**Williams®**

WE MAKE ENERGY HAPPEN

# Enterprise Service Performance Tuning and Application Usage Patterns Based on Monitoring Tools

*9/25/2018 / Ray Hardy, GISP & Carrie Landgraf, GISP / OKSCAUG*



**VIRGINIA SOUTHSIDE II CONSTRUCTION**
*Transco Pipeline, Southern Virginia*

**KENSINGTON GAS PROCESSING PLANT**
*Columbiana County, Ohio*

**SUMAS COMPRESSOR STATION**
*Northwest Pipeline, Washington*

# Agenda

> **Introduction**

> **Service Performance**

   – ArcGIS Monitor

   – MXD Perfstat

   – Geocortex Analytics

> **Customer Usage Patterns**

   – Geocortex Analytics

# Introduction

# Williams Enterprise Custom Applications

> **Web maps**

– Primarily used for viewing assets

– Only a couple allow editing of features

> **GeoMobile apps**

– Data collection and inspections

• Create new features

• Edit existing features

# Enterprise Custom Mobile Applications

**Asset Capture**
Web Mapping Application ⓘ

**Asset Capture Maximo**
Web Mapping Application ⓘ

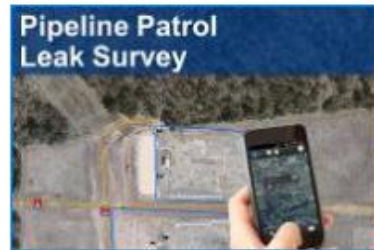**Asset Inspection**
Web Mapping Application ⓘ

**Emergency Response Planning**
Web Mapping Application ⓘ

**Encroachments**
Web Mapping Application ⓘ

**Pipeline Patrol & Leak Survey**
Web Mapping Application ⓘ

# Enterprise Custom Web Maps

**Asset Viewer**
Web Mapping Application

**Business Opportunity Viewer**
Web Mapping Application

**Communications Viewer**
Web Mapping Application

**EHS Viewer**
Web Mapping Application

**Operations Viewer**
Web Mapping Application

**Right of Way Viewer**
Web Mapping Application

**Risk Viewer**
Web Mapping Application

**Security Operations Center Viewer**
Web Mapping Application

**Volume Management Viewer**
Web Mapping Application

# Data Sources

> **Vendor Data**

> **Williams Internal Layers**

  – Assets

  – Base layers

    • Present in most, if not all, viewers

  – Business-specific layers (Risk, Environmental, etc.)

    • Specific to one or two viewers

> **External Services**

  – Weather, Wildfires, etc.

# Service Performance

# Application Use Metrics

> **Targeted Communication**

> **Decommissioning**

> **Performance and Tuning**

# Internal Services

> **Over 1,000 services are being monitored**

> **How to easily manage performance of all of these services?**

> **Benefits of improved performance**

   – Reduce load on system

   – Enhance user experience

# Monitoring Tools

> **Esri's ArcGIS Monitor**

> **Latitude Geographic's Analytics**

> **Esri's MXDPERFSTAT**


> **Audience Question:**

    – Who is using these tools?

# ArcGIS Monitor

# ArcGIS Monitor

| 2 | y ArcGIS, type Services, source AdminAPI, time Timespan, stat name Response Time(sec) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3 | Site | SiteUrl | folder | Service | TrSum | Min(sec) | Avg(sec) | p5(sec) | p50(sec) | p75(sec) | p95(sec) | p99(sec) | Max(sec) | Comments |
| 22 | PRD - WS01 Wil | https://TULPW | PUBLIC | LEGACY_WILLIAMS_PIPELINE_AND | 55291 | 0 | 0.78 | 0 | 0.21 | 0.88 | 1.86 | 2.83 | 78.60 | Investigate sporadic slow response times. |
| 23 | PRD - WS01 Wil | https://TULPW | PUBLIC | CORPORATE_BOUNDARIES | 2203 | 0 | 0.41 | 0 | 0.09 | 0.19 | 0.57 | 3.81 | 79.3 | Investigate sporadic slow response times. |
| 24 | PRD - WS01 Wil | https://TULPW | PUBLIC | PIPELINE_AND_FACILITY_BASE_LA | 77031 | 0 | 1.12 | 0 | 0.91 | 1.19 | 2.2 | 3.04 | 76.7 | Investigate sporadic slow response times. |
| 26 | PRD - WS01 Wil | https://TULPW | Gateway | REFERENCE_LAYERS | 29090 | 0 | 0.81 | 0 | 0.2 | 0.68 | 3.1 | 4.63 | 75.3 | Investigate slow response times. |
| 34 | PRD - WS01 Wil | https://TULPW | Gateway | 3rdPartyUtilities | 1021 | 0 | 7.19 | 0 | 0.26 | 14.83 | 21.31 | 42.56 | 51.58 | Investigate slow response times. |
| 55 | PRD - WS01 Wil | https://TULPW | Gateway | EMS | 1501 | 0 | 0.26 | 0 | 0.08 | 0.39 | 0.68 | 1.3 | 22.16 | Investigate sporadic slow response times. |
| 56 | PRD - WS01 Wil | https://TULPW | RISK | RISK_MAV | 1587 | 0 | 0.42 | 0 | 0.03 | 0.04 | 1.17 | 15.35 | 22.05 | Investigate sporadic slow response times. |
| 62 | PRD - WS01 Wil | https://TULPW | Gateway | EnergyBoundaries | 1426 | 0 | 0.46 | 0 | 0.08 | 0.32 | 1.07 | 11.69 | 19.80 | Investigate sporadic slow response times. |
| 99 | PRD - WS01 Wil | https://TULPW | Gateway | Environmental | 374 | 0 | 0.4 | 0 | 0 | 0 | 3.77 | 7.03 | 8.83 | Investigate slow response times. |
| 103 | PRD - WS01 Wil | https://TULPW | Gateway | MiscBoundaries | 47 | 0 | 0.21 | 0 | 0 | 0 | 0 | 4.74 | 8.47 | Investigate sporadic slow response times. |
| 111 | PRD - WS01 Wil | https://TULPW | GeoHazard | Geohazard | 2111 | 0 | 0.31 | 0 | 0.03 | 0.1 | 2.27 | 2.99 | 7.63 | Investigate sporadic slow response times. |
| 117 | PRD - WS01 Wil | https://TULPW | Gateway | Hydrology | 359 | 0 | 0.25 | 0 | 0 | 0 | 2.35 | 4.1 | 7.15 | Investigate sporadic slow response times. |
| 118 | PRD - WS01 Wil | https://TULPW | Gateway | HCA | 42 | 0 | 0.21 | 0 | 0 | 0 | 0 | 5.51 | 6.91 | Investigate sporadic slow response times. |
| 122 | PRD - WS01 Wil | https://TULPW | Gateway | Land | 391 | 0 | 0.07 | 0 | 0.02 | 0.04 | 0.15 | 0.79 | 6.55 | Investigate sporadic slow response times. |
| 123 | PRD - WS01 Wil | https://TULPW | PipelineContro | HCA | 36 | 0 | 0.16 | 0 | 0 | 0 | 0 | 4.76 | 6.47 | Investigate sporadic slow response times. |
| 143 | PRD - WS01 Wil | https://TULPW | Gateway | LaunchersReceivers | 210 | 0 | 0.2 | 0 | 0 | 0 | 2.66 | 4.58 | 5.47 | Investigate sporadic slow response times. |
| 145 | PRD - WS01 Wil | https://TULPW | Gateway | CustomerData | 36 | 0 | 0.11 | 0 | 0 | 0 | 0 | 3.36 | 5.2 | Investigate sporadic slow response times. |
| 147 | PRD - WS01 Wil | https://TULPW | Gateway | Tees | 39 | 0 | 0.14 | 0 | 0 | 0 | 0 | 4.7 | 5.20 | Investigate sporadic slow response times. |
| 148 | PRD - WS01 Wil | https://TULPW | Gateway | SurfsideLeaseholder | 39 | 0 | 0.11 | 0 | 0 | 0 | 0 | 3.06 | 5.2 | Investigate sporadic slow response times. |
| 149 | PRD - WS01 Wil | https://TULPW | Gateway | Transportation | 287 | 0 | 0.16 | 0 | 0 | 0 | 1.87 | 3.06 | 5.27 | Investigate sporadic slow response times. |
| 152 | PRD - WS01 Wil | https://TULPW | Gateway | Markers | 36 | 0 | 0.13 | 0 | 0 | 0 | 0 | 4.03 | 5.13 | Investigate sporadic slow response times. |
| 153 | PRD - WS01 Wil | https://TULPW | LandWest | pocatello_district | 55 | 0 | 0.16 | 0 | 0 | 0 | 0 | 3.88 | 5.04 | Investigate sporadic slow response times. |
| 161 | PRD - WS01 Wil | https://TULPW | Gateway | Geology | 36 | 0 | 0.11 | 0 | 0 | 0 | 0 | 3.29 | 4.55 | Investigate sporadic slow response times. |
| 165 | PRD - WS01 Wil | https://TULPW | Gateway | egis | 2466 | 0 | 0.08 | 0 | 0.01 | 0.02 | 0.73 | 1.12 | 4.41 | Investigate sporadic slow response times. |
| 170 | PRD - WS01 Wil | https://TULPW | Gateway | MajorOperators | 42 | 0 | 0.12 | 0 | 0 | 0 | 0 | 3.12 | 4.25 | Investigate sporadic slow response times. |
| 182 | PRD - WS01 Wil | https://TULPW | As_Built_Photo | UTM_18 | 42 | 0 | 0.09 | 0 | 0 | 0 | 0 | 2.34 | 4.11 | Investigate sporadic slow response times. |
| 204 | PRD - WS01 Wil | https://TULPW | Gateway | WilliamsPipelines | 773 | 0 | 0.79 | 0 | 0.19 | 1.61 | 2.09 | 2.53 | 3.67 | Investigate sporadic slow response times. |
| 205 | PRD - WS01 Wil | https://TULPW | As_Built_Photo | TX_SC | 42 | 0 | 0.09 | 0 | 0 | 0 | 0 | 2.25 | 3.67 | Investigate sporadic slow response times. |
| 209 | PRD - WS01 Wil | https://TULPW | As_Built_Photo | NC | 39 | 0 | 0.09 | 0 | 0 | 0 | 0 | 2.43 | 3.67 | Investigate sporadic slow response times. |
| 219 | PRD - WS01 Wil | https://TULPW | As_Built_Photo | ID_C | 39 | 0 | 0.09 | 0 | 0 | 0 | 0 | 2.19 | 3.49 | Investigate sporadic slow response times. |
| 222 | PRD - WS01 Wil | https://TULPW | As_Built_Photo | MD | 42 | 0 | 0.1 | 0 | 0 | 0 | 0 | 2.1 | 3.46 | Investigate sporadic slow response times. |
| 232 | PRD - WS01 Wil | https://TULPW | As_Built_Photo | GA_W | 39 | 0 | 0.09 | 0 | 0 | 0 | 0 | 2.4 | 3.35 | Investigate sporadic slow response times. |
| 234 | PRD - WS01 Wil | https://TULPW | PipelineContro | BOEMOceanBlocks | 36 | 0 | 0.09 | 0 | 0 | 0 | 0 | 2.28 | 3.37 | Investigate sporadic slow response times. |
| 244 | PRD - WS01 Wil | https://TULPW | Gateway | OhioSurveyBoundaries | 39 | 0 | 0.08 | 0 | 0 | 0 | 0 | 2.29 | 3.28 | Investigate sporadic slow response times. |
| 276 | PRD - WS01 Wil | https://TULPW | GeoHazard | ProbabilityAnalysis | 39 | 0 | 0.08 | 0 | 0 | 0 | 0 | 1.88 | 2.89 | |
| 279 | PRD - WS01 Wil | https://TULPW | As_Built_Photo | SC | 42 | 0 | 0.1 | 0 | 0 | 0 | 0 | 2.53 | 2.85 | |
| 301 | PRD - WS01 Wil | https://TULPW | As_Built_Photo | VA_N | 39 | 0 | 0.09 | 0 | 0 | 0 | 0 | 2.23 | 2.68 | |
| 303 | PRD - WS01 Wil | https://TULPW | Gateway | 3rdPartyPipelines | 3947 | 0 | 0.07 | 0 | 0.01 | 0.02 | 0.49 | 1.61 | 2.62 | |
| 304 | PRD - WS01 Wil | https://TULPW | Gateway | Parcels | 1898 | 0 | 0.03 | 0 | 0.01 | 0.02 | 0.05 | 0.62 | 2.61 | |
| 305 | PRD - WS01 Wil | https://TULPW | As_Built_Photo | PA_S | 42 | 0 | 0.09 | 0 | 0 | 0 | 0 | 2.21 | 2.61 | |
| 308 | PRD - WS01 Wil | https://TULPW | As_Built_Photo | OR_S | 36 | 0 | 0.08 | 0 | 0 | 0 | 0 | 2.2 | 2.57 | |

Summary | UrlRt | UrlRtPeakHr | UrlErrorPeakHr | AGSSite | AGSServices | AGSServiceTr | AGSTh | AGSFreeInstances | **AGSPerf** | AGSPerfPeak ...

# Geocortex Analytics
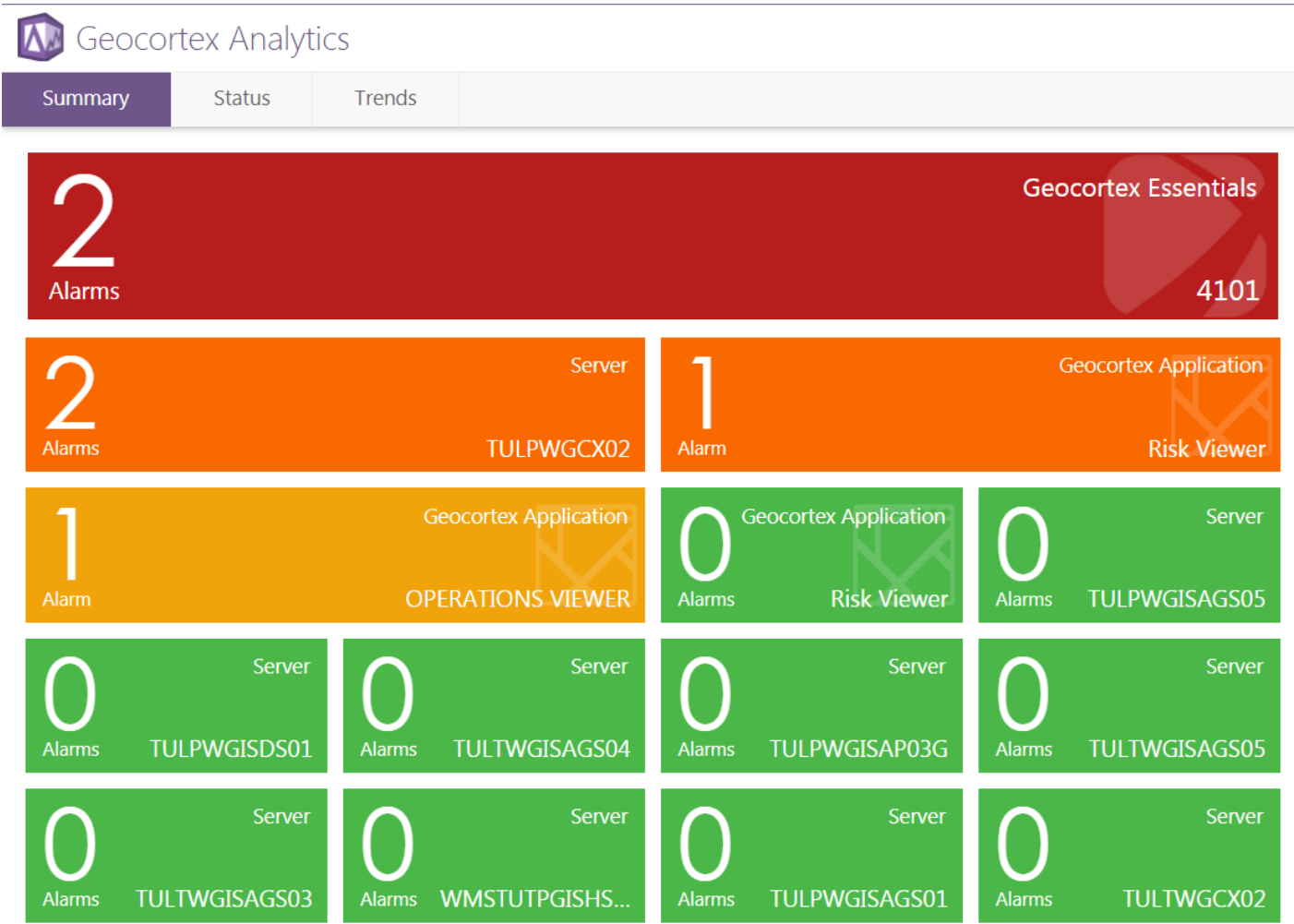
# EXAMPLE

> **Service Improvements:**

– Environment, Health & Safety Web Map (EHSMAV) Public Infrastructure – Elec Trans Lines (Rextag)

**mxdperfstat**

8/17/2018 10:05:04 AM
Z:\10.5\3rdPartyUtilities.mxd
layerCount= 2
GCS_WGS_1984
esriDecimalDegrees
X= -79.83 Y= 39.97 width= 1200 height= 1000

**Map Display Performance (sec) for each scale**

| Scale | Refresh Time(sec) | VisibleLayers |
|---|---|---|
| 14,714,382 | 40.59 | 1 |
| 18,489,298 | 32.03 | 1 |
| 9,244,649 | 27.35 | 1 |
| 4,622,324 | 13.75 | 1 |
| 2,311,162 | 6.57 | 1 |
| 1,155,581 | 2.61 | 1 |
| 577,791 | 1.44 | 1 |
| 288,895 | .79 | 1 |
| 144,448 | .39 | 1 |
| 72,224 | .20 | 1 |
| 36,112 | .30 | 1 |
| 18,056 | .07 | 1 |
| 9,028 | .03 | 1 |
| 4,514 | .01 | 1 |
| 2,257 | .01 | 1 |
| 1,128 | .01 | 1 |
| 141 | .01 | 1 |
| 282 | .01 | 1 |
| 564 | .01 | 1 |

**mxdperfstat**

8/17/2018 9:52:06 AM
Z:\10.5\3rdPartyUtilities.mxd
layerCount= 2
GCS_WGS_1984
esriDecimalDegrees
X= -79.83 Y= 39.97 width= 1200 height= 1000

**Map Display Performance (sec) for each scale**

| Scale | Refresh Time(sec) | VisibleLayers |
|---|---|---|
| 14,714,382 | .01 | 0 |
| 18,489,298 | .01 | 0 |
| 9,244,649 | .01 | 0 |
| 4,622,324 | .02 | 0 |
| 2,311,162 | .01 | 0 |
| 1,155,581 | .01 | 0 |
| 577,791 | .01 | 0 |
| 288,895 | .01 | 0 |
| 144,448 | .01 | 0 |
| 72,224 | .04 | 0 |
| 36,112 | .01 | 0 |
| 18,056 | .01 | 0 |
| 9,028 | .04 | 1 |
| 4,514 | .02 | 1 |
| 2,257 | .02 | 1 |
| 1,128 | .02 | 1 |
| 141 | .02 | 1 |
| 282 | .02 | 1 |
| 564 | .02 | 1 |

# MXDPerfStat

| Item | At Scale | Layer Name | Refresh Time (sec) | Recommendations | Features | Vertices | Labeling | Geography Phase (sec) | Graphics Phase (sec) | Cursor Phase (sec) | DBMS CPU | DBMS LIO | DBMS PIO | Source | LayerType | Layer Spatial Reference | LayerQueryDef |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 14,714,382 | Elec Trans Lines (Rextag) | 31.73 | set scale dependency: features fetched=172196; avoid projecting on the fly; | 172,196 | 4,436,733 | False | 31.72 | .00 | 9.68 | .00 | | | esriDBMS_Oracle,sde,sde:oracle$sde:oracle11g:oeutestt,gisapp_user | esriGeometryPolyline | GCS_North_American_1983 | |
| 2 | 18,489,298 | Elec Trans Lines (Rextag) | 31.91 | set scale dependency: features fetched=199823; avoid projecting on the fly; | 199,823 | 5,345,462 | False | 31.90 | .00 | 10.89 | .00 | | | esriDBMS_Oracle,sde,sde:oracle$sde:oracle11g:oeutestt,gisapp_user | esriGeometryPolyline | GCS_North_American_1983 | |
| 3 | 9,244,649 | Elec Trans Lines (Rextag) | 27.66 | set scale dependency: features fetched=133727; avoid projecting on the fly; | 133,727 | 2,915,838 | False | 27.64 | .01 | 7.07 | .00 | | | esriDBMS_Oracle,sde,sde:oracle$sde:oracle11g:oeutestt,gisapp_user | esriGeometryPolyline | GCS_North_American_1983 | |
| 4 | 4,622,324 | Elec Trans Lines (Rextag) | 18.31 | set scale dependency: features fetched=35706; avoid projecting on the fly; | 35,706 | 1,049,017 | False | 18.29 | .01 | 2.08 | .00 | | | esriDBMS_Oracle,sde,sde:oracle$sde:oracle11g:oeutestt,gisapp_user | esriGeometryPolyline | GCS_North_American_1983 | |
| 5 | 2,311,162 | Elec Trans Lines (Rextag) | 6.18 | set scale dependency: features fetched=7826; avoid projecting on the fly; | 7,826 | 248,503 | False | 6.17 | .01 | .41 | .00 | | | esriDBMS_Oracle,sde,sde:oracle$sde:oracle11g:oeutestt,gisapp_user | esriGeometryPolyline | GCS_North_American_1983 | |
| 6 | 1,155,581 | Elec Trans Lines (Rextag) | 2.59 | avoid projecting on the fly; | 1,875 | 59,690 | False | 2.57 | .01 | .10 | .00 | | | esriDBMS_Oracle,sde,sde:oracle$sde:oracle11g:oeutestt,gisapp_user | esriGeometryPolyline | GCS_North_American_1983 | |
| 7 | 577,791 | Elec Trans Lines (Rextag) | 1.43 | avoid projecting on the fly; | 574 | 19,567 | False | 1.41 | .01 | .03 | .00 | | | esriDBMS_Oracle,sde,sde:oracle$sde:oracle11g:oeutestt,gisapp_user | esriGeometryPolyline | GCS_North_American_1983 | |
| 8 | 288,895 | Elec Trans Lines (Rextag) | .77 | avoid projecting on the fly; | 161 | 5,880 | False | .76 | .00 | .01 | .00 | | | esriDBMS_Oracle,sde,sde:oracle$sde:oracle11g:oeutestt,gisapp_user | esriGeometryPolyline | GCS_North_American_1983 | |
| 9 | 144,448 | Elec Trans Lines (Rextag) | .40 | avoid projecting on the fly; | 25 | 1,223 | False | .39 | .00 | .00 | .00 | | | esriDBMS_Oracle,sde,sde:oracle$sde:oracle11g:oeutestt,gisapp_user | esriGeometryPolyline | GCS_North_American_1983 | |

# Application Architecture Diagrams
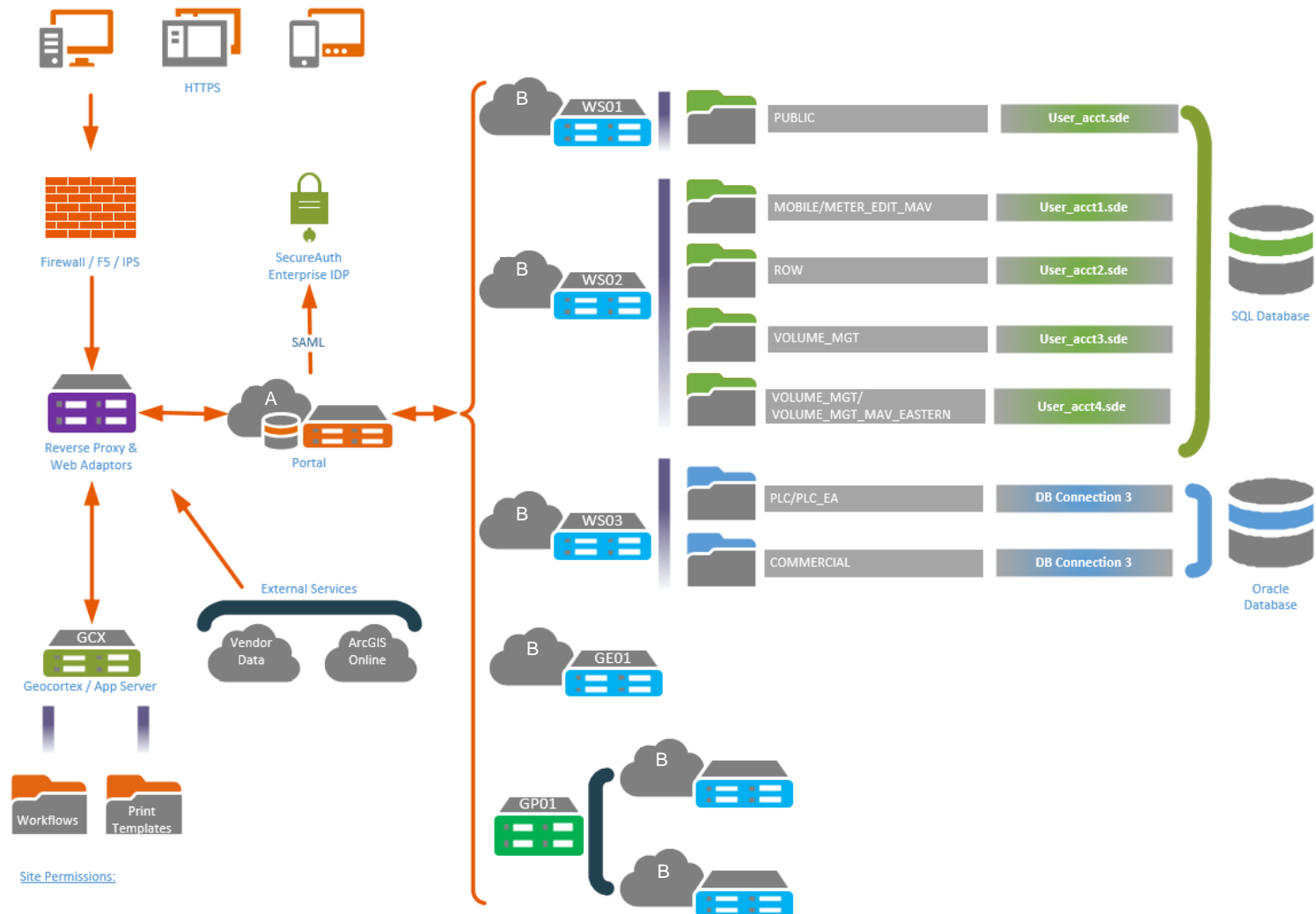
# Customer Usage Patterns

# Application Use Metrics

> **Targeted Communication**

> **Decommissioning**

> **Performance and Tuning**

# Performance Issue Identified from Targeted Communication

> **Pipeline Job Book**

– Layer took 20+ seconds to draw

– Identify tool would time out

> **What was found**

– FME job not truncating records

– Spatial Index needed to be rebuilt

> **Results**

– Layer draws in about 1 second

– Identify results return in about 2 seconds

| | |
|---|---|
| ID | 141 |
| Account | SM3 |
| CollectorHost | SM3 Production |
| CollectorHostname | WMSTUTTGISLM01 |
| Site | TST - WS01 Williams ArcGIS Server Site |
| SiteUrl | https://TULTWGISAP03G.williams.com:6443/arcgis |
| Cluster | default |
| folder | PUBLIC |
| Service | MAV_MAP_SERVICE |
| ServiceType | MapServer |
| TrSum | 4613 |
| Min(sec) | 0 |
| Avg(sec) | 0.67 |
| p5(sec) | 0 |
| p50(sec) | 0.04 |
| p75(sec) | 0.09 |
| p95(sec) | 0.73 |
| p99(sec) | 15.28 |
| Max(sec) | 65.31 |
| Uptime(%) | 100.6 |
| Samples | 336 |
| Interval(sec) | 3600 |
| Alerts(%) | 0 |
| LastUpdated | 2018-07-12 17:26:00+00:00 |
| Comments | Investigate sporadic slow response times. |

# Why Target Communications?

> **Gain an understanding of who uses what applications**

  – Allocation of resources based on level of usage

  – Communications (outages, upgrades)

  – Training

> **Focus voice of the customer surveys**

  – Enhancement requests

  – Who to reach out to for input on enhancement requests that would affect a broad range of people

# How to Target Communications?

> **Geocortex Analytics**

– Web-based

– Accessed through Portal

  • Permissions

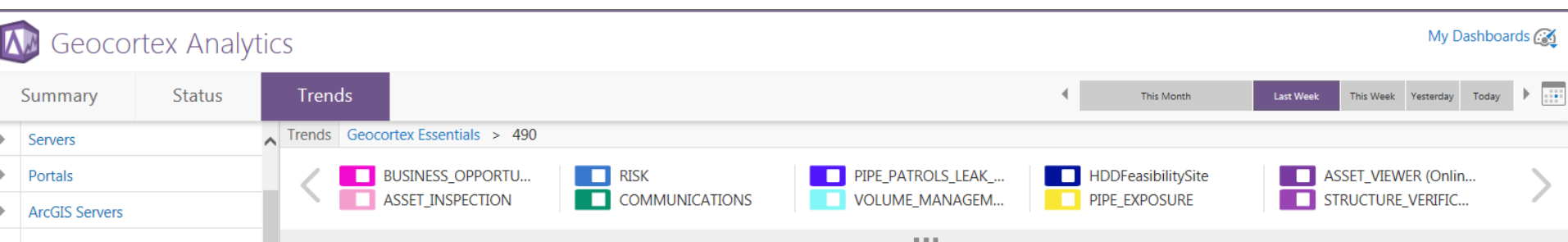# Who Uses the Enterprise Custom Apps?

> **GeoMobile**

– 570 GeoMobile users

> **Web Maps**
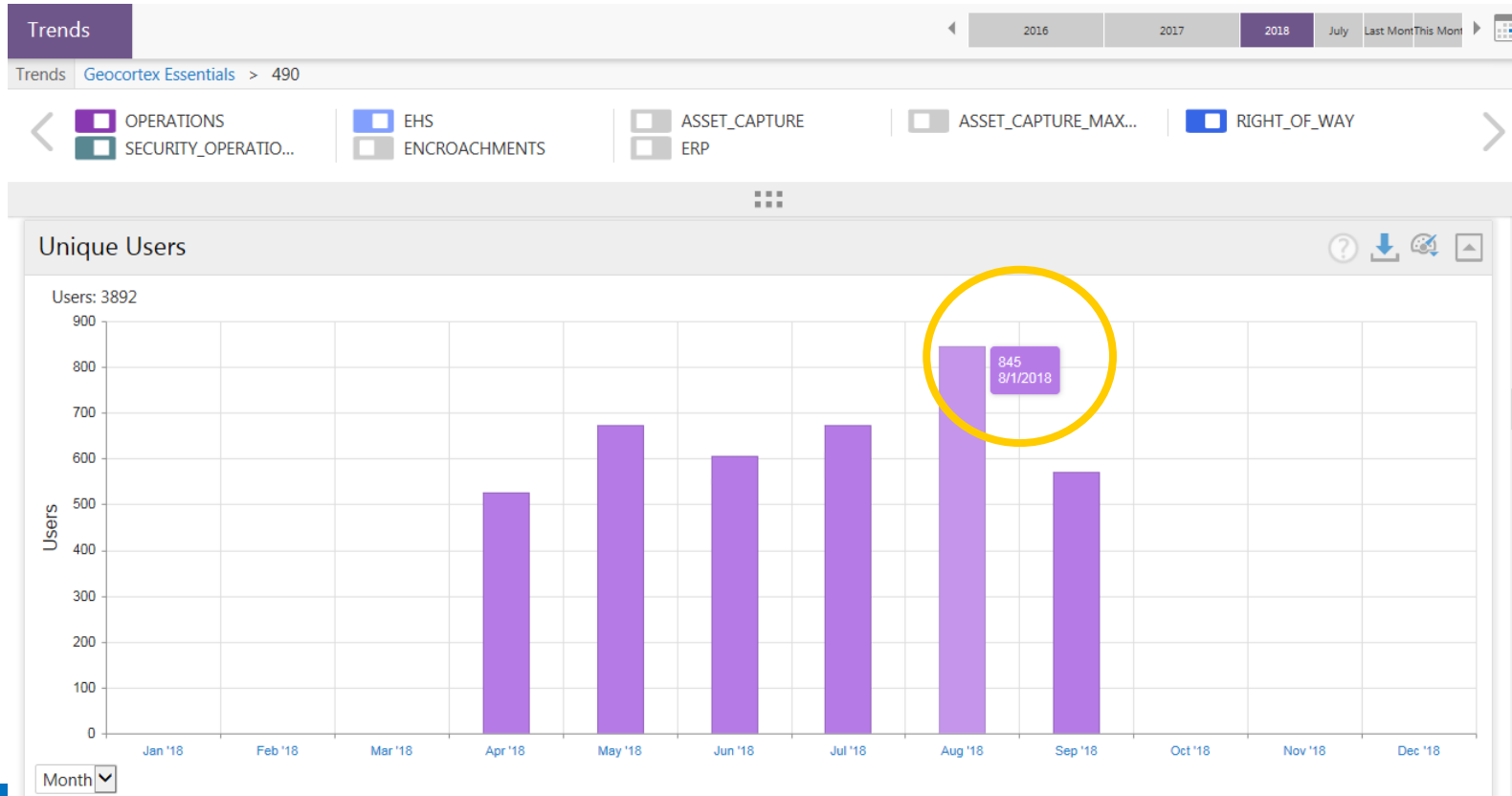
# Geocortex Analytics

> **Can look at trends over specific time periods**

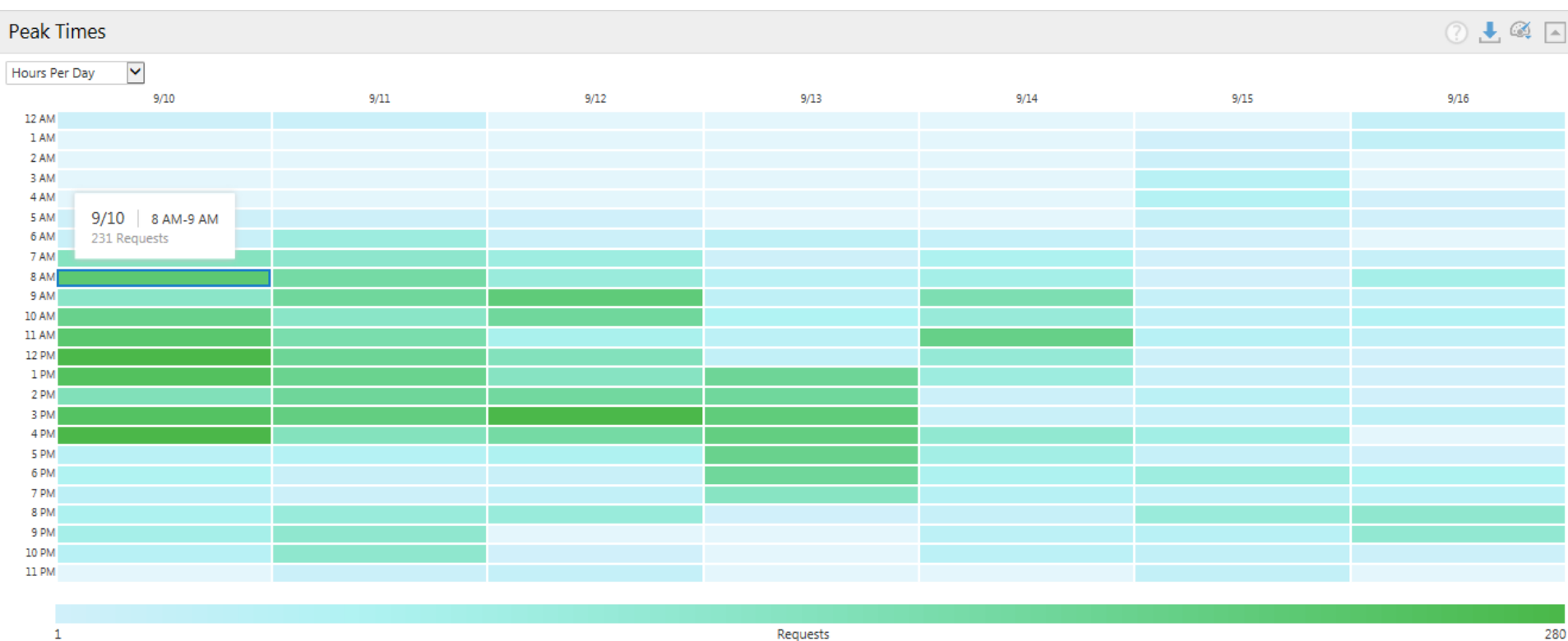> **Can focus trends on a specific application, a set of applications, or all applications**



> **Can export content**

# Temporal Metrics

> **Peak times**

  – Staffing support

  – Ideal time frames to shut down apps for upgrades/updates

# Customer Usage Metrics

> **Who are the users?**

- How often are they using apps?

- New versus returning customers

> **What devices are being used to access apps?**

> **What tasks people are doing on their own?**

- Freeing GIS Staff to perform other tasks

# Individual Customer Details

## Users

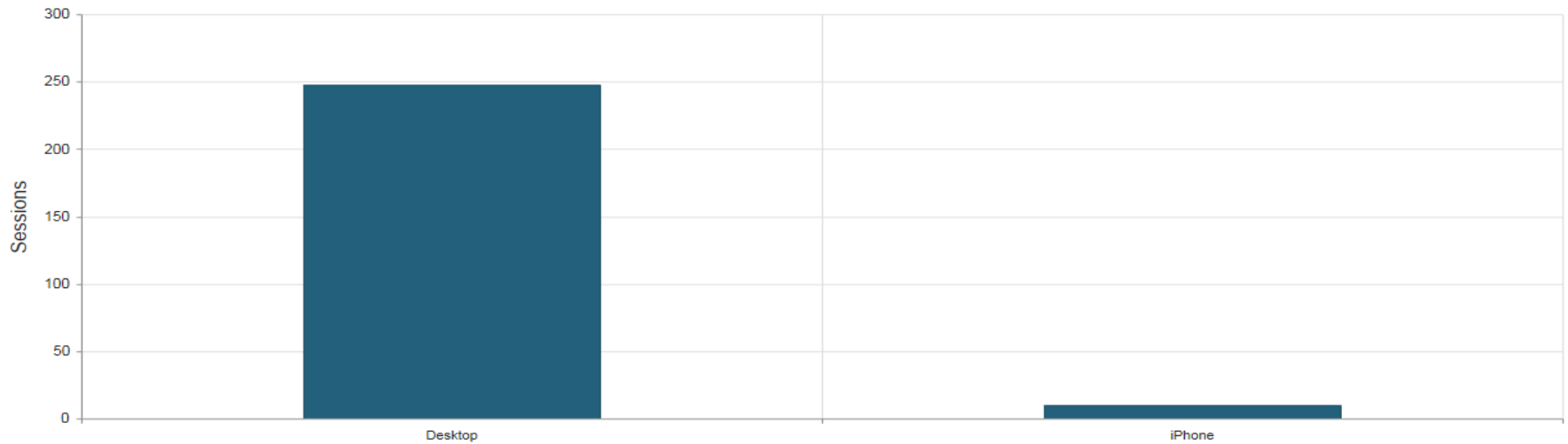| Username | Identity Type | IP Address | New User | Sessions | Map Requests | Average Requests Per Session | Average Session Duration |
|---|---|---|---|---|---|---|---|
| Anonymous User → | Guest | | ✓ | 1 | 0 | 21 | < 1 min |
| Richard → | ArcGIS Enterprise | | ✗ | 10 | 288 | 59 | 19m |
| Rik G → | ArcGIS Enterprise | | ✗ | 9 | 507 | 89 | 1h 36m |
| Carrie → | ArcGIS Enterprise | | ✓ | 9 | 61 | 45 | 11m |
| Lee → | ArcGIS Enterprise | | ✗ | 8 | 217 | 61 | 3h 3m |
| Scott → | ArcGIS Enterprise | | ✗ | 8 | 301 | 67 | 9h 30m |
| Steven → | ArcGIS Enterprise | | ✗ | 7 | 266 | 71 | 7m |
| Wesston → | ArcGIS Enterprise | | ✗ | 7 | 461 | 101 | 2h 35m |
| Eric → | ArcGIS Enterprise | | ✗ | 6 | 47 | 35 | 3m |
| Keith → | ArcGIS Enterprise | | ✗ | 6 | 237 | 85 | 8m |

|◄ ◄ 1 2 3 4 5 … ► ►|    10 ▼    items per page    1 - 10 of 98 items

# New Users / Returning Users
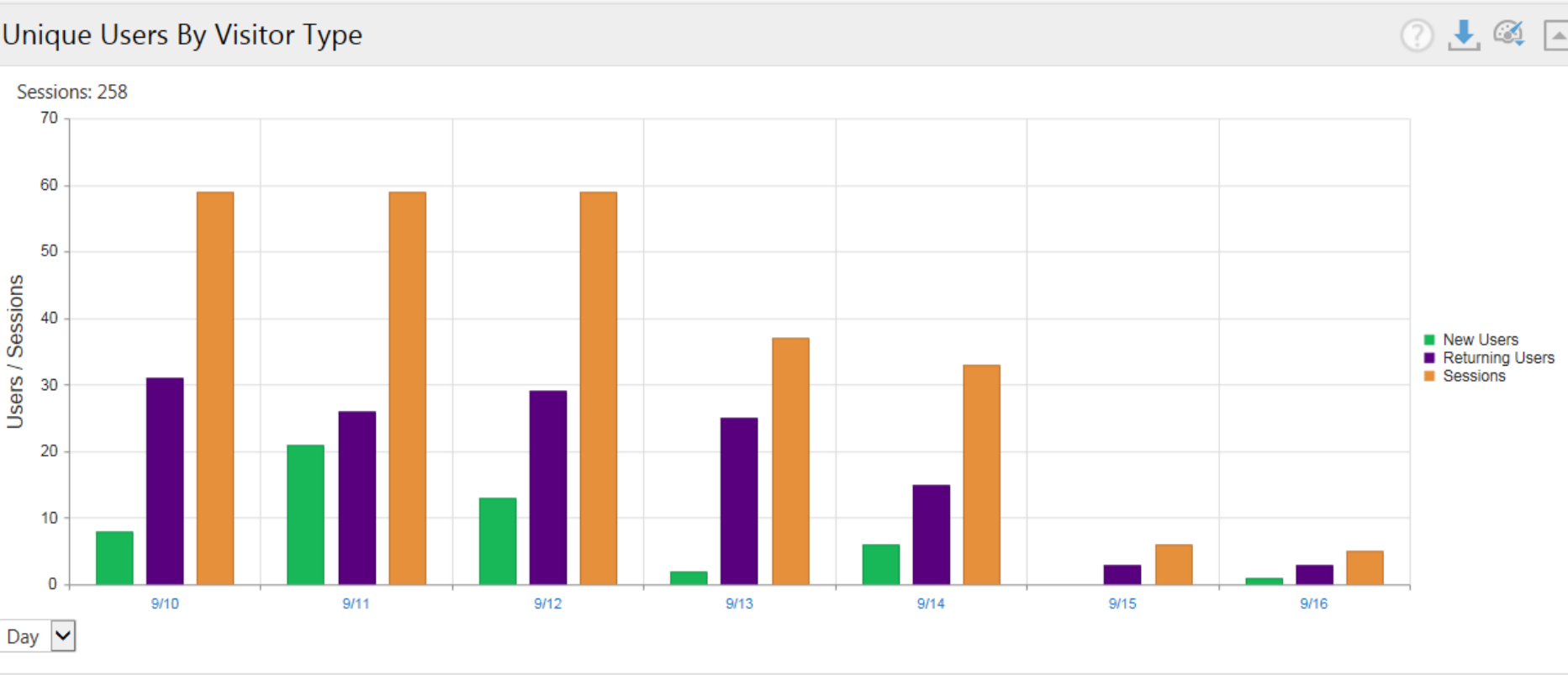
# Devices and Browsers
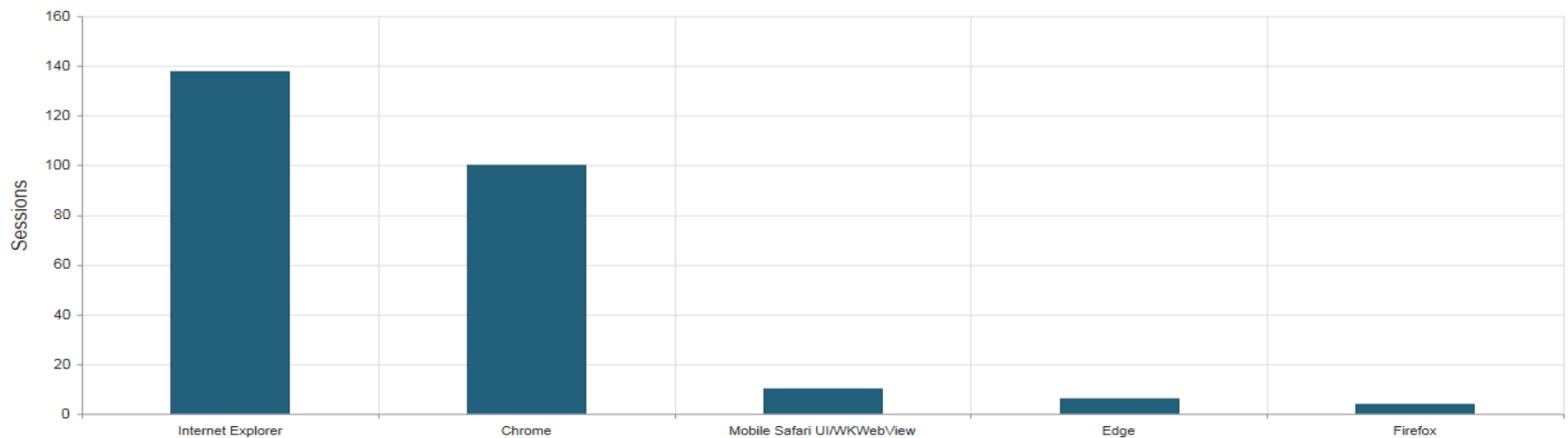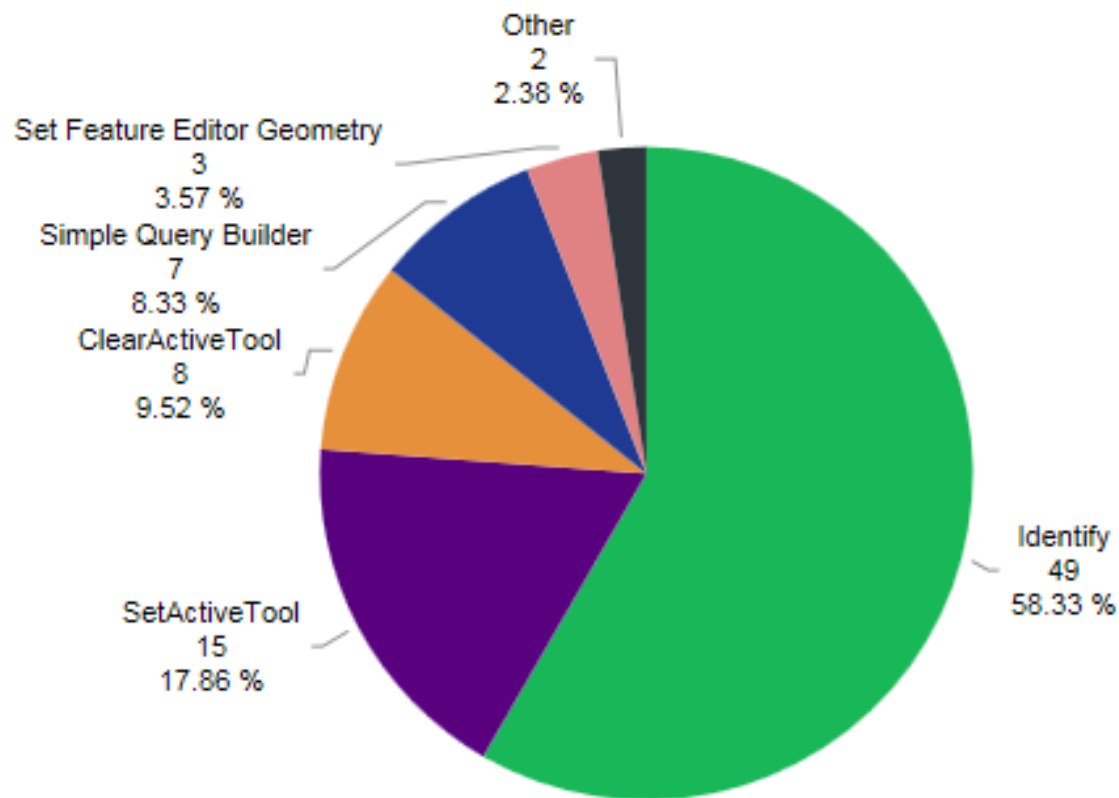
# Tasks Performed (Web Map)

# Tasks Performed (Mobile)



Other
2
2.38 %

Set Feature Editor Geometry
3
3.57 %

Simple Query Builder
7
8.33 %

ClearActiveTool
8
9.52 %
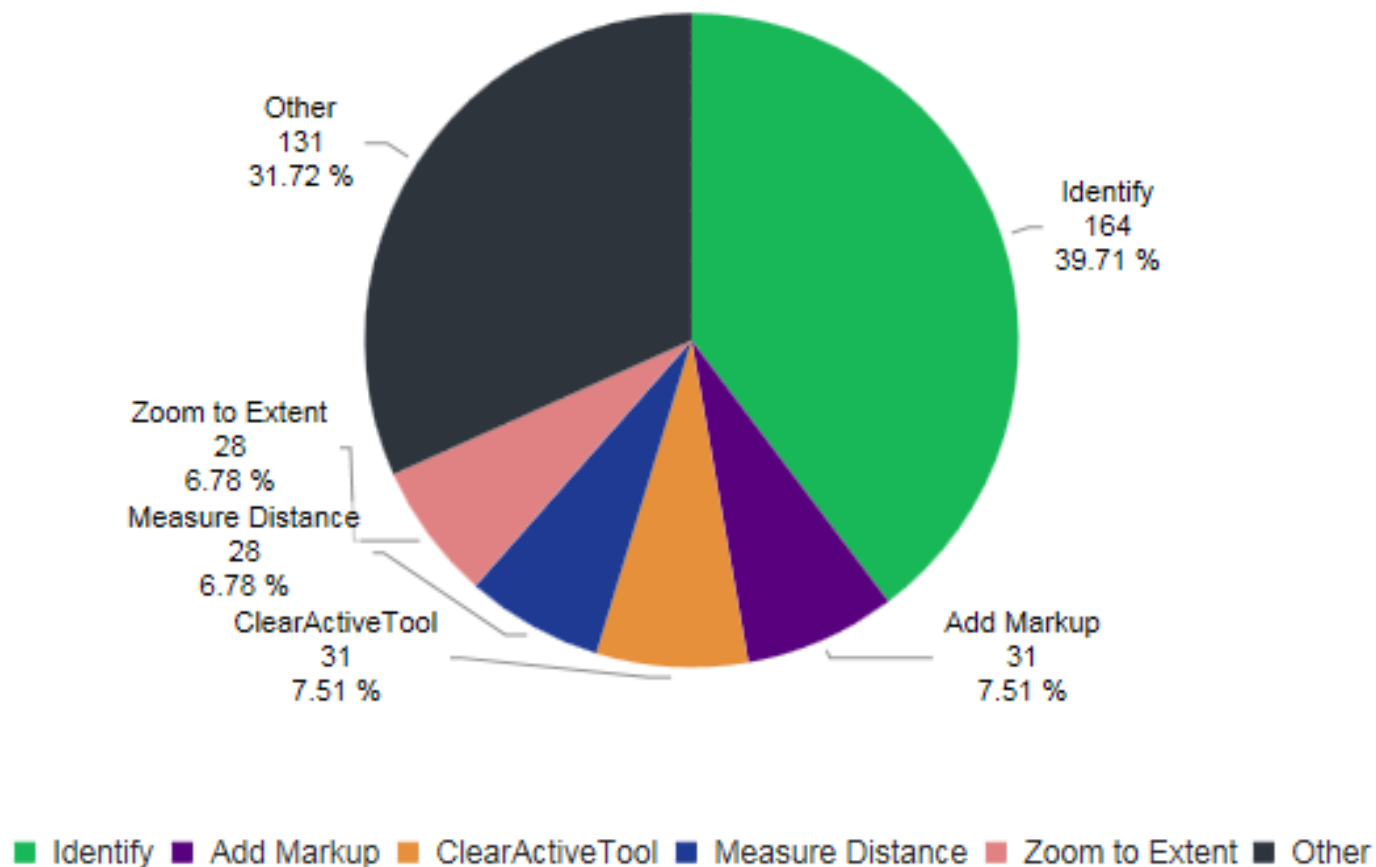
SetActiveTool
15
17.86 %

Identify
49
58.33 %

■ Identify ■ SetActiveTool ■ ClearActiveTool ■ Simple Query Builder ■ Set Feature Editor Geometry ■ Other

# Conclusions

# Lessons Learned

> **Analyzing services and performance cannot just be done using tools**

> **Understanding and meeting customer needs keeps custom applications relevant**

> **We still have a lot to learn about Analytics!**

# Questions?