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Agenda item: 4

DZ.3 Treatment of "Free" Digital Products in the "Core" National Accounts

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DZ.4 Recording and Valuing "Free" Products in an SNA Satellite Account

Guidance Note on Treatment of "free" Digital Products in the "core" National Accounts[1]

1. Introduction to the issue

1. Free media funded by advertising first emerged as an issue in the national accounts debate when television became a major source of entertainment in the 1950s. The issue then vanished from the debate, only to reemerge when free platforms became a major part of our digital lives. Some have argued that free services of digital platforms and devices consumed by households are missing from GDP as currently compiled. Others argue that GDP already captures the output of these free products indirectly, and that they only create measurement problems for price and volume indexes.

2. The practice of bundling subsidized products and marked-up products plays a key role in the argument in support of the view that GDP captures the output of free products indirectly. However, the practice of tracking users of free digital platforms, in effect collecting "observable phenomena (OP)"[2] in order to create data assets, must also be considered. Additional factors in the debate are free content created by households outside the *System of National Accounts 2008* (2008 SNA) production boundary and free software.

3. The coherence of an integrated system such as the 2008 SNA requires a consistent, unified approach to measurement problems. The treatment of free digital products must therefore be grounded in a general conceptual framework for free and other cross-subsidized outputs and be consistent with the underlying principles of the 2008 SNA. This does not prevent supplemental information needed for a full picture of the benefits of free products from being presented in a satellite account, and a separate guidance note is planned on this topic. Another guidance note is also planned on highlighting the digital economy's role within the current framework through digital supply and use tables.[3]

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[1] This guidance note has been prepared by Marshall Reinsdorf (formerly of the IMF) and Jennifer Ribarsky (IMF), members of the ISWGNA task team on digitalization, based on an issue paper drafted by the U.S. Bureau of Economic Analysis in March 2020 and a note on *Measuring Free Platforms in the System of National Accounts* (May 2020) by Marshall Reinsdorf. It also incorporates inputs from the task team members. Contributors to this paper are Andreas Dollt and Nicola Massarelli (Eurostat), Dylan Rassier and Rachel Soloveichik (BEA), John Mitchell (OECD), Marshall Reinsdorf, Jennifer Ribarsky, Jim Tebrake, Margarida Martins and Silvia Matei (IMF), Richard Heys (ONS), Ziad Ghanem (Statistics Canada), Sri Soelistyowati (BPS Indonesia), Stanimira Kosekova (ECB), Benson Sim (UNSD) and Kevin Fox (UNSW).

[2] An observable phenomenon is the occurrence of a singular event or piece of information. In contrast, "data" is interpreted in the sense of 'produced data', which means that some productive activity has taken place to create the data (sometimes also called dataset). See the Digitalization's Task Team guidance note on data for more information on the distinction between observable phenomena and data.

[3] See guidance note on Digital SUTs at: https://unstats.un.org/unsd/nationalaccount/aeg/2021/M15_7_2_Digital_SUTs.pdf.

2. Existing material

4. The 2008 SNA has special procedures to measure output supplied for free, or with no explicit payment, in two cases. First, the output of nonmarket producers such as governments and nonprofit institutions serving households (NPISH) is measured by the costs of production.[4] Second, the SNA imputes sales of output of market producers supplied via in-kind transactions, including financial intermediation services (FISIM)[5] and in-kind remuneration of employees. The imputed expenditures on these free outputs are funded by imputed income that the consumer receives from the supplier, so the saving of both parties remains the same. Free events sponsored by businesses are also mentioned in an annex on the research agenda as a type of advertising expense that could instead be treated as final consumption of corporations and social transfers to households (A4.16).

5. The OECD monograph on *Understanding National Accounts* (Lequiller and Blades, 2014) notes that television funded by advertising is not included in a direct way in household consumption expenditures. Rather, the cost of advertising is included in the price of the advertised products, and thus 'appears' as part of final consumption of those products in the national accounts but not as consumption of television.[6] Commercial television broadcasters funded by advertising have advertising services as their only output. "Free" services of digital platforms would presumably be treated similarly to free media broadcast by television stations since they are primarily funded through advertising. But collection of information on the users of digital platforms and user-generated content freely supplied by households are new phenomena that must also be considered.

6. Non-monetary transactions are discussed in the 2008 SNA (1.36 -1.39) in Chapter 1, Section D "the boundaries of the SNA" in the context of (1) goods and services supplied through barter and (2) provided free as transfers in kind. This section notes that the **goods or services involved in non-monetary transactions are produced by activities that are no different from those used to produce goods or services for sale**. Furthermore, this section goes on to define the various boundaries of the 2008 SNA (1.40 - 1.47):

a. **Production boundary**: production is understood to be a physical process, carried out under the responsibility, control and management of an institutional unit, in which labour and assets are used to transform inputs of goods and services into outputs of other goods and services.

    i. All goods and services produced as output must be such that they can be sold on markets or at least be capable of being provided by one unit to another, with or without

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[4] Free products provided by governments and nonprofit institutions are not included in household final consumption expenditures, so the 2008 SNA recommends also calculating *actual final consumption of households* as a comprehensive measure of consumption that includes products acquired by households through social transfers in kind from general government and NPISH. Social transfers in kind includes products purchased from market producers for onward transmission to household at prices that are not economically significant (SNA, 9.116).

5 FISIM includes unpriced services to depositors and borrowers. The services to depositors are an in-kind payment in lieu of interest. The services to borrowers are a third case in which output must be imputed because it involves the substitution of interest payments for explicit purchases of services, not in-kind payments. Interest in the SNA is a distribution of income, but interest in excess of the reference rate functions as a payment from borrowers for services.

[6] The same conclusion was reached for free newspapers in a European experts' discussion in the early-2000s.

charge. The SNA includes within the production boundary all production actually destined for the market, whether for sale or barter. It also includes all goods or services provided free to individual households or collectively to the community by government units or NPISHs.

ii. It excludes household production of services for own final consumption (with the exception of owner-occupied housing) and notes that the production boundary is confined to market or fairly close substitutes for market activities.[7]

b. **Consumption boundary:** the range of goods and services that are included in household final consumption and actual final consumption are **governed by the goods and services included in the production boundary**.

c. **Asset boundary**: Assets defined in the SNA are entities that must be **owned by some unit, or units, and from which economic benefits are derived by their owner(s) by holding or using them over a period of time**. Assets can be produced or non-produced.

3. Options considered

7. A consultation note from the Bureau of Economic Analysis (2020) provided information on the options considered by the ISWGNA Task Team on Digitalization. Two main perspectives were advocated by the participants in the discussions: 1) allowing access to observable phenomena (i.e., "users' data"); and 2) indirect payments for "free" digital platforms. Also, a paper by the ISWGNA Task Team on Digitalization (2020) reviews related discussions of the options for the treatment of data. The consultation revealed that the members of the Task Team see no need for changes in the core SNA framework to account for free products but rather clarification on how the phenomena should be viewed. Thus, this guidance note focuses on the indirect payments for "free" digital platforms. Following the recommendations of the Task Team, another guidance note looks into possible transactions to be described as part of a satellite account.

3.1. Bundling Approach to Measuring "Free" Digital Platforms

8. Platforms are service providers that facilitate interactions between two or more parties (OECD 2019). "Free" platforms funded by advertising and collection of user *observable phenomena* are an important part of the digital economy, leading to a concern that the "free" services that they supply to households may be missing from GDP. Reinsdorf (2020) notes, however, that outputs that are free, or at least priced below the cost of production, are common throughout the market economy. To ensure a

[7] If values are assigned to the outputs of household production of services for own final consumption, values must also be assigned to the incomes generated by their production and to the consumption of the output. SNA paragraph 1.41 states "It is clear that the economic significance of these flows is very different from that of monetary flows. For example, the incomes generated are automatically tied to the consumption of the goods and services produced; they have little relevance for the analysis of inflation or deflation or other disequilibria within the economy. The inclusion of large non-monetary flows of this kind in the accounts together with monetary flows can obscure what is happening on markets and reduce the analytic usefulness of the data."

consistent treatment of free and subsidized outputs of market producers, free digital platforms must be approached in the context of a more general conceptual framework.

9. Both platforms and ordinary (i.e., non-platform) market producers often include items that are free or priced below cost in the bundle of items that they supply. Items that are consumed together need not be individually profitable; making parts of the bundle free could avoid transactions costs, or subsidizing one item may help to sell another at a mark-up. In either scenario, operating surplus remains positive because the profits on the marked-up items fund the losses on the subsidized items. Taken as a whole, the bundle generates revenue that is commensurate with the amount of production taking place at the enterprise. "Correcting" the prices that have been subsidized – possibly all the way down to zero – without simultaneously correcting the marked-up prices that fund the subsidy would therefore be a mistake.

10. Measuring the output of ordinary producers serving one-sided markets when some of their outputs are free or subsidized involves the same principles as the more complex problem of measuring platforms offering free and subsidized services. This section therefore first develops a measurement framework for free and subsidized outputs of ordinary market producers, then builds on that framework to develop a framework for measuring the output of platforms offering free and subsidized services.

11. The distinction between measuring the level of GDP at current prices and measuring GDP volume growth is another part of the background needed to develop a measurement framework for free digital platforms. The key issue for measurement of GDP level is ensuring that domestic producers' output is all counted exactly once. In contrast, for GDP volume growth, the deflators are key, and adjustments for appearance (or disappearance) of free services could be incorporated in the consumption deflator, or in a research version of the consumption deflator in a satellite account. Measurement of price and volume growth will be discussed below after measurement of output levels.

3.2.1. "Free" and Subsidized Output of Non-Platform Market Producers in Measuring the Level of GDP

12. Subsidizing certain prices, often down to zero, is a common technique for increasing sales of complementary items at marked-up prices. For example, a telecom carrier may offer subsidized smartphones, or a manufacturer of ink cartridges and printers may subsidize the printers. Other examples are free online games that encourage in-game purchases and free software that encourages users to purchase support services and related software products. Reducing transactions costs can also be a motive for providing "free" products as part of a bundle of items that are usually consumed together.

13. Subsidized items and the marked-up items that they help sell can be treated as an implicit bundle. Supplying the cross-subsidized items is profitable because they generate revenue indirectly through increased sales of the marked-up items. They do not cause any of the producer's output to be missed by as long as the revenue from the entire bundle is taken into account. If output really were missed, the producer's net operating surplus would likely be negative (meaning that too little output has been produced to cover the costs of production). Reassuringly, suppliers of subsidized and free outputs usually have a positive net operating surplus.

14. Subsidized outputs of ordinary (non-platform) businesses are used by the same group of consumers—though not necessarily the same individuals—who purchase the marked-up outputs.

Consumers themselves therefore fund the subsidies that they receive, and their expenditures on the bundle of outputs include the full value of the cross-subsidized components of the bundle.

15. Even though the standard procedures for measuring output capture the full value of the "free" and subsidized items supplied by market producers, the recording of the output may be lagged if the marked-up item that funds the subsidy is sold in a later period than the cross-subsidized item. Certainly, for an individual consumer, the consumption of the "free" or subsidized output often comes first, and the wait until the purchase of the marked-up item may be significant. However, for consumers in the aggregate, a balanced mix of the supplier's cross-subsidized and marked-up products will be consumed in the steady state. Only during periods of rapid growth will the supplier's output be understated. But during periods of falling demand, the supplier's output will be overstated, and for a broad aggregate such as GDP, the net effect of such timing problems should be negligible.

16. A second issue – which potentially could cause GDP to be underestimated by enough to be a concern – is that prices of investment goods such as software and equipment are often cross-subsidized by marked-up supplies and services that the investment good helps sell. When this occurs, fixed capital formation and the value added of the *users* of the bundle of outputs will be understated, and their intermediate consumption of supplies and services will be overstated. Research on extent of this problem and the feasibility of reallocating the subsidies to the price of the investment good would be useful.

3.2.2. "Free" and Subsidized Services of Platforms

17. For platforms, "free" and subsidized outputs are not merely common—they are the rule. Two-sided platforms typically have a subsidized side, which is often free, and a funder side. Platform users differ in their willingness-to-pay for opportunities to connect with those on the other side and in the willingness-to-pay of those on the other side to connect with them. The platform responds to these differences by subsidizing the users whose presence on the platform will raise the value of the platform to those with a high willingness-to-pay, while marking up the prices paid by those in the latter group.

18. For example, manufacturers of consumer products often have a high willingness-to-pay to inform potential customers about the benefits of their products as a way of increasing sales. Platforms such as television broadcasters assemble the necessary audience by supplying free content, and then recover the cost of supplying the free content as part of the price of airtime paid by advertisers. The manufacturers, in turn, recover the cost of the platform's services through mark-ups on the advertised products.

19. Platforms normally obtain enough revenue from their funder side to cover the cost of the subsidies to the other side, leaving them with a positive net operating surplus. If output were significantly undermeasured it would tend to be below the cost of production, so platforms' typically positive net operating surplus indicates that the subsidies do not cause GDP as measured by the production approach to be underestimated.

20. Because the users of "free" platform services pay for those services through a chain of transactions, measurement of GDP via the expenditure approach is more complicated to analyze for platforms than for ordinary producers that bundle "free" and marked-up outputs. In the case of platforms, the direct funders of the "free" services are not the consumers of those services, but rather those who want to interact with them (e.g., the advertising corporations). But the platform's funders recover their expenses from those on the other side as part of the transactions facilitated by the platform (e.g., sales of

the advertised products). Thus, the consumers of the "free" platform services ultimately fund those services. Even if the set of individuals who pay the mark-ups and the set of individuals who consume the "free" services overlap only partially, households are collectively the funders of the "free" platform services used by households.

21. The value of data used for targeted advertising that digital platforms produce from their users' OP is included in the platform's output of advertising services. Targeted advertising is probably the main use of OP, so the collection of users' OP does not necessarily imply that the output of a "free" digital platform is undermeasured. However, some digital platforms may also sell data derived from users' OP or use the OP to create long-lived data assets. Data that is sold should generally be treated as a product included in the platform's output.[8] This should not be difficult to do in practice. On the other hand, own-account investment in long-lived data assets may present practical measurement challenges. The cost approach may be the most practical way to measure own-account investment in long-lived data assets[9]. If the cost approach is chosen, the cost of collecting OP used solely for creating long-lived data assets may or may not be included depending on the decision on *Recording Data in the National Accounts* as to whether OPs are considered non-produced assets and if these costs may be considered income payments (rent)[10].

22. Platforms may offer free or subsidized outputs in order to attract users and expand their user base and thereby benefit from *network externalities*, which occur because each additional platform user raises the value of the platform to the other platform users.[11] Investment in growth of the user base can create a timing problem in the recording of platform output, as attracting a large user base will position the platform to charge mark-ups in the future. However, a broad aggregate such as GDP should contain platforms at different stages in their life cycle. The operating losses of young platforms offering free services in order to grow should be offset by the above-average profits of mature platforms with large user bases. Note, also, that a platform's user base or network cannot be treated as an asset in the framework of the SNA even though it may be an asset for business strategy purposes.

3.2.3. "Free" Platforms and Measurement of Price and Volume Growth

23. The key step in estimating volume growth is the construction of the deflator. The output growth of a platform funded by advertising is measured by deflating the ad revenue. However, changes in households' consumption of "free" platform services would be part of a complete picture of growth of household final consumption. Unfortunately, in many cases, the assumptions and methods required to impute a pre-entry price for a new kind of free service may be better suited for academic research or a

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[8] Sales of short-lived data by a domestic platform would only affect GDP if the data are exported.

[9] The net present value valuation method was considered but rejected by the Digitalization Task Team because it was deemed too complicated and uncertain to implement.

[10] Rather than long-lived data assets, the OP might ultimately be transformed into software assets created by machine learning.

[11] Network effects can lead to winner-takes-all dynamics, a process in which the fastest-growing platform ends up capturing most of the market.

satellite account than for deflating household final consumption expenditures in the core accounts (Reinsdorf, 2020). But when a free service replaces a priced service of similar quality, a Laspeyres index that reflects the savings to consumers could provide a conservative estimate of the effect on the deflator household final consumption (Reinsdorf and Schreyer, 2020).

24. The theoretical framework for adjusting a consumption price index for new and disappearing goods proposed by Hicks (1940) also applies to goods that are free. In this framework, the appearance of a new good is handled by assuming that the good's price in the period before it appeared equaled the reservation price—the price just high enough to drive demand to zero (Brynjolfsson et al. 2020). However, estimating the reservation price by fitting a demand curve is impossible in the case of a new good that is free. Discrete choice experiments on amounts that users of "free" digital platforms would have to be paid to give them up have therefore been used to estimate the consumer surplus (Brynjolfsson et al. 2019).

25. Free products that are part of a bundle can also create measurement challenges if their price was previously positive or their price subsequently becomes positive. The price changes should be included in the price index covering the bundle. Most of the time, this can be done by tracking the change in the cost of the bundle that contains the newly free, or previously free, product. For example, if a free social media company were to start charging subscription fees, its services should be added to the household consumption basket before the fees begin so that the impact of the new expense can be captured in the deflator for household final consumption. The Paasche price index (based on amounts paid by those who remain after the fees start to be charged) will rise less than the Laspeyres index (based on amounts that would have been paid if everyone stayed on platform). The Paasche index may be more practical to compile. Cross-subsidized prices that are greater than zero can also be handled by tracking the cost of the bundle.

3.2.4. Assets that produce Free Services

Open-source software

26. The services of free online platforms are primarily produced by software assets (Heys, 2020). Indeed, many of the free services of the digital economy amount to a free license to use a software asset by executing code. In some cases, however, the software developer provides a free license to download, inspect, modify, and share the original source code. The original source code is an intellectual property (IP) asset of the developer and making this asset available to copy may be considered a service. Licenses to copy and use software assets are an important kind of free service in the digital economy.

27. Robbins et al. (2018) discuss how open-source software is developed, maintained, and supplied through the contributions of developers from universities, government research institutions, nonprofit institutions, private corporations and individuals. The paper also presents a framework for measurement of the capital stock of open-source software originals.

28. Platforms such as GitHub enable developers to exchange and disseminate open-source software, defined as free software whose source code is publicly available under a license to use, study, modify, and share. As an example of the importance of copies of open-source software, Greenstein and

Nagle (2013) estimate that installations of the Apache open-source software for servers[12], developed initially at the National Center for Supercomputing Applications at the University of Illinois, are equivalent to between 1.3 and 8.7 percent of the stock of prepackaged software currently accounted for in US private fixed asset accounts.[13]

29. The value of open-source software produced by programmers employed by corporations, government, or NPISH should already be included in measures of own-account software investment as estimated by the sum-of-costs method. Open-source software produced by an unincorporated business that is classified in the household institutional sector is also conceptually inside the 2008 SNA production boundary. Like businesses classified in the corporations institutional sector, the household enterprise may, for example, be bundling the free software with software support services – another case of cross-subsidization of products. But if the open-source software is produced by individual volunteers who are not remunerated in any way for their contribution, then the production is outside the 2008 SNA production boundary.

30. Freedom to copy a software original does not preclude the software original from being an asset of its creator. In the SNA (3.26) definition of economic ownership, the producer of a "free" asset is an economic owner if the producer bears the risks of production in order to claim benefits associated with the use of the asset. The benefits to the corporation that produced the free software might, for example, be increased sales of services or other priced products, or increased numbers of platform users.

31. Other institutional units may also enjoy benefits associated with the use of the "free" asset, but this does not diminish the risk borne by the producer. The benefits that accrue to other units are spillovers and are not included in the value of the asset that produces the spillovers. Furthermore, the flows of spillovers are not recorded as transactions. The OECD Handbook on Deriving Capital Measures of Intellectual Property Products (2010) provides an extensive discussion on the issue noting "*the fact that the IPPs are made freely available does not of itself exclude the IPPs from being recorded as assets. As long as the original producer still expects to obtain economic benefits from the IPP an asset remains*." Note, however, spillovers from free software could be relevant for productivity analysis.

User-generated content available on platforms

32. Another important category of IP asset providing free services in the digital economy is entertainment, literary and artistic originals shared as user-generated content. To be considered an asset of its creator, the user-generated content must fall within the production boundary of the SNA and be expected to yield economic benefits for its creator over a period of at least a year.

33. Household unincorporated enterprises produce goods or services for sale or barter on the market (*SNA 2008*, 4.155), so products of household unincorporated enterprises fall within the production

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[12] Apache HTTP is a cross-platform web server software released under the terms of Apache License 2.0 and maintained by an open community of developers under the auspices of the Apache Software Foundation.

[13] Although this GN treats copies of open-source software as a service, they can be a substitute for purchased copies of software, which the 2008 SNA treats as fixed assets. They can also be a substitute for software subscriptions, which are services. Distinguishing purchases of software copies that would qualify as fixed capital formation from software subscriptions is often difficult in practice, and Kortum and Eaton's abstract for the 2021 IARIW general conference argues for a change in the treatment of purchased software copies.

boundary. Thus, if the household receives renumeration from the content that it creates and uploads (e.g., ad revenue or subscription revenue), the own-account investment in artistic originals is within the SNA production boundary. For example, a social media influencer with earnings[14] should be treated as a household unincorporated enterprise.

34. Creation of entertainment, literary and artistic originals for personal enjoyment– a common leisure activity– has always been treated as outside the production boundary. This longstanding treatment should also apply to user-generated content– for example, personal posts on Facebook– where no renumeration is received or expected. This type of activity could be viewed as households producing services for own final use, namely using Facebook's network in the production of leisure services.[15] Household production of services for own final use (such as cooking for oneself), is, by convention, outside the 2008 SNA production boundary.

35. A complicating factor is that the platform benefits from the user-generated content. For example, when personal posts attract the user's friends to the platform, they provide economic benefits to the platform. However, user-generated content cannot be considered an asset of the platform. The benefits accruing to the platform are externalities, positive spillovers of the user's production of leisure services. As discussed above, spillovers are not attributed to any asset in the SNA. Second, Soloveichik (2020) argues that free user-generated content is generally short-lived and therefore does not fit the characteristics of an asset.

36. Cases where the household unincorporated enterprise is creating artistic originals on own-account for repeated use in the production of remunerated services should be treated as own-account gross fixed capital formation of the household unincorporated enterprise. Take, as an example, the exercise videos of Fitnessblender.com, which has a YouTube channel. Fitnessblender makes money through YouTube's ADSense partnership program as ads are displayed on the YouTube channel page. Additionally, Fitnessblender also earns revenue by selling a workout plan where they choose which of the free videos you use each day. Production of long-lived, video inventory is own-account gross fixed capital formation of the Fitnessblender business. Of course, YouTube also benefits by earning AD revenue. However, YouTube does not invest in any content. YouTube's revenue is a payment for platform services. Posting free videos on the platform generates a positive externality (spillover) for YouTube by helping it to sell more services and to attract more users. Note that positive externalities from users' activities are a general feature of platforms; for example, Airbnb benefits from the rental properties posted by its users, but those properties are not assets of Airbnb.

4. Recommended approach—conceptual aspects

37. The written consultation revealed that the members of the Task Team see no need for changes in the core SNA framework to account for free products. However, the framework's coverage of "free" digital

[14] Social media influencers' earnings can be substantial. See https://www.vox.com/the-goods/2018/11/28/18116875/influencer-marketing-social-media-engagement-instagram-youtube

[15] See Schreyer (2019) "Accounting for Free Digital Services and Household Production– An Application to Facebook"

products of market producers including platforms should be explained. The bundling approach described in this guidance note – which is based on Reinsdorf (2020) – can serve as the basis for this explanation.

38. Imputed values of important free products in the digital economy (possibly accompanied by estimates for similar non-digital free products such as broadcast television) could potentially provide useful information on economic welfare impacts in a satellite account. This optional satellite account is the topic of a separate guidance note. Indicators of welfare from free digital products could potentially be developed in the context of measurement of nonmarket production outside the SNA boundary. Productivity gains in households' time use for nonmarket production may be increasing welfare in ways not measured by consumption or GDP. Therefore, the old debate about measuring household non-market production is now even more pertinent. International and national institutions need to accelerate efforts to develop indicators of welfare growth from non-market production beyond the boundary of GDP. This may be taken up by the Sustainability and Wellbeing Task Team.

39. The Digitalization Task Team also discussed open-source software and user-generated content. These have been termed "free assets", but a more precise description for the assets that are in scope for the core accounts would be "assets used to produce services that are free or remunerated indirectly". The main free services in question are downloads of open-source software and views of user-generated content, while the main assets are original source code and the entertainment, literary and artistic originals. The scope of such assets for national accounts purposes includes all sectors of the economy – corporations, government, NPISH, and households operating an unincorporated household enterprise. In the case of market producers (corporations and unincorporated household enterprises), the free services generate income indirectly by helping sell bundled items such as support services or advertising. Much of the code for open-source software is developed by corporations, non-profit institutions or government, and the value of these software assets may be estimated by the sum-of-costs method. The economic owner will usually be the producer of the software or artistic original. The platform that provides the free access to the asset is normally not the owner of the asset, and the benefits to the platform should be treated as spillovers.

40. The majority of the Digitalization Task Team agreed that the SNA production boundary can include a "free asset", but this guidance note recommends not using the term for reasons stated in the paragraph above. The definition of the SNA production boundary should not change. Creating and posting artistic originals as a leisure activity would be excluded from the core accounts because unpaid household production of services is outside the SNA production boundary. *Observable phenomena* are also excluded because they are not produced at all.

5. Recommended approach—practical aspects

41. GDP is a measure of market and near-market production valued at market prices, and, as such, is well-suited to address key policy questions. However, some free services enabled by digital products represent quality improvements that could be captured in real consumption by quality-adjusting the deflator. The main compilation challenges are (a) improving quality adjustment procedures for information and communication technology (ICT) goods and services, (b) timely inclusion of new digital product varieties and suppliers in the detailed indexes, and (c) timely inclusion of new digital products in the basket and weighting structures of the high-level index. Methods for adjusting the prices of new products for quality change have been developed, but they often have substantial input data requirements,

resource requirements, and statistical capacity requirements. The guidance note on *Price and Volume Measurement of Goods and Services Affected by Digitalization* addresses such issues.

42. Additional key compilation challenges involve complete coverage of digital platforms and platform-enabled activity. More rapid and extensive access to source data, updated classifications, and adjustments for missing data are elements of the solution for coverage gaps.

43. Countries may need to review the calculation of own-account gross fixed capital formation in software. In applying the macro-approach to estimate own-account production of software and databases, countries usually focus on the following occupations (ISCO-codes): 251 (Software and Applications Developers and Analysts) and 2521 (Database Designers and Administrators). The extent that software development is done outside of these occupations implies a potential underestimation of own-account gross capital formation in software.

6. Changes required to the *2008 SNA* and other statistical domains

44. No fundamental changes are necessary in the core SNA framework to account for free products. However, the logic behind the treatment of free products should be documented, and the framework for indirect measurement of free products in GDP should be explained. The explanation should include the bundling with priced products that they help sell and apply the framework to the free products of the digital economy. This could be done in a new chapter section (or chapter) that clarifies the measurement of free products supplied by market producers, including platforms, and the treatment of own-account production of intellectual property assets such as the source code for open-source software and user-generated content that meets the criteria of artistic originals.

45. Assuming that long-lived data are an asset in the updated SNA and that own-account investment in data assets is measured by expenses, the discussion of free products should clarify the boundary of the expenses to collect observable phenomena that are included in own-account investment. Identifiable costs of providing free products to attract users to the platform solely for purposes of collecting those users' OP seem appropriate to include. In contrast, if the platform receives more than one type of benefit from attracting the users, the cost of attracting the users would not be considered part of own-account investment in data assets.

46. Digital platforms often supply free services across borders. No changes in framework for balance of payments statistics are required, but the updated balance of payments manual (BPM) should mention that free services of non-resident platforms may be funded indirectly through international transactions in advertising services and other things. Furthermore, references can be made to the guidance provided in the OECD-WTO-IMF Handbook on Measuring Digital Trade.

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Guidance Note on Recording and Valuing "Free" Digital Products in an *SNA* Satellite Account[1]

March 2022

1. Introduction

1. Options for the treatment of "free" digital products in the *SNA* were considered by the ISWGNA Digitalization Task Team in an issue paper in March 2020. In November 2020, the Task Team decided to move forward with two parallel work streams on "free" digital products, both of which result in no changes to the *SNA* central framework. One stream is a clarification of how "free" digital products are currently treated in the *SNA*. The other stream develops guidance on the treatment of "free" digital products in a satellite account. Following this, the OECD introduced a paper in April 2021 on recording and valuing data as an asset that generated additional considerations for "free" digital products and was used to gather input on the separate guidance note *DZ.6 Recording of Data in the National Accounts*.

2. This note summarizes considerations for recording and valuing "free" digital products in an *SNA* satellite account. The note briefly discusses the intersection of "free" digital products and data as an asset, the latter of which is planned to impact the *SNA* central framework, and then walks through the *SNA* sequence of accounts to outline three options for a satellite account on "free" digital products. The first option merely separates the value of "free" digital products that are already bundled in the value of other products under the current *SNA* treatment. The second option builds on the first option by including costs associated with the production of a data asset as recommended in *DZ.6 Recording of Data in the National Accounts*, specifically recording and processing (R&P) costs plus observable phenomena procurement (OP-P) costs. The third option builds on the second option by including costs associated with the production of user-generated content. All options increase the visibility of the household's role as a final consumer of "free" digital products. The second and third options increase the visibility of the intersection of "free" digital products and data as an asset. Likewise, the third option increases the visibility of the household's role in the production of digital content. All options avoid double counting the production of "free" digital products and mitigate imputed transactions, which have been cited as concerns in the development of a treatment for "free" digital products.

[1] This guidance note was drafted by Richard Heys (ONS), Dylan Rassier (BEA), and Cliodhna Taylor (ONS) as members of the ISWGNA Task Team on Digitalization. The note is based on an issue paper drafted by BEA in March 2020 on behalf of the Task Team, a guidance note prepared by the Task Team in June 2020 on recording and valuation of data in national accounts, and a paper prepared by the OECD on recording and valuing data. The note accompanies a separate guidance note prepared by Marshall Reinsdorf (retired) and Jennifer Ribarsky (IMF) on the current *SNA* treatment of "free" digital products (*DZ. 3 Treatment of "free" Digital Products in the "core" National Accounts*). This note also incorporates inputs from other Digitalization Task Team members, including Andreas Dollt and Nicola Massarelli (Eurostat), Erich Strassner and Rachel Soloveichik (BEA), John Mitchell (OECD), Marshall Reinsdorf (retired), Jennifer Ribarsky, Jim Tebrake, Margarida Martins and Slivia Matei (IMF), Ziad Ghanem (Statistics Canada), Sri Soelistyowati (BPS Indonesia), Stanimira Kosekova (ECB), Benson Sim (UNSD), and Kevin Fox (UNSW).

3. The content of the note uses feedback from consultation with the ISWGNA Digitalization Task Team on the March 2020 issue paper as well as the Task Teams' existing guidance note on data as an asset from June 2020 and OECD (2021) on recording and valuing data as an asset.

2. Existing Materials

4. "Free" products (digital and non-digital) produced by non-market producers are already included in GDP to ensure international comparability, although they are estimated in a number of ways across countries: 1) indirectly where input costs proxy for output, 2) direct measures of outputs (e.g., number of surgeries, number of children educated, etc.), or 3) directly with quality adjustment to reflect the change in the value of the service provided. Household consumption of the products is not recorded in individual consumption expenditure but is recorded in actual individual consumption as social transfers in kind from government and non-profit institutions.

5. Advertising-supported "free" products (digital and non-digital) produced by market producers (e.g., broadcast television, online platforms) are also included in GDP through the prices of advertised products. The *SNA* does not recommend disentangling prices of advertised products and unpriced products via symmetric adjustments. As a result, transactions recorded in the *SNA* are limited to advertising services and the advertised products for the relevant industries in the corporations sector, meaning household consumption of advertising-supported "free" products is not visible in the *SNA*. Likewise, in the case of "free" digital products that are provided to access observable phenomena (OPs), household participation in the provision of OPs is not visible in the *SNA*. Moreover, household production of user-generated content is also not visible in the *SNA*.

6. Reinsdorf and Ribarsky (ISWGNA 2021) provided a draft on the current *SNA* treatment of "free" digital products that was developed into *DZ. 3 Treatment of "free" Digital Products in the "core" National Accounts*. They point out that both platform and non-platform market producers often bundle items that are free or priced below cost with marked up items to maximize profits, and the bundle as a whole generates revenue that is commensurate with the amount of production taking place. They explain that digital platforms play an intermediary role by supplying "free" products that facilitate the interaction of two or more parties. There is a "funder side" and a "subsidized side" of such platforms. The funder side (e.g., an advertiser) pays a markup to the intermediary that covers the cost of the "free" products and then recovers that cost in the advertised product that it sells. The subsidized side (e.g., a household) indirectly pays for the use of the "free" products with the purchase of the advertised product. Reinsdorf and Ribarsky's (ISWGNA 2021) salient point is that the ubiquity of bundled digital and non-digital products should have a consistent treatment in the *SNA* central framework and there should be no different treatment for "free" digital products. Thus, **one option for an *SNA* satellite account on "free" digital products is to simply separate the value of the "free" digital product from the bundle to which is belongs**.

7. Mitchell, van de Ven, and Zwijnenburg (OECD 2021) distinguish "recording and processing" (R&P) costs from "observable phenomena procurement" (OP-P) costs in the development of a data asset, and the paper was developed into *DZ.6 Recording of Data in the National Accounts*. OPs are defined by observations that exist prior to any effort made to produce a data asset. R&P costs include the usual costs incurred for recording, organizing, storing, and

processing OPs to generate information content of value: the data asset is created only when OPs are converted through recording and processing into a useable form. The central theme of the OECD paper is to highlight the value of OPs as an input into the process to create a data asset, and how that value should be reflected in the accounts—as either a produced component in the data asset or a non-produced component somewhere else in the accounts. The paper identifies three ways of accessing OPs: 1) in exchange for "free" digital products, 2) in exchange for explicit payment, and 3) as a by-product of a primary production process. Thus, **a second option for an *SNA* satellite account on "free" digital products is to demonstrate the intersection of "free" digital products and data as an asset by showing the household's provision of OPs**.

8. The first two options do not include consideration for the household's production of user-generated content that is hosted by an online platform. While some user-generated content may be produced for the household's own consumption and fall outside the *SNA* production boundary as own-account services, there are two characteristics of user-generated content that merit additional consideration for the scope of an *SNA* satellite account. First, user-generated content may benefit the intermediary by attracting users and generating OPs used to produce a data asset and offer targeted advertising. Second, other households or other institutional units may consume user-generated content, which means the content would not fall within the *SNA* exclusion for household own-account services. These additional considerations imply the household may be engaged in production of output that may add to the value of an online platform's data asset if the output is used by the platform as intermediate consumption in the production of the data asset. Thus, **a third option for an *SNA* satellite account on "free" digital products is to show the production and use of user-generated content**.

3. Options Considered

9. In the literature generated by statistical offices and international organizations so far, there has not been any consensus to recognize "free" products in the *SNA* central framework. Thus, a discussion of their treatment is limited to development in an *SNA* satellite account.

3.1. Defining "Free" Products

10. Statistical discussions of "free" products often include assertions that "free" products do not impose a new challenge in national accounts because advertising-supported television and radio have been around for decades. However, this assertion misses the point that so much of "free" products today are made possible by digitalization and require that users of "free" digital products provide something of value in exchange—e.g., observable phenomena.[2] In addition, the users of "free" digital products may also participate in production. For example, a free platform such as Facebook carries content produced by users, which is key to Facebook's business model in terms of attracting new users and generating data used to target advertising.

11. A definition of "free" products can facilitate understanding for valuation and recording in an *SNA* satellite account. **Broadly, the scope of "free" products includes all digital and non-**

[2] This note does not articulate a distinction between "observable phenomena" and "data" because that distinction has been introduced in the Digitalization Task Team's separate guidance note on data as an asset (*DZ.6 Recording of Data in the National Accounts*).

digital content that is provided to users without monetary charge but where there does (or could) exist a paid-for market for the same (or very similar) product. The scope in this case includes advertising-supported broadcast television and radio that have been common for decades and includes both household users and business users. **As a subset of the first definition, the scope of "free" products includes digital content that is provided to households without monetary charge for the full value in order to access household observable phenomena that can be transformed into a data asset that can enrich the effectiveness of advertising messages or can be resold or otherwise used in production.** The scope in this narrow case excludes broadcast television and radio and excludes "free" digital products received by households that opt out of providing access to observable phenomena or are otherwise not required to provide access to observable phenomena.[3] However, the scope may include digital products obtained under the "freemium" model in which case the full value of the product is not included in the initial monetary charge but instead recovered through latter charges for additional functionality.

12. Under both definitions, the provision of content is financed with revenues generated by advertising efforts in exchange for products being placed in front of an audience. However, only with the narrower definition of "free" digital products do households provide access to OPs that have value for use in production.

3.2. Deciding the Scope of "Free" Products for a Satellite Account

13. To decide on the scope of "free" products for an *SNA* satellite account, the *SNA* definitions of *economic flows* and *transactions* are useful. *Economic flows* are defined in the *SNA* (para. 3.6) as reflecting "…the creation, transformation, exchange, transfer, or extinction of economic value; they involve changes in the volume, composition, or value of an institutional unit's assets and liabilities." *Transactions* are defined in the *SNA* (para. 3.7) as "…an economic flow that is an interaction between institutional units by mutual agreement or an action within an institutional unit that is analytically useful to treat like a transaction…"

14. In the past, households were subject to advertising messages in exchange for content provided through outlets such as broadcast television and radio. A household's contribution to the exchange was limited to passively waiting through the break in content. In this case, the exchange does not seem to fit the *SNA* definitions of an economic flow or transaction.[4] Thus, **this note excludes these "free" non-digital products from its scope.[5]**

15. With digitalization, households are still subject to advertising messages, but now the exchange takes place online and generally requires households to engage with a digital intermediary platform that is designed to collect observations that can be used either to design

[3] The scope could be expanded to include "free" digital products received by households that opt out of providing access to observable phenomena or are otherwise not required to provide access to observable phenomena.
[4] While the advertising may be successful in general terms across a population, the same cannot be said at the individual level and, thus, no individual transaction can take place. There is also no mechanism for the individual to participate in an economic exchange with the advertiser distinct from purchasing the advertised product.
[5] Issues related to the treatment of "free" non-digital products emerged in the context of the COVID-19 pandemic. In particular, the ISWGNA and AEG issued guidance on the macroeconomic statistical treatment of public and private sector responses to the pandemic. The guidance note can be accessed on the UNECE website at the following link: https://statswiki.unece.org/display/CCD2/Compilation+of+National+Accounts+in+times+of+COVID-19.

messages that more effectively target preferences or to resell or innovate in production. A household's contribution is expanded by providing access to informational content on changes in behavior – in the form of observable phenomena – as the platform algorithms present stimuli to keep the household engaged in exchange for "free" digital products. In this case, the exchange seems to fit the definition of an economic flow. Likewise, the exchange fits the *SNA* definition of a transaction if the household's engagement is considered mutual agreement.[6]

16. In the *SNA, mutual agreement* in a transaction implies prior knowledge and consent of the institutional units but does not necessarily require voluntary participation by the units (para. 3.53). The *SNA* asserts that transactions take so many different forms that any general definition is inevitably imprecise (para. 3.54). In the case of "free" digital products provided by intermediaries, a household's engagement is presumably based on prior knowledge and consent even if the household may be unaware of the full extent to which the intermediary uses the resulting household observable phenomena.[7] Thus, **this note includes the scope of "free" digital products under the narrow definition.**

17. The scope of transactions included in the *SNA* also includes barter transactions. The *SNA* defines a barter transaction as a transaction (para. 9.49) "…where one basket of goods and services is exchanged for another basket of different goods and services without any accompanying monetary payment…Values have to be estimated indirectly for goods and services exchanged in barter transactions equal to their market values." Thus, **this note treats the exchange of "free" digital products and user-generated content as a barter transaction**.[8]

18. While the provision of "free" digital products by digital intermediary platforms may satisfy the *SNA* definition of a transaction, the Digitalization Task Team generally preferred a treatment for "free" products in an *SNA* satellite account rather than a treatment in the *SNA* central framework.

19. There are three options that emerge for an *SNA* satellite account on "free" digital products: 1) an option that merely separates the value of "free" digital products that are already reflected in the value of advertised products under the current *SNA* treatment, 2) an option that demonstrates the linkages between "free" digital products and the production of a data asset, and 3) an option that shows the exchange of "free" digital products for digital content generated by household users of online platforms.

[6] This is particularly the case if platforms are required to obtain consent under GDPR and other equivalent legislation.
[7] In some cases, consent may be articulated through the clicking of a box to accept terms and conditions.
[8] Previous work suggests that advertising-supported "free" products should be treated as one side of a barter transaction with the other side being either production of "attention services" by households (Nakamura et al. 2017, Soloveichik 2020) or the production of "personal data" by households (Heys 2020). For this purpose, "personal data" are essentially akin to the concept of "observable phenomena". However, the ISWGNA Digitalization Task Team has not agreed on the introduction of attention services or personal data/observable phenomena by households as counterpart products.

3.3. Overview of the Options

20. There are three sectors utilized in the subsequent stylized examples: a household, a digital intermediary platform, and an advertiser. The intermediary develops a platform software asset and a database asset, which are used to access household OPs and produce a data asset to sell predictive advertising services to the advertiser sector. Under the current *SNA* treatment, the platform software and the database are included in the production and asset boundaries, but the data asset is excluded. In addition, the household is the sole consumer of the "free" digital products, the value of which is bundled with the value of the advertised products purchased by the household. In other words, there is no distinction made between the "free" digital products and the advertised products under the current *SNA* treatment.

21. Figure 1 presents an overview of the first satellite account option. Under this option, the household is still the sole consumer of the "free" digital products. However, separate values are reported for the "free" digital products and the advertised products, which requires an imputation for the value of the "free" digital products. There is no additional capital formation recognized for the data asset under this option.

22. Figure 2 presents an overview of the second and third satellite account options. Under these options, the household shares consumption of the "free" digital products with the intermediary. The household provides access to OPs in the form of information on marginal changes in its behavior as the platform algorithms present stimuli via "free" digital products to keep the household engaged. The OPs can be collected and used via the platform. In addition to the database asset that is already treated as capital formation in the *SNA* central framework, the intermediary produces a data asset with the household OPs accessed via the platform. The intermediary then uses both the database asset and the data asset to offer predictive advertising services in exchange for advertising revenue.

23. Valuation of the flows is necessary for compilation of an *SNA* satellite account. Following Heys (2020), the red squares in figures 1 and 2 denote the following alternatives to estimate values:

- Value 1 is the intermediary's cost of producing the "free" digital products.
- Value 2 is the value the household places on the "free" digital products received.
- Value 3 is the household's "willingness to accept" price for providing access to OPs.
- Value 4 is the value the intermediary places on the access to OPs for production of the data asset that is used to offer predictive advertising services.

24. Assuming the intermediary is rational, values 1 and 4 will be equal because the intermediary will invest in the platform software up to the point where producing the "free" digital products is equal to the value the intermediary places on access to OPs. Likewise, values 2 and 3 will be of equal and opposite values because the household will accept "free" digital products up to the point where the marginal value of the "free" products equals the household's "willingness to accept" price for access to OPs.

25. The equalities of values 1 and 4 and values 2 and 3 have three implications. First, a rational intermediary will provide "free" digital products up to the value of the resulting flows of OPs.

Second, the household will use "free" digital products until the costs of providing OPs is too great. As a result, the "willingness to accept" price is the lower bound value for the "free" digital products. Third, under the second option, a new flow results for an imputed transfer of OPs from the household to the intermediary in light of the household final consumption that is displaced by the intermediate consumption of the intermediary.

26. None of the options consider how to account for the implicit transfers between users of "free" digital products and consumers who pay higher prices for advertised products, which is only relevant if the parties are in different institutional sectors. Neither the *SNA* central framework nor the *SNA* satellite account proposes recording the transfers because the practical task of imputing such transfers would likely be infeasible.

3.4. Current Treatment of "Free" Digital Products in the *SNA* Central Framework

27. Figure 3 presents an example sequence of accounts for the current treatment of "free" digital products in the *SNA* central framework. In the example, a digital intermediary develops a platform software asset worth $150 on own account that is designed to offer the household "free" digital products (such as search services or social media services) worth $20 to access household OPs. The intermediary also develops a database asset worth $60 on own account. For simplicity, assume the platform software and database values include only labor costs. In addition, the database value excludes $15 of labor costs associated with recording and processing OPs. Thus, total compensation in the example is $225 ($150 + $60 + $15). The intermediary uses insights on the household's behavior embodied in data to sell predictive advertising services worth $275 to an advertiser that produces an advertised product worth $300. The $275 and $300 each include the actual value of the advertising services and the value of the "free" digital products. Overall, GDP for the economy is $510 and net lending/borrowing is zero because there are no external transactions.

28. Figure 3 shows the predictive advertising services are recorded as output for the intermediary and as intermediate consumption for the advertiser. The intermediary's output of own-account assets is also recorded in the production account with uses recorded in the capital account. In addition, the advertiser's sales of the advertised product are recorded in the production account accompanied by final consumption expenditure by the household in the use of income account.

29. Under the current *SNA* treatment, the role of the household is limited to the final consumption of the bundled "free" digital product and advertised product. There is nothing recorded separately for the "free" digital product consumed by the household or for the household's provision of OPs because those flows are not observed in any market transactions. Thus, inclusion of flows for the household's role would require imputed values. Nevertheless, any economic activity embodied in the transactions is currently reflected in value-added of the digital intermediary and the advertiser. In contrast, the value of the data asset produced by the intermediary is currently excluded from the *SNA* production and asset boundaries, so including values for the data flows would have an upward effect on production measures through the valuation of the data asset. The next two sections demonstrate each of the three *SNA* satellite account options considered for this note.

3.5. *SNA* Satellite Account Option 1 – Baseline

30. Figure 4 demonstrates the baseline option for an *SNA* satellite account, which builds on the current *SNA* treatment from figure 3. For this option, the value of "free" digital products may be imputed using a sum of costs method and then the value of the advertising services may be calculated as a residual. The values in the accounts under this option are exactly the same as the current *SNA* treatment except line items are added for the imputed value of the "free" digital products, which are shown at $20 and the residual values of the advertising services and advertised product are $255 and $280, respectively.

31. *Household Accounts*: The only change for the household accounts is the separate line items for the advertised product and "free" digital products highlighted in pink in the use of income account. An additional counterpart line item is also shown for demonstration in the financial account, which is unlikely to be recorded in the satellite because actual payments do not change.

32. *Digital Intermediary Accounts*: The intermediary accounts also include separate line items for advertising services and "free" digital products highlighted in yellow in the production account and the financial account.

33. *Advertiser Accounts*: Changes to the accounts for the advertiser are highlighted in green. In this case, only the residual values of advertising services and the advertised product are recorded in the production account, and the value of the "free" digital products are left out because they are already included in the digital intermediary accounts. An advantage of this presentation is that it demonstrates the output and consumption of "free" digital products is limited to the intermediary and household sectors. A disadvantage of the presentation is that it creates a discrepancy between recorded values in the production account and actual payments in the financial account. However, none of the balancing items are affected.

3.6. *SNA* Satellite Account Option 2 – Linkages between "Free" Digital Products and Data as an Asset

34. Figure 5 builds on the baseline option from figure 4 to demonstrate the option for linkages between "free" digital products and the production of a data asset. The values in the accounts under this option are the same as the baseline option except line items are added for the value of a data asset measured with R&P costs and OP-P costs. R&P costs include labor costs at a value of $15. In addition, half the value of the "free" digital products is attributed to OP-P costs – i.e., $10 – in anticipation of the costs associated with the data collection aspect of "free" digital products.[9]

35. *Household Accounts*: Since half the value of the "free" digital products is attributed to OP-P costs, half remains for final consumption by the household. Actual payments made by the household amount to $300, but the value of final consumption expenditure has declined by $10 to $290, so an imputed transfer of OPs payable is recorded for the household to account for the value

[9] For example, a digital intermediary makes a data-harvesting mobile game that is valued at 20 based on labor spent making the game. Of the 20, half of the time is spent making the data collection aspect of the game, so there is investment of 10 to procure OPs. Meanwhile, the remaining 10 is spent making the actual game aspects, which are consumed by the household.

of displaced final consumption of "free" digital products. The transfer is classified as a current transfer, assuming OPs are not assets in the household sector, which may or may not be the case.

36. *Digital Intermediary Accounts*: The accounts for the digital intermediary reflect three changes from the baseline option. First, the value of the R&P costs for the data asset are recorded as output in the production account and as gross fixed capital formation in the capital account. As a result, the balancing items (except net lending/borrowing) for the intermediary accounts increase by $15. Second, the intermediary uses the $10 of "free" digital products as intermediate consumption in the production of the data asset, which also adds to the output and gross fixed capital formation of the intermediary under a sum of costs method. Economically, this reflects that "free" digital products are produced for the purpose of obtaining access to OPs. Third, since actual payments in the financial account do not change, an imputed transfer of OPs receivable by the intermediary is necessary to account for the value of "free" digital products reclassified from final consumption to intermediate consumption.

37. *Advertiser Accounts*: The accounts for the advertiser do not change from the baseline option.

3.7. *SNA* Satellite Account Option 3 – User-generated Content

38. Figure 6 builds on the linkages demonstrated in figure 5 to include user-generated content. The values in the accounts under this option are still the same as the previous options except line items are added for the value of user-generated content at $5. In addition, half the value of final consumption of the "free" digital products is now attributed to production of user-generated content—i.e., $5.

39. *Household Accounts*: A production account is added to the household sector to reflect production of user-generated content. The household uses $5 of "free" digital products as intermediate consumption in the production of content. The value of the output of content is equal to the value of the intermediate consumption, so value-added is zero.[10] Since final consumption expenditure on "free" digital products declines by the $5 that is now used as intermediate consumption, the imputed transfer of OPs payable increases from $10 to $15.

40. *Digital Intermediary Accounts*: The digital intermediary uses the $5 of user-generated content as intermediate consumption in the production of the data asset, which adds to the value of the OP-P costs component of the data asset (and to the output and gross fixed capital formation of the intermediary) under a sum of costs method. In addition, the imputed transfer of OPs receivable increases from $10 to $15.

41. *Advertiser Accounts*: The accounts for the advertiser do not change from the previous options.

[10] As an alternative, the household may generate non-zero value-added in the production of user-generated content, in which case any additional resources generated by the household in the Primary Income Account would be consumed by either the household sector as final consumption in the Use of Income Account or the intermediary sector as intermediate consumption in the Production Account, with equally offsetting entries for the imputed transfer of OPs in the Secondary Income Account.

3.8. Comparing the Options

42. All options increase the visibility of the household's role in the consumption of "free" digital products. The second and third options increases the visibility of the intersection of "free" digital products and data as an asset. Likewise, the third option increases the visibility of the household's role in the production of digital content. All options avoid double counting output and value-added in the production account and thus, avoid double counting for aggregates in other accounts by disentangling the "free" digital products from both the advertising services and the advertised product. Finally, all options offer a single sum of costs measure for imputed "free" digital products, which reflects activity already recorded in the central *SNA* framework and mitigates significant imputed transactions for income and consumption.

43. Balancing items under the baseline option are the same as those under the current *SNA* treatment of "free" digital products. The second and third options yield higher value-added, operating surplus, balance of primary incomes, disposable income, and saving for the intermediary accounts and the total economy accounts as a result of the intermediary's production of a data asset. However, net lending/borrowing are the same as the current *SNA* treatment for all accounts.

3.9. Measurement Considerations

44. Measurement could start with a sum of costs method for each of the values required in the satellite account: 1) data flows, 2) "free" digital products, and 3) user-generated content. Under a sum of costs method, the value includes labor costs, capital costs, and intermediate consumption associated with their production. For market producers, capital costs should include consumption of fixed capital and a return to capital. If properly estimated, the sum of costs approximates a market value, or at least a feasible lower bound estimate.

45. A sum of costs method is recommended for databases in the *SNA* (para. 10.113) and for data flows in the guidance note on data as an asset (*DZ.6 Recording of Data in the National Accounts*). Likewise, Nakamura et al. (2017) use a sum of costs method to value "free" digital content, which could be adapted to the measures introduced in this note.[11]

4. Recommended Approach and Changes to the 2008 *SNA*

46. Given the Digitalization Task Team's work on data as an asset and tentative plans to revise the *SNA* to include data in the scope of the *SNA* boundaries, the third option is recommended for an *SNA* satellite account on "free" digital products. Since the scope of the note is limited to developing a satellite account, there are no changes required in the *2008 SNA*.

[11] While the scope of "free" digital content in Nakamura et al. (2017) is consistent with the broad definition in section 3.1, the same measurement could be applied under the narrow definition used in this note.

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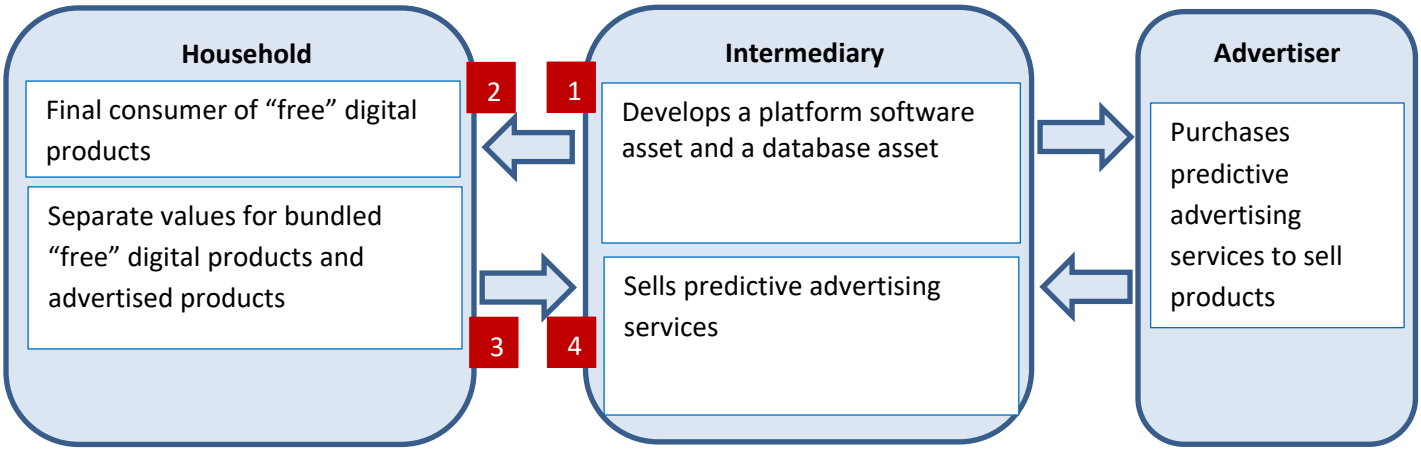
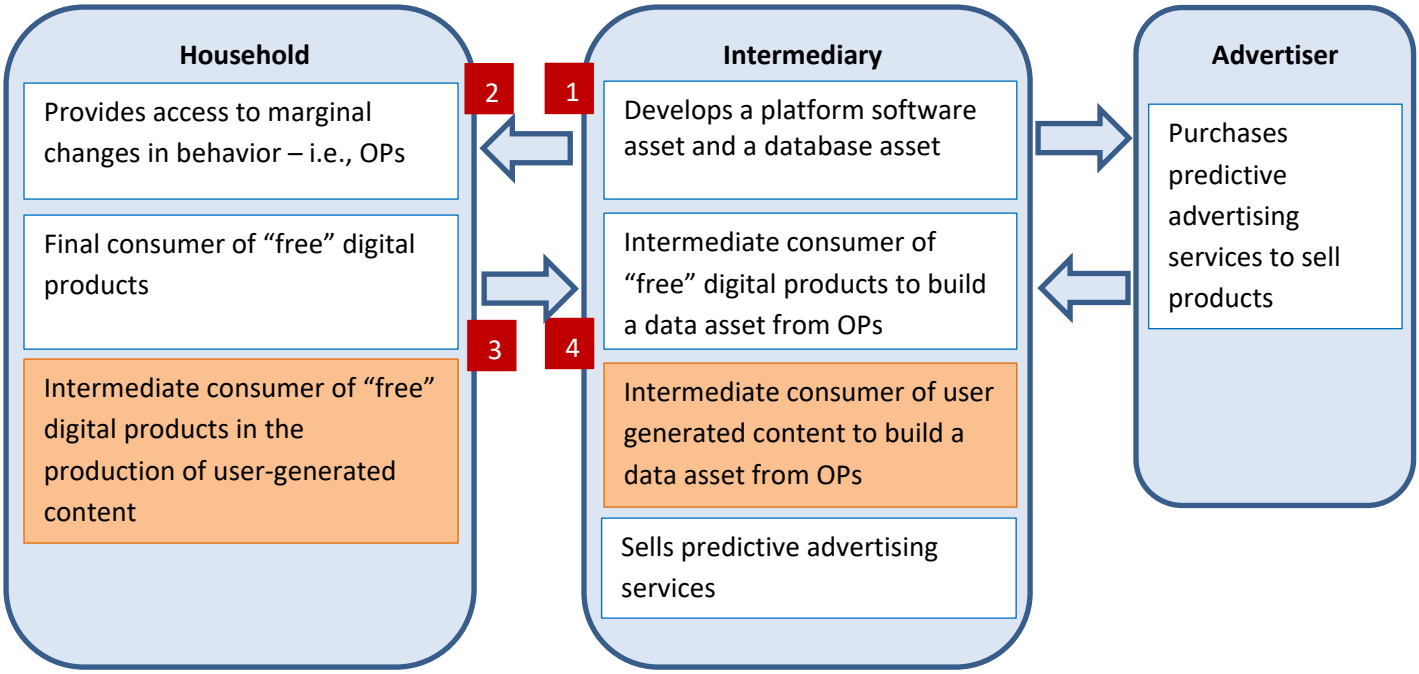
Figure 1: Separate Values for "Free" Digital Products and Advertised Products



Source: Adapted from Heys (2020).

Figure 2: Linkages between "Free" Digital Products and Data as an Asset



Source: Adapted from Heys (2020).

Figure 3: Current Treatment of "Free" Digital Products – *SNA* Central Framework

		Household		*Intermediary*		*Advertiser*		*Total Economy*	
				Uses	Resources	Uses	Resources	Uses	Resources
Production Account	Output				485		300		785
	Predictive ad services				275				275
	Software (platform asset)				150				150
	Software (database asset)				60				60
	Advertised product						300		300
	Intermediate consumption			0		275		275	
	Predictive ad services					275		275	
	Value-added			485		25		510	
				Uses	Resources	Uses	Resources	Uses	Resources
Generation of Income Account	Value-added				485		25		510
	Compensation			225				225	
	Operating Surplus			260		25		285	
		Uses	Resources	Uses	Resources	Uses	Resources	Uses	Resources
Primary Income Account	Operating surplus		0		260		25		285
	Compensation		225						225
	Balance of primary incomes	225		260		25		510	
		Uses	Resources	Uses	Resources	Uses	Resources	Uses	Resources
Secondary Income Account	Balance of primary incomes		225		260		25		510
	Transfers								
	Disposable income	225		260		25		510	
		Uses	Resources	Uses	Resources	Uses	Resources	Uses	Resources
Use of Income Account	Disposable income		225		260		25		510
	Final consumption expenditure	300		0		0		300	
	Advertised product	300						300	
	Saving	-75		260		25		210	
		Assets	Liabilities	Assets	Liabilities	Assets	Liabilities	Assets	Liabilities
Capital Account	Saving		-75		260		25		210
	Gross fixed capital formation	0		210		0		210	
	Software (platform asset)			150				150	
	Software (database asset)			60				60	
	Net lending(+)/borrowing(-)	-75		50		25		0	
		Assets	Liabilities	Assets	Liabilities	Assets	Liabilities	Assets	Liabilities
Financial Account	Net lending(+)/borrowing(-)		-75		50		25		0
	Net acquisitions	225	300	275	225	300	275	800	800
	Predictive ad services			275			275	275	275
	Advertised product		300			300		300	300
	Compensation	225			225			225	225

Figure 4: *SNA* Satellite Account Option 1 – Baseline

		Household		*Intermediary*		*Advertiser*		*Total Economy*	
				Uses	Resources	Uses	Resources	Uses	Resources
Production Account	Output				485		280		765
	Predictive ad services				255				255
	"Free" products				20				20
	Software (platform asset)				150				150
	Software (database asset)				60				60
	Advertised product						280		280
	"Free" products								0
	Intermediate consumption			0		255		255	
	Predictive ad services					255		255	
	"Free" products							0	
	Value-added			485		25		510	
				Uses	Resources	Uses	Resources	Uses	Resources
Generation of Income Account	Value-added				485		25		510
	Compensation			225				225	
	Operating Surplus			260		25		285	
		Uses	Resources	Uses	Resources	Uses	Resources	Uses	Resources
Primary Income Account	Operating surplus		0		260		25		285
	Compensation		225						225
	Balance of primary incomes	225		260		25		510	
		Uses	Resources	Uses	Resources	Uses	Resources	Uses	Resources
Secondary Income Account	Balance of primary incomes		225		260		25		510
	Transfers								
	Disposable income	225		260		25		510	
		Uses	Resources	Uses	Resources	Uses	Resources	Uses	Resources
Use of Income Account	Disposable income		225		260		25		510
	Final consumption expenditure	300		0		0		300	
	Advertised product	280						280	
	"Free" products	20						20	
	Saving	-75		260		25		210	
		Assets	Liabilities	Assets	Liabilities	Assets	Liabilities	Assets	Liabilities
Capital Account	Saving		-75		260		25		210
	Gross fixed capital formation	0		210		0		210	
	Software (platform asset)			150				150	
	Software (database asset)			60				60	
	Net lending(+)/borrowing(-)	-75		50		25		0	
		Assets	Liabilities	Assets	Liabilities	Assets	Liabilities	Assets	Liabilities
Financial Account	Net lending(+)/borrowing(-)		-75		50		25		0
	Net acquisitions	225	300	275	225	300	275	800	800
	Predictive ad services			255			255	255	255
	"Free" products		20	20		20	20	40	40
	Advertised product		280			280		280	280
	Compensation	225			225			225	225

Figure 5: *SNA* Satellite Account Option 2 – Linkages between "Free" Digital Products and Data as an Asset

		Household		*Intermediary*		*Advertiser*		*Total Economy*	
				Uses	Resources	Uses	Resources	Uses	Resources
	Output				510		280		790
	Predictive ad services				255				255
	"Free" products				20				20
	Software (platform asset)				150				150
	Software (database asset)				60				60
Production Account	Software (data asset-R&P)				15				15
	Software (data asset-OP-P)				10				10
	Advertised product						280		280
	Intermediate consumption			10		255		265	
	Predictive ad services					255		255	
	"Free" products			10				10	
	Value-added			500		25		525	
				Uses	Resources	Uses	Resources	Uses	Resources
Generation of Income Account	Value-added				500		25		525
	Compensation			225				225	
	Operating Surplus			275		25		300	
		Uses	Resources	Uses	Resources	Uses	Resources	Uses	Resources
Primary Income Account	Operating surplus		0		275		25		300
	Compensation		225					0	225
	Balance of primary incomes	225		275		25		525	
		Uses	Resources	Uses	Resources	Uses	Resources	Uses	Resources
Secondary Income Account	Balance of primary incomes		225		275		25		525
	Imputed transfer of OPs	10			10			10	10
	Disposable income	215		285		25		525	
		Uses	Resources	Uses	Resources	Uses	Resources	Uses	Resources
	Disposable income		215		285		25		525
Use of Income Account	Final consumption expenditure	290		0		0		290	
	Advertised product	280						280	
	"Free" products	10						10	
	Saving	-75		285		25		235	
		Assets	Liabilities	Assets	Liabilities	Assets	Liabilities	Assets	Liabilities
	Saving		-75		285		25		235
	Gross fixed capital formation	0		235		0		235	
	Software (platform asset)			150				150	
Capital Account	Software (database asset)			60				60	
	Software (data asset-R&P)			15				15	
	Software (data asset-OP-P)			10				10	
	Net lending(+)/borrowing(-)	-75		50		25		0	
		Assets	Liabilities	Assets	Liabilities	Assets	Liabilities	Assets	Liabilities
	Net lending(+)/borrowing(-)		-75		50		25		0
	Net acquisitions	225	300	275	225	300	275	800	800
	Predictive ad services			255			255	255	255
Financial Account	"Free" products		20	20		20	20	40	40
	Advertised product		280			280		280	280
	Compensation	225			225			225	225

Figure 6: *SNA* Satellite Account Option 3 – User-generated Content

		Household		*Intermediary*		*Advertiser*		*Total Economy*	
		Uses	Resources	Uses	Resources	Uses	Resources	Uses	Resources
Production Account	Output		5		515		280		800
	Predictive ad services				255				255
	"Free" products				20				20
	Software (platform asset)				150				150
	Software (database asset)				60				60
	Software (data asset-R&P)				15				15
	Software (data asset-OP-P)				15				15
	Advertised product						280		280
	User-generated content		5						5
	Intermediate consumption	5		15		255		275	
	Predictive ad services					255		255	
	"Free" products	5		10				15	
	User-generated content			5				5	
	Value-added	0		500		25		525	
		Uses	Resources	Uses	Resources	Uses	Resources	Uses	Resources
Generation of Income Account	Value-added		0		500		25		525
	Compensation			225				225	
	Operating Surplus	0		275		25		300	
		Uses	Resources	Uses	Resources	Uses	Resources	Uses	Resources
Primary Income Account	Operating surplus		0		275		25		300
	Compensation		225					0	225
	Balance of primary incomes	225		275		25		525	
		Uses	Resources	Uses	Resources	Uses	Resources	Uses	Resources
Secondary Income Account	Balance of primary incomes		225		275		25		525
	Imputed transfer of OPs	15			15			15	15
	Disposable income	210		290		25		525	
		Uses	Resources	Uses	Resources	Uses	Resources	Uses	Resources
Use of Income Account	Disposable income		210		290		25		525
	Final consumption expenditure	285		0		0		285	
	Advertised product	280						280	
	"Free" products	5						5	
	Saving	-75		290		25		240	
		Assets	Liabilities	Assets	Liabilities	Assets	Liabilities	Assets	Liabilities
Capital Account	Saving		-75		290		25		240
	Gross fixed capital formation	0		240		0		240	
	Software (platform asset)			150				150	
	Software (database asset)			60				60	
	Software (data asset-R&P)			15				15	
	Software (data asset-OP-P)			15				15	
	Net lending(+)/borrowing(-)	-75		50		25		0	
		Assets	Liabilities	Assets	Liabilities	Assets	Liabilities	Assets	Liabilities
Financial Account	Net lending(+)/borrowing(-)		-75		50		25		0
	Net acquisitions	225	300	275	225	300	275	800	800
	Predictive ad services			255			255	255	255
	"Free" products		20	20		20	20	40	40
	Advertised product		280			280		280	280
	Compensation	225			225			225	225