A net recording approach, especially following Option 2, provides for a greater degree of flexibility with regards to the industrial classification of the platform, as, in the case of Option 2, the intermediation platform is explicitly only providing services to the provider of the service activity that is being

¹¹ For example, in November 2017 a UK court ruled that Uber drivers should be classed as workers see <https://www.theguardian.com/technology/2017/nov/24/uber-to-take-appeal-over-ruling-on-drivers-status-to-uk-supreme-court>

¹² Which would in turn imply a different recording of flows: part of the receipts received by the contractors would need to be recorded as compensation of employees and part as intermediate consumption of the intermediation platform. See also SNA paragraphs 7.34-7.38.

intermediated. In a supply-use framework, this means that the alignment of output of the intermediated service and the corresponding demand of the same service becomes a relatively trivial affair, whether the intermediation service itself is or is not recorded to the same activity (and product). In the case of option 4 however complications may arise, as the implicit payment by the final consumer would necessarily have to be recorded to the same classification as the product being intermediated. This does not necessarily mean that the payment made by the producer to the intermediation platform should also be allocated to the same product but it would be contentious to record intermediation payments by the consumer to a different product classification to those paid by the producer, and, so, Option 4, de facto, necessarily requires that all intermediation payments are allocated to the same classification as the product being intermediated.

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.¹³ In practice, by extension, this would argue for a treatment of flows along the lines of Option 2 (which provides easier scope to record the intermediation platform in a different sector to the services being intermediated).

This is the approach that is developed in this framework and can be seen through the introduction of rows described as *product e* in Appendix 1.

Digitally delivered

The third element is referred to as digitally delivered, which captures those services and data flows that are delivered as digital downloads or web streaming products. Examples include software, e-books, data and database services. Albeit with some potential contention, by definition we exclude digital delivery of goods here. There are on-going discussions on the potential classification of 3D printing but we take the view that the transaction is in respect of a blueprint (treated as a service) or as a good if the parts are also supplied with the blueprint. Grey areas arise concerning mixed goods, for example the purchase of a phone with a constant stream of software updates by (paid upfront to) the manufacturer but again we record these for now as goods.

The product involved: goods, services and data (column 3)

Traditionally national accounts statistics identify transactions that involve either goods or services (although, as also noted above, there is an increasing blurring between what is considered a good versus

¹³ See for a discussion on intermediaries <https://unstats.un.org/unsd/class/intercop/expertgroup/2017/AC340-10.PDF>

a service, e.g. knowledge capturing products that have some characteristics that are similar to goods (SNA paragraph 6.22)).

Given its importance to the digital economy (and also some of the unique challenges concerning valuation) Figure 1 introduces a third category into the product mix, i.e. information or data. This recognises that in many cases, data flows (especially intra-firm and between households and firms) have no monetary value associated with them, and indeed reflects the fact that the underlying value of data (i.e. knowledge) is not viewed as being within the current SNA production boundary.

Note that aspects of data are also included within the category of enablers, when these are used as “assets”, albeit, and again, non-produced in the current SNA. It should be noted that the current SNA only records, as gross fixed capital formation, expenditures related to the digitisation of the data, that is the creation of the database management system and any costs involved in digitising data, and not the inherent value of the data itself.¹⁴ The underlying value of databases, including the value of the embodied data, is however recorded on the balance sheets, appearing via goodwill when a sale of an entire company occurs.¹⁵

Perhaps the biggest measurement challenge for digital transactions concerns such data flows. In many cases, data flows do not result in a monetary transaction per se, but they may support one (such as generating advertising revenue). For example, a social networking site such as Facebook offers “free” services to users who, in exchange, provide their data. There is no monetary transaction between Facebook and the user (and in terms of existing international standards, no transaction); however, the data collected by Facebook is the basis of the revenue that company receives from advertisers. While the monetary flow associated with advertising services is captured in the statistics, the data flows upon which they depend are not¹⁶.

In a similar manner, and because they are free, the national accounting system does not in general impute transactions related to the use of public goods (such as open-source or free software), which raises issues concerning the measurement of consumer surpluses or a shifting from assets that are purchased to assets that are freely available for business use. The issue may also be important for policy making, such as anti-dumping and competition policies or tax policy, if the freely available software is designed to gain market share with a view to the introduction of subsequent priced models.

¹⁴ SNA paragraphs 10.112 – 10.114.

¹⁵ The value of goodwill may also include the value of marketing assets (e.g. brand names, mastheads, trademarks, logos, and domain names. See SNA paragraphs 10.196 – 10.199.

¹⁶ It is clear that this raises issues concerning consumer surpluses and indeed at the international level who is ultimately financing those surpluses. For example, free digital products (such as Facebook) are in general available to all, but the funding model (advertising) does not discriminate between countries in that targeted advertising in developed countries may be subsidising the free products received in less developed countries. In other words, advertisers (and ultimately consumers through paying higher prices) in one country may be indirectly generating consumer surpluses in another.

Actors (Producers, column 2, and Users, column 5)

The second and fifth columns look at the actors involved, broken down by institutional sector in figure 1. But the columns can be dissected in different ways, notably by activity, but grouping firms in more meaningful aggregates such as: producers of ‘digital’ products (however we choose to define what the digital products are, see below); digital platforms, in particular with a separate identification of digital intermediation platforms; digital enablers (i.e. firms providing enabling infrastructure), and indeed web-page platforms (such as search engines and social media sites).

As for users of the products, this is shown for simplicity as consisting of the institutional sector classification of the SNA, with additional breakdowns possible for the size and sector of businesses, as a means of providing important information on the role (and take-up) of digitalised tools by SMEs for example.

“Enablers” of digitalisation

The typology described in Figure 1 puts the primary focus on the nature of the transaction, but to enable these transactions, information and communication technology products (computers, mobile phones, software, etc.), the Internet, and the communication infrastructure (spectrum, data centres) is also needed, and is often considered in broader notions of the digital economy. Therefore, an important complement required to understand the digital economy is to look at the products that enable digitalisation and can be understood as complementary drivers of digital transformation. What should be included under ‘enablers’ is still under discussion, for now the emphasis is on expenditures related to investment both produced, such as information and communication technology (ICT) assets¹⁷ and non-produced, namely data. Assets here would also include any expenditures related to the development of cloud computing services, with related flows for the use of these assets already (at least in theory) recorded as intermediate consumption by firms or final consumption by households. This category should also include imputed values for common good enabling ‘assets’ that have no monetary value, because they are collectively owned by all (such as the internet itself and Wikipedia) but generate significant economic benefits.

Discussions are on-going on whether other ‘enablers’ should be included, notably with regards to the Internet of Things (IoT), which is enabling increasingly intelligent and autonomous machines and systems that are currently outside of the scope of ICT. The use of robots (increasingly embedding artificial intelligence and machine learning) are widespread in manufacturing industries, but also in construction, mining and agriculture, which has led to the “smart factory” (also sometimes referred to as industry 4.0).

¹⁷ The OECD defines the ICT assets category to include ICT equipment (computer, electronic, and optical products, CPA 26) and computer software and databases.

Section 3. Operationalising the framework for measuring digital economy

The primary purpose of the overarching framework is to provide a structure from which a satellite account can begin to be developed. Although there remain a number of issues and challenges to consider and resolve, (in particular how to meaningfully value data and free services, where research continues) Annex 1 below presents a first proposal of such a satellite account that is designed to concretise and accelerate these discussions. In this respect it is important to note that, at this stage, the proposed level of detail described is deliberately ambitious, and whilst it tries to stay as close as possible to what is currently realistically measurable, this is often only theoretically possible, requiring in some cases changes to current conventional business and household surveys. That is not to say that these will be practically possible, as changes to surveys bring with them additional complications pertaining to business burdens and internal resources available within national statistical offices (NSOs).

Rather than pre-empt and close-off discussions on potential improvements to information sources however, we have chosen to include items that may require additional information, noting that further deliberations may deem these impractical at least for now.

As described above, in large part, the proposed satellite account uses the nature of the transaction as the organising principle but it is important to note that this does not necessarily dictate nor pre-empt what should be considered digital goods and services nor does it determine what should or should not be included within a definition of digital industries. Its primary purpose, as noted, is to provide a means for a range of analyses and specific definitions that users may require. If for example users are interested in knowing how much was bought and sold using e-commerce channels, the proposal below can provide that. If the purpose is to identify the value-added generated by digital platforms or sales channelled through them, the account can provide that view. If the purpose is to determine the value of investment in enabling industries the account provides the basis for doing so.

The account in this respect is an attempt to advance the design of a satellite account and, in particular, its key characteristics, whilst also retaining the importance of (and motivating deliberations on) definitions on these characteristics, notably concerning, digital industries, digital enablers, digital goods, digital services and platforms.

The following elaborates on the above and the proposed satellite account, providing additional commentary in certain cases pertaining to conceptual and measurement challenges.

Nature of transactions

As noted, the governing principle of the account gravitates around the nature of transactions. For simplicity; however, we have introduced a number of simplifying assumptions. The first is that goods cannot be delivered electronically. The second is that by definition, only digital services (defined below), can be delivered electronically. The third assumes negligible transactions that will be delivered electronically and not ordered digitally. In making these assumptions we obviate the need to have a

separate identification of services (and potentially goods) that are delivered digitally and instead allow the nature of the intermediary (platform/non-platform) and the product (good/non-digital service/digital service) to proxy the mode of delivery.

Digitally ordered transactions are therefore further broken down into whether they are a good (with a further breakdown into ICT and non-ICT goods) or service (digital and non-digital) and how they are processed, either purchased directly from the producer's website or via an e-tailer, or via an intermediation platform (resident/non-resident). (Appendix 1, Table A1, rows 1 to 25).

Recognising that many "transactions" that are central to the digital economy are not-monetised or are free, the account includes additional rows for these "transactions" (Appendix 1, Table A1, rows 26-29); albeit with full recognition that guidance will need to be developed to estimate and indeed identify the underlying value of these "free" and "non-monetised" transactions.

The corresponding supply table contains the same level of row breakdown as specified in the use table, and in addition separates the margin column into a non-digital (margins charged on goods transactions that are not digitally ordered) and a digital component (margins charged on goods transactions that are digitally ordered) (Appendix 1, Table A2, columns N and O).

Note, as described above, that the treatment proposed in this framework is to record the flows associated with digital (service) intermediaries on a "net" basis and to record the flows of digital platforms **intermediating the sales of goods** in the same way as flows for e-tailers and conventional non-digital retailers.

For platforms intermediating the sales of services, the approach used follows option 2 described above, with the classification of the platform and the service, allocated to a specific intermediation activity and not necessarily the activity of the service being intermediated. Payments, implicit or otherwise, are therefore able to be shown separately in the satellite accounts (described as *product e* below), reflecting any explicit intermediation payments made by either final consumers or producers, and implicit payments (assumed to be paid only by the producers, and calculated as the difference between the purchasers' final price (net of taxes/subsidies) and the producers' basic price).

It's important to also note that creating the information set described above would require a change/amendment to survey information, including, in particular for firms, questions on sales made via company web-sites, and, for households, (and estimates of intermediate consumption) questions on purchases made on-line (and via which type of platform).

Digital and non-digital products

Building on the overarching framework the nature of transactions is further broken down within the satellite account, into the type of product transacted, i.e. goods and services, with a further breakdown on whether the specific goods and services are digital or non-digital (and indeed whether the services are delivered for free, for example non-monetary transactions in data – referred to as "product f", which

covers the information/data item described in the overarching framework). As such the satellite account provides a means to determine key policy relevant statistics, such as:

- total purchases of digital goods (or ICT goods) – and by type of demand (intermediate/final demand);
- total purchases of digital services - and by type of demand (intermediate/final demand);
- total value of e-commerce¹⁸ purchases (digitally ordered goods and services); and
- total value of services (also broken down by product) intermediated by digital platforms
- (from the supply table) total output of the associated “distribution” or “intermediation” margin generated by digital intermediary platforms (broken down by type of service being intermediated).
- Imputed value of free digital services by households and industries.

As shown in the supply and use tables of the satellite account, a key question relates to what exactly constitutes digital goods and services. The distinction between digital and non-digital products is a non-trivial task, and the AG will be required to give further reflection to this issue, in particular concerning their key determining characteristics.

Digital Goods

As a starting point, the account assumes that the distinction between goods and services follows that already in use in the SNA.¹⁹ For the goods category, the scope for what is considered as a digital good could be narrow or broad.

In its most narrow sense one could take the view that there are de facto no digital goods (with the exception perhaps of some intellectual property products embedded in hard media and also, possibly, 3-D printing transactions), if the underlying definition required their electronic transmission in digitised form (i.e. as a series of zeros and ones). And even for 3-D printing it is not yet clear that such transactions would necessarily be classified as goods per se. Certainly the transaction relating to the purchase of the 3-D printing blueprint could ostensibly be classified as “digital” and, purchased separately, this should reflect a service payment but if the payment is made for a bundled activity, with the significant part of the value reflecting the value of the blueprint, it could be potentially distortionary to exclude the transaction from the category of “digital products” on the grounds that the bundle reflected a payment for a good (in much the same way that it could be distortionary if payments for software were excluded if they were provided on a disc). However, while there may be a strong interest in understanding the scale of 3-D printing transactions (and value of goods produced) the AG ultimately

¹⁸ OECD, Guide to Measuring the Information Society, 2011. The OECD started to develop definitions and statistical guidelines for measuring ecommerce transactions in 1998. Those guidelines, as well as the OECD definition of the ICT sector and Content and Media sector, and model surveys of ICT use and ecommerce for the business and household sectors, are periodically reviewed and revised to reflect policy needs in this area.

¹⁹ Goods are physical, produced objects for which a demand exists, over which ownership rights can be established and whose ownership can be transferred from one institutional unit to another by engaging in transactions on markets. (SNA paragraph 6.15) Services are the result of a production activity that changes the conditions of the consuming units or facilitates the exchange of products or financial assets. (SNA paragraph 6.17)

decided that 3-D printing transactions should not be separately identified within the satellite account framework, partly due to the fact of lack of data and partly due to the fact that it most likely should not be considered a digital good.

However, as noted, the notion of “no digital goods” would also mean that goods such as software and other IPP originals embodied in solid media are also out of scope, creating an unhelpful delineation between the same underlying software, for example, transmitted on solid media and software transmitted electronically. That is not to say of course that there is no interest in separating the two flows, as there clearly is, but it is merely to say that a narrow definition that rules out the concept of “digital goods” may not be optimal.

In its most broad sense, there is a school of thought that ICT goods – where definitions already exist²⁰ - could also be brought into scope for digital goods. The overarching framework does not of course explicitly preclude this, but implicit in the underlying framework (Figure 1) is that ICT products are more “enablers” rather than “digital” goods. The AG agreed that ICT goods are enablers of the digital economy and not digital goods but still recommended that since ICT goods are the foundations of the digital economy they should feature prominently in the satellite account. Therefore, the satellite account accommodates this perspective by breaking down the goods category into non-ICT and ICT goods (Annex 1, Tables A1 and A2, product a and b, rows 1 – 12), in turn avoiding difficulties relating to whether a good is digital or not.

Digital Services

In earlier consultations, many of the AG responded²¹ that all products that are digitally delivered could be in scope for a “digital products” category. However, this was not a unanimous view. Others felt that, whilst the mode of delivery may indeed be digital, this should not be the determining factor. For example, there is no current unanimity on whether the electronic delivery of reports and documents necessarily mean that the documents themselves fully satisfy conventional ideas of a digital product per se; even though the documents themselves live as a series of bits and bytes.

Similarly a broad definition also raises questions about whether other types of services, such as payments for insurance services, should also be in scope, but here the position is to some extent clearer, as the payments under these circumstances merely reflect a contractual electronic payment, and the underlying insurance service is not digital.

In many respects contractual exchanges like the latter services follow the same logic as payments for services intermediated by platforms, such as accommodation and transportation services. These are not, at least for now, typically viewed as being “digital” (although the intermediation services should be). Automation (such as driverless cars) may muddy the waters, but even here it seems difficult to

²⁰ The Central Product Classification, version 2.1 identifies ICT products based on the principle that these products “must primarily be intended to fulfil or enable the function of information processing and communication by electronic means, including transmission and display.”

²¹ OECD (2017c), Summary of Responses of the Advisory Group: Survey of on Digital Economy Typology STD/CSSP/WPNA(2017)1

conclude that such services would necessarily be in scope, although such developments are likely to raise challenges for price and quality measurement.

However, where there does appear to be broad agreement, is in respect of digital downloaded products and streaming services (e.g., e-books, software, video and music streaming services). But it is important to note that such a view does create significant grey areas. For example, if an e-book is in scope, then why not any electronic document? A broader grouping would be to consider all ICT and media services delivered digitally as being in scope, including telecommunication services. Such a grouping could also include advertising and data services provided digitally (bringing web-based search engines and social media platforms within scope).

Furthermore, the satellite account accommodates the recording of the implicit value of “free” services provided by these other platforms (Appendix 1, Tables A1 and A2, row 29). This area will be the subject of a more expansive elaboration by the OECD and the AG as the development of the satellite account progresses. It may for example be useful to create two categories of “free” products; those that are currently provided for free using digital means (and that are also digitised) and those provided for free using (currently) analogue means. For example, significant media services are being provided for free but the distinction between these media services and more conventional services provided by analogue channels (e.g. analogue TV) is slight, at least from the user perspective (notwithstanding higher resolutions), and it may be useful to include within “free”, non-digital categories to give an indication of potential scale. One distinction that is made in the proposed satellite account concerns free data related services (Appendix 1, Tables A1 and A2, rows 27-28), partly reflecting their different impact (policy and analytical), partly reflecting the considerable challenges in identifying the quantity of (particularly intra-firm) transactions but also partly reflecting the challenges pertaining to valuation. Of course, especially concerning the latter, these challenges are also material for other forms of free services albeit with greater potential for resolution, as the nature of the services is generally less heterogeneous (e.g. access to a Facebook account can be viewed as being a homogeneous service, even if a theoretical price paid by users may differ, whereas it would be much harder to argue for similar homogeneity to be assumed for data transactions).

Digital industries

Given that digitisation (the encoding of information or procedures into binary bits (i.e., 1s and 0s that can be read and manipulated by computers²²) could arguably impact all industries in one way or another, defining digital industries is not necessarily a trivial affair. Notwithstanding the need to continue to work on this area – possibly by building on deliberations concerning what is to be included within the scope of digital products, the satellite account proposes breakdowns into 6 distinct groupings of firms all broken down by their core activity: (1) digital enabling industries; (2) digital intermediary platforms (3) e-tailers (4) other digital businesses (5) Firms dependent on intermediary platforms – broken down, ideally by incorporated and unincorporated, to capture aspects of employment and activity in the gig economy and (6) other industries.

²² OECD (2017a), Vectors of Digital Transformation, DSTI/CDEP/GD(2017)4.

The first type (Appendix 1, tables A1 and A2, column A) separately identifies those industries engaged in the production of enabling tools. Feedback from the AG supported the view that the enabling industries (along with the enabling investment and capital stocks) should be separately identified. In addition, most AG members took the view that enablers were de facto akin to the ICT sector: defined in International Standard Industrial Classification (ISIC) as “The production (goods and services) of a candidate industry must primarily be intended to fulfil or enable the function of information processing and communication by electronic means, including transmission and display.”²³

Including the ICT sector (as defined in ISIC rev. 4) is also broadly in line with the “Core Digital (IT/ICT) Sector” proposed by Bukht and Heeks (2017). The AG however also stated that communication infrastructure should also be considered an enabler.

Many AG members took the view that “data” should also be considered as an enabler. The satellite account tries to deal with this issue by including data as an asset (albeit one that is currently outside of the asset boundary) in the investment and capital stock matrices (Appendix 1, tables A3 and A4). While data is not an industry per se, some industries where data is fundamental would be covered under the ICT sector such as computer programming, consultancy and related activities (ISIC 62) and data processing, hosting and related activities (ISIC 631), and also under ‘other digital platforms’.

The second type (column B and C) is to separately identify *digital intermediary platforms* (split between platforms intermediating services and platforms intermediating goods), differentiating by the nature of service being intermediated (e.g., accommodation, transport) on which the AG has also expressed strong support. The third type reflects ‘*e-tailers*’ (column D), as distinct from intermediation platforms as described above. *Other digital businesses* (the fourth type, column E) includes other types of digital businesses, such as web based search engines, comparison sites, social networks and collaborative platforms (e.g., YouTube, Wikipedia, and Freecycle), and those that provide content on a subscription basis (e.g., Spotify, Netflix). The fifth type includes those firms (activities) that are *largely dependent on intermediation platforms* (columns F and G). As noted, this would ideally be broken down into unincorporated and incorporated enterprises; allowing an analysis of goods and services provided by the household sector within the “sharing” economy, but also as a means of reinforcing estimation methods and methodologies in difficult to measure areas. The final type reflects (column H), for completeness, all other firms not covered in the previous 5 categories.

²³ The ICT sector includes ISIC codes 261, 262, 263, 264, 268, 4651, 4652, 5820, 61, 62, 631, and 951.

Section 4. Country Case Study: U.S. Bureau of Economic Analysis

As noted the framework and satellite account described above is not intended to provide the basis for a unique definition of the digital economy per se: a reflection of its multi-dimensional nature and indeed its multi-dimensional needs. However it is designed to serve as the basis for comparable measurement of comparable phenomena and to provide a means for users and statistics offices to arrive at tailored definitions that relate to these phenomena.

For example, aggregating the value-added of firms allocated to enabling industries, platforms, e-tailers and other digital businesses could be used to provide a definition of "digital industries" to value-added. Whilst a definition summing consumption expenditures on goods that were digitally ordered, non-digital services that were digitally ordered, all services that were platform enabled, and payments for digitally intermediated services, could provide another perspective on the contribution of the digital economy to GDP.

The U.S. Bureau of Economic Analysis (BEA) (which chairs the OECD Advisory Group) recently produced its first exploratory estimates on the digital economy (*Defining and Measuring the Digital Economy*²⁴, Barefoot et al, 2018) created within a supply-use framework following the OECD digital economy literature as an organising framework (which this paper continues to develop and operationalise).

The approach used in their study looks primarily at the digital economy from a production perspective, with the following category of industry's (which align well with the definitions used in this paper) included in scope: The ICT sector, (referred to as *digitally-enabling industries* in this paper); e-commerce activity²⁵ (selecting mainly *e-tailers* as defined here²⁶); and digital media activities, which is defined as the content that people create, access, store, or view on digital devices (a sub-set of *digital businesses*). Not currently included in their estimates are intermediation platforms reflecting on-going efforts to develop robust data in this area (which is one of the motivations for the OECD's AG work and the development of the satellite account presented here).

BEA's initial estimates show that the digital economy accounts for 6.5 percent (\$1.21 trillion) of current-dollar GDP (\$18.62 trillion) in 2016. When compared with the traditional industry classification of U.S. industries, the digital economy ranked just below professional, scientific, and technical services, which accounted for 7.1 percent (\$1.33 trillion) of current-dollar GDP, and just above wholesale trade, which accounted for 5.9 percent (\$1.10 trillion) of current-dollar GDP (Chart 1).²⁷

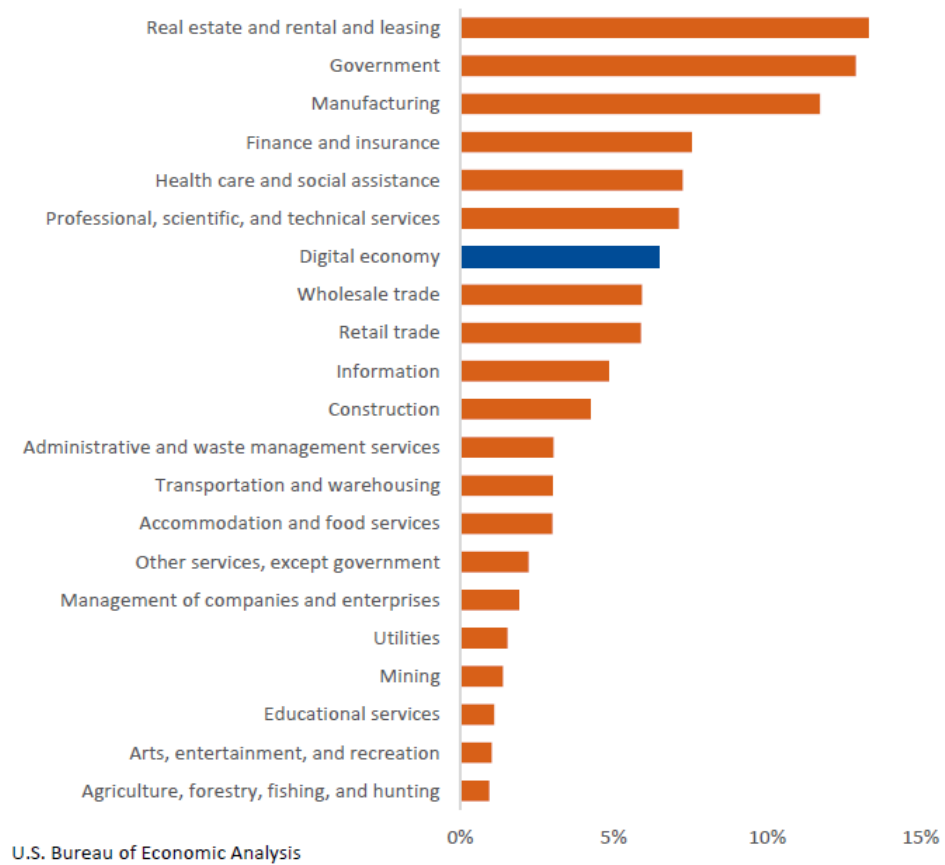
²⁴ https://www.bea.gov/digital-economy/_pdf/defining-and-measuring-the-digital-economy.pdf

²⁵ BEA included Wholesale Electronic Markets (NAICS 42511) and Retail Electronic Shopping (454111), and Retail Electronic Auctions (454112)

²⁶ BEA is able to separately identify non-margin output for wholesalers and retailers that do not take title to the goods that they sell.

²⁷ If the industries' shares were adjusted to exclude the portion attributed to the digital economy then professional, scientific and technical services would move below wholesale trade in the ranking.

Chart 1. BEA’s Digital Economy and Industry Share of Total Gross Domestic Product, 2016

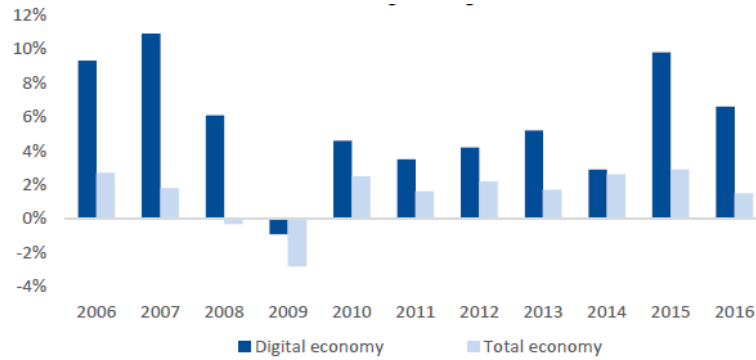


Note: Note that the digital economy’s share has not been removed from the industries for which it is partially embedded, therefore the shares add to more than 100% of GDP.

Source: U.S. Bureau of Economic Analysis, *Defining and Measuring the Digital Economy* (Barefoot et al, 2018)

BEA’s initial estimates show that growth in the digital economy outpaced overall economic growth, increasing at an average annual rate of 5.6 percent per year from 2006 to 2016 compared to 1.5 percent per year in the overall economy. In 2016, digital economy inflation-adjusted value-added totalled \$1.30 trillion, over 80 percent larger than it was in 2005.

Chart 2. BEA’s Digital Economy Value-Added and GDP
Inflation-adjusted, percent change from previous year

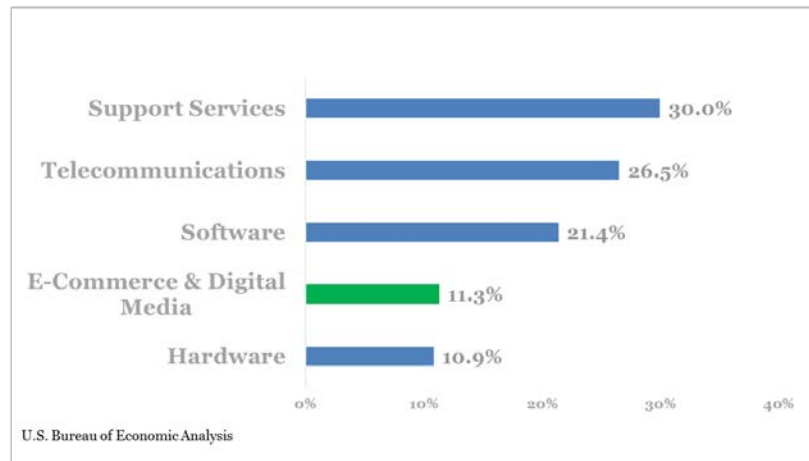


U.S. Bureau of Economic Analysis

Source: U.S. Bureau of Economic Analysis, *Defining and Measuring the Digital Economy* (Barefoot et al, 2018)

In 2016, the value-added of firms in the digital-enabling sector (blue bars in chart 3) accounted for \$1.07 trillion (88.7 percent) of the total estimated \$1.21 trillion in digital economy current-dollar value-added. E-commerce and digital media (green bar in chart 3) accounted for the remaining \$136.5 billion (11.3 percent). One can see that the digital-enabling infrastructure– the ICT sector– is the largest share of BEA’s digital economy estimates.

Chart 3. BEA’s Digital Economy: component shares, 2016
Current-dollar value-added share to total digital economy



U.S. Bureau of Economic Analysis

Source: U.S. Bureau of Economic Analysis, *Defining and Measuring the Digital Economy* (Barefoot et al, 2018)

Section 5. Conclusion

The satellite account illustrated and developed in this paper builds upon the collective efforts of the OECD Advisory Group (AG) on Measuring GDP in a Digitalised Economy, and the work of the OECD-WTO Task Force on International Trade Statistics, to create an overarching framework for measuring the digital economy from a macroeconomic perspective.

As noted it has been designed to be as flexible as possible, so that it can accommodate a variety of needs related to understanding the digital economy. As such it does not define the digital economy per se, but rather highlights important transactions (and indeed transactors) that are relevant both from a policy and from a measurement perspective.

As set up the proposed framework provides a mechanism for comparable estimates of a number of important aspects of the digital economy:

- Size of transactions supported by e-commerce.
- Value-added generated by key sectors in the digital economy, broken down by key characteristics: enabling industries, platform industries, e-tailers, other digital industries and firms dependent on e-commerce (broken down by institutional sector to provide a view of the sharing economy from a production perspective).
- Total consumption on ICT goods used in production and ICT goods (and other infrastructure) that enables the digital economy.
- Total consumption on digital services (including ICT services, such as software and cloud services).
- Estimates (where practical guidance will need to be developed) on the 'value' of free services and the value of data.

As noted, the current capacity to develop in all areas described in the framework varies by area but also by country, and further guidance will need to be developed.

Perhaps the challenge with the greatest impact on current measurement approaches used in countries, relates to the need to identify the medium (e-tailor, intermediary, other) through which orders are placed. Various efforts²⁸ have been made in particular through surveys on ICT usage²⁹, and continue to be made to gain a handle on e-commerce transactions but these are typically piecemeal and are not hardwired in to the way that national statistics offices collect information on firms output or on consumption. Categorisations and aggregations of firms around these characteristics (as noted in the columns of the supply table) can provide some measure of the contribution e-commerce activities make to overall GDP but a more comprehensive (and perhaps radical) approach would be to mainstream

²⁸ http://unctad.org/en/Pages/DTL/STI_and_ICTs/ICT4D-Measurement.aspx

²⁹ http://ec.europa.eu/eurostat/statistics-explained/index.php/E-commerce_statistics

relevant questions into standard business (output, expenditure and investment) surveys (both on how much they spent on-line, and ideally on-what, and how much they sold on-line) and household surveys.

The absence of such information today in many countries does not, however, invalidate the current utility of such a framework. One purpose, of course, is to motivate and provide a roadmap for future (and necessary) statistical developments and this, in and of itself, serves as sufficient justification. But it should not be overlooked that, even with data missing in certain areas, many can be populated today – not least with regard to the value-added and output of a whole range of digital industries, investment in digital infrastructure, expenditures on ICT goods and expenditure on digital services. And it is primarily for these reasons - the ability to have comparable estimates across countries today and increased momentum towards improved estimates tomorrow - that this paper makes a call for adopting the framework today (also providing scope for practical feedback that may lead to future refinements).

We already know that refinements in some of these areas will be needed and, of course, continue to be developed, specifically with regards to the classification of firms to specific groupings, and also for the treatment of flows related to these firms. In some cases, the proposals will require further and broader consultation. For example the framework recommends that the SNA definition of trade margins is modified to accommodate platforms intermediating sales of goods.

The biggest challenge overall however will be to develop compilation and measurement guidance on the valuation of free services and in particular data (where there may also be conceptual challenges), two areas where the OECD is currently developing proposed guidance.

Moreover despite its bold ambition and wide coverage it is important to note that the framework is by no means exhaustive. It does not for example (yet) deal with issues pertaining to the measurement of quality (and price and volume) nor does it fully articulate all relevant items, for example estimates of capital stock (gross and net, and associated service lives, depreciation rates etc.) or estimates of capital services; which are all intended for discussion in later phases of the AG's work.

Table A1. Outline of an Extended Use Table to account for the digital economy (example with 6 industries (columns A-G) and 6 products (rows a-f))
 The table is reported in both purchasers' and basic prices
 Split into domestic and imported supply (see Supply Table)

	A	B	C	D	E	F	G	H	I	J	K	L	M	N		O	P	Q															
														Industry type-1 Digitally enabling industries	Industry type-2 Digital intermediary platforms				Industry type-3 e-tailers	Industry type-4 Other digital businesses	Industry type-5 Firms dependent on intermediary platforms		Industry type-6 other industries	subtotal: sum of enabler producing industries and digital businesses (e.g. ind 1 - ind 4)	total intermediate use	HHFC	NPISH	GFC	Final use		INV	Exports	
															For services						For goods	incorporated							unincorporated	Purchased			Own-account
1	This column would contain a detailed breakdown of agreed products	product a (non-ICT good)																															
2		Digitally ordered																															
3		Directly from counterparty or other digital platform																															
4		Via a resident digital intermediary platforms																															
5		Via a non-resident digital intermediary platforms																															
6		Not digitally ordered																															
7	product b (ICT good)	Digitally ordered																															
8		Directly from counterparty or other digital platform																															
9		Via a resident digital intermediary platforms																															
10		Via a non-resident digital intermediary platforms																															
11		Via a non-resident digital intermediary platforms																															
12		Not digitally ordered																															
13	product c (non-digital services, paid)	Digitally ordered direct from counter party or other digital platform																															
14		Via resident digital intermediary platforms																															
15		Via non-resident digital intermediary platforms																															
16		Other																															
17	product d (digital services except digital intermediary service products, paid)	Digitally ordered direct from counter party or other digital platform																															
18		Via resident digital intermediary platforms																															
19		Via non-resident digital intermediary platforms																															
20		Other																															
21	product e (digital intermediary services products, paid)	intermediation fee resident platform (both implicit and explicit)																															
22		intermediation fee non-resident platform (both implicit and explicit)																															
23	product f (digital service, free)	(outside the current SNA framework)																															
24		Digital data services of which intra-firm provision of data/ and or use of databases																															
25		Other digital services (e.g., free search services, social media, etc.)																															
26	Gross value-added of which:	Gross value-added																															
27		Compensation of employees																															
28		Mixed income																															
29		Other taxes less subsidies on production																															
30		Gross operating surplus																															
31		Extensions																															
32	Employment																																
33	Employees																																

Table A2. Outline of an Extended Supply Table to account for the digital economy (example with 6 industries (columns A-G) and 6 products (a-f))
The table is reported in basic prices, transformed to purchasers' prices

	A	B	C	D	E						F	G	H	I	J	K	L	M	N		O	P	Q		
	Industry type-1	Industry type-2		Industry type-3	Industry type-4	Industry type-5		Industry type-6		Firms dependent on intermediary platforms	other industries	subtotal: sum of enabler producing industries and digital businesses (e.g. Ind 1 - ind 4)	output at basic prices	Imports	Total Supply at basic prices	Transport margin	Trade margin		Taxes less subsidies on products	Total Supply at purchasers prices					
	Digitally enabling industries	Digital intermediary platforms		e-tailers	Other digital businesses	For services	For goods	incorporated	unincorporated								non-digital margin	digital margin							
1	This column would contain a detailed breakdown of agreed products	product a (non-ICT good)																							
2			Digitally ordered																						
3			Directly from counterparty or other digital platform																						
4			Via a resident digital intermediary platforms																						
5			Via a non-resident digital intermediary platforms																						
6			Not digitally ordered																						
7	This column would contain a detailed breakdown of agreed products	product b (ICT good)																							
8			Digitally ordered																						
9			Directly from counterparty or other digital platform																						
10			Via a resident digital intermediary platforms																						
11			Via a non-resident digital intermediary platforms																						
12			Not digitally ordered																						
13	This column would contain a detailed breakdown of agreed products	product c (non-digital service, paid)																							
14			Digitally ordered direct from counter party or other digital platform																						
15			Via resident digital intermediary platforms																						
16			Via non-resident digital intermediary platforms																						
17			Other																						
18			Not digitally ordered																						
19	This column would contain a detailed breakdown of agreed products	product d (digital services except digital intermediary service products, paid)																							
20			Digitally ordered direct from counter party or other digital platform																						
21			Via resident digital intermediary platforms																						
22			Via non-resident digital intermediary platforms																						
23			Other																						
24			Not digitally ordered																						
25	This column would contain a detailed breakdown of agreed products	product e (digital intermediary services products, paid)																							
26			intermediation fee resident platform (both implicit and explicit)																						
27			intermediation fee non-resident platform (both implicit and explicit)																						
28																									
29																									
30																									

Table A3. Investment matrix

		A	B	C	D	E	F	G	H	I	J	K
		Industry type-1	Industry type-2		Industry type-3	Industry type-4	Industry type-5		Industry type-6			
		Digitally enabling industries	Digital intermediary platforms		e-tailers	Other digital businesses	Firms dependent on intermediary platforms		other industries	subtotal: sum of enabler producing industries and digital businesses (e.g. ind 1 - ind 4)	Total corporations	HH
			For services	For goods			incorporated	unincorporated				
39	Investment - purchases	Software										
40		Purchases of proprietary databases										
41		Artistic originals etc										
42		R&D										
43		ICT goods										
44		Other Digital enabling infrastructure										
45		Vehicles (only needed for certain industry categories)										
46		Dwellings (only needed for certain industry categories)										
47	Investment - own-account	Software and databases										
48		Artistic originals etc										
49		R&D										
50		ICT goods										
51		Other Digital enabling infrastructure										
52		Accumulation of data/bytes-- (outside the SNA asset boundary)										

Table A4. Capital stock matrix (gross and net)

		A	B	C	D	E	F	G	H	I	J	K
		Industry type-1	Industry type-2		Industry type-3	Industry type-4	Industry type-5		Industry type-6			
		Digitally enabling industries	Digital intermediary platforms		e-tailers	Other digital businesses	Firms dependent on intermediary platforms		other industries	subtotal: sum of enabler producing industries and digital businesses (e.g. ind 1 - ind 4)	Total corporations	HH
			For services	For goods			incorporated	unincorporated				
53	Capital Stock	Software and databases										
54		Artistic originals etc										
55		R&D										
56		ICT goods										
57		Other Digital enabling infrastructure										
58		Accumulation of data/bytes-- (outside the SNA asset boundary)										
59		Vehicles (only needed for certain industry categories)										
60		Dwellings (only needed for certain industry categories)										

Table A5. Production & supplementary information

		A	B	C	D	E	F	G	H	I
		Industry type-1	Industry type-2		Industry type-3	Industry type-4	Industry type-5		Industry type-6	subtotal: sum of enabler producing industries and digital businesses (e.g. ind 1 - ind 4)
		Digitally enabling industries	Digital intermediary platforms		e-tailers	Other digital businesses	Firms dependent on intermediary platforms		other industries	
			For services	For goods			incorporated	unincorporated		
61	Sales	Sales via own-site to residents								
62		Sales via own-site to non-residents								
63		Sales via platforms to residents								
64		Sales via platforms to non-residents								
65		Sales of licenses to use IPP (by IPP and databases)								
66	platform-specific transactions	Digital platforms charges to resident producers								
67		Digital platforms charges to non-resident producers								
68		Digital platforms receipts from resident consumers								
69		Digital platforms receipts from non-resident consumers								
70		Digital platforms advertisting revenue from residents								
71		Digital platforms advertisting revenue from non-residents								

References

- Barefoot, K., D. Curtis, W. Jolliff, J. Nicholson, and R. Omonhundo “Defining and Measuring the Digital Economy”. Available at <https://www.bea.gov/digital-economy/pdf/defining-and-measuring-the-digital-economy.pdf> .
- Bukht, R. and Heeks R. (2017), “Defining, Conceptualising, and Measuring the Digital Economy”. Available at http://hummedia.manchester.ac.uk/institutes/gdi/publications/workingpapers/di/di_wp68.pdf
- Konijn, Paul (2017), “Price and Volumes Measures in Times of Digitalisation”. Available at https://unstats.un.org/unsd/nationalaccount/aeg/2017/M11_4_2_Price_Volume_DE.pdf
- Murphy, J. (2017), “Intermediaries in the Provision of Services and Classification in ISIC” Available at <https://unstats.un.org/unsd/class/intercop/expertgroup/2017/AC340-10.PDF>
- OECD (2011), Measuring the Information Society – A New Perspective, OECD Publishing, Paris. Available at <http://www.oecd.org/sti/ieconomy/oecdguidetomeasuringtheinformationsociety2011.htm>
- OECD (2014), Measuring the Digital Economy – A New Perspective, OECD Publishing, Paris. Available at <http://www.oecd.org/sti/measuring-the-digital-economy-9789264221796-en.htm>
- OECD Statistics Working Papers, No. 2016/07, "Measuring GDP in a Digitalised Economy", OECD Publishing, Paris. Available at <https://doi.org/10.1787/5jlwqd81d09r-en>.
- OECD (2017a), Vectors of Digital Transformation, DSTI/CDEP/GD(2017)4
- OECD (2017b), Measuring Digital Trade: Towards a Conceptual Framework, STD/CSSP/WPTGS(2017)3. Available at [http://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=STD/CSSP/WPTGS\(2017\)3&docLanguage=En](http://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=STD/CSSP/WPTGS(2017)3&docLanguage=En)
- OECD (2017c), Summary of Responses of the Advisory Group: Survey of on Digital Economy Typology, STD/CSSP/WPNA(2017)1. Available at [http://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=STD/CSSP/WPNA\(2017\)1&docLanguage=En](http://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=STD/CSSP/WPNA(2017)1&docLanguage=En)
- OECD (2017d), Issue Paper on a Proposed Framework for a Satellite Account for Measuring the Digital Economy, STD/CSSP/WPNA(2017)10. Available at [http://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=STD/CSSP/WPNA\(2017\)10&docLanguage=En](http://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=STD/CSSP/WPNA(2017)10&docLanguage=En)
- OECD Statistics Working Papers, No. 2017/09, "Can potential mismeasurement of the digital economy explain the post-crisis slowdown in GDP and productivity growth?", OECD Publishing, Paris. Available at <https://doi.org/10.1787/a8e751b7-en>.
- US Department of Commerce (2016) “Digitally Matching Firms: A New Definition in the ‘Sharing Economy’ Space” . Available at <http://www.esa.doc.gov/reports/digital-matching-firms-new-definition-%E2%80%9Csharing-economy%E2%80%9D-space>
- Verrinder, J. (2016), “E-platforms- Conceptual and Measurement Issues”. Available at [http://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=STD/CSSP/WPNA\(2016\)12&docLanguage=En](http://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=STD/CSSP/WPNA(2016)12&docLanguage=En)