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Americas' SAP Users' Group

State of Arkansas' Journey to Reduce Recidivism Using SAP HANA and SAP Analytics Cloud

Session ID #ASUG82649

SAP SAPPHIRENOW | **ASUG**ANNUAL CONFERENCE

May 7 – 9, 2019

About the Speakers

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Research Administrator

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Key Outcomes/Objectives

- Find out how SAP and Arkansas worked together to leverage existing data for new actionable insights through machine learning and dashboards

- Hear first hand experience with HANA machine learning and spatial analytics

- Learn from our experiences overcoming data sharing and cultural challenges

- Benefit from our lessons learned as we went from design thinking to finished prototype

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Agenda

- Challenge
- Approach
- Results
- Lesson Learned
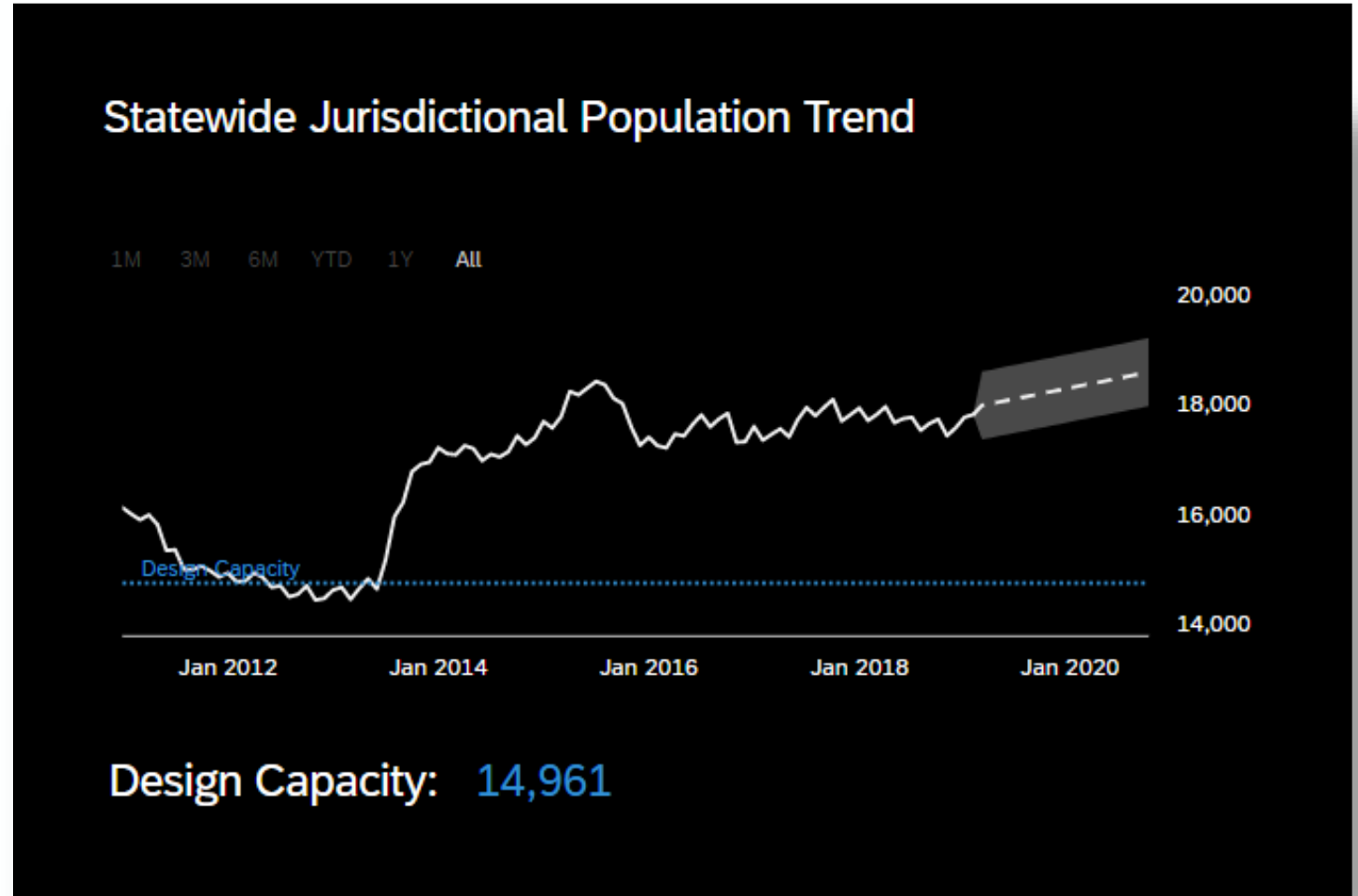- What's Next

Challenge: Rising Prison Population

$650M

Cost of maintaining status quo in additional spending over next six years.

$11B

The estimated cost of Arkansas's projected prison population over the next 10 years in housing costs and economic loss.

Statewide Jurisdictional Population Trend

1M   3M   6M   YTD   1Y   **All**

20,000

18,000

Design Capacity

16,000

14,000

Jan 2012   Jan 2014   Jan 2016   Jan 2018   Jan 2020

Design Capacity: 14,961

Key Stat: Arkansas' prison population grew 26% in the past decade vs a decline of 4.5% nationally

*** Source JFA Report*

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Timeline

Key Legislation Passed
Act 912 & Act 423

Data Sharing Agreement Executed
SAP, DIS, ACC, ADC, APB, and ACIC
September 25, 2018

Technical work began
November 2018

Design Thinking Workshop
January 23, 2018
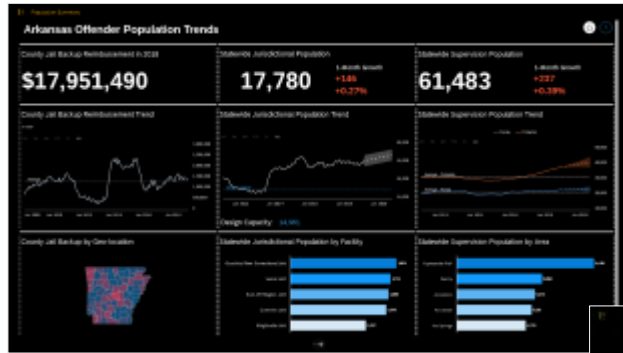
Partnership Investment
SAP, Intel, and HPE

POC Delivered
February 2019

The data sharing agreement that enabled the POC took approximately 8 months compared to the 3 months of technical work. Data sharing is a critical component to utilizing technology to tackle complex issues.

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Deliverables

Arkansas Offender Population Trends

County Jail Backup Reimbursement in 2018

$17,951,490

Statewide Jurisdictional Population

17,780

1-Month Growth
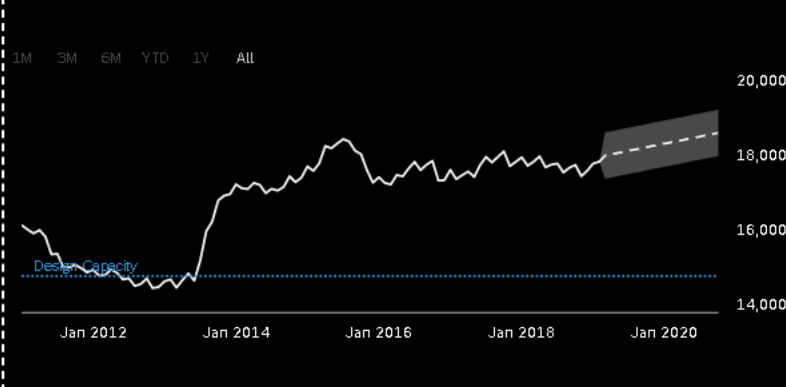**+146**
+0.27%

Statewide Supervision Population

61,483

1-Month Growth
+237
+0.39%

County Jail Backup Reimbursement Trend

In USD

1M 3M 6M YTD 1Y All

3,000,000
2,500,000
2,000,000
1,500,000
1,000,000
500,000
0

Average

Jan 2008   Jan 2010   Jan 2012   Jan 2014   Jan 2016   Jan 2018

Statewide Jurisdictional Population Trend

1M 3M 6M YTD 1Y All

20,000
18,000
16,000
14,000

Design Capacity

Jan 2012   Jan 2014   Jan 2016   Jan 2018   Jan 2020

Design Capacity: 14,961

Statewide Supervision Population Trend

— Parole   — Probation

1M 3M 6M YTD 1Y All

50,000
40,000
30,000
20,000
10,000

Average - Probation

Average - Parole

Jan 2012   Jan 2014   Jan 2016   Jan 2018   Jan 2020
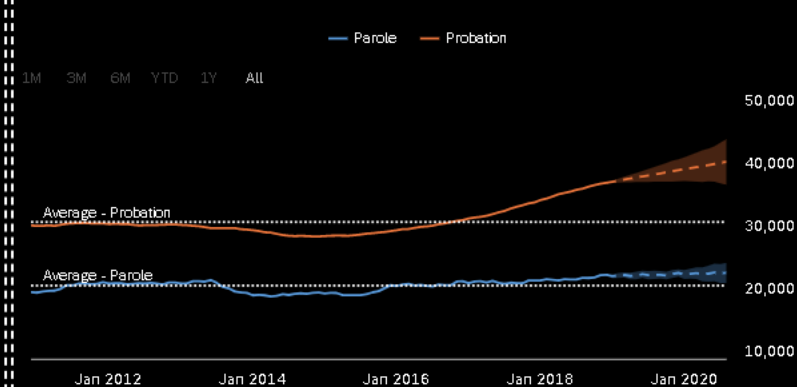
County Jail Backup by Geo-location
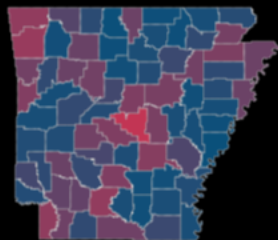
Statewide Jurisdictional Population by Facility

Facility	Population
Ouachita River Correctional Unit	1,824
Varner Unit	1,724
East AR Region. Unit	1,685
Cummins Unit	1,649
Wrightsville Unit	1,297
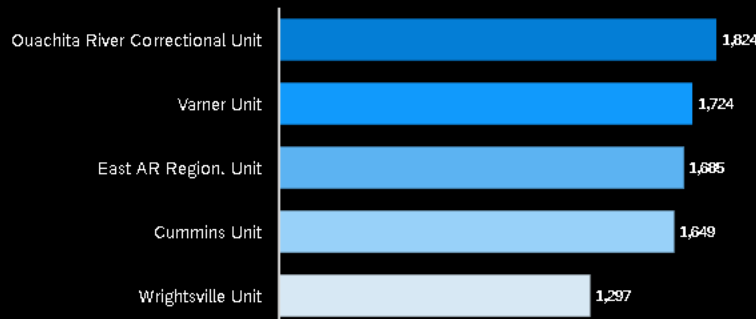
Statewide Supervision Population by Area

Area	Population
Fayetteville P&P	9,418
Searcy	5,850
Jonesboro	5,373
Fort Smith	5,116
Hot Springs	4,729
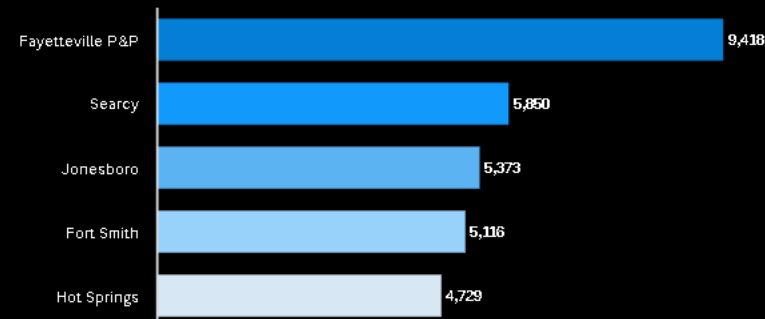
Arkansas Recidivism Overview

6-Month Recidivism
12.74%

12-Month Recidivism
27.36%

36-Month Recidivism
53.65%

Releases By Offense Type

- DRUG — 2,444 (Average)
- VIOLENT — 1,468
- PROPERTY — 1,436
- SEX — 288
- OTHER — 173
- PUBLIC ORDER — 115

Returns By Offense Type

- DRUG — 1,266 (Average)
- PROPERTY — 812
- VIOLENT — 805
- SEX — 132
- OTHER — 91

Recidivism by Location

SHAPE_ZBLOCKGRP
Mississippi County

36-Month Rate	53.45 %
Released	58
Returned	31

LEGENDS

36 Month Recidivi...
SHAPE_ZBLOCKG...

≤0   15   50   ≥100   %

12 Month Reci...
6 Month Recid...

POWERED BY esri
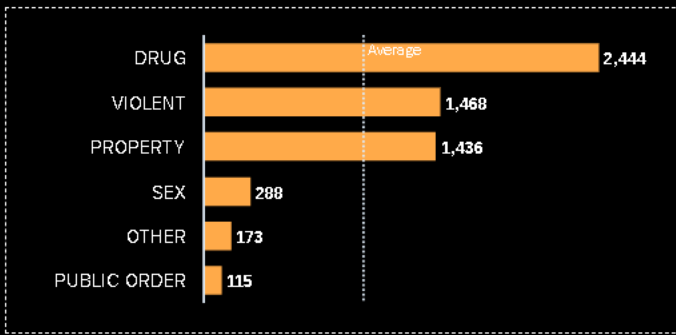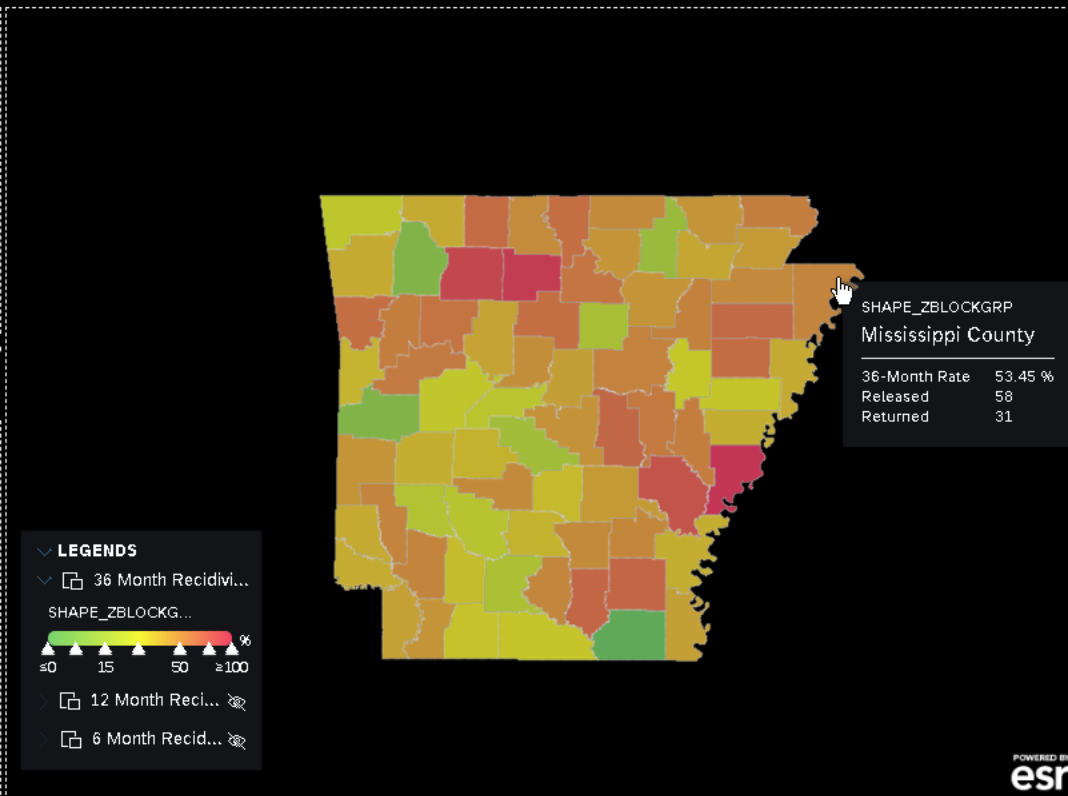
Recidivism Historic Trends

— 36-Month Rate — 12-Month Rate — 6-Month Rate

1M 3M 6M YTD 1Y All

- 43.35%
- 22.09%
- 9.85%

2008 2010 2012 2014 2016 2018

70% 60% 50% 40% 30% 20% 10% 0%
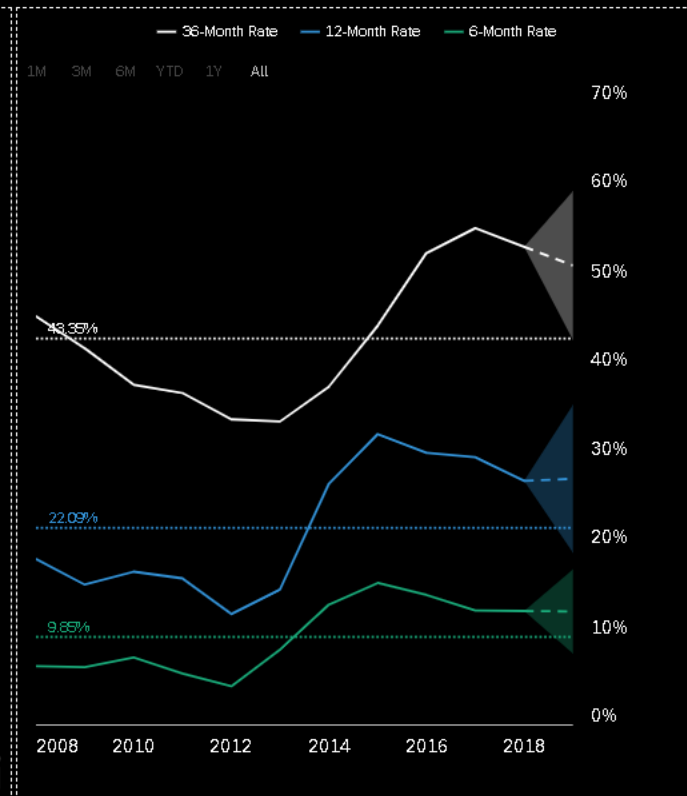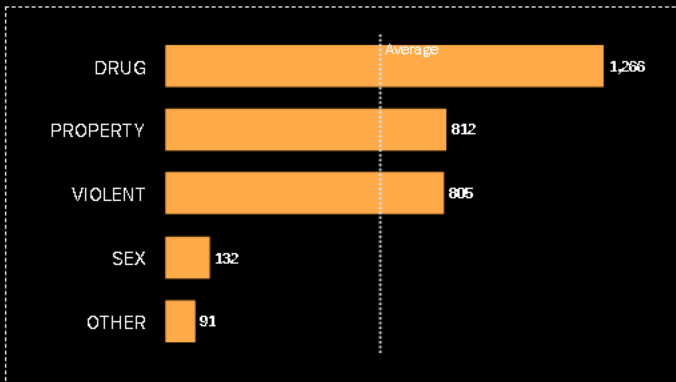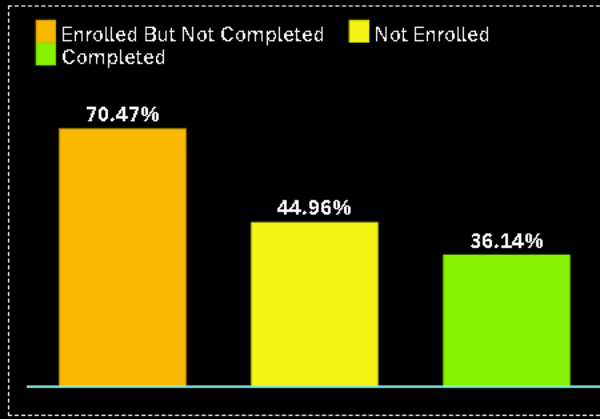
Community Supervision - Proximity to Resources

Recidivism by Program Participation

- Enrolled But Not Completed
- Not Enrolled
- Completed

70.47%
44.96%
36.14%

Program Participation by Average Distance

- No Participation
- Program Participation

No Participation — 11.36

Program Participation — 3.59
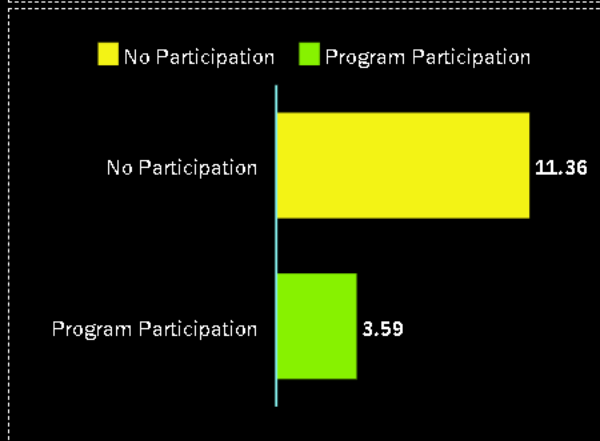
Offender Proximity to Substance Abuse Treatment Facility

2 POINTS
2 POINTS
2 POINTS
2 POINTS
2 POINTS
2 POINTS
2 POINTS
2 POINTS
2 POINTS
2 POINTS
2 POINTS
2 POINTS
5 POINTS
2 POINTS
2 POINTS

SHAPE_ZBLOCKGRP
Arkansas County

OFF_PER_SA	636.67
GEO_OFF_COUNT	1,910

LEGENDS
- Drug Offenders
  SHAPEPOINT_ZAD...
  < 4   ≥ 11
- SA Treatment Loc...
  ZSHAPE
  2 POINTS
- SA Treatment Avail...

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The color scale for offender location indicates proximity to a treatment location.
(Green--Yellow--Orange)

Average Proximity to SA Treatment by County

County	Average
DALLAS	29.34
CALHOUN	28.24
NEWTON	24.10
PIKE	22.25
MADISON	22.15
LINCOLN	22.10
PRAIRIE	21.52
LAFAYETTE	21.03
CLEVELAND	17.77
POINSETT	17.41
FULTON	17.18
NEVADA	17.15
MONTGOMERY	16.72
DESHA	16.44
SEARCY	12.86

6-Month Base Risk
27.84%

12-Month Base Risk
56.35%

36-Month Base Risk
85.58%

6-Month Base Risk		% Contribution
Return Count	4	27.27
Monthly Drug Miscond...	0.062	18.12
Monthly Major Miscon...	0.125	13.41
Receiving Location (C)	Sebastian County Backup List	10.88
Sending Location (C)	Sebastian County Sheriff's Office	10.73

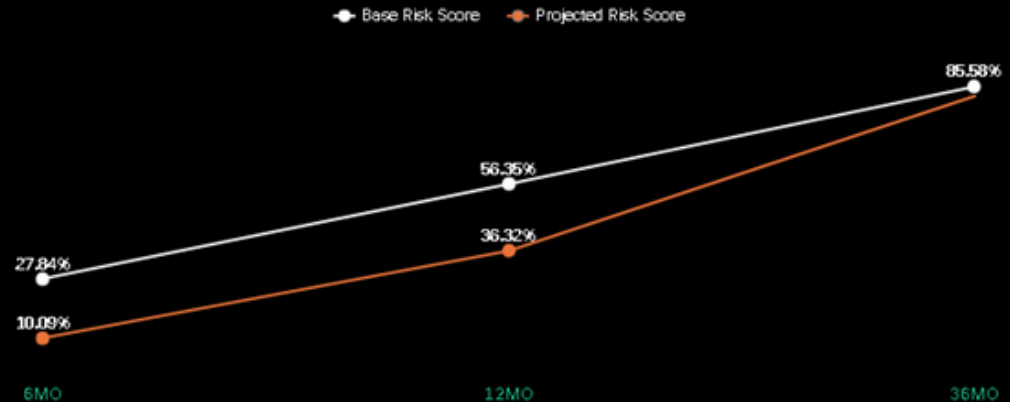| 12-Month Base Risk		% Contribution
Return Count	4	20.95
Receiving Location (I)	Ouachita River Correction Unit Ne...	16.60
Receiving Location (C)	Sebastian County Backup List	14.76
Sending Location (C)	Sebastian County Sheriff's Office	13.13
Monthly Drug Misconducts	0.062	11.61

36-Month Base Risk		% Contribution
Return Count	4	30.18
Drug Misconduct	Y	18.31
Monthly Drug Miscond...	0.062	14.95
Months In Prison	16	11.00
Drug Use Frequency	Never	10.62

Intervention Risk Trajectory

Chemical Dependence Education

	6MO % Change	12MO % Change	36MO % Change
Anger Management	6.16 %	3.16 %	0.10 %
Substance Abuse Education	4.27 %	2.19 %	0.07 %
Substance Abuse Treatment	29.03 %	15.33 %	0.82 %
Chemical Dependence Education	63.8 %	35.54 %	3.36 %
Continuing Care	71 %	39.37 %	3.63 %

Base Risk Score — Projected Risk Score

Base Risk Score: 27.84%, 56.35%, 85.58%
Projected Risk Score: 10.09%, 36.32%, 85.58%

6MO   12MO   36MO

Time-to-Value (Deliverables+)

UCR Crime Data

SHAPE_ZCOUNTY
Madison County

Drug Abuse (Rate Per 1000)   23.48

LEGENDS

Sale/Mfg of Na...

Aggravated As...

Forcible Rape

Drug Abuse

SHAPE_ZCOUNTY ...

≤0   12   25   ≥100   %

60km
30mi

County of Pulaski, AR, Esri, HERE, Garmin, FAO, METI/NASA, USGS, EPA, NPS
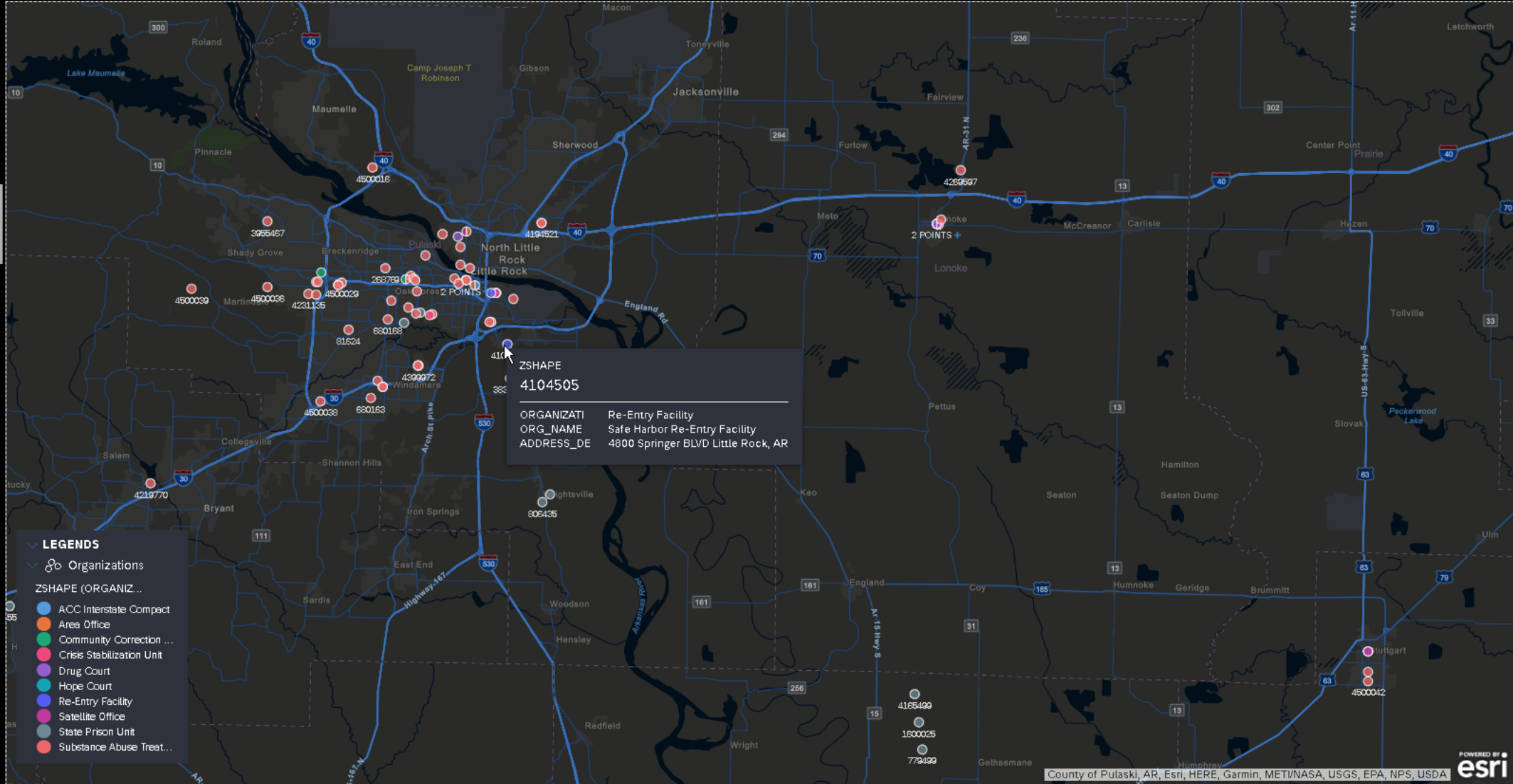
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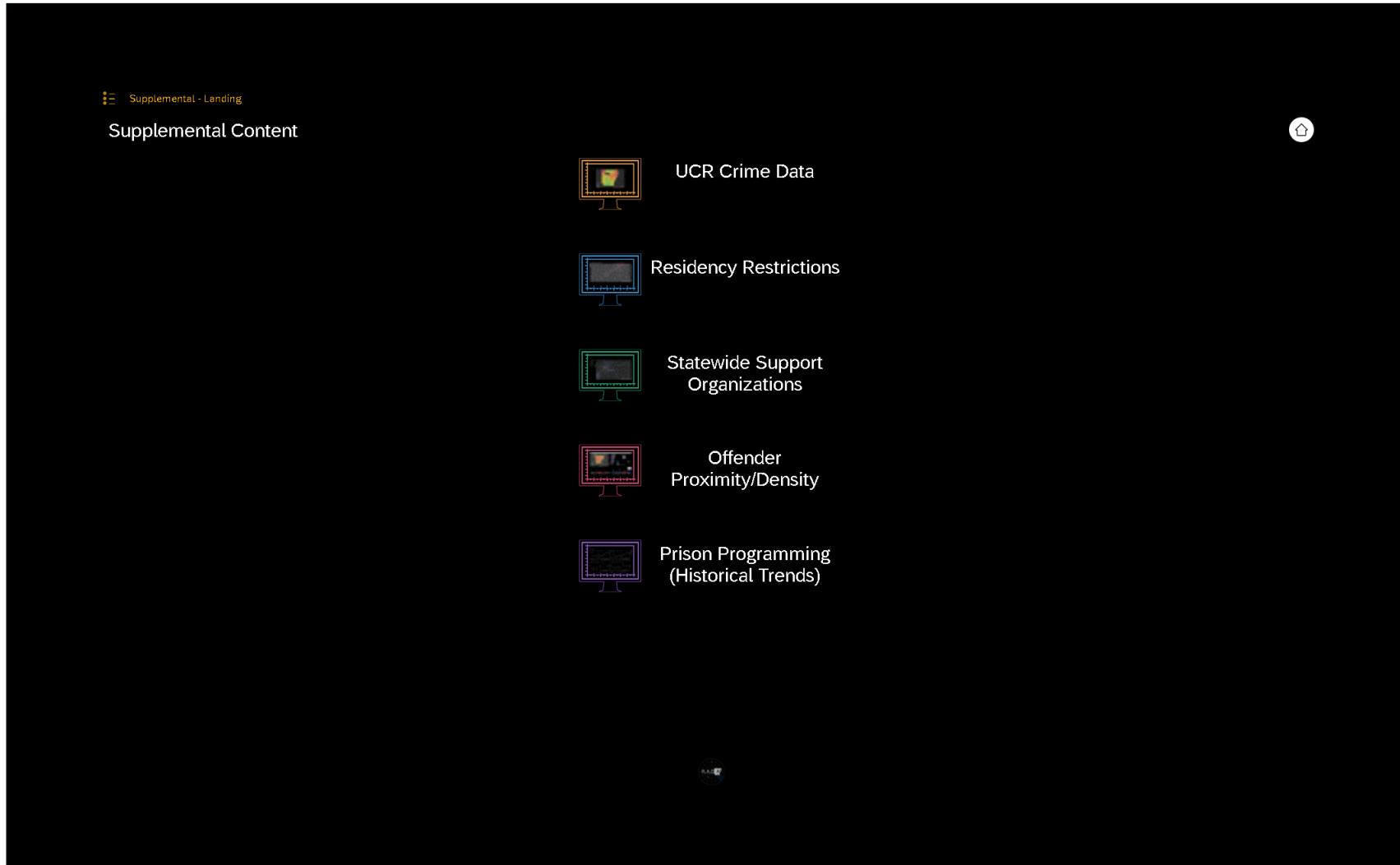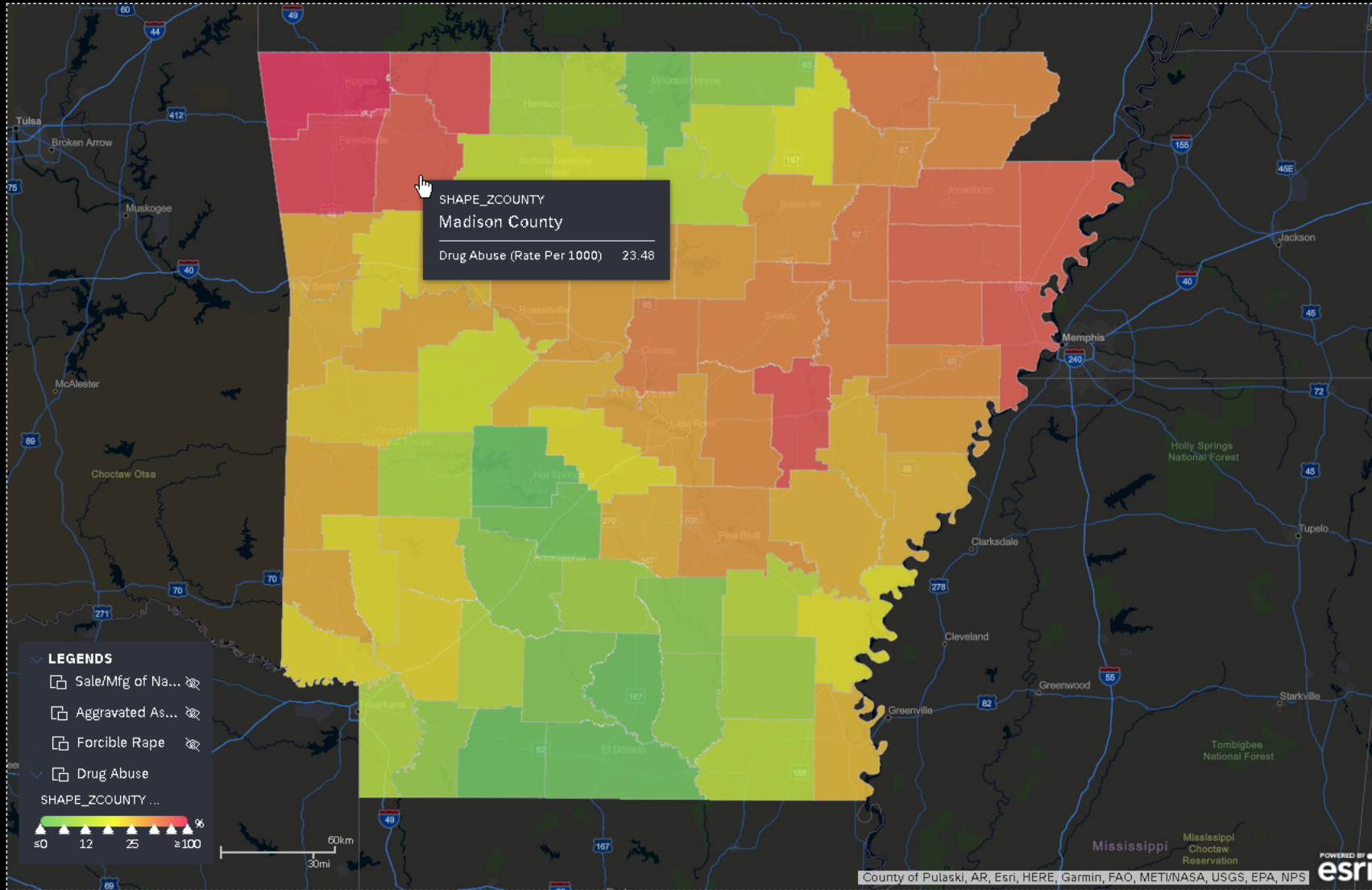
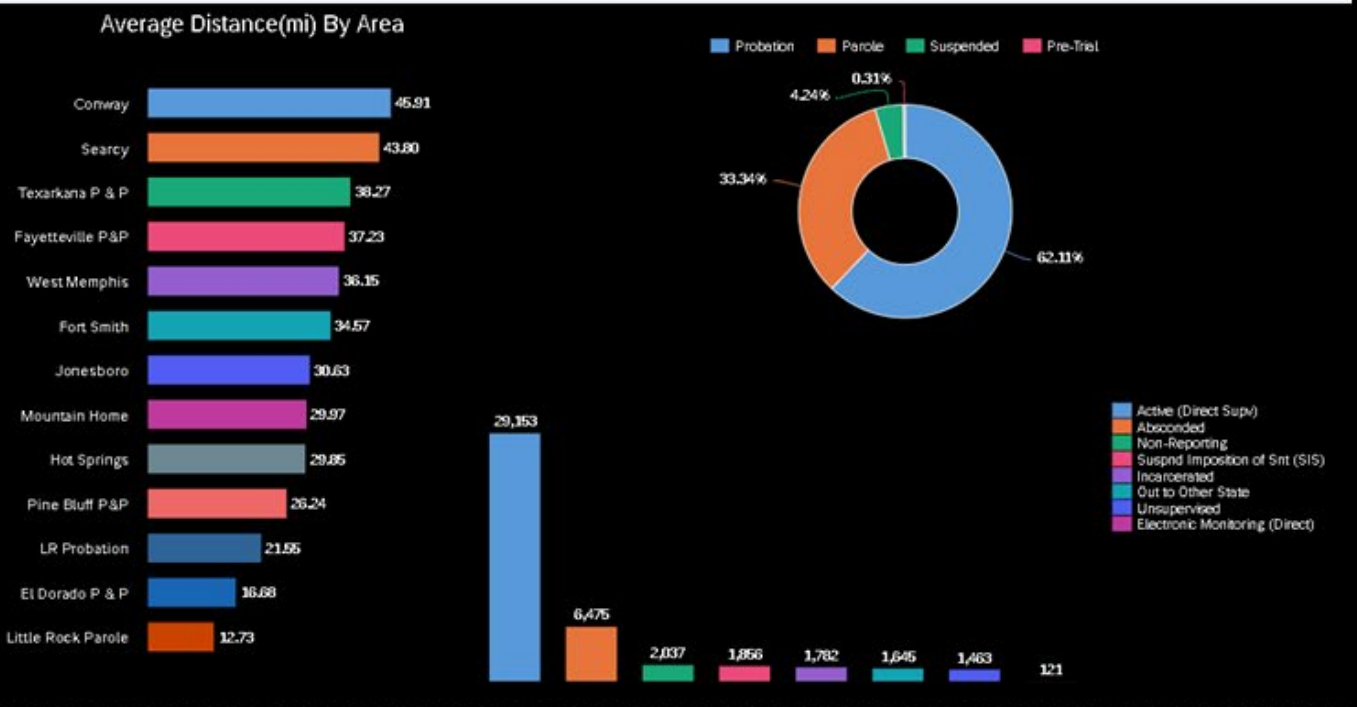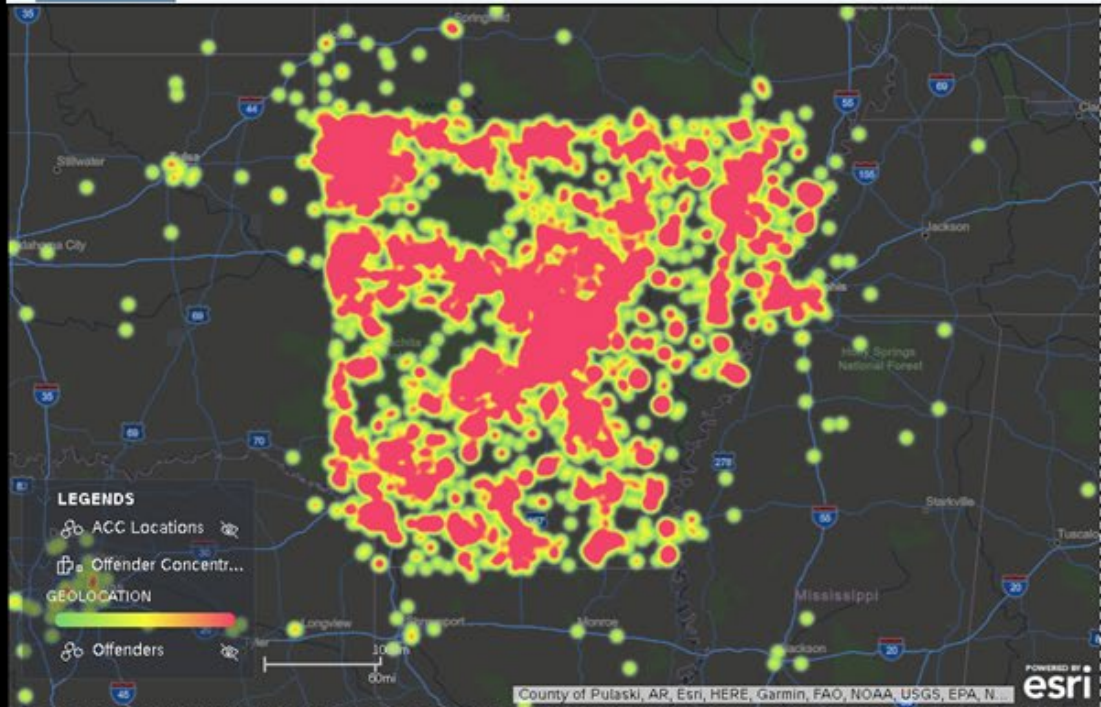Residency Restrictions for Sex Offenders
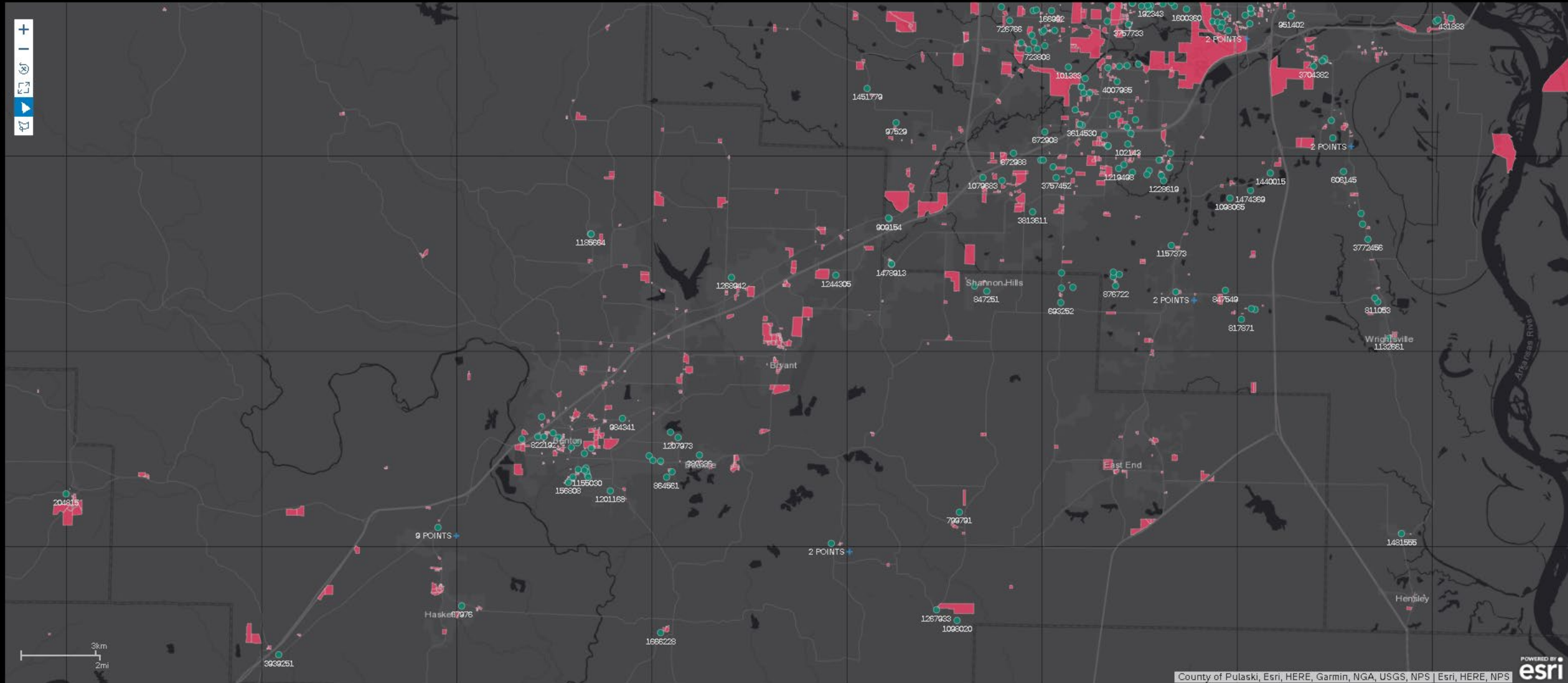
Support Organizations

Search

- All
- Mental Health/Counseling
- Miscellaneous
- Personal Development
- Public Benefits/Legal Assistance
- Re-Entry Facility
- Reintegration/Transition Support
- Satellite Office
- State Prison Unit
- Subsistence Assistance

ZSHAPE
4104505

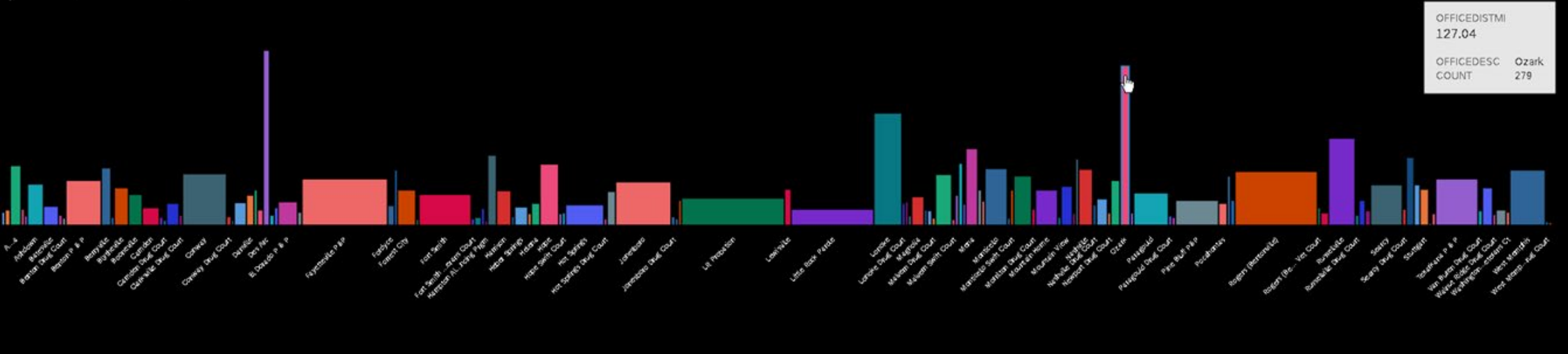|	
ORGANIZATI	Re-Entry Facility
ORG_NAME	Safe Harbor Re-Entry Facility
ADDRESS_DE	4800 Springer BLVD Little Rock, AR

LEGENDS

Organizations

ZSHAPE (ORGANIZ...
- ACC Interstate Compact
- Area Office
- Community Correction ...
- Crisis Stabilization Unit
- Drug Court
- Hope Court
- Re-Entry Facility
- Satellite Office
- State Prison Unit
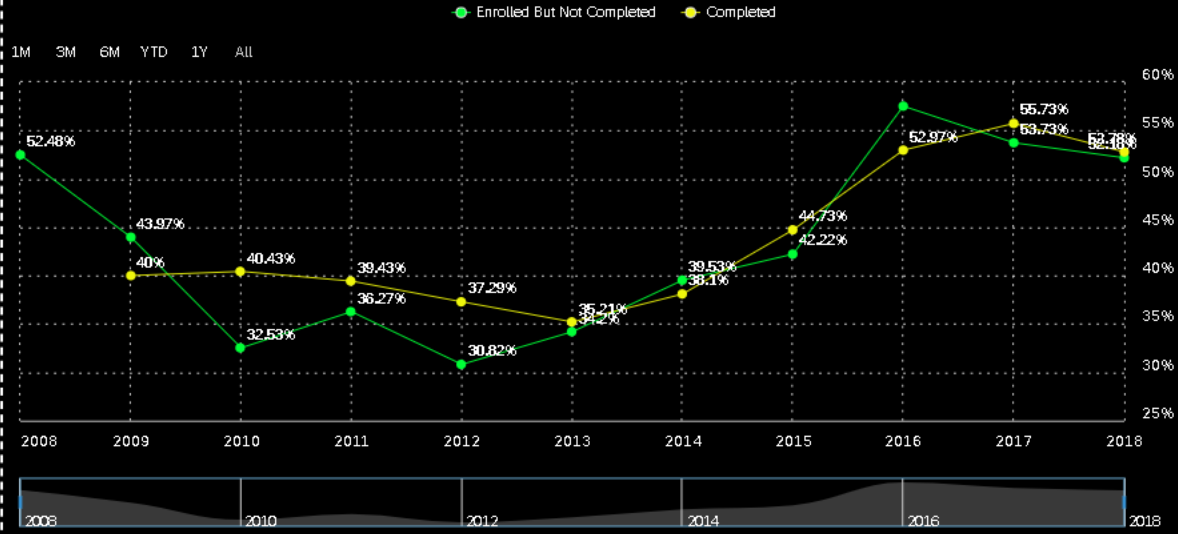- Substance Abuse Treat...

County of Pulaski, AR, Esri, HERE, Garmin, METI/NASA, USGS, EPA, NPS, USDA

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Average Distance(mi) By Area

Area	Average Distance(mi)
Conway	45.91
Searcy	43.80
Texarkana P & P	38.27
Fayetteville P&P	37.23
West Memphis	36.15
Fort Smith	34.57
Jonesboro	30.63
Mountain Home	29.97
Hot Springs	29.85
Pine Bluff P&P	26.24
LR Probation	21.55
El Dorado P & P	16.68
Little Rock Parole	12.73

Legend (donut chart): Probation, Parole, Suspended, Pre-Trial

Donut chart values: 62.11%, 33.34%, 4.24%, 0.31%

Bar chart values: 29,153 · 6,475 · 2,037 · 1,856 · 1,782 · 1,645 · 1,463 · 121

Legend:
- Active (Direct Supv)
- Absconded
- Non-Reporting
- Suspnd Imposition of Snt (SIS)
- Incarcerated
- Out to Other State
- Unsupervised
- Electronic Monitoring (Direct)

Average Distance(mi) **BY** ⟷ Offender Count **BY** Office

OFFICEDISTMI
127.04

OFFICEDESC   Ozark
COUNT   279

Recidivism Rate per Anger Management (P), Date Hierarchy

in % · 3 Filters applied

● Enrolled But Not Completed ● Completed

1M 3M 6M YTD 1Y All

- 52.48%
- 43.97%
- 40%
- 40.43%
- 32.53%
- 36.27%
- 39.43%
- 30.82%
- 37.29%
- 38.1%
- 39.53%
- 35.21%
- 34.2%
- 42.22%
- 44.73%
- 52.97%
- 55.73%
- 53.73%
- 52.18%

2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018

Recidivism Rate per Date Hierarchy, Thinking Errors (P)

in % · 3 Filters applied

● Enrolled But Not Completed ● Completed

1M 3M 6M YTD 1Y All

- 33.33%
- 32.59%
- 42.5%
- 32.91%
- 28.85%
- 37.21%
- 33.62%
- 35.06%
- 34.09%
- 38.41%
- 36.08%
- 46.32%
- 43.79%
- 54.21%
- 53.15%
- 52.51%
- 54.98%
- 55.05%
- 49.34%

2009 2010 2011 2012 2013 2014 2015 2016 2017 2018
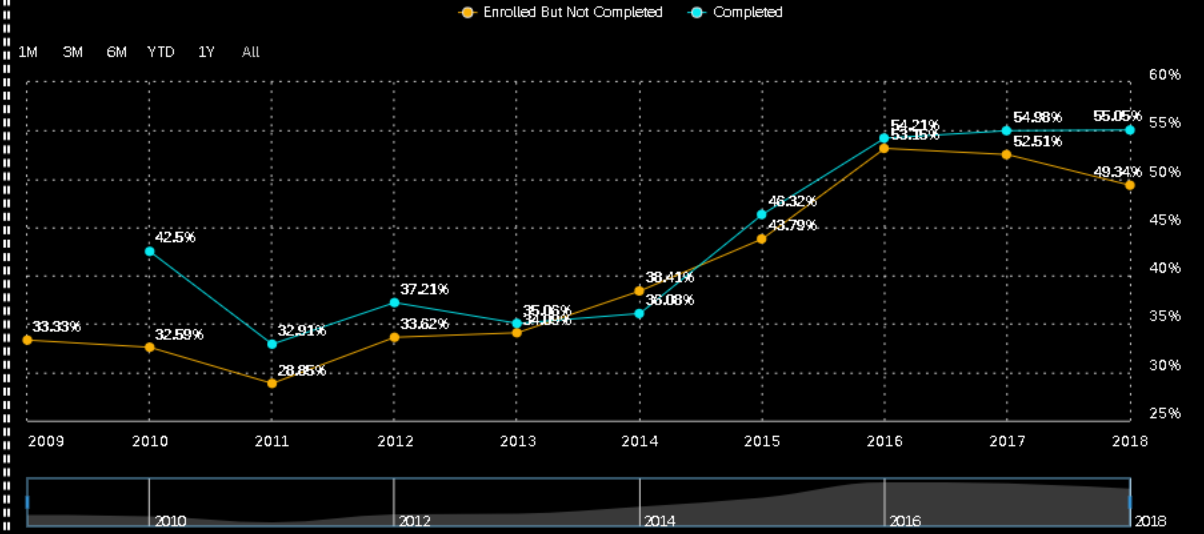
Recidivism Rate per Communication Skills (P), Date Hierarchy

in % · 3 Filters applied

● Completed ● Enrolled But Not Completed

1M 3M 6M YTD 1Y All

- 40%
- 33.33%
- 34.21%
- 31.91%
- 38.27%
- 35.19%
- 46.06%
- 37.68%
- 55.62%
- 42.24%
- 55%
- 47.17%
- 47.63%
- 45.54%

2012 2013 2014 2015 2016 2017 2018
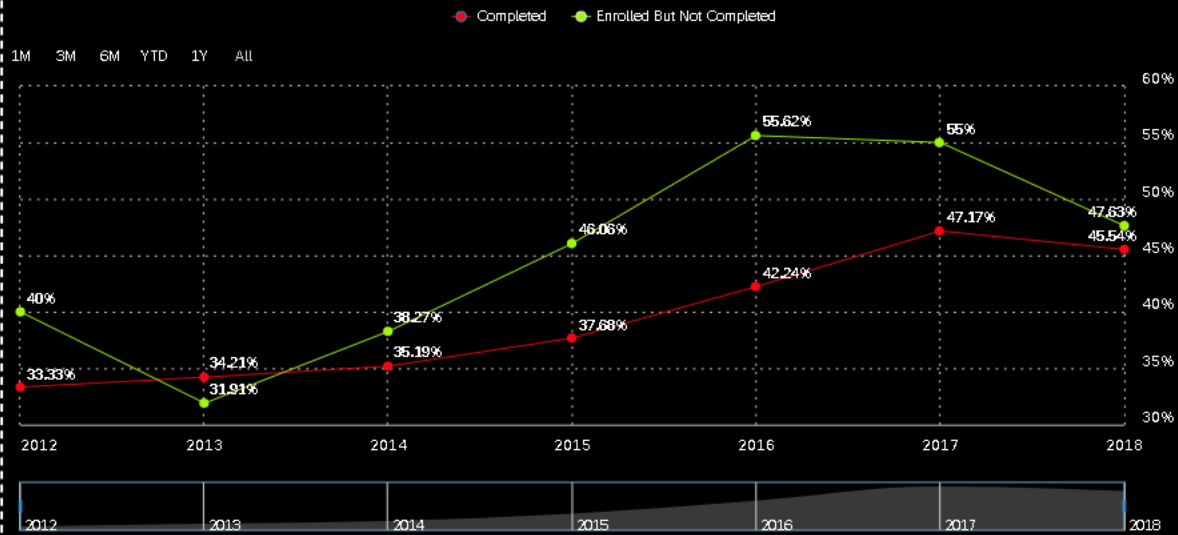
Recidivism Rate per Date Hierarchy, Domestic Violence (P)

in % · 3 Filters applied

● Completed ● Enrolled But Not Completed

1M 3M 6M YTD 1Y All

- 55.56%
- 50%
- 38.71%
- 32.31%
- 44.59%
- 43.17%
- 45.83%
- 45%
- 58.8%
- 54.95%
- 56.88%
- 54.28%
- 55.43%
- 49.5%

2012 2013 2014 2015 2016 2017 2018
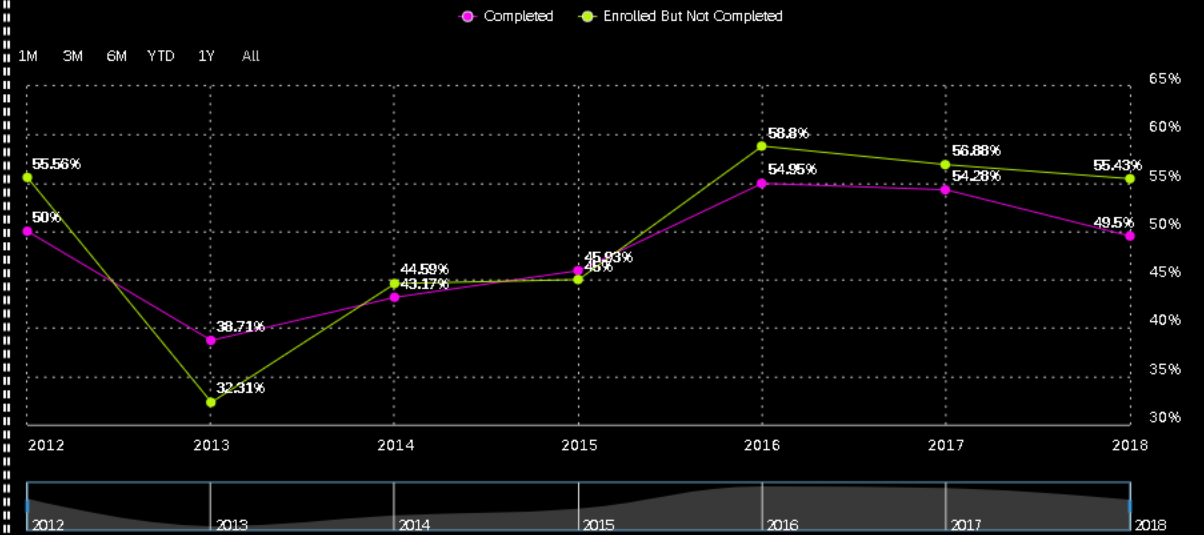
Solution Architecture
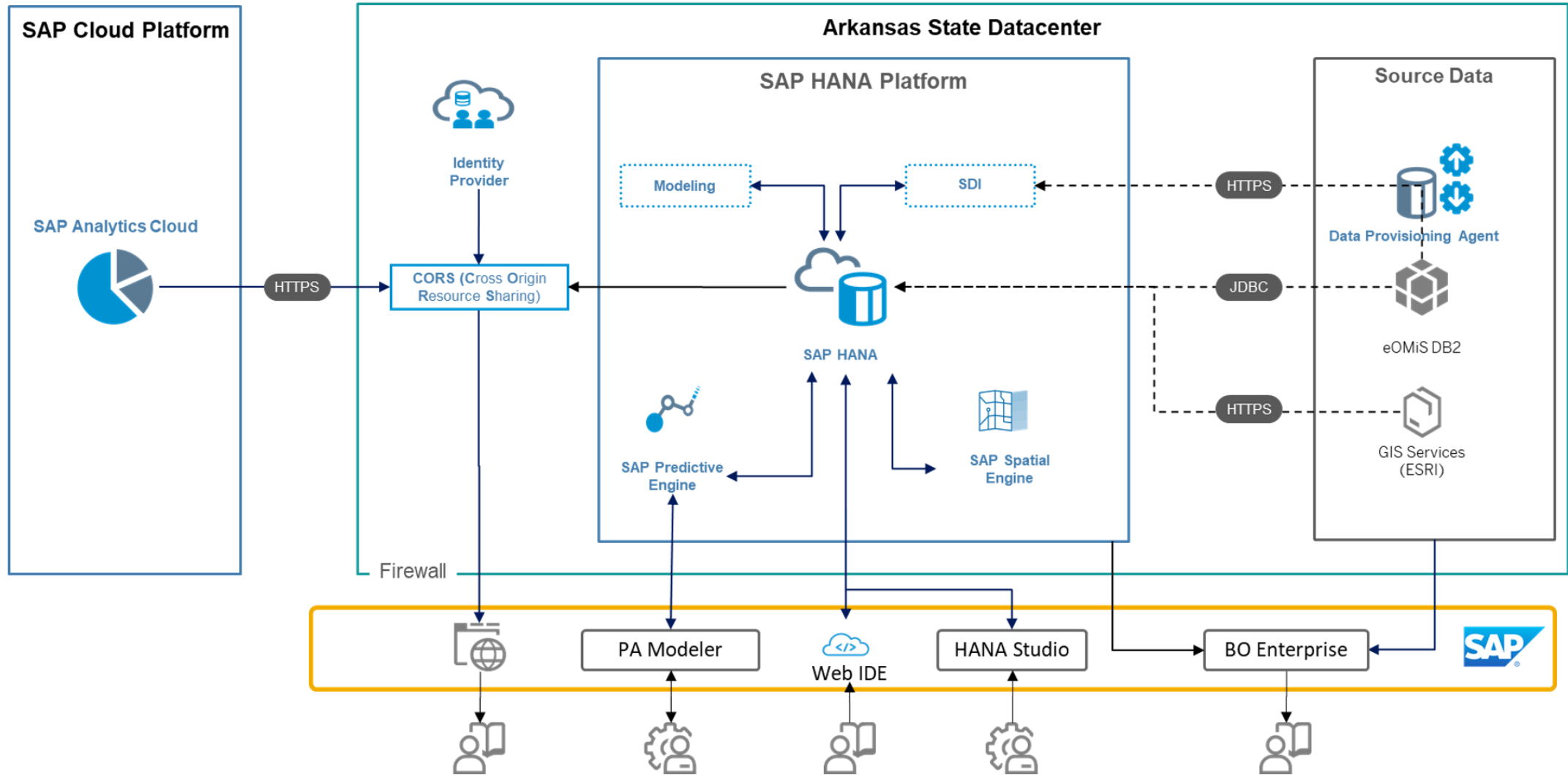
Lessons Learned

- Benefits of Hands-On Experience

- Public Sector Challenges (Pace, Sharing, Security, Culture)

- Value is Defined by the Business

- Consistent Stakeholder Engagement

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Next Steps

- Move from POC to production system

- Introduction of more data sources for additional interventions

- Scale out beyond public safety to other domains

Take the Session Survey.

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Presentation Materials

Access the slides from 2019 ASUG Annual Conference here:
http://info.asug.com/2019-ac-slides

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Q&A

For questions after this session, contact us at
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