Exposure Records & Data-Driven Decision-Making

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Occupational & Environmental Health (OEH) Surveillance and Exposure Records

Occupational and Environmental Health (OEH) Threats

Defense OEH Readiness System (DOEHRS-IH)

- Force Health Protection/Preventive Medicine system of record for OEH surveillance
- Occupational Health
  - Shop → Process → Hazards → Controls
  - Similar Exposure Group (SEG): May differ by frequency and duration (e.g., Active vs. vs. Reserve)
  - Models → Samples → **SEG Assessments** (i.e., exposure profile compared to action level or limit)
- Environmental "Exposure Pathway": Source, Exposure Route, Population
  - Air, Water, Soil Samples
  - Ambient monitoring = **POTENTIAL** for exposure
  - **Population-level assessments**
- Incident Reports – Non-routine, short-term exposures
  - Natural disasters, accidents, intentional attacks
  - Assign responders and bystanders to **potentially exposed populations (PEPs)**
  - May include workplace events, and not just "lights and sirens" responses (e.g., small spill clean-up)

Note: DOEHRS-IH is also the source for POEMS and Exposure Registry data, but these are managed at the Service level

Individual Longitudinal Exposure Record (ILER) System

- Compiles, collates, and presents exposure data in an **individual-centric** format
- Intended to represent the complete record of service-related exposures and to serve as an authoritative data source for OEH surveillance data
- In use by VA providers and claims adjustors since 2021
- DHA providers now have by-patient access through MHS Genesis
- Epidemiologists can create custom **cohorts for studies/research**

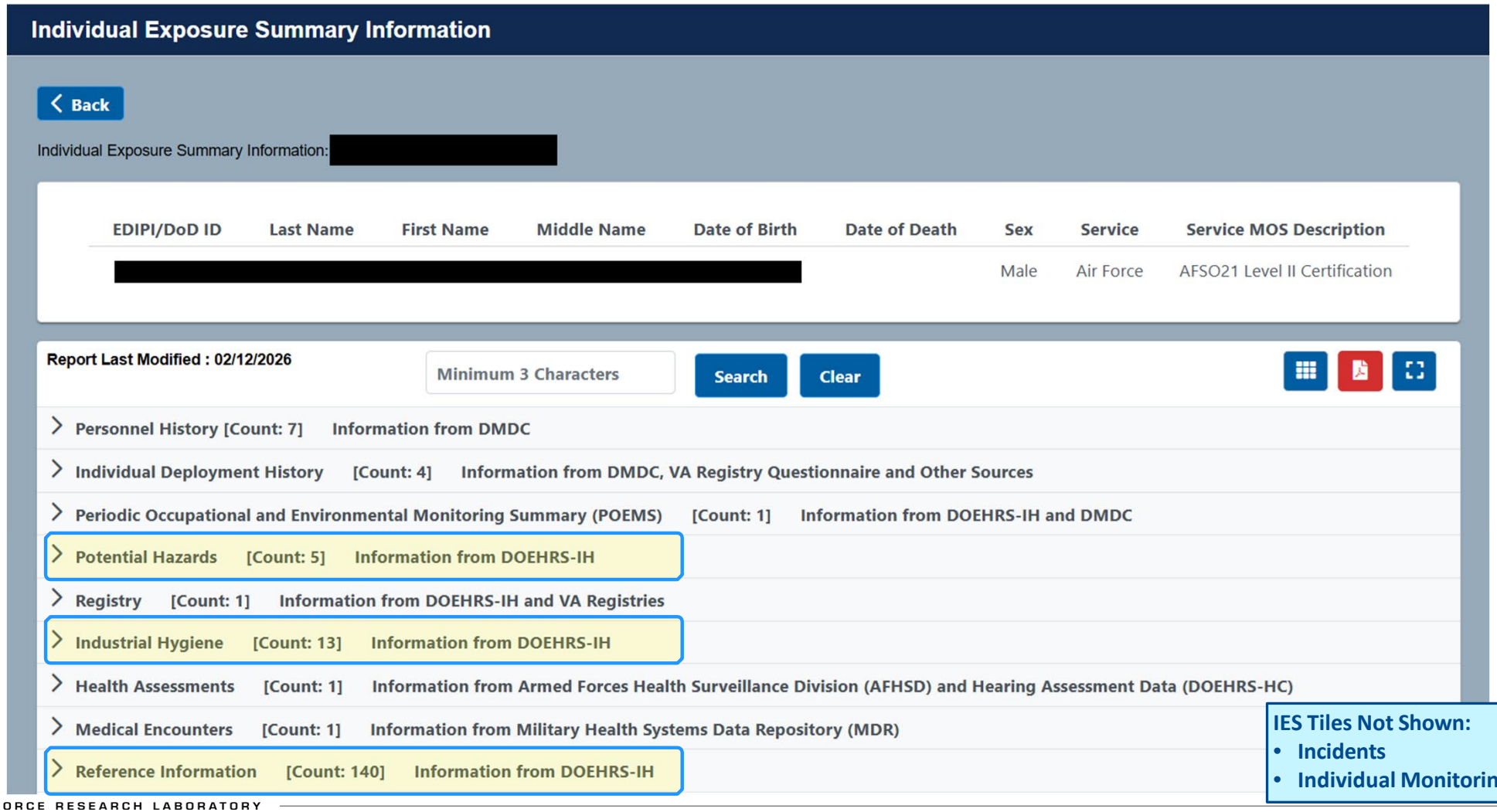
- **Individual access** will be available to **CAC-holders** by 31-Mar-26

https://iler.csd.disa.mil/

Presence of a Chemical or of an Infectious Disease Agent in a Location ≠ Exposure

Exposure ≠ Dose

Dose ≠ Infection, Injury, or Disease



IES Tiles Not Shown:
- **Incidents**
- **Individual Monitoring**

ILER Individual Exposure Summary

- Approximately 11.8M exposure summaries available
- Compiles the *most clinically relevant* data (i.e., diagnoses that might be exposure-related)
- Highlights relevant data and information about exposures when thresholds exceeded

For *POEMS*, *Potential Hazards*, and *Reference Info* tiles, ILER attempts to match each duty station/deployment to a location in DOEHRS

*** Exposure records from DOEHRS-IH**

Base-level OEH documentation

IES Tile/Section	Description
Personnel History	Garrison assignments as reported to DMDC by Service
Individual Deployment History	Deployments as reported to DMDC by Service
POEMS *	Periodic Occ & Env Monitoring Summary for deployed **locations**
Potential Hazards*	**Environmental monitoring for garrison/deployment locations**
Industrial Hygiene*	**Occupational exposures for assigned workplaces/processes**
Health Assessments	• Annual and Pre-/Post-Deployment Health Assessments • "Latest NON-resolved" hearing test with a threshold shift
Registry *	**DoD and VA registry enrollment**
Incidents *	**Exposures where the individual was assigned to a PEP in an incident report**
Individual Monitoring*	**Blast overpressure (BOP) and impulse noise sensor data (NEW)**
Medical Encounters	A limited dataset of potentially exposure-related diagnoses from CAPER, TMDS, SIDR, and MHS Genesis
Reference Info *	**Document library uploaded for garrison/deployment locations**

Data Sources that Feed ILER

Current Database/Source
DOEHRS-IH
DOEHRS – Hearing Conservation **(DOEHRS-HC)**
Defense Medical Surveillance System **(DMSS)**
Defense Manpower Data Center **(DMDC)** Feed
Medical Data Repository **(MDR)**
VA Registries (e.g., Agent Orange, Gulf War, Ionizing Radiation)
DoD Registries (e.g., Gulf War Oil-Well Fires, Chemical Warfare Agents, Airborne Hazards & Open Burn Pits, DU/Toxic Embedded Fragments)
Armed Forces Health Surveillance Div. (**AFHSD**)

Upcoming System Interfaces (FY26-27)*:

- VA Oracle Health (Electronic Health Record)
- VA Clinical Data Repositories **(VA-CDR)**
- VA Health Data Repository **(HDR)**
- HAZMAT Information Resource System **(HMIRS)**

On Deck – Waiting for Additional Information*:

- Explosive Ordnance Disposal Management Information System (EODMIS) – *Planned*
- Joint Pathology Center – *Defining Technical Approach*
- Radiation Dosimetry Data
- Joint Hearing Loss and Auditory System Injury Registry **(JHASIR)**
- Separation Health Assessments

** From ODASW for Health Readiness Policy & Oversight (HRPO)/ OASW Health Affairs (HA) slides (5-FEB-26)*

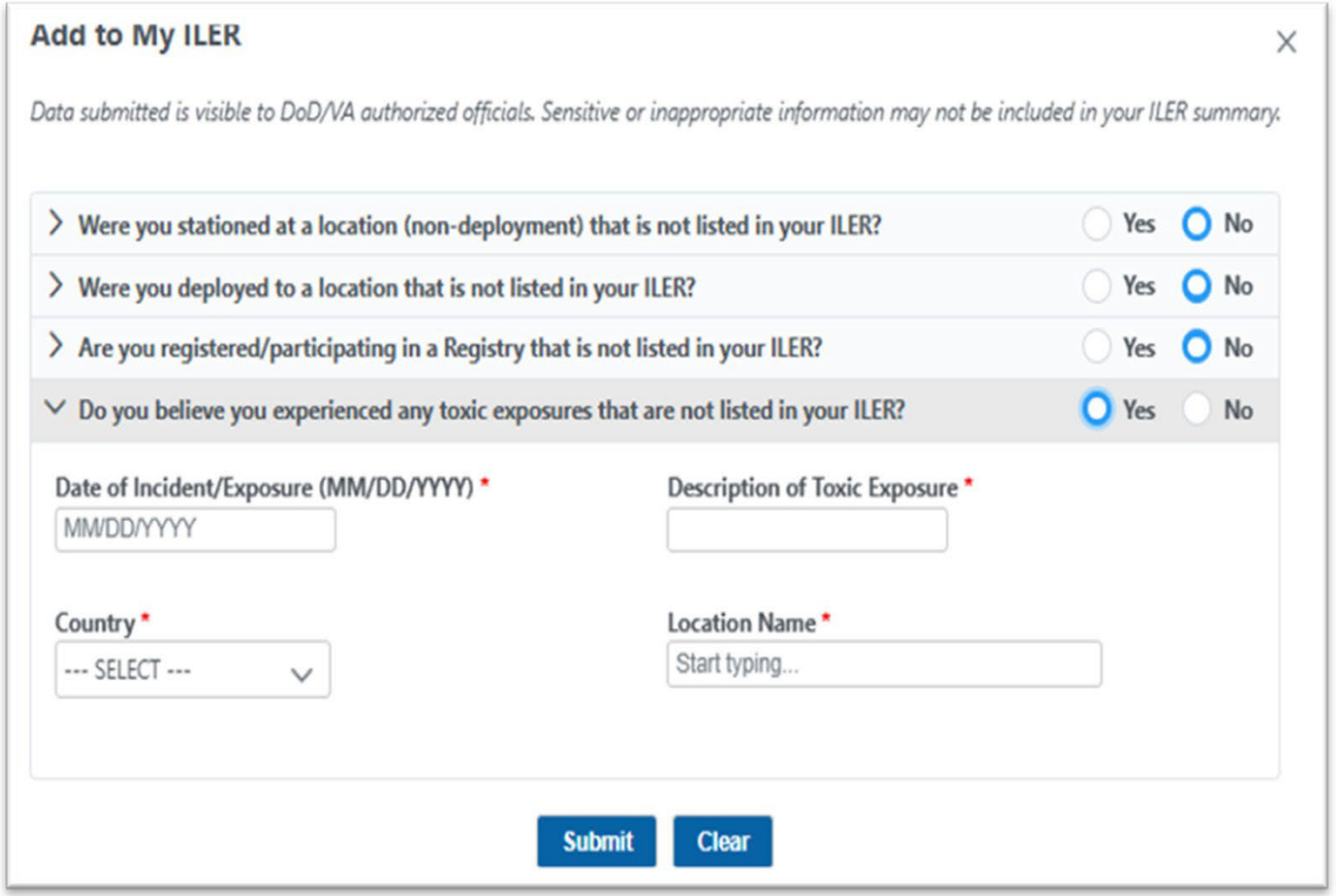
ILER Limitations

- OEH data is collected where/when Preventive Medicine support is available
- No data for classified locations/operations
  - The **SIPR Military Exposure Surveillance Library (MESL)** is available separately
  - The NIPR MESL became the DOEHRS Document Library
- DOEHRS modules were implemented at **different times** (2008-2014), then had <u>many</u> significant **system changes** over 15+ years – and still more in progress
- **Differing, evolving policies/procedures** within/between Bases / Commands / Services
- ILER output is a combination of queries/reports designed by IT teams; OEH functionals **continue to QA data and request changes/corrections**
- ILER **"location matching"** depends on unit zip code or deployment GPS from DMDC
- ILER is still in active development – **"Building the plane while flying it"**

ILER Self-Reporting

"**Add to My ILER**"

- Garrison assignments
- Deployments
- Registry enrollment
- **Toxic Exposures**



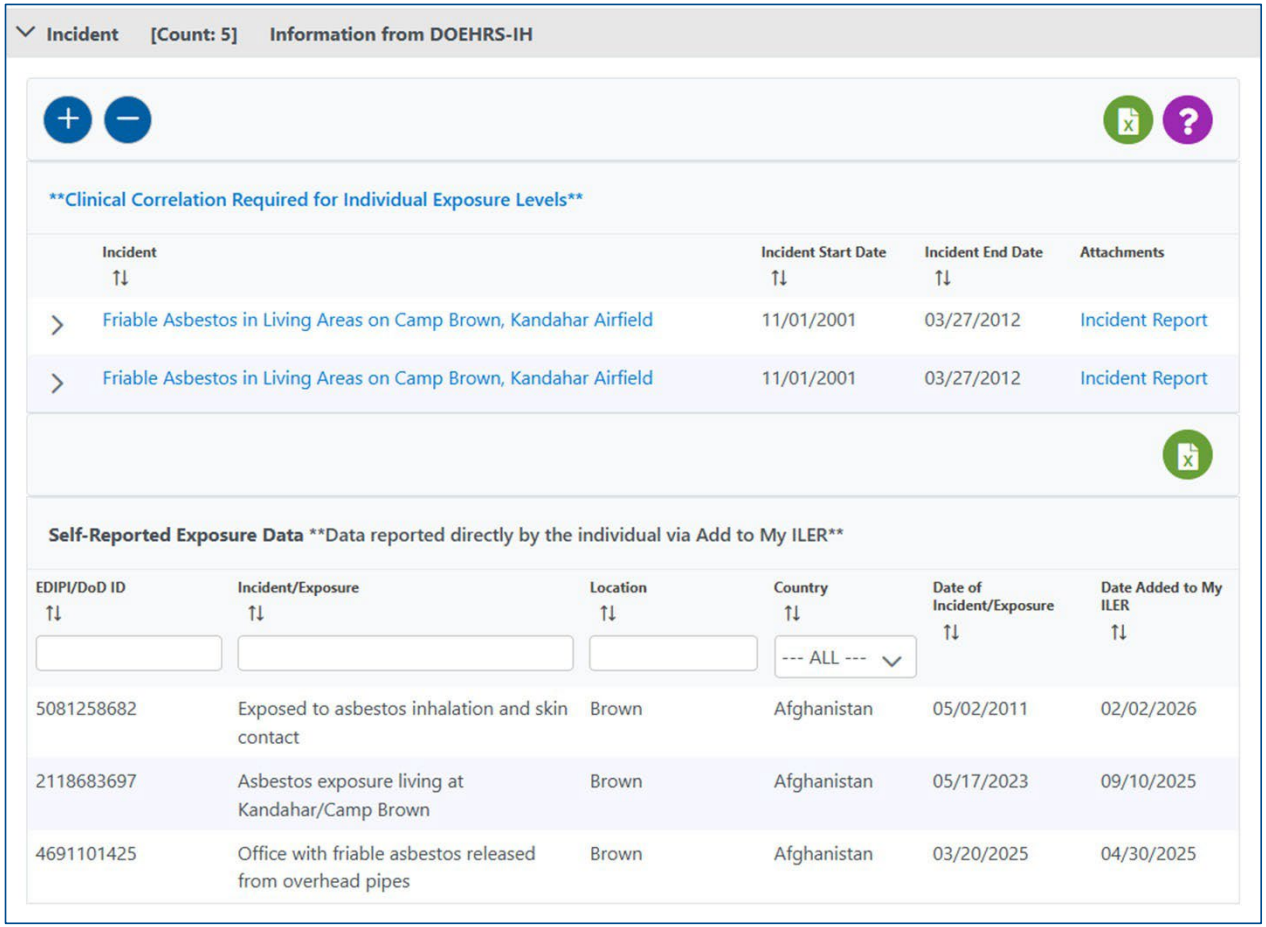
ILER Self-Reporting

Data directly from DOEHRS-IH

(Incident tile used as example)

Self-Reported Exposure Data

- Language specifies "*Data reported directly by the individual via Add to my ILER*" function
- No Incident Reports available on self-reported data, as this data has not been verified



Incident [Count: 5] Information from DOEHRS-IH

Clinical Correlation Required for Individual Exposure Levels

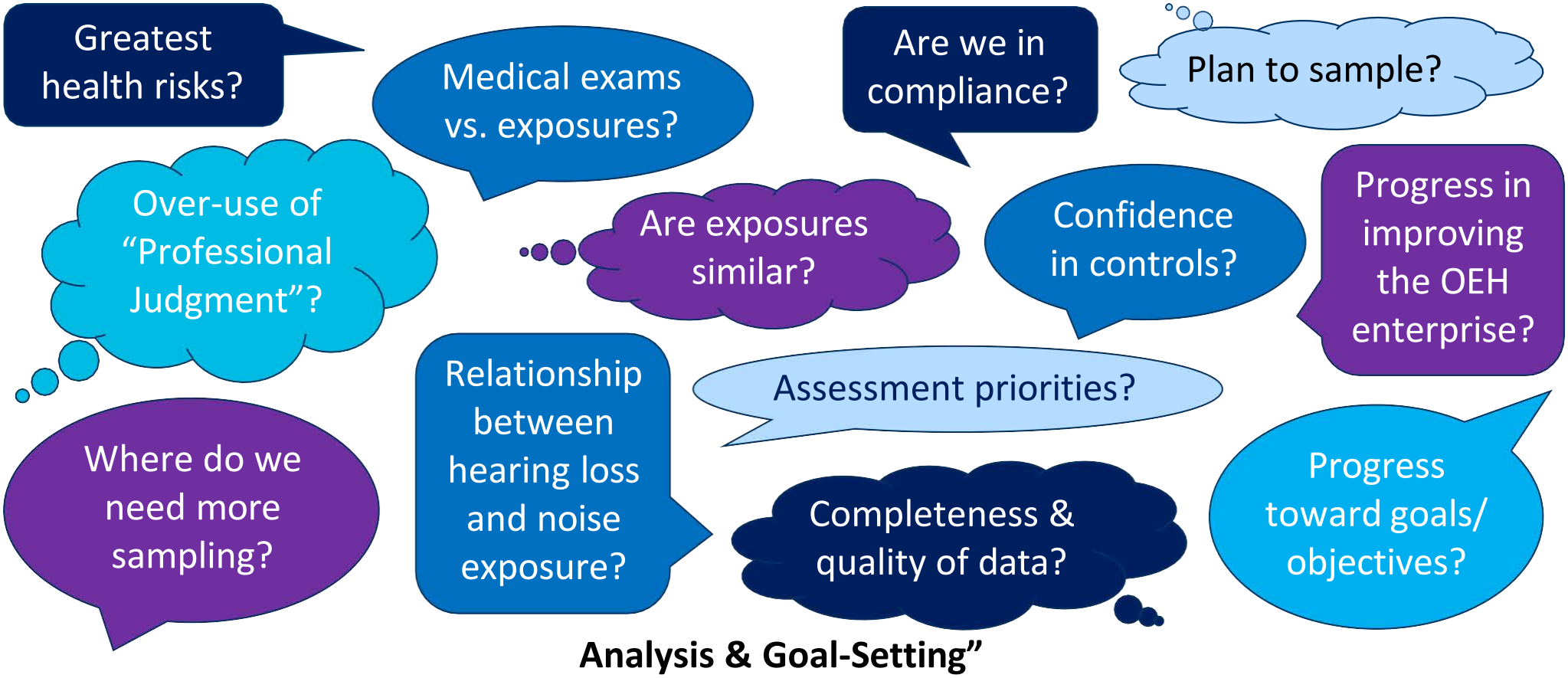
Incident	Incident Start Date	Incident End Date	Attachments
Friable Asbestos in Living Areas on Camp Brown, Kandahar Airfield	11/01/2001	03/27/2012	Incident Report
Friable Asbestos in Living Areas on Camp Brown, Kandahar Airfield	11/01/2001	03/27/2012	Incident Report

Self-Reported Exposure Data **Data reported directly by the individual via Add to My ILER**

EDIPI/DoD ID	Incident/Exposure	Location	Country	Date of Incident/Exposure	Date Added to My ILER
			--- ALL ---		
5081258682	Exposed to asbestos inhalation and skin contact	Brown	Afghanistan	05/02/2011	02/02/2026
2118683697	Asbestos exposure living at Kandahar/Camp Brown	Brown	Afghanistan	05/17/2023	09/10/2025
4691101425	Office with friable asbestos released from overhead pipes	Brown	Afghanistan	03/20/2025	04/30/2025

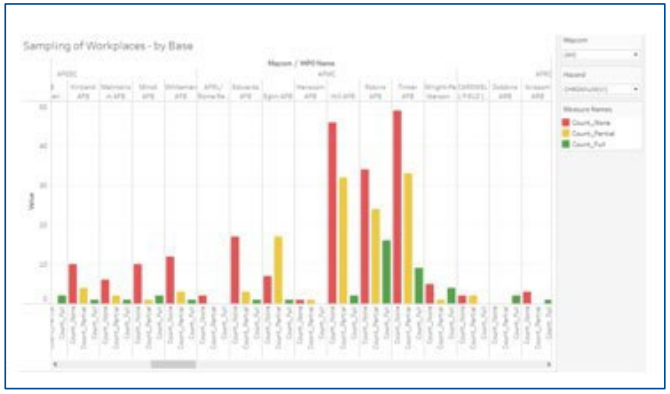
Why OEH Data Analytics?

Occupational & Environmental Health Data Analytics

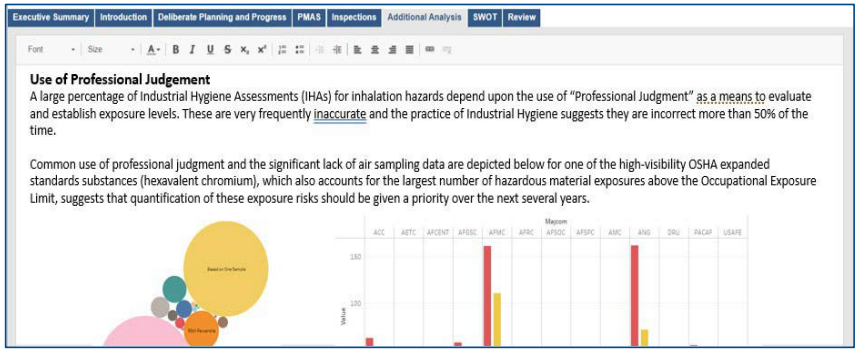


Analysis & Goal-Setting"

Current Product Lines – Data Analytics & Transformation

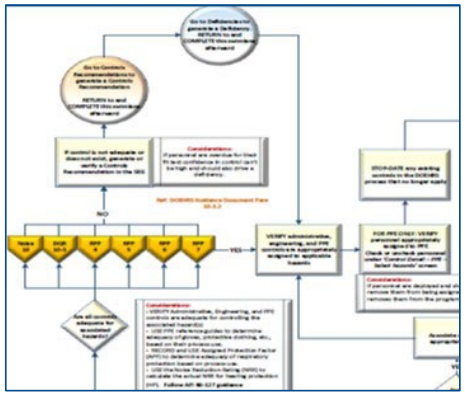


OEH Data Processing, Analytics, & Dashboards



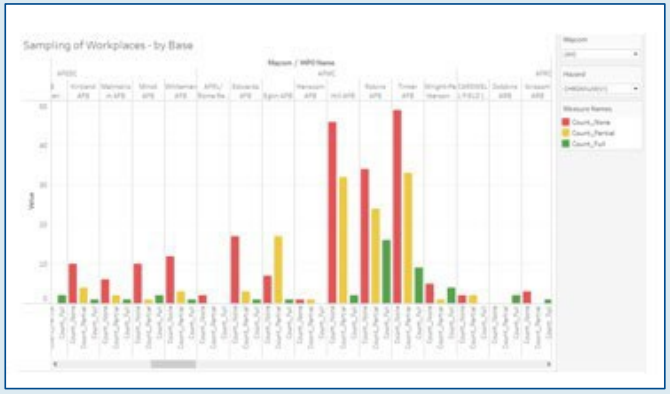
Program Management Review (PMR)

Program Maturity Audit System (PMAS)

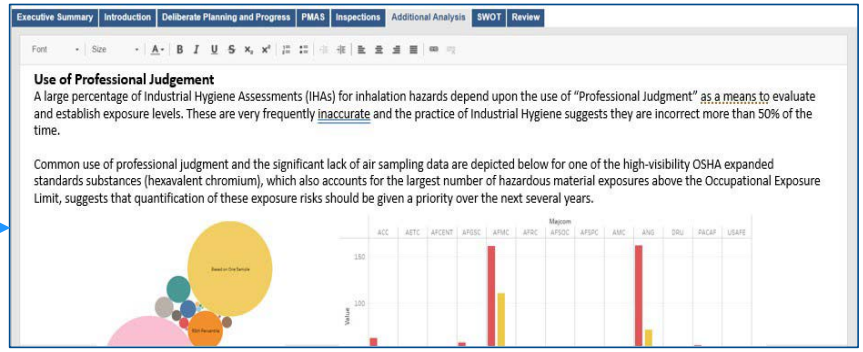


Risk Assessment Methodology

Current Product Lines – Data Analytics & Transformation



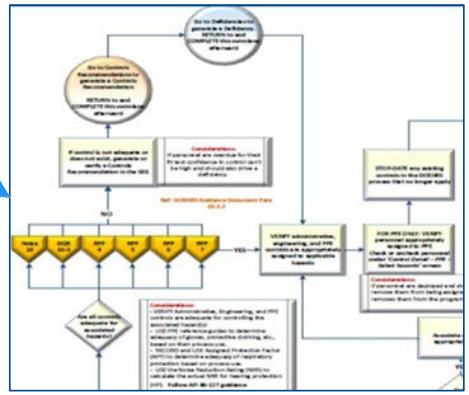
OEH Data Processing, Analytics, & Dashboards



Program Management Review (PMR)

Installation Data Quality

Program Maturity Audit System (PMAS)

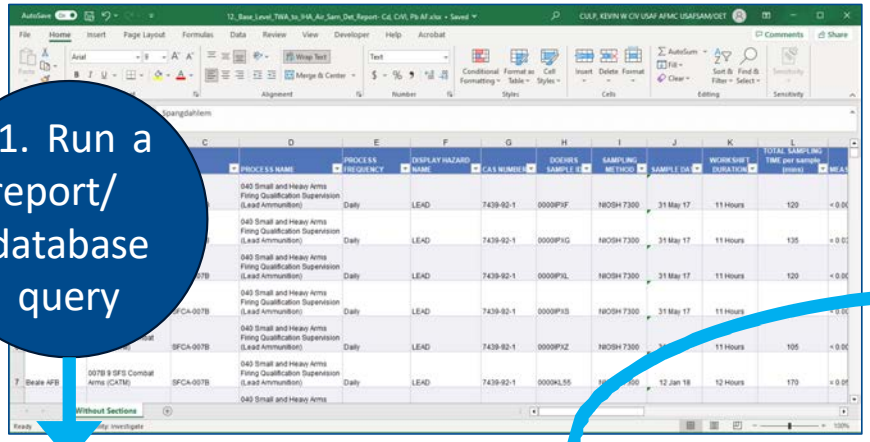


Risk Assessment Methodology

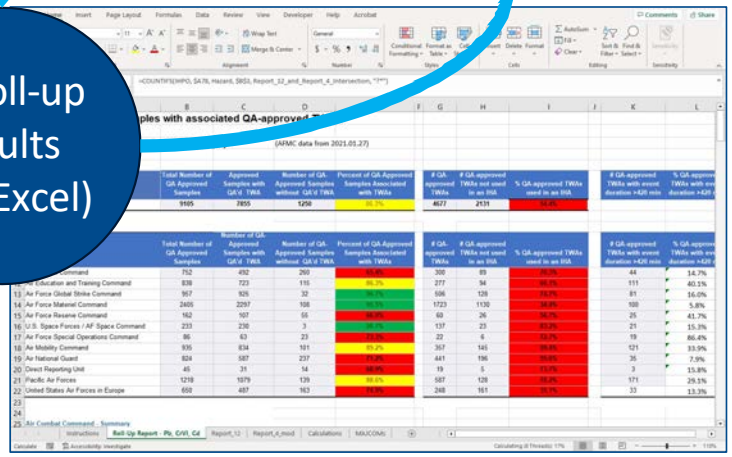
The Process

Analytics Process - The Old Way

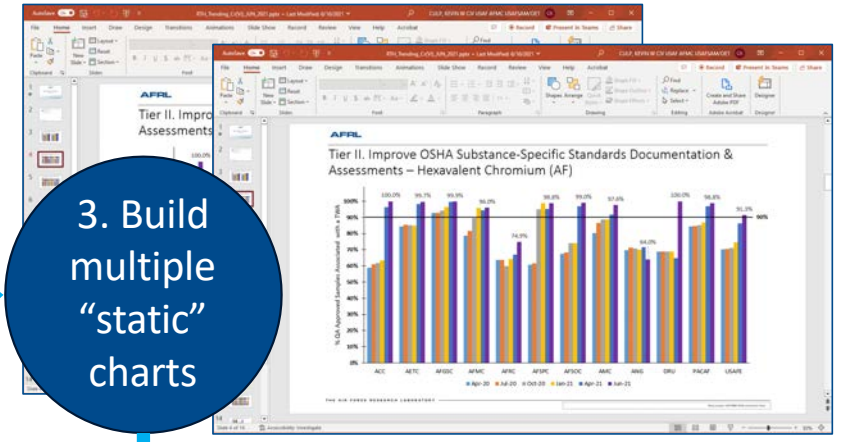
1. Run a report/ database query



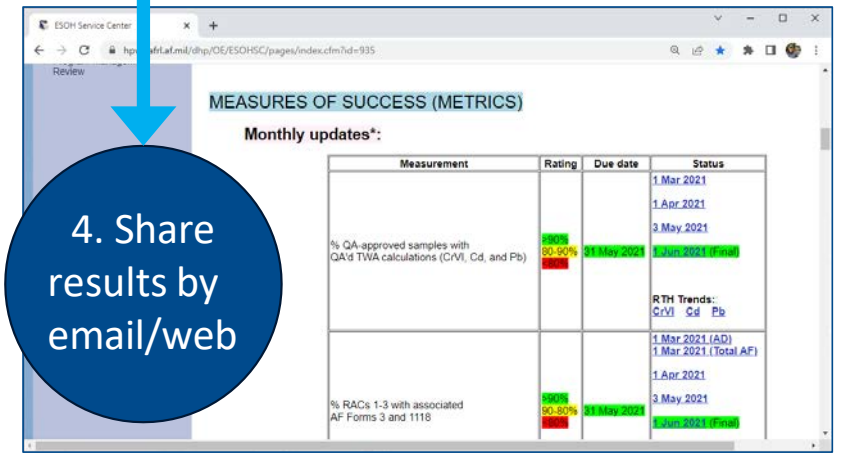
2. Roll-up results (MS Excel)



3. Build multiple "static" charts



4. Share results by email/web



New Tools of the Trade

```
def processData(input_df, output_df, report_date, value_limit):

    # Loop through the data set to count FULL/PARTIAL and number of days
    # since latest sample, by shop-hazard

    rows_total = len(output_df.index) # Total number of unique shop-hazards
    i = 0

    while i < rows_total:

        current_shop = output_df.iloc[i]['SEG ID']
        current_hazard = output_df.iloc[i]['Hazard']
        shopHazard_df = input_df.query("`SEG ID` == @current_shop and \
            Hazard == @current_hazard").reset_index()

        samp_count = len(shopHazard_df)
        num_full = len(shopHazard_df[shopHazard_df['Total TWA Sample Time'] >= 420])
        if num_full > 0:
            max_period = "FULL"
        else:
            max_period = "PARTIAL"

        newest_sample_date = shopHazard_df.iloc[0]['Sample Date']
        #TODO Set report date to first day of current month
        days_elapsed = (report_date - newest_sample_date).days

        max_index = shopHazard_df['Result Value'].idxmax()
        max_level = shopHazard_df.iloc[max_index]['Result Value']
        max_units = shopHazard_df.iloc[max_index]['Sample Result Unit']

        above_OEL = "N"
        al_to_OEL = "N"
```

python™

https://www.python.org/

Advanced analysis, calculations, statistics

Merge and process multiple data sets (may include embedded Python scripts)

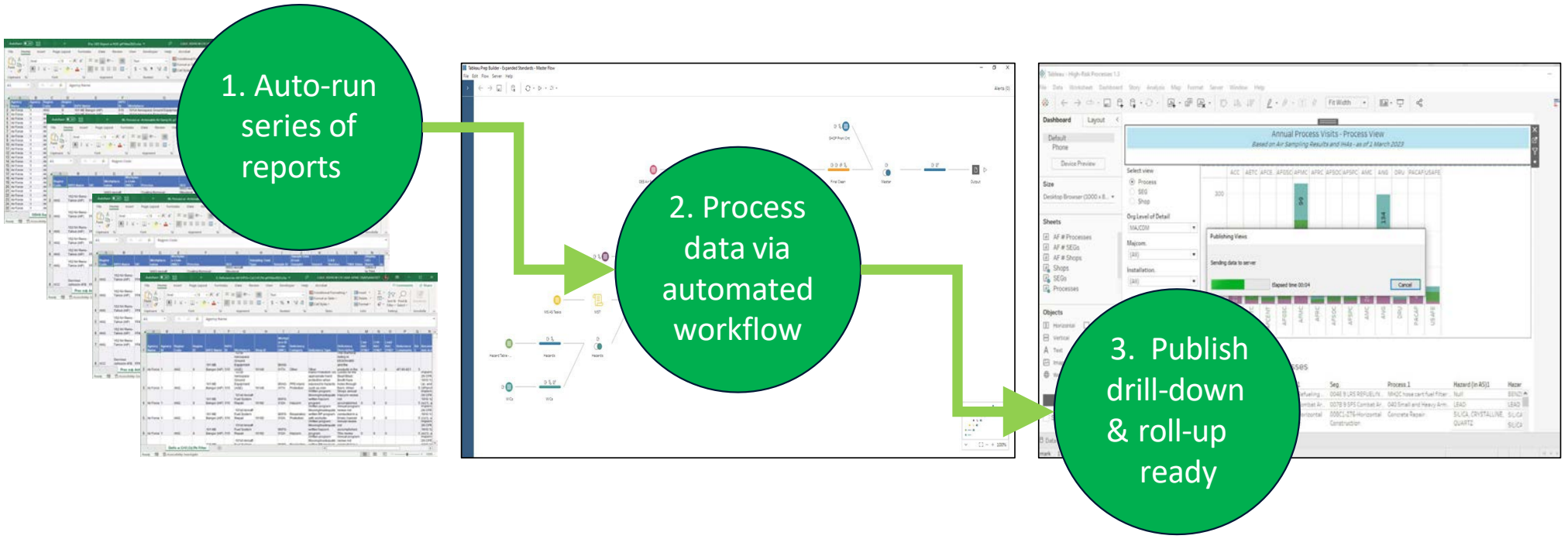
+ableau® from Salesforce

Build visualizations (includes real-time calculations, filters)

CarePoint information portal

Host dashboard, supporting content, and provide direct links to Tableau server

Analytics Process - The New Way



- Most dashboards integrate data originating from up to 12 reports or external data sources
- USAFSAM downloads & processes several Gigabytes of data every month (and growing)

Example Dashboards

Presence ≠ Exposure

Exposure ≠ Dose

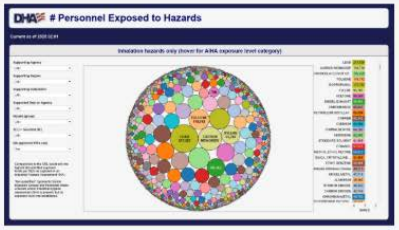
Dose ≠ Risk of Injury or Disease

Example Dashboards

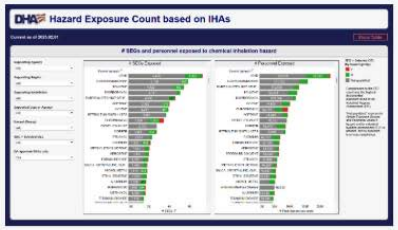
Inhalation Hazard Assessments

- Count SEGs/individuals exposed
- SEGs with exposure data/where data is missing
- Exposure level ratio to OEL
  - Identify OEL exceedance
  - Quality review
  - Compare to respirator APF
  - Predict OEL change impact
- Compare air sample results to assessment “conclusion”
- Compare assessed time ranges to when process/hazard were present

Industrial Hygiene Assessment (IHA) Analysis (Inhalation Only)



The **Exposure Summary** dashboard displays the number of personnel exposure to an inhalation hazard. The user can hover on a select hazard to view the AIHA exposure category when that informaiton is available. This chart helps priortize air sampling for unsampled SEGS.



The **Hazard Exposure Count** dashboad displays the number of SEGs and personnel exposed to inhalation hazards. In the chart, green represents IHA exposure levels below selected the OEL and red above the OEL. Grey represents unquantified IHAs.

The **OEL Ratio by IHAs** dashboad displays the numerical exposure level divided by the numerical OEL level. The chart does not correct for mismatched units. The user can select to view IHAs where the exposure unit does not match the OEL unit. Furthermore, the user can identify where exposure levels appear out of the ordinary. The active-filter bubble chart shows the IHA rationale selected.

The **Assessment Coverage/Conflicts** dashboard displays active and inactive processes, process hazards, and associated IHAs date ranges providing a "**timeline**" of IHA versus hazard dates. All process hazards must have an IHA covering the full timeframe of the process hazard exposure. Furthermore, no hazard should have multiple, conflicting IHAs. This chart helps improve OEHED and ILER data quality.

Example Dashboards

Tabs for each dashboard

Personnel Exposed to Hazards

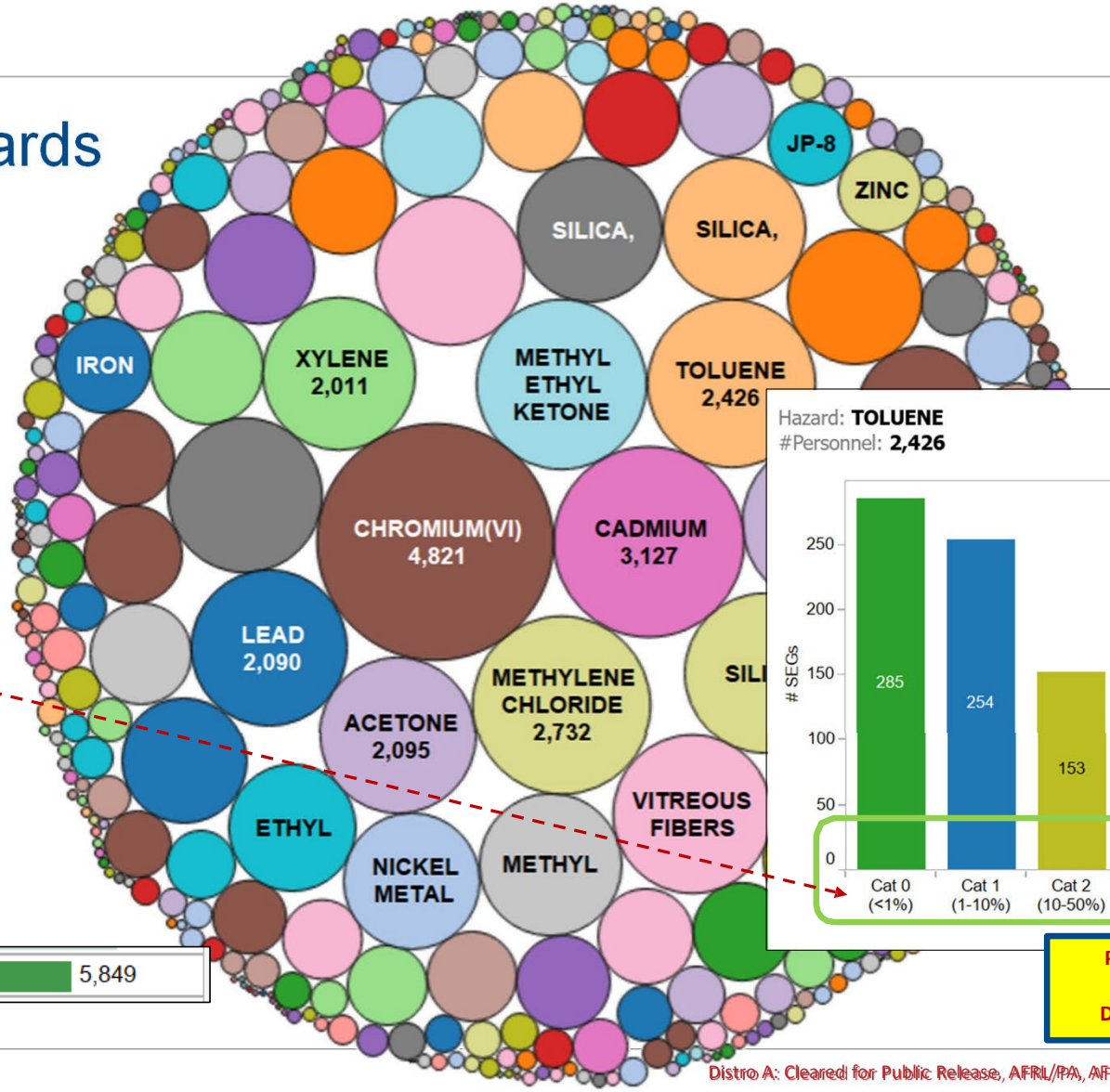
- Interactive Filters, such as:
  - Agency
  - MAJCOM & **Installation**
  - **Shop/SEG**
  - **Workplace ID Code**
    - Unit Category
    - Workplace Category

  (e.g., MXSM = Structural Mx)
  - **Exposures**: All / Over the limit / "Not quantified"
- Selectable values, such as:
  - **Hazard**
  - **Job Series**
  - Process Name

Example Dashboards

Personnel Exposed to Hazards

- Hover over hazard to view breakdown of SEG exposures
- American Industrial Hygiene Assoc. (**AIHA**) **Exposure Categories** (based on % of OEL)



WIC (2-ltr) - AF Use Only

MX

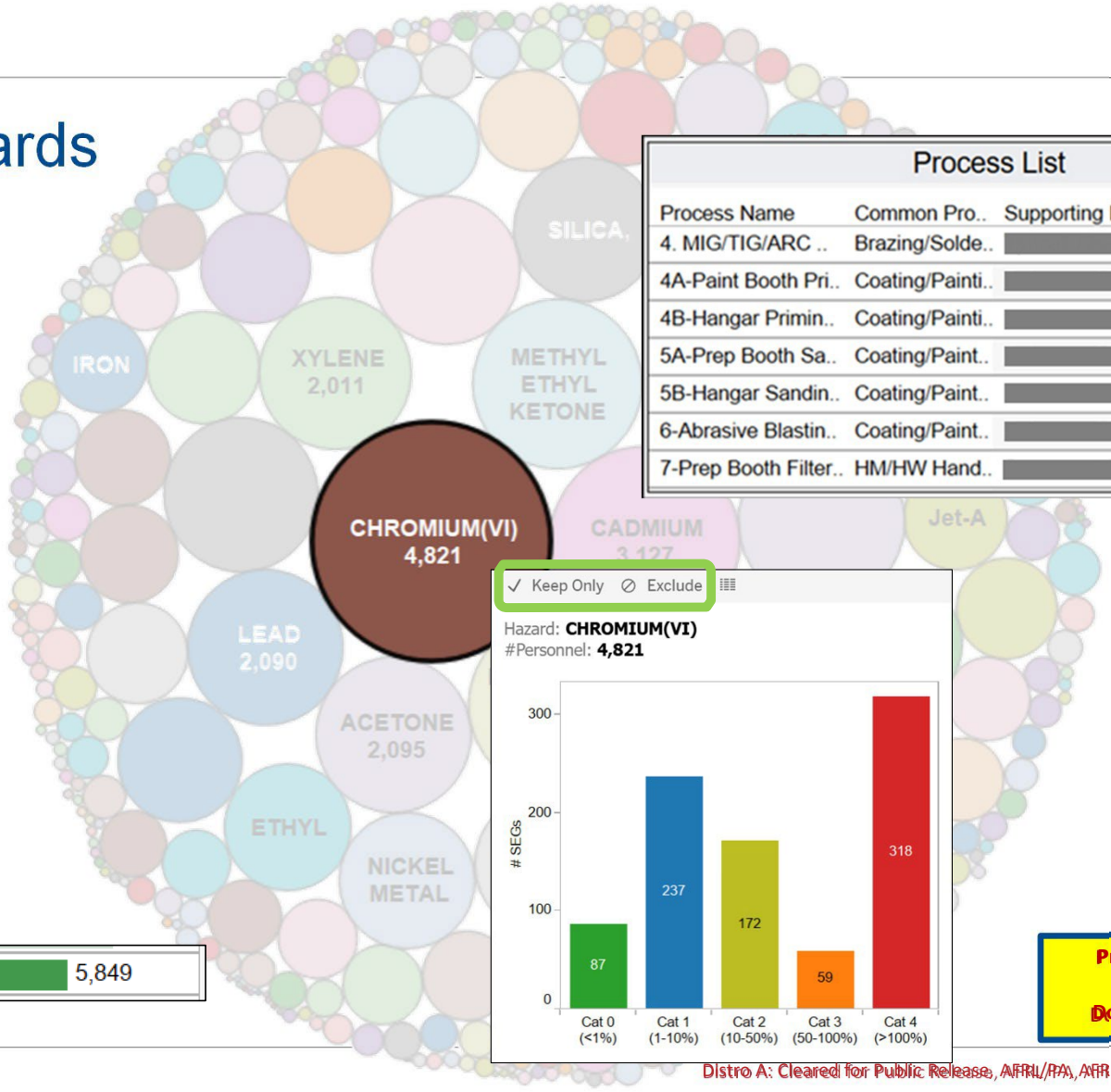
AF-2A7	Aircraft Fabrication	5,849

Presence ≠ Exposure
Exposure ≠ Dose
Dose ≠ Injury/Disease

Example Dashboards

Personnel Exposed to Hazards

- Select hazard as a filter to see details (e.g., the processes where that hazard is present)
- Can focus on or exclude any hazard/data element



Process List

Process Name	Common Pro..	Supporting Installation
4. MIG/TIG/ARC ..	Brazing/Solde..	
4A-Paint Booth Pri..	Coating/Painti..	
4B-Hangar Primin..	Coating/Painti..	
5A-Prep Booth Sa..	Coating/Paint..	
5B-Hangar Sandin..	Coating/Paint..	
6-Abrasive Blastin..	Coating/Paint..	
7-Prep Booth Filter..	HM/HW Hand..	

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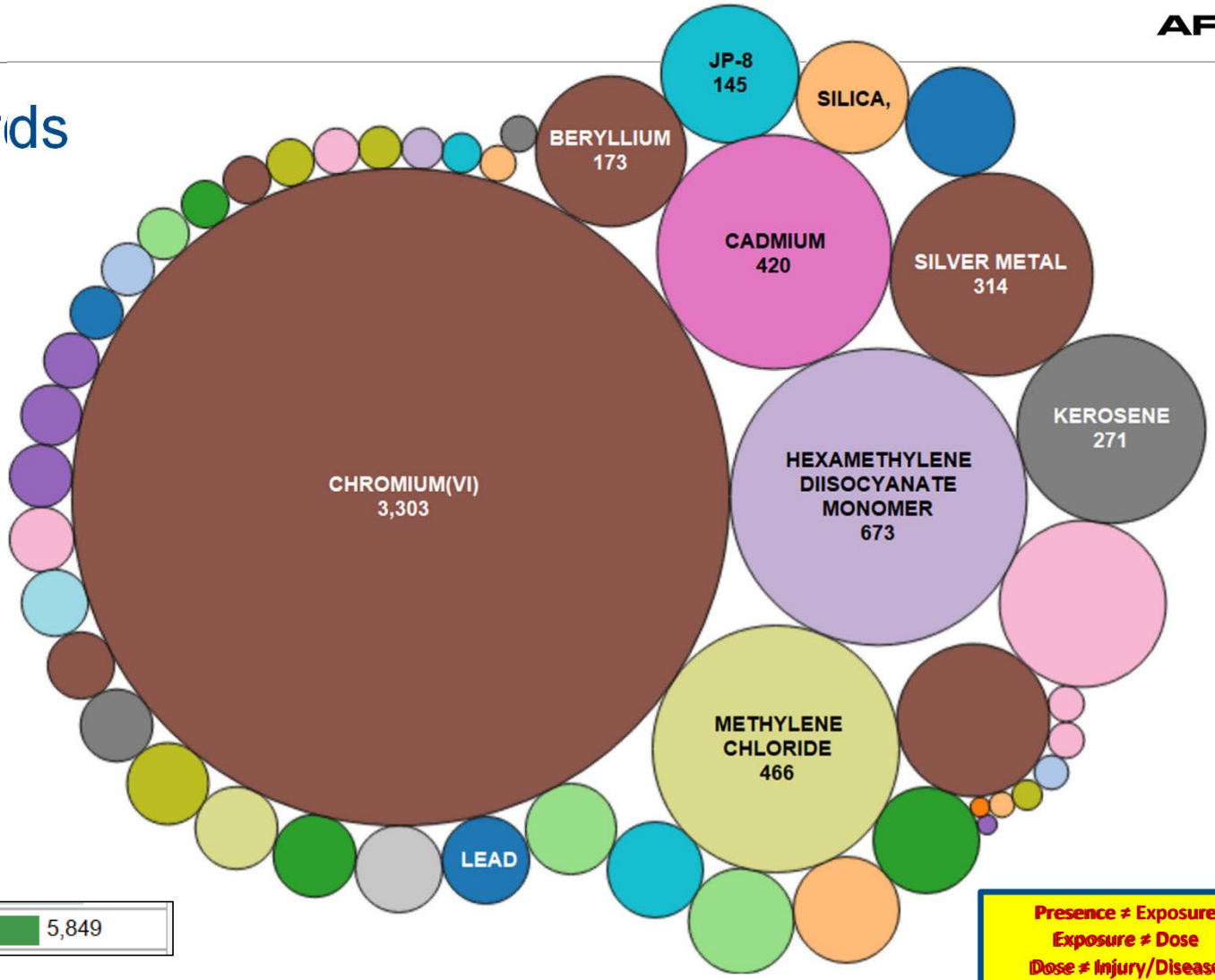
Example Dashboards

Personnel Exposed to Hazards

- Adjust filters to see counts adjust

SEG > Selected OEL

Y



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AF-2A7	Aircraft Fabrication	5,849

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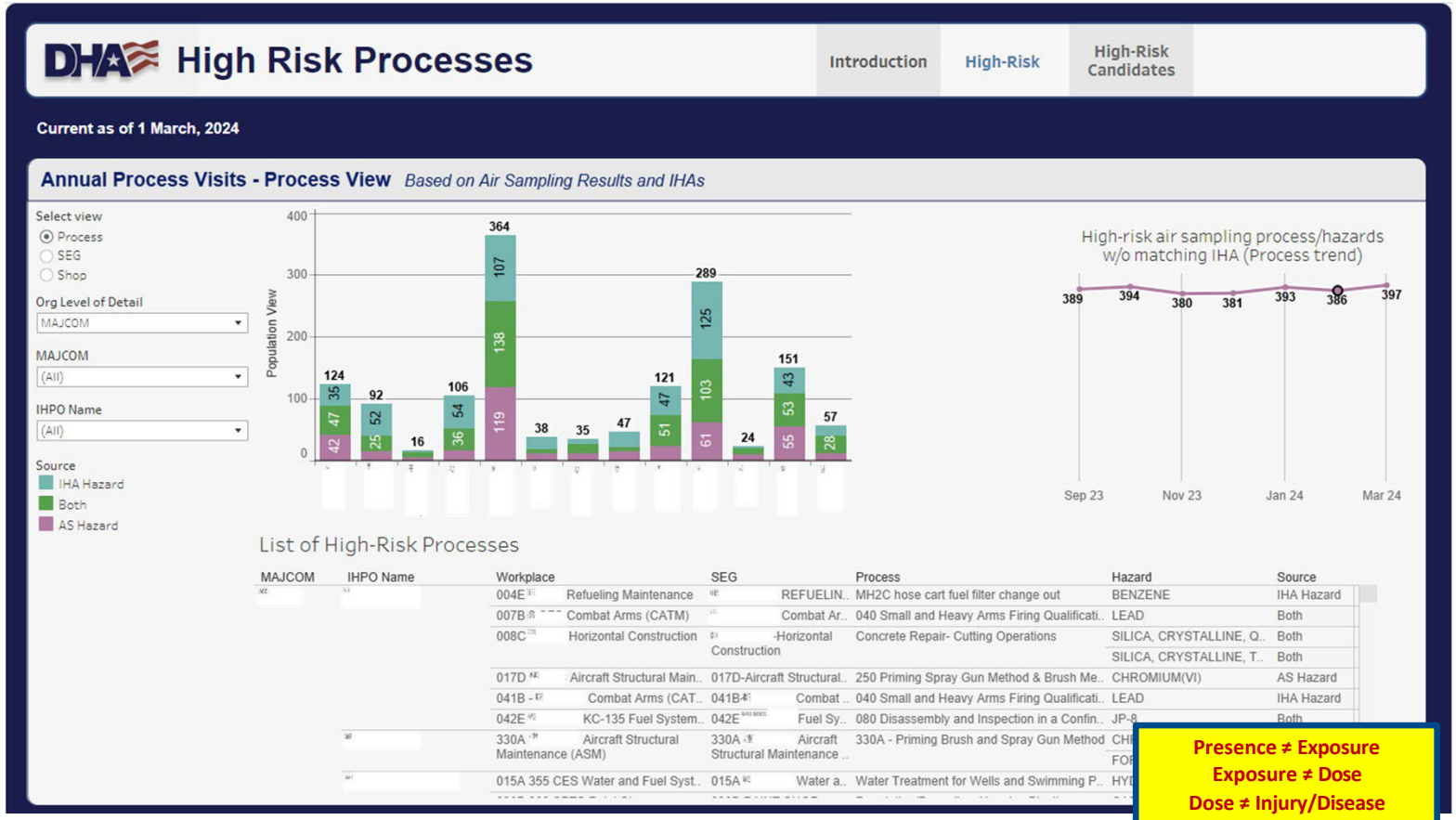
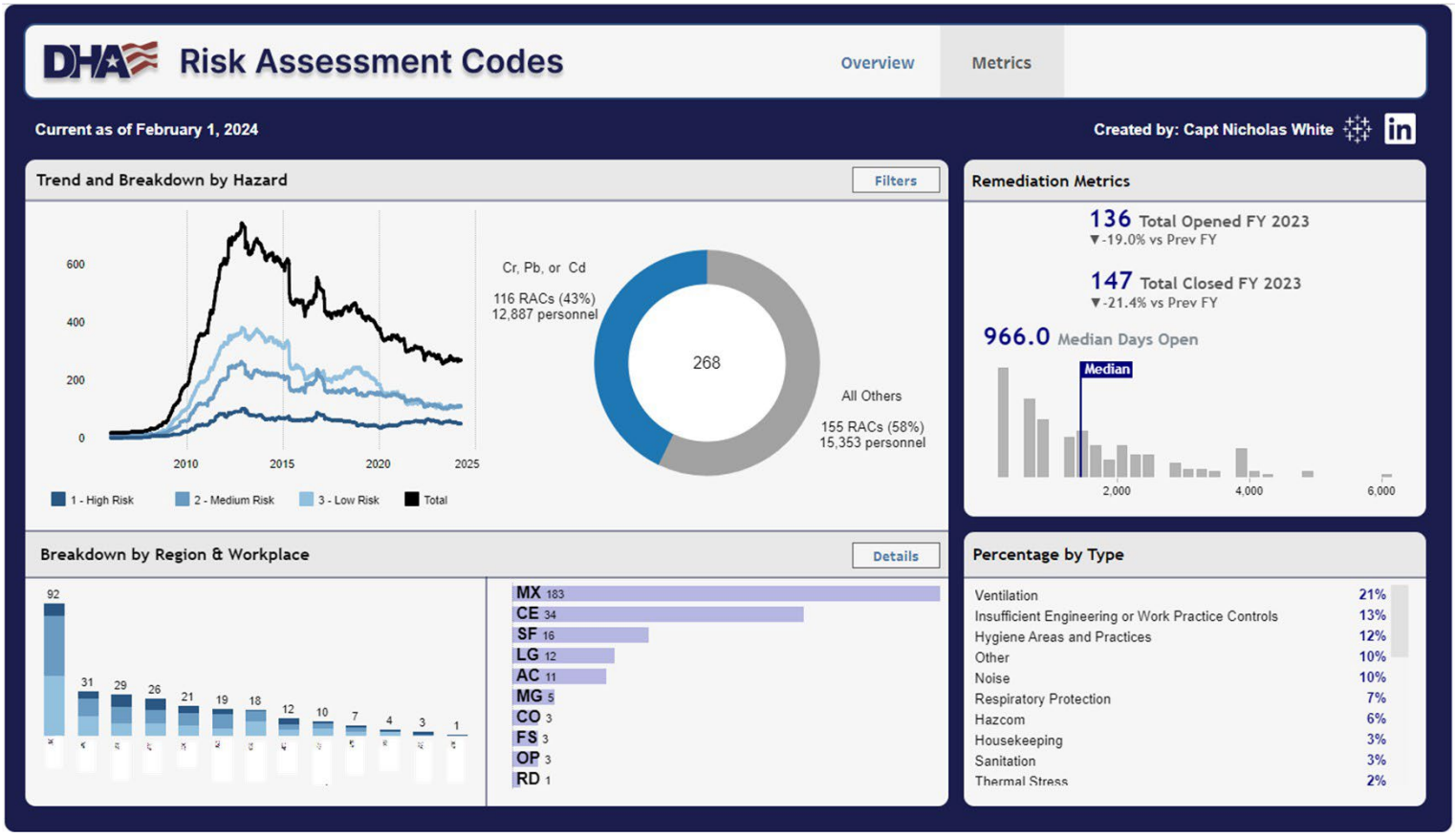
Example Dashboards

High-Risk Processes

- Exposures over an action level or an exposure limit
- Alignment between documented exposure levels (assessments) and the supporting sampling data



Example Dashboards



Risk Assessment Codes (RACs)

- Distribution of categories, hazards, etc. across orgs
- Closure timelines
- Export to support DoD PMR RAC input

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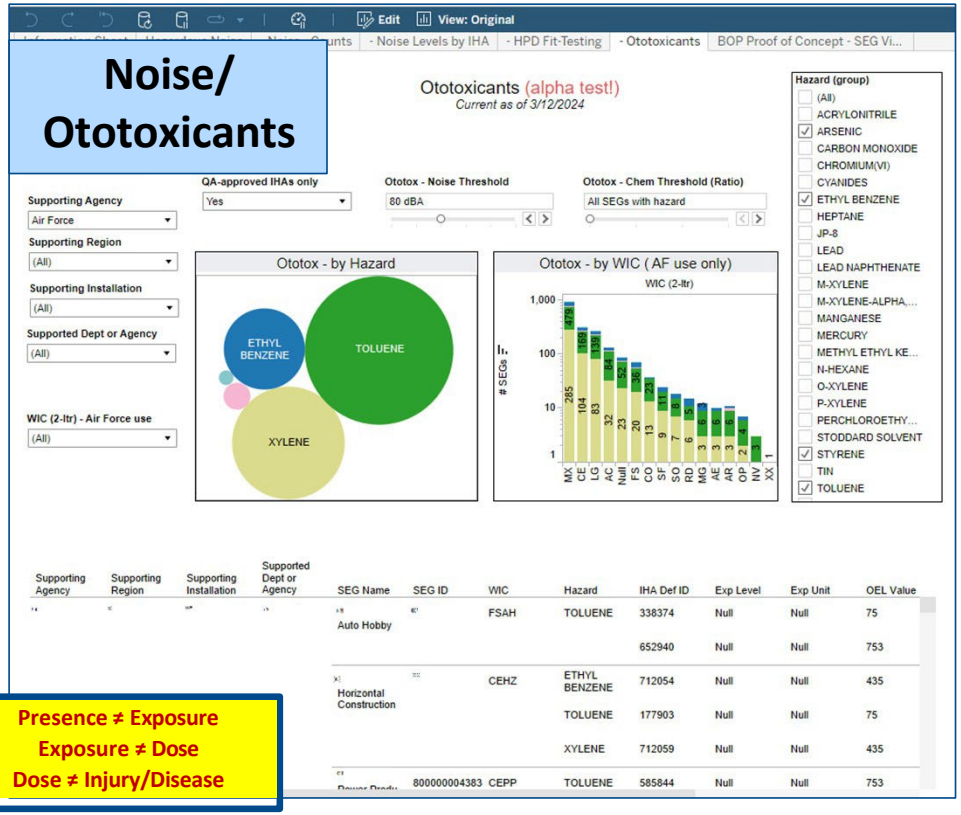
Example Dashboards

Special Interest Areas

Noise/ Ototoxicants



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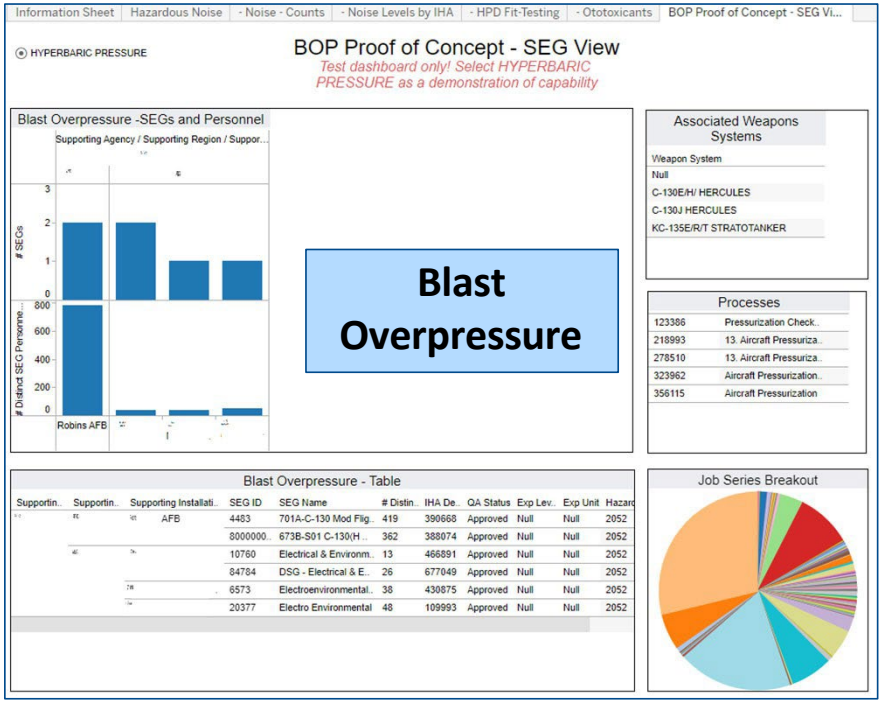
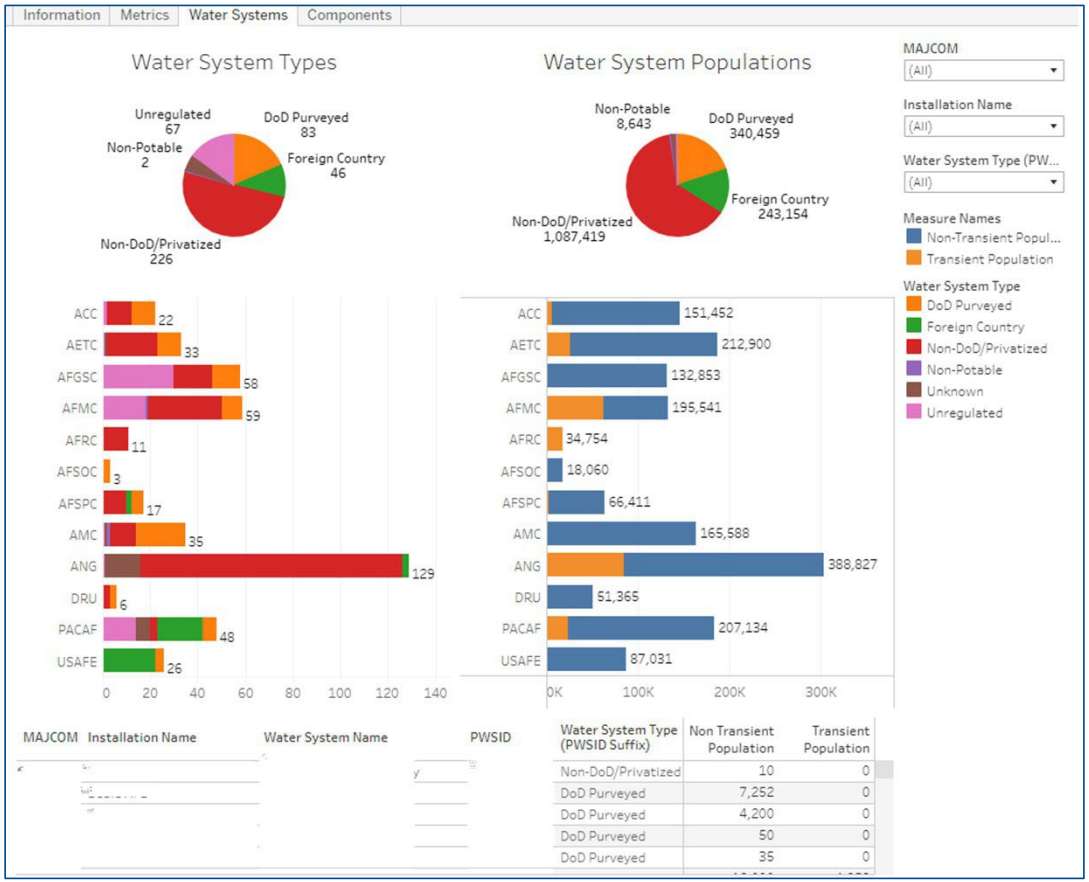
Blast Overpressure



- SEGs with exposure data / where data is missing
- ID presence of both otoxicants & noise, with threshold filters vs. exposure limits
- Where is blast overpressure (workplaces, job series, processes, and weapons systems)

Example Dashboards



Drinking Water: Water System Infrastructure & Sampling

- ID gaps in linking sampling points to their water system
- Highlight sampling result data entry errors
- Insight into U.S. EPA “emerging contaminant” monitoring (e.g., PFAS “forever chemicals”)

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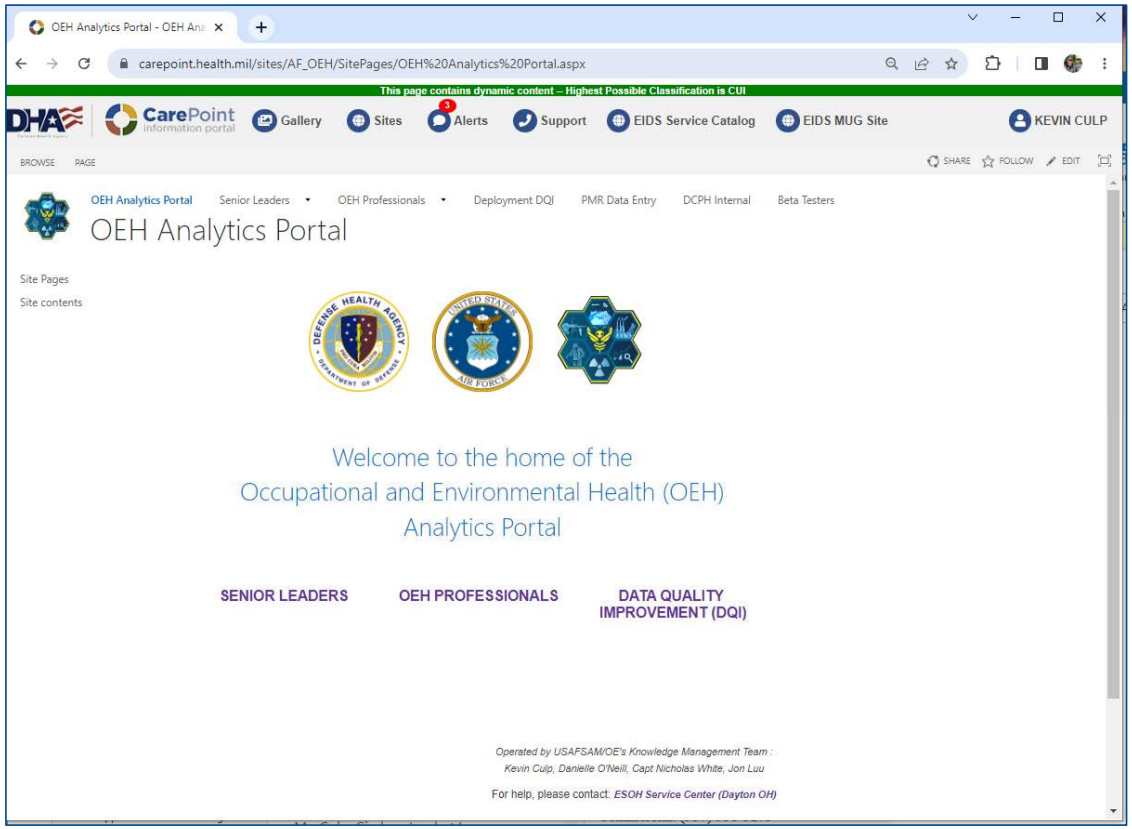
OEH Analytics Portal

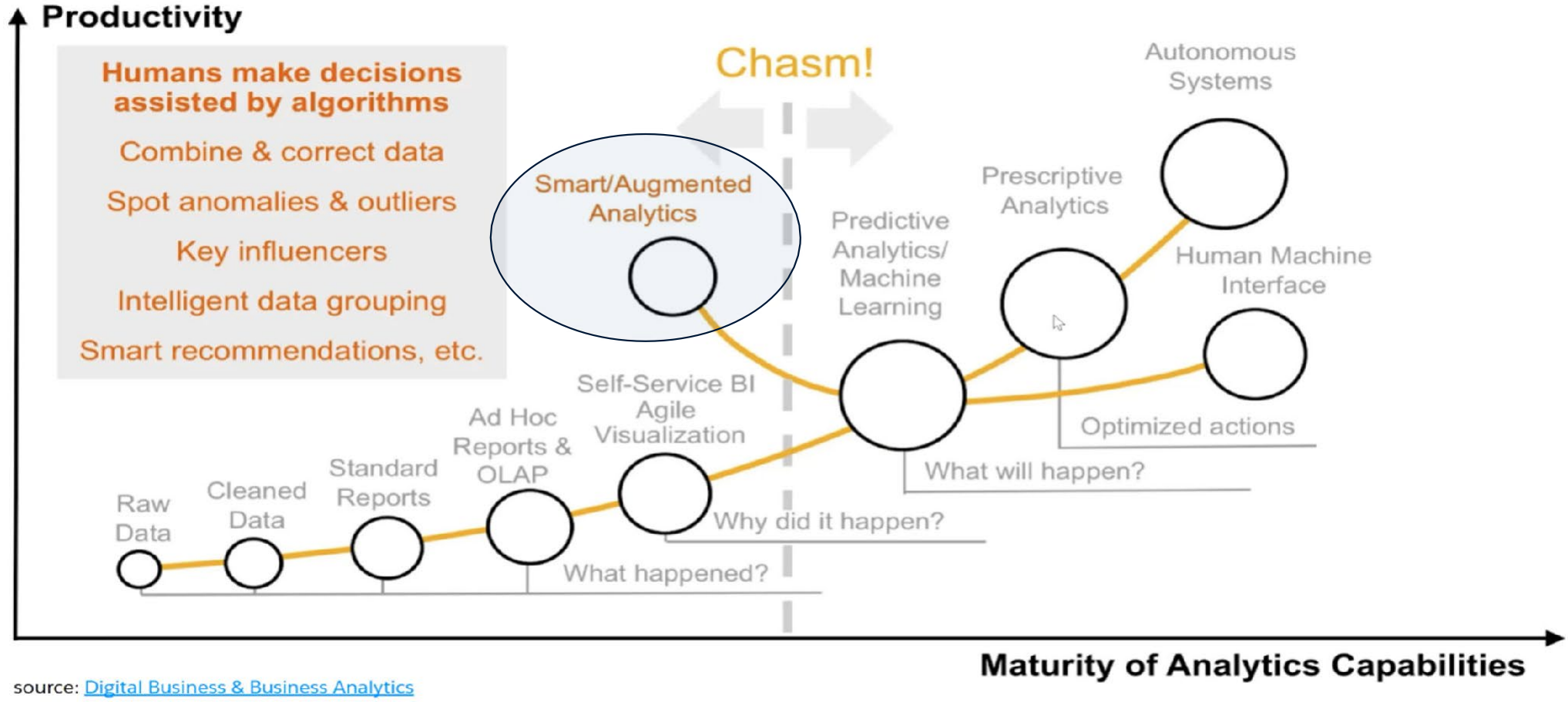


OEH Analytics Portal

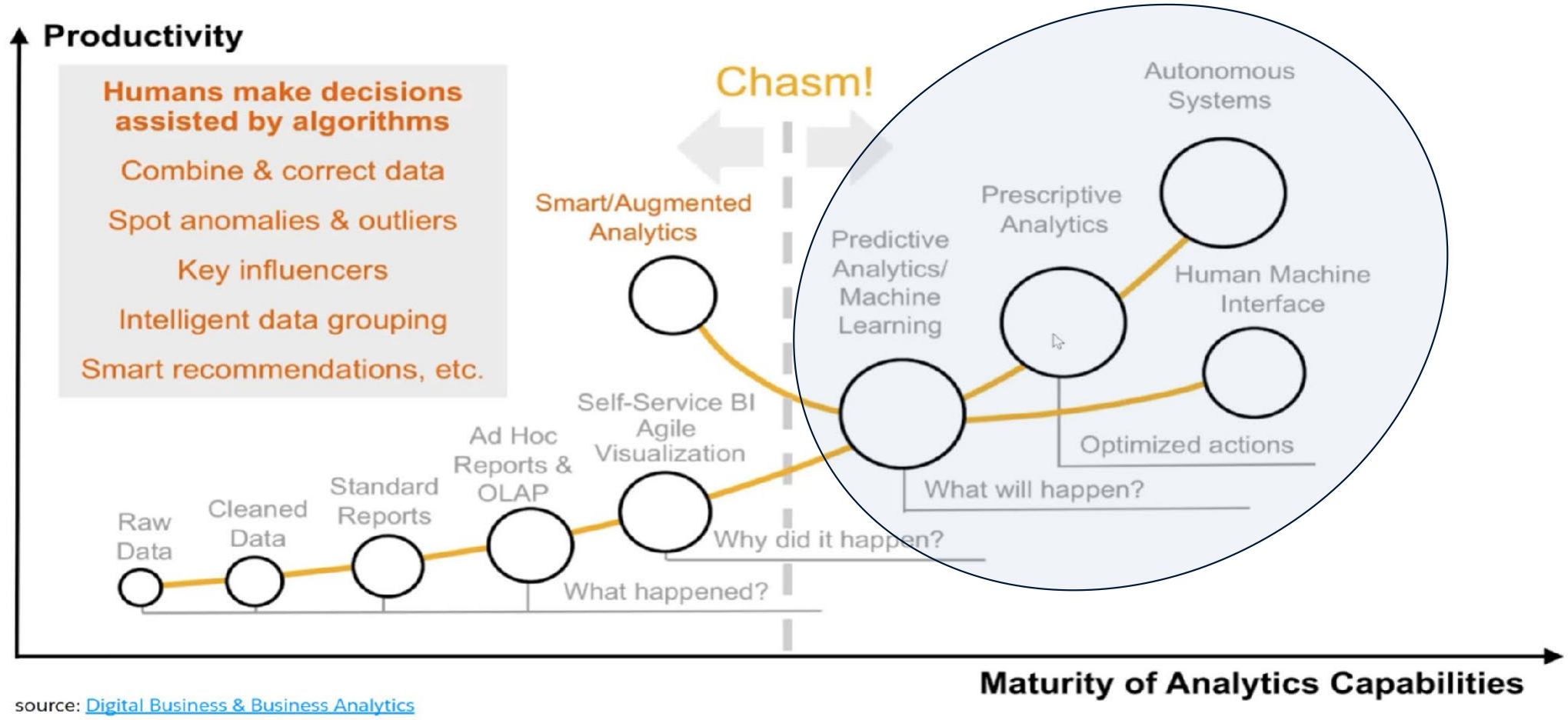
https://carepoint.health.mil/sites/AF_OEH/

(.mil access only)

Next Steps



source: Digital Business & Business Analytics



source: Digital Business & Business Analytics

Automated IH-STAT & Bayesian Data Analytics (Near-term)

- How can we better use and share air sampling & noise data?
  - Iteration 1: IH-STAT and descriptive statistics – **All DoD air sampling data by Hazard**
  - Iteration 2: Bayesian Data Analytics and Monte Carlo; work w/uncertainty & limited data sets

Converting public algorithms into native Python scripts – allows enhanced flexibility on government systems

Risk decision

- Criterion defining overexposure:

  95th percentile ≥ OEL

- Uncertainty management : based on the Bayesian model, the probability that this criterion is met (overexposure risk) is:

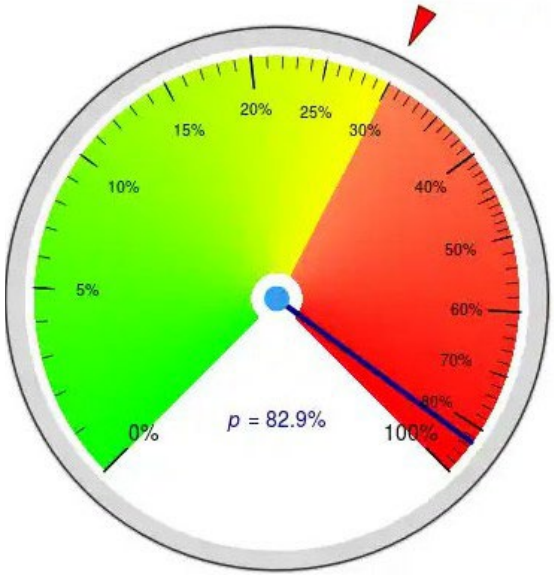
  82.9 %

- Uncertainty management : The probability of overexposure (overexposure risk) should be:

  < 30%

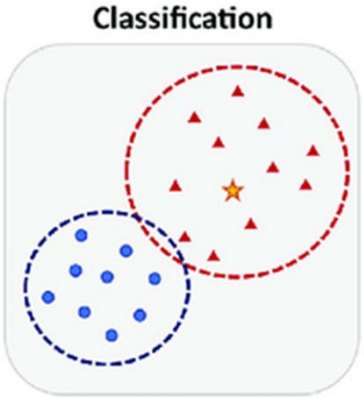
- As a consequence, the current situation is declared:

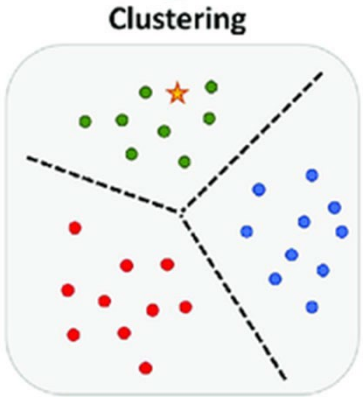
  Poorly controlled

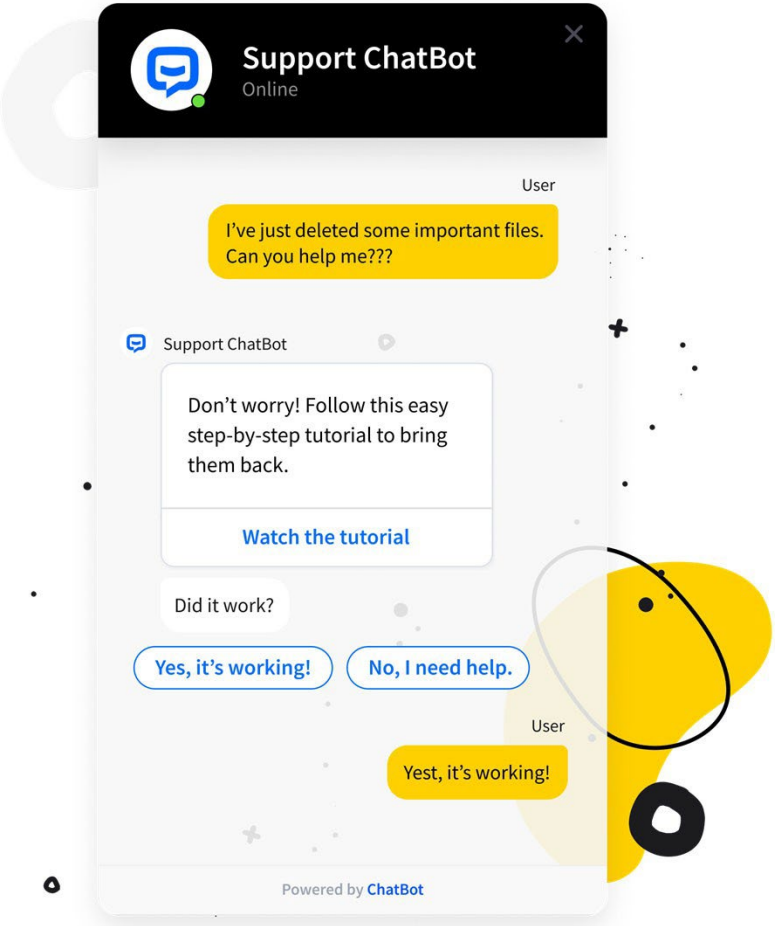


Artificial Intelligence & Machine Learning

- Explore AI Use Cases for OEH Consulting
  - Large Language Model (LLM) Informed Chat Assistance
- Machine Learning: Statistics on Steroids
  - Fill Gaps in Data with “Most-Like Fit”



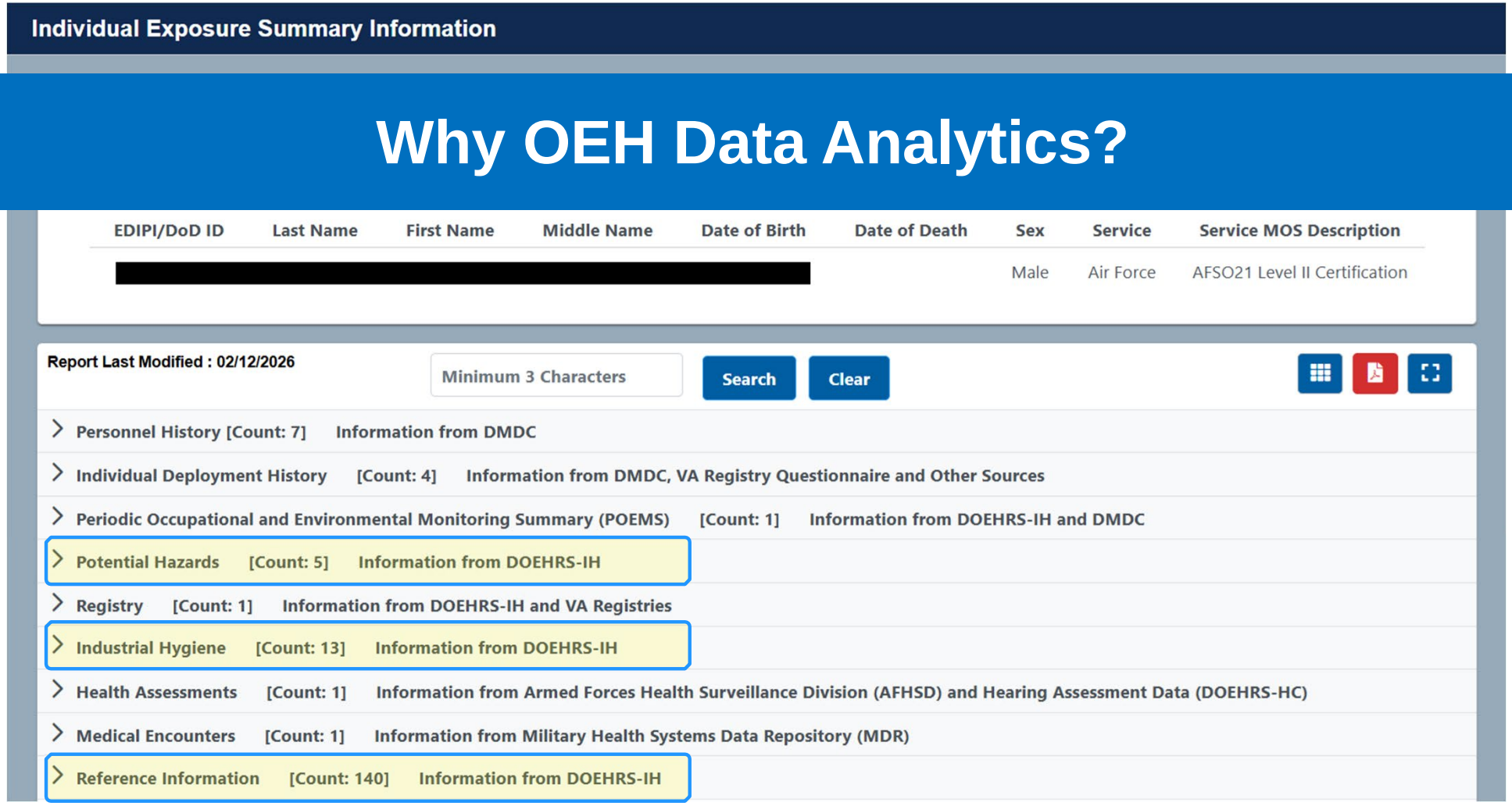




DoD OEH & Leveraging Partnerships

- Opportunity to expand OEH scope – Most analytics applicable to all Services and other/external orgs
- Integrate Horizontally
  - Medical, Personnel, Safety

Why OEH Data Analytics?



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Questions?