JEDx

HARNESSING EMPLOYER RECORDS FOR ENHANCED RESEARCH, STATISTICS, AND EVALUATION

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Abstract

The Jobs and Employment Data Exchange (JEDx) is an initiative of the U.S. Chamber of Commerce Foundation to enhance the administrative data systems of employers' earnings and employment records to enhance government reporting, workforce analytics, and empower people to pursue opportunity and advancement. Through this report, the JEDx Research Enhancement Project (JEDx-REP) provides perspectives on the potential benefits of enhanced earnings and employment records for social science research, official statistics, and evaluation. The JEDx-REP team conducted literature reviews, interviews, and advisor forums to prepare findings and recommendations regarding research, statistical, and evaluation use cases; priority data enhancements (such as occupation, hours worked, and primary work location); and models and options for data access systems to enable these applications while protecting privacy and confidentiality.

EXECUTIVE SUMMARY

This report of the JEDx Research Enhancement Project (JEDx-REP) presents information on employment and earnings records maintained by employers for government reports (such as unemployment insurance program [UI] reports), and how these records are also used for research. Some states have expanded the information employers must report, and government and non-government efforts, such as the Jobs and Employment Data Exchange (JEDx) are intended to further enhance these records. Through this report, JEDx-REP offers recommendations to the JEDx initiative for how enhanced wage records could improve research, government statistics, and evaluation.

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Wage records and current uses. Employment and earnings records maintained by employers are often referred to by researchers as "wage records," but can also include a variety of other kinds of information. This report uses the following definitions:

- Employer administrative records: data maintained by employers for their internal business purposes and to complete reports for state and federal government agencies

- Core wage records: a component of employer administrative records that list the employer, a worker, and the earnings paid to the worker over a period of time.

- UI wage records: wage records that the federal UI system requires each state to collect. These consist of core wage records for each quarter, plus minimal ancillary information

- National Directory of New Hires (NDNH) wage records: states' UI wage records combined with UI benefits received by a worker and a new hire indicator, augmented by equivalent records from federal agencies for workers not included in state records.

- State-required wage records: records collected by states to meet state and federal UI and NDNH requirements and to serve additional state-specific uses

- Enhanced wage records: wage records based on data standards collected by states to satisfy requirements for NDNH, federal and state UI programs. These records also contain additional elements (common across states) in order to meet other needs.

Major research uses of employer-maintained wage records are:

1. Social science research;

2. Official federal and state statistics;

3. Program evaluation; and

4. Benchmarking, analytics, and tracking.

5. Use cases (both current and potential) in these areas are presented in Section 4.

Wage records in the context of national data infrastructure. Technological advances, declining survey response rates, and government policies have raised the importance of using administrative data (particularly digitized) for research purposes across all policy areas (e.g., Foundations for Evidence-based Policymaking Act). These developments point to many opportunities for enhanced wage records to advance important policy and research objectives. However, many barriers limit such expanded use. This has spurred additional efforts and strategies to standardize employer and other administrative data (e.g., National Labor Exchange, Schema.org, HR Open Standards Consortium, Data Standards United, Office of Management, and Budget's Circular A-119).

Overall finding: Data standards and enhanced wage records (as envisioned by JEDx and other initiatives), along with improved researcher access to wage records hold important potential for improving labor statistics, economic and other social science research, and program evaluation.

General recommendations for JEDx:

- Include researchers, researcher access, and research products in JEDx pilots with governments, states, and employers.

- Explore approaches to lowering the burden on employers of adding several high-priority/high-burden data elements as part of the wage record enhancements desired by researchers.

Specific recommendations for JEDx:

- Test and pilot highest priority data elements for researchers:
  * indicates those that may be easier for employers to provide

  – *Hours worked and paid, disaggregated by categories, and reported frequently and timely

  – *Geo-code primary location of work and the employee's residence

  – *Job title

  – *Employment start and stop dates and the reason for separation

  – *Nature of employer-worker relationship for standard workers (e.g., regular, full time, part time, and/or union status)

  – *Compensation/earnings/wages, disaggregated by categories, and reported more frequently and timely

  – *Enhanced data items to facilitate linking records to other data sources

  – Occupation, duties, and skill requirements

  – Non-standard work relationships (e.g., 1099 recipients)

  – Worker demographic characteristics or ability to link to other sources

  – Worker education and training attainment or ability to link to other sources

  – Characteristics of the organization and establishment (e.g., industry and non- or for-profit status)

  – Position in employer hierarchy (e.g., manager, stock owner, officer)

- Data categories that are more difficult for employers to provide may be best obtained by other means, such as linking to other data sources.

- Access for researchers, in the long run, will likely require (1) a mix of multiple complementary access points for different research purposes; (2) supportive governance and technical models that manage research access and protect data privacy; and (3) public/private portals and tiers of access for different types of researchers.

CONCLUSIONS

Data standards and improved access to enhanced wage records will provide substantial benefits to social science research, official statistics, and program evaluation.

There is strong agreement among researchers about priority data items.
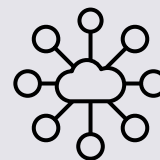
Data access for researchers would best be provided through a mixed approach using a combination of public and private facilities. JEDx should include the exploration and selection of various models and options in future pilots.

HARNESSING EMPLOYER RECORDS FOR ENHANCED RESEARCH, STATISTICS, AND EVALUATION

This report of the JEDx Research Enhancement Project (JEDx-REP) presents information and recommendations to facilitate research, statistical, and evaluation uses of workers' employment and earnings data that are maintained by employers for government reporting purposes. The goal is to inform data and system enhancement initiatives underway, primarily by the JEDx initiative sponsored by the U.S. Chamber of Commerce Foundation in collaboration with several states and other stakeholders, including human resource organizations and business technology providers (USCCF, 2021). Funded by a grant from the Economic Institutions, Behavior, & Performance Program of the Alfred P. Sloan Foundation, this project provides research perspectives to the JEDx initiative.

The sections that follow cover:

1. Introduction and goals of this project;

2. Current uses of administrative employment and earnings records for research, evaluation, and statistical analysis;

3. Increasing reliance on employer administrative records for analytical purposes;

4. Research use cases for enhanced wage records;

5. Desirable data and access enhancements for research, based on literature reviewed and input from JEDx-REP advisors; and

6. Findings and recommendations.

01

INTRODUCTION, PURPOSE, AND PROCESS

INTRODUCTION

Employers maintain various types of information on their businesses, including workers' employment and earnings. They are required to report a portion of this information to government agencies for tax and other purposes, including unemployment insurance. These employer records, along with other information gathered by government agencies, are a major source of data for official statistics, program evaluations, and other labor-related research. Currently, the worker employment and earnings records submitted to the government, often referred to as "wage records" (a convention followed in this report), are maintained in state government data systems, into which employers report, typically, quarterly.

Rapid advances in computer technology and data science are spurring many initiatives to enhance, streamline, and modernize the wage record collection and reporting systems used by employers and federal and state governments. These developments have implications for how researchers, statisticians, and evaluators access and use the data analytically.

The Jobs and Employment Data Exchange (JEDx) initiative is a public-private effort led by the U.S. Chamber of Commerce Foundation to enhance earnings and employment record administrative data systems (see more detail in USCCF, 2021). At present, through JEDx, a number of states are exploring the opportunity to pilot standards for data elements, technology platforms, and system maintenance processes. This report provides the JEDx initiative with findings and recommendations to support research, statistical, and evaluation uses of JEDx-facilitated enhanced wage records.

The JEDx-REP team conducted literature reviews, interviews, and advisor forums to: (1) identify the most critical use-case applications and data requirements for research using enhanced wage records and (2) explore systems for collecting, managing, and using enhanced wage records for these applications. Throughout, the JEDx-REP team conveyed findings to JEDx leadership to inform decisions and facilitate useful connections with potential public and private partners.

As its first step, the JEDx-REP team recruited 29 leading social scientists, statisticians, policy researchers, and program evaluators in non-government and government positions to advise the project, prioritizing diversity of disciplines and experience. *Appendix G* provides a list of these advisors. Through two advisory forums and individual interviews, these advisors and other experts (all referred to as advisors in this report) were asked to identify:

1. The standards-based jobs and employment data needed in enhanced wage records for the most critical analytic applications and

2. The desired characteristics of systems for collecting and accessing enhanced records for these applications, while protecting privacy.

In parallel, the JEDx-REP team reviewed relevant literature on enhanced wage record systems. Based on these activities, the JEDx-REP team prepared a draft report of findings and recommendations for the JEDx initiative, compiled comments from advisors, and prepared this final document.

The following sections discuss how wage records are currently used for statistical, evaluation, and other research purposes, along with how these uses have evolved over the years; and opportunities for improving the use of, and access to, wage records and related data for research going forward.

02

WAGE RECORDS AND THEIR CURRENT USES

This section reviews what wage records are and how wage records collected by the government are used both for running government programs—and as a critical source of data for economic research, official labor market and statistical purposes, and (especially government-sponsored) program evaluations. The examples presented here reflect prominent cases and are not intended to cover all instances. For simplicity, each example is categorized by one major type of research use, even though many of the examples support multiple uses.

2.1. Wage records defined

This report uses the following terms depicted in the Venn diagrams in *Figures 1A* and *1B*:

- **Employer administrative records** refer to data maintained by US employers for their internal business purposes and to complete a substantial number of reports for state and federal government agencies. Data gathered by these agencies (either as individual worker records or in aggregates) are used for tax, regulatory, program administration, or enforcement purposes. Examples include ongoing reports (e.g., Unemployment Insurance [UI] and income tax reporting such as W-2 and 1009 forms), surveys (such as Bureau of Labor Statistics [BLS] or Census Bureau surveys), and records required in case of regulatory investigations (e.g., for Fair Labor Standards Act or Occupational Safety and Health Act violations).

- **Core wage records** (a subset of employer administrative records) refer to individual worker records that list the employer, the worker, and the earnings paid to the worker over a period of time. Core wage records are generated, in part, to manage payrolls and taxes.

- **UI wage records** refer to the current federally required elements in state UI wage records. These consist of core wage records for each quarter plus minimal ancillary information, such as employer industry and location. The states submit reports to the federal government based on the US Department of Labor's UI program regulations.

- **NDNH wage records** refer to the records in the federal National Directory of New Hires (NDNH). The NDNH is administered by the US Department of Health and Human Services (HHS) to assist states and the federal government in enforcing child support obligations. The federal NDNH data system consists of the complete set of state UI wage record files, state UI benefits received (if any) by a worker, and an indication of whether a worker was a new hire (drawn from information submitted by employers to the state independent from UI). Separately, the federal NDNH system collects the equivalent of state UI wage records from other federal agencies for many workers not included in state UI records—mainly federal employees and military personnel.

- **State required wage records** refer to individual worker records collected from employers by states to meet state and federal UI and NDNH requirements. States collect these records and use them for determining businesses' unemployment tax rate, eligibility for any application for UI claims by workers, and child support enforcement. Many states also collect a variety of additional information from employers, reflecting state tax laws, regulations and other uses. Increasingly, some states require additional elements for use in labor market information and other analytics.

- **Enhanced wage records** refer to wage records that would satisfy requirements for NDNH, federal and state UI programs, and contain additional useful elements (common across all states) that go beyond those requirements. Unified submission and collection of these records would be facilitated by employers' adoption of standardized employer administrative records as proposed by the JEDx initiative. See more discussion below.

For brevity, this report refers to all records containing core worker wage data as "wage records" even though they are more appropriately called "wage and employment administrative records" because they record both employment and wages.

Figure 1A summarizes how these various records currently interact. States gather wage records from employers in accordance with federal UI and NDNH data requirements and submit them to their respective federal agencies. States also use the data reported by employers for state UI, tax, and other purposes.

Enhanced wage records, as discussed here, are an aspiration and the focus of this report. These records would build on—and go beyond—changes that some states have adopted so far, for example, requiring hours of work or reporting monthly rather than quarterly wages. Because state variation exists in these changes and no agreement yet on what enhanced records would ideally contain, "enhanced wage records" are not as well defined as the other terms listed above.

The upcoming JEDx pilots will explore whether a version of enhanced wage records can improve data quality and reduce the number and variety of reports that employers submit. Figure 1b illustrates a potential scenario in which states require their employers to submit wage records that have (enhanced) information that is more uniform than is the case currently. Importantly, enhanced wage records could support consolidated reporting, shown here, by reducing the need to collect information outside of the state requirements. In concept, the states and programs would have more information available for their analytical purposes and there would also be more efficient access to data by other researchers, statistical agencies, and evaluators. The JEDx pilots and stakeholder input will help shape the eventual details of the system, which could differ from what is shown in *Figure 1B*.

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Figure 1A. US wage records in current context
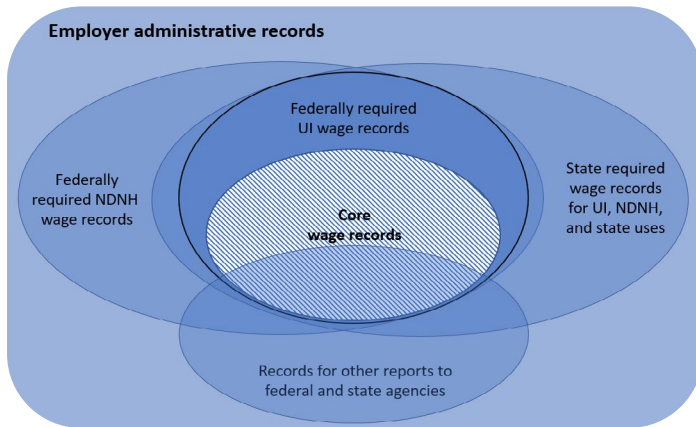
Figure 1B. Potential role of enhanced wage records
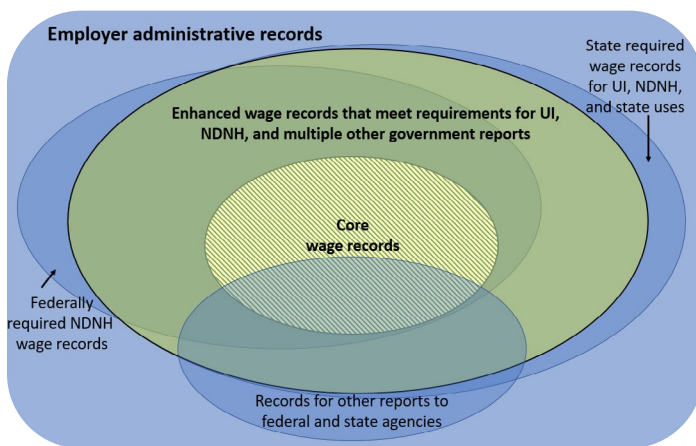
Notes for *Figures 1A and 1B:*

1. *Figure 1A* summarizes the current arrangement.

2. In *Figure 1B*, states collect enhanced wage records, which meet expanded needs for UI, NDNH, and state uses, as well as those of the research, statistics, and evaluation communities. This expansion is enabled by employer adoption of standards for content and architecture of employer administrative records.

3. The areas and overlaps shown represent data elements included (or not) in various types of records, and possibly variation in the employers and workers covered. Altering data elements, employers, or employees in standards and requirements changes the size of various areas depicted.

4. A core wage record identifies an employer, a UI-covered worker, and a measure of earnings paid to the worker for a period of time.

5. Federally required UI wage records include core wage records as well as additional information drawn from employer administrative records, such as industry and employer location.

6. States gather wage records from employers in accordance with federal Unemployment Insurance (UI) and National Directory of New Hires (NDNH) data requirements. State collections of wage records must meet those requirements, but vary in other information collected, reflecting state laws and other ways they use the wage records they collect. Increasingly, some states require additional elements for use in labor market information and other analytics.

7. NDNH collects UI wage record data from states and wage records on some non-UI covered workers (such active duty military personnel) from other sources, including other federal government agencies. NDNH wage records contain a few additional data elements compared to UI records, such as a flag for new hires.

Notes

UI records cover employees in the private-sector and in the federal, state, and local government sectors. These records cover about 95% of US workers. These jobs include most corporate officials, all executives, all supervisory personnel, all professionals, all clerical workers, many farmworkers, all wage earners, all piece workers, and all part-time workers and. Workers on paid sick leave, paid holiday, paid vacation, and the like are also covered. Federal employment data are based on reports of monthly employment and reports of quarterly wages, both submitted quarterly to state agencies. Reports are submitted for all federal installations with employees covered by the act, except for certain national security agencies, which are excluded for security reasons.

Besides excluding the aforementioned national security agencies, UI records exclude proprietors, the unincorporated self-employed, unpaid family members, certain farm and domestic workers from having to report employment data, and railroad workers covered by the railroad unemployment insurance system. Excluded as well are workers who earned no wages during the entire applicable pay period because of work stoppages, temporary layoffs, illness, or unpaid vacations. Excluded also are federal government employment are elected officials in the executive or legislative branch, members of the armed forces or the Commissioned Corps of the National Oceanic and Atmospheric Administration, individuals serving on a temporary basis in case of fire, storm, earthquake, or other similar emergency, and individuals employed under a Federal relief program to relieve them from unemployment. For a complete list of federal government exclusions, see Appendix A of the UCFE Instructions for Federal Agencies. Other exclusions include state and local government elected officials, members of a legislative body or members of the judiciary, members of the state National Guard or Air National Guard, and employees serving on a temporary basis in case of fire, storm, snow, earthquake, flood or similar declared emergency. For a complete list of state and local governments excluded services, see the coverage section of the most recent Comparison of State UI Laws.

https://www.bls.gov/cew/overview.htm#coverage

2.2. Program administration uses

The largest, most comprehensive systems that collect and rely on individual employee wage records are the state and federal UI programs and the NDNH. *Table 1* provides an in-depth summary of these systems, including the data collection mechanisms, data types collected, and key purposes or uses for the data. For completeness, the last row of Table 1 also lists Equal Employment Opportunity Commission (EEOC) reports, which collect similar information for many employers, albeit currently in aggregated form.

The UI system is the best-known federal system for employee wage records. Each state reports quarterly earnings records from employers on each of their workers covered by UI, which is nearly all full-time non-agricultural private sector workers in the US and about half of agricultural workers. Individuals who are self-employed, active-duty military, and some government workers are not covered by UI and therefore not included. Other non-standard, contingent, or informal workers may not be included if they do not report income for tax purposes. Although quite comprehensive in coverage, the data items in the UI wage records are sparse and vary in content and quality across states (see appendix B of USCCF, 2021). The minimum information contained in UI wage records submitted (few states have much more) include quarterly earnings (sometimes divided into months) and identifying information on the employer (reporting unit ID, name, and location) and worker (Social Security number and name). These records are used by states to determine employer UI tax rates and UI eligibility for individuals who may apply for unemployment compensation.

In addition, UI wage records are repurposed to help administer other government programs. For example, so that states can fully report workforce development program quarterly performance data to the Employment and Training Administration (ETA) in the US Department of Labor (DOL), UI wage records are used by states to determine post-program employment and earnings of people who have participated in a Workforce Innovation and Opportunity Act (WIOA) program and to prepare and submit their quarterly WIOA performance reports to DOL and the Department of Education. For the performance reports, wage reporting on WIOA participants whose training and employment may cross state lines is shared among states via the State Wage Interchange System (SWIS) and Common Reporting Information System (CRIS) coordinated by ETA. SWIS facilitates the interstate exchange of data among the state UI agency signatories to the SWIS agreement. CRIS is an adaptation of SWIS, used by various other non-WIOA DOL program grantees (e.g., Registered Apprenticeship, YouthBuild) to report performance to DOL. State UI programs also share wage records (through the UI Interstate Connection Network [UI ICON]) to establish eligibility for people who work in more than one state.

Another use of UI wage records is to comply with US Department of Education Gainful Employment rules. In this case, colleges and other programs that receive federal student aid are required to report employment and earnings outcomes for their students. Some states grant the institutions access to UI wage records to compute these statistics.

The HHS also accesses state UI wage records, supplemented with other information, for the federal NDNH data system—a key resource for child support enforcement. Although more comprehensive than the basic state UI wage records (it includes active military and federal employment as well as the amount of UI benefits received), the NDNH only retains the individual-level records for a short time (two years), and access is restricted to specific program administrative uses and program-related evaluation and research. A particular value of NDNH is that it offers a single point of entry for UI wages from all states, using one simple format.

The EEOC collects a different set of information from employers' administrative records–and not through the UI system. By law and regulation, large employers and federal contractors are required to report aggregate data on wages and employment by gender, race, ethnicity, and occupational categories. A recent Committee on National Statistics (CNSTAT) report recommends that individual records be collected for EEOC purposes in the future (National Academies of Sciences, Engineering, and Medicine, 2022b). Adoption of employer administrative record standards and enhanced wage records could enable the EEOC to follow this recommendation, adding a third major comprehensive program that could rely on enhanced wage records.

Table 1. Wage records collected for administrative uses

SYSTEM NAME	COLLECTION MECHANISMS	DATA ELEMENTS COLLECTED	ACCESS TYPES	PRIMARY USES OF DATA
Unemployment Insurance Programs, managed by states and DOL-ETA	Employers submit UI wage records regularly to administering state agencies.	Individual level core items: ID, earnings, usually by quarter (data items and periods vary by state); Excludes workers not covered by UI (e.g., contract workers, self-employed, military-see note below) Employer level core items: ID, quarterly total earnings paid (divide by month), number of employees	Restricted access, state-specific and often *ad hoc*	Determining employer's unemployment insurance taxes and worker's eligibility for unemployment benefits
State Wage Interchange System (SWIS) and Common Reporting Information System (CRIS), managed through the states and DOL-ETA	States submit UI wage records to SWIS.	SWIS: UI wage records (see above) for individuals in WIOA programs CRIS: aggregation of SWIS data for performance reports for other DOL programs	Limited to participating states.	State program Quarterly System Performance Results performance reports submitted to DOL-ETA, as required by WIOA and other DOL programs https://www.dol.gov/sites/dolgov/files/ETA/Performance/pdfs/Final%20QWSR%20Report%20PY%202021%20Q1.pdf
National Directory of New Hires (NDNH), managed by Federal Office of Child Support Enforcement (OCSE) in HHS	UI wage and benefits records, and supplemental employer reports, submitted by administering state agencies. Federal government agencies report wage records and new hire data.	In addition to UI wage records: (1) federal government reports military wage records; (2) employers report individuals newly hired; (3) states report UI benefits received.	Individual-level data: Restricted to program administration uses for federal and state child support enforcement agencies. Not set up as longitudinal.	Child Support Enforcement Programs (locating non-custodial parents and enforcing child support obligations); with HHS approval, may be used for research and evaluation on child support, public assistance, or related issues.
Equal Employment Opportunity reports (EEO), managed by Federal Equal Employment Opportunity Commission (EEOC)	Employers maintain required data and report aggregate information to EEOC	Aggregate summary data by large (100+ or 50+ if federal contractors) employers with earnings, job category, and demographics and (e.g., race, gender, age)	Aggregate data reported to EEOC	Reporting required for the non-discrimination provisions of the Equal Employment Opportunity Act and related regulations.

2.3. Social science research uses

Over the past three decades, researchers have gained access to UI and NDNH wage records in various ways, enabling a considerable body of research, despite the limited information in those records. The top panel of *Table 2* shows a selection of labor-related studies that have used wage records to analyze trends, causes, and consequences of key economic, demographic, and social issues. These are grouped by the agencies or entities that gave researchers access to wage records, all of which come from state UI wage reporting systems. The table shows the data system's managing organization(s), selected recent products, and areas of research studied.

Several researchers (including the authors of the studies noted in the top panel of *Table 2*) obtain access to UI wage records through the Longitudinal Employer Household Dynamics program (LEHD) at the US Census Bureau. The Census Bureau receives UI wage records from the states, links them over time and merges them with employer records and other federal data. Researchers can apply for, and if approved (by Census, the states, and the IRS) gain access to LEHD (and the associated Post-Secondary Employment Outcomes program) data for a number of states through the Federal Statistical Research Data Center (FSRDC) network.

Other researchers have gained access to wage records through special research facilities through agreements with research organizations or states. For example, the Coleridge administrative data research facility (ADRF) is building a portal for general research access to states' wage records. A more specialized example is the Institute for Research on Innovation Science (IRIS) at the University of Michigan, an ADRF that matches individuals' UI wage records (contributed by partner states) with information from university-based science research projects. One major goal of IRIS is to advance the study of the many employment and education impacts of funded research. In addition, many states allow some research access to wage records through their business and economic research centers (see AUBER, n.d.). The California Policy Lab is an example of a state center that provides access to individual UI records and other matched information to allow the study of important policy issues in that state.

2.4. Federal and state analysis and statistical uses

With the enactment of the Foundations for Evidence-based Policymaking Act of 2018 (Evidence Act), the federal government aims to significantly increase use of administrative data to generate evidence for policy making. UI wage records are an example of such data and have long been reused for federal statistical purposes. The second panel of *Table 2* summarizes examples of current uses. These varied and important products demonstrate some of the promise that enhanced wage records could have for statistical purposes.

A very important reuse of employer administrative data for official statistics is the BLS Quarterly Census of Employment and Wages (QCEW) program (US Bureau of Labor Statistics, 2022b). State UI employer-level wage records are the primary source for the QCEW.[1] States collect and curate these aggregate records under BLS supervision, including supplementing them with additional data from the Annual Refiling Survey (ARS) and the Multiple Worksite Report (MWR). BLS, which does not have access to individual UI wage records, uses the QCEW to produce direct products and support a wide variety of significant economic and labor statistics as indicated in *Figure 2* and *Appendix Table B-1*.

The QCEW serves as the sampling frame for almost all BLS establishment surveys. For example, the BLS Current Employment Statistics (CES) program (which produces closely watched monthly estimates of payroll, average hourly earnings, and average weekly hours) uses the QCEW as a survey sample frame and for annual benchmarking (US Bureau of Labor Statistics, 2022). The CES employment series then serves as input to other important macroeconomic indicators such as personal income and productivity.

The BLS also uses QCEW data in the Local Area Unemployment Statistics program (LAUS) as "an input for residential employment estimates and unemployment estimates for agricultural workers" (Bieneman & Almousa, n.d.) and in the Occupational Employment and Wage Survey (OEWS), which is used to biannually generate 10-year Employment Projections (EP) (US Bureau of Labor Statistics, 2021). Uses of QCEW by the BLS can be found in *Figure 2* and by other federal agencies in *Appendix B, Table B-1*. Statistical uses of the LEHD can be found in *Appendix B, Table B-2*.

Table 2. Examples of reuse of UI, NDNH, state, and employers' wage records for research, statistics, and program evaluation

PROGRAM	DATA PROGRAM PURPOSE AND OVERVIEW	WAGE RECORD SOURCE	EXAMPLES OF RESEARCH AREAS	EXAMPLES OF RECENT PUBLICATIONS AND RELEASES
SOCIAL SCIENCE RESEARCH				
Longitudinal Employer Household Dynamics (LEHD), managed by the Census Bureau	Provides labor market information and other economic insights	Combination of state wage records, QCEW, and survey data from Census Bureau	Earnings inequality, gender wage gap, worker displacement, geographic earning differences, racial inequality, employer matching, immigration, climate change, food insecurity, social inequality	Thomas B. Foster & Marta Murray-Close & Liana Christin Landivar & Mark deWolf, 2020. "An Evaluation of the Gender Wage Gap Using Linked Survey and Administrative Data," Working Papers 20-34, Center for Economic Studies, US Census Bureau. Sonya Ravindranath Waddell & John M. Abowd & Camille Busette & Mark Hugo Lopez, 2022. "Measuring Race in US Economic Statistics: What Do We Know?" Working Papers 22-30, Center for Economic Studies, US Census Bureau. Sarah Miller & Laura Wherry, 2022. "Covering Undocumented Immigrants: The Effects of a Large-Scale Prenatal Care Intervention," Working Papers 22-28, Center for Economic Studies, US Census Bureau. Christina Patterson, 2022. "The Matching Multiplier and the Amplification of Recessions," Working Papers 22-20, Center for Economic Studies, US Census Bureau. Ishan Nath, 2021. "Climate Change, The Food Problem, and the Challenge of Adaptation through Sectoral Reallocation," Working Papers 21-29, Center for Economic Studies, US Census Bureau.
Institute for Research on Innovation and Science (IRIS), a center within the University of Michigan	Study the impact of research funding on higher education, labor dynamics, and macroeconomy	Records collected from IRIS consortium of over 26 US research universities, merged with data on research grants and activity	Social and economic effects of research funding, gender inequality, productivity, earnings outcomes	Ross, M.B., Glennon, B.M., Murciano-Goroff, R. et al. Women are credited less in science than men. Nature (2022). Barbina T, et al. The Color of Money: Federal vs. Industry Funding of University Research. SSRN (2020). Andrews M, Chatterji, A, et al. The Role of Innovation and Entrepreneurship in Economic Growth. NBER (2022).
California Policy Lab (CPL), a center within the University of California	Improve the quality of life and solve urgent public problems in California	State of California wage records; linking with other state data	Education inequality, criminal justice reform, racial inequality, labor and employment dynamics, health, homelessness	Raphael, S., Shem-Tov, Y., Skogg, A. (2022). The Impacts of the Make-it-Right Program on Recidivism. California Policy Lab. Bird, M., Gill, O., Lacoe, J., Pickard, M., Raphael, S. (2021). Crime in California during the COVID-19 Pandemic. California Policy Lab. Caprara, C., Obermark, D., Rountree, J., Santillano, R. (2022). Serious Mental Illness among People who are Unsheltered in Los Angeles. California Policy Lab.
Texas Education Research Center, a center within the University of Texas at Austin	Facilitate research that benefits all levels of education in Texas and helps inform critical issues to education today	State of Texas wage records matched with broad range of longitudinal student- and school-level data	Causes and consequences of educational disparities, impact of education policies	Giani, M. (2022). How Industry-Recognized Credentials in High School Shape Students' Education and Employment Outcomes. Washington D.C.: Thomas B. Fordham Institute. Dobbie, W. and Fryer, R. (2020) Charter Schools and Labor Market Outcomes Journal of Labor Economics

Table 2 continued. Examples of reuse of UI, NDNH, state, and employers' wage records for research, statistics, and program evaluation

PROGRAM	DATA PROGRAM PURPOSE AND OVERVIEW	WAGE RECORD SOURCE	EXAMPLES OF RESEARCH AREAS	EXAMPLES OF RECENT PUBLICATIONS AND RELEASES
FEDERAL AND STATE STATISTICS AND ANALYTICS				
Quarterly Census of Employment and Wages (QCEW), and Business Employment Dynamics (BED) managed by the US Bureau of Labor Statistics	Sample frame and benchmarking for most of BLS employer surveys, including Current Employment Statistics (CES), Job Openings and Labor Turnover Survey (JOLTS)	Employers report wage record aggregates quarterly to state UI programs, which submit them to BLS	Wage and employment trends; productivity measures; labor market dynamics; hurricane flood zone reports	Employment Situation Job Openings and Labor Turnover Survey Metropolitan Area Employment and Unemployment State Employment and Unemployment State Job Openings and Labor Turnover Business Employment Dynamics Productivity and Costs Productivity and Costs by Industry: Manufacturing and Mining Industries Productivity and Costs by Industry: Selected Service-Providing Industries Productivity and Costs by Industry: Wholesale and Retail Trade Productivity by State Total Factor Productivity Total Factor Productivity in Major Industries Total Factor Productivity Trends for Detailed Industries Employment, Wages, and Establishment Counts in Hurricane Flood Zones
The Coleridge Initiative– not-for-profit organization working with governments to use data effectively for public decision-making	Build new technologies to enable secure access to and sharing of confidential microdata	State wage records and other data on individuals in select state programs participating in Coleridge Administrative Data Research Facility, following secure and standardized data procedures	General purpose facility to support state and cross-state research and analysis, including issues related to poverty, disease, unemployment, inequality, and economic and workforce development	Coleridge Initiative, Democratizing Our Data Challenge see array of projects at https://coleridgeinitiative.org/coleridge-initiative-announced-democratizing-our-data-challenge-winners/
Workforce Data Quality Initiative (WDQI) collaborative partnership between the Departments of Labor and of Education	Support development of, or enhancements to, longitudinal administrative databases that integrate workforce data and education data	State wage records matched over time and linked with education and training records	Inform workforce development programs about labor supply and demand; track educational and workforce training program operations and performance; help customers select training and education programs to suit their needs	Kentucky: Provides data for interactive dashboards for local workforce areas to inform practices in their areas and a tool to allow people to explore careers based on several inputs including, their individual knowledge, skills, and abilities, a particular major, a specific salary or occupation. https://kystats.ky.gov/latest/KWD Iowa: Community College Program Outcomes Interactive Charts, a dashboard providing employment and wage outcomes data by academic program. https://www.educateiowa.gov/iowa-community-college-program-outcomes

Table 2 continued. Examples of reuse of UI, NDNH, state, and employers' wage records for research, statistics, and program evaluation

PROGRAM	DATA PROGRAM PURPOSE AND OVERVIEW	WAGE RECORD SOURCE	EXAMPLES OF RESEARCH AREAS	EXAMPLES OF RECENT PUBLICATIONS AND RELEASES
PROGRAM EVALUATION				
Federal Evaluations of Labor Programs, sponsored by the US DOL (Chief Evaluation Office and Employment and Training Administration) or other departments	Evaluations of employment-related outcomes and impacts of programs and interventions	Wage records on individuals in evaluation study samples (mainly from NDNH or state wage records)	Evaluations of DOL and related programs with employment and earnings outcomes	Klerman, J. A., Saunders, C., Dastrup, E., Epstein, Z., Walton, D., Adam, T. & Barnow, B. S. (2019). Evaluation of impacts of the Reemployment and Eligibility Assessment (REA) Program: Final report. Prepared for the US Department of Labor. Abt Associates. https://www.dol.gov/sites/dolgov/files/OASP/evaluation/pdf/REA%20Impact%20Study%20-%20Final%20Report.pdf Fortson, Kenneth, et al (2016) Providing Public Workforce Services to Job Seekers: 30-month Impact Findings on the WIA Adult and Dislocated Worker Program. Mathematica Policy https://www.mathematica.org/publications/providing-public-workforce-services-to-job-seekers-30-month-impact-findings-on-the-wia-adult Heinrich, C., Mueser, P. & Troske, K. (2008). Workforce Investment Act Non-Experimental Net Impact Evaluation: Final Report. IMPAQ International. https://wdr.doleta.gov/research/FullText_Documents/Workforce%20Investment%20Act%20Non-Experimental%20Net%20Impact%20Evaluation%20-%20Final%20Report.pdf

Figure 2. Data flow and usage for the BLS Quarterly Census of Employment program
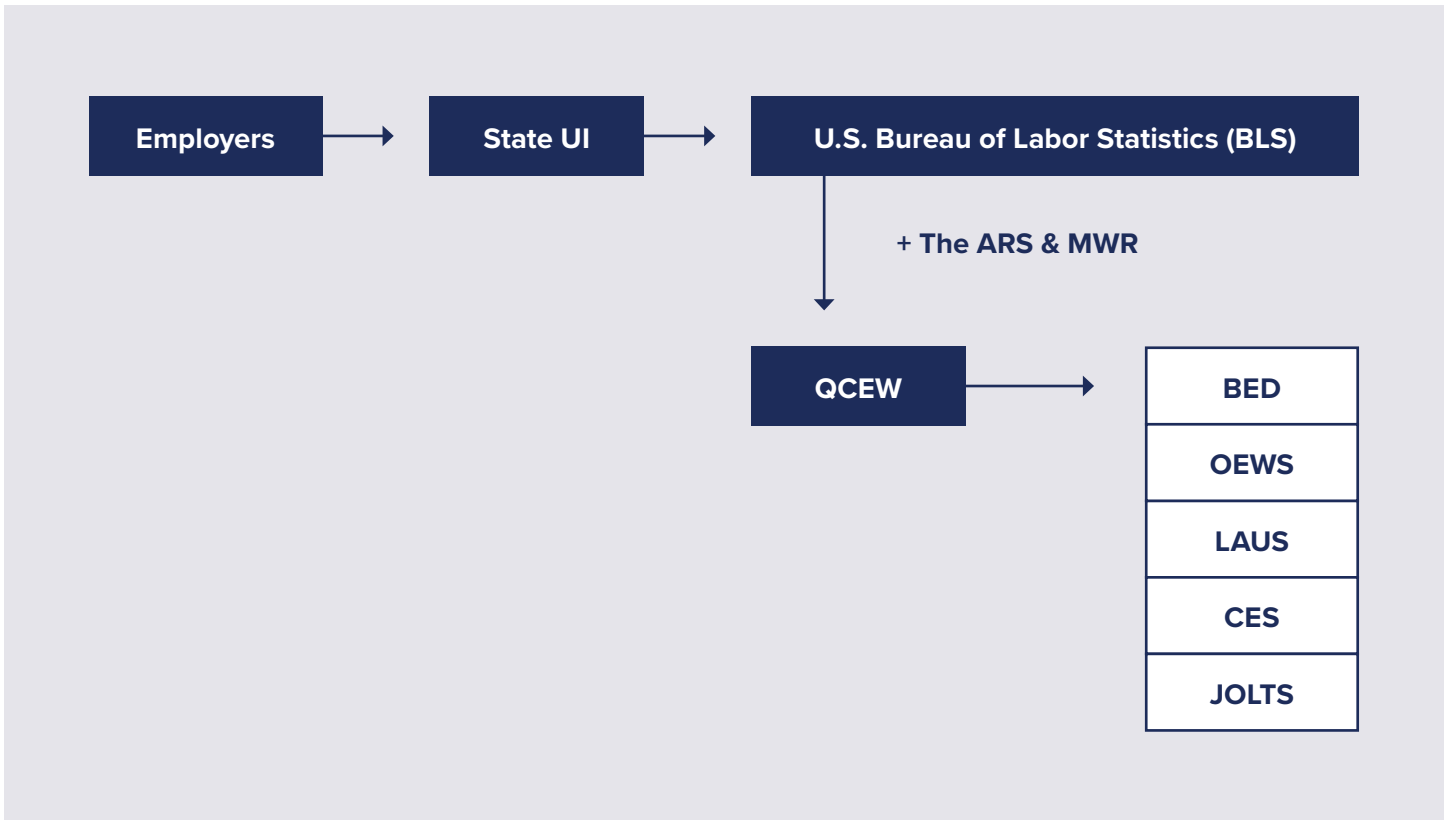
Notes

ARS: Annual Refiling Survey

MWR: Multiple Worksite Report

QCEW: Quarterly Census of Employment and Wages program

BED: Business Employment Dynamics program

OEWS: Occupational Employment and Wages Survey program

LAUS: Local Area Unemployment Statistics program

JOLTS: Job Openings and Labor Turnover Survey program

CES: Current Employment Statistics program

UI wage records are also reused by state Labor Market Information (LMI) agencies to produce labor market indicators. These efforts are supported by the BLS and the ETA to inform workforce and economic development decisions. Key measures include nonfarm payroll employment, unemployment rates, and employment-to-population ratios for counties, regions, states, and cities (US Bureau of Labor Statistics, 2018).

In addition, most states have one or more university business and economic research centers (typically at the land grant university) that provide statistical products and services that cover the state economy. These centers are members of the Association for University Business and Economic Research (AUBER, n.d.).

Statewide longitudinal data systems—a newer federal effort to promote the linkage and exchange of states' administrative data among programs—are also available for statistical purposes. DOL-ETA's Workforce Data Quality Initiative (WDQI) funds and supports states to develop longitudinal individual-level data from workforce development programs and wage records. Similarly, on the education side, the development of statewide longitudinal data systems (SLDS) is funded by a National Center for Education Statistics (NCES) grant program. DOL and the Department of Education encourage state workforce longitudinal data systems and SLDSs to link to each other to include education data from pre-kindergarten to postsecondary and workforce program and training data and UI wage records. Some states are making progress with longitudinal systems and using it to produce publicly available statistical reports. Kentucky, for instance, provides publicly accessible aggregated data on an interactive dashboard that informs people of empowers the public to search for certain training and educational certificate courses and explore its career and wage range (Kentucky Center for Statistics, n.d.). The linked SLDS-WDQI longitudinal data systems can be used for state evaluations. When fully developed by states nationwide and linked to wage records, these systems could be important sources of data for national evaluations.

2.5. Program evaluation uses

State UI wage records are now the major source of data for outcome measures in impact evaluations of labor and education programs, especially in studies sponsored and funded by the federal Departments of Labor, Education, and Health and Human Services along with those mandated by Congress. State workforce agencies also sponsor formal evaluations that use UI wage records.

Some evaluations enter into agreements with states to obtain the wage records, but most federally-sponsored evaluations request data from the federal NDNH because it is the most comprehensive source of wage and employment information on workers in the formal sector for all states. This allows evaluators to track peoples' employment anywhere in the US. It is worth noting, however, that informal workers who may not report income for tax purposes would not be included in NDNH or state wage record systems, which may mean these data sources do not fully describe the demographic or income distribution of the entire workforce.

Often, wage record data (from NDNH or directly requested from state UI wage record systems) are combined with program administrative data about the training or other services an individual receives, and/or merged with information obtained by surveying participants directly. Several large-scale evaluations using UI and NDNH wage records are shown in the third panel of *Table 2*. The following are a few examples:

- The Evaluation of the Reemployment Eligibility and Assessment Program (REA)[2] was a large-scale DOL-sponsored random assignment experimental design impact evaluation that included nearly 300,000 UI claimants in the treatment and control group samples in four study states. Evaluators combined REA program administrative data with the UI wage record data from NDNH. *Table 3* indicates the data elements used in this impact study (Klerman et al., 2019).

- The congressionally mandated impact evaluation of the Adult and Dislocated Worker programs under the Workforce Investment Act (WIA) used NDNH wage record data, along with administrative program and service provision data from states in the evaluation (Fortson et al., 2016). A separate non-experimental analysis used matched linked data from a sample of states. The employment and earnings outcome measures (obtained from NDNH wage records for a sample of WIA participants) were compared to non-participants in local workforce programs (Heinrich et al., 2008). Table 3 notes the data elements used in the WIA evaluations.

- The evaluation of the WorkAdvance Demonstration was funded by Arnold Ventures and other foundations in collaboration with the HHS Office of Family Assistance. The multi-year, multi-site evaluation used NDNH wage records—combined with state administrative data from the public assistance agencies, the criminal justice system, and other sources to evaluate the individual-level impact of sectoral, industry-based occupational and career advancement models (Kanengise & Schaberg, 2022).

2.6. Summary

Since the 1980s, wage records collected for the administration of the UI, NDNH, and EEO programs have proven to be very valuable for research, statistical analysis, and program evaluation—as well as for program management and administrative purposes. *Tables 1 and 2* show key examples of how UI wage records are increasingly repurposed for these important activities.

Table 3. Examples of administrative and wage record data used in program impact evaluations

PROGRAM IMPACT EVALUATION EXAMPLES	ADMINISTRATIVE DATA SOURCE USED	DATA ELEMENTS USED
Reemployment Eligibility and Assessment Program (REA) impact study	State UI administrative program claimant data	• Basic UI claimant demographics such as gender, race/ethnicity, age, citizenship, disability status, education, veteran status, occupation, and prior earnings • Profile score (i.e., a state's official predicted probability of a UI claimant exhausting UI benefits—higher scores indicate higher probability that UI benefits will be exhausted) • UI benefit award (e.g., weekly amount, maximum weeks) • Weekly information on claiming UI and dollars of UI benefit paid • Per-incident information on non-monetary issues raised and adjudication of that UI claim
	NDNH	For individuals in the treatment and control groups, quarterly wage record data from entire US
Workforce Investment Act (WIA) impact study	State WIOA program administrative data	For individuals in the treatment and control groups, program data on enrollment, services, and activity from the state agencies in the evaluation study sample.
	NDNH	For individuals in the treatment and control groups, quarterly wage record data from the entire US

03

WAGE RECORDS IN THE EVOLVING U.S. NATIONAL DATA INFRASTRUCTURE

WAGE RECORDS IN THE EVOLVING U.S. NATIONAL DATA INFRASTRUCTURE

The utility of administrative data is not limited to wage records. Indeed, use of other administrative data for analytical purposes has risen substantially in recent decades and is poised to expand further as part of modernizing the national data infrastructure. This section, for context, briefly discusses some of the most recent developments.

3.1. Expanded use of electronic administrative data in public policy

Until the late 1970s, surveys were the main (often the only) source of data for research, statistics, and evaluation analytics in the United States. Federal statistical agencies relied almost exclusively on household and business surveys. Similarly, program evaluations also collected individual-level program information from agencies and often surveyed participants in study samples to obtain their self-reported information about employment and earnings. Firms and employers submitted paper copies of required reports to government agencies.

Digitization, however, revolutionized how businesses operate. They now collect unprecedented amounts of information and data, modernizing their course of ordinary operations. The modernization of computer technology and management reporting systems has led federal and state agencies to develop computerized administrative processes, including digitized UI wage record systems. Subsequently, firms were allowed or required to submit their reports electronically. It has also enabled public and private efforts to capture and use transaction data of various sorts. One such example is the use of electronic job postings by the National Labor Exchange and Indeed to facilitate searches and recruitment and to track labor market conditions.

This revolution has also created opportunities to modernize our national statistics and improve policy analysis using more current and fine-grained digital data. Federal statistical agencies incorporated administrative data into their programs for a variety of uses, and researchers and evaluators gradually began to use the electronic wage records and other employer data[3]. More recently, costs of conducting surveys have risen response rates have fallen (Czajka & Beyler, 2016), and demand for more timely, detailed, and relevant localized data and analysis has accelerated. To improve efficiency and possibly reduce costs, increased use of public and private administrative data has been promoted recently by congressional action, expert committees, and policy initiatives.
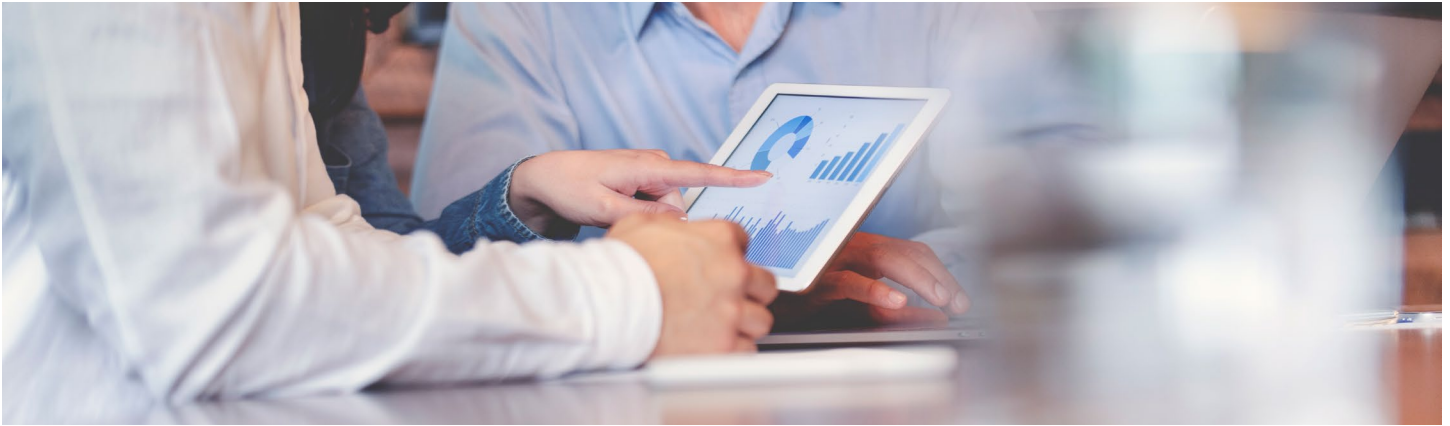
Key activities at the national level include the following[4]:

- A bipartisan federal commission report recommends ways to increase the availability and use of government data to build evidence and inform program design, while protecting privacy and confidentiality of those data (Commission for Evidence-Based Policymaking, 2017). This includes determining how to integrate administrative and survey data and to make those data available to facilitate research, evaluation, analysis, and continuous performance improvement. The subsequent Foundations for Evidence-Based Policymaking Act of 2018 (Evidence Act) requires federal agencies to expand the use of government administrative data to develop evidence to support policymaking (H.R.4174—115th Congress). One provision created the just-completed Advisory Committee on Data for Evidence Building to recommend how to promote the use of Federal data for evidence building, including how to manage data access and facilitate data sharing, data linkage, and privacy enhancing techniques (Bureau of Economic Analysis, 2022).

- Section 10375 of the CHIPS and Science Act of 2022 authorizes the National Science Foundation to undertake a National Secure Data Service demonstration project "to inform the full implementation of the Commission on Evidence-Based Policymaking recommendation for a governmentwide data linkage and access infrastructure for statistical activities conducted for statistical purposes..."[5]

- The combined use of wage records and statistical survey data in programs such as NDNH and LEHD enables production of more robust, timely, and detailed statistical information but also raises access and technical challenges (National Academies of Sciences, Engineering, and Medicine, 2017).

- In September 2022, the Committee on National Statistics released a report proposing a vision for a new data infrastructure for national statistics and social and economic research in the 21st century. This report describes why and how the country should improve the statistical information by mobilizing data assets and blending them with existing survey data. Particular emphasis is placed on the need to harness the potential of private and public sector administrative data for research, statistics and evaluations (National Academies of Sciences, Engineering, and Medicine, 2022a).

- The American Economic Association's Committee on Economic Statistics recommends developing uses of non-survey data for official statistics (American Economic Association, 2022).

- In 2021, the Alfred P. Sloan Foundation funded the Re-Engineering Statistics Using Economic Transactions (RESET) project, led by economists from the University of Maryland College Park, University of Michigan, and US Census Bureau. The RESET team aims to find an alternative or complement to price data gathered by BLS business surveys, to broaden coverage and improve timeliness.

3.2. Data standards for wage records

Inconsistencies and incompleteness in wage record systems present barriers to using the data for many critical purposes (public and private). These issues often reflect the high response burden for companies that need to conform to a variety of government data requests that are not aligned. Thus, advances in data technology are also spurring efforts to devise and promote common standards for data elements and their transmission.

Some of the current efforts to standardize data, including JEDx, aim to add to the large set of industrial and technical standards that underpin our complex and dynamic economy. For example, in the private sector, Schema.org is a multi-organization collaboration (co-founded by Microsoft, Google, Yahoo, and Yandex) that creates, maintains, and promotes schemas for many types of structured data on the internet. In another example, the real estate industry has standardized its listing protocols, upon which sites like Trulia and Zillow have been built. See *Appendix C* for more examples of burgeoning data standards.

Efforts to establish employer record standards has also been growing. To date, a number of private sector efforts closely related to JEDx are proceeding independently with early stages of efforts at limited cross-system standardization, some of which are listed here.

- As part of the JEDx initiative, the U.S. Chamber of Commerce Foundation is working with Schema.org to design and pilot JDx JobSchema+, a standardized approach to organizing structured data on job openings postings on the internet. (*Appendix Table D-1* shows primary JobSchema+ data elements.)

- The industry-led HR Open Standards Consortium develops and promotes voluntary consensus standards in human resource-related data systems, including employer wage records. The consortium was established originally to improve standards-based data sharing between HR systems. It currently has over 190 members, including businesses, employer organizations, government associations, and payroll and human management service providers; (HR Open Standards, 2022). *Appendix Table D-2* lists some of the relevant specifications included in the HR Open Standards schema.

- Data Standards United is a collaboration of standard bodies and supporters with a purpose to align global data standards with systems in the education, training, and employment sectors (DSU, 2021).

- Credential Engine focuses on the development of a centralized registry of credential information from training institutions and businesses, and a common credentialing language (Credential Engine, 2022). Both Data Standards United and Credential Engine collaborate with HR Open Standards. Furthermore, they are related to W3C and other efforts to standardize job postings through Schema.org.[6]

3.3. Legal requirements for federal agencies to follow industry standards

By law (National Technology Transfer and Advancement Act of 1996 [NTTAA]) and executive action (OMB Circular A-119), the federal government has promoted the development and use of industry (or "voluntary") standards developed through consensus outside of the federal government. The rationale is that doing so could eliminate the cost of federal standards development, improve the quality of standards, increase compliance, and promote economic efficiency. Some advisors caution, however, that such non-governmental efforts could be problematic when the motivation is related to developing or maintaining policies acceptable, but least disruptive, to industry practices.

The NIST Standards Coordination Office (SCO) is delegated by OMB to facilitate implementation of Circular A-119, through a process known as the conformity assessment—the "demonstration that specified requirements relating to a product, process, system, person or body are fulfilled."[6] OMB Circular A-119 directs federal agencies to use standards developed or adopted by voluntary consensus standards bodies, except where it is inconsistent with applicable law or otherwise impractical. For agencies participating in the development of these voluntary consensus standards, the Circular provides them with guidance and procedures to ensure they meet the reporting requirements of the NTTAA. It also provides policy guidance to federal agencies on the use of conformity assessment in procurement, regulatory, and program activities.

One important caveat is that, to date, these federal requirements have not been fully applied to data standards especially in the workforce area.

3.4 Summary

Technological advances have changed government and private data substantially. Today's mostly digitized administrative data can be repurposed for many important uses, including augmenting or replacing survey-based data for research. One consequence is that the demand for access to employment-related administrative records for research, official statistics, and evaluation has increased dramatically in recent years, often outstripping available access. Many government efforts to promote more data standardization are in progress. Simultaneously, the private sector has initiated efforts to develop data standards for their own purposes. Development and adoption of data and access standards for enhanced wage records for employers to meet government reporting requirements may offer an opportunity to improve the availability of high-quality, comprehensive wage records for research uses.

04

CRITICAL RESEARCH, STATISTICS, AND EVALUATION USE CASES FOR ENHANCED WAGE RECORDS

CRITICAL RESEARCH, STATISTICS, AND EVALUATION USE CASES FOR ENHANCED WAGE RECORDS

JEDx-REP advisors unanimously agreed that enhanced employer administrative records and wage records provide important opportunities to improve social science research, official statistics, program evaluation, and policy and program analytics. The use cases presented by category below are compiled from conversations with these advisors. Each case notes one or more representative examples that illustrate the analytic value of enhanced wage records.

4.1. Social science research use cases

Earnings and education/training attainment: Improve analysis of earnings and education patterns in various occupations, industries, and geographic areas by demographic variables such as gender, age, race, and ethnicity.

Example: Analysis of lifetime earnings differentials by gender, educational attainment and occupational cluster, as well as the causes and effects of the differentials.[7]

Nature of employer-jobholder relationships (such as wage and salary employee or contractor; full or part-time status; permanent or contingent worker; union status): Improve analysis of causes and effects of work relationships in various occupations, industries, geographical areas by demographic characteristics.

Example: Analysis of earnings outcomes by employee status and industry.

Spatial nature of work arrangements: Improve analysis of causes and effects of the spatial work arrangement (such as on-site-work, remote work, or hybrid work) in various occupations, industries, geographic areas, by demographic characteristics.

Example: Descriptive analysis of changes in the various types of spatial employment arrangements during the COVID pandemic, and causal analysis of the number and types of occupations affected positively or negatively by the pandemic and estimates of the impact on future labor market trends.

4.2. Official federal and state statistics use cases

Principal Federal Economic Indicators (PFEIs): Improve statistical reliability and provide greater geographic and distributional detail of key monthly and quarterly PFEIs.

Examples: Number of jobs, labor force statistics (participation, employment, unemployment), Gross Domestic Product, Gross Domestic Income, personal income, labor productivity, and multifactor productivity.

Occupational statistics: Improve statistical reliability, demographic and geographic (especially sub-state) detail, and frequency on measures such as employment, earnings, benefits, work arrangements, and projections.

Examples: OEWS, Employment Projections (EP), Modeled Wage Estimates (MWE), Occupational Outlook Handbook (OOH).

Labor market dynamics: Provide timelier regional, state, and local geographic detail and more reliable data on job openings, hires, and separations. This improves the ability to track worker career pathways in context of macroeconomic and sectoral changes.

Example: Add occupational categories to monthly Job Openings and Labor Turnover measures for openings, hires and separations for the nation, state and substate areas.

Geographic classifications: Allow adjustments in the various federal and state geographic classification systems critical for statistical analysis, social science research, and program management and evaluation in light of OMB's recognition "that the pandemic's impact on commuting patterns may create an acute challenge for the 2028 [CBSA] mid-decade update, as well as a longer-term challenge for the continued use of ACS commuting data as the sole measure of intercounty connectivity and economic integration." (OMB 2022).

Examples: Core-based statistical areas (OMB), labor market areas (BLS), rural county classifications (USDA Economic Research Service), urban–rural classification scheme for counties (National Center for Health Statistics), and Medicare geographic classification (Centers for Medicare and Medicaid Services).

4.3. Program evaluation use cases

Impact evaluations of education and workforce development programs and services on individual economic outcomes: Improve data and analysis to estimate employment outcomes of programs, services and policies for workers and employers (e.g., curriculum, job training, apprenticeships, employment services, career counseling, coaching); particularly in causal (net) impact designs with treatment and control or comparison groups (experimental and nonexperimental designs).

Example: Net impact analysis of employment and earnings of industry-based/sectoral-specific training programs, compared to general training, including tracking over time the outcomes of people who participated in the programs over time, using wage records from all states.

Outcome evaluations of education and workforce development programs and services on individual or program economic outcomes: Improve analysis and disaggregation of employment, earnings, and career pathways.

Example: Descriptive analysis of aggregate employment, earnings, benefits, and compensation outcomes obtained from wage records on subgroups of workers, industries, and occupations; activity trend analysis; program performance analysis.

Cost-benefit analysis: Improve analytical specificity by using results of more detailed impact and/or outcome evaluations that use enhanced data elements.

Example: Comparative costs and benefits of investments in industry-based training vs. general training programs.

4.4. Benchmarking, analytics, and tracking to inform policy and programs

Occupational supply and demand analysis: Improve identification of occupations with growing demand for workers in order to guide public and private investments in education, training, and recruitment.

Examples: Under WIOA, state and local Workforce Investment Boards are to make investments considering occupations in high demand; institutions of higher education require information to guide decisions regarding the nature and size of program offerings.

Effects of trade and trade policy on U.S. workers: Improve the ability to measure distributional effects of U.S. trade and trade policy on workers.

Example: A recent US International Trade Commission report finds that greater access to "longitudinal data that links employees and employers could permit simultaneous analysis of supply and demand-side factors related to wages and employment" (USITC, 2022).

Analysis of job quality: Improve research and policy analysis on jobs with characteristics that are desirable from various perspectives (e.g., to workers, businesses, or policymakers); and expand research on factors (such as work hours, scheduling, paid leave, security, and opportunities for training and career advancement) that may reflect quality.

Example: Some studies conduct surveys of workers and businesses to obtain this information (Congdon et al., 2021). Enhanced wage records could include job and worker characteristic information that would advance the coverage and impact of research in this area, as recommended in this report.

National and regional industrial strategies: Improve the availability of occupational data by industry (NAICS) code and individual worker characteristics by industry to analyze the capacity of US-based firms in economically important industries competing in global markets.

Examples: Analysis of sectoral employment factors in supply chain assessments (National Economic Council); Advanced Manufacturing Strategy (NIST); analysis of national STEM and CTE workforce Pipeline Strategy (OSTP); research on defense industrial base workforce development (Department of Defense); assessing workforce development in emerging technologies (NSF's Technology, Innovation, and Partnerships Directorate) and in state science and technology strategies; and research and evaluation of the Build 2 Scale Program supporting regional innovation clusters (Office of Innovation and Entrepreneurship, US Economic Development Administration).

Equal employment opportunity regulation: Improve detail, accuracy, timeliness, and frequency of employee data with lower employer burden.

Examples: EEO-1 (EEOC); reporting requirements of DOL's Office of Federal Contract Compliance Programs (OFCCP).

Investigations by Department Inspectors General: Enhance the capability of the Office of Inspector General in several departments to conduct investigations.

Example: The DOL Office of Inspector General recommends that it gain access to state UI records so that it can better investigate UI fraud.

4.5. Summary

JEDx-REP advisors unanimously agree that enhanced employer administrative records could lead to valuable improvements in social science research, official statistics, program evaluation, and policy and program analytics. Accordingly, they offer several recommendations for enhancements as discussed in the next sections.

05

USEFUL ENHANCEMENTS
TO FACILITATE RESEARCH,
STATISTICS AND EVALUATION
USES: OBSERVATIONS
FROM ADVISORS AND THE
LITERATURE

USEFUL ENHANCEMENTS TO FACILITATE RESEARCH, STATISTICS AND EVALUATION USES: OBSERVATIONS FROM ADVISORS AND THE LITERATURE

Although wage records (mainly those required for UI reporting) are already a major data source for research, statistical reports, and program evaluation and management, they are often incomplete, inconsistent across employers and jurisdictions, and difficult for researchers to access. Observations from advisors and the literature about enhancements needed to address these limitations (in the context of the use cases discussed in Section 4) are provided below. They cover:

1. Priority improvements in data elements;

2. Viable research access models and desirable attributes of access; and

3. Incentives for employers to participate.

5.1. Useful data enhancements and standardization of records

Over the last decade, numerous federal government units have called for improving data elements in the current wage-reporting system and/or enhancing employer administrative records with additional data elements. For example, the Commission on Evidence-based Policymaking; OMB; the Council of Economic Advisers; and DOL's Workforce Information Council (which ended in 2016) and Workforce Information Advisory Council (2016-present) note the importance of enhanced records. (See *Table 4*). The current system's limitations both constrain how research, statistical analysis, and evaluations can use wage records and increase the time and costs required to acquire, clean, and reconcile disparate datasets. For example, federal and state agencies' differing definitions for earnings, work hours, and occupation require researchers and statistical agencies to reconcile a large set of variables. In addition, these issues raise employers' costs and complicate the use of their own wage records for benchmarking efforts against regional or industry peers for management and planning purposes.

To move toward definitional consistency, the HR Open Work Group and JEDx developed a Data Model and Dictionary that lists more than 230 data elements currently collected from employers by governments, with related definitions and guidance for application within the United States. *Appendix B* of USCCF (2021) presents a list of data elements in UI wage records with the percentage of states currently requiring that information. *Appendix C* of USCCF (2021) shows other data elements that employers are required to report by other government programs. The research, statistical and evaluation community would welcome consistency and standardization in definitions.

Many of the data elements in the HR Open dictionary are of interest to researchers. In forums and interviews for this report, JEDx-REP advisors identified the existing data elements they would like to see improved and the data elements of interest that could be included in enhanced and standardized employer records. Their perspectives, grouped by data category, are presented here.

1. **Hours worked and paid** are currently reported in only a few state wage record systems. Where they are reported, the states vary in what they require employers to submit. Hours should be disaggregated by category (especially regular and premium hours worked and paid leave). Reports should be timely and frequent (by pay period at least). When government agencies request work hours, their requests are inconsistent (for example they may or may not include types of leave, such as training leave, in hours worked). One suggestion from researchers is to ask employers for sufficient detail to allow components of time worked and paid to be assembled as needed for alternative government statistical and research purposes and to provide more transparency on different definitions.

2. **Geocode of employer and/or primary work location** (including remote work) is inconsistently reported. **Geocode of employee residence** is not reported on wage records but may be reported for other purposes. Such location information is highly desired by researchers.

3. **Job title** is not currently included in most wage records, even though most employers assign job titles to their workers. Job titles have high research value for evaluations, although researchers recognize their limitations for other purposes, such as assigning occupation codes for government statistical reports. For assigning occupation codes, job titles will need augmentation with more job-specific information, as discussed below.

4. Employment **start and stop dates and reason for separation** are not currently included in UI wage records. Although NDNH wage records include start dates, the field is often missing. The JOLTS program successfully collects reasons for separation, as do many other countries' statistical agencies.[8] Advisors believe the availability of these dates, consistently reported, is desirable to better track job duration for program and policy evaluations, and to measure workforce dynamics and conditions (such as unemployment, equity, and job quality), and estimate their causes and consequences.

5. Nature of **employer-worker relationship** data for standard (UI eligible) employees (including regular hours, full or part-time status, and union status) are not on wage records now but are part of reports to other government agencies and, according to advisors, would be a desirable addition.

6. **Compensation, earnings, and wages** are included in employer wage records, but should be collected in a more consistent manner, distinguishing wages earned from wages paid during a period, and reported on a more frequent and timely basis. Improved timeliness is critical for emergent policy use cases as current reporting lags in wage record availability are at least six months long. Additionally, the compensation information requested by federal and state government agencies is inconsistent across agencies. For example, cash bonuses or shift premiums may or may not be included. One solution is to ask for sufficient detail to allow components to be assembled by analysts as needed for alternative government and research purposes. This modular approach (where employers report more detailed data) allows governments to select what they want and be more transparent about how their definitions differ from those of other government reporting systems.

7. **Data needed for capacity to link records** could be improved by collecting more identifying information for employers and workers. Important worker information includes name, birthdate, address, and Social Security number. Important employer information includes name, address, and Employer Identification Number. This would allow many linkages that researchers typically seek, such as being able to track workers' wage records over time; link workers to establishments; link establishments to firms; link wage records to survey, administrative, and external data on individuals and employers; and link longitudinal workers' wage records to data on education activity and attainment.

8. **Occupation, duties, and skill requirements** are currently not generally included in wage records. These are of a high research interest, and advisors see a need for further review about how best to collect and apply this information. This information can be gathered and recorded in many ways, including using Standard Occupation Classification (SOC), job title, duties or skill requirements. There is much ongoing debate on what to collect, how difficult it is for employers to report various aspects about a job, and how this information should be processed and presented. Some advisors suggest using the least burdensome information from employers (such as job title and industry) which could be combined with other sources of information (perhaps from JobSchema+ or surveys such as the OEWS) using advanced modeling techniques to both help employers assign SOC codes and to identify emerging occupations and skill needs trends on a timely basis.[9]

Table 4. Examples of government proposals to enhance employer administrative records to include more data items in state data systems

ORGANIZATION	DATE	DOCUMENT
DOL Workforce Information Advisory Council	August 2021	Many Americans Are Struggling And Need Better Information To Make A Comeback—Recommendation 1
Office of Management and Budget	March 2019	FY2020 Budget of the US--Analytical Perspectives, Chapter 6: Building and Using Evidence to Improve Government Effectiveness
DOL Workforce Information Advisory Council	January 2018	Recommendations to Improve the Nation's Workforce And Labor Market Information System—Recommendation 1
Commission on Evidence-based Policymaking (CEP)	September 2017	CEP Final Report: The Promise of Evidence-Based Policymaking
	July 2016	Background Paper: Using Administrative and Survey Data to Build Evidence Background Paper: Barriers to Using Administrative Data for Evidence Building
Workforce Information Council	September 2015	Administrative Wage Record Enhancement Study Group, Enhancing Unemployment Insurance Wage Records: Potential Benefits, Barriers, and Opportunities, Final Observations and Recommendations
Council of Economic Advisers	March 2014	2014 Economic Report of the President, Chapter 7: Evaluation as a Tool for Improving Federal Programs

9. **Worker demographic characteristics** (e.g., age, gender, race, and ethnicity) are not contained in wage records now and are highly desired by researchers. They are collected from employers for some other reports and internal purposes, such as on hiring application forms. Some government agencies request aggregate rather than individual level demographic data, and employers often compile the information from periodic surveys of workers. In fact, self-reported demographic information is likely the most reliable way to obtain current information, although a worker's self-identification on some items may change over time. Given the complexities in recording this information for each worker, some advisors suggest it may be preferable to link to self-reported information from another source (perhaps with modeling), such as drivers licenses, Social Security records, the decennial Census, or possibly, learning and employment records (LERs). LERs are digital records on workers with personal information that will document learning wherever it occurs, including at the workplace, through an education program/experience, or through military training. LERs are part of another effort to standardize labor market data, also under the auspices of the USCCF.

10. **Worker education and training attainment** are not contained in wage records and are highly desired by researchers, particularly credentials and certificates earned through training. Self-reported data are likely more reliable and up to date than employer records. Some advisors suggest linking to self-reported or administrative data from another source, such as education records or LERs.

11. **Nonstandard employer-worker relationships,** that is, records for people serving as contract workers with 1099 reporting, vendors, or volunteers. Information on nonstandard work is highly sought by researchers. This presumes that government-collected wage records would extend beyond workers currently covered by UI. Pandemic experiences (and subsequent fraud investigations) could spur such an extension of UI wage record coverage to self-employed and others to facilitate any future expansion of UI coverage, whether temporary or permanent. Although advisors indicate non-standard employment status is of high interest, there is also recognition that some desired information may not be maintained by businesses for these workers. A firm can report information based on 1099 tax forms it has submitted.

However, a firm does not have employer relationships with its contractors, so it may not know much about those workers, such as occupation or hours for completion of tasks. Thus, records for contractors may need a different design and more augmentation of data from other sources.

12. **Characteristics of the organization and establishment** are only partially contained in wage records now (establishment industry, in particular). Other components (such as for-profit or non-profit, parent company information) are part of reports to other government agencies. Advisors view these as desirable additions.

13. **Position in employer hierarchy** (e.g., officer, manager, stock owner, front-line worker) is not contained in wage records now but is part of reports to other government agencies and, according to advisors, would be a desirable addition to wage records. Also desirable would be the number of people who directly report to the worker and the level each worker reports to, recognizing that these factors would be more difficult for employers to provide.

These data elements are sought for direct research uses and for use in combination and over time. For example, the prevalence of uncertain work schedules could be indicated by high variation in weekly (or pay period) work hours for a team of workers. Similarly, knowing a worker's occupation, size of the establishment and firm, and wage per hour can help indicate where a worker is located in the workplace hierarchy.

Table 5 cross-references these categories of potential data enhancements with corresponding data elements in the JEDx Data Dictionary. (*Appendix F* provides descriptions and definitions of each data element from the dictionary.) Most variables are linked to the dictionary's description of the information that is already collected and which government programs require it. The variables are organized by categories of information that describe the organization and its structure, the job held, the person who engages as a worker, the nature of the work relationship, and the wages and hours resulting from that relationship. The final column provides additional comments.

Table 6 splits these data enhancement categories into three groups: (1) important new data categories likely to represent low employer burden (and feasible to collect from employers directly); (2) important refinements to existing data categories; and (3) important new data categories, but likely to be high employer burden or best merged from other sources. We base the categorization of burden on a combination of advisor input and whether employers are already reporting data elements to government agencies. Obtaining the data elements in the third group likely requires particular attention to alternatives to relying on employer records, such as linking to surveys or other administrative data. These are discussed further in this report's recommendations. This is important information when planning enhanced wage record systems pilots and implementing a full system.

Table 5. Categories of useful JEDx-REP data enhancements and associated elements in the JEDx data dictionary

	CATEGORY	EMPLOYER ORGANIZATION DATA	EMPLOYER ESTABLISHMENT DATA	EMPLOYER JOBS, POSITIONS AND ASSIGNMENTS DATA
1	Hours worked and paid			
2	Geocode of employer, work location, and residence	Organization Street Address	Establishment Street Address, Establishment City, Establishment State, Establishment Zip Code	
3	Job title			Employer Job Title, Employer Job Code, Job Category Code
4	Employment start and stop dates and reason for separation			Position Status, Position Status Reason, Position Status Date
5	Nature of standard employer-worker relationship			Standard Hours, Position Schedule Type, Position Type, Position Term
6	Compensation, earnings, and wages			
7	Capacity to link records	Organization Identification, Legal Name, Federal Employer Identification Number, Previous Federal Employer Identification Number, State Unemployment Tax Account Number, Trade Names, Parent Company Tax ID, Parent Company Name	Establishment ID Number, Establishment Name, Federal Employer Identification Number, State Unemployment Tax Account Number	
8	Occupation, duties, and skill requirements			Standard Occupation Code, Business Support Role, Employer Job Duties, Employer Job-Required Skills, Employer Job-Required Education and Experience
9	Worker demographic characteristics			
10	Worker education and training attainment			
11	Non-standard employer-worker relationships			Position Type, Position Term
12	Characteristics of the employer organization and establishment	Industry Code, Activity, Business Structure Type, Operating Status, Operating Status Date, Principal Products & Services	Establishment Industry Code, Operating Level, Business Functions	
13	Position in employer hierarchy			Management Flag, Management Level

Table 5 continued. Categories of useful JEDx-REP data enhancements and associated elements in the JEDx data dictionary

	CATEGORY	WORKER PERSONAL IDENTIFICATION AND WORK RELATIONSHIP DATA	WORKER PAID TIME AND COMPENSATION REPORTS	COMMENTS
1	Hours worked and paid		Hours Worked in Payroll Period Including 12th of the Month, Weeks Worked, Days worked, Regular Hours Worked, Total Premium Hours Worked, Total Hours of Paid Leave Taken (Paid Time Off), Pay Frequency	Need frequency and timely data. Challenging to define for salaried employees. Ask for sufficient disaggregation to allow components to be assembled as needed for varied uses.
2	Geocode of employer, work location, and residence	Primary Work Location, Residence Street Address, Residence City, Residence State, Residence Zip Code		Work from home information is important and may need updating.
3	Job title			
4	Employment start and stop dates and reason for separation	Date of Hire, First Work Date, Contract Beginning Date, Contract Ending Date, Probationary Status Beginning Date, Probationary Status Ending Date, Seasonal Work Beginning Date, Seasonal Work Ending Date, Return-to-Work Date, Last Work Date, Date of Termination, Work Status Reason		
5	Nature of standard employer-worker relationship	Worker Type, Work Status, Work Status Reason, Union Status, FLSA Indicator		
6	Compensation, earnings, and wages	Stock Owner Indicator, Stock Owner Percentage	Compensation Time Period, Salary Earned, Regular Hourly Wages Earned, Total Premium Hourly Wages Earned, Total Leave Pay Earned, Total Other Cash Compensation Earned, Total Wages Paid Out of State, Total Compensation Paid	Need improved frequency and timeliness. Ask for sufficient disaggregation to allow components to be assembled as needed for varied uses.
7	Capacity to link records	First Name, Last Name, Middle Name, Previous Last Name, Name Suffix, Social Security Number, Previous Social Security Number, Driver's License		Facilitate linkages, including: Workers' wage records over time; Workers to establishments; Establishments to firms, Workers to survey and other data; and Longitudinal links to education data.
8	Occupation, duties, and skill requirements			Requires more research. Linkages to Learning and Employment Records or JobSchema+ job listing information may be needed to provide needed data.
9	Worker demographic characteristics	Birth Date		Unresolved data issues. Disability, race, ethnicity, gender, veteran and marital status needs to be gathered from workers some other way or matched from other sources.
10	Worker education and training attainment			Needs to be added or provision needed to link to other sources, such Learning and Employment Records.
11	Non-standard employer-worker relationships	Worker Type, Work Status, Work Status Reason, Union Status		Identifies contractors, vendor employees, and volunteers. Implies inclusion of workers not currently covered by UI. Wage record design may need to be different for non-standard workers.
12	Characteristics of the employer organization and establishment			
13	Position in employer hierarchy	Officer Indicator, FLSA Indicator		

Table 6. Data category enhancements grouped by impact on employer reporting

IMPORTANT NEW DATA CATEGORIES THAT ARE LIKELY TO BE LOW EMPLOYER BURDEN
(FEASIBLE TO COLLECT FROM EMPLOYERS DIRECTLY)

1. Hours worked and paid
2. Geocode of employer, work location, and worker residence
3. Job title
4. Employment start and stop dates, reason for separation
5. Nature of standard employer-worker relationship (regular employee, full-time or part-time, union status)

IMPORTANT REFINEMENTS TO EXISTING DATA CATEGORIES

6. Compensation, earnings, and wages
7. Capacity to link records

IMPORTANT NEW DATA CATEGORIES, LIKELY TO BE HIGH EMPLOYER BURDEN
(MAY REQUIRE DIFFERENT SOURCES OR ANOTHER APPROACH)

8. Occupation, duties, and skill requirements
9. Worker demographic characteristics
10. Worker education and training attainment
11. Non-standard employer-worker relationships (if not a regular employee of the firm)
12. Characteristics of the employer organization and establishment
13. Position in employer hierarchy

Note (for Table 5)

The JEDx data dictionary can be found here. It supplies definitions and information on government programs that already collect the data elements listed above from employers. Links in the table point to relevant entries in the data dictionary. See *Appendix F* for excerpted descriptions of each data element listed.

5.2. Access options and necessary attributes to improve statistical analysis, research, and program evaluations

This section addresses how the more important data elements are—or could be—accessed for research, statistical purposes and program evaluations. *Table 7* summarizes the ways that worker wage and employment data are currently accessed for research, evaluations, and official statistics. Advisors discussed, often at length, some major challenges and limitations. For example, researchers and evaluators must submit applications to the holding entities to access data and the application process varies by system. Researcher access to WDQ, and SLDS data, for example, requires approval from states for each study with inconsistent application and approval processes across states. Researchers accessing LEHD data through FSDRCs must have approved arrangements with states and obtain IRS permission for each study. NDNH requires interagency agreements, HHS approval, and fund transfers to HHS by federal departments sponsoring research or evaluation.

These limitations reduce the amount and quality of research that can be accomplished with the data. A few of the major issues are noted here:

1. Existing wage record repositories are secure and protect privacy but do not offer adequate access for research, statistics, and evaluation. The data are also limited in coverage, timeliness, and curation quality—depending on the repository. Similarly, data and technology standards that facilitate data sharing for administrative purposes do not automatically allow for or provide research access. Future governance of access needs to explicitly support research uses of wage records.

2. Achieving representative data AND timely, flexible, non-cumbersome access may not be feasible with one access point, especially in the near term. The federal government has representative national data on some particular topics, but the data are not very timely, lack adequate geographic

detail, or both. Depending on the purpose of the data system, it may not always be universal (i.e., including all workers and all employers) or have individual identifiers, both of which are usually essential for rigorous program evaluations. Also, funding, legal restrictions, and structure constrain development speed and research access. Further, access for academic researchers is cumbersome and even more difficult or impossible for non-academic researchers. While some state governments have data systems and interest in research, evaluation and statistics, their datasets often have geographic coverage limited to one state or inconsistent datasets and access policies across states.

3. Administrative data research facilities (ADRFs) are a growing model for providing secure access to non-survey data for analytical purposes. For example, some states have joined together to offer research access to their data through a facility's network. ADRFs generally keep separate the implementation of the technical infrastructure from the data ownership and governance processes. *Appendix E* lists examples of ADRF research access models. Such facilities may or may not feature data repositories; some operate with APIs that are held by the data providers. Guidance for ADRFs is available in at least three forms: (1) for technical standards, see FAIR principles (guidelines to improve the findability, accessibility, interoperability, and reuse of digital assets); (2) for governance models, data trusts are structures whereby data are placed under control of a board of trustees with fiduciary responsibility to look after interests of beneficiaries; (3) for systems to manage access, see Researcher Passport systems (policies, procedures, practices, and norms for restricted data access and identifies the significant challenges faced by researchers interested in accessing and analyzing restricted use datasets); and (4) for "program visits the data" systems, see edge computing, a distributed computing paradigm that brings computation and data storage closer to the sources of data.

Advisors discussed many ways in which access to micro-data for research, statistical analysis and program evaluation could be improved, whether through ADRFs or other mechanisms. This would allow for more precise and timely analysis, improved efficiency, and reduced cost. These include having a standard data request application such as the recent federal Standard Application Process and streamlined transmission of data to federal statistical agencies, such as in the BLS wage record pilot.

Table 7. Examples of federal and state efforts that provide or support researcher access to multiple states' wage records or other information

PROGRAM	PRODUCTS
Employment and Training Administration, Department of Labor	Trainingproviderresults.gov (aggregate data)
	Workforce Performance Results (aggregate data)
	Workforce Data Quality Initiative (WDQI) (state access for primarily state research)
Bureau of Labor Statistics, Department of Labor	Wage Record Pilot Project (Pilot states: NM, TX, AR, ID, OR, WA, WY, NE, IA, MN, WI, MI, IN, OH & CT)
National Center for Education Statistics, Department of Education	Statewide Longitudinal Data Systems (SLDS) grant program (state access for primarily state research)
Census Bureau, Department of Commerce	Longitudinal Employer-Household Dynamics Program (applications through Federal Data Research Centers)
Office of Child Support Enforcement, Administration for Children and Families, Department of Health and Human Services	National Directory of New Hires (for approved and legally allowed evaluation topics)

While it is too early at this stage of the JEDx initiative to determine the best research access structure for employer administrative and wage record data, the advisors noted the following issues that need to be explored for the success of providing research access:

01   **Privacy** protection in data treatment before sharing, in access, and in use. Aim: Protections that meet national, state, and international standards for handling personally identifiable information (PII), informed consent, right to be forgotten, and disclosure review. Employers and workers must be able to trust that it is safe to allow researchers to access the data. Privacy and confidentiality are rapidly developing fields and will be very important to address in arrangements for research access to employer administrative records. The upcoming Third Workshop of the National Academies of Sciences, Engineering, and Medicine project on the future of the national data infrastructure will provide an assessment of best practice in protecting privacy in the context of statistical analysis and economic and demographic research, along with state and national program evaluations.

02   **Security** for systems of storage, provisioning, and access. Aim: Security protections that earn the trust of stakeholders and meet national, state, and international standards.

03   **Quality** of data checked before allowing access. Aims: Careful and consistent data curation and well documented data sourcing and treatment.

04   **Transparency** through open policies, transformations, use logs, and public dataset requirements. Aims: Documentation of methods should be public. Legal provisions/issues must be in place for statistical agencies and other state and/or federal use and clearance disclosure restrictions, and Freedom of Information Act (FOIA) requests.

05   **Data user** access governed by appropriate eligibility rules and terms. Aims: Explicitly enable access to qualified academic and government researchers; researchers with government grants or contracts; researchers at foundations, including think tanks, industry associations, and nonprofits; and contributing employers. It is important that this governance does not default to rejection to avoid all risk. Instead, tiers of appropriate access and clearances are needed for different uses and users. Governing terms of access will also be complex, including issues such as funding (who pays for what?); application process and time constraints; levels of aggregation; timeliness; and remote or onsite access.

06   **Data use** rules govern how data may be used and for what purposes. Aims: Uses must enable broad capabilities/activities (including matching, linking, blending and other computationally intensive analysis) and rule out misuse of data. Allowable uses must consider options for permanent and temporary storage of microdata on individuals and employers. Research uses must also allow for pre-publication revisions of papers and reproducibility exercises. The purpose of this access is for research, analysis, program evaluations, and statistics for the public good, as well as private access to incentivize employer participation. Rules and processes must ensure that data will not be used for illegal purposes, such as violation of antitrust laws.

5.3. Motivating employers and government agencies to enhance administrative data and allow research access

To succeed, JEDx standards must offer an attractive value proposition for employers and for the state and federal agencies involved in wage record collection and management. It follows that provision of research access to enhanced wage records will need to contribute sustainably to that value proposition. The key employer and government use cases for JEDx enhanced wage records listed in Section IV and Appendix E of USCCF (2021) are intended to motivate their participation. Fortunately, many of the research use cases described earlier should be of interest to employers, government agencies, or both. But special effort may be needed to demonstrate the possibilities effectively and quickly.

We have noted that various federal and state agencies currently provide some research access to wage records for particular uses. This reflects some appreciation of the usefulness of analytics for policy making and program administration. In Figure 1b, state requirements would remain the backbone of wage records in the US, implying important roles for state participation and federal agency support. Advisors suggest that researchers can team up with agency staff to help design prototype products that would incentivize state and federal participation.

Many companies have also allowed researchers to have access to parts of their internal data for particular research studies, demonstrating that some employers recognize the value that research can create for them. Yet, such access is the exception, not the rule. The advisors acknowledge that the scale of research access they seek would be far greater than ever offered before.

Thus, advisors discussed how to maximize the value of the data and access enhancements to employers as well as to researchers. They emphasized that researchers can often devise new products to meet employers' needs. For examples of the products produced by some voluntary programs to compensate data holders for providing their data, see *Table 8*. Not surprisingly, most of the programs supply data providers with access to statistics or reports that companies value to inform their decision-making. An American Economic Association's Committee on Economic Statistics report suggests that while some companies do not initially see the value proposition for sharing the data with outsiders, researchers can enhance the value of corporate data by cleaning, editing, and organizing data assets and can appeal to corporate public service ethics (American Economic Association, 2020). The latter was also mentioned by several JEDx-REP advisors.

The recent Committee on National Statistics report suggests ensuring that data sharing is consistent with the companies' promises to their clients. In addition, the report points out that businesses value having the ability to compare their performance to other businesses in their sectors (National Academies of Sciences, Engineering, and Medicine, 2022a). This was also mentioned repeatedly by JEDx-REP advisors. Similarly, both the report and advisors mentioned the importance of ensuring that the societal benefits of data sharing are proportionate to the costs and risks of employers sharing their data.

5.4. Summary

JEDx-REP advisors and the literature agree on the three categories of improvements in employer wage records that could appreciably advance research, official statistics, and evaluation analytics:

1. Priority enhancements in data elements;

2. Viable research access models and desirable attributes of access; and

3. Incentives for employers and state and government agencies to participate.

Researcher access and input to the upcoming JEDx pilots offer an important opportunity to test these improvements and demonstrate the potential benefits of adoption of enhanced wage records.

Table 8. Motivations and incentives for data providers to contribute data

EXAMPLE	DATA PROVIDERS	INCENTIVE(S)
Longitudinal Employer Household Dynamics Program (LEHD)	States are part of the LEHD partnership. They submit UI wage records and other data, which the Census Bureau combines with social security and other data sources to create the LEHD and produce statistical products. Employers are required by law to submit wage records to the state UI programs.	Participating states receive Quarterly Workforce Indicators and other statistical products that inform their workforce development systems.
BLS Wage Record Pilot Project	State LMI agencies submit UI wage records to BLS. Employers are required by law to submit wage records to the state UI programs.	The pilot is currently underway. The project is expected to have the potential to produce new statistical products, especially across states. It also facilitates sharing of UI wage record data across states for many purposes.
Criminal Justice Administrative Records System (CJARS)	States in partnership with the US Census Bureau.	CJARS offers data and analytical services to providers such as statistical reports, projections and trends analysis, and program evaluations.
Institute for Research on Innovation and Science (IRIS)	IRIS collects individual and institution level administrative data from research in its member universities and states.	Reports that are shared with external stakeholders such as legislators and employers. Some reports are produced based on the request of a local congressional representative.
Coleridge Initiative ADRF	State and federal agencies in the Coleridge network contribute their UI earnings and other administrative data from governmental agencies. Data from payroll companies such as ADP are also used.	Agency staff are trained, and statistical products produced by Coleridge and staff are provided to the agencies.

06

FINDINGS AND RECOMMENDATIONS

FINDINGS AND RECOMMENDATIONS

The **overall finding** of JEDx-REP is: Data standards and enhanced wage records incorporated into the JEDx design hold important potential for improving official statistics, economics and other social science research, program evaluation, and evidence-building.

General recommendations

- **Include research products in the JEDx pilots.** As the most important short-run recommendation, JEDx pilot projects should include a small team of researchers to access the data to quickly design and produce a set of compelling statistical products and review the pilot for evaluation potential. Among the priority wage record data enhancements identified, some are easy for employers to provide. The JEDx pilots should aim to create products that use these elements and tie clearly to specific interests within the research, official statistics, evaluation, program management, and policymaking communities.

- **Explore how to lower the burden of adding high-priority/ high-burden data enhancements to wage records.** Researchers and stakeholders should use the pilot to investigate options for linking, merging, or combining data sources to supply these high-priority elements to produce compelling products.

Specific findings and recommendations are provided below in three realms: use cases, data enhancements, and improved research access.

6.1. Use cases

Findings: Data standards, enhanced wage records, and research access provide important opportunities to improve social science and economic research, program evaluation, and official statistics for the following types of use cases:

1. **Social science research:** Estimating interactions between earnings and education/training attainment, the impact and nature of employer-jobholder relationships and the spatial nature of work arrangements.

2. **Program evaluation:** Assessing the economic impact of education and workforce development programs and services on individuals, and the outcomes of education and workforce development programs and services on individuals and communities, and cost-benefit analyses.

3. **Official federal and state statistical reports:** Improving estimates of GDP, GDI, personal income, productivity, occupational trends, labor market dynamics, labor force participation and employment, and geographic conditions.

4. **Benchmarking, analytics, and tracking:** Informing local occupational demand and supply analysis, job quality assessment, local/state/regional economic development strategies and equal employment opportunity laws and regulations.

Recommendations: Selecting from the following options, **develop prototypes** of new data products using enhanced wage records:

- Improve benchmarking and analysis of regional/state/local occupational supply and demand

- Add more detail for occupational demand and labor supply analysis

- Prepare more rapid priority policy analysis (e.g., COVID proposals, extreme weather event impacts, cyclical unemployment)

- Analyze social determinants of labor markets and labor force participation (e.g., persistent unemployment, worker skills, location of jobs, high quality jobs)

- Conduct lower cost program evaluations (e.g., long-term impacts of skills training)

- Facilitate complex, policy-relevant evaluations (e.g., labor market outcomes of trainees, youth, unemployed workers) and impacts on people with high geographic mobility (e.g., formerly incarcerated people)

6.2. Data enhancements

Findings: The highest priority data enhancements needed to support the research use case types listed above fall into three categories.

Important new data categories, likely to represent low employer burden:

1. Hours worked and paid, disaggregated by categories that can be added to meet multiple needs; also more frequent and timely

2. Geocode of primary location of workplace (including remote work) and geocode of employee residence

3. Job title

4. Employment start and stop dates and reason for separation

5. Nature of standard employer-worker relationship (regular employee, full-time or part-time, union status)

Important refinements to existing data categories:

1. Compensation/earnings/wages, disaggregated by categories that can be added to meet multiple needs; also more frequent and timely

2. Enhanced data to facilitate linking records in various ways (e.g., over time, and with other data sources)

Important new data categories, likely to be high employer burden (may require different sources or another approach):

1. Occupation, duties, skill requirements

2. Worker demographic characteristics or ability to link to data with this information

3. Worker education and training attainment or ability to link to data with this information

4. Non-standard employer-worker relationships (if not a regular employee of the firm)

5. Characteristics of the organization and establishment, including industry

6. Position in employer hierarchy (e.g., officer, manager, stock owner, front-line worker)
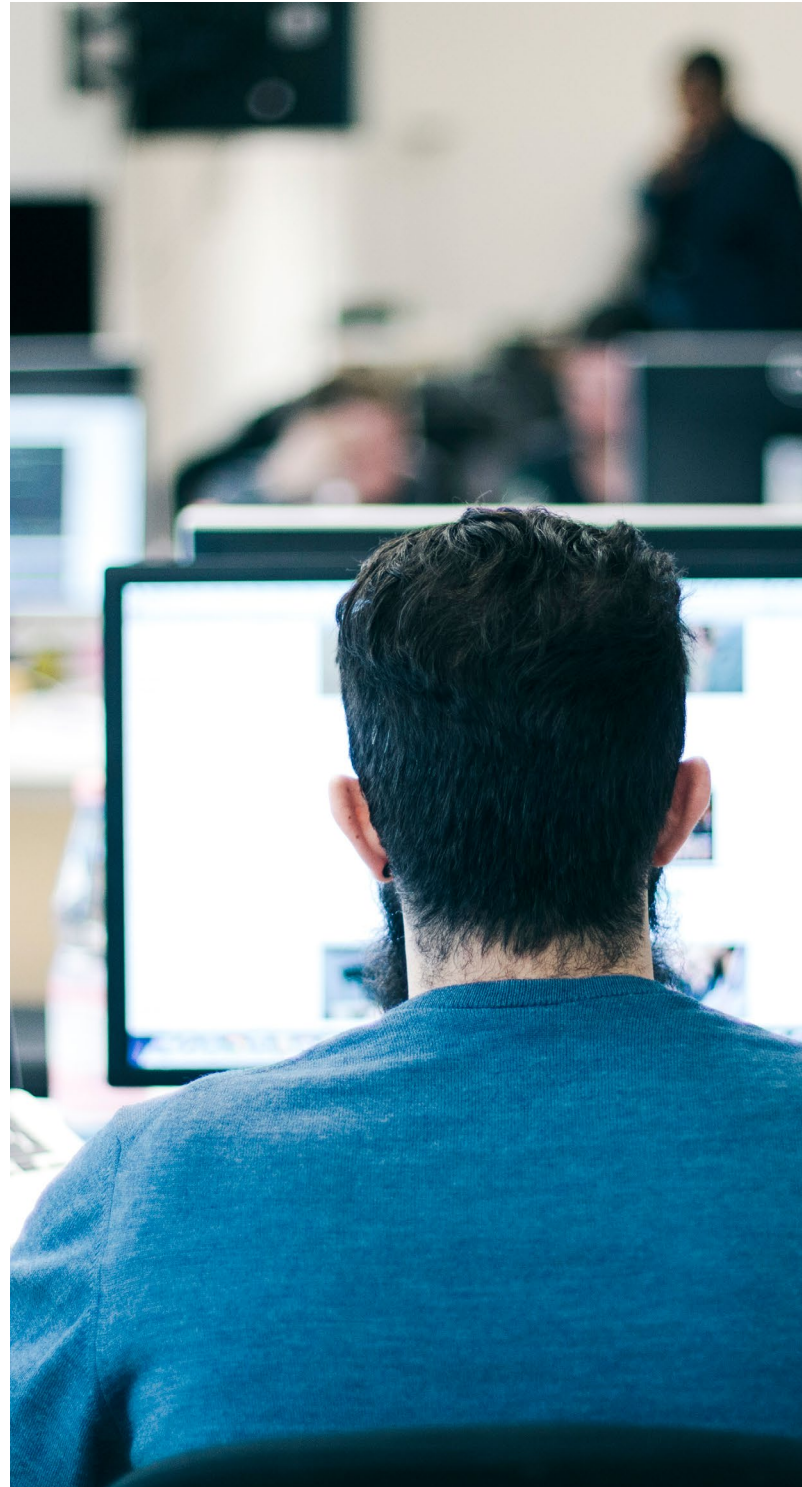
Recommendations: We recommend the following to JEDx for enhancing data to serve the research use cases:[10]

- Test and pilot research priority data enhancements that are likely to be easiest and most acceptable for employers to provide (*Table 6*).
  - Hours worked and paid
  - Geocode of employer, work location and worker residence
  - Job title
  - Employment start and stop dates and reason for separation
  - Nature of standard employer-worker relationship (regular employee, full-time or part-time, union status)
  - Compensation, earnings, wages
  - Identifying employer and worker data to facilitate matching and linking
- Collect earnings and hours information more frequently, with more granularity, and on a more timely basis (e.g., payroll period or monthly), which is necessary for rapid policy analysis and benchmarking.
- Devise a strategy for obtaining universal data (all workers, all employers, all states), which is necessary for most rigorous national evaluations of labor issues and programs.
- Explore other sources for several high priority data enhancements that are difficult for employers to provide. These include the following:
  - **Nonstandard workers:** Investigate the feasibility of obtaining information on nonstandard workers (e.g., 1099 filers), recognizing employers may not know all work statuses of 1099 workers (e.g., self-employed) or employees of another subcontractor firm at their operations. It is, though, worth trying to obtain, given the importance of this factor. Wage records for nonstandard workers will necessarily differ from those for standard work arrangements (perhaps only containing information from 1099s and assignments) and may require special efforts to merge in data from external sources.

  - **Worker demographics characteristics:** For accurate, updated information, explore options for linking to other sources to obtain worker age, race, ethnicity, gender, disability status, etc. Possible sources include driver license records, Social Security files or LERs. Many university research centers (e.g., Institute for Research on Poverty and the California Policy Lab) undertake such data linking and may provide good examples for privacy and access strategies for enhanced wage record systems. Comparisons with employer data on worker demographics would be very informative for determining how to best obtain this information.

  - **Worker education and training attainment:** JEDx pilot projects should explore linking to self-reported or administrative data from another source, such as state DMV or education records or LERs.

  - **Occupation, duties, and skill requirements:** Accurate occupational (SOC) information is critical for many research use cases, but difficult to provide. In the JEDx pilots, determine which occupation-related data elements are least burdensome for employers to provide and most informative, such as job title, duties, and other information. Then, develop a nationwide strategy to use obtainable information and other data sources (such as JobSchema+ or HR Open standards) to assign SOC codes to jobs and to identify emerging occupations. An ongoing strategy to support employers in assigning SOC codes could reduce employer burden, improve data quality, track emerging trends, and facilitate accurate comparisons and benchmarking. JEDx pilots could include partnering with BLS or the Standard Occupational Classification Policy Committee (a Federal interagency technical working group that is chaired by the BLS) to develop such a strategy.

6.3. Enhanced access

Findings: The existing wage record repositories do not offer ideal access to wage records for research, statistics, and evaluation purposes.

1. The long-run access solution will likely require **a mix of multiple complementary access points** for different research purposes.
2. Setting up such access requires both **a supportive governance model and implementation of technical structures** to manage research access.
3. **Access models are evolving rapidly** and JEDx is not at a stage to choose one yet. In the long run, achieving representative data and timely, flexible, non-cumbersome research access may not be feasible with one access point, whether in government or private sector.
4. **Administrative data research facilities (ADRFs) are an expanding model** with the potential for providing timely, flexible, and safe research access to non-survey data. A fully developed public-private or private entity such as an ADRF could conceivably provide speedy development of a uniform and secure access to researchers and evaluators across the entire country.

Recommendations: Our recommendations necessarily address the variety of roles and interests of the JEDx pilot stakeholders and reflect the need for different data and access approaches to address different research uses. This complexity calls for exploring multiple access approaches.

- JEDx pilots should include an explicit effort to provide researchers with access to the data to generate products of value to policy makers, businesses, and researchers and other interested parties.
- Pilots should also include government agencies providing internal and/or external researchers with access to the comprehensive, fully-curated microdata that underlie official statistics and other government information products, including any data shared by a JEDx system. These government records would be improved in content and quality by more standardization. Government participation in pilots would provide a comprehensive test of the future potential of enhanced wage records for administrative as well as research, statistics, and evaluation purposes.[11]
- JEDx should also support the establishment of one or more public-private portals, such as an ADRF (state-sponsored versions are one option) and explore the provision of tiers of access for different kinds of research users.

In the development of portals, JEDx should:

- Focus first on developing a **public-private portal optimized for timely analysis.** Prioritize research access that will generate timely products of use to key stakeholders, including data providers, public officials, program administrators, and researchers. Nimble efforts that demonstrate the value of data use and enhanced research access can be a way to pilot data improvements and bring employers and state governments on board with enhanced wage records.

- As soon as possible, engage a variety of non-government and/or government **researchers to help design products** valued by data providers and users. To that end, create opportunities for researchers to interact with employers to build better understanding of data and trust in each other.

- **Actively engage stakeholder communities,** including employers and employer organizations, payroll service providers, states, federal statistical agencies, non-statistical federal agencies, unions, individual workers and researchers. Provide outreach to them about the importance of research, statistical, and evaluation products that could flow from JEDx data enhancements and research access to employer wage records.

- Consider initially (and perhaps permanently) only covering **employers who participate first or voluntarily** but recognize this would greatly limit the system's usefulness in nationally representative evaluations or research.

- **Maintain parallel legacy systems** (perhaps permanently) with universal data that currently exists (e.g., through NDNH) until a new system is comprehensive in scope (essential to have universal data for evaluation purposes), and fully tested for quality, security and reliability.

- To **protect privacy and security,** maintain funding, manage access, move expeditiously, and provide an adequate computational environment for a private or public-private access option, consider these options:

  – Partner with one or more experienced research access entities to leverage their technical capacities and expertise for security and confidentiality.

  – Instead of a repository for data, follow a "program visits the data" distributed computing model, where the entity queries employers for data, performs statistical operation and returns results that are aggregated, not worker-level data.

6.4. Conclusion

Research access to enhanced wage record data for the public good should be a high-priority goal of the JEDx initiative. Employers and states participating in the initiative should be recognized publicly and with incentives for advancing critical policy analysis, official statistics, program evaluations and social science research. Such access will not happen without intention and support from the JEDx stakeholders. The JEDx-REP project concludes that:

- There is unanimous agreement that data standards and improved access to enhanced wage records would provide substantial benefits to social science research, official statistics, program evaluation and management, and policymaking.
- There is strong agreement regarding priority data enhancements.
- Data access for research, statistics, and evaluation would best be provided through a mixed approach, that is, some combination of public and private facilities. JEDx should facilitate the exploration and selection of various models and options.

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APPENDICES

APPENDIX A. LIST OF ABBREVIATIONS

ACS American Community Survey

ADRF Administrative Data Research Facility

ARS Annual Refiling Survey

AWI Average Wage Index

BED Business Employment Dynamics Program

BLS US Bureau of Labor Statistics

CES Current Employment Statistics

CJARS Criminal Justice Administrative Records System

CNSTAT Committee on National Statistics

CRIS Common Reporting Information System

DOL US Department of Labor

EB Extended Benefits

EEOC Equal Employment Opportunity Commission

EIA Energy Information Administration

EP Employment Projections

ETA Employment and Training Administration

FDI Foreign Direct Investment

FSRDC Federal Statistical Research Data Center

HHS Department of Health and Human Services

IEC International Electrotechnical Commission

IRIS Institute for Research on Innovation & Science

IRS Internal Revenue Service

ISO International Organization for Standardization

IUR Insured Unemployment Rates

J2J Job-to-Job

JDX Job Data Exchange

JOLTS Job Openings and Labor Turnover Survey

LAUS Local Area Unemployment Statistics

LEHD Longitudinal Employer-Household Dynamics

LMI Labor Market Information

LODES LEHD Origin-Destination Employment Statistics

MWR Multiple Worksite Report

NCES National Center for Education Statistics

NDNH National Directory of New Hires

NTTAA National Technology Transfer and Advancement Act

OASDI Old Age and Survivors and Disability Insurance

OEWS Occupational Employment and Wage Statistics

OFCCP Office of Federal Contract Compliance Programs

OMB Office of Management and Budget

PSEO Post-Secondary Employment Outcomes

QCEW Quarterly Census of Employment and Wages

QWI Quarterly Workforce Indicators

RESET Re-Engineering Statistics using Economic Transactions

SLDS State Longitudinal Data Systems

SSA Social Security Administration

SWIS State Wage Interchange System

UI Unemployment Insurance

VEO Veteran Employment Outcomes

VETS Veterans Employment Service

WDQI Workforce Data Quality Initiative

WIA Workforce Investment Act

WIOA Workforce Innovation and Opportunity Act

Table B-1. Statistical uses of Quarterly Census of Employment and Wages by federal and state agencies

MAIN PURPOSE AND LIMITATIONS OF QCEW	EXAMPLES OF OTHER STATISTICAL USES BY THE FEDERAL GOVERNMENT AND STATES
Purpose and aim • Re-using data from UI wage records: ensuring that the employer exists and is paying to the UI compensation fund through the QCEW. • Providing labor market information at the country, metropolitan, state, and national levels by industry • Sample frame for BLS most employer surveys • Annual benchmark for Current Employment Statistics program **Limitations** • Not designed as a time-series • Difficult to get more detailed geographical and inclusive industry-level data • Information on employers with multiple work sites is hard to capture as employers would report from their one registered address	**General Federal Statistical Uses** • BLS Office of Publications: graphics-oriented publications • Publications in the Monthly Labor Review, principal journal of BLS • Measuring economic indicators such as the unemployment rate and payroll job growth (ILR School, 2021), changes in average weekly wages (US Bureau of Labor Statistics, 2022a). • Business Employment Dynamics statistics • Employment, wages, and establishment counts in hurricane flood zones (US Bureau of Labor Statistics. (2021a). • Federal fund allocations (HUD, USDA, and HCFA/CHIP) • Sampling for various price, wage, and safety programs. **Specific Federal Programs** • EIA: Starting in 2017, QCEW microdata files are provided to the EIA to be used in updating the sampling frame used for the MECS, PPSIS, and MGPS. • SSA: quality check against data provided by IRS and employers on Forms W-2; improve estimates of OASDI, HI, taxable wages, average US wage, and AWI. • ETA, OCTAE, State Workforce and Education Agencies: Data to administer and track outcomes of ten WIOA workforce development programs. • US Census Bureau: the industrial classification of QCEW is used to assign some industry codes in the Census' BR. Basic data items are then extracted from the BR to be used in the CBP. • The Census Bureau relies on the QCEW data along with other additional administrative data and data from censuses and surveys to produce the LEHD. • Bureau of Economic Analysis: GDP, Personal Income components and estimates, as well as enhancing data on FDI **State Statistical Uses** • State revenue projections. • Local economic development indicators • Used as the underlying data to predict short-term and long-term industry and occupation projections. Calculation of IUR for federal-state EB triggers.

Table B-2. Statistical products of LEHD program

STATISTICAL PRODUCT	KEY ECONOMIC AND STATISTICAL PRODUCTS	DATA LEVELS AND COVERAGE DURATION
QWI	A set of 32 economic indicators that include: • Employment • Wages • Hires • Earnings • Industry • Firm size • Firm age • Worker age, race, ethnicity, sex, and education	Data levels: National, state, metropolitan/micropolitan, and county and Workforce Investment Areas. Coverage duration: Quarterly data. It covers different periods over time, offering longitudinal data since 1990 for the labor market statistics, which allows for analysis by worker and firm characteristics across the different industries.
PSEO	It offers earnings outcomes and employment flows for post-secondary graduates that are crossed by degree level, major, institution, and graduation cohort.	Data is only available for specific States and covers only the partner universities that agreed through a data-sharing agreement to share the transcript data with the Census Bureau. Transcript data is then matched with a national database of jobs produced by the LEHD program—to generate PSEO data (US Census Bureau, n.d.a). In June 2022, six new states were added to the PSEO data product to include 23 states in total, 660 institutions, covering 25% of the US college graduates in 2015 (US Census Bureau, 2022). Data is also not available over time, where it only covers cohorts of the years 2001N/A2005; 2006N/A2010; and 2011N/A2015.
J2J	A set of statistics on job mobility in the US. It captures worker flows across employers, industries, geographic labor markets, and to/from employment (US Census Bureau, n.d.). • Job-to-job transition rate • Hires and separations to/ from employment • Change in earnings due to job change • Characteristics of origin and destination jobs	National, State, and metropolitan areas. Coverage duration: Data is updated quarterly.
LODES	It connects a job/worker's employment and residential locations, offerings statistics such as: Workers by • Age • Earnings • NAICS Industry Sector • Location Available for datasets for years 2009–2019 • Educational Attainment • Race • Ethnicity • Sex Available for datasets for years 2011–2019 • Firm age • Firm size (US Census Bureau, 2021a)	Available at census block geographic detail, covering most states. Coverage duration: years 2002–2019
VEO	Statistics on labor market outcomes for discharged veterans. Key statistics cover: • Veteran's demographics (age, race, ethnicity) • Veteran's education • Earnings • Employer's industry and geography • Pay grade	National and State levels Coverage duration: two-year range—years from 2000 to 2014

Table B-2 continued. Statistical products of LEHD program

STATISTICAL PRODUCT	STATISTICAL USES	PRODUCT LIMITATIONS
QWI	Based on the QWI data, States forecast job changes in their state for the next ten years. This effort is funded by the Employment Training Administration.	QWI provides demographic data that is, however, an estimate as it is the result of data matching . No geography below county No residential information (Dowell, 2017)
PSEO	N/A	PSEO covers only specific States and does not offer longitudinal data.
J2J	N/A	No worker characteristics by firm characteristics (except geography) No geography below states (Dowell, 2017)
LODES	LODES database provides the workforce-related data to another statistical product: OnTheMap for Emergency Management, which aims at providing real-time data for the US population and workforce in areas affected by natural disasters such as hurricanes and floods (US Census Bureau, 2021)	It offers less detailed firm/person characteristics compared to QWI (Dowell, 2017). Not covering all years Not covering all states Variables such as race, education, sex, and firm size are only available for certain years of data
VEO	N/A	

APPENDIX C: DATA STANDARDS FOR ADMINISTRATIVE RECORDS IN OTHER FIELDS

Standards are agreements among stakeholders that ensure certain technical specifications and criteria are consistently followed and thus, ensure that the materials, products, processes, and/or services are safe, reliable, and of high quality (Iqbal, 2006). JEDx can benefit from experiences in developing data standards in other fields. To advance data standards, the federal government leads the National Information Exchange Model (NIEM), a stakeholder-initiated effort to develop data standards in topical domains (currently 15). Electronic medical records are another realm with many efforts to devise standards (see *Table C-1*)

Table C-1. Examples of data standards in other fields

SPONSOR(S)	INITIATIVE	DESCRIPTION
DHS, DOJ, HHS	National Information Exchange Model (NIEM)	NIEM provides a common vocabulary that enables efficient information exchange across diverse public and private organizations. Think of NIEM as a dictionary of agreed-upon terms, definitions, relationships, and formats that are independent of how information is stored in individual systems. The NIEM model includes community-specific elements, as well as core elements that are commonly agreed to by the communities who use NIEM.
		NIEM has model content for 15 domain communities, including agriculture, cyber, human services, immigration, intelligence, international trade, learning and development, and surface transportation.
		Over the next two (2) years, the NIEM Management Office (NMO) will begin the formal transition to becoming an OASIS Open Standard. This initiative will allow NIEM to be designated as an official standard in national and international policy and procurement.
Office of the National Coordinator for Health Information Technology (ONC), HHS	HealthIT.gov Interoperability Standards Advisory (ISA)	A standardized set of health data classes and constituent data elements for nationwide, interoperable health information exchange.
	United States Core Data for Interoperability (USCDI)	The model by which the Office of the National Coordinator for Health Information Technology (ONC) coordinates the identification, assessment, and determination of "recognized" interoperability standards and implementation specifications for industry use to fulfill specific clinical health IT interoperability needs.
	Standards Version Advancement Process	To enable health IT developers' ability to incorporate newer versions of Secretary-adopted standards and implementation specifications, as part of the "Real World Testing" Condition and Maintenance of Certification requirement (§ 170.405) of the 21st Century Cures Act.
Patient-Centered Outcomes Research Network (PCORnet)	PCORnet Common Data Model	PCORnet enables researchers to quickly capture data insights from a large network of clinical information systems at once, which has historically been challenging. That's because each of these systems code and define data slightly differently from one another. The PCORnet Common Data Model solves this challenge by standardizing millions of data points from the Network's diverse clinical information systems into a common format. As a result, users of PCORnet can ask the same question simultaneously to hundreds of disparate systems and receive a clear, reliable answer.

APPENDIX D. JDX JOBSCHEMA+ AND HR OPEN STANDARDS EMPLOYER RECORD SPECIFICATIONS

Table D-1. Some key data elements used in JDx JobSchema+ pilot testing*

DATA ELEMENT	WHAT IT INCLUDES
Category 1. Job overview	
Employment Overview	Description of the employer, and career opportunities.
Employment Unit	Department/unit/facility where the job is performed and/or where the employee reports
Formatted Description	Description of the job including job responsibilities, qualifications, education requirements and working hours
Industry	Description of the work activities performed (e.g., software development, diagnostic and therapeutic services).
Job Agreement	E.g., employee contract-to-ire, internship, volunteer, eligible for overtime.
Job Location	Geographic location of the job
Job Location Type	Description of whether the job can be performed in-person, remote, or combination.
Title	Title of the job
Category 2. Competency related information	
Assessment	"Direct, indirect, formative, or summative evaluation or estimation of the nature, ability, or quality of a person's performance or outcome of an action"
Responsibility	Key job tasks/activities
Category 3. Credentialing and other hiring requirements	
Alternative credential/education/experience	Any alternative credential, education or experience fulfilling the requirements needed for the job
Minimum credential/education/experience	Minimum credential/education/experience required for the job
Preferred credential/education/experience	Preferred credential/education/experience required for the job
Required credential/education/experience	Required credential/education/experience needed for the job
Physical requirement	Any type of physical activity associated with the job
Citizenship requirements	The applicant's citizenship
Security Clearance requirement	Any security clearance requirements for the job
Category 4. Compensation & work hours	
Base salary	Minimum and maximum salary and unit value (hour, day, week, month, or year).
Incentive compensation	Bonus and commission compensations
Job benefits	E.g., employee discount, health insurance
Work hours	Typical working hours for the job
Category 5. Job posting only	
Date posted	The date the job posting was published
Total job openings	Number of positions open for the job posting
Estimated salary	Estimated salary for job postings computed by another organization, not the hiring one

*Some definitions for elements are different from those at Schema.org. Some of them are also not included in Schema.org. For definitions used in JDx JobSchema+ pilot testing, please refer to this link. For definitions used in Schema.org, please refer to this link.

Table D-2. Some relevant specifications included in HR Open standards

SPECIFICATIONS	USE CASES
Employee and employment earnings	Produce labor market information
Assessments	Pre-hire assessment, employee development assessments
Payroll: deployment information, payment methods, garnishments, and other deductions	Personal data change, recurring payments & deductions, ad hoc payments/deductions
Employee benefits	Enrollment, Census Change, plan setup

Source: https://www.hropenstandards.org/about-hr-open

APPENDIX E. EXAMPLES OF CURRENT RESEARCH DATA ACCESS MODELS

This appendix presents a variety of models and resources about research access to protected micro data.

US Wage Record Facilities (see discussion in text)

1. LEHD—for research and statistics
2. BLS Wage Record Pilot—for statistics
3. NDNH—for policy administration and evaluations
4. SWIS—for performance purposes, not evaluations

Administrative Data Research Facilities (ADRFs)

5. Handbook on Using Administrative Data for Research and Evidence-based Policy (Cole et al. 2021)—Broad overview with examples go-to reference for researchers seeking to use administrative data and for data providers looking to make their data accessible for research. It provides information, best practices, and case studies on how to create privacy-protected access to, handle, and analyze administrative data, with the aim of pushing the research frontier as well as informing evidence-based policy innovations.

6. Institute for Research on Innovation and Science (IRIS)—Each participating institution receives regular reports that highlight the local, state and national effects of their research spending

7. Coleridge Initiative—Works with government agencies to create value from careful use of data and building technologies to enable secure access to and sharing of confidential microdata

8. Criminal Justice Administrative Record System (CJARS)—An integrated national research data repository that follows individual offenses from arrest to charge to conviction to sanction.

Medical Records

9. PCORnet (Nat. Patient-Centered Clinical Research Network)—Health data, research expertise, and patient insights available to deliver fast, trustworthy answers to advance health outcomes

10. PopMedNet (Population Medicine Network)—Scalable and extensible open-source informatics platform to help implement and operate distributed health data networks

11. FDA's Sentinel Initiative—Creates and runs programs to study relationships and patterns in standardized medical bills and electronic health records

12. Clinical Trials Data Network—Proposed by the White House Office of Science and Technology Policy (OSTP), key aspects include: a U.S.-level governing entity that "would oversee development of a clinical trial protocol for broad distribution across clinical trial networks and sites"; study sites enroll trial participants; clinical trial data sent to trial sponsor through an electronic case report form (eCRF) via common APIs; data would be captured in the patient's electronic health record; clinical trial data would also be sent to a cloud-based central data repository or small set of data repositories for research access.

Access and Governance Concepts

13. Data trusts—Structures whereby data are placed under control of a board of trustees with fiduciary responsibility to look after interests of beneficiaries.

14. FAIR principles—Guidelines to improve the Findability, Accessibility, Interoperability, and Reusability of digital assets, and Go FAIR, a vehicle for organizing groups to further develop FAIR infrastructure

15. Researcher Passport systems—Review of the extant landscape of policies, procedures, practices, and norms for restricted data access and identify the significant challenges faced by researchers interested in accessing and analyzing restricted use datasets. It identifies commonalities among these repositories to articulate shared community standards that can be the basis of a community-normed researcher. Passport: a credential that identifies a trusted researcher to multiple repositories and other data custodians. See Levenstein et al. (2018).

16. Edge computing and distributed learning platforms—The idea of software programs visiting data, to make confidential data available (but not open) for analysis by building an architecture that enables users/analysts to submit software programs to do the computations on a system that securely connects to the data without providing the analyst to view the confidential data. Edge computing is a distributed computing paradigm that brings computation and data storage closer to the sources of data. This is expected to improve response times and save bandwidth. It is an architecture rather than a specific technology. Added data protection is not generally assumed and would be another layer. Specific Implementation Network projects pursuing this approach refer to it as a "distributed learning platform," and those implementing this architecture refer to the visiting dimension as "trains" that presumably carry the computer instructions to the data. For example, there is a Personal Health Train and a Farm Data Train, both of which are largely conceptual at the moment.

Research Access to Government Data

17. Federal Statistical Research Data Centers (FSRDCs)—Partnerships between federal statistical agencies and leading research institutions that provide secure environments supporting qualified researchers using restricted-access data while protecting respondents' confidentiality. Recently, access through the FSRDC system is being facilitated by ResearchDataGov, "a web portal for discovering and requesting access to restricted microdata from federal statistical agencies" and the Standard Application Process, which enables researchers to use the same application for access to the restricted-use data assets of each statistical agency.

18. BLS Restricted Data Access Program—Grants external researchers access to confidential microdata for approved statistical analysis at the BLS national office in Washington, DC, at Federal Statistical Research Data Centers (FSRDCs), and at a designated offsite location (see Access Modes).

19. NSF's America's Datahub Consortium—As a precursor to a National Secure Data Service, eligible people and secure data come together for collaborative research and decision-making that will benefit the American public.

20. Inter-University Consortium for Political and Social Research ICPSR—An international consortium of academic institutions and research organizations that provides leadership and training in data access, curation, and methods of analysis for the social science research community. ICPSR maintains a data archive of more than 250,000 files of research in the social and behavioral sciences. It hosts 21 specialized collections of data in education, aging, criminal justice, substance abuse, terrorism, and other fields.

21. Statistical Query Service for Administrative Tax Data: A project that seeks to create foundations for a secure, privacy-protected data service that will advance federal tax administration and priorities for evidence building. Such a data service would also support state and local government agencies that deliver social benefits and human services. See Burman et al. (2018) and Bown et al. (2020).

Data Standards for Distributed Data Systems

22. United States Core Data for Interoperability (USCDI)—Standardized set of health data classes and constituent data elements for nationwide, interoperable health information exchange. The Workgroup for Electronic Data Interchange (WEDI), a consortium of over 250 public and private organizations and "trusted as a formal advisor to the Secretary of Health and Human Services (HHS), WEDI focuses on "on advancing standards for electronic administrative transactions [and] promoting data privacy and security" in "health IT to efficiently improve health information exchange, enhance care quality, and reduce costs."

23. National Information Exchange Model (NIEM)—A common vocabulary that enables efficient information exchange across diverse public and private organizations. NIEM can save time and money by providing consistent, reusable data terms and definitions, and repeatable processes.

24. Clinical Data Interchange Standards Consortium (CDISC)—Brings together a global community of global health experts to develop and advance data standards of the highest quality.

International Models

25. Germany's [Research Data Center at the Institute for Employment Research (RDC-IAB)](#)— Example of the Research-Data-Center in Research-Data-Center (RDC in RDC) approach of accessibility to labor market data. Provides access to labor market data and also creates standardized data for the scientific community. It also links administrative data with surveys to produce data products for labor market researchers and evaluators of specific labor market policies. The RDC in RDC approach gives researchers access to data that is similar to that on-site at RDC-IAB but "a different data access point located in a guest RDC." See Müller, D. and P. vom Berge (2022).

26. UK [Data Access System](#)—See description in Levenstein et al. (2018).

27. Australia's [Single Touch Payroll](#) System— Tax office receives employers' real-time payroll data via enabled payroll and accounting software, then provides selected data to statistical agencies.

Examples of use in official statistics:

- The release of Weekly Payroll Jobs and Wages indexes from STP data: https://www.abs.gov.au/statistics/labour/jobs/weekly-payroll-jobs-and-wages-australia/latest-release and supporting methodology: https://www.abs.gov.au/methodologies/weekly-payroll-jobs-and-wages-australia-methodology/week-ending-16-july-2022; and

- An example of where STP data has been useful in providing insights related to our quarterly National Accounts : https://www.abs.gov.au/articles/insights-single-touch-payroll.

Examples of policy research uses:

- 3 month JobKeeper review (JobKeeper was the name of Australia's COVID wage subsidy, from the first year of the pandemic): https://treasury.gov.au/sites/default/files/2020-07/jobkeeper-review-2020_0.pdf;

- 6-month review of JobKeeper: https://treasury.gov.au/publication/p2021-211978; and

- Analysis of employment and unemployment: https://treasury.gov.au/sites/default/files/2022-05/foi-3103_0.pdf

28. [Danish Matched Employer-Employee Data](#): See Bobbio and Bunze (2018). The Danish data constitutes a unique source of administrative information: it covers and links together the universe of persons, establishments and firms in Denmark for over 30 years. In addition, workers' histories are constructed on a weekly basis.

APPENDIX F. JEDx DATA DICTIONARY DESCRIPTIONS FOR DATA ELEMENTS CORRESPONDING TO USEFUL JEDx-REP DATA ENHANCEMENT CATEGORIES

#	JEDx-REP DATA CATEGORY	US DATA ELEMENT	US GUIDANCE DEFINITION OR HR OPEN DESCRIPTION	US DATA ELEMENT ID
Job and occupation information				
3	Job title	Employer Job Title	Employer Job Title—A word or label an employer uses to describe the work of their workers with the same or similar tasks, primary duties or position in the organization. For example, finish carpenter, sales representative, vice president of marketing, or charge nurse.	III.B
3	Job title	Employer Job Code	Employer Job Code—A company-specific alphanumeric code assigned by the employer to classify the specific job duties of workers with the same Job Title.	III.A
8	Occupation, duties, and skill requirements	Job Category Code	Job Category—A code used to group jobs into the following broad categories: • Executives/Senior Managers • First/Mid-Level Managers • Professionals • Technicians • Sales Workers • Administrative & Clerical Support • Crafts Worker Skilled • Operatives, Semi-skilled • Laborers & Helpers, Unskilled • Service Workers	III.C
8	Occupation, duties, and skill requirements	Business Support Role	Business Support Role—a code indicating the broad business activity supported by the job, e.g., HR, Finance, Marketing, Sales, Product Development, etc.; e.g., HR, Finance, Marketing, Sales, Product Development, etc.	III.D
8	Occupation, duties, and skill requirements	Business Support Role	Business Support Role—a code indicating the broad business activity supported by the job, e.g., HR, Finance, Marketing, Sales, Product Development, etc.; e.g., HR, Finance, Marketing, Sales, Product Development, etc.	III.D
8	Occupation, duties, and skill requirements	Employer Job Duties	Employer Job Duties—The essential activities/functions/tasks performed by workers with the same Job Title at an establishment operated by the employer.	III.E
8	Occupation, duties, and skill requirements	Employer Job-Required Skills	Employer Job-Required Skills—The essential knowledge, skills, and abilities required to perform the same Job Title at an establishment operated by the employer.	III.F
8	Occupation, duties, and skill requirements	Employer Job-Required Education and Experience	Employer Job-Required Education and Experience—The essential credentials, education, and /or experience required to perform the same Job Title at an establishment operated by the employer.	III.G
8	Occupation, duties, and skill requirements	Standard Occupation Code	Standard Occupational Classification (SOC) Code—A six-digit number from the SOC that classifies the job's essential work activities/functions/tasks. The SOC coding system is used by federal statistical agencies to classify work performed into categories for collecting, calculating and disseminating data.	III.H
6	Position in employer hierarchy	Management Level	Management Level: • Executive • Manager • Supervisor • First Line • Lead	III.J
6	Hours worked and paid, disaggregated by pay period, weeks, months	Standard Hours	The typical hours required for this job. For example, 40 hour per week or 2080 hours per year.	III.L
8	Occupation, duties, and skill requirements	Position Schedule Type	The type of position schedule. Values include Full-time, Part-time, Shared-Time and FlexTime.	IV.D

#	JEDx-REP DATA CATEGORY	US DATA ELEMENT	US GUIDANCE DEFINITION OR HR OPEN DESCRIPTION	US DATA ELEMENT ID
11	Non-standard employer-worker relationships	Position Type	The code of the position type. Values include DirectHire, Temporary, Contract, Internship, Seasonal, etc.	IV.E
11	Non-standard employer-worker relationships	Position Term	The code of the position term. Values include Fixed, Permanent, Casual, Seasonal.	IV.F
4	Employment start and stop dates and reason for separation	Position Status	Employer Job Openings All positions in the same Job Title that are open (not filled) on a specified day of the month. A job is "open"" only if it meets all three of the following conditions: 1. A specific position exists and there is work available for that position. The position can be full-time or part-time, and it can be permanent, short-term, or seasonal, and 2. The job could start within 30 days, whether or not the establishment finds a suitable candidate during that time, and 3. There is active recruiting for workers from outside the establishment location that has the opening.	IV.G
4	Employment start and stop dates and reason for separation	Position Status Reason	The reason for the position status change.	
4	Employment start and stop dates and reason for separation	Position Status Date	The date the position status changed.	IV.H
Employee information				
7	Capacity to link records	Social Security Number	Social Security Number—A nine-digit number that the U.S. government issues to all U.S. citizens and eligible U.S. residents who apply for one. The government uses this number to keep track of the individual's lifetime earnings and the number of years worked.	VI.A
7	Capacity to link records	Previous Social Security Number	Previous Social Security Number—An additional SSN for an employee who has performed work under more than one Social Security Number.	VI.B
7	Capacity to link records	First Name	The given name of a person.	VI.C
7	Capacity to link records	Middle Name	The middle names or initials of a person.	VI.D
7	Capacity to link records	Last Name	The family name (or surname) of a person.	VI.E
7	Capacity to link records	Previous Last Name	The former family name of a person (used if the person's name was changed).	VI.F
7	Capacity to link records	Name Suffix	The generational designation attached to the end of a person's name (such as Jr., Sr., II, III).	VI.G
9	Worker demographic characteristics	Birth Date	The birth date of a person.	VI.H
2	Geocode of employer, work location & residence	Residence Street Address	Residence Street Address—the street address of the employee's primary residence.	VI.I
2	Geocode of employer, work location & residence	Residence City	Residence City—the name of the city in which the employee's primary residence is located.	VI.J
2	Geocode of employer, work location & residence	Residence State	Residence State—the two-digit alphabetic code for the state in which the employee's primary residence is located.	VI.K
2	Geocode of employer, work location & residence	Residence Zip Code	Residence Zip Code—the code for the ZIP Code in which the employee's primary residence is located.	VI.L
2	Geocode of employer, work location & residence	Driver's License	Driver's License—The state and number of the driver's license held by the worker.	VI.O

#	JEDx-REP DATA CATEGORY	US DATA ELEMENT	US GUIDANCE DEFINITION OR HR OPEN DESCRIPTION	US DATA ELEMENT ID
2	Geocode of employer, work location & residence	Primary Work Location	Primary Work Location—the address where the worker actually spent the most work hours during the covered period. If the employee spent less than one-half of her/his work time during the period at any individual address, enter 'MOBILE' to indicate the employee had a mobile work status.	VII.E
11	Non-standard employer-worker relationships	Worker Type	Enter a code from the list below to indicate the type of work relationship: EE: Employee IC: Independent contractor VE: Vendor Employee VO: Volunteer	VII. F
11	Non-standard employer-worker relationships	Work Status	• "The status of the worker in relation to the assignment. • Pending • Active • Inactive • Terminated"	VII. H
11	Non-standard employer-worker relationships	Work Status Reason	The employer's reason for the work relationship status.	VII.I
13	Position in employer hierarchy	Officer Indicator	Officer Indicator—Report a "1" if the individual is an officer of the company. Otherwise report a "0".	VII.J
13	Position in employer hierarchy	FLSA Indicator	FLSA Indicator—Identifies whether the worker is exempt or non-exempt under the Fair Labor Standards Act (FLSA).	VII.Y
6	Compensation, earnings, and wages	Stock Owner Indicator	Stock Owner Indicator—Report a "1" if the individual is an owner of the company. Otherwise report a "0".	VII.K
6	Compensation, earnings, and wages	Stock Owner Percentage	Stock Owner Percentage—Enter the percentage of stock ownership if greater than 5 percent.	VII.L
6	Compensation, earnings, and wages	Total Compensation Paid	Total Compensation—The total monetary amount of all cash, cash-equivalent and non-cash compensation that was paid by the employer to a worker for her or his services, for work or time off from work. Includes payments directly to the worker such as salary, hourly wages, commissions, bonuses, lump-sum, residuals, severance, tips, and incentive, piecework, and job or production-based payments, as well as the monetary value of non-cash fringe benefits paid indirectly to the worker, such as employer-paid portions of Social Security, Medicare, Unemployment Insurance, health/dental/vision insurance, retirement benefits, educational benefits, and relocation expenses, and meals and lodging provided for the employer's benefit. Total Compensation = Total Cash (Direct) Compensation (Gross Pay) + Total Non-Cash (Indirect) Compensation	IX.C
6	Compensation, earnings, and wages	Position Remuneration Basis	A code classifying the primary method by which remuneration for a position is provided or calculated. Examples include Hourly, Salaried, Salaried plus Commission, Commission Only, Salaried plus Bonus, etc.	IV.C
1	Hours worked and paid	Pay Frequency	Pay Frequency—The period of time covered by the worker's regular pay checks. 1. monthly 2. semi-monthly (twice a month) 3. biweekly (every two weeks) 4. weekly 5. daily 6. upon delivery of product 7. variable 8. other	VII.M

#	JEDx-REP DATA CATEGORY	US DATA ELEMENT	US GUIDANCE DEFINITION OR HR OPEN DESCRIPTION	US DATA ELEMENT ID
4	Employment start and stop dates and reason for separation	Date of Hire	Date of Hire—Date on which the worker was added to company payroll.	VII.N
4	Employment start and stop dates and reason for separation	First Work Date	First Work Date—The actual first date the person starts work.	VII.O
4	Employment start and stop dates and reason for separation	Contract Beginning Date	Contract Beginning Date—The beginning date of an employment contract with an independent contractor.	VII.P
4	Employment start and stop dates and reason for separation	Contract Ending Date	Contract Ending Date—The ending date of an employment contract with an independent contractor.	VII.Q
4	Employment start and stop dates and reason for separation	Probationary Status Beginning Date	Probationary Status Beginning Date—The first day of a worker's probationary status.	VII.R
4	Employment start and stop dates and reason for separation	Probationary Status Ending Date	Probationary Status Ending Date—The last day of a worker's probationary status.	VII.S
4	Employment start and stop dates and reason for separation	Seasonal Work Beginning Date	Seasonal Work Beginning Date—The beginning date of a worker's seasonal work in accordance with state law.	VII.T
4	Employment start and stop dates and reason for separation	Seasonal Work Ending Date	Seasonal Work Ending Date—The ending date of a worker's seasonal work in accordance with state law.	VII.U
4	Employment start and stop dates and reason for separation	Return-to-Work Date	The date on which a worker who had been on temporary inactive status returned to work (active status).	VII.VII
4	Employment start and stop dates and reason for separation	Last Work Date	Last Work Date—the last date on which an employee actually worked for pay.	VII.W
4	Employment start and stop dates and reason for separation	Date of Termination	Last Paid Date—Date on which the worker received final compensation.	VII.X
11	Non-standard employer-worker relationships	Union Status	Enter the appropriate letter from the list below: Y= Yes N= No	VII.Z
1	Hours worked and paid	Paid Time Period	Paid Time Period—The period of the time for which the worker was paid.	VIII.B
1	Hours worked and paid	Weeks Worked		VIII.C
1	Hours worked and paid	Total Hours Paid	Total Paid Hours = Total Hours Worked + Total Hours of Paid Leave (Paid Time Off)	VIII.E
1	Hours worked and paid	Total Hours Worked	Total Hours Worked = Regular Hours Worked + Total Premium Hours Worked	VIII.E.1
1	Hours worked and paid	Regular Hours Worked	Regular Hours Worked—The number of hours a worker actually worked, including rest periods and stand-by time, for which a standard salary, hourly rate, or other type of compensation (e.g., piece work, commission) was paid. Does not include any hours for which overtime or shift premium was paid or hours of employer-paid leave time that were used.	VIII.E.1.a

#	JEDx-REP DATA CATEGORY	US DATA ELEMENT	US GUIDANCE DEFINITION OR HR OPEN DESCRIPTION	US DATA ELEMENT ID
1	Hours worked and paid	Total Premium Hours Worked	Total Premium Hours Worked—The number of hours a worker actually worked, including stand-by time, for which a premium rate of compensation was paid. Includes overtime and hours for which shift differentials were paid such as night, holiday or weekend work. Includes hours for which compensatory time off was earned, if more than one hour of CTO was earned for each hour of actual work. Does not include any hours used of employer-paid leave time. Total Premium Hours Worked = Overtime Hours Worked + Shift Differential Hours Worked + Call-Back Hours Worked + Holiday Hours Worked + Hazardous Duty Hours Worked + Other Premium Hours Worked	VIII.E.1.b
1	Hours worked and paid	Overtime Hours Worked	Overtime Hours Worked—The number of hours a worker actually worked, beyond normal daily or weekly working hours, for which a premium rate of compensation was paid, as specified in agreement, contract, or law. Does not include any hours used of employer-paid leave time.	VIII.E.1.b.(1)
1	Hours worked and paid	Shift Differential Hours Worked	Shift Differential Hours Worked—The number of hours a worker actually worked during alternate shifts, for which a premium rate of compensation was paid. Includes hours for which compensatory time off was earned, if more than one hour of CTO was earned for each hour of actual work. Does not include any hours used of employer-paid leave time.	VIII.E.1.b.(2)
1	Hours worked and paid	Call-Back Hours Worked	Call-Back Hours Worked—The number of hours a worker actually worked after normal hours, such as during a workplace emergency, for which a premium rate of compensation was paid. Includes hours for which compensatory time off was earned, if more than one hour of CTO was earned for each hour of actual work. Does not include any hours used of employer-paid leave time.	VIII.E.1.b.(3)
1	Hours worked and paid	Holiday Hours Worked	Holiday Hours Worked—The number of hours a worker actually worked over a weekend or on a company-provided holiday when weekend and holiday work was not part of the worker's regular schedule, and for which a premium rate of compensation was paid. Includes hours for which compensatory time off was earned, if more than one hour of CTO was earned for each hour of actual work. Does not include any hours used of employer-paid leave time.	VIII.E.1.b.(4)
1	Hours worked and paid	Hazardous Duty Hours Worked	Hazardous Duty Hours Worked—The number of hours a worker actually worked in situations where individuals may be directly exposed to hazards on the job (e.g., handling explosives or hazardous chemicals), for which a premium rate of compensation was paid. Includes hours for which compensatory time off was earned, if more than one hour of CTO was earned for each hour of actual work. Does not include any hours used of employer-paid leave time.	VIII.E.1.b.(5)
1	Hours worked and paid	Other Premium Hours Worked	Other Premium Hours Worked—The number of hours a worker actually worked in other situations for which a premium rate of compensation was paid. Includes hours for which compensatory time off was earned, if more than one hour of CTO was earned for each hour of actual work. Does not include any hours used of employer-paid leave time.	VIII.E.1.b.(6)
1	Hours worked and paid	Total Hours of Paid Leave (Paid Time Off)	Total Hours of Paid Leave (Paid Time Off)—The total number of hours of employer-paid time used by a worker for any type of absence from work when used. Total Hours of Paid Leave (Paid Time Off)—Administrative Leave + Bereavement Leave + Compensatory Time Off (CTO) + Consolidated Paid Time Off (PTO) + Education Leave + Family Leave + Holiday Leave + In-Lieu-of-Notice Leave + Jury Duty Leave + Military Duty Leave + Sick Leave	VIII.E.2
1	Hours worked and paid	Administrative Leave Hours Used	Administrative Leave Hours Used—The number of hours of employer-paid leave that a worker used at the discretion or direction of the employer. Administrative Time Off is not deducted from the worker's leave balances.	VIII.E.2.a

#	JEDx-REP DATA CATEGORY	US DATA ELEMENT	US GUIDANCE DEFINITION OR HR OPEN DESCRIPTION	US DATA ELEMENT ID
1	Hours worked and paid	Bereavement Leave Hours Used	Bereavement Leave Hours Used—When the employer offers such a benefit as a separate accrued leave, the number of hours of employer-paid leave that a worker used because of the death of a family or household member.	VIII.E.2.b
1	Hours worked and paid	Compensatory Time Off (CTO) Hours Used	Compensatory Time Off (CTO) Hours Used—The number of hours of previously earned employer-paid Compensatory Time Off that was used by a worker for personal leave. Generally, CTO is granted and accrued in lieu of overtime pay for irregular or occasional overtime work.	VIII.E.2.c
1	Hours worked and paid	Consolidated Paid Time Off (PTO) Hours Used	Consolidated Paid Time Off (PTO) Hours Used—When the employer offers such benefit as a separate accrued leave, the number of hours of general-purpose employer paid leave that a worker was entitled to, and used at her/his discretion for vacations, family leave, holidays, sick leave, rest and relaxation, and other personal business or emergencies.	VIII.E.2.E
1	Hours worked and paid	Education Leave Hours Used	Education Leave Hours Used—When the employer offers such a benefit as a separate accrued leave, the number of hours a worker was paid by the employer to pursue outside, non-in-service, education.	VIII.E.2.e
1	Hours worked and paid	Family Leave Hours Used	Family Leave Hours Used—When the employer offers such a benefit as a separate accrued leave, the number of hours a worker was paid by the employer to care for a family member, including child, maternity, paternity, or elder care leave.	VIII.E.2.f
1	Hours worked and paid	Total Holiday Leave Hours Used	Total Holiday Leave Hours Used—When the employer offers such a benefit as a separate accrued leave, the number of hours a worker was paid by the employer for absence from work on days of special religious, cultural, social, or patriotic significance, on which work and business ordinarily cease. Includes public and floating holiday paid leave. Holiday Leave Hours Used = Public Holiday Leave Hours Used + Floating Holiday Leave Hours Used	VIII.E.2.g
1	Hours worked and paid	Public Holiday Leave Hours Used	Public Holiday Leave Hours Used—When the employer offers such benefit as a separate accrued leave, the number of hours a worker was paid by the employer for absence from work on publicly recognized days of special religious, cultural, social, or patriotic significance, on which work and business ordinarily cease.	VIII.E.2.g.(1)
1	Hours worked and paid	Floating Holiday Leave Hours Used	Floating Holiday Leave Hours Used—When the employer offers such benefit as a separate accrued leave, the number of hours a worker was paid by the employer for absence from work offered as a substitution for a public holiday, to be used at a worker's discretion.	VIII.E.2.g.(2)
1	Hours worked and paid	In-Lieu-of-Notice Leave Hours Used	In-Lieu-of-Notice Leave Hours Used—The number of hours a worker does not work as a result of the employer's decision not to provide a required notice of termination and for which the worker was paid.	VIII.E.2.h
1	Hours worked and paid	Jury Duty Leave Hours Used	Jury Duty Leave Hours Used—When the employer offers such benefit as a separate accrued leave, the number of hours a worker was paid by the employer for absence from work when he/she was summoned to serve as a juror.	VIII.E.2.i
1	Hours worked and paid	Military Duty Leave Hours Used	Military Duty Leave Hours Used—When the employer offers such a benefit as a separate accrued leave, the number of hours a worker was paid by the employer for absence from work to fulfill military commitments.	VIII.E.2.j
1	Hours worked and paid	Sick Leave Hours Used	Sick Leave Hours Used—When the employer offers such a benefit as a separate accrued leave, the number of hours a worker was paid for absence from work when he/she was unable to work because of a non-work-related illness or injury.	VIII.E.2.k
1	Hours worked and paid	Vacation Leave Hours Used	Vacation Leave Hours Used—When the employer offers such a benefit as a separate accrued leave, the number of hours a worker was paid for absence from work for recreation, relaxation, and rest. Paid vacations are typically provided on an annual basis and taken in blocks of days or weeks.	VIII.E.2.l

#	JEDx-REP DATA CATEGORY	US DATA ELEMENT	US GUIDANCE DEFINITION OR HR OPEN DESCRIPTION	US DATA ELEMENT ID
1	Hours worked and paid	Other Paid Personal Leave Hours Used	Other Paid Personal Leave Hours Used—The number of hours a worker was paid for absence from work for any purpose not captured in another specific type of leave authorized by the employer.	VIII.E.2.m
1	Hours worked and paid	Compensation Time Period	The period of work time for which the compensation was paid.	IX.B
6	Compensation, earnings, and wages	Salary Earned	Total salary earned for tasks and duties related to job.	
6	Compensation, earnings, and wages	Regular Hourly Wages Earned	The total compensation amount earned by an employee for the number of hours actually worked, including rest periods and stand-by time, for which a standard salary, hourly rate, or other type of compensation (e.g., piece work, commission) will be paid.	
6	Compensation, earnings, and wages	Total Premium Hourly Wages Earned	The total compensation amount earned by an employee for the number of hours a worker was engaged in a paid work activity, including regular and premium hours (overtime, shift differential), rest periods and stand-by time.	
6	Compensation, earnings, and wages	Total Leave Pay Earned	The total monetary amount earned by an employee for any type of absence from work including vacation, sickness, bereavement, maternity, family care, jury duty, education, military duty, administrative time off, sabbatical, or other personal leave. Includes compensatory time off (CTO) when used.	
6	Compensation, earnings, and wages	Total Other Cash Compensation Earned	The total monetary amount of cash or cash-equivalent (currency, coin, check, or direct deposit) compensation earned by the employee other than salary, hourly wages, and paid leave. Includes, but is not limited to bonuses, commissions, lump-sum, residuals, severance, tips, and incentive, piecework, production-based payments, and buy back of accrued leave.	
6	Compensation, earnings, and wages	Total Wages Paid Out of State	Total Wages Paid Out of State (Reported In Other Jurisdictions)—The total amount of cash (direct) compensation (gross pay) paid to the employee that is reported to other states for work done in those states.	IX.D.10
6	Compensation, earnings, and wages	State Personal Income Tax Withheld	The monetary amount withheld by the employer from the worker's pay to cover the worker's contribution to taxes.	
1	Hours Worked & Paid	Worked in Payroll Period Including 12th of the Month	A flag to indicate whether the worker worked for pay during any part of the pay period that included the 12th day of the month.	VIII.D
Organization information				
7	Capacity to link records	Legal Name	Employer Legal Name—Name of the business for all contractual purposes associated with the FEIN	I.B
7	Capacity to link records	Federal Employer Identification Number	Federal Employer Identification Number (FEIN)—also known as the Employer Identification Number (EIN) or the Federal Tax Identification Number, is a unique nine-digit number assigned by the Internal Revenue Service (IRS) to business entities operating in the United States for the purposes of identification.	I.C
7	Capacity to link records	Previous Federal Employer Identification Number	Previous Federal Employer Identification Number (FEIN)—used in cases where the enterprise was previously operated under another FEIN.	I.D
7	Capacity to link records	State Unemployment Tax Account Number	State Unemployment Tax Account Number—The identification number assigned by the state agency responsible for administration of the Unemployment Insurance Program in the state where this establishment is located.	I.E

#	JEDx-REP DATA CATEGORY	US DATA ELEMENT	US GUIDANCE DEFINITION OR HR OPEN DESCRIPTION	US DATA ELEMENT ID
12	Characteristics of the employer organization & establishment	Business Structure Type	Business Structure Type—A type of business organization that is legally recognized in a given jurisdiction and characterized by the legal definition of that particular category. For example: 1. Sole Proprietorship 2. Partnership 3. B Corporation 4. C Corporation 5. S Corporation 6. Close Corporation 7. Non-profit Corporation 8. Limited Liability Company (LLC) 9. Cooperative 10. Government	I.F
12	Characteristics of the employer organization & establishment	Operating Status	Organization Status—The current operating status of the business. 11. Open for business 12. Temporarily closed 13. Permanently closed 14. Sold, transferred to new owner	I.H
12	Characteristics of the employer organization & establishment	Operating Status Date	Status Date—Specifies the date the entity was opened for business, temporarily or permanently closed, merged, acquired, or sold.	I.I
12	Characteristics of the employer organization & establishment	Operating Status Date	Status Date—Specifies the date the entity was opened for business, temporarily or permanently closed, merged, acquired, or sold.	I.I
7	Capacity to link records	Trade Names	Organization Trade Names—A list of the names the business operates under in different locations, as opposed to the legal name of the company. Some states require trade, DBA or fictitious business name filings to be made for the protection of consumers conducting business with the entity.	I.J
2	Geocode of employer, work location & residence	Street Address	Employer Street Address—the physical address where the employer's headquarters is located.	I.K
12	Geocode of employer, work location & residence	Industry Code	Employer Industry Code—the North American Industry Classification System (NAICS) code assigned to reflect the overall company business activities, functions and principal products and services.	I.P
12	Geocode of employer, work location & residence	Business Functions	"A description of the functions performed at the location, e.g., administrative, warehouse, retail, professional services, information technology, engineering, R&D, etc."	
12	Geocode of employer, work location & residence	Principal Products & Services	Principal Products & Services—A description of the business activities conducted company-wide, listed by approximate percentage of revenue or sales associated with each activity.	I.Q
7	Capacity to link records	Parent Company Tax ID	Parent Company Tax ID—The tax ID of the parent company if this company is a wholly owned subsidiary of another company.	I.R
7	Capacity to link records	Parent Company Name	Parent Company Name—The legal name of the parent company if this company is a wholly owned subsidiary of another company.	I.S

#	JEDx-REP DATA CATEGORY	US DATA ELEMENT	US GUIDANCE DEFINITION OR HR OPEN DESCRIPTION	US DATA ELEMENT ID
Establishment information				
7	Capacity to link records	Establishment ID Number	Establishment ID Number—A numeric identifier assigned by the state agency responsible for the Unemployment Insurance Program to each physical location where the employer conducts business.	II.A
7	Capacity to link records	Establishment Name	Establishment Name—The operating name of a company at the location, as opposed to the legal name of the company. Some states require trade, DBA or fictitious business name filings to be made for the protection of consumers conducting business with the entity.	II.B
7	Capacity to link records	Federal Employer Identification Number	Federal Employer Identification Number—The Federal Employer Identification Number (FEIN), also known as the Employer Identification Number (EIN) or the Federal Tax Identification Number, is a unique nine-digit number assigned by the Internal Revenue Service (IRS) to business entities operating in the United States for the purposes of identification.	II.D
7	Capacity to link records	State Unemployment Tax Account Number	State Unemployment Tax Account Number—The identification number assigned by the state agency responsible for administration of the Unemployment Insurance Program in the state where this establishment is located.	II.E
12	Characteristics of the employer organization & establishment	Establishment Operating Level	The organizational level at which the establishment operates.	II.C
12	Characteristics of the employer organization & establishment	Establishment Industry Code	Establishment Industry Code—the North American Industry Classification System (NAICS) code assigned to reflect the-business activities, functions and principal products and services at this establishment location.	II.J
2	Geocode of employer, work location & residence	Establishment Street Address	Establishment Address—The physical street address of the establishment location.	II.K
2	Geocode of employer, work location & residence	Establishment City	Establishment City—The name of the city in which this operating establishment is located.	II.L
2	Geocode of employer, work location & residence	Establishment State	Establishment State—The two-digit alphabetic code for the state in which this operating establishment is located.	II.M
2	Geocode of employer, work location & residence	Establishment Zip Code	Establishment Zip Code—The ZIP Code in which this operating establishment is located.	II.N

Note

This table elaborates on the information provided in *Table 5*. The descriptions and definitions listed are excerpted from the JEDx data dictionary, which can be found here. The dictionary also supplies information on government programs that already collect the data elements listed above from employers.

APPENDIX G. ADVISORS TO THE JEDx-REP PROJECT

NAME	INSTITUTION	TITLE
Katharine Abraham	University of Maryland, Department of Economics	Distinguished University Professor
danah boyd	Data & Society	Founder, President
Diane Burton	Cornell University	Professor of Human Resource Studies
Ashley Edwards	Opportunity@Work	Director of Data Services
Lucia Foster	Census Bureau	Chief of Center for Economic Studies and Chief Economist
Scott Gibbons	Department of Labor	Chief Data Officer
Daniel Goroff	Alfred P. Sloan Foundation	Vice President and Program Director
John Haltiwanger	Department of Economics, University of Maryland	Distinguished University Professor
Julie Hatch-Maxfield	Bureau of Labor Statistics	Associate Commissioner for Employment and Unemployment Statistics
Carolyn Heinrich	Vanderbilt University	Patricia and Rodes Hart Professor of Public Policy
Michael Horrigan	Upjohn Institute for Employment Research	President
Jennifer Hunt	Rutgers University	Professor of Economics
Bjorn Jarvis	Australian Bureau of Statistics	Head of Labour Statistics
Christopher Kurz	Board of Governors of the Federal Reserve System	Chief of Industrial Output Section
Margaret Levenstein	University of Michigan	Director of Inter-university Consortium for Political and Social Research, Co-director of Michigan FSRDC, Research Professor
Pamela Loprest	Urban Institute	Senior Fellow and Labor Economist, Income and Benefits Policy Center
Mark Loewenstein	Bureau of Labor Statistics	Senior Research Economist
Chelsea Mason-Placek	Washington State Labor Council	Workforce Development Director
Robert McGough	State of Arkansas	Deputy State Chief Data Officer and Chief Analytics Officer, Division of Information Services
Sarah Nusser	Iowa State University and University of Virginia	Professor Emerita of Statistics, ISU & Research Professor, Biocomplexity Institute, UVA
Dana Peterson	The Conference Board	Executive Vice President and Chief Economist
Denice Ross	Office of Science and Technology Policy	US Chief Data Scientist
Jesse Rothstein	California Policy Lab	Chancellor's Professor of Public Policy and Economics Faculty Director
Rhonda Sharpe	Women's Institute for Science, Equity, and Race	Founder and President
Heidi Shierholz	Economic Policy Institute	Senior Economist and Director
Michael Strain	American Enterprise Institute	Arthur F. Burns Scholar in Political Economy and Director of Economic Policy Studies
Lars Vilhuber	Cornell University –ILR School	Senior Research Associate and Executive Director, Labor Dynamics Institute
Till von Wachter	University of California at Berkeley	Professor of Economics, Faculty Director of the California Policy Lab, Director of the Federal Statistical Research Data Center, and Associate Dean for Research for the Social Science Division
Ahu Yildirmaz	Coleridge Initiative	President and Chief Executive Officer

ENDNOTES

1 Employers submit quarterly aggregated reports to states in addition to individual UI worker wage records.

2 In 2005, the Federal REA initiative provided funds to states to reduce the duration of UI. This was to be accomplished by combining the in-person UI eligibility reviews with labor market information—among other efforts (United States President & Council of Economic Advisers, 2014, p. 278).

3 See materials from the Federal Committee on Statistical Methodology for guidance on best uses of administrative data.

4 Complementing these national actions are state and local efforts to build capacity for evidence-based policy, including work carried out at the Coleridge ADRF.

5 See https://www.congress.gov/bill/117th-congress/house-bill/4346/text

6 Note that these efforts are also related to work done by USCCF and JEDx with HR Open.

7 "Conformity assessment" is defined in ISO/IEC 170001.

8 The Year 2 report (October 2022) of the Advisory Council on Data for Evidence-Building (ACDEB) proposes an Education and Training Pilot (p. 76) for the two-year National Secure Data Service (NSDS) demonstration (authorized by Section 10375 of the CHIPS and Science Act of 2022) that aims to identify: "detailed local and national measures of the earnings and employment duration associated with post-secondary credentials"; "information about the differences in earnings and jobs between those completing credentials and those leaving before completion"; and "differences for different subgroups: race, ethnicity, sex, foreign-born, and first-generation status." The pilot also would "demonstrate the value of access to education and workforce data by state analysts and researchers."

9 For example, Canada's record of employment (ROE) contains this information, see here. Annex 2 on page 46 has an example of a Canadian ROE. The key data typically not available in the US is in box 1 and boxes 10-12.

10 Wages are paid to workers with a lag, leading to mismatches between when the period when the work took place and the compensation for that work. For example, wages paid on a monthly basis will reflect hours worked during the previous month, not during the current month.

11 The Secretary of Labor's Two Year Plan to Improve LMI, 2022 (published in mid-2022) indicates: "The Department plans to continue participating and coordinating amongst public/private efforts to enhance wage records, such as the T3 Innovation Network... . Involvement in these efforts will enable the Department to gather additional input from stakeholders... to better understand concerns about and benefits of enhanced state UI wage records, including sharing the preliminary findings and experiences of pilot states. ETA will then make a recommendation on concrete actions that it can take on behalf of the Department to advance enhanced state UI wage records..." (DOL, 2022).

12 In 2005, the Federal REA initiative provided funds to states to reduce the duration of UI. This was to be accomplished by combining the in-person UI eligibility reviews with labor market information—among other efforts (United States President & Council of Economic Advisers, 2014, p. 278).

13 This is because it comes from ACS, Social Security administrative records and individual tax returns. These are then linked to the UI earnings data (US Census Bureau, 2019).

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