DEPARTMENT OF STATISTICS SINGAPORE
Empowering You with Trusted Data

# Singapore's Journey in Measuring the Digital Economy

**Singapore Department of Statistics (DOS)**

Webinar series on Digitalisation in the 2025 System of National Accounts

17 March to 7 April 2026

# Content

# 01 Why Digital Economy Matters in Singapore

## Digitalisation is an important driver of economic growth

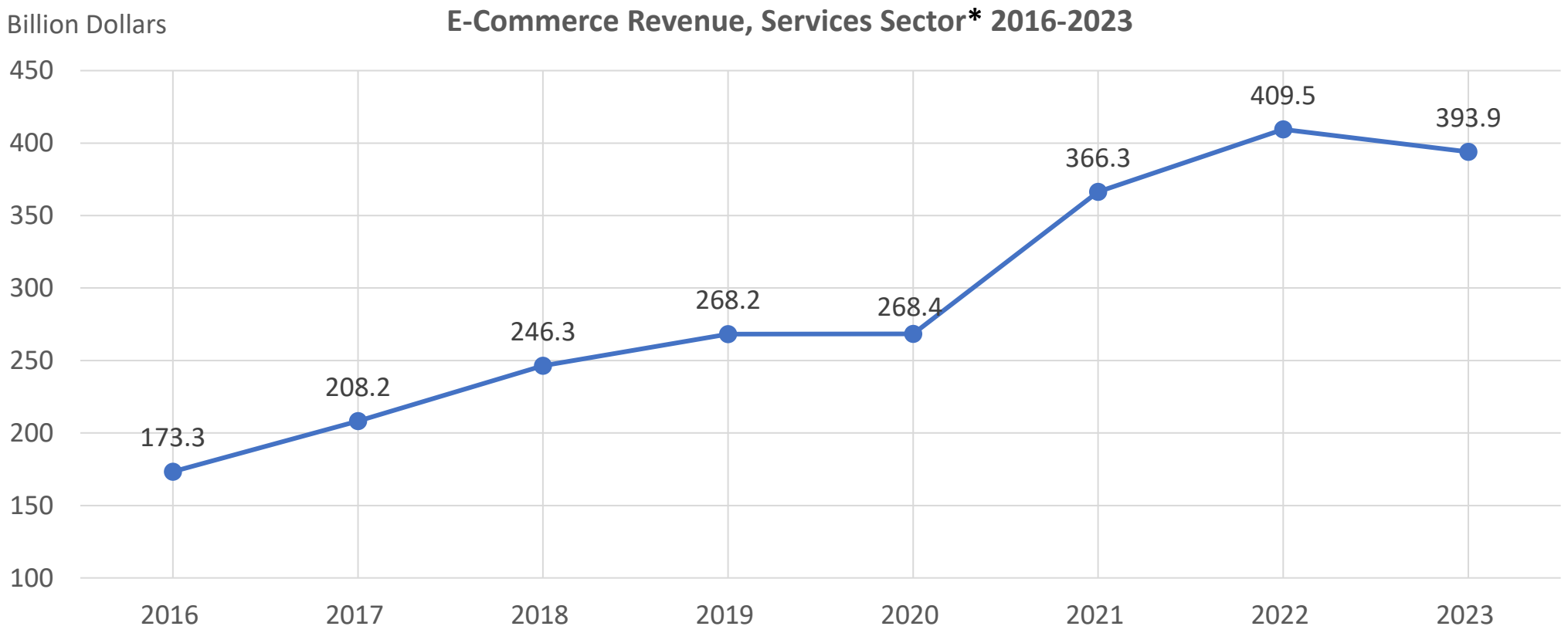
- National Research Foundation's Research, Innovation and Enterprise (RIE) Plans – Smart Nation and Digital Economy
- Digital Economy Agreements (DEAs), including the Digital Economy Partnership Agreement (DEPA), EU-Singapore Digital Trade Agreement (EUSDTA), Korea-Singapore Digital Partnership Agreement (KSDPA), Singapore-Australia DEA, UK-Singapore DEA

**Growing presence of e-commerce and digital intermediation platforms (DIPs)**

**Creation of business models and gig economy jobs**

**COVID-19 pandemic further accelerated the pace of digitalisation globally**

# Sharp rise in e-commerce revenue following Covid-19 pandemic and corresponding shift in consumption patterns




* Exclude Financial & Insurance Services and Public Administration Activities

*Source: Singapore Department of Statistics (DOS)*

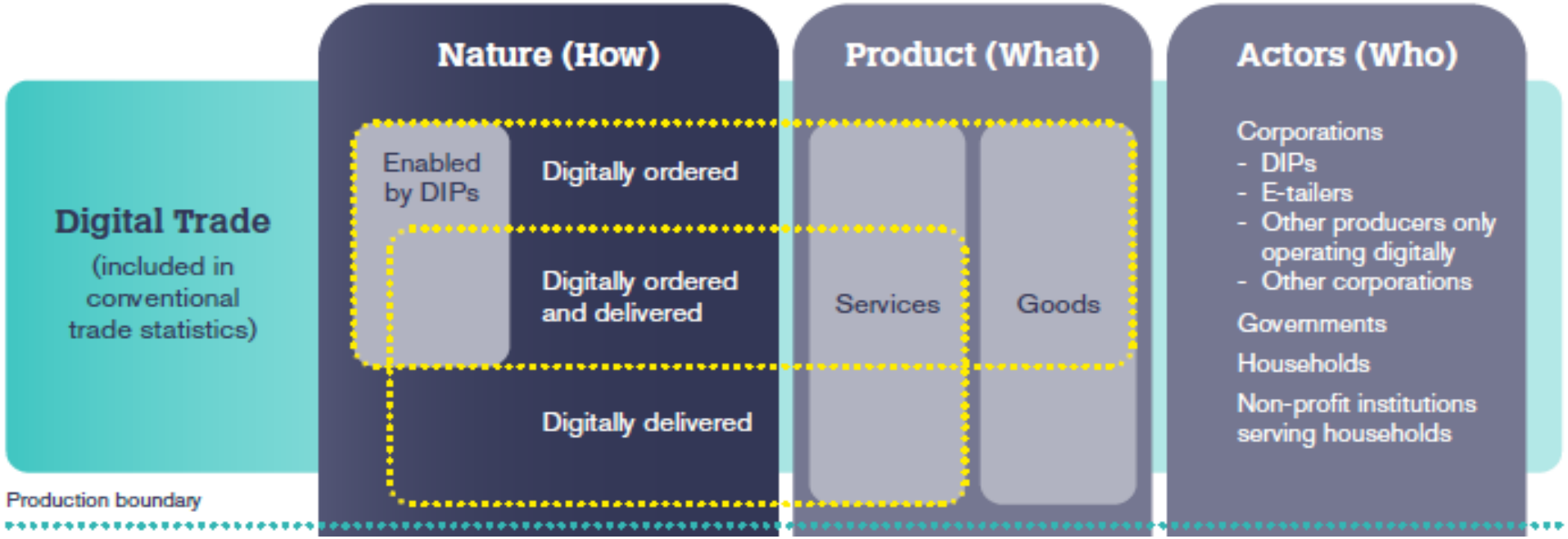
# 02 Developing Singapore's Digital Economy Satellite Accounts (DESA)

# Singapore is currently developing experimental estimates of the three HPIs, taking reference from the OECD Handbook on Compiling Digital Supply and Use Tables

## High Priority Indicators (HPIs)

| Digital industries | Digital products | Nature of the transaction |
|---|---|---|
| i. Digitally enabling industries | Digital products within the SNA production boundary | i. Digitally ordered |
| ii. Digital intermediation platforms (DIPs) charging a fee | a) ICT goods | a) Direct from a counterparty |
| iii. Data and advertising driven digital platforms | b) Priced digital services – except cloud computing services and digital intermediation services | b) Via a resident DIPs |
| iv. Producers dependent on DIPs | c) Priced cloud computing services | c) Via a non-resident DIPs |
| v. E-tailers | d) Priced digital intermediation services | ii. Not digitally ordered |
| vi. Financial service providers predominantly operating digitally | | iii. Digitally delivered |
| vii. Other producers operating only digitally | | iv. Not digitally delivered |
| **OECD's HPI**: Output, GVA and its components, of digital industries | **OECD's HPI:** Output and/or intermediate consumption of digital products | **OECD's HPI:** Expenditures split by nature of the transaction |

# … along with experimental digital trade estimates

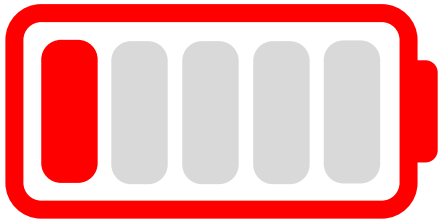



*Source: Handbook on Measuring Digital Trade, Second Edition (IMF, OECD, UNCTAD and WTO)*

Key indicators:

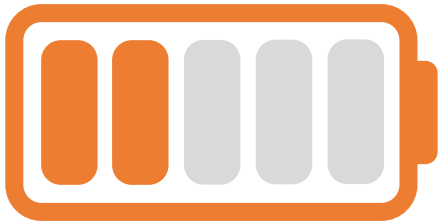
- Exports and imports of digitally ordered goods
- Exports and imports of digitally ordered and/or digitally delivered services

# State of DESA development in Singapore: Exploratory Phase



## Mid 2020-2021

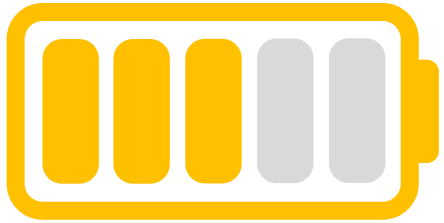
- **Conducted environmental scanning** on international best practices
- **Reviewed studies done by government agencies** to size Singapore's digital economy (DE) and indicators compiled related to DE
- **Assessed data available** for DESA compilation and identified data gaps



## 2022

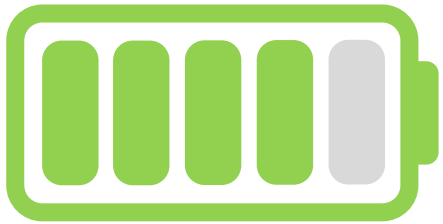
- **Engaged stakeholders**, primarily government agencies, to introduce the DESA framework
- **Collaborated with the Infocomm Media Development Authority (IMDA)** to improve on the data collection of DE indicators by adding relevant questions to their Infocomm Usage by Enterprises (IU) Survey
- **Piloted collection** of digitally delivered services trade information in DOS's International Trade in Services (TIS) Survey

# State of DESA development in Singapore: Implementation Phase



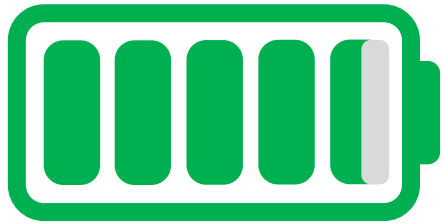
## 2023

- **Obtained resources** to compile DESA
- **Engaged other NSOs** to exchange knowledge and adopt best practices in DESA compilation
- **Assessed and cultivated data sources** e.g., business data, administrative records, audited financial statements
- **Utilised web scraping techniques** to identify firms with both physical and online presence



## 2024

- **Developed methodology and compiled experimental estimates** on digital industries
- **Reviewed methodologies** to compile experimental estimates on digital products and nature of the transaction



## 2025

- **Refined** digital industries' scope and estimates
- **Compiled experimental estimates** on digital products, nature of the transaction and digital trade

# 03 Data Sources and Methodology - Digital Industries

# Scoping of digital industries

The OECD handbook on compiling digital supply and use tables (SUTs) recommends compiling seven digital industries

| Digital Industries | Definition |
|---|---|
| 1) Digitally enabling industry (DEI) | Firms that produce goods and services **facilitating digital transformation**, such as IT equipment and software |
| 2) Digital intermediation platforms (DIPs) charging a fee | Firms that **operate online interfaces** which, **for a fee**, facilitate direct interaction between multiple buyers and sellers **without taking economic ownership** of the goods or rendering the services that are being sold |
| 3) Data- and advertising-driven digital platforms (DADPs) | Firms operating exclusively as digital platforms whose **main source of revenue is either the sale of data produced** using information collected from the platform and/**or the sale of advertising services** using the platform for advertising |
| 4) Producers dependent on digital intermediation platforms (DIPs) | Firms that **sell most of their goods or services through DIPs**, and their output and value-added stem from the revenue they generate through DIPs |
| 5) E-tailers | Traders engaged in purchasing and reselling goods who receive the **majority of their orders digitally** |
| 6) Financial service providers predominantly operating digitally | Financial service providers which **predominantly transact with consumers via digital channels** |
| 7) Other producers only operating digitally | Firms **operating exclusively online** that are not included in the above six digital industries, and interact with consumers exclusively through digital means |

# Identifying data sources – Surveys, web-scraped data and administrative records

The compilation of digital industry estimates relies on a diverse range of data sources, ensuring comprehensive coverage and accuracy.

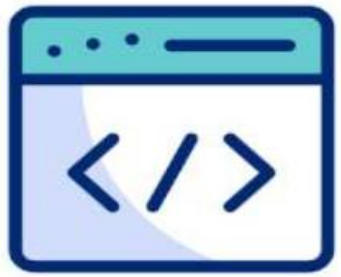
For the compilation of digital industries' estimates, the following survey data sources are used:

- **Annual Industry Surveys:** Information on the performance of establishments engaged in manufacturing and services activities
- **E-commerce data**: Data on firms' online presence and e-commerce activities
- **Annual Survey on Infocomm Usage by Enterprises (IU)**: Data on the level of infocomm usage by enterprises

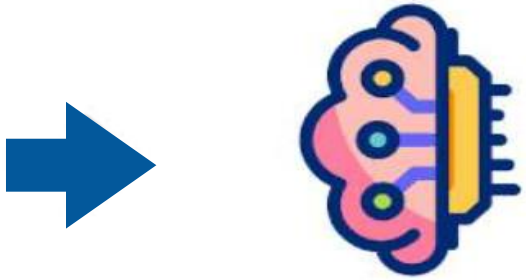
To enhance the accuracy of the estimates, two key processes are conducted regularly:

- **Refine survey questions** to ensure clarity, relevance and effectiveness in capturing required information while avoiding overlap with existing surveys to minimise respondent burden
- **Validate data** to identify inconsistencies or anomalies in responses, incorporating best practices for data collection and questionnaire design

# Web-scraping conducted to identify digital firms



Website/HTML



Web scraping software

Structured data in database

**Step 1. Obtain URLs of enterprises**

- Gather from various sources
  e.g., surveys, administrative data, online directory, Singapore Network Information Centre (SGNIC)

**Step 2. Categorise based on the usage of their corporate websites using a supervised machine learning classifier**

A. Enterprises without websites
B. Enterprises with websites but do not generate revenue directly from their websites
C. Enterprises with websites and generate revenue directly from their websites

**Step 3. Merge information on predicted categories with other data on firm characteristics for further analysis**

- Use economic activity codes (ISIC equivalent) and other category-specific keywords to assign the firms into the correct digital industry

# Web-scraping – Using E-tailers as an example

**Internet Economy –**
Enterprises with websites and generate revenue directly from their websites

SSIC 46 – Wholesale Trade
SSIC 47 – Retail Trade
…

**Keywords –**
Cart, order, …

Scoping

**Web scrape output**

E-tailers

# Administrative records as supplementary data source

Besides survey and web-scraped data, other administrative records are used to enhance the comprehensiveness and accuracy of the digital industries' estimates

- Retail and food & beverage services **outlets by location**
- Audited company **financial statements**

# Compilation methods for digital industries fall broadly into two categories

## Industry-based Method

**Based on industry classification:**

1) Digitally Enabling Industry (DEI): Mapped to specific ICT sector codes

2) Digital Intermediation Platforms (DIPs) charging a fee: Identified through existing SSIC codes, created ahead of the planned introduction of new DIP codes in ISIC Rev. 5

## Income-based Method#

**Based on primary revenue derived from e-commerce and digital activities and/or customer interactions mainly through digital channels:**

1) Data- and advertising-driven digital platforms (DADPs)

2) Firms dependent on DIPs

3) E-tailers

4) Financial service providers predominantly operating digitally

5) Other producers operating only digitally

# Predominance approach established to refine the scoping

# Integrating datasets to compile digital industries

| Digital industries |
| --- |
| i. Digitally enabling industry (DEI) |
| ii. Digital intermediation platforms (DIPs) charging a fee |
| iii. Data- and advertising-driven digital platforms |
| iv. Producers dependent on DIPs |
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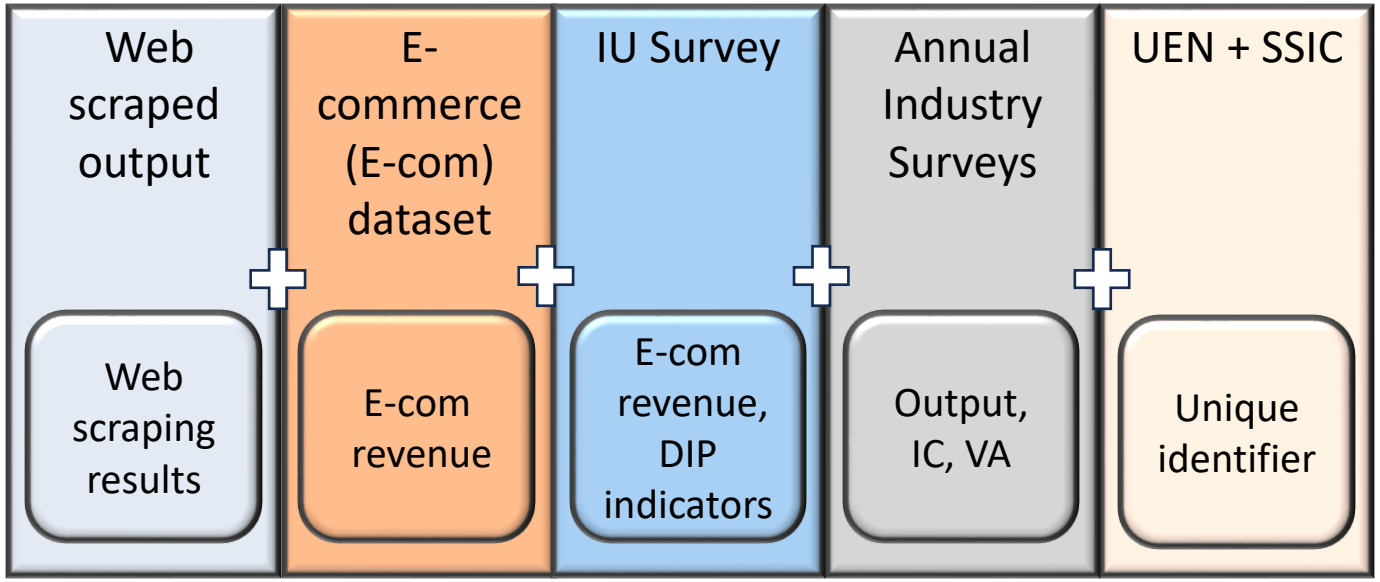



Legend

- IC = Intermediate consumption
- VA = Value-added
- UEN = Unique Entity Number. UEN is Singapore's identifier for firms.
- SSIC = Singapore Standard Industrial Classification. SSIC is equivalent of the International Standard Industrial Classification of All Economic Activities (ISIC)

# Further refinement carried out to improve accuracy in digital industry classification

**Resolution of Multiple Category Qualifications**

- Some establishments may qualify for inclusion in multiple digital industry categories. For instance, a business might simultaneously be a producer dependent on DIPs and classified within the digitally enabling industry. In such cases:
  - A careful assessment is conducted to determine the establishment's primary classification
  - The establishment is then allocated to the most appropriate category based on its predominant business model or largest revenue stream

**Firm-Level Studies**

This process involves:

- Analysing survey returns in depth
- Cross-checking with audited financial statements
- Conducting comprehensive web-based research on the establishment's operations

# Automating compilation to improve workflow

- **Streamline data processing**: Handle multiple large datasets efficiently, reducing manual data processing while minimising human error in complex compilation procedures
- **Standardise data validation**: Develop automated quality checks and validation rules to manage the complexity of integrating diverse data sources, ensuring consistent data accuracy across all compilation cycles
- **Enable faster updates**: Create automated workflows that can process large volumes of data from multiple sources simultaneously, allowing for more frequent data refreshes and faster production of estimates.

# 04 Challenges and Next Steps

# Key Challenges

## 1. Development and compilation of DESA requires adequate resource allocation

- **Multi-agency collaboration**, with involvement from several government agencies
- Need to strike a balance between addressing users' needs and aligning the compilation with international statistical standards

## 2. Wide-ranging data sources are essential for comprehensive DESA compilation

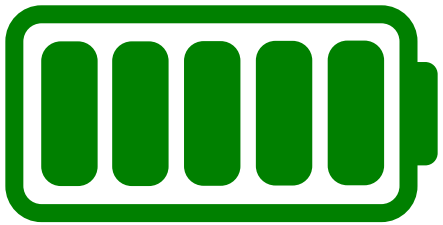
- Survey data collection tends to be **resource-intensive** and subject to data quality assessments
- Use of alternative administrative data sources and estimation methods would likely **require more assumptions to be made**, given that they are not collected primarily for statistical purpose and do not contain information at the required level of details

# Key Challenges

## 3. No internationally prescribed percentage cut-off exists for classifying firms with both physical and online presence within digital industries

- While the predominance approach recommended in the OECD Handbook provides a framework for scoping of firms to the digital economy, its implementation requires careful consideration and adaptation to local contexts
- To navigate these challenges and determine the most feasible approach, an experimental approach was adopted in our DESA compilation, involving testing different parameters on available data

# Next Steps



**2026-2027**

- **Continue refining** the DESA methodology and work with relevant stakeholders to improve the estimates
- **Continue monitoring** international developments in the measurement of DESA and learn from best practices
- **Publish experimental DESA indicators** for digital industries, digital products and nature of the transaction

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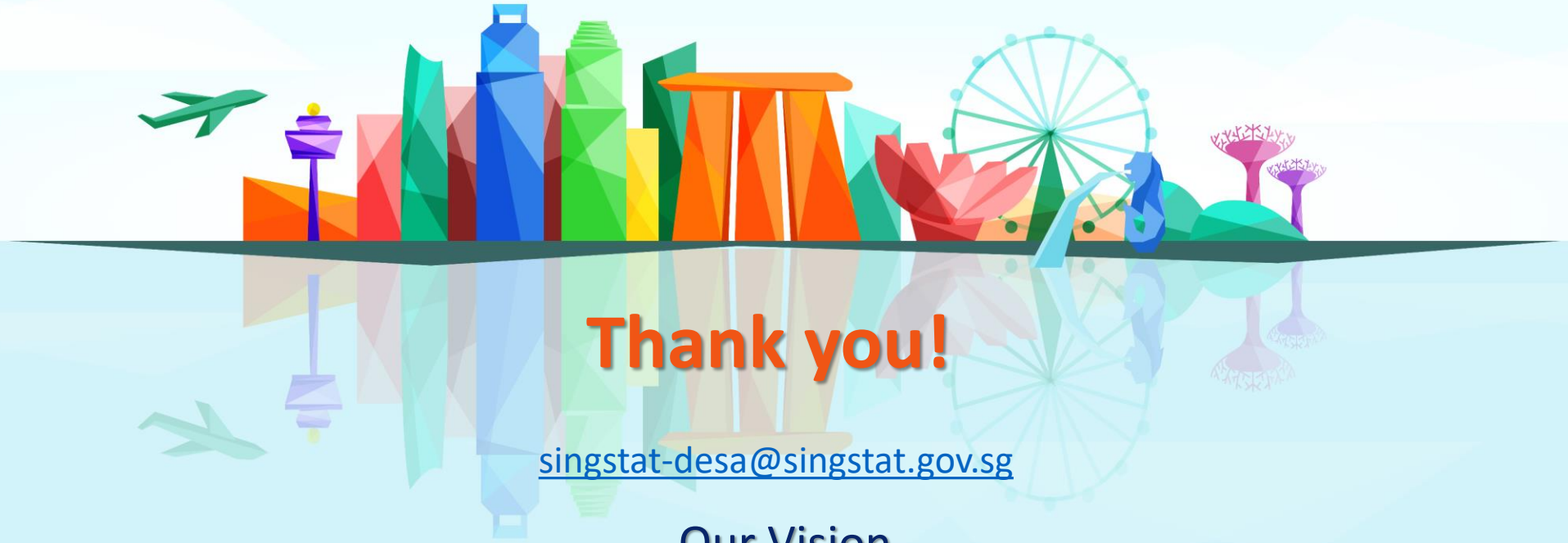

# Thank you!

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