

Appendix: Employment Analysis Methodology

Data: We analyzed Bureau of Labor Statistics (BLS) data, including the annual May 2010 Occupational Employment Statistics (OES) data for 291 industry subgroups and 796 occupations and the biannual 2010-2020 Employment Projections (EP) data. The OES jobs data cover non-farm, wage and salary workers. The OES reports occupations in three tiers: industry total; major occupations; and sub groups. For some industries, occupational estimates are not reported at the lower tiers, so the sum of the sub groups (125.5m) is less than the major groups (126.8m), which is less than the sum of industry totals (127.1m). 1.6m jobs, or 1.2%, were not reported in a sub category. The EP data set is broader; it includes farm and self-employed workers (143.1m total). Larger total ICT jobs figures based on EP data are primarily due to self-employed workers in ICT-centric occupations. Methodological changes compared to prior years are discussed below.

ICT Classification: (1) *ICT Industries.* We classified all industries as information and communications technology (ICT) or not. ICT includes: (1) information industries, consisting of telecom and broadcasting, information and data processing services, publishing (including software), and movies and music; (2)* computer and electronics manufacturing; (3) computer system design services; (4)* call centers; and (5)* e-commerce, electronics & media trade industries, e.g., electronics retailers and wholesalers; online retailers; business to business online commerce; book, periodical, and music stores; and electronics repair. Among ICT Industries in the OES data, approximately 144,000 out of 6.2 million employees, or 2.3%, were not classified into the sub group. **Revisions in the 2010 analysis: (A) Removed the navigational, measuring, electro-medical, and control instruments from the computer and electronics manufacturing industry. (B) Added call centers. (C) Added e-commerce, electronics & media trade. In the OES, these were aggregated with non-ICT industries (e.g., home appliance, electrical). We allocated less than half of over 2.1 million of these jobs to ICT in proportion to more granular BLS industry data (Current Employment Statistics, May 2010). The impact of the reclassification is discussed in detail below.*

(2) *ICT-Centric Occupations.* **We classified certain occupations as “ICT-centric”—those that: predominantly exist to utilize, implement, produce, or distribute ICT and related information; or otherwise primarily serve to integrate their organizations with the ICT ecosystem. ***BLS used revised Standard Occupational Classification codes in 2010. We mapped our ICT-Centric occupations from prior years to the new classifications. See list at the end of the Appendix for occupations considered ICT-Centric under the new classification system. The impact of the revisions is discussed below.*

Computation of Overall ICT Employment: We define direct ICT employment as ICT industry employment in both ICT-centric and non-ICT-centric jobs, plus ICT-centric jobs in non-ICT industries. (1) We first identified all direct employment within the ICT industries, broken out by ICT-centric and non-ICT occupations. For OES data, the industry “total” group was not broken out into ICT-centric and non-ICT centric jobs. Therefore, we allocated it between ICT-centric and other categories in proportion to the industry’s distribution within the sub group. (2) We next identified all ICT-centric occupations based on our classification. For OES data, the “total” group was not broken out by those employed in ICT industries and those employed in other (i.e., non-ICT) industries. We allocated into ICT industry and non-ICT industry categories in proportion to the sub group distributions. (3) To avoid double counting, we backed out ICT-centric jobs in the ICT industries, since they were already counted in the ICT industry totals. We then summed the ICT industry job totals, both ICT-centric and other, with the ICT-centric jobs in non-ICT industries.

Cautionary Notes. *Time Series:* The BLS OES and EP data are based on sampling, and have undergone methodological changes over time. Therefore, they are not well suited to time series comparisons. *Projections:* The EP 2020 data are ten-year projections based on an assumed return to full employment. These projections are subject to a level of uncertainty because we cannot project economic cycles with precision. One must also consider the impact of the recent economic downturn on 2010 as a starting point when interpreting growth projections.

Appendix: Employment Analysis Methodology (Continued)

Impact of Reclassification of ICT Industries and Occupations:

In this year's analysis we relied more heavily on EP data. In the past, we have relied primarily on OES data. So, the discussion that follows comparing results of different methodologies is based on ready comparisons to OES data. As a result of our revised ICT industry definitions, we subtracted over 404k navigational, measuring, electro-medical, and control instruments manufacturing jobs, while adding 438,000 call centers jobs and 957,000 e-commerce, electronics & media trade jobs. Our new industry definitions resulted in an increase of approximately 1 million ICT industry jobs. However, we must net out approximately 200,000 ICT-centric jobs that would have otherwise been counted as ICT-centric occupations in non-ICT industries, but are now accounted for in the ICT industry category. Thus, compared to the old definitions, there was a net increase of approximately 800,000 total ICT jobs (to 10.2 million from 9.4 million).

We assume the BLS occupational code revisions are neutral. While we cannot test this assumption directly, it is useful to compare 2009 to 2010 OES data, holding industry definitions constant. Under our old definitions, May 2010 data yield 9.4 million ICT jobs, 100,000 less than the 9.5 million ICT jobs in the May 2009 data. The small decline is consistent with the 1.2 million private non-farm wage and salary jobs lost from May 2009 to May 2010. But we must be cautious in making the comparison because the May 2009 and May 2010 survey data are not directly comparable (see "Note of Time Series").

While our new ICT industry definitions increased the number of jobs considered ICT, they also decreased the average wages for the ICT industries. Under the new definitions, ICT industries pay 37% greater than the national mean and 52% greater than the national median wage. Without low-wage industries, such as call centers and electronics and media retailers, ICT industries pay approximately 53% greater than the national mean and 72% greater than the national median wage.

Occupational Categories Classified as ICT-Centric

Computer Programming and Software

- Computer Programmers
- Software Developers, Applications
- Software Developers, Systems Software

Computer Specialists, Support, Operators, Users

- Computer Hardware Engineers
- Computer Operators
- Computer Support Specialists
- Data Entry Keyers
- Database Administrators
- Word Processors and Typists
- Computer Occupations, All Other
- Computer and Information Research Scientists

Content/Information Production and Management

- Archivists
- Broadcast News Analysts
- Broadcast Technicians
- Camera Operators, Television, Video, and Motion Picture
- Desktop Publishers
- Film and Video Editors
- Graphic Designers
- Librarians
- Library Assistants, Clerical
- Library Technicians
- Motion Picture Projectionists
- Radio and Television Announcers
- Sound Engineering Technicians
- Printing Press Operators
- Print Binding and Finishing Workers
- Audio-Visual and Multimedia Collections Specialists

Other

- Media and Communication Workers, All Other

Teaching and Research

- Communications Teachers, Postsecondary
- Computer Science Teachers, Postsecondary
- Library Science Teachers, Postsecondary

Equipment, Repair, and Installation

- Audio and Video Equipment Technicians
- Camera and Photographic Equipment Repairers
- Computer, Automated Teller, and Office Machine Repairers
- Electronic Equipment Installers and Repairers, Motor Vehicles
- Electronic Home Entertainment Equipment Installers and Repairers
- Media and Communication Equipment Workers, All Other
- Radio Operators
- Security and Fire Alarm Systems Installers
- Telecommunications Equipment Installers and Repairers, Except Line Installers
- Telecommunications Line Installers and Repairers
- Radio, Cellular, and Tower Equipment Installers and Repairs

Manufacturing

- Electrical and Electronic Equipment Assemblers
- Semiconductor Processors

Marketing, Advertising, and Sales

- Advertising and Promotions Managers
- Advertising Sales Agents
- Telemarketers

Network/I. T. Administrators, Operators, & Analysts

- Communications Equipment Operators, All Other
- Computer and Information Systems Managers
- Computer Systems Analysts
- Switchboard Operators, Including Answering Service
- Telephone Operators
- Network and Computer Systems Administrators
- Information Security Analysts, Web Developers, and Computer Network Architects