Visualizing PennDOT's Planning and Programming Data

Information Resources Exchange Group
September 10th, 2014

Patrick Kielty
Center for Program Development and Management

What are we going to talk about?

Data Sharing and Visualization

Platforms

- MPMS – IQ
- PENNSHARE

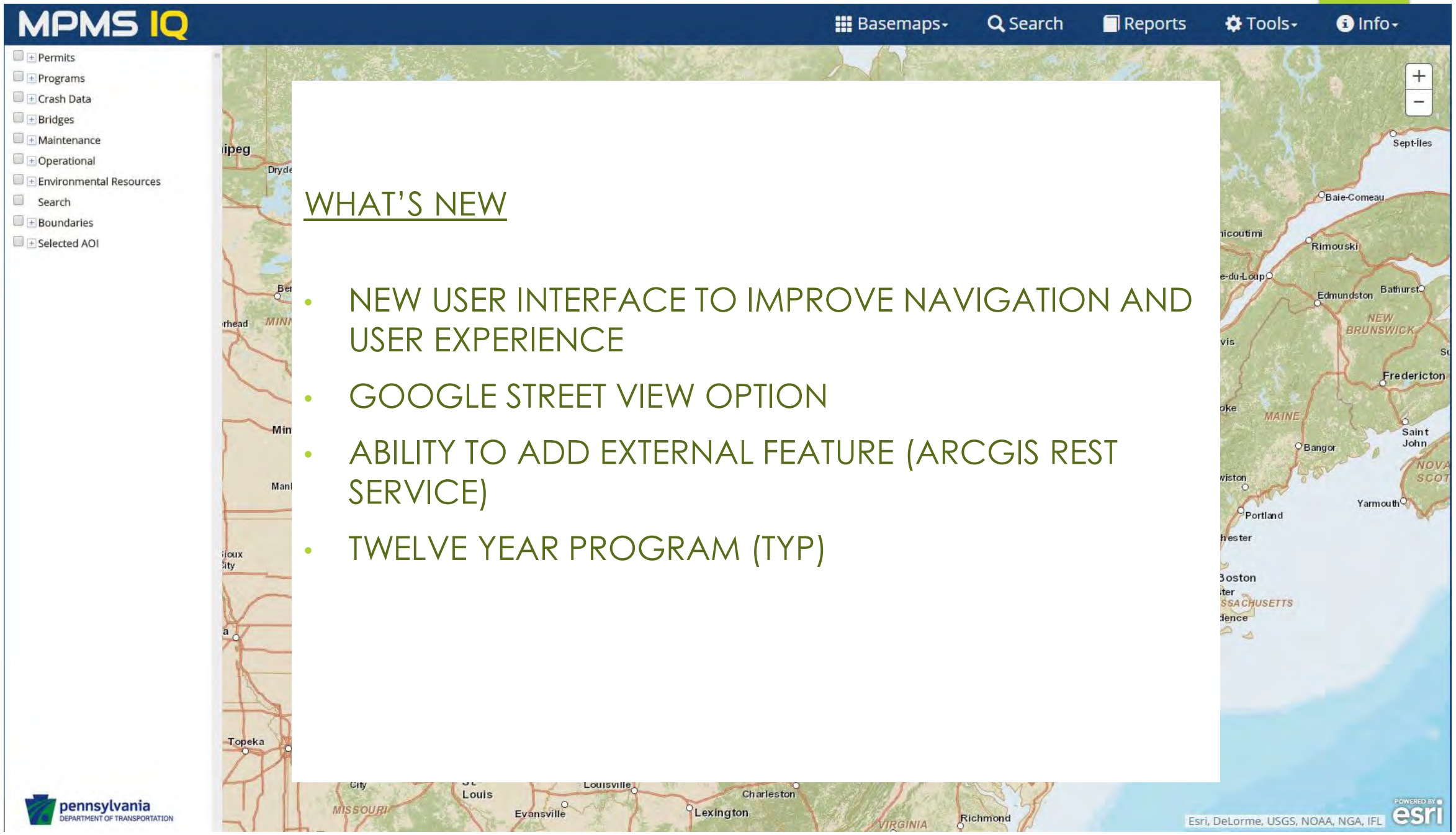
MPMS - IQ

http://164.156.155.62/mpms_iq/default.aspx

www.dot7.state.pa.us/mpms_viewer

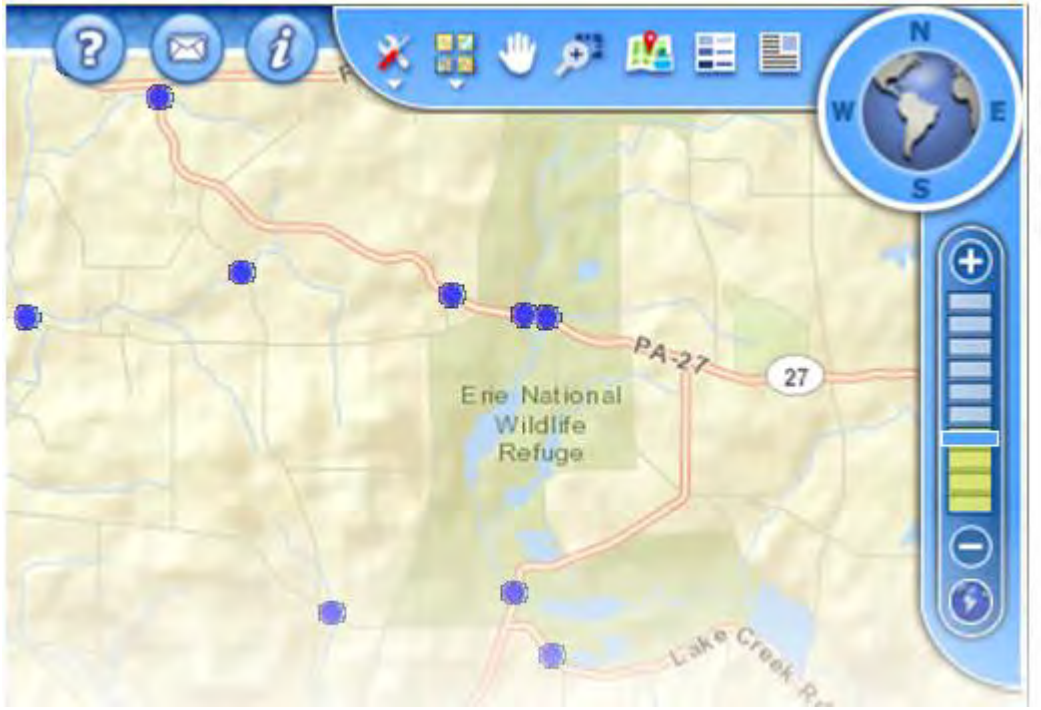
THE MPMS IQ APPLICATION IS A WEB-BASED GIS MAPPING APPLICATION FOR HIGHWAY AND BRIDGE PROJECTS ON THE COMMONWEALTH'S TWELVE YEAR TRANSPORTATION PROGRAM AND REGIONAL TRANSPORTATION IMPROVEMENT PLANS (TIPS). THIS APPLICATION ALLOWS USERS TO **MAP** AND OBTAIN **INFORMATION** FOR HIGHWAY, BRIDGE, AVIATION AND TRANSIT PROJECTS

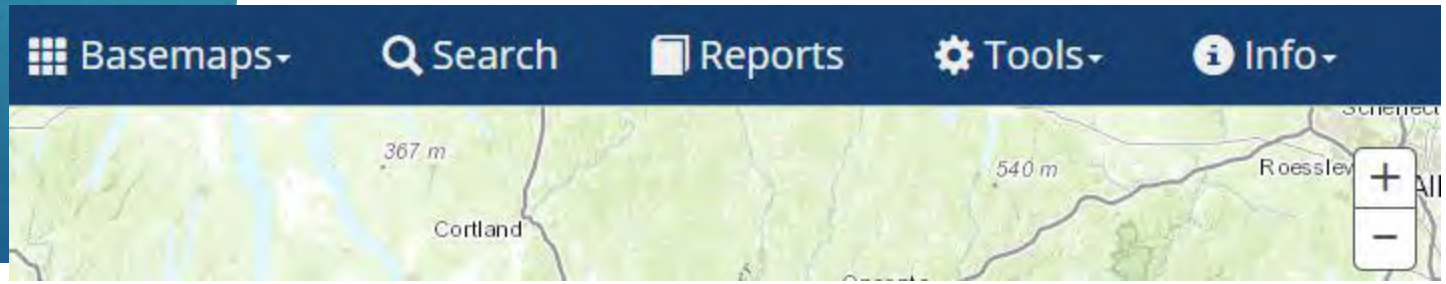
AVAILABLE AS BOTH AN INTERNET AND INTRANET VERSION


MPMS IQ
Basemaps
Search
Reports
Tools
Info
Permits
Programs
Crash Data
Bridges
Maintenance
Operational
Environmental Resources
Search
Boundaries
Selected AOI
WHAT'S NEW
NEW USER INTERFACE TO IMPROVE NAVIGATION AND USER EXPERIENCE
GOOGLE STREET VIEW OPTION
ABILITY TO ADD EXTERNAL FEATURE (ARCGIS REST SERVICE)
TWELVE YEAR PROGRAM (TYP)
Sept-Îles
Baie-Comeau
Rimouski
Edmundston
Bathurst
NEW BRUNSWICK
Fredericton
MAINE
Saint John
Bangor
Portland
Yarmouth
Boston
Topeka
Louisville
Charleston
Lexington
Evansville
Richmond
VIRGINIA
MISSOURI
pennsylvania
DEPARTMENT OF TRANSPORTATION
Esri, DeLorme, USGS, NOAA, NGA, IFL
esri

WHAT'S NEW

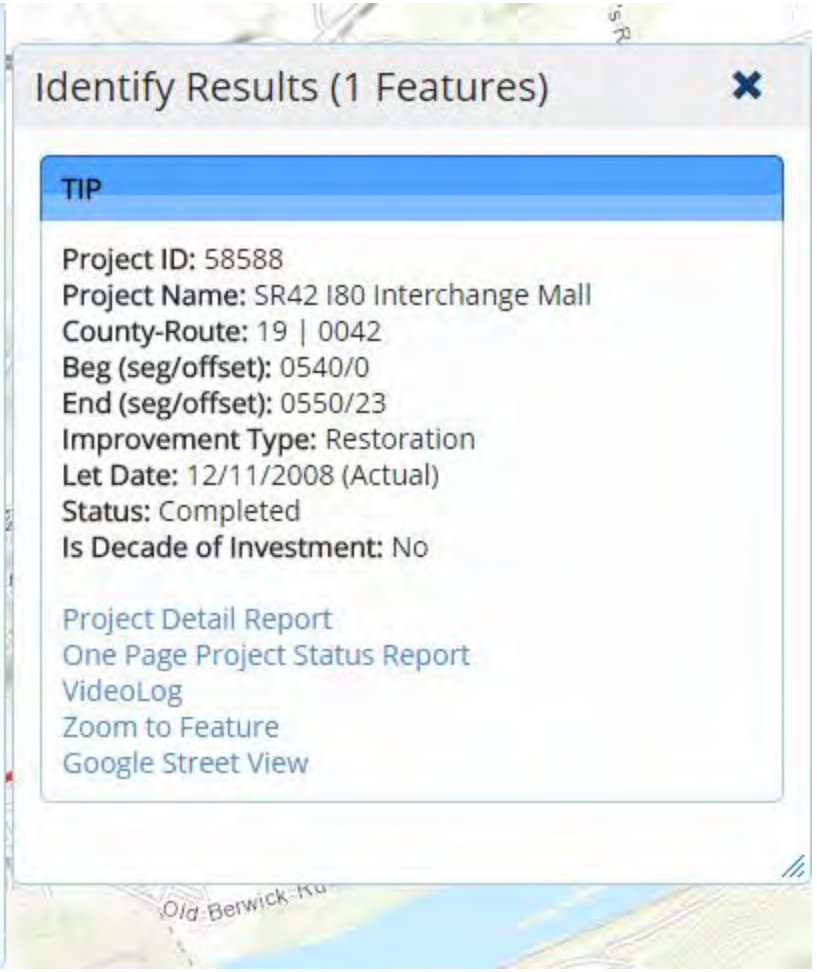
NEW INTERFACE





WHAT'S NEW

GOOGLE STREET VIEW



MPMS – IQ DATA AVAILABLE

PERMITS

- DRIVEWAY
- UTILITY
- MISCELLANEOUS

THESE INCLUDE PENDING, ISSUED, AND CLOSED OUT PERMITS

MPMS – IQ
DATA AVAILABLE

PROGRAMS

- DECADE OF INVESTMENT
- TIP
- DRAFT TIP
- INTERSTATE TIP
- ALL PROGRAMS
- TWELVE YEAR PROGRAM (TYP)

THESE INCLUDE FUTURE DEVELOPMENT, IN DEVELOPMENT, UNDER CONSTRUCTION, AND COMPLETED PROJECTS

MPMS – IQ DATA AVAILABLE

CRASH DATA (INTRANET ONLY)

- STATEWIDE CRASH LOCATIONS
- MPO/RPO CRASH LOCATIONS

MPMS – IQ DATA AVAILABLE

BRIDGES

- STATE BRIDGES
- LOCAL BRIDGES
- STATE STRUCTURALLY DEFICIENT BRIDGES
- LOCAL STRUCTURALLY DEFICIENT BRIDGES
- STATE POSTED BRIDGES
- LOCAL POSTED BRIDGES

MPMS – IQ DATA AVAILABLE

MAINTENANCE

- PLANNED MAINTENANCE
- ACTUAL MAINTENANCE

MPMS – IQ DATA AVAILABLE

OPERATIONAL LAYERS

- FUNCTIONAL CLASS
- INTERNATIONAL ROUGHNESS INDEX (IRI)
- OVERALL PAVEMENT INDEX (OPI)

MPMS – IQ DATA AVAILABLE

ENVIRONMENTAL RESOURCES (LPN)

- WATER TRAILS
- TROUT STREAMS
- HQ/EV STREAMS
- WETLANDS
- HISTORIC RESOURCES
- 100-YEAR FLOODPLAIN
- AND MANY MORE….

MPMS – IQ DATA AVAILABLE

BOUNDARIES

- COUNTY
- PENNDOT ENGINEERING DISTRICTS
- MUNICIPAL
- LEGISLATIVE
- DEP REGIONS

MPMS – IQ SEARCH

SEARCH BY

- LOCATION
- PROJECT OR BRIDGE ID
- PLANNING PARTNER
- LEGISLATIVE DISTRICT
- DEP REGION

MPMS – IQ SEARCH

FILTER PROGRAMS

- TIP
- DRAFT TIP
- INTERSTATE TIP
- DECADE OF INVESTMENT
- ALL PROGRAMS

FILTER STATUS

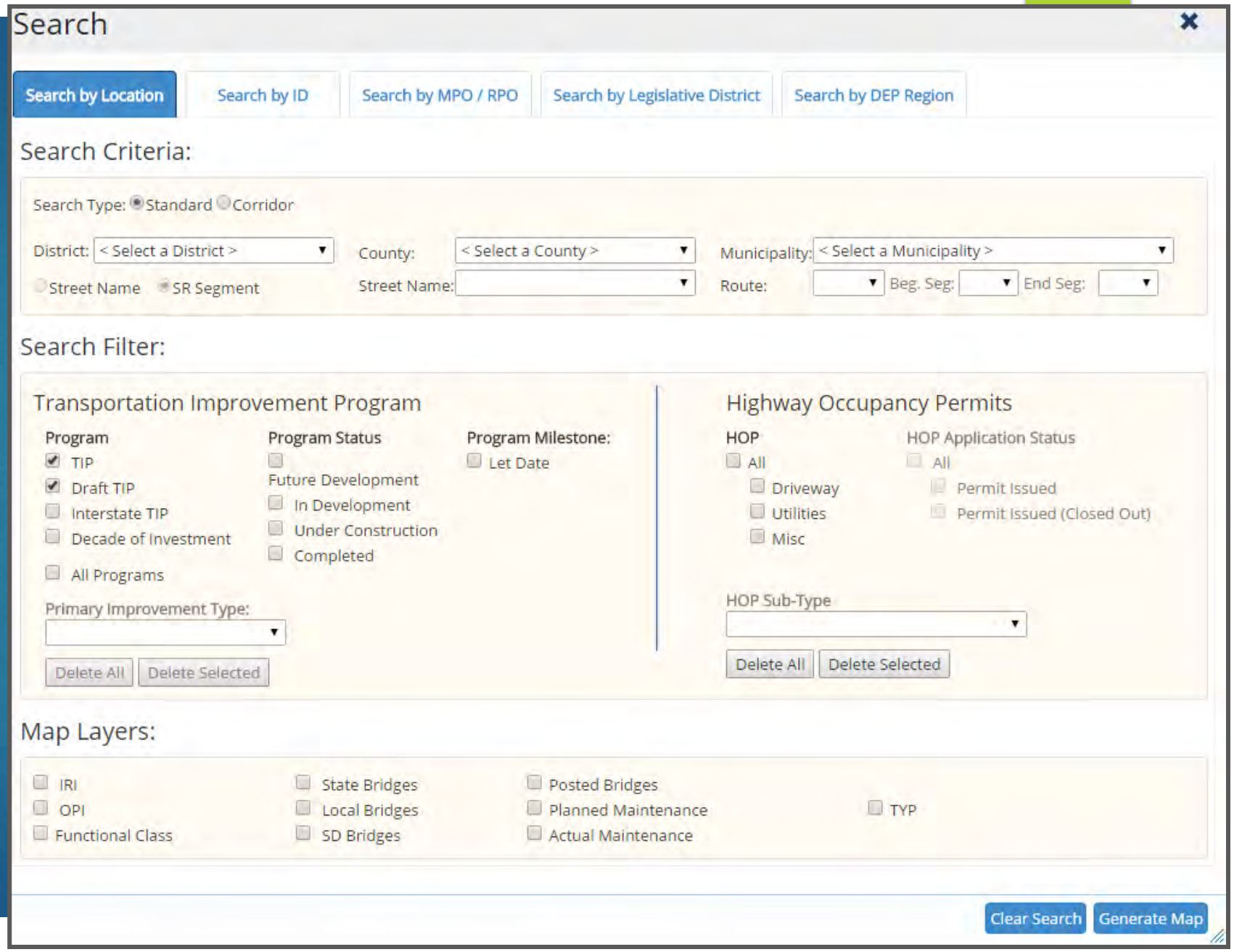
- FUTURE DEVELOPMENT
- IN DEVELOPMENT
- UNDER CONSTRUCTION
- COMPLETED

MPMS – IQ SEARCH

SET LAYERS

- MAINTENANCE
- OPERATIONAL
- BRIDGES
- TYP

MPMS – IQ SEARCH



MPMS – IQ REPORTS

- BASED ON THE SEARCH
- CAN BE ACCESSED FROM THE POP-UP OR TOOL BAR
- AVAILABLE IN BOTH WEB AND EXCEL FORMATS
- AVAILABLE AS BOTH COMPREHENSIVE AND SUMMARY REPORTS

MPMS – IQ REPORTS

- BRIDGE DATA REPORT
- CONSTRUCTION TIP REPORT
- MUNICIPALITY ASSET REPORT
- PROJECT DATA REPORT
- IRI DATA REPORT
- IRI PROJECT EVALUATION REPORT
- OPI DATA REPORT
- OPI PROJECT EVALUATION REPORT
- SD BRIDGE REPORT
- SD BRIDGE SUMMARY REPORT
- PLANNED MAINTENANCE REPORT
- ACTUAL MAINTENANCE REPORT
- PROJECTS/PLANNED MAINTENANCE (MPMS) REPORT
- LEGISLATIVE ASSET REPORT
- PLANNED STATS TIP REPORT
- PLANNED STATS DRAFT TIP REPORT
- PROJECTS REPORTS LIST

Legislative Asset Report

Legislative Asset Report for the Honorable Ryan P. Aument, (R)

Legislator Name: Aument, Ryan P. (R) - Lancaster County
Total Number of State Bridges: 60
Total Number of Local Bridges: 25
Total Number of TIP Projects: 8
Total IRI Miles: 103.31
Fed Aid Miles: 30.48

Legislative Type: House
Legislative District: 41
Poor IRI (Miles): 5.65
Fair IRI (Miles): 16.84
Good IRI (Miles): 48.54
Excellent IRI (Miles): 32.29

	Project ID	Description		Primary Improvement Type	
	64829	State Road Interchange		Safety Improvement	
	65131	Stony Battery Road		Widen	
	80119	PA 72 Inter. Corr. Imp.		Intersection Improvement	
	82481	Harrisburg Pike		Resurface	
	83791	Traf. Sig. Impvt 230/4020		Traffic System Management	
	86479	Main Street		Resurface	
	88997	PA741 Improvements		Resurface	
	94661	Rohrerstown Grade Crossin		RR Warning Devices	

MPMS – IQ
ONE-PAGE REPORTS

WHILE THE REPORTS ABOVE PROVID LISTS OF PROJECTS, THE ONE-PAGE REPORTS PROVIDE INFOMRATION ABOUT A SINGLE PROJECT

- PROJECT DETAIL REPORT
- BRIDGE BASIC REPORT
- BRIDGE DETAIL REPORT
- HOP DETAIL REPORT
- ONE-PAGE PROJECT STATUS REPORT

ONE-PAGE PROJECT STATUS REPORT

Project Status Report

Basic Information

Description/Location

Project Map

Cost Data

Project: Lake Wilhelm Road Bridge **Date of Report:** 2/13/2013 **MPMS #:** 1743

Basic Information

State Route:	TR:	County:	Planning Partner:	Improvement Type:	Length:	ADT:	Truck Percentage:
1009	000	Mercer	SVTS	Bridge Replacement	0	537	23

Project Class:	Let Date:	Physical Work Complete:	Open to Traffic:	Capital Budget Year:
Bridge Replacement	05/26/2011 Actual	04/17/2012		1982

Description/Location

Description: Lake Wilhelm Road Bridge
Location: State Route 1009 (Lake Wilhelm Road) Bridge over Little Shenango River in Perry Township

Project Map

DEMO

HTTP://164.156.155.62/MPMS_IQ/DEFAULT.ASPX

WWW.DOT7.STATE.PA.US/MPMS_VIEWER

PennShare

- ARCGIS ONLINE PLATFORM
- LIGHT WEIGHT MAPS AND APPS
- DATA SHARING
- CONTENT MANAGEMENT
- AD-HOC PRODUCTS

PENNSHARE IS NOT AN APPLICATION, IT IS AN IDEA ON HOW WE WANT TO ADMINISTER A AGOL ACCOUNT.

There are no items currently available to display.

Vision

- LIGHT WEIGHT MAPS AND APPS
- DATA SHARING
- CONTENT MANAGEMENT
- AD-HOC PRODUCTS

PennDOT Next Generation

What are the Components?

Next Generation is the combination of five distinct initiatives:

PennDOT Next Generation Projects
Engage PennDOT management and staff to refresh and advance business practices and technology.

Mapping the Future
Coordination among PennDOT, the Turnpike Commission (PTC), the Department of Conservation and Natural Resource (DCNR), and other agencies to save resources and avoid duplicating efforts.

Modernization Initiatives
Delivering on the Transportation Funding Advisory Commission's and department's modernization recommendations.

State Transportation Innovation Council
A public/private/institutional approach to adopt and cultivate innovative technologies and techniques to expedite project delivery.

IdeaLink
Bottom-up approach that empowers all employees to submit innovative ideas to improve workplace safety and enhance operations.

PennDOT Next Generation - PennShare

- MULTI-TIERED APPROACH
- PROOF OF CONCEPT
- FEEDBACK BASED
- RECOMMENDATIONS

Process

- EVALUTE AND SELECT PROJECTS
- COLLABORATIVE EFFORT
  - TURNPIKE COMMISSION
  - DCNR
  - PLANNING PARTNER
  - COUNTY
- SAMPLES
  - BRIDGE PROJECTS OVER TURNPIKE
  - AT RISK POSTED BRIDGES
  - SIMPLE ENVIRONMENTAL SCREENING MAP
  - ASSET MANAGEMENT

RESULTS

- DELIVERED WHITE PAPER TO EXECUTIVES

DATA

WHAT DO WE WANT TO SHARE

- PROGRAM DATA
- OPERATIONAL DATA
- MAINTENANCE DATA
- BOUNDARIES
- ASSET DATA

CURRENLTY WE SHARE ZIPPED SHAPEFILES WITH PLANNING PARTNERS, PENNSHARE WOULD ALLOW PENNDOT TO PROVIDE LIVE AND CURRENT DATA.

DATA

EXAMPLES OF STANDARD DATA

- RSMSEG
- RMSADMIN
- RMSTRAFFIC
- MPMSPROJECTS
- MPMSPHASE
- HPMS
- BMS2 (BRIDGE)

EXAMPLES OF AD-HOC DATA

- DECADE OF INVESTMENT
- ACT 89 PROJECTS
- P3 BRIDGES

FORMATS

HOW DO WE WANT TO SHARE

- SPATIAL DATA
  - SHAPEFILES
  - GEODATABASES
  - SERVICES
- TABLE DATA
- DOCUMENTATION
  - DATA DICTIONARY
  - METADATA

WHAT'S THE DIFFERENCE

PENNSHARE -VS- MPMS-IQ

- PENNSHARE IS CUSTOMIZABLE
- DATA/MAPS CAN BE SHARED
- WITH AGOL ACCOUNT, DATA AND MAPS CAN BE SECURED
- DOWNLOAD DATA FOR ANALYSIS (EXCEL, ARCMAP, …)
- VIEWED AS STAND-ALONE APP
- CROSS-PLATFORM

ISSUES

Cloud

- NEW (TO GOVT)
- EVOLVING
- LEARNING
- PLANNING

SECURITY

- SERVICES
  - FEATURES
  - REST
  - EDITING
- MAPS
  - WEB MAPS
  - APPLICATIONS
- ORGANIZATION
  - GROUPS
  - USERS

ROLES AND RESPONSIBILITIES

- CENTRALLY MAINTAINED OR BY BUREAU
- HOW DO WE ADMINISTER THE SITE
  - LICENSES
  - USERS
  - PRIVLEGES
  - DATA
- DATA INTEGRITY
- INTERNAL -VS- EXTERNAL
- METADATA
- SHARING WITH THE PUBLIC

BEST PRACTICES AND ISSUES

- SERVICES
- DESKTOP
- FEATURE TYPES
- IE8
- GIS EXPERIENCE

What's next for PennShare:

- FINALIZE BY ~~MAY JUNE JULY AUGUST~~ SEPTEMBER
- STAFFING
- HARDWARE AND SOFTWARE
- MOBILE

Sites

WE ENCOURAGE YOU TO TAKE A LOOK AT OTHER AGOL SITE TO SEE THE CAPABILITIES AND VISIONS

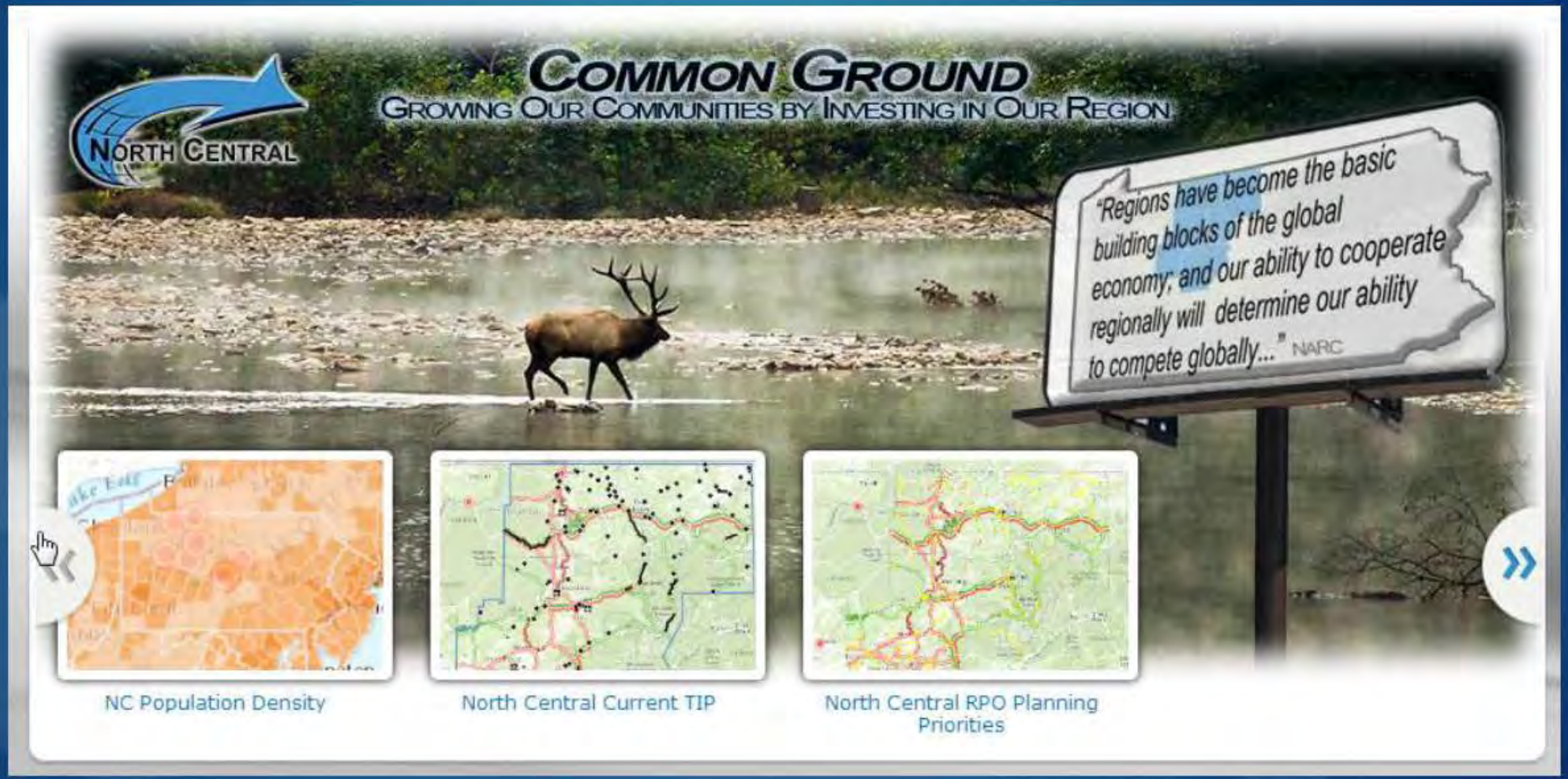
FEDERAL EMERGENCY MANAGEMENT AGENCY

GO! NC

THE NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

PENNSYLVANIA DEPARTMENT OF CONSERVATION AND NATURAL RESOURCES

NORTH CENTRAL PENNSYLVANIA REGIONAL AND DEVELOPMENT



CHESTER COUNTY | PENNSYLVANIA

Featured Maps

Is Your Property in the 100 Year Floodplain?

Parcel Viewer

Nottingham County Park Map Tour

Police Departments, Fire Stations, Hydrants and

Thank you.

QUESTIONS?

The GIS Professional: An Exam-Based Certification for the GIS Workforce

Jeremy Mennis, Ph.D., GISP

Department of Geography and Urban Studies, Temple University

About Me

- Teaching GIS since 1996
- Faculty Member at Temple University since 2004
- Chair, Geographic Information Systems and Science Specialty Group, AAG (2008-9)
- Board of Directors, UCGIS (2008-12)
- Board of Directors, GISCI (2010-14)
- Advisory Board, UCGIS BoK (2006, 2014)
- Panelist, DoL/GeoTECH GTCM (2010)

This presentation reflects my own personal perspective.

This is the true story... of seven strangers... picked to work together... to find out what happens... when people stop being polite... and start getting real...*The Real World*.

This is the true story... of seven strangers... picked work together... to find out what happens... when people stop being polite... and start getting real...*The Real World*.

Landscape Architecture

Planning

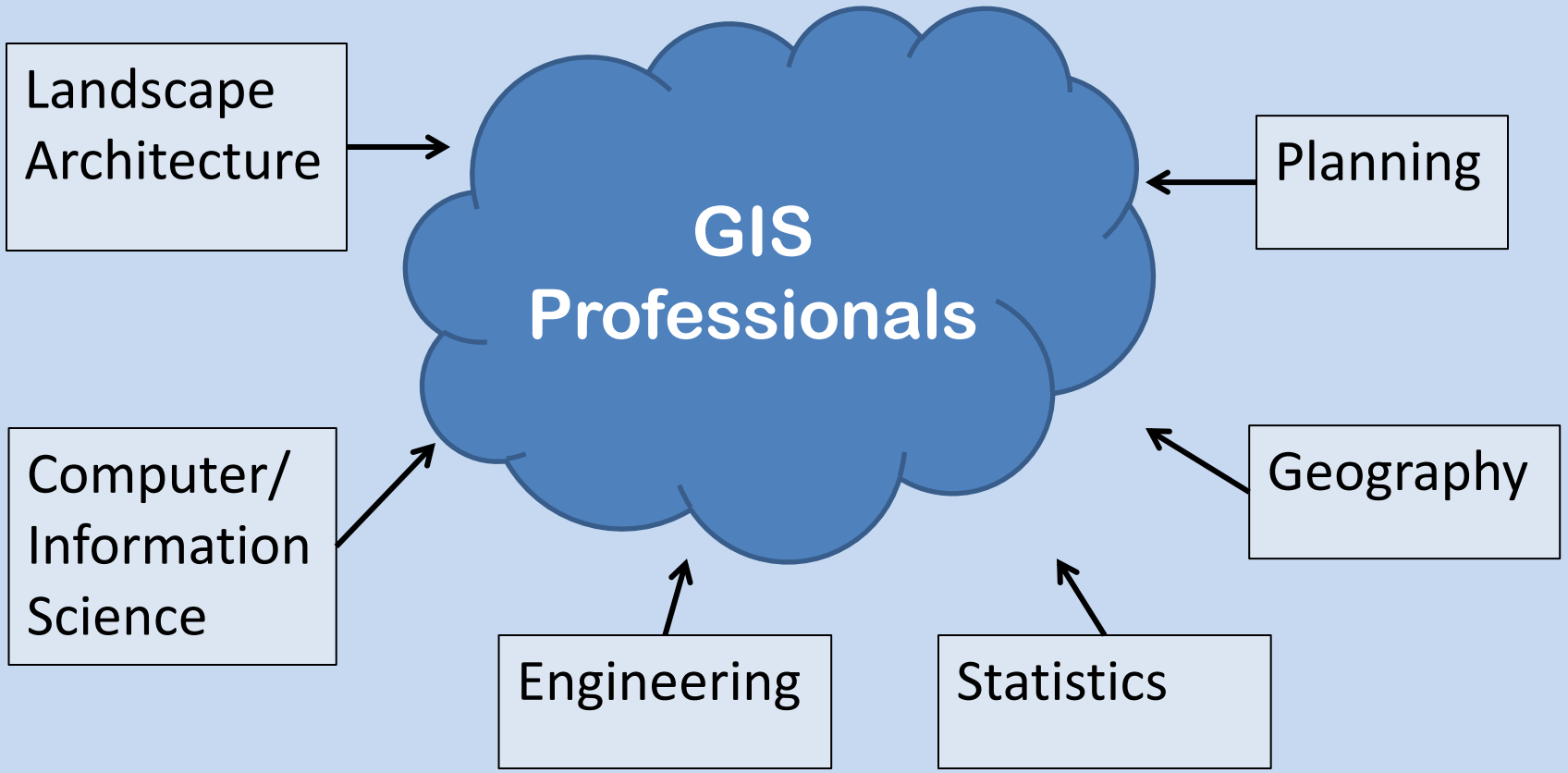
Computer/ Information Science

Geography

Engineering

Statistics

This is the true story... of seven strangers... picked work together... to find out what happens... when people stop being polite... and start getting real...*The Real World*.



Let’s get right to the point…

- Yes, there is a coherent GIS profession.
- But it needs to be cultivated, through certification.
- Now is the time for an exam-based certification.
- This will benefit all of us!

What is the GIS profession?

- The **academics**, **workforce**, and **industry** centered around geospatial data, analysis, and technology

- GIS, remote sensing and photogrammetry, GPS, geodesy, cartography and visualization, surveying, spatial analytics, spatial database management, ….

What is certification? (as opposed to…)

Certification: Recognition by a third party of a level of expertise in the profession.

Certificate: Recognizes completion of an academic program.

Licensure: A license to practice a profession, often regulated by states and indoctrinated in legislation.

Accreditation: Granted to an institution or program of study in accordance with pre-established criteria.

Why certification?

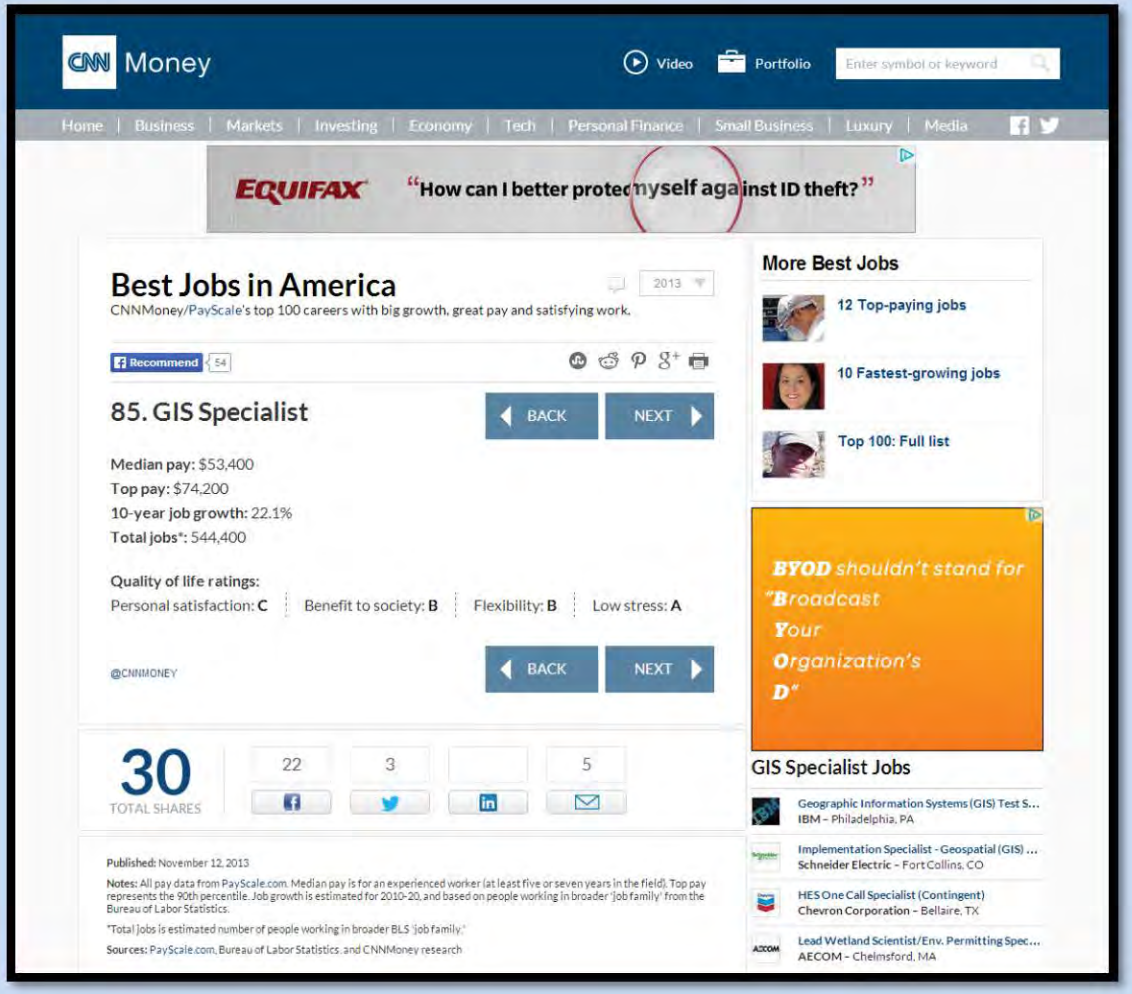
- To establish GIS as a profession
- To attain recognition by allied professions and colleagues
- To encourage long-term professional development
- To ensure ethical behavior
- To assist employers assess and hire GIS professionals
- To ensure a core competency of knowledge
- To strengthen the GIS industry.

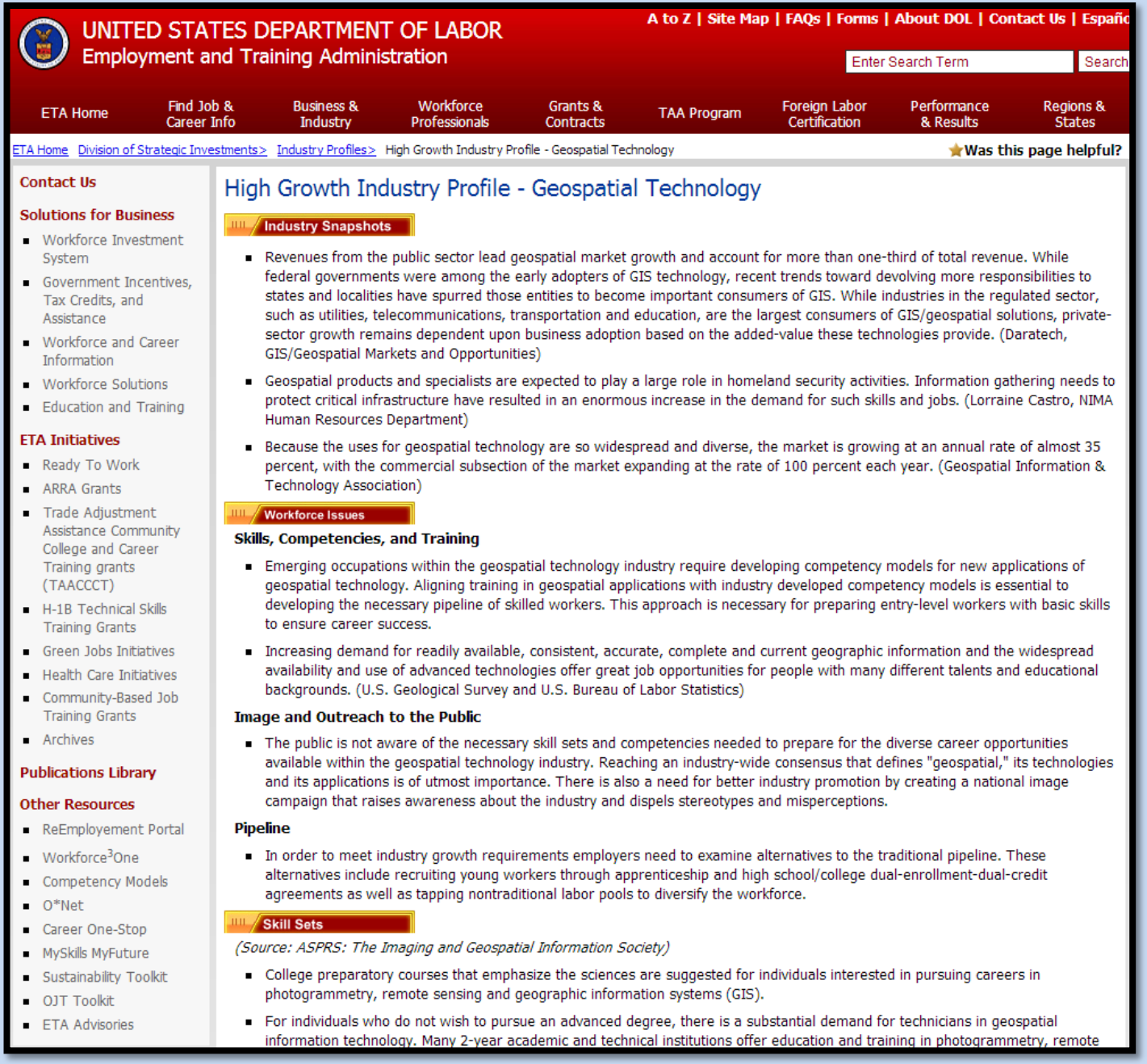
The GIS Profession is growing rapidly

According to a new report on the GIS market (Geographic Information Systems (GIS): A Global Outlook released January 2012) from Global Industry Analysts, Inc (GIA), the GIS industry is expected to growth to a worldwide to US$10.6 Billion by 2015.

Morais, 2012 (http://www.gislounge.com/gis-industry-trends/)

CNN says GIS Specialist is a top 100 job





UNITED STATES DEPARTMENT OF LABOR
Employment and Training Administration

A to Z | Site Map | FAQs | Forms | About DOL | Contact Us | Español

Enter Search Term | Search

ETA Home | Find Job & Career Info | Business & Industry | Workforce Professionals | Grants & Contracts | TAA Program | Foreign Labor Certification | Performance & Results | Regions & States

ETA Home > Division of Strategic Investments > Industry Profiles > High Growth Industry Profile - Geospatial Technology

Was this page helpful?

Contact Us

Solutions for Business
- Workforce Investment System
- Government Incentives, Tax Credits, and Assistance
- Workforce and Career Information
- Workforce Solutions
- Education and Training

ETA Initiatives
- Ready To Work
- ARRA Grants
- Trade Adjustment Assistance Community College and Career Training grants (TAACCCT)
- H-1B Technical Skills Training Grants
- Green Jobs Initiatives
- Health Care Initiatives
- Community-Based Job Training Grants
- Archives

Publications Library

Other Resources
- ReEmployement Portal
- Workforce³One
- Competency Models
- O*Net
- Career One-Stop
- MySkills MyFuture
- Sustainability Toolkit
- OJT Toolkit
- ETA Advisories

High Growth Industry Profile - Geospatial Technology

Industry Snapshots

- Revenues from the public sector lead geospatial market growth and account for more than one-third of total revenue. While federal governments were among the early adopters of GIS technology, recent trends toward devolving more responsibilities to states and localities have spurred those entities to become important consumers of GIS. While industries in the regulated sector, such as utilities, telecommunications, transportation and education, are the largest consumers of GIS/geospatial solutions, private-sector growth remains dependent upon business adoption based on the added-value these technologies provide. (Daratech, GIS/Geospatial Markets and Opportunities)
- Geospatial products and specialists are expected to play a large role in homeland security activities. Information gathering needs to protect critical infrastructure have resulted in an enormous increase in the demand for such skills and jobs. (Lorraine Castro, NIMA Human Resources Department)
- Because the uses for geospatial technology are so widespread and diverse, the market is growing at an annual rate of almost 35 percent, with the commercial subsection of the market expanding at the rate of 100 percent each year. (Geospatial Information & Technology Association)

Workforce Issues

Skills, Competencies, and Training

- Emerging occupations within the geospatial technology industry require developing competency models for new applications of geospatial technology. Aligning training in geospatial applications with industry developed competency models is essential to developing the necessary pipeline of skilled workers. This approach is necessary for preparing entry-level workers with basic skills to ensure career success.
- Increasing demand for readily available, consistent, accurate, complete and current geographic information and the widespread availability and use of advanced technologies offer great job opportunities for people with many different talents and educational backgrounds. (U.S. Geological Survey and U.S. Bureau of Labor Statistics)

Image and Outreach to the Public

- The public is not aware of the necessary skill sets and competencies needed to prepare for the diverse career opportunities available within the geospatial technology industry. Reaching an industry-wide consensus that defines "geospatial," its technologies and its applications is of utmost importance. There is also a need for better industry promotion by creating a national image campaign that raises awareness about the industry and dispels stereotypes and misperceptions.

Pipeline

- In order to meet industry growth requirements employers need to examine alternatives to the traditional pipeline. These alternatives include recruiting young workers through apprenticeship and high school/college dual-enrollment-dual-credit agreements as well as tapping nontraditional labor pools to diversify the workforce.

Skill Sets

(Source: ASPRS: The Imaging and Geospatial Information Society)

- College preparatory courses that emphasize the sciences are suggested for individuals interested in pursuing careers in photogrammetry, remote sensing and geographic information systems (GIS).
- For individuals who do not wish to pursue an advanced degree, there is a substantial demand for technicians in geospatial information technology. Many 2-year academic and technical institutions offer education and training in photogrammetry, remote

US DoL says Geospatial Technology is a high growth industry

What does it mean for us?

If we are to build a healthy GIS **educational infrastructure, workforce, and industry**, we have to recognize the fundamental **job tasks, competencies, and knowledge areas** for what it is WE do…

What does it mean for us?

If we are to build a healthy GIS **educational infrastructure, workforce, and industry**, we have to recognize the fundamental **job tasks, competencies, and knowledge areas** for what it is WE do…

An exam-based certification is the natural framework for establishing this criteria. Because doing nothing is not a good option.

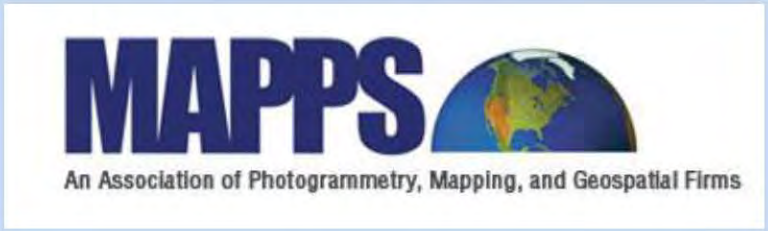
What does it mean for us?

If we are to build a healthy GIS **educational infrastructure, workforce, and industry**, we have to recognize the fundamental **job tasks, competencies, and knowledge areas** for what it is WE do…

An exam-based certification is the natural framework for establishing this criteria. Because doing nothing is not a good option.

But who decides what is WE do….(and who are WE, exactly)?

WE are the GIS Workforce



GIS Certification Institute

- Founded 2004 by URISA
- Non-profit organization
- Board representatives from 6 member organizations
- Awards individuals GISP certification

GEOGRAPHIC AND LAND INFORMATION SOCIETY GLIS 1993

University Consortium for Geographic Information Science

gita

NSGIC National States Geographic Information Council

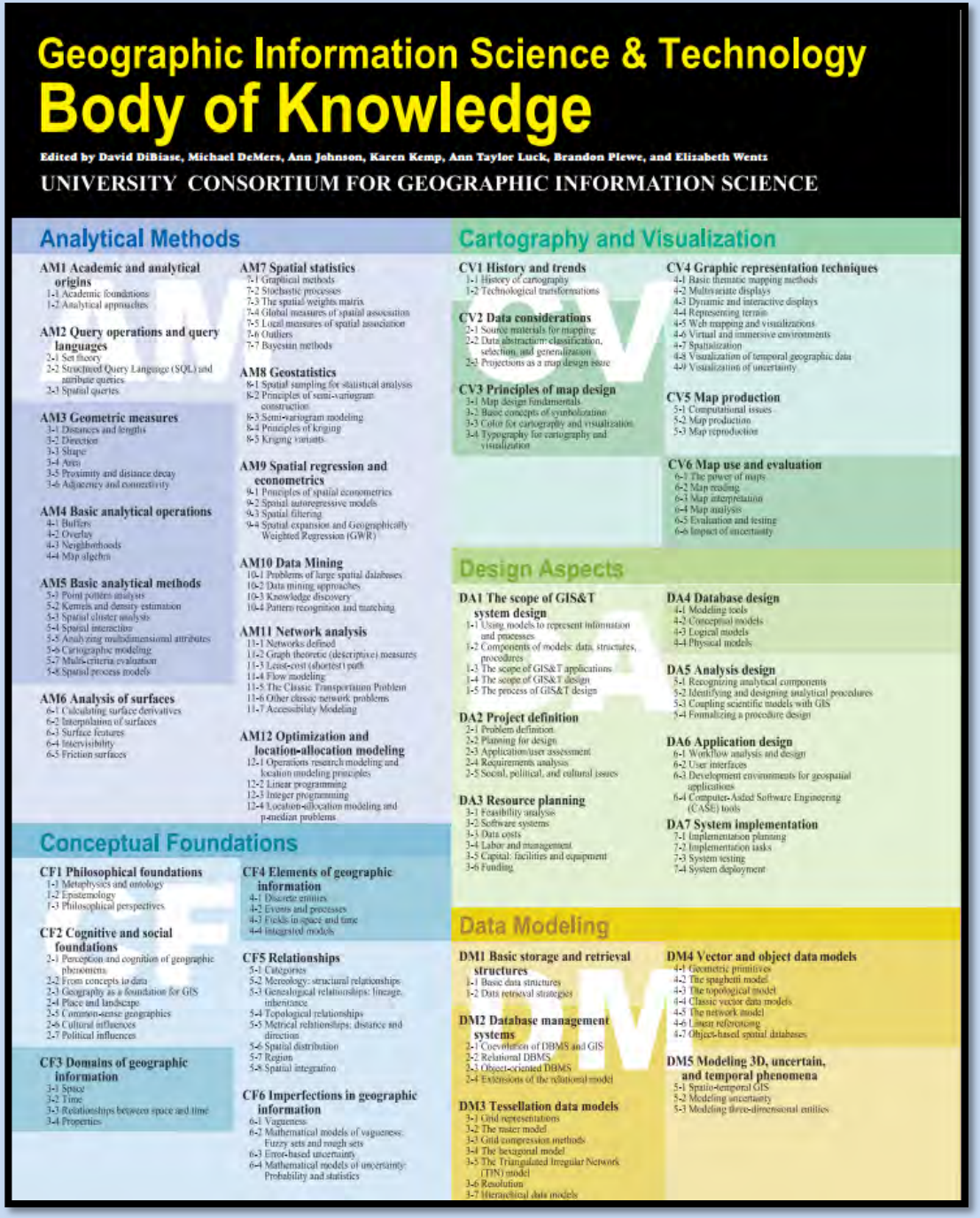
URISA Fostering Excellence in GIS www.URISA.org

AAG Association of American Geographers

GIS Professional (GISP) Certification

- Self-documented and peer reviewed portfolio
  - **Education**: University courses, degrees, workshops
  - **Experience**: At least 4 years equivalent full time
  - **Contributions**: Publications, organizations
  - **Code of Ethics**: Must be signed
- GISPs must recertify every 5 years
- Currently approximately **7000 GISPs**

- GISCI is developing an **exam** component, with rollout anticipated Fall 2015



Geographic Information Science & Technology
Body of Knowledge

Edited by David DiBiase, Michael DeMers, Ann Johnson, Karen Kemp, Ann Taylor Luck, Brandon Plewe, and Elizabeth Wentz

UNIVERSITY CONSORTIUM FOR GEOGRAPHIC INFORMATION SCIENCE

Analytical Methods

AM1 Academic and analytical origins
1-1 Academic foundations
1-2 Analytical approaches

AM2 Query operations and query languages
2-1 Set theory
2-2 Structured Query Language (SQL) and attribute queries
2-3 Spatial queries

AM3 Geometric measures
3-1 Distances and lengths
3-2 Direction
3-3 Shape
3-4 Area
3-5 Proximity and distance decay
3-6 Adjacency and connectivity

AM4 Basic analytical operations
4-1 Buffers
4-2 Overlay
4-3 Neighborhoods
4-4 Map algebra

AM5 Basic analytical methods
5-1 Point pattern analysis
5-2 Kernels and density estimation
5-3 Spatial cluster analysis
5-4 Spatial interaction
5-5 Analyzing multidimensional attributes
5-6 Cartographic modeling
5-7 Multi-criteria evaluation
5-8 Spatial process models

AM6 Analysis of surfaces
6-1 Calculating surface derivatives
6-2 Interpolation of surfaces
6-3 Surface features
6-4 Intervisibility
6-5 Friction surfaces

AM7 Spatial statistics
7-1 Graphical methods
7-2 Stochastic processes
7-3 The spatial weights matrix
7-4 Global measures of spatial association
7-5 Local measures of spatial association
7-6 Outliers
7-7 Bayesian methods

AM8 Geostatistics
8-1 Spatial sampling for statistical analysis
8-2 Principles of semi-variogram construction
8-3 Semi-variogram modeling
8-4 Principles of kriging
8-5 Kriging variants

AM9 Spatial regression and econometrics
9-1 Principles of spatial econometrics
9-2 Spatial autoregressive models
9-3 Spatial filtering
9-4 Spatial expansion and Geographically Weighted Regression (GWR)

AM10 Data Mining
10-1 Problems of large spatial databases
10-2 Data mining approaches
10-3 Knowledge discovery
10-4 Pattern recognition and matching

AM11 Network analysis
11-1 Networks defined
11-2 Graph theoretic (descriptive) measures
11-3 Least-cost (shortest) path
11-4 Flow modeling
11-5 The Classic Transportation Problem
11-6 Other classic network problems
11-7 Accessibility Modeling

AM12 Optimization and location-allocation modeling
12-1 Operations research modeling and location modeling principles
12-2 Linear programming
12-3 Integer programming
12-4 Location-allocation modeling and p-median problems

Conceptual Foundations

CF1 Philosophical foundations
1-1 Metaphysics and ontology
1-2 Epistemology
1-3 Philosophical perspectives

CF2 Cognitive and social foundations
2-1 Perception and cognition of geographic phenomena
2-2 From concepts to data
2-3 Geography as a foundation for GIS
2-4 Place and landscape
2-5 Common-sense geographies
2-6 Cultural influences
2-7 Political influences

CF3 Domains of geographic information
3-1 Space
3-2 Time
3-3 Relationships between space and time
3-4 Properties

CF4 Elements of geographic information
4-1 Discrete entities
4-2 Events and processes
4-3 Fields in space and time
4-4 Integrated models

CF5 Relationships
5-1 Categories
5-2 Mereology: structural relationships
5-3 Genealogical relationships: lineage, inheritance
5-4 Topological relationships
5-5 Metrical relationships: distance and direction
5-6 Spatial distribution
5-7 Region
5-8 Spatial integration

CF6 Imperfections in geographic information
6-1 Vagueness
6-2 Mathematical models of vagueness: Fuzzy sets and rough sets
6-3 Error-based uncertainty
6-4 Mathematical models of uncertainty: Probability and statistics

Cartography and Visualization

CV1 History and trends
1-1 History of cartography
1-2 Technological transformations

CV2 Data considerations
2-1 Source materials for mapping
2-2 Data abstraction: classification, selection, and generalization
2-3 Projections as a map design issue

CV3 Principles of map design
3-1 Map design fundamentals
3-2 Basic concepts of symbolization
3-3 Color for cartography and visualization
3-4 Typography for cartography and visualization

CV4 Graphic representation techniques
4-1 Basic thematic mapping methods
4-2 Multivariate displays
4-3 Dynamic and interactive displays
4-4 Representing terrain
4-5 Web mapping and visualizations
4-6 Virtual and immersive environments
4-7 Spatialization
4-8 Visualization of temporal geographic data
4-9 Visualization of uncertainty

CV5 Map production
5-1 Computational issues
5-2 Map production
5-3 Map reproduction

CV6 Map use and evaluation
6-1 The power of maps
6-2 Map reading
6-3 Map interpretation
6-4 Map analysis
6-5 Evaluation and testing
6-6 Impact of uncertainty

Design Aspects

DA1 The scope of GIS&T system design
1-1 Using models to represent information and processes
1-2 Components of models: data, structures, procedures
1-3 The scope of GIS&T applications
1-4 The scope of GIS&T design
1-5 The process of GIS&T design

DA2 Project definition
2-1 Problem definition
2-2 Planning for design
2-3 Application/user assessment
2-4 Requirements analysis
2-5 Social, political, and cultural issues

DA3 Resource planning
3-1 Feasibility analysis
3-2 Software systems
3-3 Data costs
3-4 Labor and management
3-5 Capital: facilities and equipment
3-6 Funding

DA4 Database design
4-1 Modeling tools
4-2 Conceptual models
4-3 Logical models
4-4 Physical models

DA5 Analysis design
5-1 Recognizing analytical components
5-2 Identifying and designing analytical procedures
5-3 Coupling scientific models with GIS
5-4 Formalizing a procedure design

DA6 Application design
6-1 Workflow analysis and design
6-2 User interfaces
6-3 Development environments for geospatial applications
6-4 Computer-Aided Software Engineering (CASE) tools

DA7 System implementation
7-1 Implementation planning
7-2 Implementation tasks
7-3 System testing
7-4 System deployment

Data Modeling

DM1 Basic storage and retrieval structures
1-1 Basic data structures
1-2 Data retrieval strategies

DM2 Database management systems
2-1 Coevolution of DBMS and GIS
2-2 Relational DBMS
2-3 Object-oriented DBMS
2-4 Extensions of the relational model

DM3 Tessellation data models
3-1 Grid representations
3-2 The raster model
3-3 Grid compression methods
3-4 The hexagonal model
3-5 The Triangulated Irregular Network (TIN) model
3-6 Resolution
3-7 Hierarchical data models

DM4 Vector and object data models
4-1 Geometric primitives
4-2 The spaghetti model
4-3 The topological model
4-4 Classic vector data models
4-5 The network model
4-6 Linear referencing
4-7 Object-based spatial databases

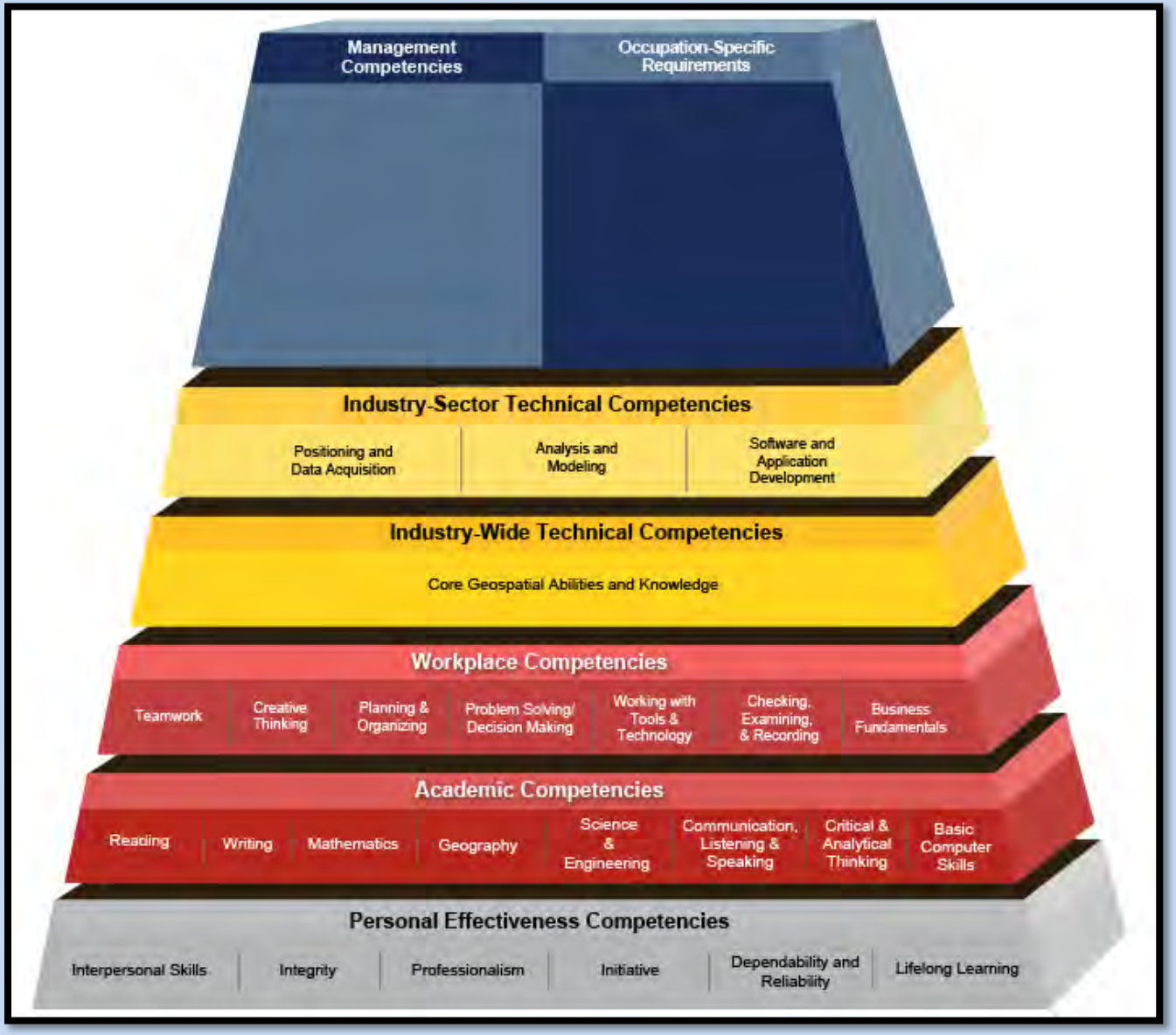
DM5 Modeling 3D, uncertain, and temporal phenomena
5-1 Spatio-temporal GIS
5-2 Modeling uncertainty
5-3 Modeling three-dimensional entities

UCGIS Body of Knowledge (2006)

DACUM Chart: GIS Specialist (GeoTECH)

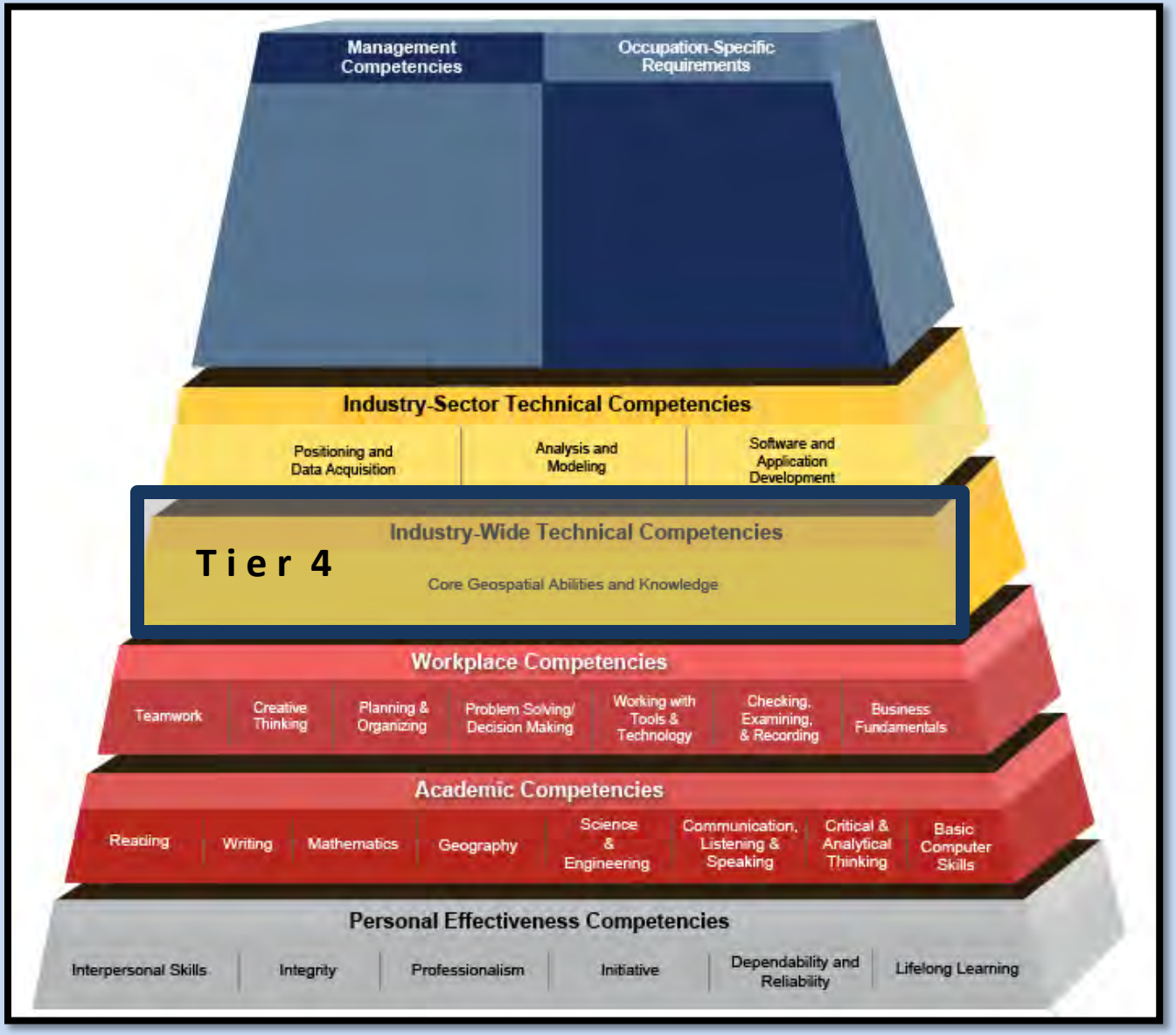
Duties	Tasks												
Plan Projects (E)	A1 Clarify audience/ scope of work	A2 Prepare project feasibility studies	A3 Coordinate resources (budget, time, people)		A4 Develop & create data structure (naming, conventions)		A5 Create spatial database (SQL, Geodatabase)		A6 Define data attributes	A7 Evaluate project progress				
Acquire Data (E)	B1 Coordinate acquisition logistics (permissions, legal, GPS mission planning)		B2 Obtain outside data (legal docs)	B3 Connect to real time data sources	B4 Upload project parameters	B5 Create data dictionary	B6 Assemble fieldwork equipment	B7 Calibrate control network	B8 Collect GPS observations	B9 Record field notes (photo, site surveys, inspections, samples)		B10 Scan documents	B11 Export raw data	
Process Data (E)	C1 Validate data integrity (sampling, projections)	C2Post process data (LIDAR field notes, GPS, Imagery)		C3 Convert datums and projections	C4 Georeference information (PDF, video, images)		C5 Digitize data	C6 COGO data	C7 Geocode data	C8 Populate data attributes	C9 Create map layer	C10 Create metadata	C11 Create base map	C12 Create raster mosaic
Process Data con't		C13 Create cache	C14 Backup & archive data											
Analyze Data (A/E)	D1 Edit/update data attributes (data attribute tables)		D2 Edit/update geometry	D3 Join data (SQL)	D4 Relate Data	D5 Build network data set	D6 Build models (model builder, add-ins automate)		D7 Execute models	D8 Write programming scripts (python automate, C#)		D9 Execute programming scripts	D10 Create query statements (SQL, joins, relates)	
Analyze Data con't		D11 Conduct surface analysis (slope, contour, TINs)		D12 Conduct cost analysis	D13 Conduct network analysis	D14 Conduct raster analysis	D15 Conduct statistical analysis	D16 Conduct spatial analysis						
Administer Server (A)	E1 Configure servers	E2 Configure user permissions	E3 Develop GIS website	E4 Publish web services	E5 Maintain GIS website	E6 Trouble-shoot server	E7 Update server							
Produce Deliverables (E)	F1 Export final data (DTMs, raster vector, tables, CAD, elevation data)		F2 Create static maps (PDF, paper, e.g. density map)		F3 Create dynamic maps (e.g. web-map)	F4 Create map books	F5 Compose reports (statistical, charts, graphs)		F6 Write proposals (grants)	F7 Create web services (WMS, WFS, ARC server)	F8 Create navigational maps (GPS tours)	F9 Create progress reports	F10 Create presentations	F11 Deliver presentations
Support Users (A)	G1 Create Help Files (answer FAQs)	G2 Develop instructional materials	G3 Conduct training (meetings, job shadow)	G4 Provide technical support (troubleshoot)	G5 Solicit user feedback	G6 Closeout project								
Professional Development (A/E)	H1 Attend employer mandated training	H2 Obtain certifications and licensure	H3 Maintain credentials	H4 Attend webinars and on-line classes	H5 Attend conferences and seminars	H6 Present at conferences and seminars	H7 Subscribe to trade publications	H8 Participate in user groups and committees	H9 Expand professional network	H10 Participate in on-the-job training (job shadow)		H11 Explore new technologies	H12 Obtain advanced degrees	H13 Promote GIS

Geospatial Technology Competency Model



GeoTECH Center / US Dept. of Labor (2010)

Geospatial Technology Competency Model



GeoTECH Center / US Dept. of Labor (2010)

GTCM Tier 4: Critical Work Functions

- Earth Geometry and Geodesy
- Data Quality
- Satellite Positioning
- Remote Sensing and Photogrammetry
- Cartography
- GIS
- Programming, Application Development
- Professionalism

US DoL: Geospatial Occupations

Occupation	
Geospatial Information Scientists and Technologists	Bright Outlook
Remote Sensing Scientists and Technologists	
Remote Sensing Technicians	
Geographic Information Systems Technicians	
Cartographers and Photogrammetrists	
Precision Agriculture Technicians	
Geographers	
Geoscientists, Except Hydrologists and Geographers	
Geophysical Data Technicians	
Geological Sample Test Technicians	
Architects, Except Landscape and Naval	
Biochemists and Biophysicists	
Geography Teachers, Postsecondary	

DoL Occupation: GIScientist

Summary Report for:

15-1199.04 - Geospatial Information Scientists and Technologists

Updated 2011

Bright Outlook

green

Research or develop geospatial technologies. May produce databases, perform applications programming, or coordinate projects. May specialize in areas such as agriculture, mining, health care, retail trade, urban planning, or military intelligence.

View report: Summary | Details | Custom

Tasks | Tools & Technology | Knowledge | Skills | Abilities | Work Activities | Work Context | Job Zone | Education | Credentials | Interests | Work Styles | Work Values | Related Occupations | Wages & Employment | Job Openings

Tasks

- Produce data layers, maps, tables, or reports, using spatial analysis procedures or Geographic Information Systems (GIS) technology, equipment, or systems.
- Coordinate the development or administration of Geographic Information Systems (GIS) projects, including the development of technical priorities, client reporting and interface, or coordination and review of schedules and budgets.
- Provide technical expertise in Geographic Information Systems (GIS) technology to clients or users.
- Create, analyze, report, convert, or transfer data, using specialized applications program software.
- Design, program, or model Geographic Information Systems (GIS) applications or procedures.
- Provide technical support for computer-based Geographic Information Systems (GIS) mapping software.
- Perform computer programming, data analysis, or software development for Geographic Information Systems (GIS) applications, including the maintenance of existing systems or research and development for future enhancements.
- Lead, train, or supervise technicians or related staff in the conduct of Geographic Information Systems (GIS) analytical procedures.
- Collect, compile, or integrate Geographic Information Systems (GIS) data, such as remote sensing or cartographic data for inclusion in map manuscripts.
- Meet with clients to discuss topics such as technical specifications, customized solutions, or operational problems.

How is the exam being developed?

Project Manager

Rebecca Somers (Somers-St. Claire GIS Consulting)

Exam Development Contractor

HumRRO (Human Resources Research Organization)

In consultation with

GISPs and individuals from the GISCI member organizations.

How is the exam being developed?

Based on the (GTCM) Tier 4. ***What are the key competencies that every GIS Professional should know?***
The key steps in GISCI's exam development process are:

1. Job Analysis
   GIS Professional subject matter experts (SMEs)
2. Exam Blueprint Development
3. Item Writing
4. Exam Construction
5. Pilot Exam
6. Standard Setting

Challenges

- A coherent plan for **certification and accreditation**…

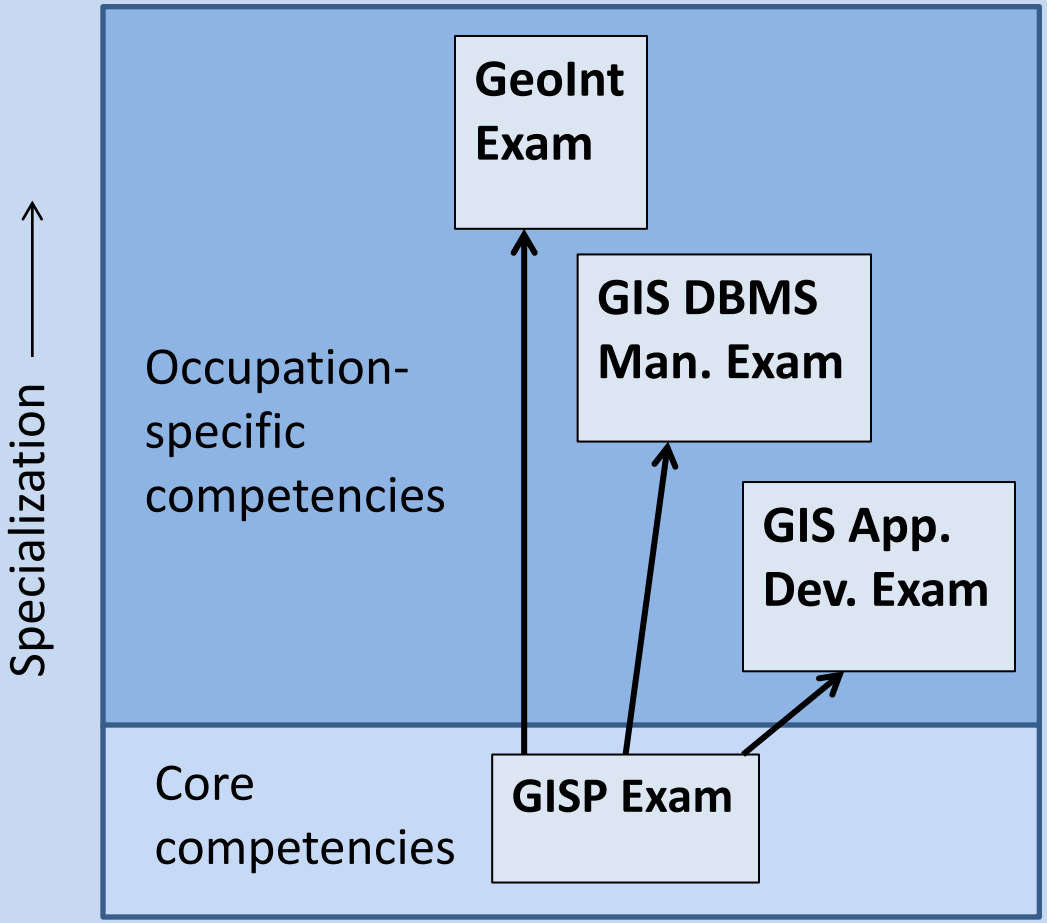
Challenges

- A coherent plan for **certification and accreditation**…
- Developing **paths for specialization** and experience…

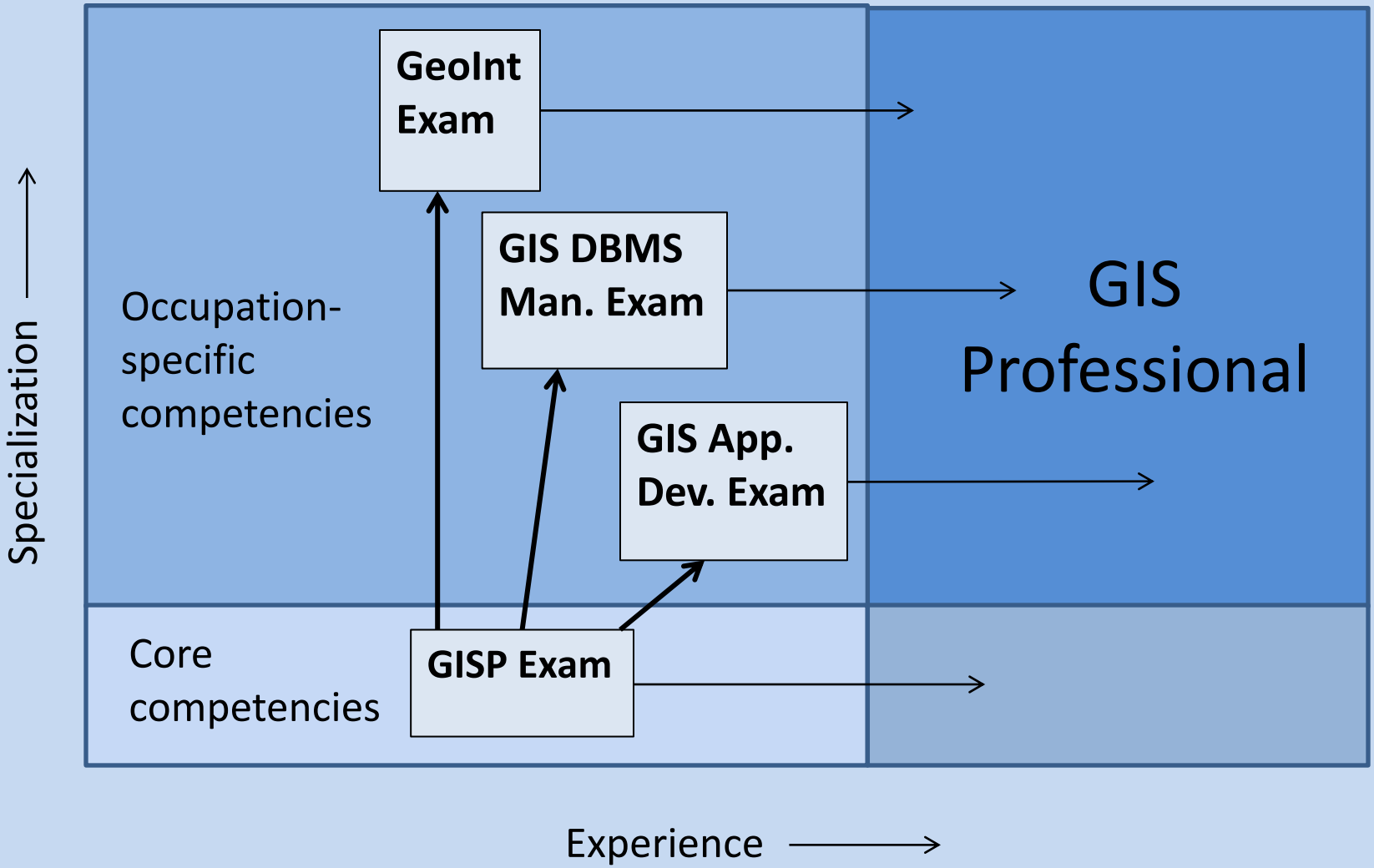
Challenges

- A coherent plan for **certification and accreditation**…
- Developing **paths for specialization** and experience…
- **Cooperation**, not competition…

The Future: A Tiered Exam Structure?



The Future: A Tiered Exam Structure?



Who Benefits?

- **Workers**

  Because they will know the skills required and pathways towards a successful career in GIS.

- **Employers**

  Because they will be able to hire a more informed and better educated workforce.

- **Educators**

  Because they will be able to develop more coherent educational programs with better employment opportunities for their students.

How to get your GISP?

WWW.GISCI.ORG

Contact Bill Hodge, bhodge@gisci.org

GISP Certification Resources

- **GISCI**
  - http://www.gisci.org
- **UCGIS Body of Knowledge**
  - http://www.aag.org/galleries/publications-files/GIST_Body_of_Knowledge.pdf
- **US DoL GTCM**
  - http://www.careeronestop.org/COMPETENCYMODEL/competency-models/geospatial-technology.aspx
- **URISA Resources**
  - http://www.urisa.org/
- **GeoTECH Center Resources**
  - http://www.geotechcenter.org/
- **Directions Magazine booklet on geospatial careers and certification**
  - http://media.directionsmedia.net/directionsmag/channels/whitepapers/GIS-jobs-07-2013-432979234.pdf

Permanent Bicycle and Pedestrian Counters

Shawn Megill Legendre

Information Resources Exchange Group
September 10, 2014

DELAWARE VALLEY
dvrpc
REGIONAL
PLANNING COMMISSION

A Multi-Pronged Approach to Cyclist and Pedestrian Counting

- DVRPC is initiating an improved program for bicycle and pedestrian counting
- The program will include both permanent, continuous counts and regularly-collected week-long counts

TYPE	PURPOSE
PERMANENT	Provide continuous data. Allows for development of seasonal adjustment factors.
SHORT-TERM (cyclical)	Provide regularly-collected data from many locations. Allows for measurement of trends.
SHORT-TERM (non-recurring)	Provides location-specific data for use in local plans and studies.

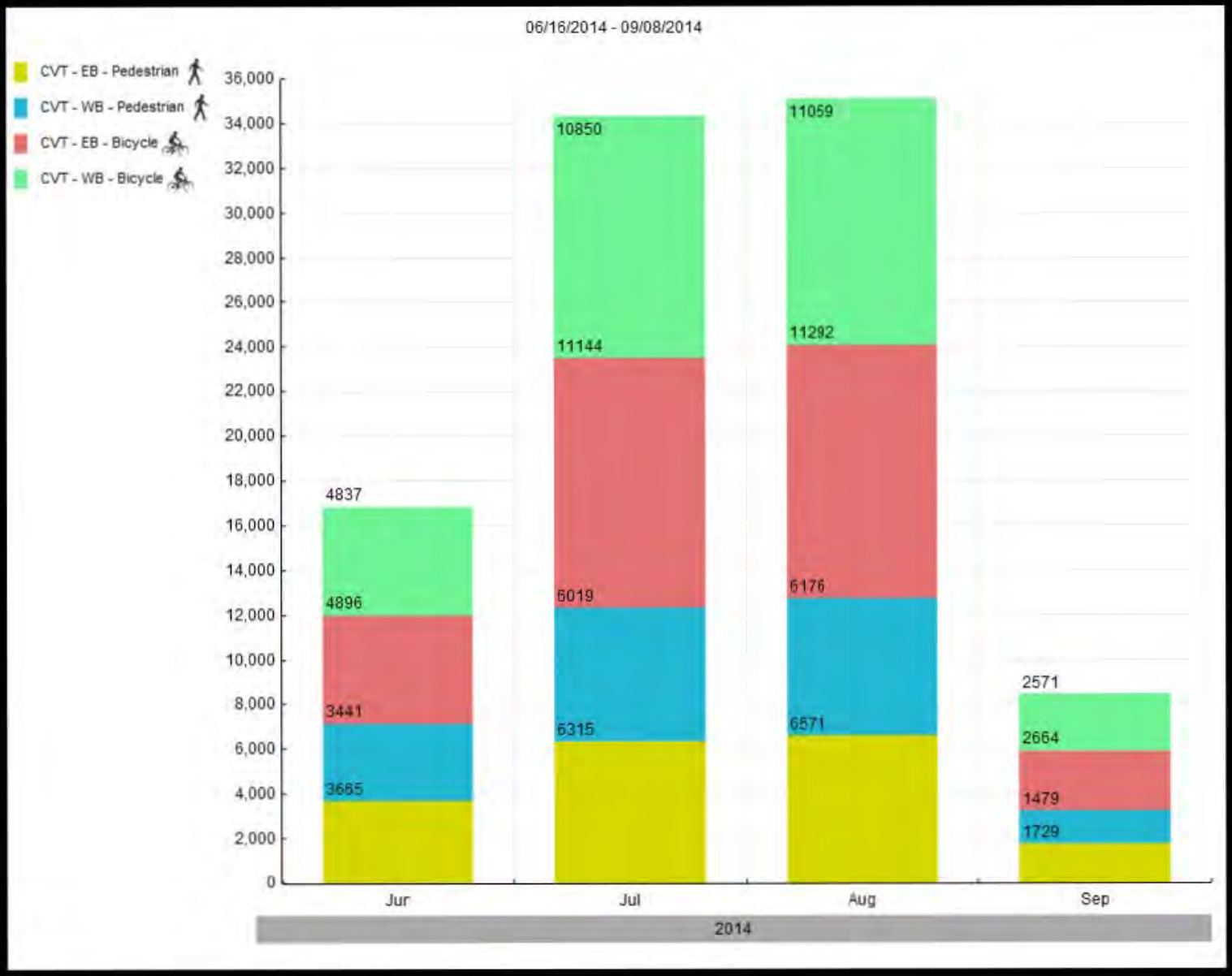
Source: EcoCounter

Continuous Automated Trail User Counting Program

- DVRPC has installed 8 permanent cyclist and pedestrian counters on multi-use trails – 4 additional installations are planned
- The counters will record and report data continuously throughout the year - 15 minute increments by direction by mode
- DVRPC will use this data to calculate region-specific seasonal adjustment factors for application to week-long counts

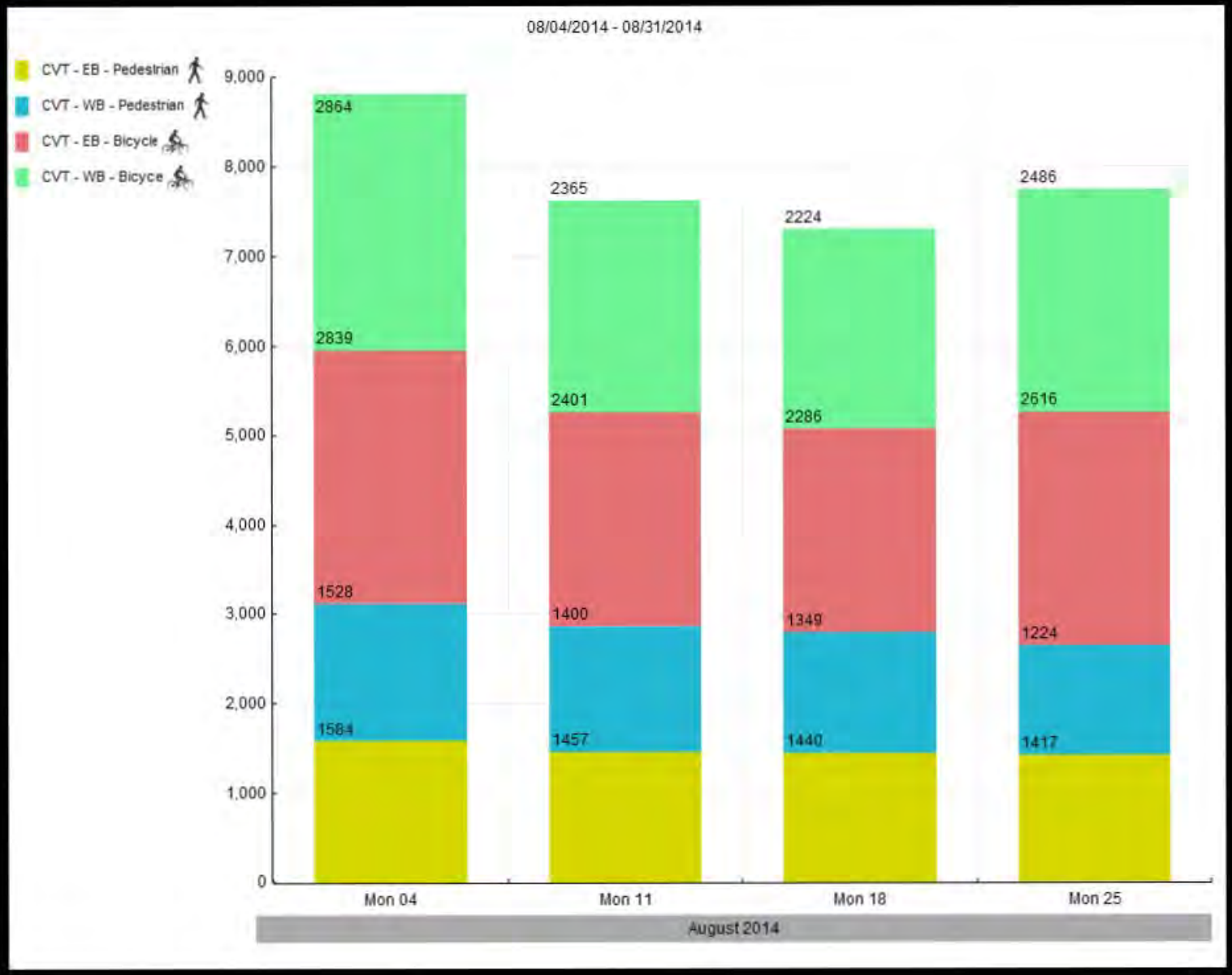
Continuous Automated Trail User Counting Program

Chester Valley Trail - Monthly



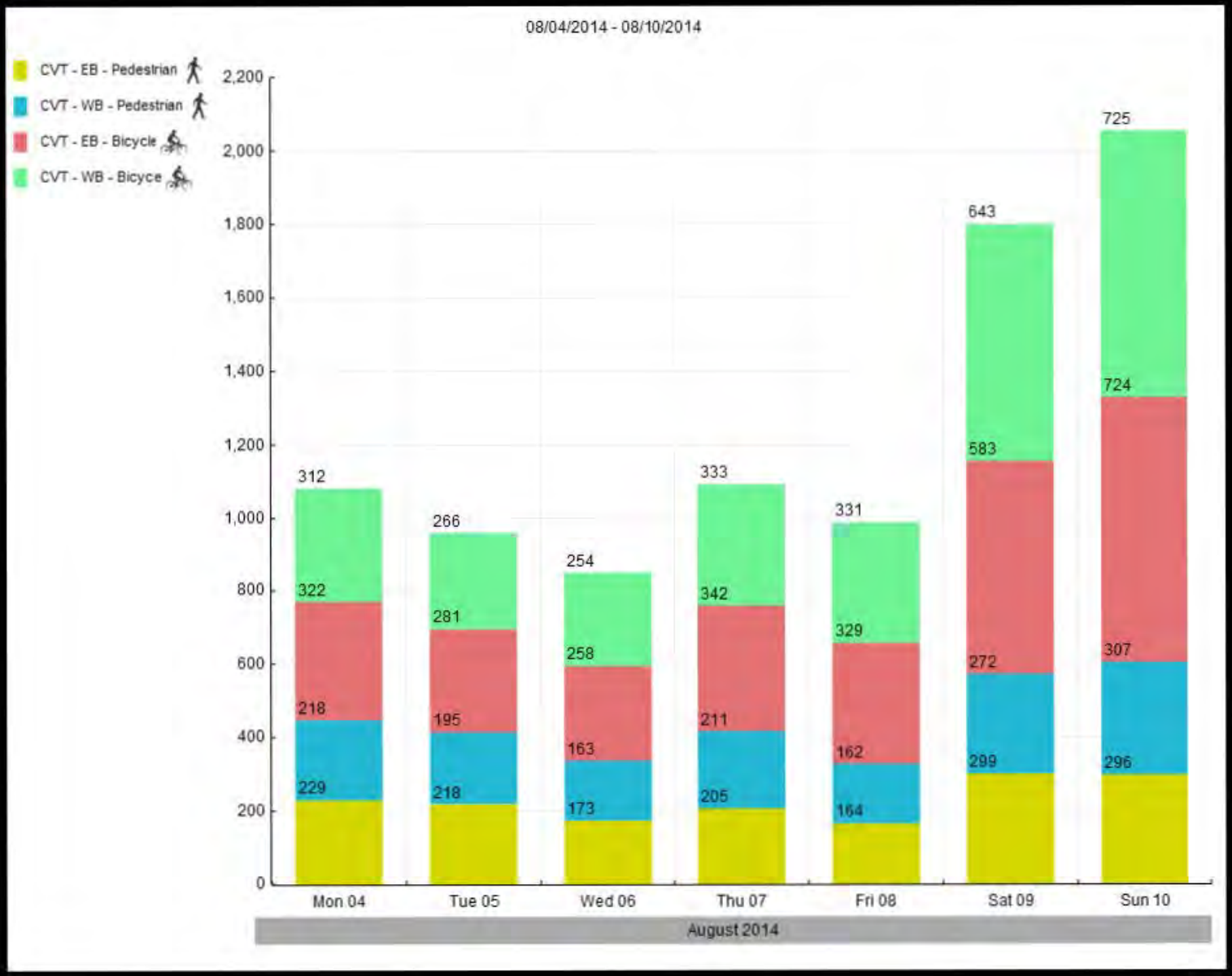
Source: EcoCounter

Chester Valley Trail – Weekly



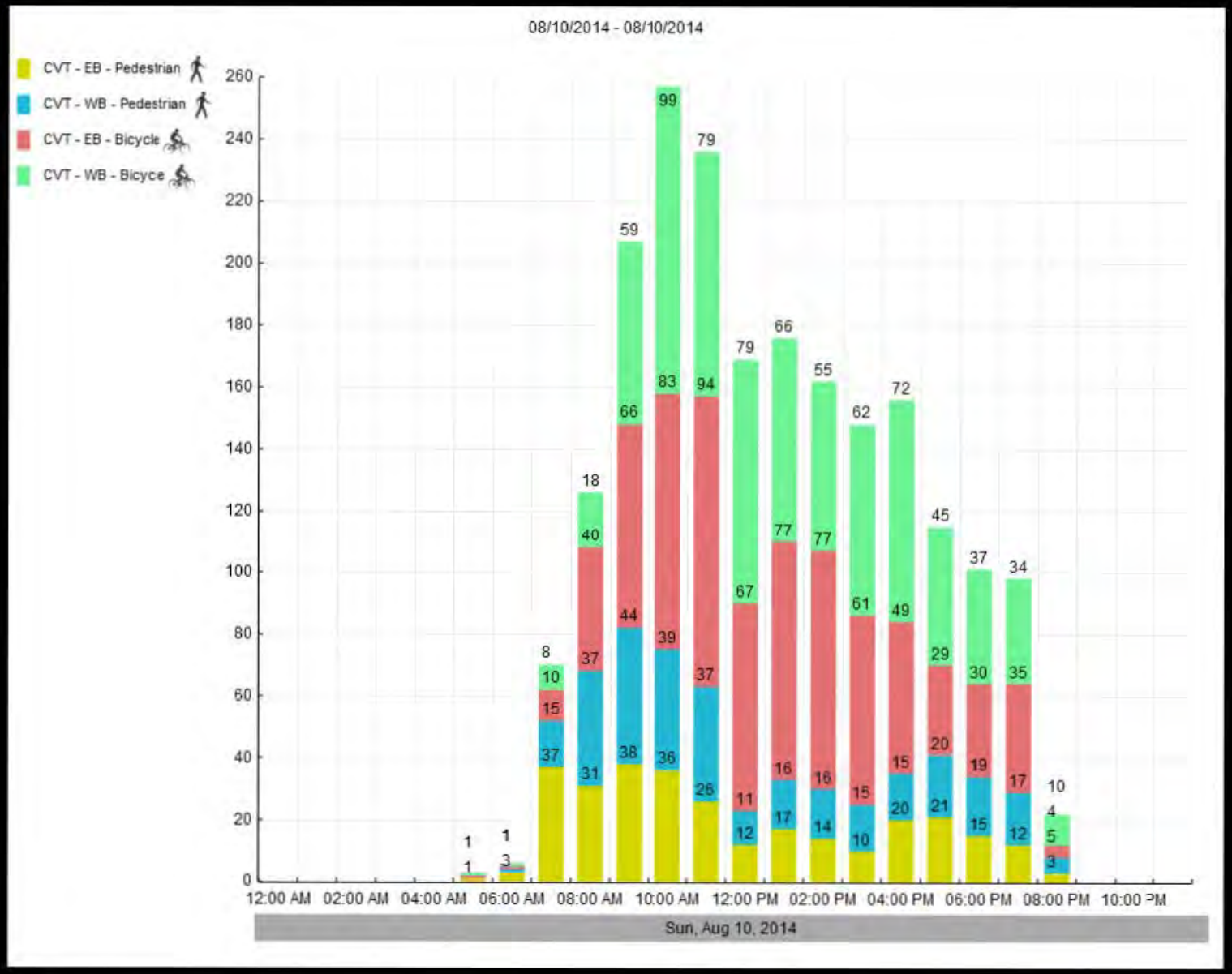
Source: EcoCounter

Chester Valley Trail – Daily



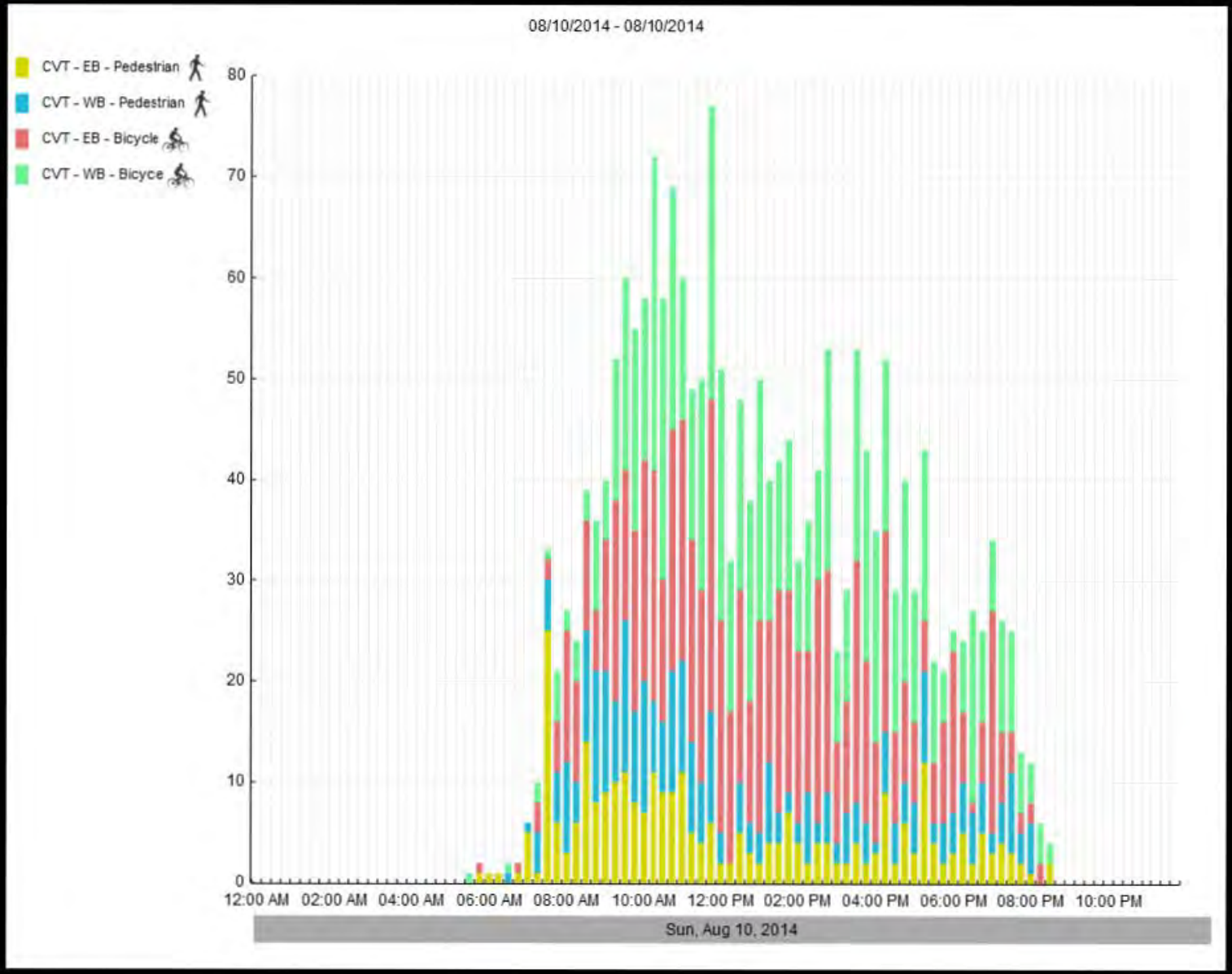
Source: EcoCounter

Chester Valley Trail – Hourly



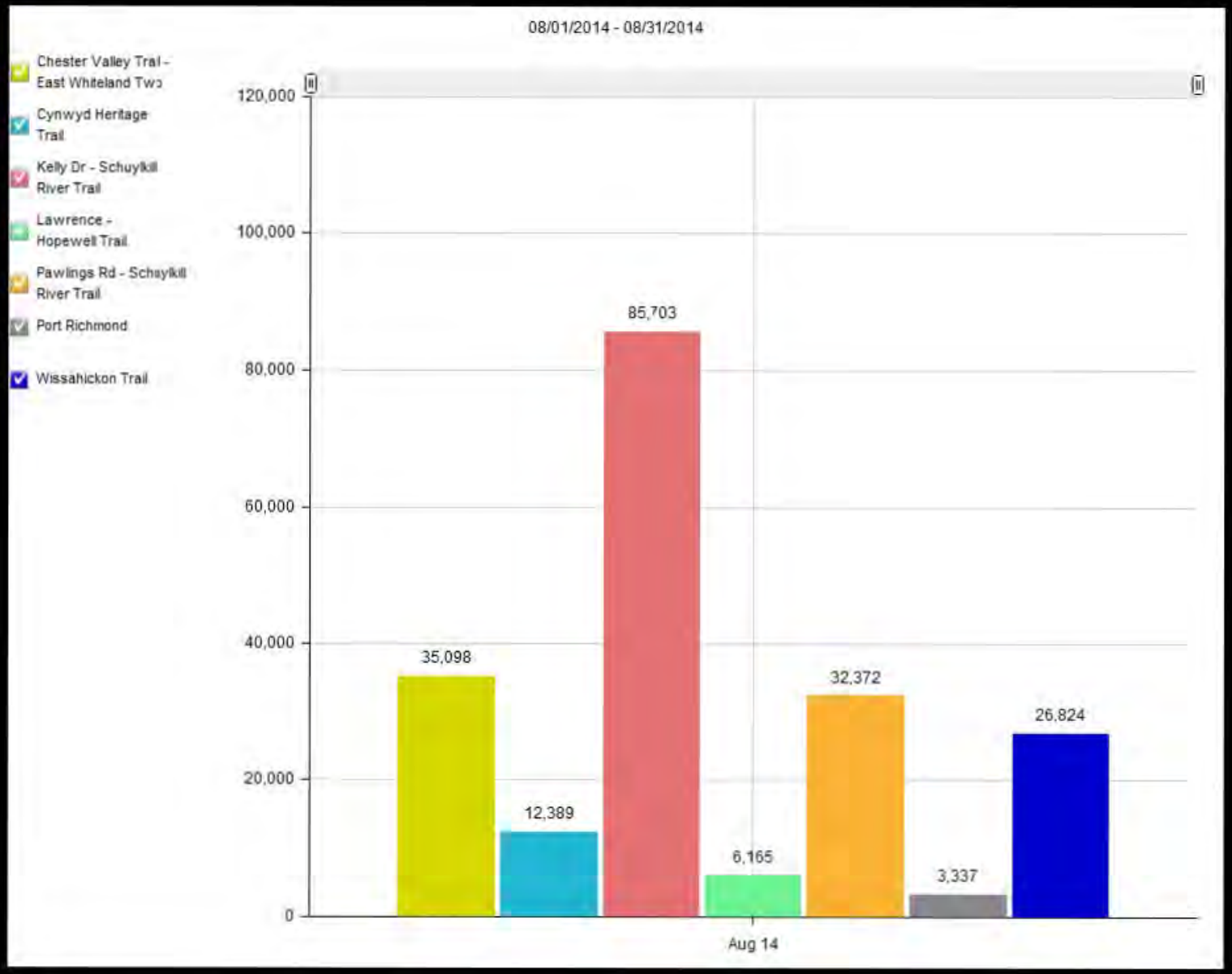
Source: EcoCounter

Chester Valley Trail – 15 Minute Increments



Source: EcoCounter

All Trails – August 2014



Source: EcoCounter

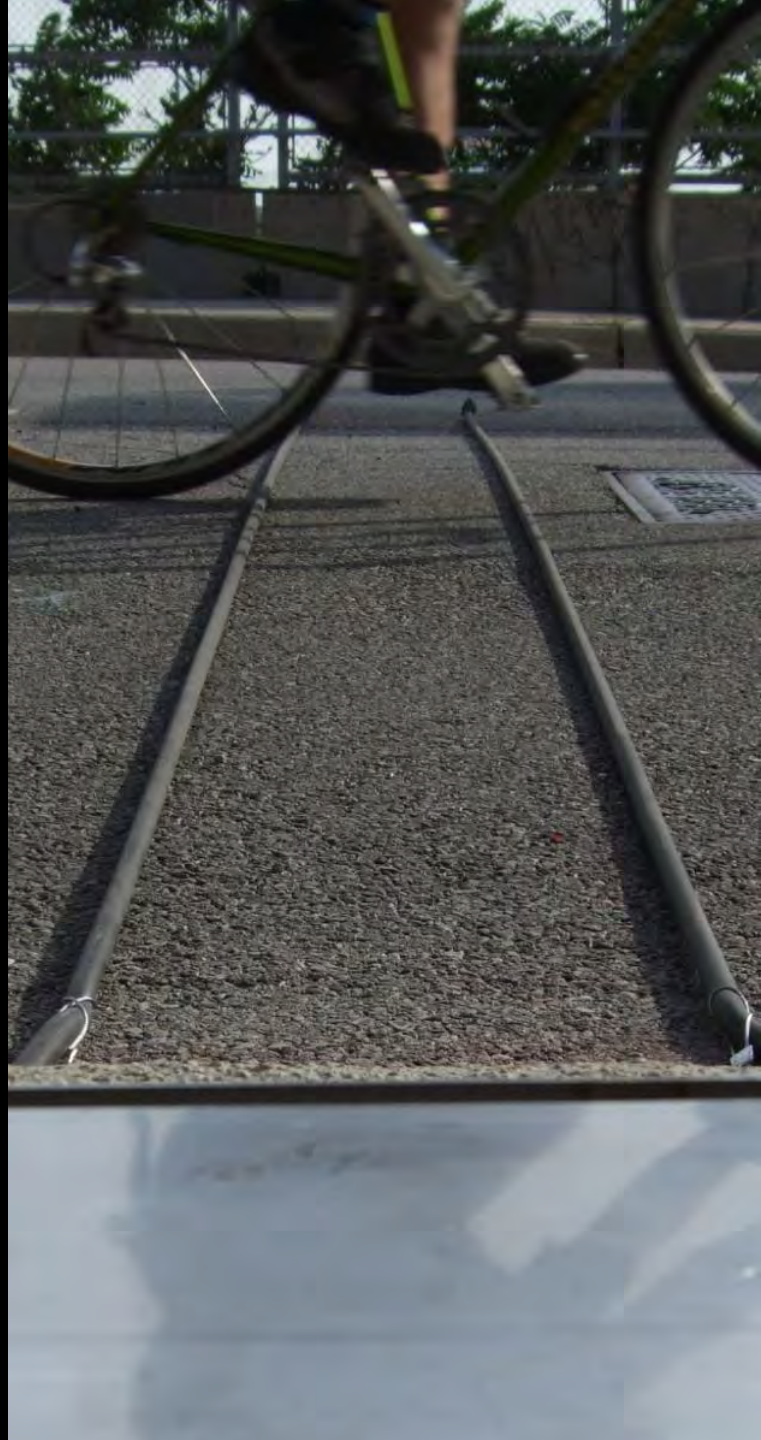
Cyclical Bike Count Program

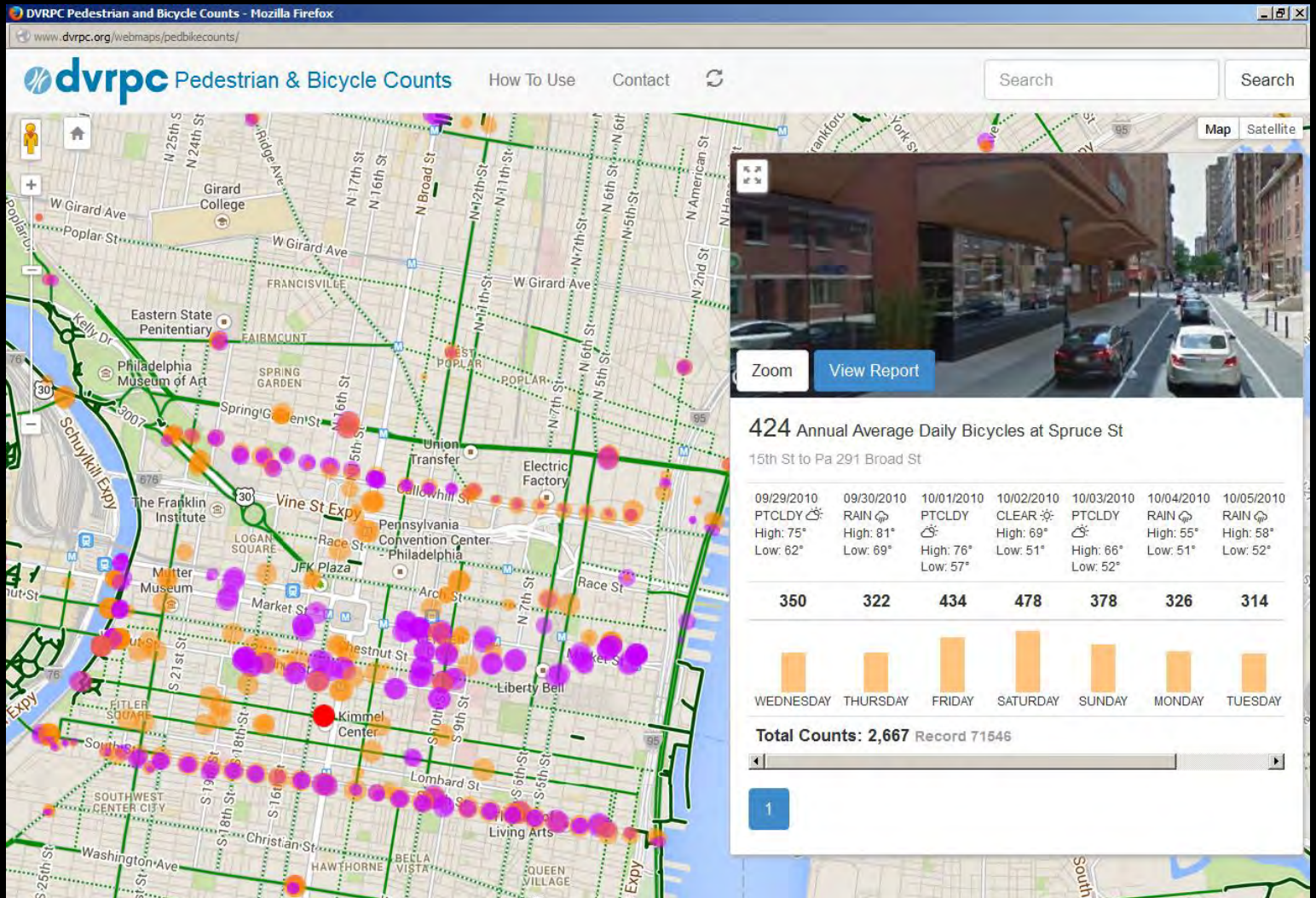
- What?
  - Ongoing measurement of bike volumes in the DVRPC region (first of its kind)
  - Weeklong counts using tubes (on- and off-road facilities)
  - About 10 locations per county to be selected as cyclical count stations, to be counted on a rolling 3-year cycle

- Why?
  - New seasonal adjustment factors will permit better weeklong count data
  - Seek to improve regional travel demand model
  - General gap in bike data: opportunity to support your planning and ours

Cyclical Bike Count Program

- When?
  - Saturation batch of counts in FY2015 (regional snapshot)
  - ~10 locations per county to be selected as cyclical count stations, to be counted on a rolling 3-year cycle



Web Viewer

http://www.dvrpc.org/webmaps/pedbikecounts/