Arizona Workforce Evaluation Data System

Presentation by OEO to ITAC

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Project Background
Project Description

- **Build Arizona Workforce Evaluation Data System (AWEDS)**—a computing system that matches individual-level data across education and workforce programs to analyze education and workforce outcomes.

- To be used only for **statistical purposes**:
  - Confidential Information Protection and Statistical Efficiency Act of 2002 defines statistical purpose as the use of data to describe, estimate, or analyze the characteristics of groups, **without identifying individuals or organizations** that comprise such groups
  - To be used for **evidence building** for performance management & reporting, research & analysis, and consumer information initiatives (examples are in the following slides)

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Project Background
Use Case

<u>Example use in **policy making**</u>:

- In Washington State, legislature had concerns about whether math & science teachers were leaving to work in the private sector

- Researchers identified teacher and school district characteristics associated with teachers who left for employment in other fields

- Found math & science teachers did not leave the field at a higher rate than other teachers

- Finding prompted state legislature to focus its attention on improving recruitment of math & science teachers rather than improving retention

Source: https://erdc.wa.gov/publications/washington-teachers/who-leaves-teaching-and-where-do-they-go

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<u>Example use in **workforce program performance measures**</u>:

- In Ohio, Office of Workforce Transformation uses **Ohio Longitudinal Data Archive** to calculate performance indicators for workforce programs like vocational rehabilitation

- Audience: (1) county-level policy makers & program staff, (2) state-level policy makers, and (3) Ohio taxpayers

Status of 2014-15 completers

Youth	Adult
Completers 4,187	Completers 7,695
Percent Employed 50%	Percent Employed 45%
Earnings $8,600	Earnings $9,900
Employee Retention 2013-14 67%	Employee Retention 2013-14 $66%

Source: https://workforcesuccess.chrr.ohio-state.edu

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Example use in **economic impact study**:

- In Illinois, 12-years of Community College data and 11-12 years of Unemployment Insurance wage data were combined.

- Pre- and post-education earnings gains were analyzed

- Determined that students who earned a community college degree earn over $600,000 more over their career

Source: http://www.ibhe.org/ILDS/materials/ILDSReport052815.pdf

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Project Background
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Example use in **college and career planning**:

- The Georgia Higher Learning and Earnings (GHLE) dashboard uses data from **Georgia's Academic and Workforce Analysis and Research Data System**.

- GHLE provides comparisons of wages by *degree type*, *program of study*, and *college,* one year and five years after graduation

- Following information is from selecting *Bachelors degree* in *Education* from *University of Georgia* using the online tool:
  - Median earnings are $37,573 one year after graduation and $42,541 five years after graduation.
  - There is a $4,968 increase in median earnings from the first to fifth year.
  - One year after graduation, earnings are $3,211 higher than the statewide median for Bachelor's degrees.
  - Five years after graduation, earnings are $2,758 less than the statewide median for Bachelor's degrees.

Source: https://learnearn.gosa.ga.gov/

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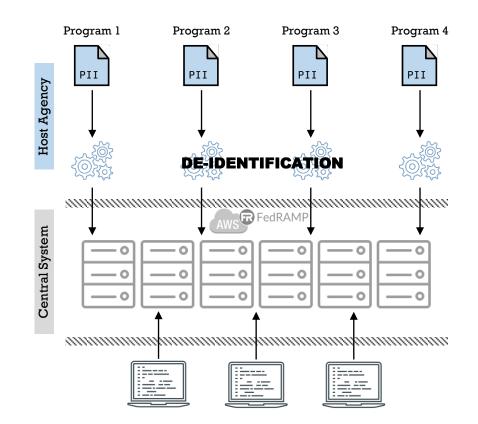OFFICE OF ECONOMIC OPPORTUNITY

Project Background
Legislation, governance & data sharing agreements

- **Workforce Data Task Force** was established by Laws 2016, Chapter 372, in the Office of Economic Opportunity to oversee development & maintenance of a **state workforce evaluation data system** (AWEDS)

- **Members of Task Force:** Director of OEO, Director of DES, Superintendent of Public Instruction, President of Board of Regents, Representative of a community college district (or designees of each)

- Task Force approved **archiving 20-years of Unemployment Insurance data** by OEO for use in AWEDS in its October 2016 meeting

- **Data Sharing Agreement between DES and OEO**, allowing archiving of UI data and its use in AWEDS, was signed in December 2016

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System Design

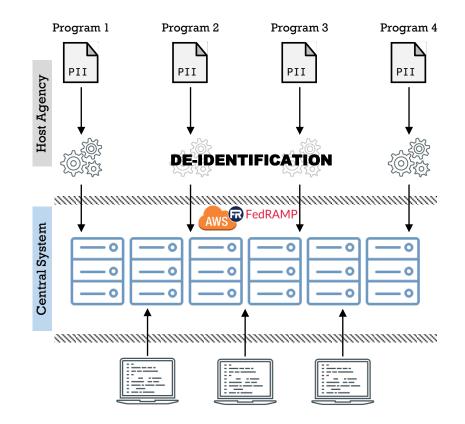**Privacy protection** and **data security** are central to the design

1. Direct identifiers are not exposed to central system operator and agency analysts

2. The pipeline for this project begins with data extracts produced from host systems

3. Before data is sent to the central system,
   - SSN is converted into a one-way cryptographic hash
   - String identifiers like names and addresses are encrypted

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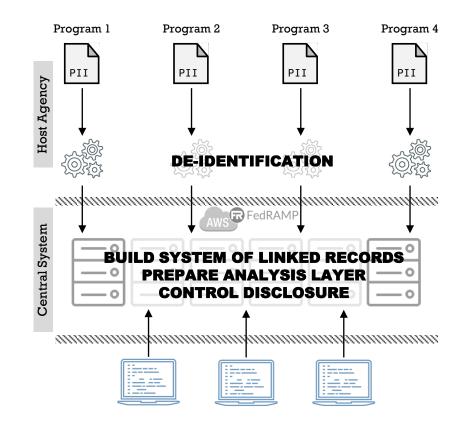OFFICE OF ECONOMIC OPPORTUNITY

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System Design

Continued…

4. Privacy-preserving record linkage is done in the central system using machine learning methods

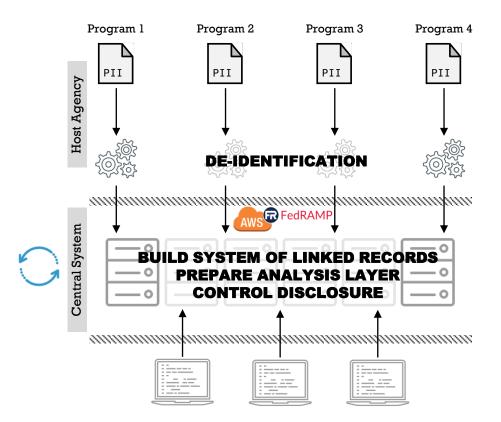5. Central system is in a **FedRAMP authorized AWS cloud environment**

System Design

Continued...

6. **Analysis layer** with system of linked records **will not have direct identifiers**

7. **Data sharing agreements** between agencies determine the **select few agency staffers** with access to the analytical layer

8. **Access control**, two-factor authentication etc. will be used for access to the system

9. All reports and summary data will go through the Task Force **data governance** for **security review** before release

10. Security review will include statistical **disclosure control** to minimize inferential disclosure in summary data

System Design

No long term storage of data:

- Central system is constructed once a quarter

- Checked for vulnerabilities, penetration tested and patched before data flows into it

- After the analysis period (a few weeks), system is scrubbed securely

Selection Process

- Exploratory discussions in 2016 with University of Arizona, ASU, Virginia, Nevada
- RFP was posted on April 14th, 2017
- Evaluation panel created with representation from OEO, DES & Maricopa County Community College District
- Bids were opened on May 17th, 2017
- Received 5 offers:
    1. Accenture LLP
    2. Andrew J. Wong Inc.
    3. CenturyLink Communications, LLC
    4. Deloitte Consulting LLP
    5. The Nerdery, LLC
- Awarded contract to The Nerdery on October 26th, 2017

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Selected Vendor
The Nerdery

- Founded in 2003

- Over 400 people representing deep expertise in **data science, engineering, strategy, and design** delivering complex solutions at enterprise scale.

- Works on-site and from their offices in **Phoenix**, Chicago, Minneapolis, and Kansas City

Selected Vendor
The Nerdery

Noah Kunin—Compliance & Security Lead

- Over 15 years as a technologist, including **8 years with the US Government**, where his work included the **development of cloud.gov**

- **Significant contributor to FedRAMP** initiatives and implementing the Trusted Internet Connection (TIC) policy in the cloud

- **Founding Member of the Consumer Financial Protection Bureau's (CFPB) Technology Team**, serving as a Technology Portfolio Manager

- **Founding Member of 18F**, the General Services Administration's (GSA) government-wide digital agency, serving as the Infrastructure Director

- Regulatory Compliance
- Information Security Best Practice Implementation
- Risk Management
- Cloud Data Management

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Selected Vendor
The Nerdery

Chad Dvoracek—Data Architect

- **Domain lead for Data Services** at The Nerdery
- Directed the evolution and growth of the data services best practices for **clients 3M and Infor**.
- **Domain expert providing thought leadership** for industry growth as a key presenter at MinneAnalytics and Device Talks Minnesota
- **Master of Science in Data Science** from the University of St. Thomas
- **Graduate Certificate in Big Data**

- Cloud Architecture
- Big Data & Distributed Systems
- Databases
- Data Analysis & Visualization
- Data Mining & Machine Learning

Selected Vendor
The Nerdery

Brandon Veber—Data Scientist

- Leads data science practice focusing on enhancing The Nerdery's capabilities in **record linkage, algorithmic transparency, recorded masking, predictive modeling**, etc.

- Lead on many customer projects aimed at reducing manufacturing waste through the **evaluation and implementation of machine learning**.

- **Published numerous data science publications**

- **Master of Electrical Engineering with a specialization in Machine Learning**

- Data De-identification & Masking
- Data Evaluation & Visualization
- Data Transformation & Record Linkage
- Signal Processing & Relational Database
- Predictive Modeling & Trend Analysis

Project Costs

- AWEDS **development cost**: $4,685,400
  - Don't have comparable costs from states for systems that have been built & enhanced over many years
  - Table below has **grants received by states** from Education & Labor departments to implement and expand their systems (**state funds used for these systems are not included**)

Grants Received for Building/Enhancing Systems With Similar Scope

Grantees	SLDS FY12[a]	WDQI 2011[a]	WDQI 2012[a]	WDQI 2014[b]	WDQI 2015[b]
Hawaii	$3.4M[(PS/W)]		$1M		
Idaho	$3.1M[(PS/W)]		$1M		
Iowa	$3.7M[(PS/W)]	$1M			
Maryland	$4M[(PS/W)]	$1M			
New Jersey	$4M[(PS/W)]		$1M	$1M	
North Dakota	$3.9M[(PS/W)]	$1M			
Rhode Island	$4M[(PS/W)]		$1M		$1M

[a] **Figures from national center for education statistics: https://nces.ed.gov/programs/slds/pdf/SLDS_WDQI_Table.pdf**
[b] **Figures from U.S. Department of Labor: https://www.doleta.gov/performance/workforcedatagrant_rounds_Archive.cfm**

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Project Costs

- AWEDS **operational cost**: $720,000 per year

- Costs for similar systems:
  - University of Chicago: $750,000 per year[a]
  - Ohio State University: $800,000 per year[b]

- Additional costs not shown here include agency staff time

[a] Workforce Data Quality Campaign publication: http://www.workforcedqc.org/sites/default/files/images/WDQC-Tapestry-Brief.pdf
[b] National Association of State Workforce Agencies report: https://wdr.doleta.gov/research/FullText_Documents/ETAOP-2017-13_Evidence_Building_Capacity_in_State_Workforce_Agencies_Report.pdf

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