

# New and Revised Statistics of the U.S. Digital Economy, 2005–2020

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This report provides an overview of [updated and revised digital economy statistics for 2005–2020](#) as released by the U.S. Bureau of Economic Analysis (BEA). These statistics build on the [2005–2019 estimates released in June 2021](#) by incorporating new data for 2020 and revised source data for 2005–2019. The new data show in 2020, the U.S. digital economy accounted for \$3.31 trillion of gross output, \$2.14 trillion of value added (translating to 10.2 percent of U.S. gross domestic product (GDP)), \$1.09 trillion of compensation, and 7.8 million jobs.<sup>1</sup> Growth in price-adjusted GDP (also referred to as “chained-dollar” or “real” GDP) was 4.0 percent in 2020, greatly outpacing growth in the overall economy, which contracted –3.4 percent.<sup>2</sup> Hardware, software, and business-to-consumer (B2C) e-commerce were the main drivers of growth in the digital economy for 2020. These new digital economy statistics suggest this area of the economy was mostly insulated from the declines seen in other areas of the economy caused by the pandemic. See [BEA’s digital economy website](#) for the detailed data tables, plus other research and papers related to this subject.

The new 2020 data and growth in recent years (2012–2020) are the focus of this report. A brief overview of the methodology is also provided, along with a description of the revisions to the 2005–2019 estimates, and a short discussion of the results and plans for future work.

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1. The gross output of an industry is the market value of the goods and services produced by an industry. The GDP or value added for an industry represents the market value it adds in production, or the difference between an industry’s gross output and the cost of its intermediate inputs.
  2. Real or constant-dollar estimates hold prices constant such that growth rates for real estimates reflect changes in quantities produced, removing the impact of inflation. Chained-dollar estimates are calculated by taking the current-dollar level of a series in the reference period and multiplying it by the change in a chained-type quantity index number for the series since the reference period. Chained-dollar estimates correctly show growth rates for a series but are not additive in periods other than the reference period.

## Methodology overview

The digital economy statistics are built using BEA's comprehensive supply-use tables (SUTs), which provide insight into the internal workings of the U.S. economy and detail the contribution of specific industries and products to gross output and GDP. The SUTs detail the flows of products (goods and services) purchased by each industry, the incomes earned from production in each industry, and the distribution of sales for each product. The purpose of the digital economy statistics is to highlight production and spending for the digital economy that is already present in the SUTs. To do this, we first identified within the SUTs the goods and services relevant to the digital economy (see "[Defining and Measuring the Digital Economy](#)" (2018) for more information on definitions and methodology). In cases where the good or service includes both digital and nondigital production, such as retail trade margins for clothing stores, we use external source data to isolate the digital activity, described in more detail below.

BEA's digital economy statistics are comprised of the following three major categories of goods and services:

1. **Infrastructure**, or the basic physical materials and organizational arrangements that support the existence and use of computer networks and the digital economy, primarily information and communications technology (ICT) goods and services. Infrastructure products are categorized in terms of hardware and software.
2. **E-commerce**, or the remote sale of goods and services over computer networks. E-commerce products are presented separately for B2C e-commerce (that is, retail trade) and business-to-business (B2B) e-commerce (that is, wholesale trade).
3. **Priced digital services**, or services related to computing and communication that are performed for a fee charged to the consumer. Priced digital services products include cloud services, telecommunications services, internet and data services, and all other priced digital services.

Appendix table 1 provides the complete list of North American Industry Classification System (NAICS) industries within these three activity categories and eight subcategories. The following provides an overview of the methodology and source data used to estimate each of the activities:

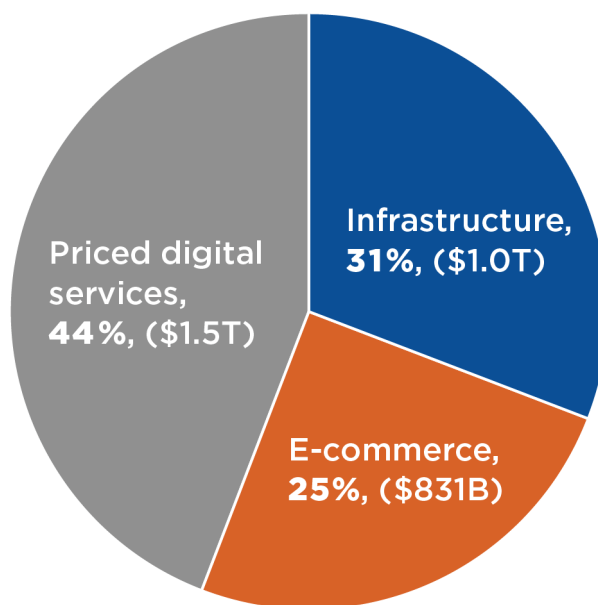
- **Hardware** represents the manufactured physical elements that constitute a computer system including, but not limited to, monitors, hard drives, and semiconductors. Hardware also includes communications products and audio and visual equipment. The hardware values are available directly from the SUTs.
- **Software** represents the programs and other operating information used by devices such as personal computers and commercial servers including both commercial software and software developed in-house by firms for their own use. The software values are found within the software publishers and custom computer programming products in the SUTs. A small portion of the value for these two products is allocated to cloud services, as described below.

- **B2B e-commerce** represents purchasing or ordering of goods and services between businesses using the internet or other electronic means. The B2B values are determined using the U.S. Census Bureau Annual Wholesale Trade Survey (AWTS), which includes data on total sales and e-commerce sales for wholesalers. The proportion of e-commerce sales to total sales is used to estimate the share of margins earned by engaging in e-commerce for each type of wholesale trade category in the SUTs.
- **B2C e-commerce** represents the sale of goods and services by businesses to consumers, or retail e-commerce, using the internet or other electronic means. The B2C values are determined using the Census Annual Retail Trade Survey (ARTS) and supplemental e-commerce data. As with B2B, the proportion of e-commerce sales to total sales is used to estimate the share of margins earned by engaging in e-commerce for each type of retail trade category in the SUTs.
- **Cloud services** represents computing services based on a set of computing resources that can be accessed on demand with low management effort, including remote and distributed hosting, storage, computing, and security services. The cloud services values are estimated using Census product line data for 2002, 2007, and 2012 to establish benchmark values. For nonbenchmark years through 2011, the values are interpolated using the benchmark values. For 2013 onward, the 2012 benchmark value is grown using private industry reports and public financial information from companies engaged in cloud computing. The Census data concord directly with SUT data and show cloud services production occurs in various information and professional and business services industries (NAICS sectors 51 and 54).
- **Telecommunications services** represents services related to telephony, cable and satellite television, movie and video production, and broadcasting; internet is excluded. The telecommunications services values are available directly from the SUTs, all within the information sector (NAICS 51).
- **Internet and data services** represents services related to providing internet access and to hosting, searching, retrieving, and streaming content and information on the web. Internet and data services often occur in the same product categories as cloud services, all within NAICS 518 (data processing, hosting, and related services). In these cases, the cloud services value is determined first, and the internet and data services values are the difference between the cloud services value and the overall value of production for the relevant product.
- **All other priced digital services** represents purchased digital services not categorized in the other activities. Specifically, computer systems design and related services, computer training, and electronic and precision equipment repair and maintenance. Computer training and electronic equipment repair and maintenance are available directly from the SUTs (NAICS 61 and 81). Computer systems design and related services often occur in the same product as cloud services, all within NAICS 5415. In these cases, the cloud services value is determined first, and the computer systems design and related services values reflect the difference between the cloud services value and the overall value of production for the relevant product.

## Gross output by activity

The digital economy produced \$3.31 trillion in current-dollar gross output in 2020, up from \$3.17 trillion in 2019. In real terms, digital economy gross output grew by 3.8 percent between 2019 and 2020. The annual growth rate for real gross output averaged 4.8 percent between 2012 and 2020, much faster than the overall economy's growth of 1.5 percent over the period. Chart 1 shows priced digital services was the largest activity in the digital economy in 2020, representing 43.9 percent of total gross output, followed by infrastructure (30.9 percent) and e-commerce (25.2 percent). Additional information about each activity is provided below.

**Chart 1. Digital Economy Gross Output by Major Activity, 2020**



U.S. Bureau of Economic Analysis

- **Priced digital services** produced \$1.45 trillion in current-dollar gross output in 2020. In real terms, gross output grew 1.3 percent between 2019 and 2020, slower than the average annual growth rate of 4.3 percent over the 2012–2020 period. This category experienced atypically low growth in 2020 due to the reduction in real gross output from telecommunication services (–2.0 percent), driven by a contraction in the motion picture and sound recording industries (NAICS 512). Telecommunication services accounted for about half of all gross output within the priced digital services category in 2020 (table 1).
- **Infrastructure** produced \$1.02 trillion in current-dollar gross output in 2020. Real gross output grew 6.5 percent for 2019–2020, driven by gains in both hardware and software. The infrastructure category grew an average of 5.0 percent annually between 2012 and 2020 for real gross output.
- **E-commerce** produced \$831 billion in current-dollar gross output in 2020. Real gross output in 2020 grew 5.2 percent from 2019, with all growth in this category attributable to the 22.5 percent increase in the B2C e-commerce subcategory. The B2B e-commerce subcategory contracted by 0.8 percent between 2019 and 2020. The e-commerce category had an average annual growth rate of 5.8 percent for real gross output between 2012 and 2020.

**Table 1. Digital Economy Gross Output by Activity, 2020**  
[Millions of dollars]

Digital economy	3,305,894
Infrastructure	1,022,201
Hardware	394,437
Software	627,764
E-commerce	831,490
Business-to-business e-commerce	581,298
Business-to-consumer e-commerce	250,192
Priced digital services	1,452,203
Cloud services	161,790
Telecommunications services	754,551
Internet and data services	202,486
All other priced digital services	333,376

## Gross output by industry

When evaluated by industry sectors, there were significant variations in both the distribution and growth of the digital economy current-dollar and real gross output estimates. Table 2 shows over 80 percent of 2020 gross output for the digital economy was produced by 3 industry sectors: information (43.6 percent), wholesale trade (21.5 percent), and professional and business services (16.3 percent). Additional information about each industry sector is provided below.

**Table 2. Digital Economy Gross Output for Major Sectors, 2020**

[Millions of dollars]

Digital economy	3,305,894
Information	1,440,992
Wholesale trade	711,661
Professional and business services	539,781
Manufacturing	280,046
Retail trade	261,212
All other industries	72,202

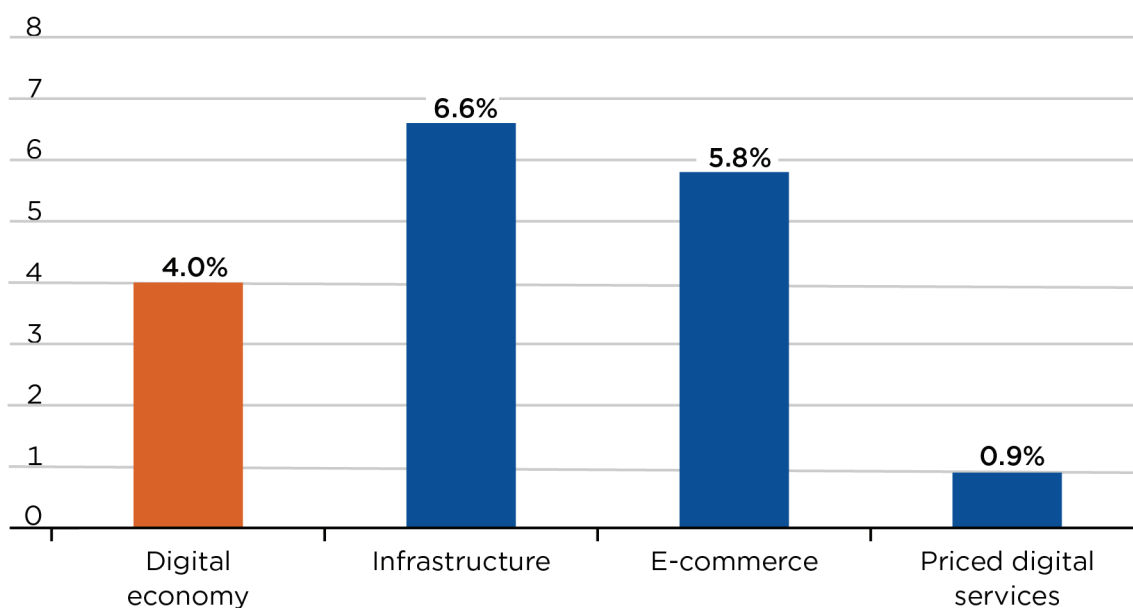
- **Information** had growth of 4.2 percent in real gross output for 2019–2020 and had an average annual growth rate of 5.6 percent between 2012 and 2020. Broadcasting and telecommunications was the largest industry within this sector, representing half of 2020 gross output. Almost three-quarters (71.8 percent) of gross output in the U.S. information sector was attributable to the digital economy in 2020.
- The second- and third-largest sectors, **wholesale trade** and **professional and business services**, both had below-average growth in real gross output from 2019 to 2020. Wholesale trade decreased by nearly 1 percentage point (–0.9 percent) and professional and business services increased by only 0.3 percent.
- **Retail trade** had the strongest growth in 2020 real gross output across all sectors at 23.0 percent. Retail trade has grown an average of 12.6 percent annually since 2012, more than twice the average annual growth rate for the overall digital economy (4.8 percent).

## Value added by activity

The digital economy accounted for \$2.14 trillion in current-dollar value added in 2020, up from \$2.05 trillion in 2019. In real terms, digital economy value added grew 4.0 percent between 2019 and 2020 (chart 2). The average annual growth rate was 6.3 percent for 2012–2020 real value added. Many of the trends in the gross output results hold for the value added estimates. Activity highlights include:

- **Infrastructure** contributed \$771 billion to current-dollar value added in 2020. In real terms, infrastructure value added grew 6.6 percent from 2019 to 2020 with strong growth from both hardware (7.2 percent) and software (6.3 percent). Infrastructure’s average annual growth rate for 2012–2020 was 6.6 percent.
- **E-commerce** contributed \$500 billion to current-dollar value added in 2020. Real value added for e-commerce grew 5.8 percent in 2020, with all growth in this category attributable to B2C e-commerce. The e-commerce category had an average annual growth rate of 5.6 percent for real value added growth between 2012 and 2020.
- **Priced digital services** contributed \$869 billion to current-dollar value added in 2020. Real value added for priced digital services grew only 0.9 percent between 2019 and 2020. As with the gross output estimate, fast growth in real value added for cloud services (15.3 percent) was overshadowed by a contraction in telecommunications services (–1.7 percent), which represents a larger share of the category. Real value added growth for priced digital services was 6.5 percent on average for 2012–2020.

**Chart 2. Real Value-Added Growth for the Digital Economy and Major Activities, 2020**



## Value added by industry

Similar to gross output, there is considerable variation in the annual value added growth rates by sector and associated contributions to the digital economy, with similar patterns emerging. Industry highlights include:

- Nearly all digital economy value added in 2020 was produced by five sectors: information (40.8 percent), professional and business services (19.1 percent), wholesale trade (19.0 percent), manufacturing (10.5 percent), and retail trade (8.1 percent).
- **Information**, the sector that accounts for the largest share of the digital economy value added, grew by 4.4 percent in 2020 and averaged an annual growth rate of 8.2 percent for 2012–2020 in real terms. Both the 2019–2020 and 2012–2020 growth rates for information were above the growth rates observed for the overall digital economy.
- **Professional and business services** grew by 0.6 percent between 2019 and 2020, much slower than its average annual growth rate for 2012–2020 of 6.1 percent. Fifteen percent of value added in the U.S. professional and business services sector was attributable to the digital economy in 2020.
- **Retail trade** had the strongest growth in real value added (23.9 percent) for any sector between 2019 and 2020, similar to gross output. Growth in real value added for retail trade since 2012 has been consistently higher than for the overall digital economy.

## Employment and compensation by industry

The digital economy employed over 7.8 million full- and part-time employees in 2020, corresponding to nearly \$1.09 trillion in total compensation. The average annual growth rate for digital economy employment was 2.5 percent for 2012–2020, with only 1.2 percent growth between 2019 and 2020. Compensation showed stronger growth, with an average annual rate of 6.0 percent for 2012–2020 and 7.3 percent growth between 2019 and 2020.

- Four industry sectors accounted for more than 85 percent of both total employment and total compensation: professional and business services, information, wholesale trade, and manufacturing.
- **Professional and business services** accounted for nearly one-third of digital economy employment (30.8 percent) and compensation (32.1 percent) in 2020. Computer systems design and related services is the dominant industry within this sector. Growth in professional and business services was 0.2 percent for employment and 6.2 percent for compensation between 2019 and 2020. Over the 2012–2020 period, the average annual growth rate in employment was 3.6 percent and 6.7 percent for compensation.
- **Information** accounted for 22.2 percent of digital economy employment and 28.9 percent of compensation. Publishing industries, except internet (includes software) garnered 46.6 percent of total compensation for this sector in 2020. Employment grew by only 0.1 percent and compensation by 7.9 percent between 2019 and 2020 for information. For 2012–2020, this sector averaged an annual growth rate of 1.3 percent for employment and 6.4 percent for compensation.



- **Wholesale trade** accounted for nearly one-quarter of total digital economy employment (23.6 percent) and one-fifth of total compensation (19.1 percent). Employment in this sector contracted between 2019 and 2020 (−0.6 percent), while compensation grew by 4.5 percent. Over the 2012–2020 period, the sector had an average annual growth rate of 2.3 percent for employment and 4.9 percent for compensation. Thirty-three percent of employment in the U.S. wholesale trade sector was attributable to the digital economy in 2020.

## Revisions to 2005–2019 estimates

Revisions to the 2005–2019 estimates were mostly minor, and all were due to new source data. The main source of revisions was updated statistics within the SUTs stemming from improved source data, mostly to the 2016–2019 estimates. Notable revisions to current-dollar gross output include the following:

- **Software** was revised up for 2016–2019 by more than \$13 billion per year due to the incorporation of new and revised data on systems software publishing and application software publishing from the Census Survey of Annual Services. Although the software levels are now higher than previously estimated for 2016–2019, the upward revision to 2019 was relatively less than for 2018. The uneven upward revision to software levels was a main driver of the revisions to overall digital economy growth rates. Specifically, 2018 growth in overall digital economy gross output was revised up by 0.4 percentage points (from 6.3 percent to 6.7 percent), while 2019 growth in the overall digital economy was revised down by 1.6 percentage points (from 5.9 percent to 4.3 percent).
- **Hardware** was revised down in 2019 by over \$23 billion due to new data on semiconductor-related manufacturing from the Census Annual Survey of Manufactures and new data for computer and electronic products manufacturing research and development (R&D) from the National Science Foundation Business Enterprise Research and Development Survey.

Revisions to value added followed a similar pattern to gross output due mostly to updated source data for the software and hardware activities, described above. Overall growth in current-dollar value added was revised up in 2018, from 5.8 percent to 6.9 percent, while 2019 growth was revised down by 0.8 percentage points (from 6.3 percent to 5.5 percent).

Census e-commerce data used to estimate the digital share of retail and wholesale trade were also revised back to 2005, though revisions were mostly minor. Lastly, cloud services was revised up in 2019 due to newly incorporated financial data from cloud companies that showed relatively faster growth than previously estimated. This upward revision was offset from the internet and data services activity.

## Discussion

Unlike the overall economy, the digital economy experienced relatively strong growth in 2020. Hardware was a strong contributor to overall growth, driven by a large increase in semiconductor-related manufacturing—an industry that was deemed essential during the COVID-19 pandemic and therefore was not subject to the shutdowns that impacted many other industries.<sup>3</sup> On the contrary, this industry saw an increase in demand for many COVID-19-related products, such as remote work products, as described by the [Semiconductor Industry Association](#). Likewise, software experienced relatively strong growth in 2020, as did cloud services and retail trade e-commerce. Census data show retail e-commerce (B2C) sales grew by 42.8 percent between 2019 and 2020, with most of that growth coming from nonstore retailers.<sup>4</sup> These new digital economy statistics suggest this area of the economy was mostly insulated from the downswings seen in other industries caused by the pandemic.

The future of BEA's digital economy initiative includes many possibilities for improvement and expansion. BEA is currently investigating experimental price indexes for certain segments of the digital economy that are experiencing rapid growth and technological improvement, such as satellite manufacturing and cloud services. Additionally, research continues to further incorporate private sector source data that are more timely and may result in smaller revisions. Lastly, BEA intends to expand the digital economy statistics to include areas that are currently excluded, such as digital intermediary platforms. BEA will endeavor to implement these changes and other extensions subject to time, data, and resource constraints. We ask for feedback from data users and other stakeholders regarding these estimates and future plans. Please send comments to [DigitalEconomy@bea.gov](mailto:DigitalEconomy@bea.gov).<sup>5</sup>

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3. See [2021 State of the U.S. Semiconductor Industry](#) for more details on how the pandemic impacted this industry.

4. See the table "[Estimated Annual U.S. Retail Trade Sales - Total and E-commerce: 1998-2020](#)."

5. We wish to thank the following current and former BEA employees for their invaluable assistance in preparing this report: Jennifer Bennett, David Curtis, Jessica Nicholson, Gregory Prunchak, Ricky Stewart, and David Wasshausen.

## Appendix

**Appendix Table 1. Digital Economy Activities and Detailed Industries—Continues**

Digital economy activities	NAICS industries	NAICS description	
<b>Infrastructure</b>			
Hardware	333242	Semiconductor machinery manufacturing	
	333293	Printing machinery and equipment	
	333990	Other general-purpose machinery manufacturing, repair work	
	334110	Computer and peripheral equipment manufacturing	
	334200	Communications equipment manufacturing	
	334310	Audio and video equipment manufacturing	
	334410	Semiconductor and other electronic component manufacturing	
	334610	Manufacturing and reproducing magnetic and optical media	
	335920	Communication and energy wire and cable manufacturing	
	335999	All other miscellaneous electrical equipment and component manufacturing	
Software	511210	Software publishers	
	541511	Custom computer programming services	
<b>E-commerce</b>			
Business-to-consumer (B2C)	441000	Motor vehicle and parts dealers	
	442000	Furniture and home furnishings stores	
	443000	Electronics and appliance stores	
	444000	Building material and garden equipment and supplies dealers	
	445000	Food and beverage stores	
	446000	Health and personal care stores	
	447000	Gasoline stations	
	448000	Clothing and clothing accessories stores	
	451000	Sporting goods, hobby, book, and music stores	
	452000	General merchandise stores	
	453000	Miscellaneous store retailers	
	454000	Nonstore retailers	
	Business-to-business (B2B)	423000	Merchant wholesalers, durable goods
		424000	Merchant wholesalers, nondurable goods
		425110	Business to business electronic markets

**Appendix Table 1. Digital Economy Activities and Detailed Industries—Table Ends**

Digital economy activities	NAICS industries	NAICS description
<b>Priced digital services</b>		
Cloud services	511210	Software publishers
	518210	Data processing, hosting, and related services
	519130	Internet publishing and broadcasting and web search portals
	541400	Specialized design services
	541510	Computer systems design and related services
Telecommunications services	512110	Motion picture and video production
	515120	Television broadcasting
	515210	Cable and other subscription programming
	517110	Wired telecommunications carriers
	517120	Wireless telecommunications carriers (except satellite)
	517410	Satellite telecommunications
	517910	Other telecommunications
Internet and data services	512110	Motion picture and video production
	517110	Wired telecommunications carriers
	517919	All other telecommunications
	518210	Data processing, hosting, and related services
	519110	News syndicates
All other priced digital services	519130	Internet publishing and broadcasting and web search portals
	541512	Computer systems design services
	541513	Computer facilities management services
	541519	Other computer related services
	611420	Computer training
	811211	Consumer electronics repair and maintenance
	811212	Computer and office machine repair and maintenance
	811213	Communication equipment repair and maintenance

Notes. North American Industry Classification System (NAICS). The value of these industries are included fully or partially. The hardware estimates also include research and development and sales of used products. The e-commerce estimates represent margins earned on e-commerce sales.