Assessment of Effectiveness and Efficiency of VR Office Placement Using Location Analytics

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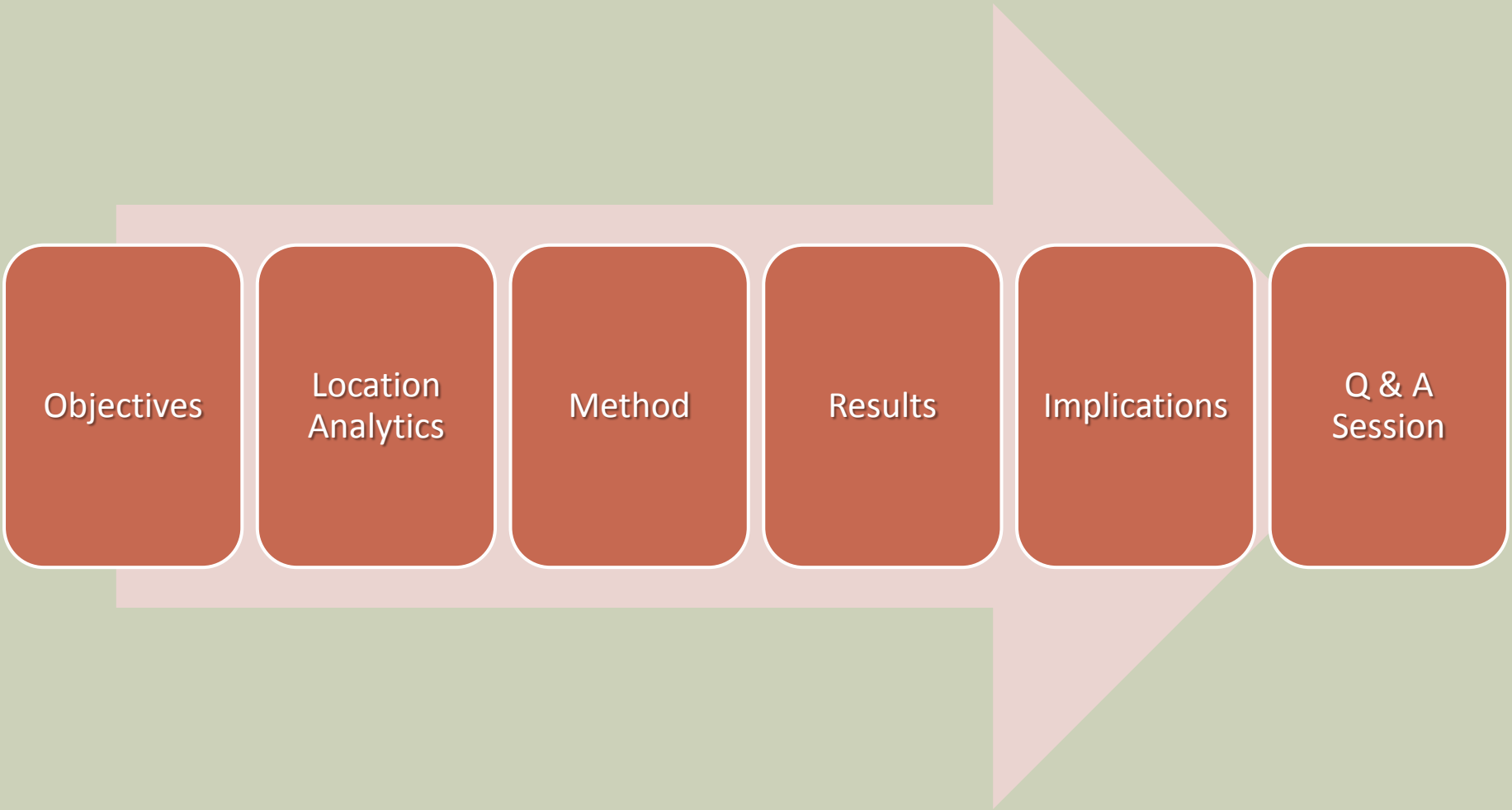
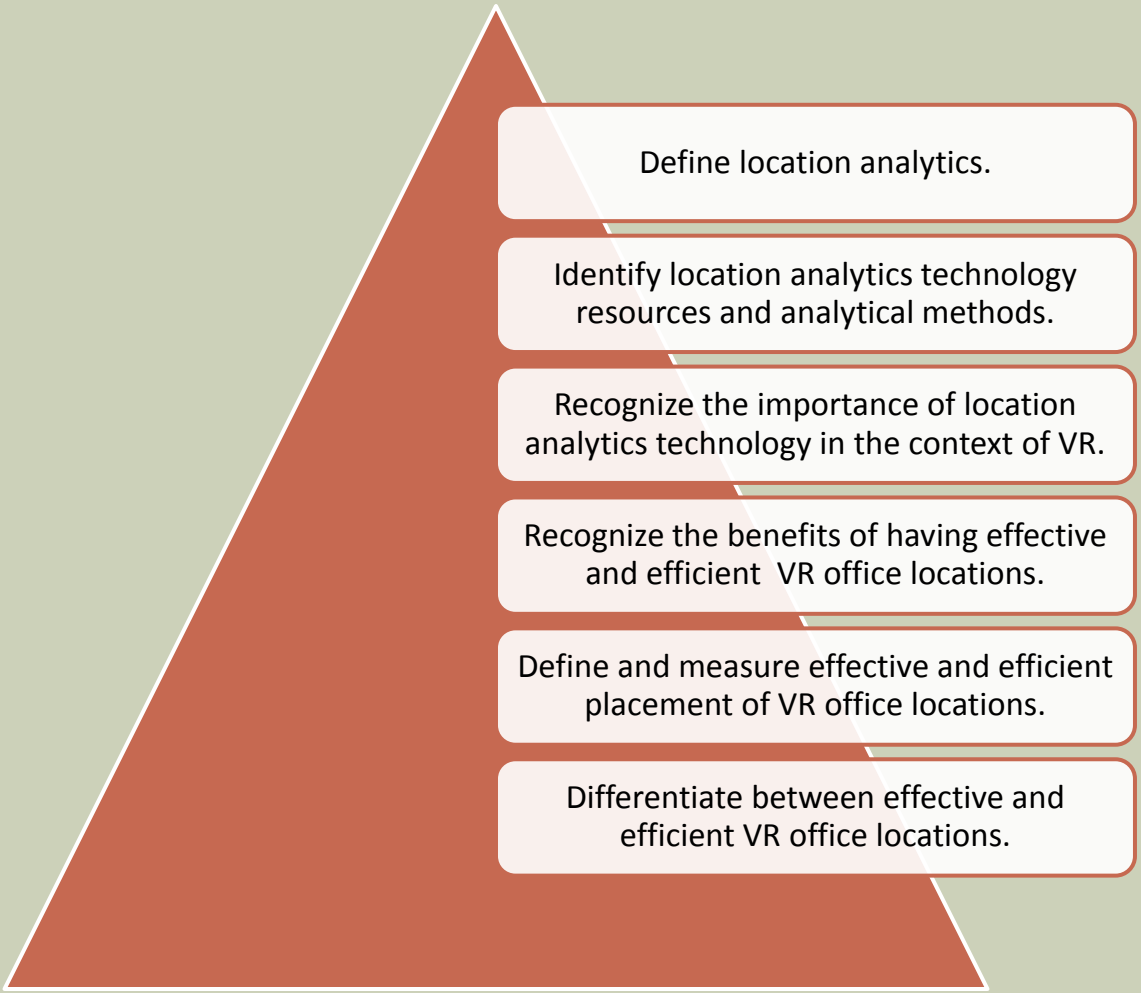
Outline

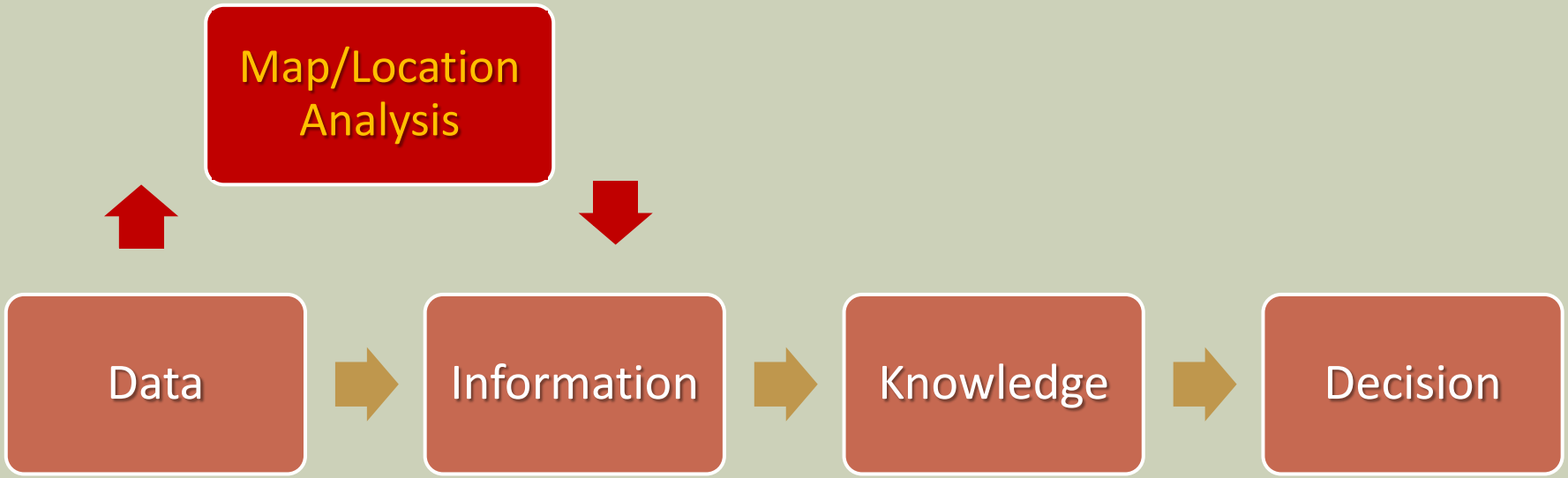

Objectives
Location Analytics
Method
Results
Implications
Q & A Session

Objectives


Define location analytics.
Identify location analytics technology resources and analytical methods.
Recognize the importance of location analytics technology in the context of VR.
Recognize the benefits of having effective and efficient VR office locations.
Define and measure effective and efficient placement of VR office locations.
Differentiate between effective and efficient VR office locations.

Location Analytics

Enhance data discovery and communication with maps



Everything happens somewhere…

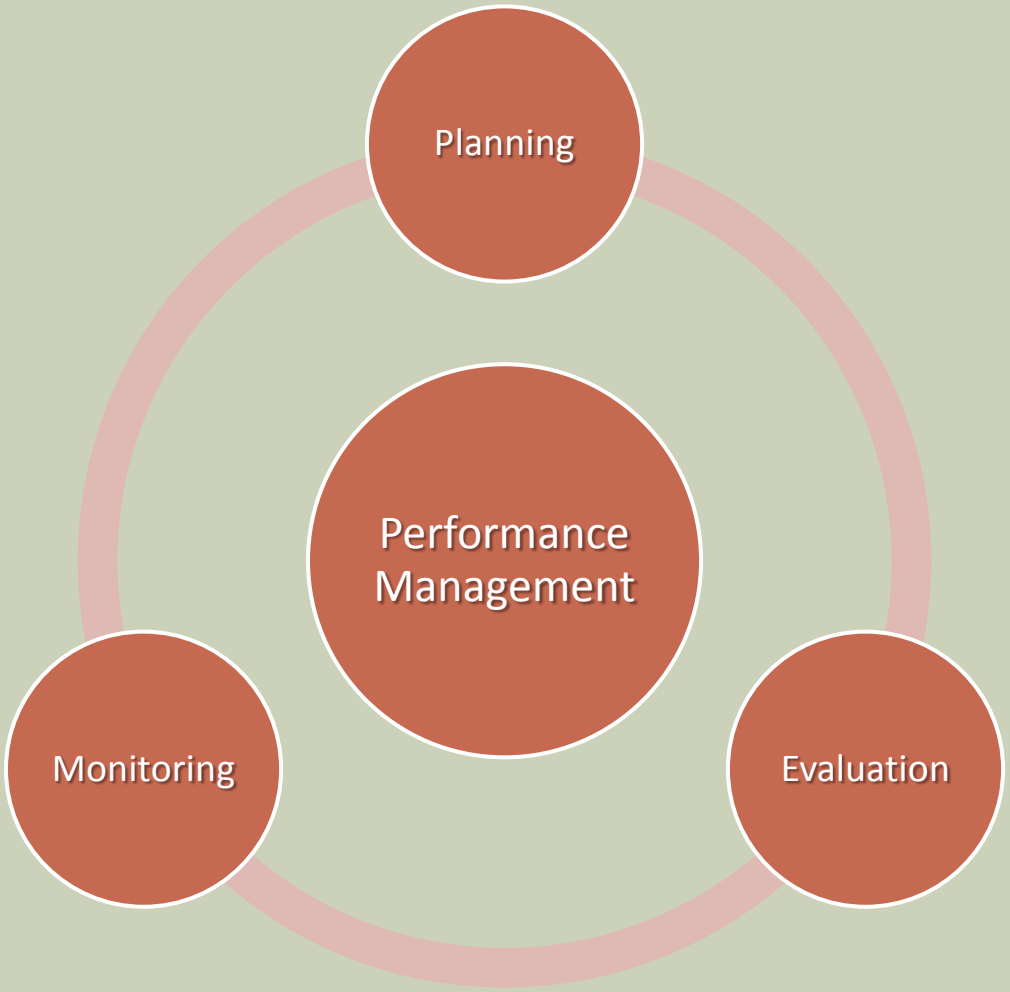
Location Analytics
Resources Available

- Identify the analytics training you need
  - 3 step process.....Forbes Magazine
    - Identify what you want to do
    - Identify the skills gap
    - Based on skills gap, choose the most appropriate training option
  - Or pay someone outside to do it for you…

- Technology Resources
  - InstantAtlas
  - tableau
  - Google Fusion Tables
  - Top 10 Data Analysis Tools for Business
  - ArcGIS Desktop (ESRI) Free Trial

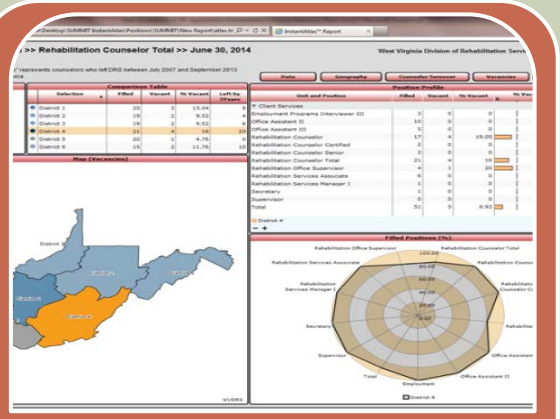
Location Analytics

Applications in VR

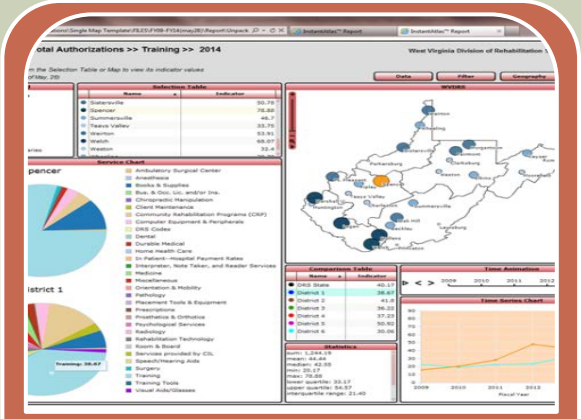


Location Analytics

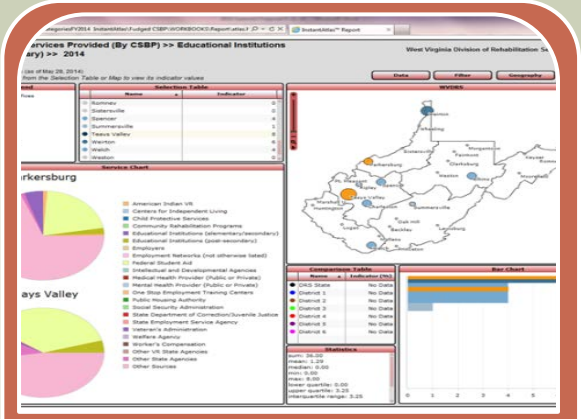
WVDRS Applications



Human Resources



Service Provision and Expenditures



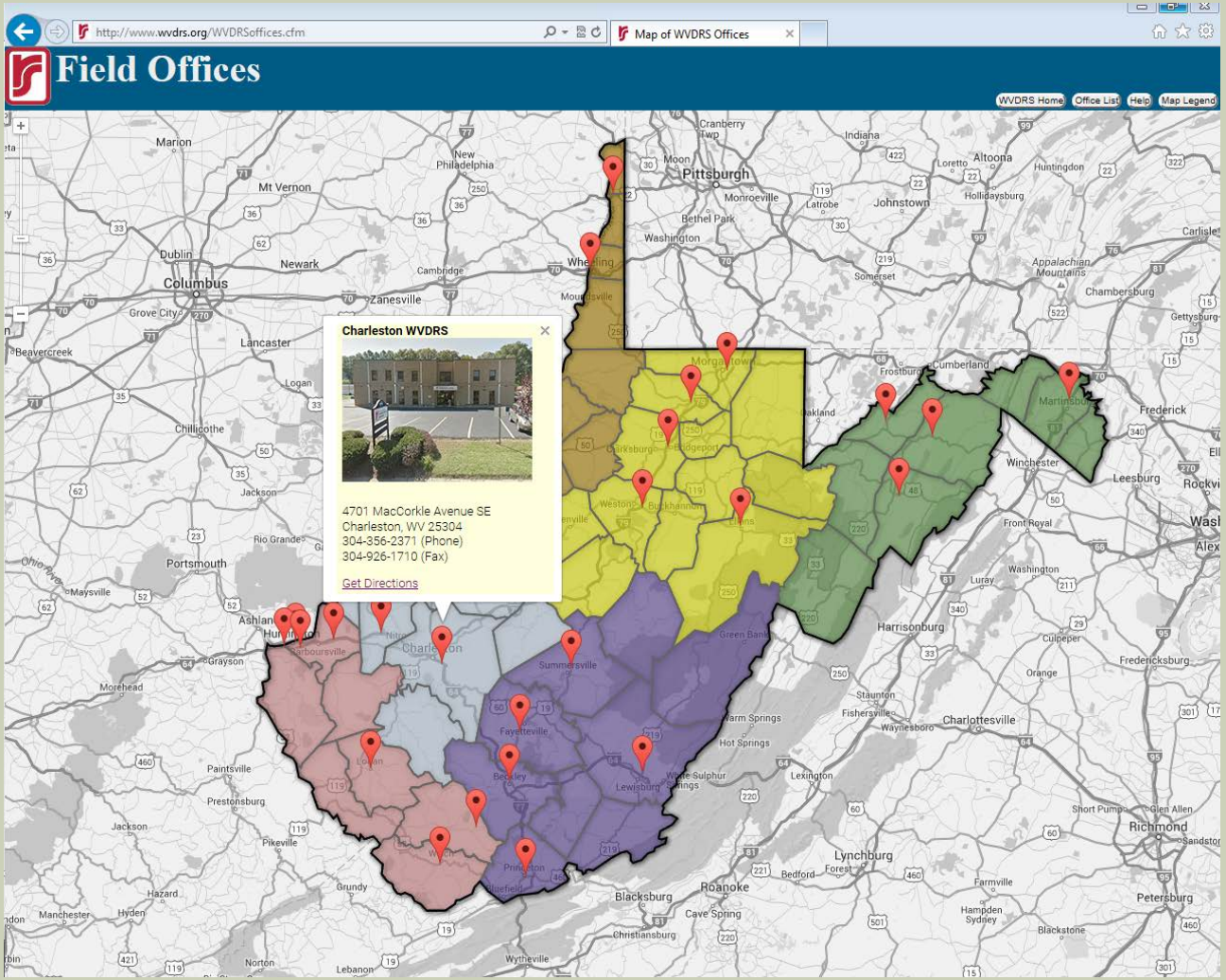
Partnerships & Collaborations

Performance Management

Location Analytics

WVDRS Applications

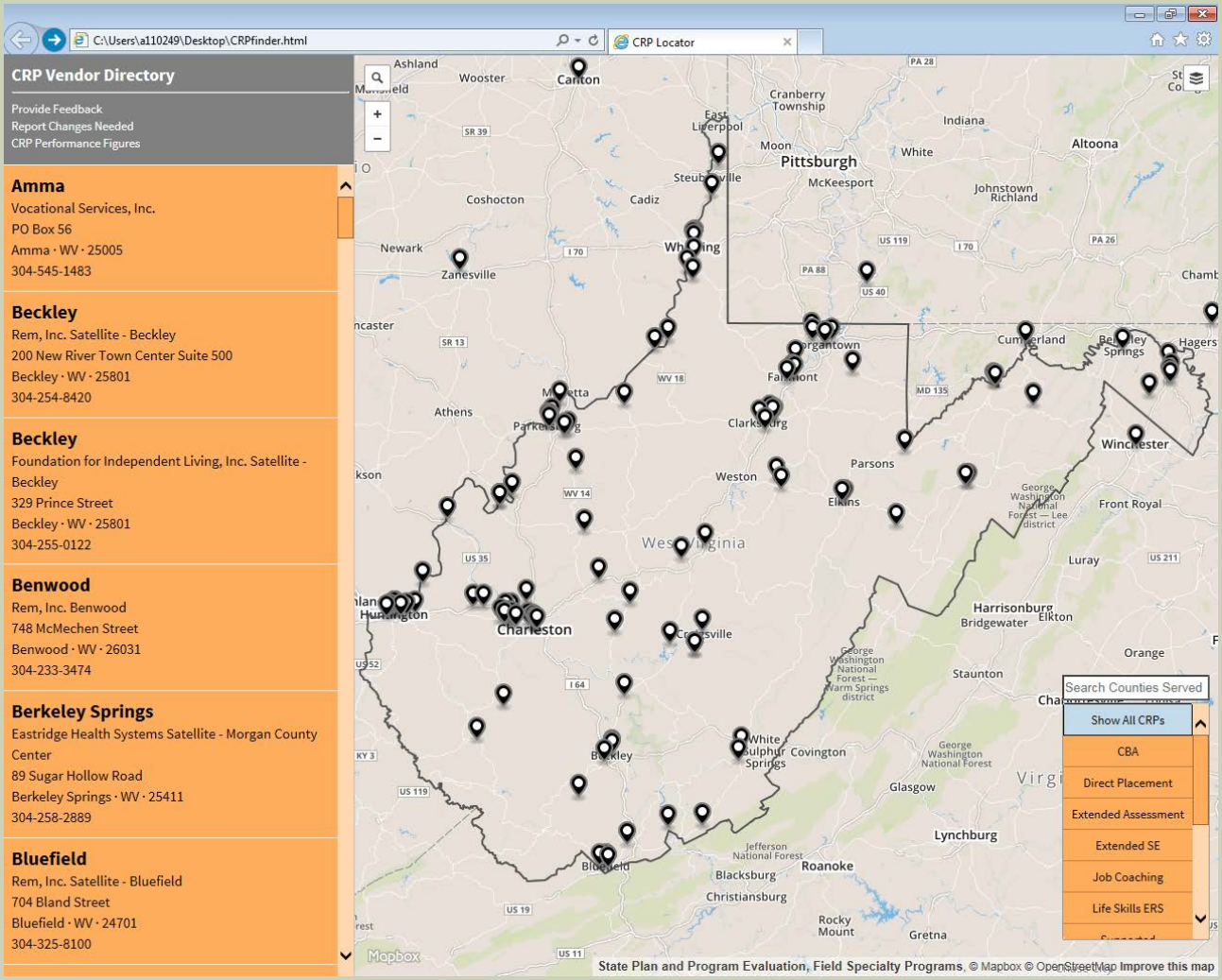
For Potential Consumers



Location Analytics

WVDRS Applications

For VR Counselors



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Applying Location Theory in Vocational Rehabilitation

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Abstract. *A rarely acknowledged strategy to optimize vocational rehabilitation (VR) service delivery and consumption for persons with disabilities is to have effective and efficient VR field office locations. Public facility location theory offers a sound framework for understanding how VR agencies can meet these locational objectives. This study determines the relevance of this theoretical framework for VR by applying a network analysis method using a geographic information system (GIS) and data on West Virginia Division of Rehabilitation Services (WVDRS) field office locations and consumers. The findings confirm the value of public facility location theory in VR. The GIS method presented in this study can be replicated by federal and state VR agencies to evaluate the effectiveness and efficiency of VR field office locations and validate the need for new offices across the United States to enable and empower individuals with disabilities to gain or maintain employment.*

Keywords: Vocational Rehabilitation (VR), location theory, effectiveness and efficiency, geographic information systems (GIS), network analysis, field office

Within the public vocational rehabilitation (VR) program, VR field offices are where the path to employment begins for individuals with disabilities. The critical stages in the VR process—from application to development of an individualized plan for employment (IPE)—are facilitated at a VR field office. Field offices, therefore, are nuclei in the public VR program but we very rarely acknowledge how and where VR agencies choose to locate them, let alone how these decisions affect VR service coverage and utilization. Field office location decisions are subject to careful weighing of choices and constraints in support of VR program goals of enabling and empowering individuals with disabilities to gain or maintain employment. Stakeholder interests, zoning regulations, political climate, real estate costs and availability, and architectural accessibility regulations in the Americans with Disabilities Act, are a few of these factors.

Distance between VR field offices and consumers also shapes office location decisions in VR. Literature of public facility location theory offers a general framework for understanding how distance influences these decisions (Batta, Lejeune, & Prasad, 2014; Beguin & Ipanga, 1991; Bigman & ReVelle, 1978; DeVerteuil, 2000; Fok, Hartman, & Fok, 2001; Fortney, 1996; Greenhut & Mai, 1980; Hansen, Peeters, & Thisse, 1980; Lea, 1979; Marianov, Rios, & Taborga, 2004; McAllister, 1976; Morril & Symons, 1977; Orloff, 1977; Schilling, 1980; Serra & Marianov, 2004; Teixeira & Antunes, 2008). This literature suggests that VR agencies strive for field office locations that are effective and efficient.

Importance of field office location in optimizing VR service delivery and consumption

- GIS location modeling
- Statistical analysis

VR Office Location

VR Program Nuclei

Path to employment begins here for VR consumers

Critical stages facilitated here:

Application  IPE Development

VR Office Location

Where to locate field offices?

Choices and constraints

- Stakeholder interests
- Zoning regulations
- Real estate cost/availability
- Architectural accessibility

What about distance?
(between field office and consumer)

Effective and Efficient locations

Effective =

near persons with disabilities

Efficient =

high utilization of VR services

VR Office Location

Outcomes of maintaining effective and efficient locations

Serve consumers more:

- **Effectively** by minimizing the distance between office and consumer
- **Efficiently** by maximizing service consumption by persons with disabilities

Research Questions

- (1) Do VR consumers enter the VR program via field offices nearest to them?
- (2) Is there a distance decay effect on program participation in VR?
- (3) How effective and efficient are VR office locations?

- Assumption: Persons with disabilities who need VR services will exhibit rational behavior by using VR offices that are nearest to them.

- Goal: Measure and evaluate where WVDRS consumers are **expected** to apply for VR services and where they **actually** apply for VR Services

- **Expected locations** = field offices they would use if they exhibit perfectly rational behavior (choose office closest to them).

Method

GIS	• Definition • Progress in VR
Data	• WVDRS • GIS
Network Analysis	• ESRI's Network Analyst • Closest facility analysis • Network models
Statistical Analysis	• Nearest office • Distance decay effect • Effectiveness and efficiency of VR office locations

Geographic Information System (GIS)

Definition:

A computer-based system used in managing, analyzing, and displaying ***spatial*** information in support of decision-making.

- Cost savings from greater efficiency
- Improved communication
- Better decision making about location
- Better record keeping
- Managing geographically
  - Source: http://www.esri.com/what-is-gis

Progress in VR

Cultivating data analysis and visualization capabilities of GIS for the benefit of VR program development and evaluation

- VR Service Accessibility (Metzel and Giordano 2007)
- Data Visualization (Groomes, Jones, Stoddard & Pflueger, 2012; Quinn, Pflueger, & Stoddard; Stoddard, 2011)
- Minority Outreach (WVDRS: 2011, 2012)

DATA

WVDRS

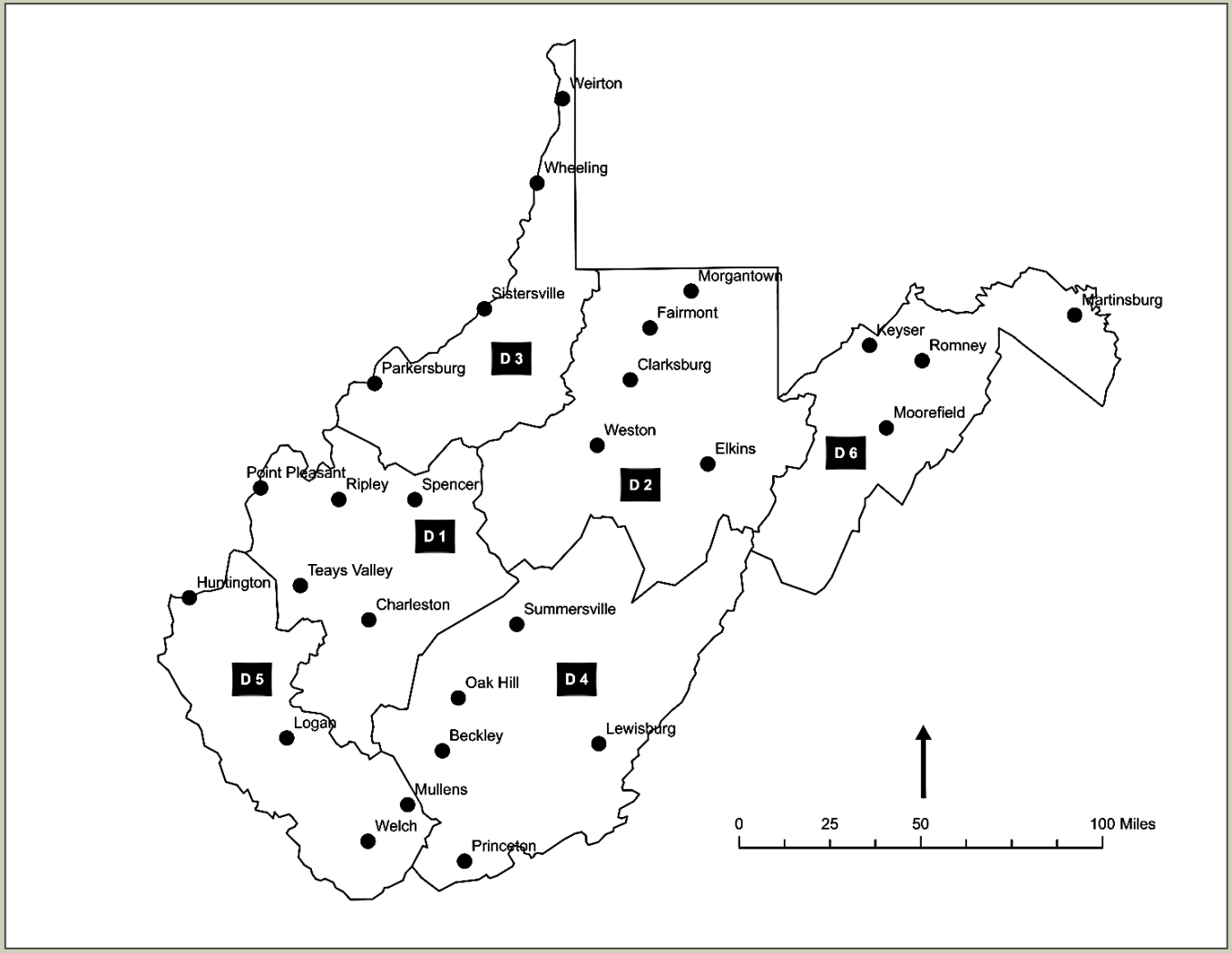
- The number of WVDRS consumers who applied for VR services over federal fiscal years (FY) 2009-2014 (as of 07-23-2014) were used.
- Only general cases in which the applicants resided in WV and were above the age of 24 at application were used.
- A total of 15,234 applicants were used in the analysis.

DATA

GIS

- **WV Road Network**
  - WV file contains 384,455 road segments
  - Descriptive characteristics for each segment (name, classification)
  - Special characteristics (travel direction, one-way street designation)
- **WV Zip Codes**
  - 708 WV zip code boundaries
  - Make connections in network analysis between applicant's home zip codes and field offices (observed and expected applications)
- **Field Offices**
  - Permanent WVDRS field offices (n=27) were used. The field offices are distributed over six service districts: District 1 (n = 5); District 2 (n = 5); District 3 (n = 4); District 4 (n = 5); District 5 (n = 4) and; District 6 (n = 4).

WVDRS Office Locations

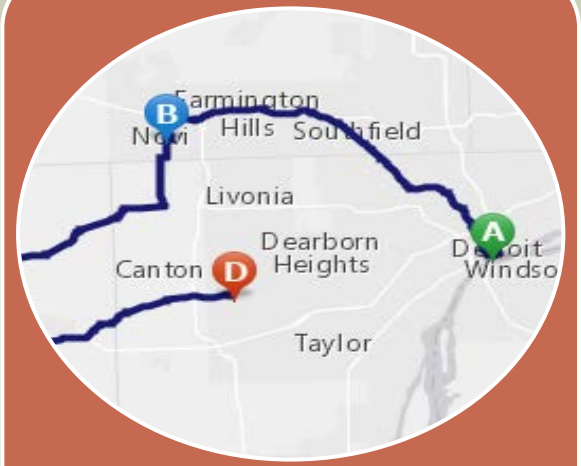


Network Analysis

ArcGIS Network Analyst (ESRI)

Solve Network Problems

Service Areas



Least-Cost path

Closest Facility

Network Analysis
Closest Facility Analysis

Measure driving distance along road network between WVDRS applicants' home zip code centroid (geometric center of zip code) and WVDRS offices.

Model Requirements	• WVDRS parameters below
Travel Costs	• Road Length (miles)
Travel Restrictions	• One-way designation
Facility Locations	• WVDRS offices
Incident Locations	• Applicants' home zip code centroid

Network Analysis

Closest Facility Analysis Models

(1) Nearest WVDRS offices where applicants were ***expected*** to have applied for VR services.

(2)WVDRS offices where applicants were ***observed*** to have applied for VR services.

Statistical Analysis
Nearest Office

Question 1: Do VR consumers enter the VR program via field offices nearest to them?

Analysis Technique	Needed Evidence
Welch's T test	-More WVDRS applicants used the office they were expected to use than applicants that did not. -Applicants that used expected offices also traveled significantly shorter distances in submitting their application for WVDRS services.

Statistical Analysis
Distance Decay Effect

Question 2: Is there a distance decay effect on program participation in VR?

Analysis Technique

Exponential regression

-DV: WVDRS applicants

-IV: Miles traveled to office

Needed Evidence

-Tendency for WVDRS applicants to use field offices less frequently with increasing distance

-Fewer applicants with increasing distance

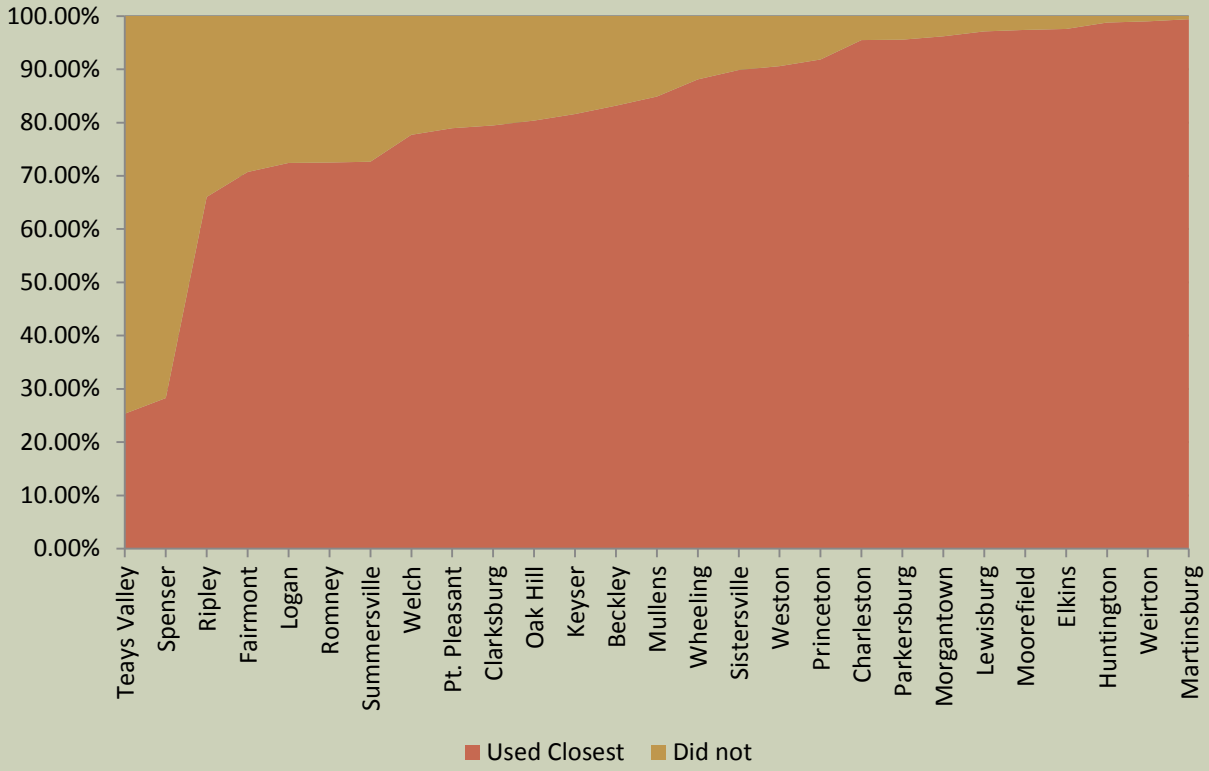
Statistical Analysis
Effectiveness and Efficiency

Question 3: How effective and efficient are VR office locations?

Analysis Technique	Needed Evidence
-Majority of VR consumers should be as close to VR offices as VR offices are to each other. -Nearest neighbor analysis used to calculate average driving distance from each office to its nearest neighbor----29.05 miles. -Average distance used as threshold in determining effectiveness and efficiency----30.00 miles.	- No less than 80% of the WVDRS applicants traveled 30 miles or less in reaching field offices.

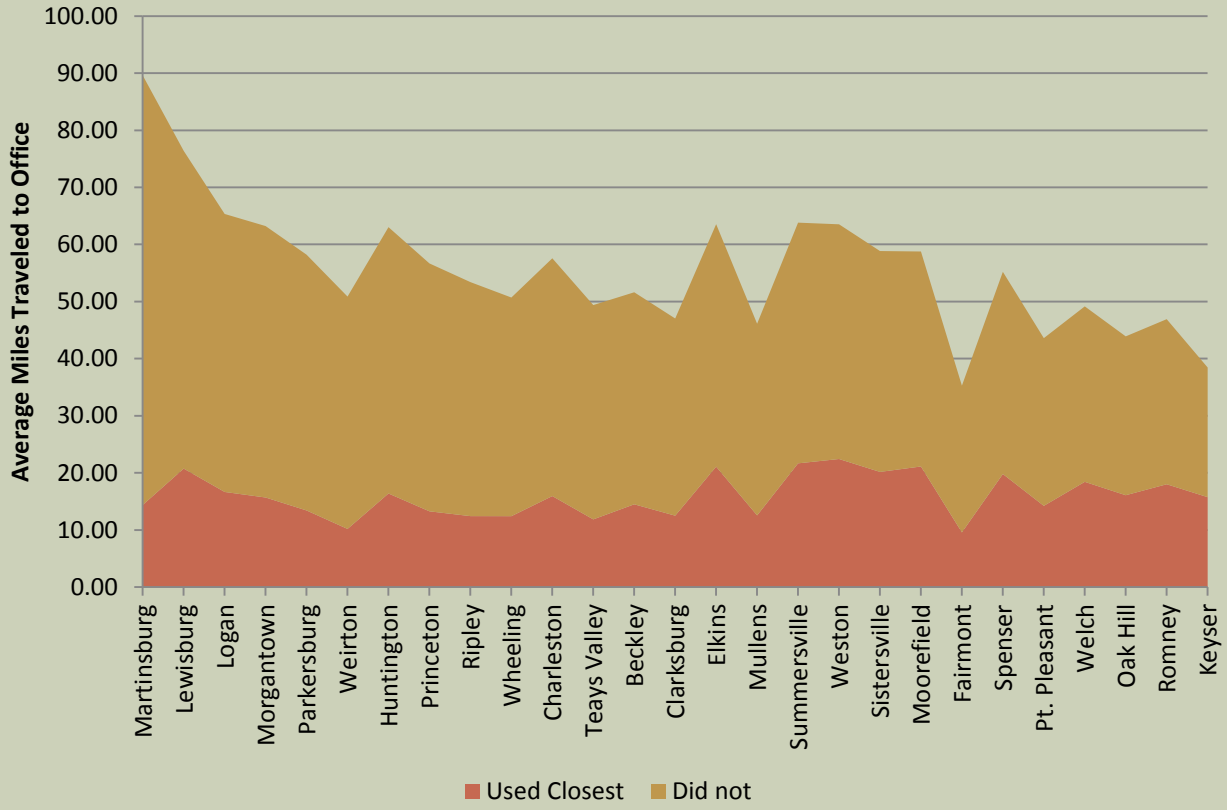
Results
Nearest Office

- Throughout WV from FY 2009-2014, 13,072 WVDRS applicants, or 85.80%, did use the closest WVDRS field office while 2,162 applicants (14.20%) did not.



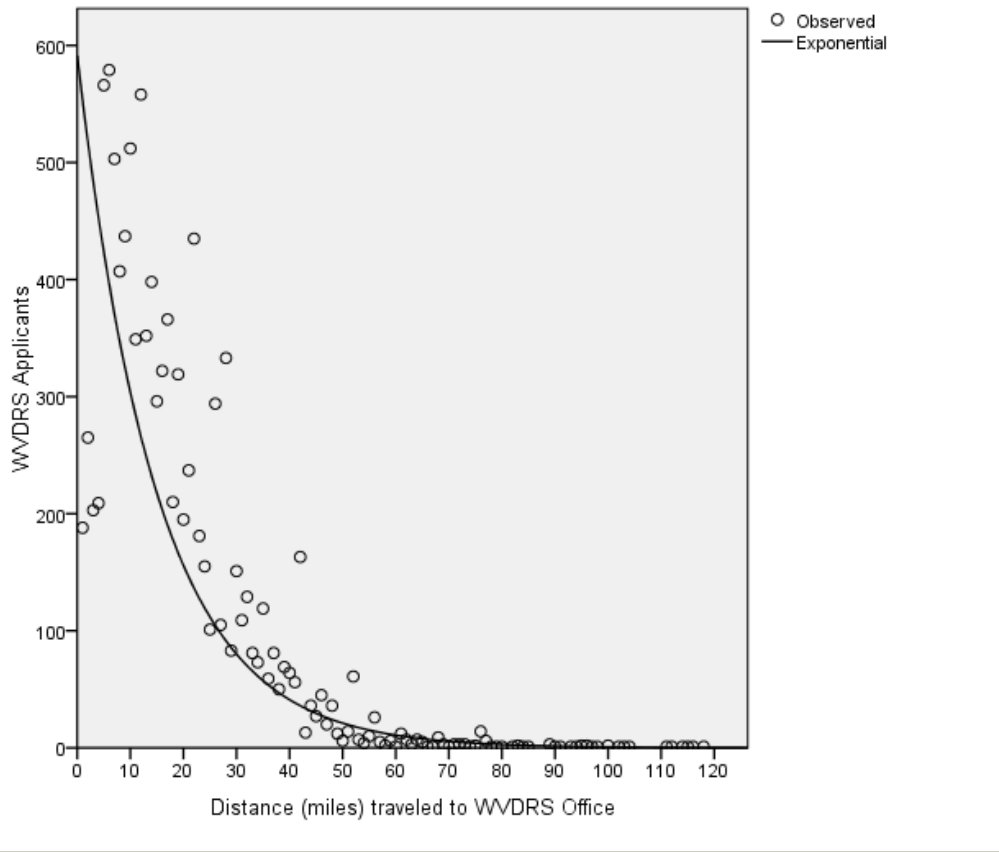
Results
Nearest Office

- WVDRS applicants who did not choose the nearest office traveled 24 miles farther on average than WVDRS applicants who used the nearest office.



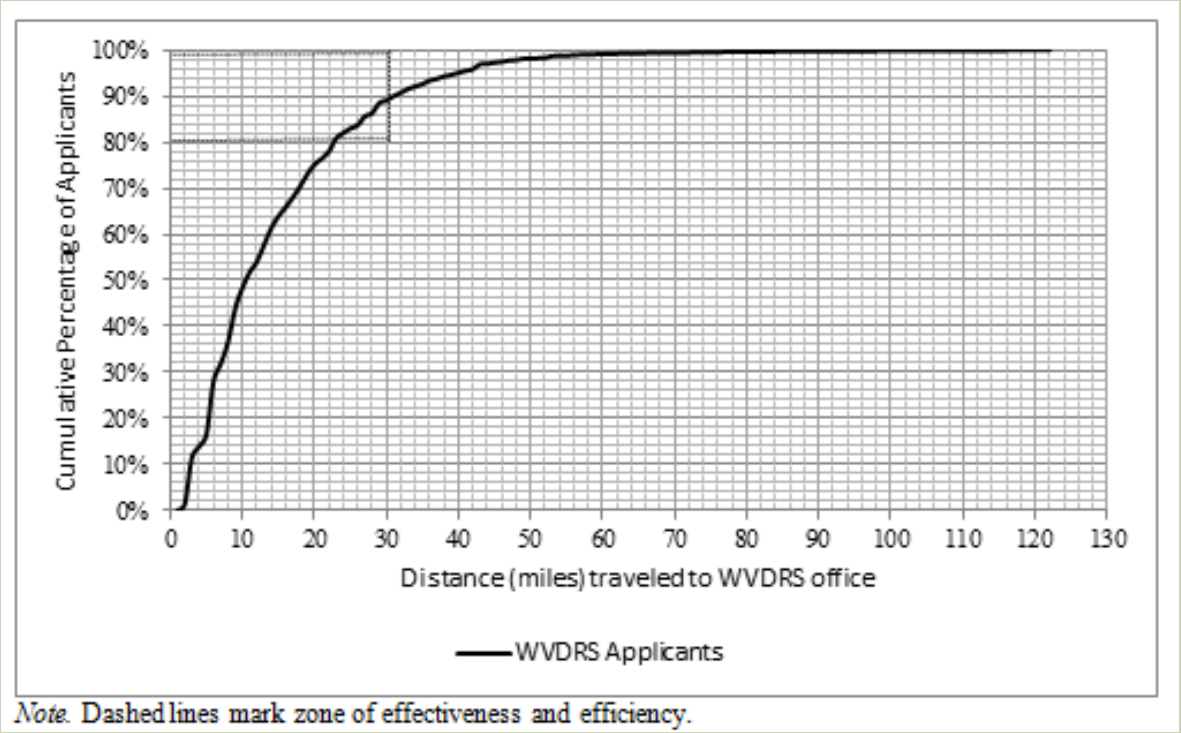
Results
Distance Decay Effect

- Distance did not curtail some consumers from traveling outside their expected VR service area, but it did influence how many applicants made these trips.



Results
Effective and Efficient Locations

- Global pattern of WVDRS offices is effective and efficient.
- Getting maximum returns on VR service consumption.
  - Received a 90% return on VR service consumption at the distance threshold, 10% larger than the minimum return desired.

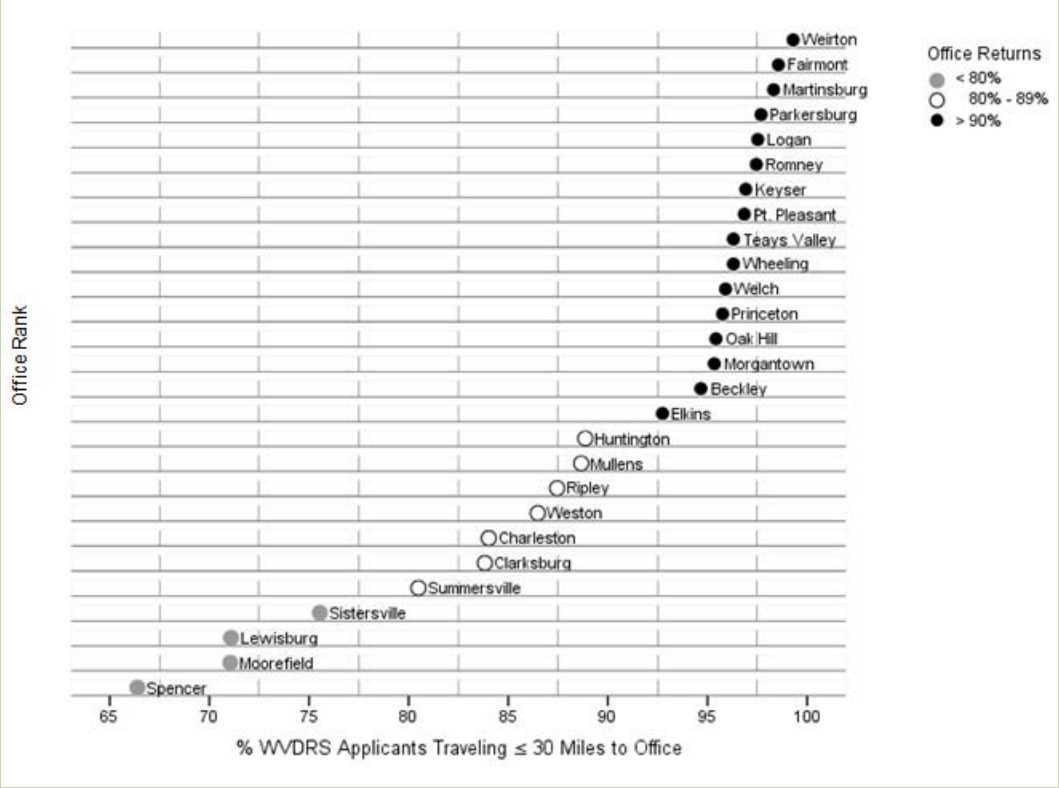


Note. Dashed lines mark zone of effectiveness and efficiency.

Results

Degree of Effectiveness and Efficiency

- Nearly all WVDRS office locations are effective and efficient: 23 of 27 offices achieved returns above the 80% threshold.
- Only a few more miles were needed to capture the desired 80% at a few offices.



Conclusion

- Location Analytics
  - VR administrators can be even clearer about policies and choices.
  - Example: GIS-modeling allows testing of different assumptions that may influence effectiveness and efficiency of office location.
- Replication
  - Collection of zip code information requirement
  - Federal-and state-level studies
  - Optimize VR service delivery and consumption by persons with disabilities

Special Thanks

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Questions?

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