

# MEASURING ELECTRONIC BUSINESS

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## **Abstract**

This paper describes the United States Census Bureau's e-business measurement program. The paper discusses our measurement framework and associated definitions, our measurement strategy, the ambitious measurement program now underway, initial results, and future plans requiring additional funding. The paper concludes with a summary of lessons learned.

This paper reports the results of research and analysis undertaken by Census Bureau staff. It has undergone a Census Bureau review more limited in scope than that given to official Census Bureau publications. This report is released to inform interested parties of ongoing research and to encourage discussion of work in the progress.

## 1. INTRODUCTION

The growth, integration, and sophistication of information technology and communications are changing our society and economy. Consumers now routinely use computer networks to identify sellers, evaluate products and services, compare prices, and exert market leverage. Businesses use networks even more extensively to conduct and re-engineer production processes, streamline procurement processes, reach new customers, and manage internal operations.

While the burgeoning use of electronic devices in our economy is widely acknowledged and discussed, it remained largely undefined and unrecognized in official economic statistics. The Census Bureau initiated an aggressive program in 2000 to begin filling this data gap. This paper describes the Census Bureau measurement framework, definitions, strategy, data collection initiatives, initial results, and future plans. The fact that electronic business (e-business) is in its infancy, yet growing and changing rapidly, poses special problems. A summary of the lessons we have learned over the past two years of this initiative is provided at the end of the paper.

It is useful to think of the digital economy as having three primary components--supporting infrastructures, electronic business processes (how business is conducted), and electronic commerce transactions (selling of goods and services online). These components are defined and discussed in the following section. In addition, it is important to note that a common feature of both electronic business processes and electronic commerce transactions is reliance on the use of computer-mediated networks. The reliance on the use of computer networks, and the benefits they can provide, is the "bottom line" difference between electronic and other kinds of business. This important shared feature is defined and discussed in next section.

## 2. MEASUREMENT FRAMEWORK AND DEFINITIONS

One of our first challenges in early 1999 was defining what we wanted to measure. Early on it became clear that policymakers, industry, and the media used a variety of terms to describe digital economic activity. Moreover, we found that these terms often were used interchangeably and with no common understanding of their scope or relationships. Consequently, we determined that establishing specific terms that clearly and consistently described our growing and dynamic networked economy was a critical first step in developing useful statistics about it. During the Summer 1999, the Census Bureau developed definitions and concepts to describe the digital economy. Our starting point was a thorough review of related work undertaken by other National statistical agencies. We borrowed heavily from work done by Statistics Canada and others. We also have participated in an OECD task force charged with developing electronic commerce definitions.

The three primary components of our digital economy, and the feature shared by two of them, are defined below. Each definition includes examples of its scope and content, both to clarify and elicit reactions. The definitions are intentionally broad to provide an inclusive framework for planning statistical measures, and to allow flexibility to incorporate continuing changes in the digital economy.

**E-business infrastructure is the share of total economic infrastructure used to support e-business processes and conduct electronic commerce.** It includes hardware, software, telecommunication networks, support services, and human capital used in electronic business and commerce. Examples of e-business infrastructure are:

- ! computers, routers, and other hardware,
- ! satellite, wire, and optical communications and network channels,
- ! system and applications software,

- ! support services, such as web site development and hosting, consulting, electronic payment, and certification services, and
- ! human capital, such as programmers.

**E-business is any process that a business organization conducts over computer-mediated networks.** Business organizations include any for-profit or nonprofit entity. Examples of major e-business process categories include: online purchasing, selling, production management, logistics, as well as internal communication and support services. Within each major category one can identify more specific processes. For example, online purchasing includes the following online processes: access to vendors' products/catalogs, ordering from vendors, electronic payment to vendors, vendor managed inventory, use of electronic marketplaces and online auctions. Internal processes include: e-mail capabilities, automated employee services, training, information sharing, video conferencing, recruiting, and telecommuting.

**Electronic commerce (e-commerce) is the value of goods and services sold over computer-mediated networks.** An e-commerce transaction is “completed” when agreement is reached between the buyer and seller online to transfer the ownership or rights to use goods or services. This online agreement is the trigger for determining an e-commerce transaction, not the payment. Only priced transactions will be measured. Downloads of free software, for example, will not be measured. While transactions involve buyers and sellers, we generally will measure e-commerce from the seller’s perspective. Examples of e-commerce transactions include the sale of a book or CD over the Internet, an electronic marketplace selling parts to another business, a manufacturing plant selling electronic components to another plant within the company using the company's Intranet, and a manufacturer selling to a retailer over an EDI network.

**Computer-mediated networks are electronically linked devices that communicate interactively over networks.** A variety of electronic devices can be linked, including computers, Internet-enabled cellular phones, personal digital assistants, WebTV, and telephones linked through interactive telephone systems. Such links generally involve minimal human intervention though increasingly e-businesses are providing the capability of “chatting” with a customer support representative.

Networks include the Internet, intranet (internal network within an enterprises' or organization's firewall), extranets (networks using Internet/intranet technology that permit businesses to securely share information with selected suppliers, paying customers, or other businesses), Electronic Data Exchange (EDI - a proprietary electronic system used for exchanging business data over networks) networks, and telecommunication networks. Networks can be either open or closed.

### **3. MEASUREMENT STRATEGY**

Our measurement strategy is multifaceted, yet purposeful, and was tempered by reductions in our FY 2000 budget (October 1999-September 2000). The key characteristics of our e-business measurement strategy are described below.

**Achieve and exploit first mover status.** We thought it imperative to begin measuring and understanding the electronic economy sooner rather than later. By adding e-commerce inquiries to existing surveys we were able to begin collecting new data in FY 2000 and FY 2001. We hoped that by providing the first official e-commerce measures last year and having a number of other surveys underway, our first mover status would help secure support for a FY 2001 e-business budget initiative. In October 2000, we learned that this strategy was at least partially successful. The Congress provided \$2.0 million of the \$8.5 million requested for FY 2001 to expand the e-business measurement program.

**Leverage our core competencies.** Faced with resource constraints, we wanted to leverage our experience and expertise in measuring transactions and take advantage of existing survey instruments. Consequently, we identified e-commerce as our initial measurement priority. By taking advantage of existing surveys we were able to collect additional e-commerce information at relatively low marginal cost.

**Contract for e-business process expertise.** Understanding and measuring e-business processes was identified as a second measurement priority. We believe that e-business processes are significantly changing the ways business operate, and that these changes may change the traditional view of the firm, are changing supply chains and the structure of many industries, and pose many challenges to existing

and future statistical programs. While understanding e-business processes and their effects is likely to be far more important than quantifying e-commerce transactions, e-business processes are less well-defined, more closely linked with other business operations, and less easily measured in our existing programs. Rather than attempting to develop in-house business process expertise, we contracted with outside experts to help us better understand e-business processes and their effects. Research activities are described briefly later in the paper.

**E-business measures should complement and improve our existing economic statistics.**

E-business measures should not stand alone, but rather complement our existing measures. The practical outcome of this directive was to exploit existing surveys first, so e-commerce measures were conceptually consistent and comparable with broader measures of economic activity. Baseline measures of e-commerce were developed by adding inquiries to existing surveys so the estimates can be compared to sector or industry totals. Furthermore, we used consistent definitions for measures whether the data are collected from brick-and-mortar, click-and-mortar, or pure Internet plays. Even our e-business measures will be linked to existing survey frames to better understand how these processes are changing firms, industries, and economic sectors.

**Partner with government, business, and academia.** Our goal was to develop an e-business measurement program in collaboration with government, business, and academia. Definitions and underlying e-business measurement took into account work undertaken by other National statistical agencies, private sector analysts, and the research community. Likewise, we contracted with private sector experts to help us better understand e-business process effects and implications.

**Employ e-business processes in business data collections.** The Census Bureau, like successful e-businesses, must exploit e-business processes and adopt more effective methods of operation. Expanded electronic reporting capabilities and a new Customer Relationship Management group are two attempts to employ the methods being used by successful e-businesses.

#### **4. CENSUS BUREAU INITIAL MEASUREMENT ACTIVITIES**

This section describes the Census Bureau's initial data collection and research activities.

**Produce first official measures of Retail e-commerce.** In the Fall 1999, the Census Bureau initiated our first e-commerce data collection effort as we added two questions to our monthly retail trade survey. We asked some 8,000 retail firms if they were selling online and if they responded affirmatively, they were asked to report the dollar volume of their e-commerce sales. We collected the data monthly, but published quarterly estimates. The first official retail e-commerce estimates were released on March 2, 2000, covering the fourth quarter 1999. The table below provides information for the six quarters for which we have published e-commerce estimates.

## Estimated Quarterly U.S. Retail Sales: Total and E-Commerce

(Data in millions of dollars. Not adjusted for seasonal, holiday and trading-day differences.)

Period	Retail Sales		E-Commerce as a Percent of Total Sales	Quarter-to-Quarter Percent Change	
	Total	E-commerce		Total Sales	E-Commerce
1 <sup>st</sup> Quarter 2001	765,227	6,994	.91	-10.6	-19.3
4 <sup>th</sup> Quarter 2000	856,282	8,672	1.01	5.4	35.7
3 <sup>rd</sup> Quarter 2000	812,158	6,393	0.79	-0.4	15.7
2 <sup>nd</sup> Quarter 2000	815,677	5,526	0.68	9.1	5.5
1 <sup>st</sup> Quarter 2000	747,934	5,240	0.70	-8.9	0.8
4 <sup>th</sup> Quarter 1999	821,351	5,198	0.63	8.5	(NA)

NA = Not available

As one can see from the table, we provide three numbers in our quarterly release - total retail sales, total e-commerce sales, and e-commerce sales as a percent of total retail sales. While there has been much attention focused on retail e-commerce, e-commerce sales are still a relatively minuscule part of overall retail trade sales, accounting for only 1 percent of total retail sales only in the fourth quarter of 2000. Contrary to the recent media hype over failing dot.coms would lead one to believe, our most recent estimates do not show a decline in e-commerce retail sales from a year ago. For the fourth quarter 2000, e-commerce sales grew 36 percent from the third quarter level, significantly stronger than overall retail sales which increased by only 5.4 percent.

The quarterly e-commerce report does not provide any information by kind-of-business category or industry. The underlying monthly survey, one of the Nation's principal economic indicators, is based on the Standard Industrial Classification System (SIC), but is converting to the new North American Industry Classification System (NAICS) for calendar year 2001. The first quarterly

e-commerce release on a NAICS basis will be available in mid-August 2001 and will provide NAICS-based data for the first two quarters of 2001. Important differences between NAICS and the SIC include a change in the Retail and Wholesale Trade boundary which shifted a significant number of businesses from Wholesale to Retail, and moved Foods Services from the Retail Trade sector to the Accommodation and Food Services sector.

**Provide baseline e-commerce measures for key economic sectors.** After successfully producing quarterly retail e-commerce estimates, we turned our attention to providing baseline statistics for other key sectors of the economy. Our goal was to provide annual e-commerce measures for 1999, a time when e-commerce was beginning to become economically significant. The easiest and most inexpensive way to achieve this goal was to add questions to four existing annual surveys.

We added e-commerce sales questions to 1999 annual surveys covering retail trade (19,000 firms), wholesale trade (6,900 firms), and selected NAICS services industries (51,000). These three 1999 surveys were NAICS-based. In order to provide a bridge back to the NAICS-based 1997 Economic Census results, we asked firms to report total and e-commerce sales for 1998 as well as 1999.

In addition, for nonstore retailers (catalog and electronic shopping sites), and all computer, software, and office supply firms we collected supplemental information on:

- total sales and e-commerce sales by 11 commodity categories (books, CDs, computers, software, apparel, etc.),
- e-commerce sales by class of customer (individuals, businesses, government), and
- total foreign e-commerce sales (percent ranges of total e-commerce sales).

Report forms covering reference year 1999 were mailed in March-April 2000.

For the manufacturing sector we decided to collect not only e-commerce data, but also information about the manufacturing plant's existing and planned use of selected e-business processes. The focus on e-business processes required us to rethink our collection strategy. Rather than targeting the accounting department, we developed a special supplemental form aimed at the plant manager. A special supplement to the 1999 Annual Survey of Manufactures (ASM) collected data from some 50,000 manufacturing plants on:

- e-commerce sales and purchases,
- types of information (design specifications, product descriptions, demand projections, order status, inventory data, production schedules, and so on) manufacturers are sharing online with suppliers and customers, and
- e-business processes use (present and planned)-over 25 specific e-business processes are identified.

The ASM supplement was mailed to the plant managers in June 2000. We also provided plant managers with the opportunity to report electronically. A copy of the report form is available online at <http://www.census.gov/mcd/ma1000ec.pdf>.

### **1999 E-commerce Highlights**

The e-commerce results from these four surveys were integrated into a single report *E-Stats E-commerce 1999* which was released on March 7, 2001. The full report and accompanying tables are available at [www.census.gov/estats](http://www.census.gov/estats). The report covers manufacturing, merchant wholesale trade (wholesalers that take title to the goods they sell; the report does not cover manufacturers' sales offices and branches, commission agents, e-marketplaces and other nonmerchant wholesalers that do not take title to the goods they sell), retail trade, and selected service industries. Within each sector information is presented by industry group on: total dollar value of shipments, sales, or revenues (measure of economic activity varies by sector), the value of e-commerce activity, e-commerce as a percent of total value for each industry group, and each industry group's e-commerce value as a percent of the total sector e-commerce total. All industry groups are based on NAICS.

Manufacturing led all industry sectors with 1999 e-commerce shipments of \$485 billion or 12.0 percent of the total value of manufacturing shipments. Merchant Wholesalers were second with e-commerce sales that represented 5.3 percent or \$134 billion of total sales. A special grouping of service industries created for this report showed that Selected Service Industries had e-commerce revenues of \$25 billion or 0.6 percent of total revenues for these industries. Retail Trade had e-commerce sales of \$15 billion or 0.5 percent of total retail sales.

Manufacturing and Merchant Wholesale Trade, sectors where goods are primarily sold to other businesses, had substantially higher e-commerce percentages than Retail Trade and Selected Service Industries, sectors where goods and services are sold to individual consumers as well as to businesses. Although the surveys did not collect separate data on business to business (B-to-B) and business to consumer (B-to-C) e-commerce, one can approximate relative shares by using some simplifying assumptions. If one assumes all manufacturing and wholesale e-commerce was entirely B-to-B and all retail and service e-commerce activity was entirely B-to-C, and ignores the definitional differences between shipments, sales, and revenue, more than 90 percent of total e-commerce was B-to-B.

One possible explanation for the large e-commerce percent differences among the four sectors may be the long-standing use of EDI systems for online selling by many manufacturing and wholesale trade industries in contrast to the much more recent adoption of Internet systems by many retail and service industries. In manufacturing, while many plants used the Internet for accepting online orders from their customers, in terms of dollar volume, EDI systems continued to dominate. Of those manufacturing plants that reported offering online ordering to their customers, 52 percent used the Internet most frequently for accepting online orders, while 36 percent used EDI most often. However, in terms of dollar value, plants using Internet ordering systems most frequently accounted for only 5 percent of total manufacturing e-commerce shipments while plants offering EDI online ordering accounted for 59 percent.

The E-Stats tables show that almost all industry groups are engaged in e-commerce activity to some degree, but that in terms of dollar value, e-commerce is concentrated in a few groups within each sector. For example, in Merchants Wholesale Trade three industry groups accounted for 76 percent of

wholesale e-commerce sales, while in Retail Trade one group accounted for 77 percent of retail e-commerce sales.

The analysis for each of the sector tables and the table which provides information on the Electronic Shopping and Mail-Order Houses industry, which accounts for 76 percent of all retail e-commerce sales, can be found at [www.census.gov/estats](http://www.census.gov/estats). E-commerce data for calendar year 1998 for merchant wholesalers, retailers, and selected service industries are also available on the web site. No 1998 e-commerce data are available for manufacturing.

**Conduct e-business research studies.** Last year we conducted two research studies. We contracted with Pembroke Consulting (Dr. Adam Fein) to study changing supply chain industries and organizations. Deliverables included a description of the changing supply chain, implications for Census Bureau measurement programs, and specific recommendations regarding how to better capture and describe supply chain activities in the 2002 Economic Census and in our current economic statistics. We plan to add a number of check box inquiries to the 2002 Economic Census forms for wholesalers, retailers, and transportation establishments to identify what supply chain functions are being provided by different establishments in the supply chain.

A second research activity, led by Dr. Hal Varian, assessed how well NAICS captures e-business activities. The research found that NAICS was doing a very good job classifying various kinds of e-businesses but that additional information needs to be collected to better understand the myriad activities these firms are engaged in. These results reinforced the importance of the work underway with Mexico and Canada to develop a North American Product Classification System, initially focused on identifying the products of service industries. In the 2002 Economic Census we will collect data on over 1000 new service products from about 65 industries including all the industries in the Information Sector.

## **5. FUTURE E-BUSINESS PRODUCTS AND ACTIVITIES**

The FY 2001 budget initiative would have funded the implementation of an ambitious e-business measurement program, extending the program started last year. The Congress, however, only appropriated \$2.0 million of the \$8.5 million requested. Given this reduction, we have scaled back our original plans. This section describes future products and activities that are funded. Section 6 describes activities that have been deferred.

**Deliver first official baseline measures of e-business process usage** by manufacturing industries.

The ASM Supplement collected data on planned and future e-business process use. The initial e-business process use data will be released in May 2001. Later, data from the ASM supplement will be linked to the full ASM data set permitting us to assess the effect of e-business processes on individual plants, firms, and industries. Analysis of the linked data sets will begin in the Summer 2001. Next year, we will not collect the e-business process use information because of the reduction in the FY 2001 funding request.

**Quarterly retail e-commerce estimates will be available on a NAICS-basis in mid-August 2001.**

Beginning with the January 2001 reference month, we began the conversion of the monthly retail trade survey to NAICS. The first quarter 2001 Retail e-commerce release, available in May 2001, is based on the SIC. In mid-August we will issue the second quarter 2001 e-commerce estimates on a NAICS basis and reissue the first quarter estimates on NAICS basis.

**Complement our business e-commerce measures with household data.** We are developing and testing a series of e-commerce questions that will be included in a special Internet supplement on the monthly Current Population Survey. The September 2001 CPS supplement will collect data on the various devices household members are using to access the Internet, collect information on types of e-commerce purchases, and provide new insights on how consumers are using the Internet when shopping for an auto. We expect initial results to be available in November/December 2001.

**Provide e-commerce measures for most economic sectors and their associated industry groups.**

We plan to continue our *E-Stats E-commerce* release with the 2000 multi-sector report scheduled for release in February 2002. Coverage will be identical to the 1999 report.

**Employ e-business processes in Census Bureau business data collections.** Our goals are to ease reporting burden and increase efficiency in data collection programs. Deliverables for late 2002 include an Internet reporting capability for all five million businesses included in the 2002 Economic Census; establishment of a Customer Relationship Management staff to coordinate and improve communication with the largest companies and facilitate their responses to information requests from separate Census Bureau data programs; and development of an Internet-based customer support system for the 2002 Economic Census to provide on-line information and technical assistance to census respondents.

**6. PROPOSED E-BUSINESS MEASUREMENT ACTIVITIES REQUIRING ADDITIONAL RESOURCES**

The activities listed below were originally included in our FY 2001 Measuring E-business request of \$8.5 million, but currently are not funded at the \$2 million reduced level. Additional funding will need to be secured before we will be able to move forward on these activities.

**Continue to collect data on manufacturers use of e-business processes.** At this time there are no plans to collect data on e-business process use for either reference year 2000 or 2001. While we believe the 1999 results are going to be extremely illuminating, we do not have the resources to replicate or expand the ASM Supplement in the future.

**Include coverage of electronic marketplaces** and other important distribution channels in the annual wholesale trade survey. Currently, the Annual Trade Survey excludes nonmerchant wholesalers such as manufacturers' sales branches and offices, agents, brokers, commission agents, and electronic marketplaces and exchanges. In the 1997 Economic Census nonmerchant wholesalers accounted for 44 percent of total wholesale trade sales. We have selected a sample of nonmerchant wholesalers, but currently we do not have the funds to include the new sample in the 2000 ATS.

**Conduct a supply chain survey.** E-business processes are facilitating the shifting of functions among supply chain actors. For example, functions traditionally performed by wholesalers are now being performed by some transportation firms, while transportation firms are leveraging their core competencies and are now outsourcing logistics services. In order to better understand these shifting functions and their implications for our economic statistics programs, we would like to conduct a first time in-depth survey of supply chain organizations associated with two or three industries. We are developing a surveying strategy and related content, but will not conduct the survey until we have secured additional resources.

**Develop e-business infrastructure measures.** To date we have not expended any resources and little attention to the adequacy of existing measures of the e-business infrastructure. We had planned to assess existing measures, identify new priority measures, and explore opportunities for adding questions to our Annual Capital Expenditures Survey, but all activities have been placed on hold. We still invite interested parties to suggest new measures that should be considered in the future.

## **7. LESSONS LEARNED**

The past two years have been exciting and challenging. The Census Bureau has embarked on an ambitious e-business measurement program and the response to our initial efforts has been encouraging and supportive. Nonetheless, we fully recognize that e-business is in its infancy, is changing rapidly, and that the most difficult measurement challenges lay ahead of us. Implementing an aggressive measurement program has provided us with some valuable lessons.

**Definitions and concepts are important.** We spent almost six months developing definitions and a framework for measuring e-business, and this was time well spent. We found that it has been essential to use precise terms to discuss e-business transactions, processes, and the underlying infrastructure. These definitions, supplemented with specific examples, have been especially useful in discussing measurement plans and priorities with policymakers, business, and other statistical agencies.

While during our deliberations we agonized over specific words and examples, we decided for collection purposes to keep the instructions simple and straight forward. Consequently, we have tried

to avoid overly technical definitions of communication protocols and such and have tried to craft questions in language that accountants would understand. To better communicate with respondents, our instructions provide clarifying examples such as descriptions of computers and electronic devices that communicate interactively over various types of networks.

We began field testing our e-commerce definition in November 1999 with the monthly retail survey, in March-April 2000 with our non manufacturing annual surveys, and in June 2000 for the manufacturing supplement. The initial results were encouraging. The vast majority of businesses understand our definitions and instructions and we have had very few questions. The retailers have had few, if any problems, with the definitions. The manufacturing e-business supplement was our first test of the e-business processes definitions. We targeted the manufacturing plant manager, not the accounting department, so we expected a high degree of familiarity with existing processes and the degree of integration with vendors and customers. We did a small scale cognitive test prior to mail out, and discovered that “Extranet” was a term that is unfamiliar to many plant managers. Another confusing term was “computer-mediated networks.” Subsequently, we have used “online networks” in lieu of “computer mediated.”

**Expect the unexpected.** As in any statistical program the survey responses do not always seem logical. For example, in our manufacturing supplement we have had some manufacturers claim that they have no network connections at the plant, yet they filed their report forms via the Internet. In some service industries that seem unlikely to have e-commerce sales we have a few companies reporting such sales. We followed up all suspicious cases and will refine definitions and examples for next year’s surveys.

**Distinction between e-commerce transactions, e-business processes, and the e-business**

**infrastructure is not obvious.** This lesson was learned as a result of a series of meetings with Census Bureau staff that have responsibility for processing e-commerce measures but who had not been involved in the development of specific definitions. While everyone understood the e-commerce definition, understanding of e-business processes was mixed, and they were also unclear about how we would characterize the e-business infrastructure. To address this problem we have introduced a number of briefing sessions to discuss particular examples and answer specific questions.

**Measures can be problematic.** Developing e-commerce measures for retail trade, wholesale trade, and manufacturing was relatively straightforward. Developing e-commerce measures for many service industries has proved to be more challenging. This first year's experience will help improve subsequent measures. We are not alone in this arena. The Financial Accounting Standards Board (FASB) as well as the Securities and Exchange Commission have struggled with issues concerning the recognition and measurement of e-commerce transactions. Recently the FASB's Emerging Issues Task Force (EITF) issued three consensus conclusions that will significantly impact revenue recognition for e-commerce companies. The issues covered include:

Redefining revenue to include shipping and handling fees (EITF 00-10). Previously these items were reported net of costs under generally accepted accounting principles (GAAP).

Severely restricting the reporting of gross commission income for agents and brokers (EITF 99-19) as revenue. Under EITF 99-19 most companies will be required to report commission revenue net of costs.

Severely restricting the reporting of barter transactions not involving the exchange of money (EITF 99-17) as revenue. Previously internet based e-commerce companies had been including barter transactions, like advertising, in their revenue.

These rulings will have to be accounted for by what questions we ask and how we them. We must ensure that the data are being reported consistently during the adoption phase. This latter impact may lead to revisions in our data.

The manufacturing supplement was our first foray into e-business process measurement and we have found that it was critically important to work with industry experts in identifying the processes. While we expect some commonality in processes across sectors, we believe that there also will be substantial differences, so compiling a comprehensive list will be difficult and time consuming. The measure of e-business process “use” has proved relatively straightforward, but we have little information that documents or explains these changes or assess their impact on existing measures of economic activity. Understanding and quantifying e-business process effects is going to be difficult and will likely require innovative and nontraditional methods, and we welcome any and all suggestions.

**The statistical unit and the survey instrument place significant constraints on what can be collected.** Our economic census program generally collects data for the individual location or establishment while most of our current surveys collect data for the enterprise or subsidiary, with survey forms generally directed to the accounting department within the firm. We are successfully collecting e-commerce sales data from both enterprises and establishments, but accountants are not the appropriate group from which to collect information about e-business process use. Consequently, we believe we will have to create new survey vehicles that can target the plant manager, the chief information or technology officer to collect e-business process information. Combining e-commerce data collected from different statistical units and using different measures of economic activity in developing our 1999 E-Stats release highlighted these challenges. Finally, information about the e-business infrastructure is probably going to have to be collected at the enterprise rather than the establishment level just as we do in our Annual Capital Expenditures Survey.

**Start small, leverage your existing resources.** Constrained budget resources in FY 2000 prohibited us from considering stand-alone e-business surveys or programs. By adding questions to our existing surveys we were able to mobilize quickly, minimize data collection costs, and provide e-commerce baseline measures which can be related to broader measures of economic activity. Taking advantage of our transaction expertise, we first focused on e-commerce measures. As our

understanding of e-business processes increased, we developed the manufacturing supplement. This approach has served us well and we expect the results from these initial collections will not only provide useful summary statistics but also further our staff's understanding of e-business. Our focus on e-business within the context of our existing programs also has had an unanticipated benefit in that it has forced us to address a long list of measurement issues related to coverage, classification, valuation, and so on. These issues are not new or associated only with e-business, but a new e-business perspective has caused us to take a fresh look at them.

## **8. CONCLUSION**

Measuring the electronic economy poses new challenges to the Census Bureau and other statistical agencies. We are excited about what we have accomplished, but realize much more remains to be done. We invite feedback on our initial and future plans. We also are very interested in other organizations and countries' experience with measuring e-business activity and invite them to share them with us. Please forward your comments, experiences, and suggestions to Thomas L. Mesenbourg at [tmensenbo@census.gov](mailto:tmensenbo@census.gov)