U.S. Department of Labor (DOL)'s Analytics Platform: Driving Cultural Change By Leveraging Data as a Strategic Asset

Christina Yancey, *Chief Evaluation Officer, DOL*
Scott Gibbons, *Chief Data Officer, DOL*
David R. Judkins, *Principal Scientist, Abt Associates*

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Chief Evaluation Office
U.S. DEPARTMENT OF LABOR

Presentation Agenda

- Christina, DOL Chief Evaluation Office
  - **Introduction And Context**
- Scott, DOL Chief Data Officer
  - **Challenges and Solutions**
- David, Principal Scientist-Abt Associates
  - **External user perspective**

Introduction: Evidence Act and DOL

- Chief Evaluation Office established in 2010 to coordinate, manage, and implement the DOL evaluation program, with 2 operating units:
  - **Evaluation**
    - Plan and oversee research studies (3rd party contractors)
    - Disseminate/publicly post findings and work with stakeholders to incorporate evidence
  - **Data Analytics**
    - Directly conduct analysis of extant administrative data
- Evidence Act builds on existing momentum

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DOL's Co-Location of Analytics and Evaluation

- **Culture of collaboration and innovation**
  - Learning agendas, projects, capacity building
  - Evaluation perspectives inform analytics
    - Analytics driven by research questions
  - Analytics perspectives inform and benefit evaluation
    - QA/QC analytic work informs thinking on evaluation suitability
- **Not just intersection of interests, co-evolution**

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Case Study for Using Administrative Data at DOL

Analytics platform as tool for-

1. Accessing and combining federal data
   - Repeatable secure data transfers, storage, analysis
   - Generalizable risks and requirements (statutory provisions, security protocols, MOUs)
   - Culture change to build capacity for leveraging data for multiple purposes
2. Evaluator analysis
   - Nimble external user access
   - Varied requirements for tools

Challenges In Leveraging Data As A Strategic Asset

- Resistance to data sharing, rigorous evaluation
- Data are collected as a by product of programs
- We have had little IT consolidation, no governance
- No enterprise analytic framework, tools are ad hoc
- No enterprise emphasis on data-informed decisions
- DOL has trouble retaining Data Scientists
- Staff are often not trained in analysis

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Challenges In Leveraging Data As A Strategic Asset

Decision

- Co-develop a dynamic analytical sandbox
- Focus on practical evaluation, analytics use cases
- Select technology consistent with mission, vision, goals, and methods
- Development driven by stakeholders, users
- Feedback loops between collaborative work with agencies and architecture, tools

Challenges In Leveraging Data As A Strategic Asset

Solution:

- **An internal analytical hub that co-locates data and tools**
- **Containerization to rapidly prototype new capabilities**
- **Iterative development of platform components**
- **DevSecOps, Registries maintain variation in tooling**
- **Open source tools to keep costs low**
- **Leverage benefits of user communities**

Addressing The Cause, Not The Symptoms

Q: What do the Evidence Act, FDS asks us to do?

A: Build culture, capacity to leverage strategic value in data

- **Addressing symptoms is easy but addressing the root cause is more complicated.**
- **We need to be honest about limiters, and appropriately design and build services and tools**
- **Federal IT culture makes it challenging to innovate**

We aim to build capacity that:

- **Rather than limiting staff, enables innovation, creativity, and testing feasibility of new ideas**
- **Generates products that resonate with our staff and leaders**
- **Disrupts in a "good" way: supports staff, maintains trust relationships with leadership**
- **Consistent with the change and evolution we seek to create**

Addressing The Cause, Not The Symptoms

Concern # 1: Resistance to data sharing / MOU issues

Approach: Technical challenges < legal, admin issues

- All data are now local, directly controlled
- Bringing researchers in rather than sending data out
- Less time with legal, parochial data mgmt. issues
- Develop comfort, trust with the process
- Cultural Change -> Common Enterprise process
- Example: CEO manages outcome data from NDNH

Addressing The Cause, Not The Symptoms

Concern # 2: No enterprise analytic framework, tools

Approach: Leverage analytic, evaluation work to inform effort

- **Fill that need in ways customers are asking for.**
  - **Embrace CD/CI and varying tool sets, containerization, high frequency deployment, open source analytics tools**
- **Concurrent provisioning of proprietary software for more users**
- **Cultural Change -> Increase in experimentation; less attrition;**
- **Benefit-> Better analytics, science, cost effectiveness, efficiency**
- **Example: Use DevSecOps, Registry to host variations on one tool**

Addressing The Cause, Not The Symptoms

Concern # 3: Limited Staff Skills

Approach: Leverage tools with amazing COPs

- Abundant training templates for open source tools
- Have software champions provide template code
- Training sessions with template code in all platforms
- PUDF repos with code to ingest, weight, benchmark
- Cultural Change -> Why reinvent what works well?
- Faster prototyping; easier experimentation; more trust
- Many of our new services come from ideas on blogs

Addressing The Cause, Not The Symptoms

Concern # 4: Limited use of data to inform programs, planning

Approach: Collaborative work is key to building capacity

- Leverage sandbox to host capacity building efforts
- Bring program staff into process through research questions
- Ensure analysts understand constraints of data product users
- Ensure that program staff understand what is possible
- Develop mutual understanding of goals, methods, constraints
- Exposure to iterative approach builds trust and comfort
- Cultural Change -> Successful elimination of real barriers

Addressing The Cause, Not The Symptoms

Concern # 5: Transitioning to Data Science

- **Advocating person-autonomous, repeatable, consistent**
- **Integrating tools like git, ETL, governance**
- **Training tools is also communicating expectations**
- **Cultural Change -> Transitioning staff to better science, better workflows, more rigor, more transparency**

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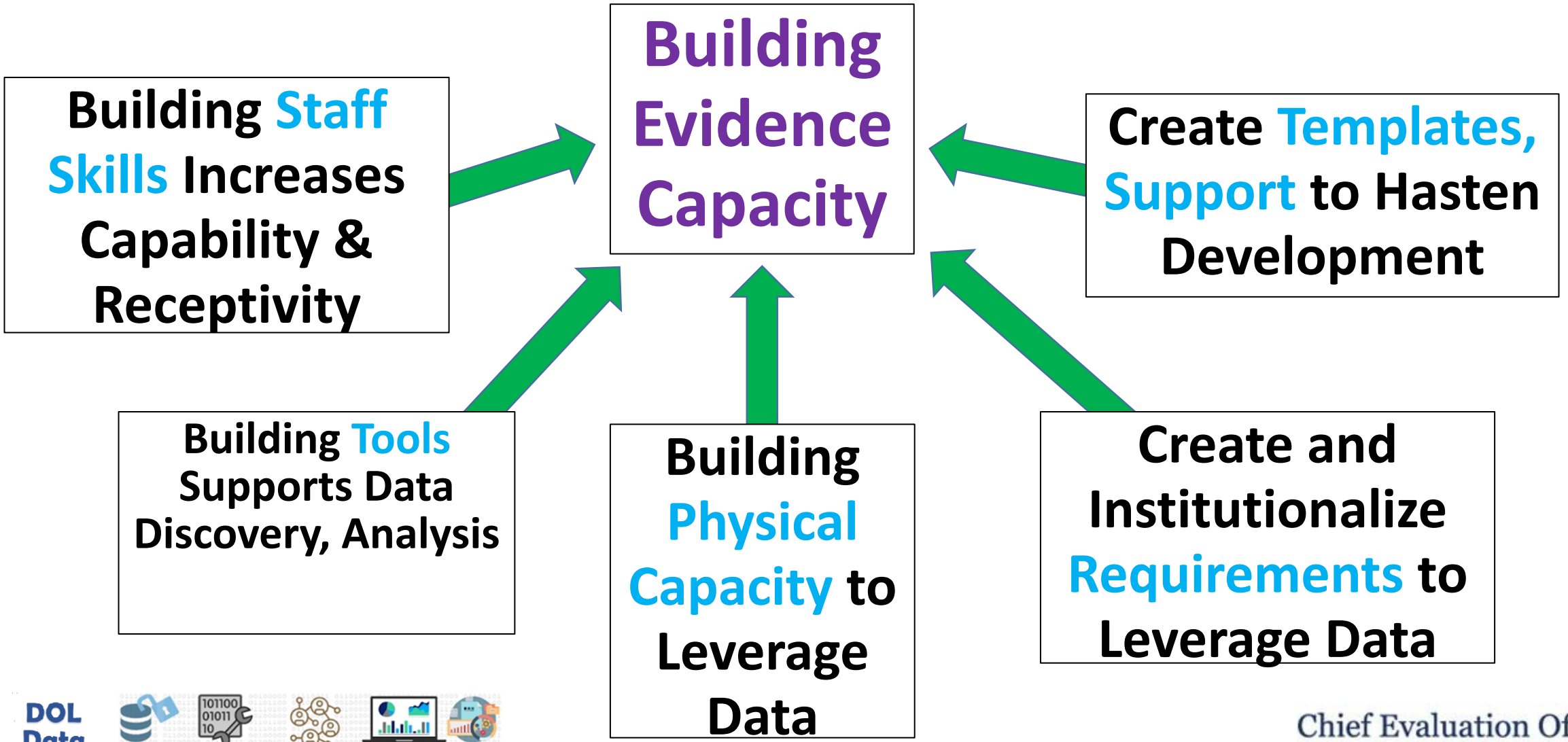
What Is It That The Evidence Act Asks Us To Do?



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What Is It That The Evidence Act Asks Us To Do?

Analytics capacity is supporting research and evidence

- **Leading culture change; building trust & receptivity**
- **Using favorable experiences with analytics to push towards more rigorous efforts**
- **Bringing value to the enterprise:**
  - **Using analytics to test data for evaluation suitability**
  - **Familiarizing users with the methods**
  - **Proceed up the cascades from descriptive > QED > Causal?**
- **As analytics integrate data into decisions, it lays the groundwork for greater use of evidence in planning, policy**

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DEAP: The User Experience

FCSM 2020

Using Data in New Ways: Leveraging the Evidence Act to Coordinate Evaluation, Statistics and Policy

Research needs

- Both SAS and RStan
- SAS for frequentist analyses
- RStan for Bayesian analyses
- Highly secure processing environment to tabulate data from employer UI tax forms

Why Bayesian?

- Reporting training outcomes for each of 34 programs
- Sample sizes too small at many of these to serve as a useful guide for likely performance of future trainee cohorts
- Bayesian methods specifically designed for this task, including variance estimation
- Similar to small-area estimation in federal surveys

Why RStan?

- Very flexible priors, very flexible models, and post-model processing (e.g., aggregation of individual predictions into program-level means)
- Blistering speed thanks to Hamiltonian Monte Carlo (no U-turn sampling)
- 10-20 times faster than Stata despite use of less congenial priors (most advanced method is blocked Metropolis-Hastings sampling)
- Much easier to program than Bayesian procedures in Stata (at least for my star collaborator, Stas Kolenikov)

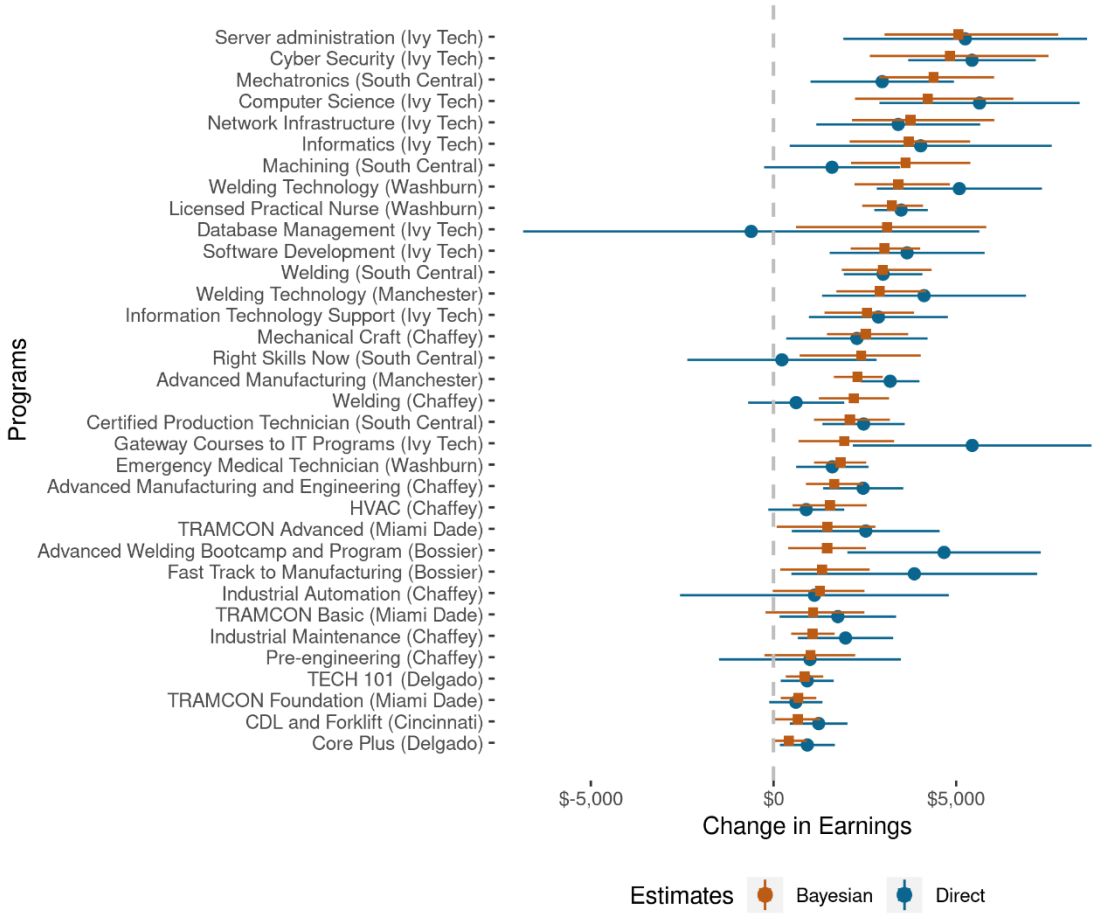
But…

- RStan achieves it speed and flexibility thanks to run-time compilation with a C++ compiler
- This compiler triggers anti-malware software on most systems that prevents successful compilation
- Scott and his collaborators developed a great safe environment with containerization. C++ compilers are dangerous to system security, but with the container approach, we cannot break out and compromise DOL server system

Smooth flexible operations

- With RSA security, workers with proper clearance can use DOL laptops from home
- No need for visits to a research data center
- No need even for locked rooms on contractor premises
- Vetted users are responsible for ensuring that downloaded tabulations and models do not compromise data confidentiality

Beautiful results



Contact

David Judkins

Principal Scientist

David_Judkins@abtassoc.com

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