

**STATISTICS**

# Digitalization

**MARCH 6-7, 2024**

**IMF Statistics Department – United Nations  
Economic Commission for Europe  
SNA / BPM Joint Virtual Outreach Seminar**

# Lecture Outline

- ✓ **Motivation**
- ✓ **Content of the 2025 SNA Chapter 22/BPM7 Chapter 16 Digitalization**
  - ✓ A. Digital Products
  - ✓ B. Digital Platforms
  - ✓ C. Digitalization and the Financial system
  - ✓ D. Measuring Prices and Volumes of Products affected by Digitalization
  - ✓ E. Analytical Tools to Increase the Visibility of Digitalization

# Motivation

This Chapter is a new addition resulting from the update process of the SNA and BPM Manuals.

- Give **visibility** of the impact of digitalization on production, consumption, investment, trade, process, finance, communication, and other aspects of the economy and relevant cross-border transactions.
- Provide **guidelines** to measure digital products in accordance with the broad conceptual framework of the SNA/BPM.
- Explain the **measurement** of products and assets that have emerged as part of digitalization and provide a **consolidated view** of measuring and reporting on key aspects of digitalization.

# Content of Chapter 22. Digitalization

## A. Digital Goods and Services

1. Cloud computing
2. Data assets
3. Artificial intelligence
4. Nonfungible tokens

## B. Digital platforms

1. Nonfinancial digital intermediary platforms (DIPs)
2. Free digital platforms and free digital products
  - Free products supplied by non-platforms firms
  - Free Digital Platforms
  - User-generated content
  - Free Software
  - Increasing visibility of Free Digital Platforms and Products

## C. Digitalization and the Financial System

1. New Financial Services and Means of Payment Enabled by Digitalization
2. Financial Digital Intermediation Platforms
3. Digital Assets, including Fungible Crypto Assets

## D. Measuring Prices and Volumes of Products affected by Digitalization

- Measuring quality change in ICT goods and goods with ICT components
- Software and data
- Cloud computing
- Internet and telecommunications services
- E-commerce and digital intermediation platforms
- Expanded access to variety and customization
- Free digital products

## E. Analytical Tools to Increase the Visibility of Digitalization

1. Thematic Account on the Digital Economy
2. Digital Supply and Use Tables
3. Extended Account to Increase the Visibility of the Free Services of Digital Platforms Consumed by Households

# A. Digital Products (1)

## Cloud Computing



Computing, data storage, software, and related IT services accessed remotely over a network, supplied on demand and with measured resource usage.

1. **Infrastructure-as-a-service (IaaS)** - access to hardware
2. **Platform-as-a-service (PaaS)** - access to a software platform
3. **Software-as-a-service (SaaS)** - access to the application software

**Business process as a service (BPaaS)** - specialized software used to automate common business functions or tasks

## Data assets



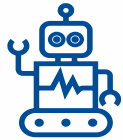
**Data has become an important type of produced intangible asset.**

Data as an asset means information content produced by accessing and observing phenomena and recording, organizing and storing information elements. These assets are produced when information on observable phenomena (OP) such as facts, behaviors, and characteristics are recorded, organized, and stored in digital format.

Data that is expected to be used in production for more than one year is conceptually a fixed asset (IPP).

# A. Digital Products (1)

## Artificial intelligence



AI means capabilities of a computer program, or system controlled by a computer program, of recognition, reasoning, communication, and prediction that emulate human recognition, reasoning, and communication. AI programs may also be capable of learning.

AI systems are distinguished as a special type of software within a class of intellectual property product identified as “Computer Software, including Artificial Intelligence Systems”, with the separate reporting of AI encouraged as an “of which” item.

## Nonfungible tokens



Digital records hosted on a blockchain that are associated with a digital or physical asset or product but that are distinct from that asset or product. NFTs certify ownership of rights to use and benefit from the asset and may also serve to certify the asset’s authenticity.

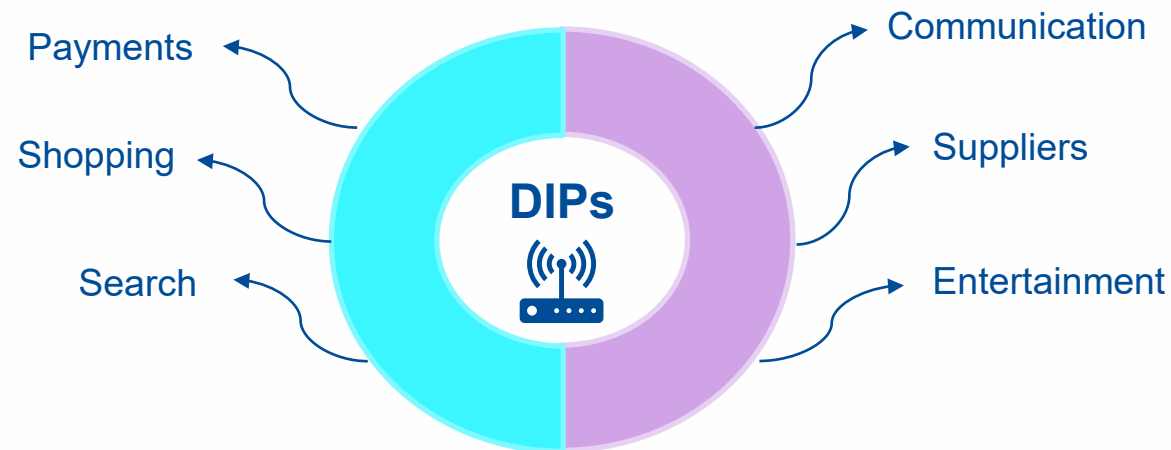
- (1) NFTs that convey no ownership rights → (SNA Consumption) ; (BOP-computer and information services)
- (2) NFTs that convey limited ownership rights → Non-produced, nonfinancial assets: contracts, leases and licenses
- (3) NFTs that convey full ownership rights → purchase of the underlying asset (digital or physical).  
>>> For the BOP: digital--(goods or computer services)

## B. Digital Platforms

- Operators of digital platforms are service providers that facilitate interactions via the internet between two or more distinct but interdependent sets of users (either firms or individuals).
- Digitally-enabled services of matching producers with consumers or funders with borrowers are known as digital intermediation.

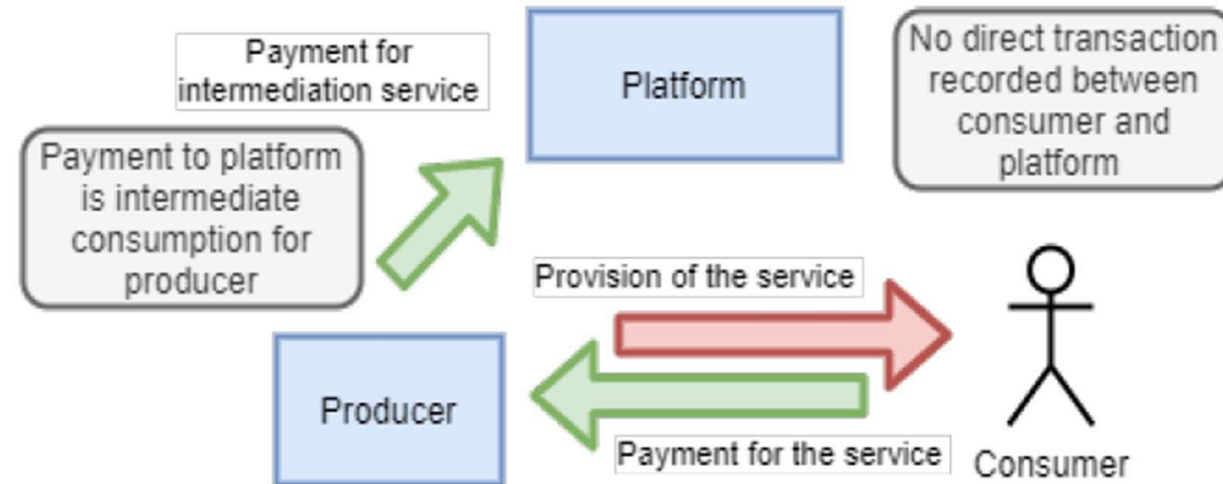
There are three types of digital platforms:

- a) Nonfinancial digital intermediation platforms (DIPs) facilitate transactions between buyers and sellers for the ordering and delivery of goods and services for a fee or commission, without taking ownership of the goods or rendering the services that are intermediated.
- b) Free digital platforms facilitate non-commercial interactions between users or provide entertainment and information services and are usually funded by advertising and the collection of data on their users.
- c) Financial digital intermediation platforms mediate funding or payment transactions. Financial DIPs are discussed below in the section on digitalization and the financial system.



## Nonfinancial DIPs (2)

- The output of the DIP consists only of the digital intermediation services, which are recompensed through a fee or commission.
- A rerouting is needed to include a direct sale of the output of the producers using the platform to the buyers using the platform and a purchase by those producers of intermediation services supplied by the platform.





# Digital Trade

- International trade in goods and services includes digital trade.
- Digital trade comprises *all international trade that is digitally ordered and/or digitally delivered*.
- Digitally ordered trade is aligned with the *2009 OECD definition of e-commerce* but focusing only on international transactions in goods and services.
- Both goods and services can be digitally ordered whereas only services can be digitally delivered.
- Digital trade is often facilitated by a digital intermediation platform (online marketplace) that charges a fee for the intermediation service

# Free digital platforms and free digital products

- Digitalization has been marked by the emergence of free digital platforms as part of daily life and a general expansion in the availability of free digital products.
- The SNA framework values the free outputs of nonmarket producers such as nonprofit institutions funded by donations by the cost of production. However, this approach does not apply to free digital products in general because many are supplied by a commercial enterprise.
- The outputs of commercial enterprises are valued by their price, which is zero in the case of a free product.
- Free products supplied by market producers are included in GDP as part of the price of other products they help sell or with which they are bundled either directly or indirectly.
- Taken together, the items in the bundle generate at least enough revenue to cover the operating costs of the supplier of the free product, so the overall output of the supplier of the free digital product is not undermeasured.
- Both platforms and non-platforms supply digital products.

# Free digital platforms and free digital products (1)

## Free products supplied by non-platforms firms

Suppliers of digital products frequently adopt a “freemium” pricing strategy, in which a free basic version of the product promotes sales of upgrades or a premium version of the product.

The price of the promoted output, includes a mark-up that covers the cost of supplying the free output that has facilitated its sale.

## Free Digital Platforms

Some digital platforms (such as public wikis created and maintained by volunteers) are owned by NPISHs and operate as non-market producers (social media, search, and access to content providing entertainment and information).

Most free platforms are commercial enterprises funded by advertising and monetizing user data. Multi-sided commercial platforms often charge a price for their services to the users on one side of the platform and supply free services to the users on the other side of the platform, to attract and retain these users.

# Free digital platforms and free digital products (2)

## Free Software

- Free software products are often used by households for final consumption, or in production. Copies of free software are frequently supplied across borders.
- App stores are a type of DIP where the service that is intermediated is often free. Free and subsidized apps used by households may be funded by advertising, data monetization, or other services whose use they facilitate. The services of apps funded by advertising are purchased indirectly as part of the price of the advertised product.
- Open-source software developed by corporations is usually funded through sale of complementary services, such as training and support, or by other products it helps sell.
- Free software developed by individuals working independently (unpaid production) is outside the SNA production boundary.

## Increasing visibility of Free Digital Platforms and Products

Alternative measures of household final consumption expenditures and the output of free digital platforms may be presented in an extended account on free digital platforms.

# Free digital platforms and free digital products (3)

## User-generated content

- Users of free platforms frequently create user-generated content such as videos, articles, photos, etc. both for leisure activity and commercial purposes.
- Creating content for leisure is outside the SNA production boundary. Unless the creator receives remuneration, user-generated content is assumed to have been created for leisure purposes.
- Households that receive monetary remuneration for their uploaded content can be considered unincorporated household enterprises supplying services. If the purchaser is a non-resident, these services should be included in exports of services.

# Digitalization in the Financial system

## New Financial Services and Means of Payment Enabled by Digitalization.

The new digital financial services fall within existing categories of products, and the new digital payment mechanisms fall within existing asset categories.

- Financial digital intermediation platforms,
- Crypto currency exchanges,
- Digital providers of insurance services (InsurTech),
- Digital banking platforms operating solely online (neobanks),
- Emoney issuers, and
- Online only foreign exchange bureaus and money transfer operators.

## Financial Digital Intermediation Platforms

Provide matching services and facilitate financial transactions between suppliers of funds and users of funds.

They receive fees or commissions for their services and are classified as financial auxiliaries (S126).

## Digital Assets, including Fungible Crypto Assets

Digital assets are digital representations of value recorded on a cryptographically secured distributed ledger or using a similar technology.

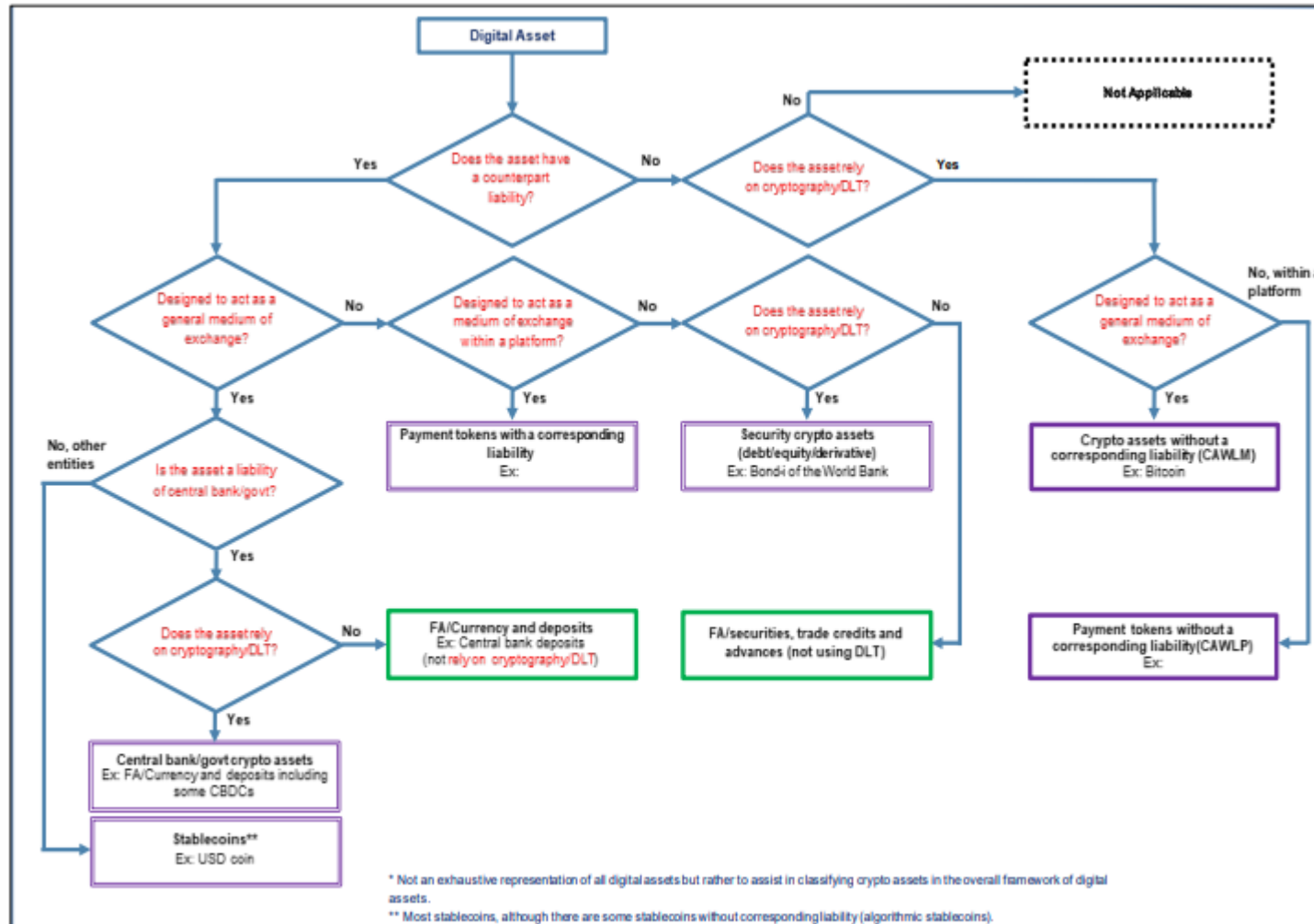
Include crypto assets and CBDCs, which may be designed as crypto assets, but which do not necessarily use crypto asset technology.

Crypto assets are digital representations of value that use cryptography and distributed ledger technology (DLT) such as blockchains to enable parties to transact directly with each other without the need for a trusted intermediary.

Crypto assets with a corresponding liability = Financial assets

Crypto assets without corresponding liability = Nonproduced nonfinancial assets.

# C. Decision tree to classify digital assets



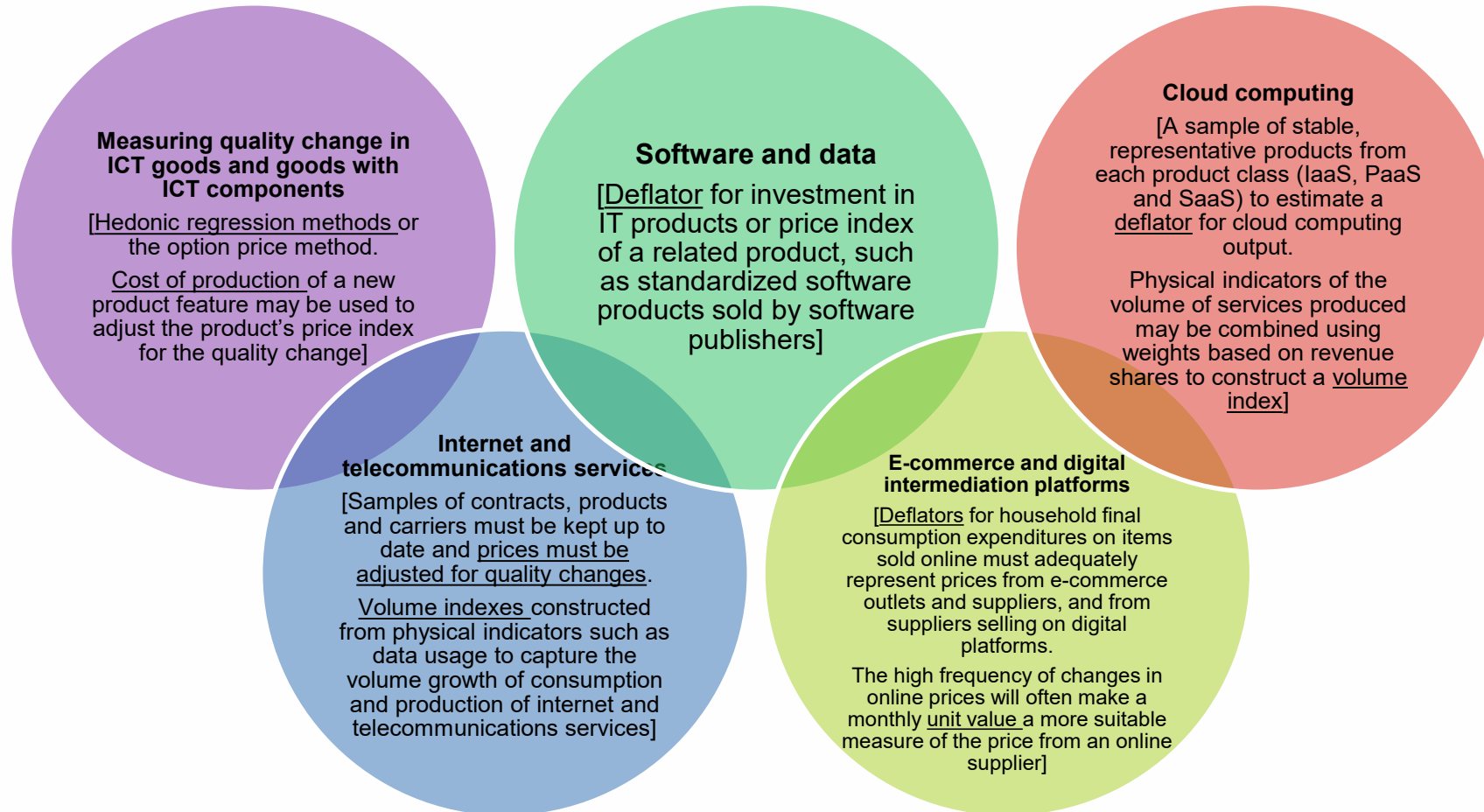
Note: Nonfungible crypto assets are not covered in this decision tree.

## D. Measuring Prices and Volumes of Products affected by Digitalization

- Many measurement challenges arising from digitalization involve prices and volumes rather than the output at current prices.
- Price and volume measurement challenges are particularly common for products affected by digitalization because price change is straightforward to measure only when the products and their characteristics remain static.
- To capture the price and volume impact of quality changes in digital products, the prices of new models must be adjusted for the value of their quality difference from the models they replace.
- The commonly used “matched models” should be adjusted by introducing models of products benefiting from advances in digital technology that often offer substantially improved quality at about the same price as the model they replaced.
- Hedonic regression models relating the price to the product’s characteristics are a recommended method for adjusting prices for quality change.
- Another technique used to adjust the price of a digital good for a quality change is options pricing, which averages observations on the differences in the price of the item caused by a characteristic offered as an option.



# D. Measuring Prices and Volumes of Products affected by Digitalization



## E. Analytical Tools to Increase the Visibility of Digitalization

### Thematic Account on the Digital Economy

The main purpose of the thematic account and the accompanying Digital SUTs is to increase the visibility of activities, products and transactions affected by digitalization that are subsumed in broader aggregates in the standard classifications of the national accounts.

A thematic account can communicate the key information from the digital SUTs in a convenient and effective format. In this account the items that are most important for understanding the structure of the domestic economy and its uses of digital products should be prioritized.

### Digital Supply and Use Tables

Digital SUTs analyze the impact of digitalization on the economy along three dimensions: type of transaction, type of product, and type industry.

The Digital SUTs start with the conventional SUTs and add rows on digital transactions and products and columns on new digital industries.

### Extended Account to Increase the Visibility of the Free Services of Digital Platforms Consumed by Households

Extended accounts are a flexible tool for presenting concepts that extend SNA boundaries, including expanded measures of economic activity and household final consumption expenditures that extend the production boundary.

Households' consumption of the free services of advertiser-funded digital platforms can be included in an extended account as part of expanded measures of household final consumption expenditures and output.

**Thank you!**