# Toward a Digital Economy Satellite Account for the United States

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# Measuring the Digital Economy

- Better measure the digital economy and further capture technology's role in economic growth
  - Partly supported through a reimbursable agreement with the National Telecommunications and Information Administration
- Strategies
  - Define the digital economy and capture its contribution to economic growth
  - Improve price and volume measures of high-tech products
  - Measure the economic contribution of cloud computing
  - Estimate the digital component of structures
  - Evaluate the changing role of data and (re)consider its treatment in National Accounts
  - Estimate the contribution of "free" digital media and internet services

# Digital Economy Satellite Account

- Initial results in March 2018
- Updated experimental digital economy estimates for 1997-2007 in April 2019
- Consistent with guidance from OECD Advisory Group
  - Efforts underway to fully harmonize with Advisory Group
- Three-step methodology
  - Structure for estimates (conceptual definition)
  - Identify digital goods and services
  - Identify digital industries

# Step 1: Structure for Estimates

- **Digital-enabling infrastructure**: Goods and services needed for an interconnected computer network to exist and operate
  - Hardware
  - Telecommunications
  - *Internet of Things (IoT)*
  - Software
  - Support services
  - *Structures*
- **E-commerce**: Digital transactions that use the computer system
  - Digitally-ordered goods and services: B2B, B2C
  - *Digital intermediary services, paid (P2P)*
- **Digital media**: Content that users create and access
  - Digitally-delivered services (except cloud and digital intermediary services)
  - *Digital services, free*
  - *Data*
- **Cloud computing services, paid**

# Steps 2 and 3: Identification

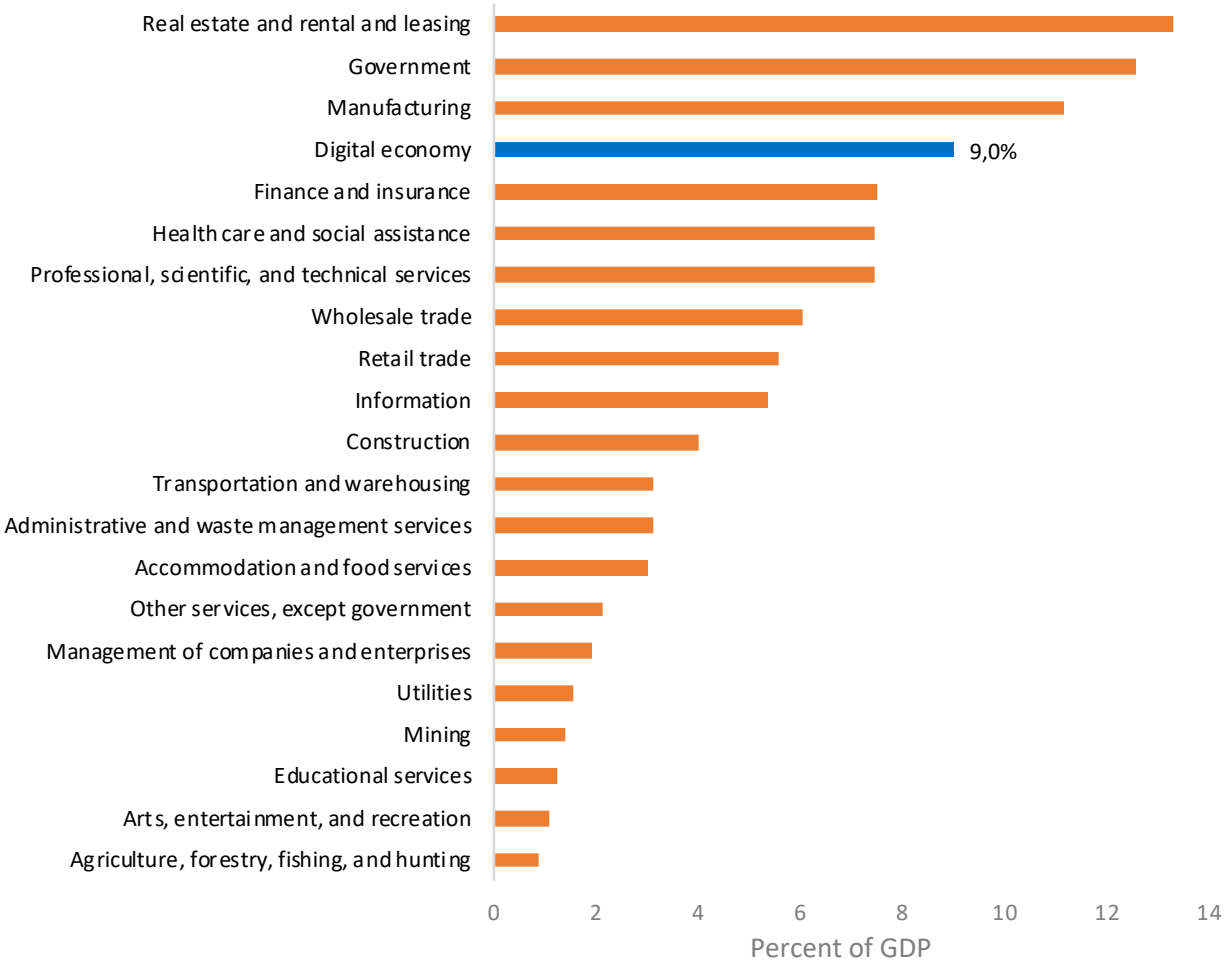
- **Step 2**: Identify digital goods and services
  - Over 200 categories of primarily digital products
  - Partially digital products
- **Step 3**: Identify digital industries
  - Gross output: Sum of gross output for all in-scope products
  - Value-added
  - Compensation
  - Employment

  } Derived from ratios of digital economy gross output to total gross output

  - Price and quantity indexes: Double deflation method

# Results: Industry Shares of GDP

**Digital Economy and Industry Share of Total Gross Domestic Product, 2017**

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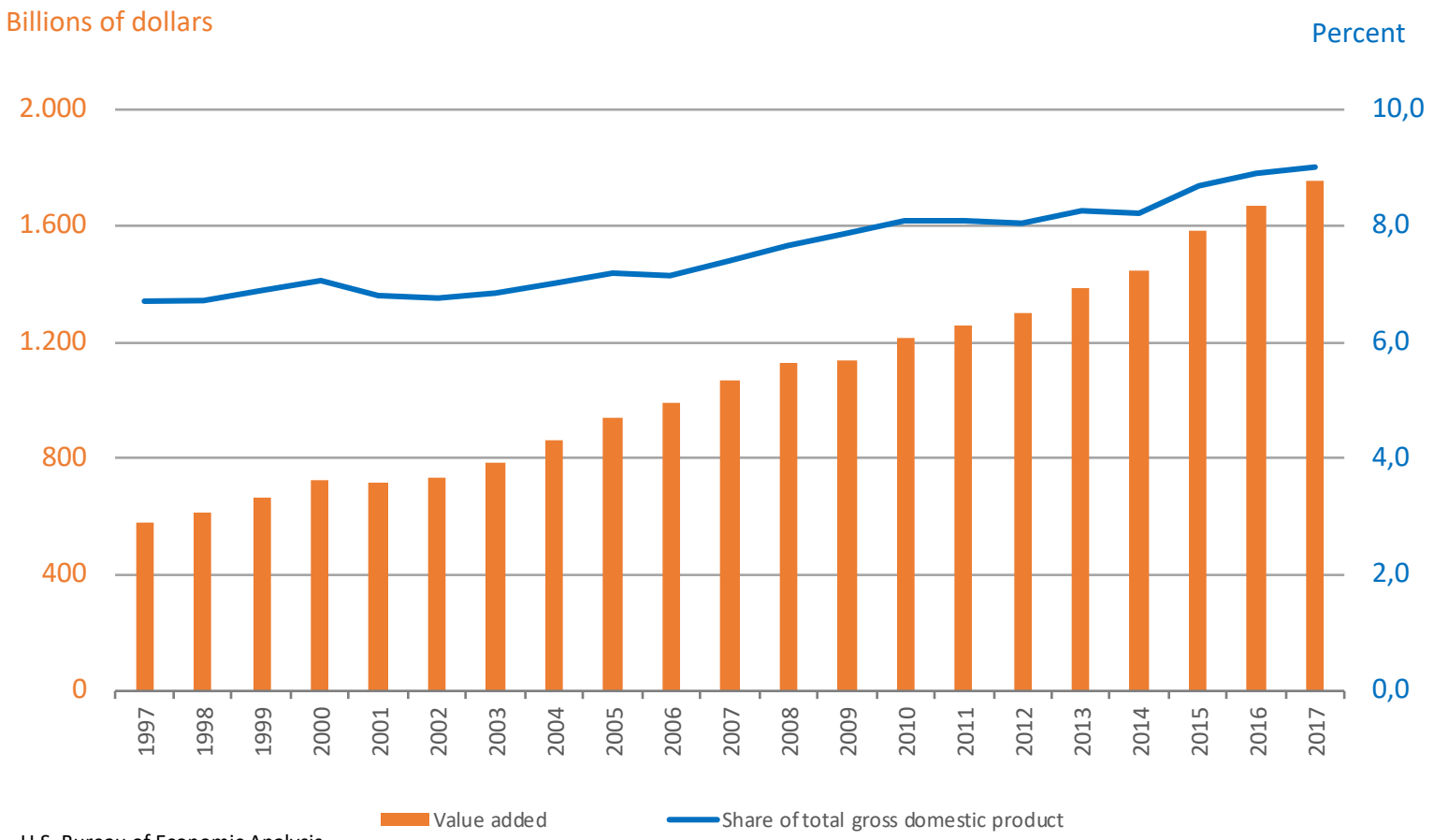
# Results: Share of GDP

**Digital Economy Current-Dollar Value Added and Share of Total Current-Dollar Gross Domestic Product**

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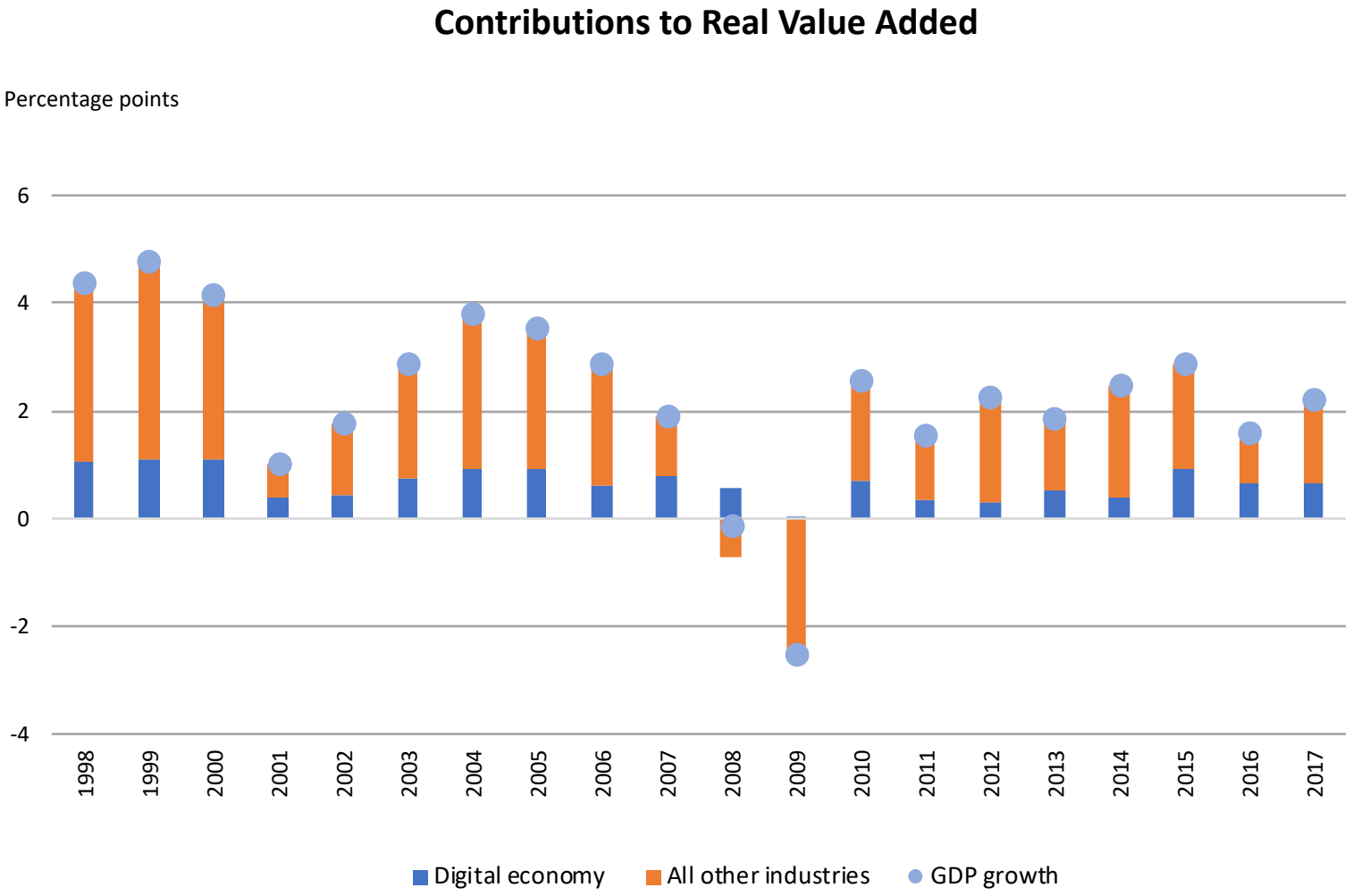
# Results: Contributions to Real GDP Growth

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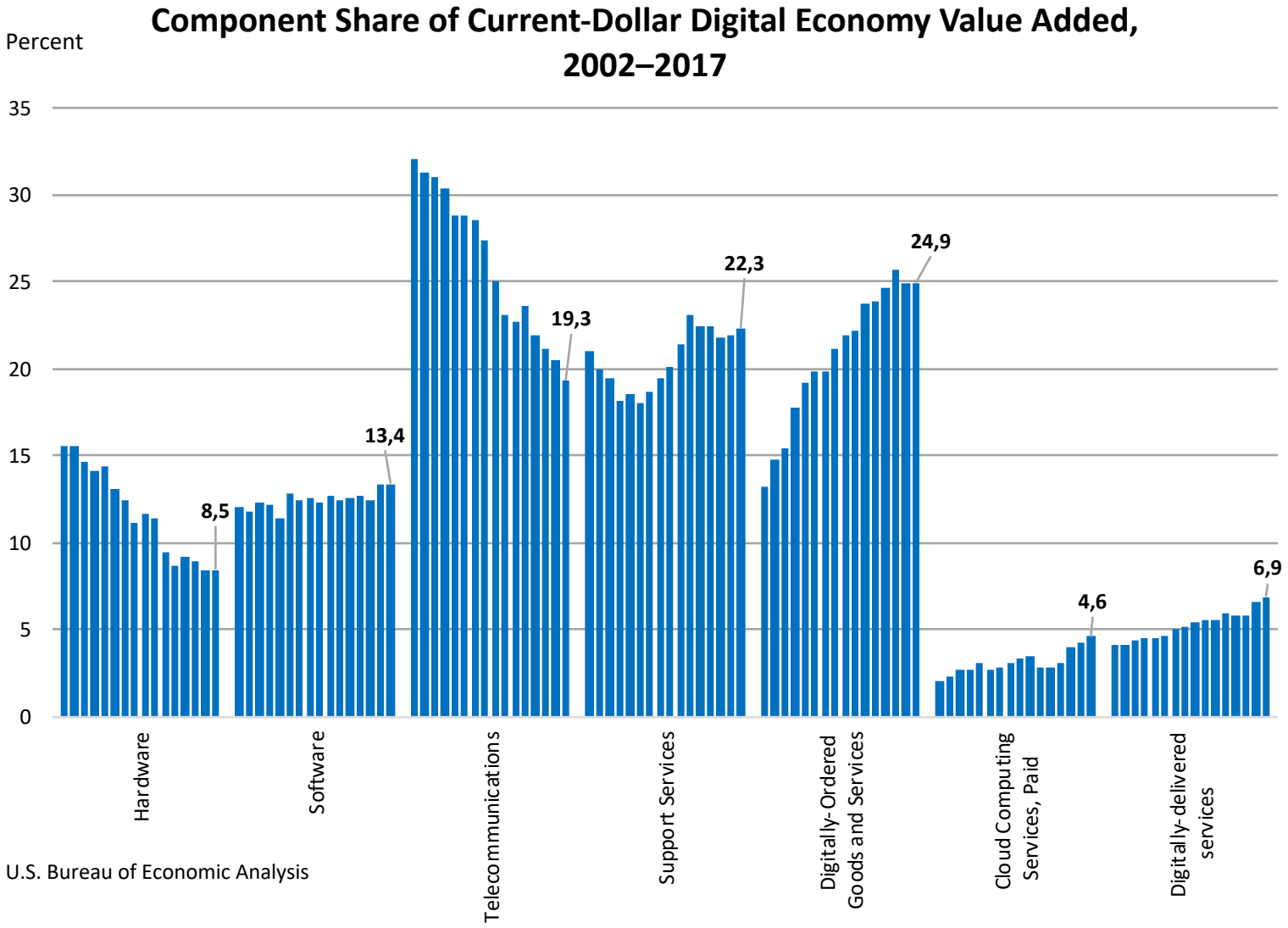
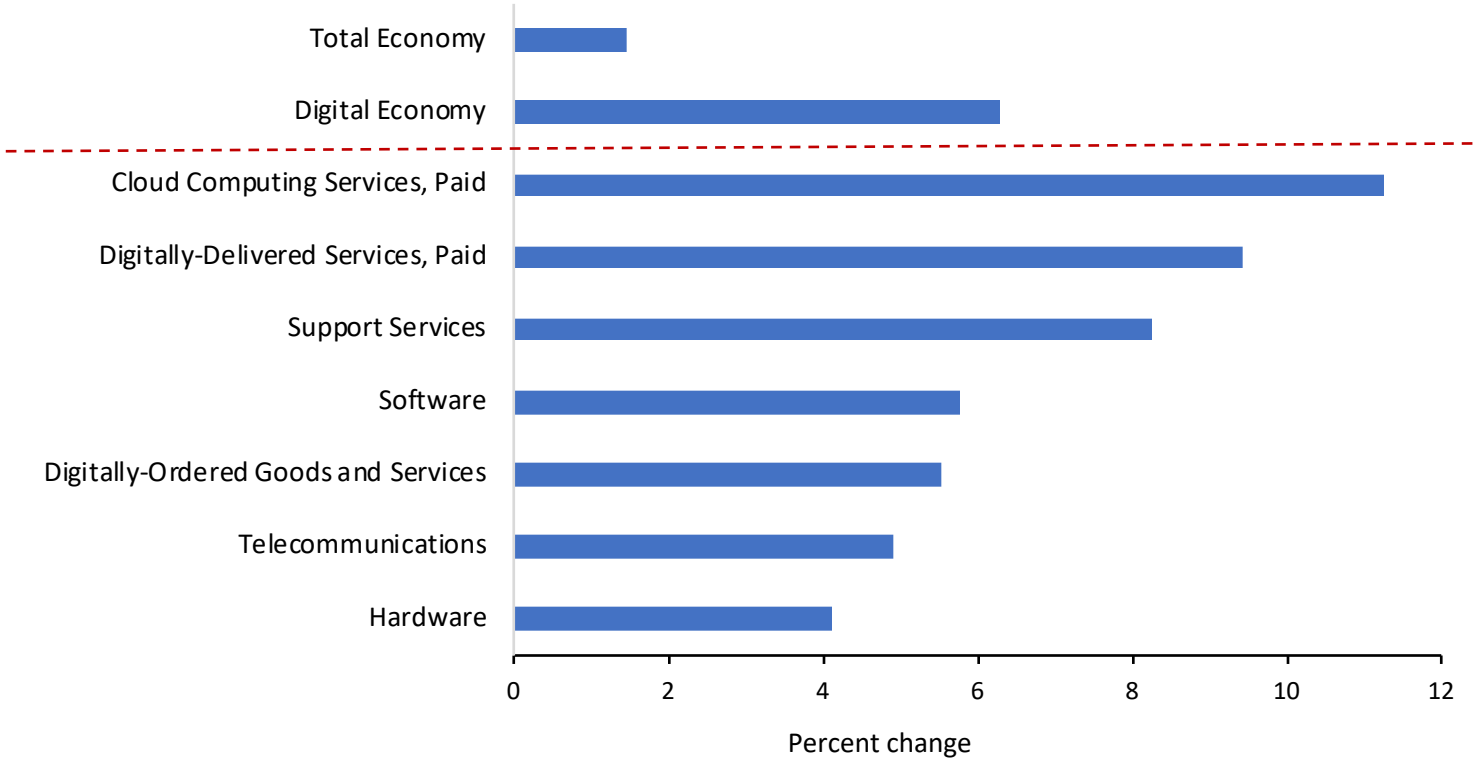
# Results: Components



# Results: Components

**Components of the Digital Economy:**
**Real Value-Added Average Annual Growth, 2008–2017**

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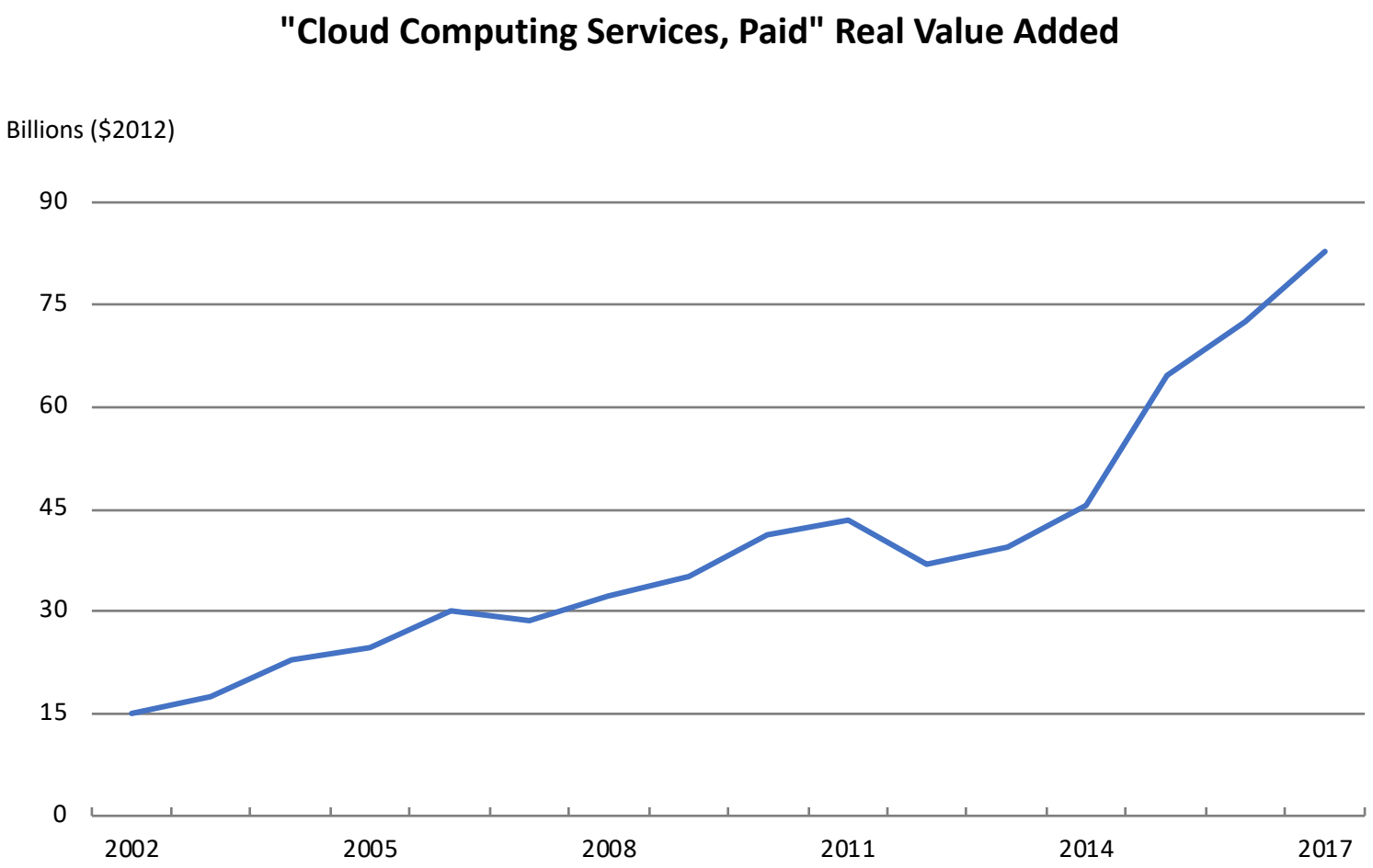
# Ongoing Research
# Cloud Computing Services, Paid

- Rapid growth in ICT includes cloud computing
  - Investment by individual firms replaced by third-party cloud services
  - Do changes in trends require changes in data collection?
- Components of Information Services and Internet Publishing
  - NAICS 518: Data processing, hosting and related services
  - Internet publishing and broadcasting
  - News syndicates, libraries and other information services
- Cloud computing activities under 518
  - Application service provisioning
  - Automated data processing services
  - Data storage and management services
  - Website hosting and collocation services
  - Video and audio streaming services
  - Information and document transformation services

# Ongoing Research
# Cloud Computing Services, Paid

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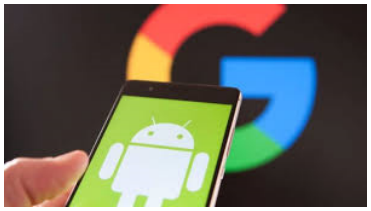
# Changing Role of Data: IoT Sensor Data

- Caterpillar and John Deere install sensors on machinery and equipment to collect data on operations.
- Sensor data are combined with historical and real-time data on weather, irrigation, and other relevant systems.
- Actionable intelligence is available in platforms to reduce downtime, save fuel, improve safety, and manage crops and worksites.


# Changing Role of Data: Personal Data

- Insurance firms collect health and lifestyle data from fitness devices and social network sites to assess risk.
- Location firms collect geolocation data from mobile service providers and mobile apps to sell to advertisers, retailers, and investment firms.
- E-commerce firms collect purchase and browsing data to predict demand and improve service.

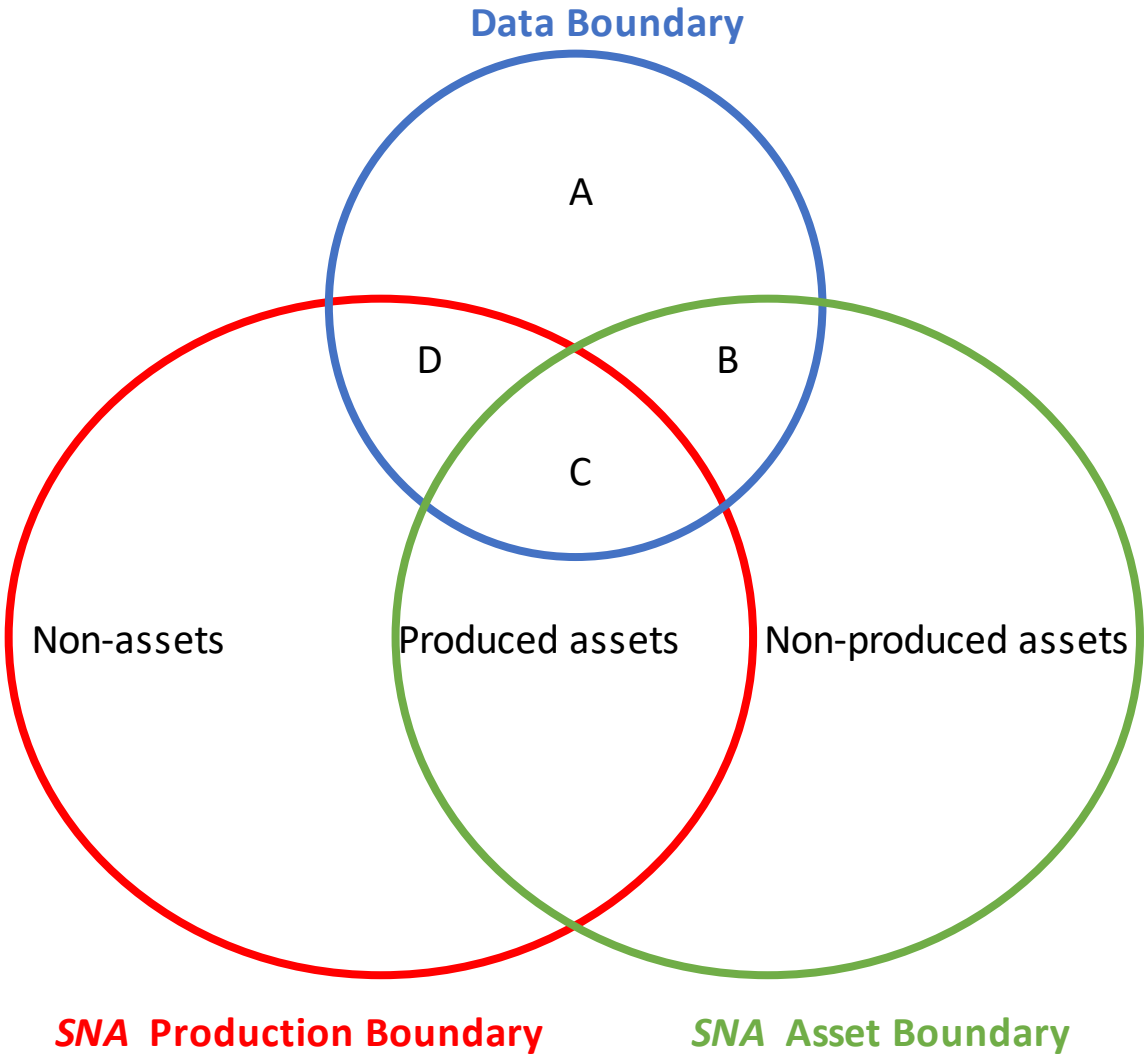


# Stats Canada-BEA Collaboration on Data

- What is the role of data in a modern economy?
- What is an appropriate typology of data?
- How are data currently treated in national accounts and how are data valued in the private and public sectors?
- Who owns data?
- What are the different methods that national statisticians could use to assign a value to data?
- What is the value of data in Canada and the U.S.?

# Considerations for Data: Data Boundary



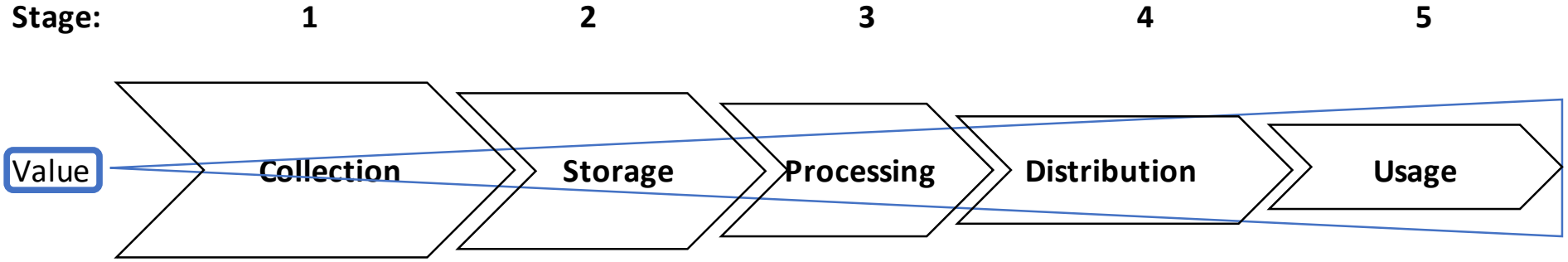

Source: Adapted from *SNA 2008* .

# Considerations for Data: Classification

| *Personal Data* | *Institutional Data* | | |
|---|---|---|---|
| | *Businesses* | *Governments* | *Non-Profits* |
| User-Generated | Personnel Files | Personnel Files | Personnel Files |
| Behavior | Accounting Records | Accounting Records | Accounting Records |
| Social | Legal Docs | Legal Docs | Legal Docs |
| Location | Financial Docs | Financial Docs | Financial Docs |
| Demographic | Customer Lists | Intelligence Records | Social Policy Programs |
| Official Identification | IoT Sensors | Diplomatic Cables | Public Policy Programs |
| | | Defense Files | |
| | | Statistical Surveys | |
| | | Regulatory Records | |
| | | Admin Records | |
| | | Monitoring Tech | |

Source: Adapted from World Economic Forum (2011) and OECD (2013).

# Considerations for Data: Data Value Chain




| Collection | Storage | Processing | Distribution | Usage |
|---|---|---|---|---|
| Electronic payments | Cloud facilities | Analysis | Tracking companies | Business models |
| Web-connected devices | Data centers | Fusion | Data exchanges | Regulatory programs |
| Regulatory filings | | | | Social programs |
| | | | | Information |
| | | | | Entertainment |

Source: Adapted from OECD (2013) and Moro Visconti et al. (2017).

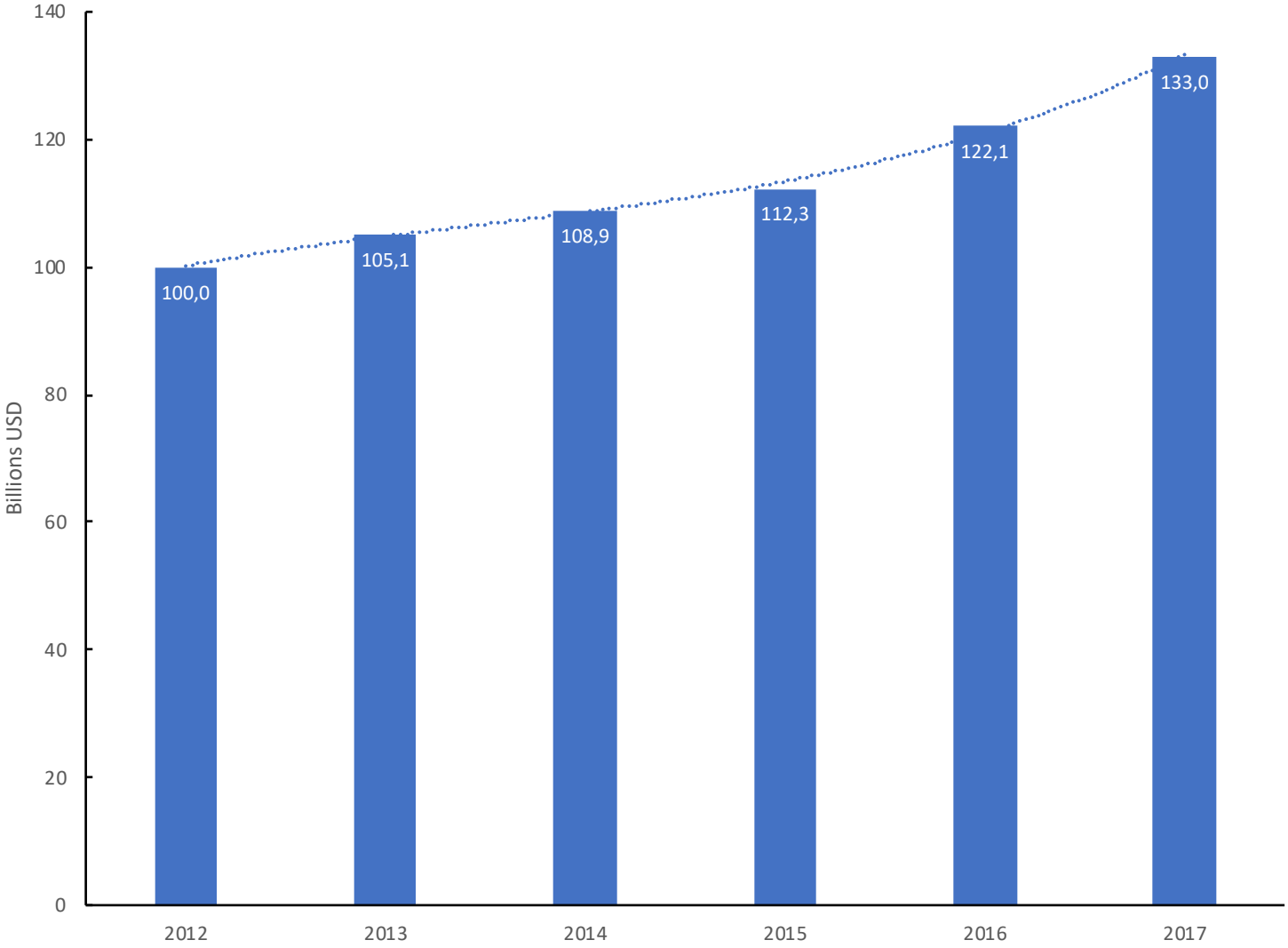
# Considerations for Data: Features

- Features shared with other *SNA* assets
  - Non-rival but excludable: risk of multiple counting
  - Irregular depreciation profiles: may experience appreciation (Li et al. 2019)
- Features unique to data
  - Characteristics of both goods and services (Mandel 2012)
  - Provision of personal data by households at beginning of the value chain is not customary in national accounts
  - Value of data is context dependent (OECD 2013)

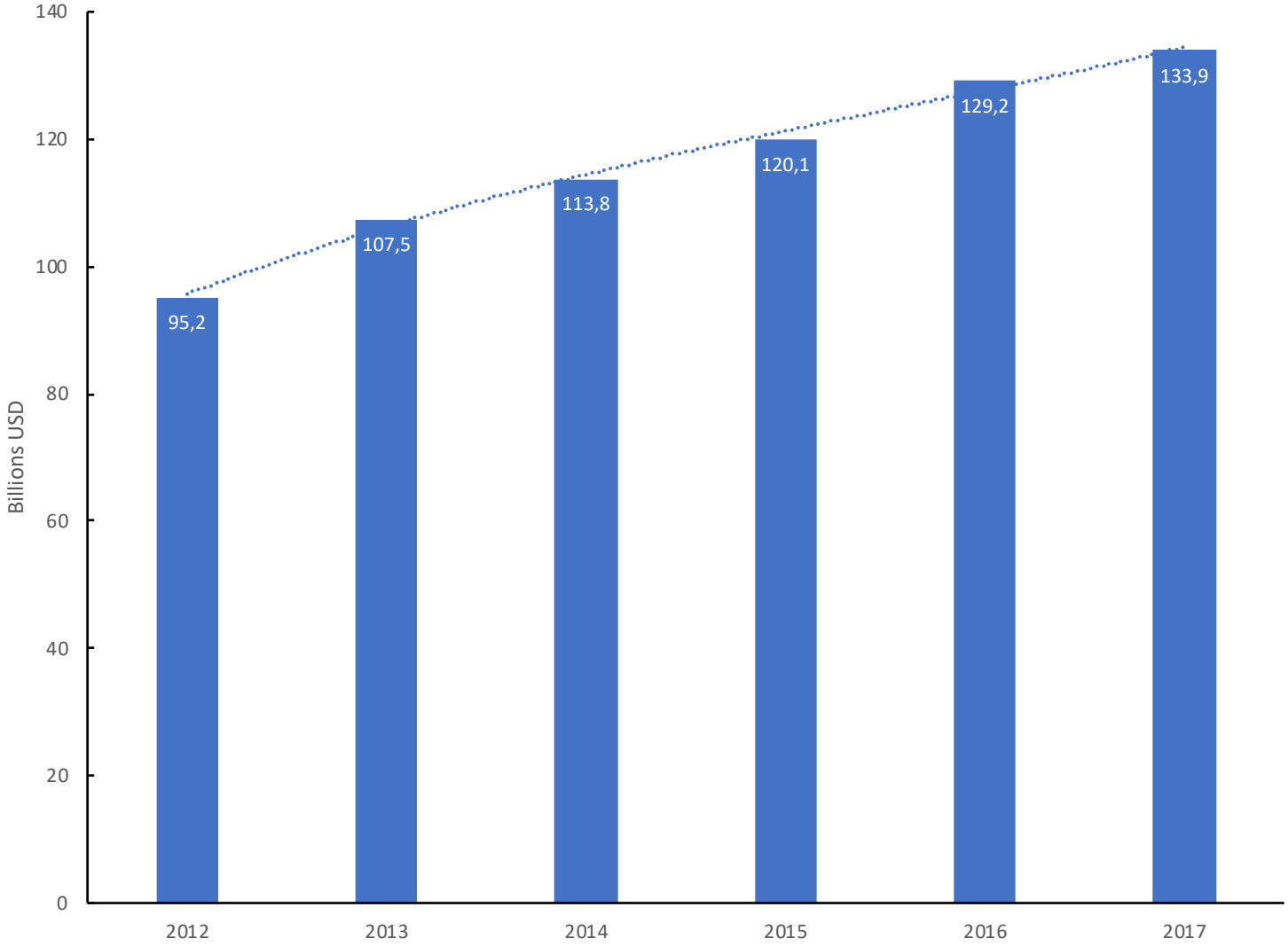
# Valuing Data for the U.S. Economy

- Purchased data products
  - Receipts from Economic Census and Service Annual Survey
  - NAICS 51 (information), NAICS 54 (professional, scientific, technical)
  - Identify 26 data products
- Own-account products
  - Wages from Occupational Employment Statistics survey
  - All private industries except NAICS 51 and NAICS 54
  - Sum of costs
    - Assume 50% of time spent on data-related activities
    - Multiply wages by an annual aggregate “blow-up” factor
  - Identify 30 data occupations
    - We exclude occupations for own-account software

# Purchased Data for the U.S. Economy



# Own-Account Data for the U.S. Economy



# Next Steps

- BEA plans to publish an update of the Digital Economy Satellite Account in fall 2019
  - New estimates for clouding computing services
  - Expanded coverage of wholesale and retail e-commerce
  - Progress on measuring digital platforms
- Full set of digital economy supply-use tables
- Continue work on other aspects of digital economy
  - Treatment of data and “free” internet services
  - Price and volume measures for digital goods and services