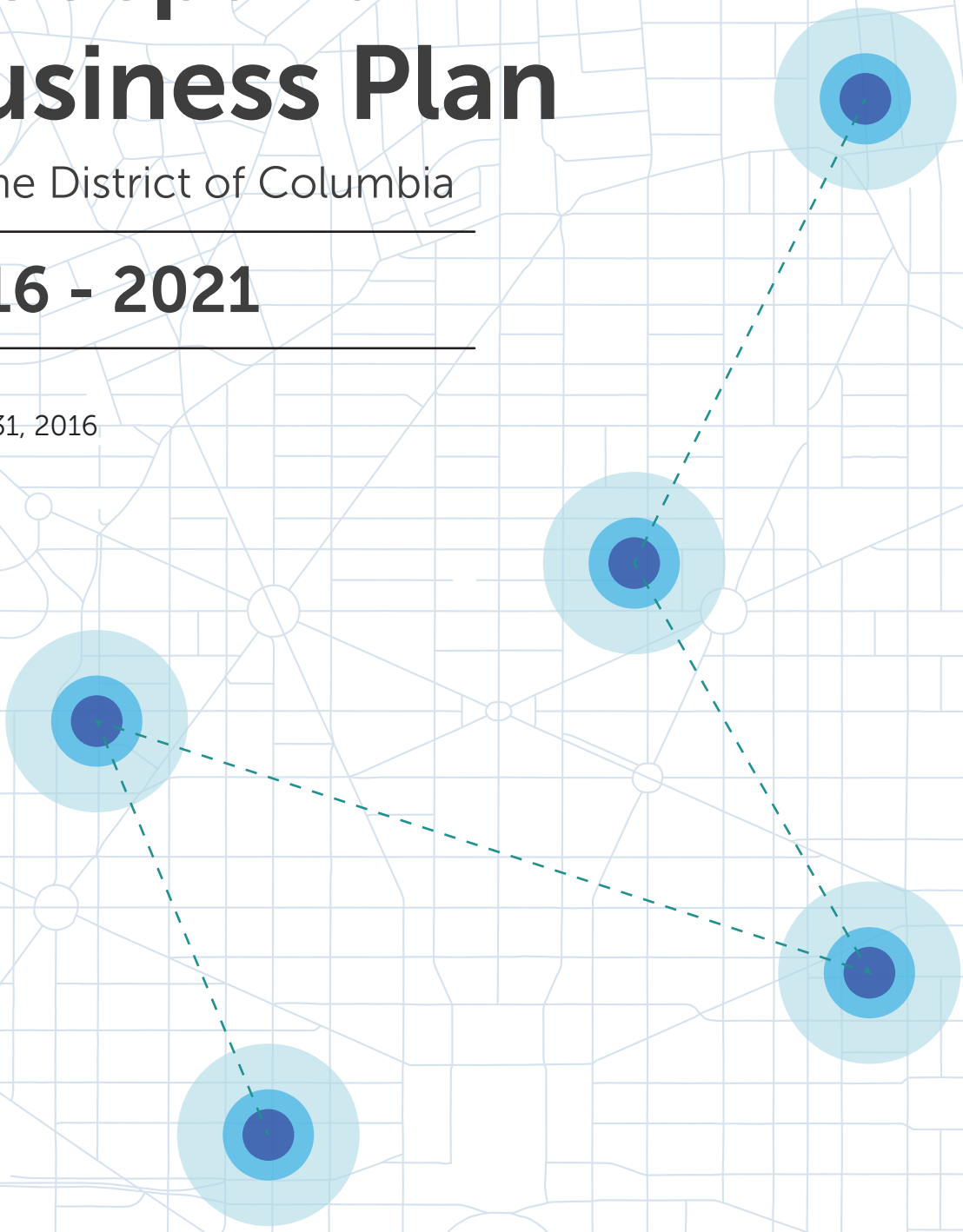
Geospatial Business Plan

for the District of Columbia

2016 - 2021

Final

March 31, 2016



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DC GIS

octo

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1 EXECUTIVE SUMMARY

This Business Plan is a companion document to the DC GIS Strategic Plan 2016-21. The goals that are addressed in detail in this document were articulated in the Strategic Plan as part of the overall agenda for DC GIS. DC GIS is more than just OCTO's GIS program – it is DC Government-wide, and engages the public. OCTO is the custodian of a very important social compact for creating shared value when it comes to GIS, and has achieved a distinctive **stakeholder-embraced approach** for its GIS governance, stewardship, and value added.

This plan focuses primarily on two of the five goals defined in the Strategic Plan for DC GIS: **Data and Service Delivery**. Its purpose is to inform the DC GIS Steering Committee (GISSC) and OCTO executive leadership in support of the DC GIS program. In the Business Plan, the principles of IT portfolio management are applied to DC GIS programs to classify investments in data, applications, and services.. tThis plan updates and replaces the previous plan from 2011, and should be refined on a regular basis as a guide for spending to maintain and modernize DC GIS.

The Strategic Plan, by design, focused on what the overall DC GIS strategy should be for the next five years, whereas this companion Business Plan zeros in on how to accomplish the goals by proving specific recommendations. In general, the **near-term implementation strategy** is to act on the recommendations as presented in this Business Plan for the first two strategic goals. Longer-term, the strategy will be to pursue the development of business plans for the remaining goals.

This document focuses on the first two strategic goals:

1. **Provide geospatial data governance and delivery in alignment with District priorities.**
2. **Provide outstanding infrastructure and service delivery to the DC GIS stakeholder community.**

The OCTO GIS Group, working within the District's IT ecosystem, is either managing or leveraging a variety of platforms to support the DC GIS mission, customers and stakeholders. In this context, a platform is a base technology (or technologies) on which other technologies, services, or processes are built. In addition, it is viewed as a whole "economic unit" in terms of aggregating budget costs to support it. As platforms evolve, different investment strategies become more or less relevant, depending on both user demand and the technology life-cycle. These strategies are described in this Business Plan, for data and services delivery platforms. In brief, the following items were identified for investment:

- The **District of Columbia Open Data Portal**
- New **"high value" data sets** for assessing citizen quality of life, such as pedestrian and cycling accidents, moving and parking violations, parking meter locations and usage, and certificates of occupancy
- The capture of **Big Data** to identify previously unknown correlations and other useful information that can be used to improve decision making and **data analytics**, such as aggregated tax information, moving violations, permit locations, real-time data, emergency response times, and wireless cellphone coverage

- The capture, vetting, and integration of **crowd-sourced data** to increase citizen engagement and encourage contributions to DC GIS – leverage **social media** (e.g. tweet mapping to discover what's trending and where)
- Make **3D data and tools** available to visualize and analyze such data, to support planning projects, emergency situations, or code enforcement – e.g. 3D building data and a 3D representation of the Master Address Repository (MAR), e.g. underground Metro stations
- Make **temporal geospatial data** available, e.g. to include near real-time data related to traffic accidents, events, or other highly dynamic data sets – and the capture and archive of **historic data** for the purposes of visualizing and analyzing change over time
- Provide **agency and public customer support** that encourages and enables users to "help themselves" to answer questions, create maps and perform geospatial analysis – i.e., **self-service** and new WMS and data services (e.g. buffer services, MAR web service improvements, MySchoolsDC services, District priorities API and data replication routines)
- Invest in **new software platforms and improvements to existing platforms** including Google Maps API, ESRI ArcGIS Server and Extensions, GeoServer and PostGIS, Cyclomedia, ArcGIS Online, Safe Software's Feature Manipulation Engine (FME), Elastic Search, Hadoop, and cloud-based geoanalytics platforms
- Support **alternatives and complements to the Esri geospatial platform** including Google, MapLarge, and especially Open Source tools such as Mapbox, Leaflet, and CartoDB, and options yet to emerge -- create a **"Pilot Lab"** or otherwise named entity to test and explore new geospatial technologies and stimulate new thinking to solve problems, and to proactively avoid vendor lock-in by understanding viable alternatives
- Invest in **data visualization tools** to leverage the diversity of available data sets, including tools for mobile devices, web viewers, and new platforms such as MapBox and CartoDB
- Meet the growing demand for **Business Intelligence and performance metrics analysis tools** from agencies and the public.

In addition to investment priorities, specific recommendations are included on governance, including the following subset:

- Request a **Mayoral Memo** on the DC GIS program to raise awareness of it as an important and essential DC asset
- Formally establish **GISSC subgroups for Data and Web Services** to concentrate appropriate GISSC resources and attention on important DC GIS program areas
- Make **data ownership and stewardship** responsibilities for OCTO GIS and for agencies explicit
- Modernize the DC GIS federated data model to **leverage new data platforms** and organizing concepts for data

- Reinvigorate **Annual GISSC Budget Meeting for DC GIS** to assure participation in prioritization of spending to support DC GIS

The current fiscal year 2016 operating budget for OCTO GIS is $2.55 million. This supports 12 full-time equivalent (FTE) staff members supporting program management, data, customer service and application development (but does not include staff for the Citywide Data Warehouse). While not finalized at the time of this report, the operating budget for FY17 is expected to reflect a 15% increase over FY16. As large enterprise data expenses such as orthoimagery and planimetric data capture are no longer eligible for capital budget support, the **OCTO GIS budget will likely be strained**. The demonstrated need for maintenance of OCTO GIS enterprise geospatial assets -- including data, platforms, and services -- plus the demand for new investments described in this plan will likely require additional funding. **This plan recommends that DC GIS convene an annual budget meeting to review assets, plan for important investments, and strategize on funding sources.** This will help OCTO GIS assess how much spending on GIS is being done throughout the enterprise, and ensure alignment with strategic goals and priorities.

2 BACKGROUND

2.1 The 2011 DC GIS Business Plan

The 2011 DC GIS Business Plan[1] was first published as a draft in August 2009, as a follow-on action to the DC GIS Strategic Plan (January 2009), and published in its final form in July 2011. The goals addressed in the 2011 Business Plan were two of six programmatic goals articulated in the 2009 DC GIS Strategic Plan, including:

- Develop and operate enterprise mapping data, geospatial applications, and Web services that enhance the utility, reduce the cost, and expand the interoperability of citywide and agency IT systems
- Provide outstanding customer service and training that enables DC GIS users and stakeholders to leverage the full power of GIS technology

The 2011 Business Plan was intended to support the newly proposed annual GISSC Budget Meeting for DC GIS, which was called for in the 2009 Strategic Plan, to occur in the fall of each year. It was also the first example in the sphere of government geospatial programs where the principles of IT portfolio management were applied as a methodology to classify investments, both current and future. It was

[1] "DC GIS Business Plan: Data, Applications, and Services," OCTO, July 2011.

also the first Plan to define and use the conceptual construct of “geospatial platforms” for organizing program elements and facilitating budget management.

In the DC GIS context, a platform was defined as a base technology (or technologies) on which other technologies or processes are built. It was considered to be a whole “economic unit” in terms of aggregating budget costs to support it, including people, training, software, systems, and data. As platforms evolve different investment strategies would become more or less relevant, depending on both user demand and the technology life-cycle. The OCTO GIS Group, working within the District’s IT ecosystem, saw itself as either managing or leveraging a variety of platforms to support the DC GIS mission, customers and stakeholders. Aspirationally, the Business Plan could theoretically be updated and refined, annually, to eventually address all of the strategic goals for DC GIS in a 5-year planning cycle, and support the idea of an annual GISSC Budget Meeting. However, it has been 5 years since the Business Plan was last updated, and DC GIS Budget Meetings with GISSC engagement have not been held every year.

3 OCTO GIS PROGRAM OVERVIEW

A more comprehensive OCTO GIS Program Overview can be found in the DC GIS Strategic Plan 2016-21. A synopsis of from the Strategic Plan is presented below.

The OCTO GIS Program provides District agencies and the public a hub for geospatial data, enterprise applications and licensing. The OCTO GIS Program is responsible for supporting existing centralized infrastructure and implementing new infrastructure that supports and enhances the DC GIS program's stakeholders. Agencies benefit from the wealth of enterprise geospatial data and web services, as well as technical support, GIS software licensing, training, and application development expertise. The public and broader GIS community benefit from access to public-facing web applications, open geospatial data, and improved DC government services. The services described below cover the many components of the Group’s ongoing effort.

The services provided by the OCTO GIS Program include:

- Support to the GISSC as mandated by Mayors Order 2002-27 in the form of coordination, outreach, planning, program management, and standards development
- Cloud-based mapping platforms
- Custom web mapping applications
- An Esri Enterprise License Agreement (unlimited access to Esri software)
- Design, development, deployment and maintenance of geospatial services from the District’s central enterprise GIS
- Customer services including training courses, as-needed technical support to agencies, technical consulting services, citizen customer services, and public and non-governmental organizational support

- Data services including acquisition, maintenance, and quality control of enterprise geospatial data and metadata
- The District of Columbia Open Data Portal
- Direct support for individual agencies with projects of multi-agency importance
- Procurement and project management support

In addition to the day-to-day technical support for District agencies, OCTO as a whole and the GIS Program in particular are in a position to support the high level priorities and goals set by the District's Administration. Alignment with District Priority Goals (DPGs) is a key factor in attracting the executive level attention needed for the long-term support of the District's GIS Program. The District Priority Goals include:

District Priority Area: A Healthy Community
1. Promote health equity
2. Transform emergency medical services in the District into a premier system
3. Reduce the rate of HIV infection, and improve the health of those living with HIV
4. Establish DC as a world class age-friendly city
District Priority Area: A Safer, Stronger DC
1. Make DC a model city for police-community relations
2. Reduce domestic and sexual violence, and improve outcomes for survivors
3. Make DC the safest big city in America
District Priority Area: A Strong Economy for All
1. End Homelessness
2. Produce, preserve and protect 7,500 affordable housing units by 2018, so that current and future residents can call DC home – regardless of income level
3. Reduce the unemployment rate in Wards 7 and 8 by 35%
4. Increase DC's employment by 40,000 jobs by 2018, and create a thriving business climate for entrepreneurs
District Priority Area: A World Class Education System
1. Prepare every child for kindergarten
2. Make public middle schools the premier choice for parents and students
3. Close the achievement gap, and empower all students to succeed
4. Graduate all high school students ready for college and career
5. Equip all adults with the knowledge and skills necessary for employment and post-secondary education.
District Priority Area: Sustainable Neighborhoods
1. Increase the number of District residents who commute by public transit, bike or by foot
2. Zero transportation system fatalities and serious injuries by 2024

3.	Make DC the greenest city in the US, with healthy air and waterways
4.	Make DC more efficient, effective, and responsive to residents' needs through the use of smart technology

Adopting these priorities for the District and committing to tracking and measuring them demands the widespread embrace of data driven decision-making across District agencies. The majority of priorities above imply comprehensive geospatial data collection, maintenance and analytics.

OCTO as a whole and the GIS Program can support these priority areas and move the District toward these goals by focusing on the following essential outcomes as described in the FY2015 Performance Accountability Report from OCTO[2]:

1. Provide strategic IT leadership, drive technology innovation and open government initiatives for the District government, to enhance the delivery of services and adoption for the city's residents, businesses, and visitors.
2. Provide and maintain a ubiquitous, reliable, and secure computing environment to ensure continuity of government operations and safeguarding the District's equipment, facilities, and information.
3. Improve service delivery through purposeful and strategic city-wide agency alignment.
4. Manage or oversee IT initiatives, programs and assets strategically, efficiently and economically to lower the cost of government operations.

By achieving these outcomes, DC GIS will not only accomplish its own programmatic goals but will continue to demonstrate how geospatial data, tools, platforms, and analysis are instrumental to solving the District's most fundamental and challenging problems.

[2] http://oca.dc.gov/sites/default/files/dc/sites/oca/publication/attachments/OCTO_FY15PAR.pdf

4 STRATEGIC GOALS & SUCCESS FACTORS

4.1 Mission Statement

The Mission of DC Geographic Information System (DC GIS) is to:

> *Improve the quality and lower the cost of services provided by the DC Government, through the District's collective investment and effective application of geospatial data and systems. Furthermore, DC GIS will reach beyond the DC Government by continuing to make DC GIS data freely and publicly available to the fullest extent possible in consideration of privacy and security.*

4.2 Long-term Programmatic Goals

The five long-term programmatic goals from the latest DC GIS Strategic Plan are listed below. Only the first two are primarily the subject of elaboration in this particular Business Plan, although the others may be touched upon, as in the section on success factors that follows the goals.

1. Focus on geospatial data governance and delivery in alignment with District priorities.
2. Provide outstanding infrastructure and service delivery to the DC GIS stakeholder community.
3. Be innovative, adaptive and maintain a multi-platform geospatial technology strategy.
4. Sustain geospatial coordination and engagement with the GISSC and nurture new partnerships within the District.
5. Support data-driven decision-making and performance-based management.

4.3 Short-term Success Factors for Each Goal

Programmatic Goals	Success Factors
Goal 1: **Focus on geospatial data governance and delivery in alignment with District priorities**	*Create a GIS Steering Committee data sub-group to focus on data requirements, maintenance, stewardship, inter-dependencies and notification/communication.*
	Seek commitment from agency leaders for sharing data of broad value.
	Maintain and expand the "one-stop shop" of current, accurate, and documented DC enterprise

	and agency geospatial data. Ensure the availability and currency of core data set.
	Expand the development and deployment of web services making current data easily accessible for casual as well as programmatic users
	Create feature level metadata and ensure that it is current, readily accessible, and easily discoverable.
Goal 2: **Provide outstanding infrastructure and service delivery to the DC GIS stakeholder community.**	*Increase agency awareness of DC GIS services among both technical GIS users and executive level leaders.*
	Continue to provide excellent technical training, support, and services to District agencies; Adapt to evolving demands and stakeholder needs.
	Develop and deploy enterprise applications focused on the needs of the general public.
	Maintain a stable geospatial platform and resilient infrastructure to reliably support business processes throughout the District.
	Create a GIS Steering Committee service delivery sub-group to focus on evolving requirements and service delivery challenges.
	Enhance the branding and marketing of DC GIS to highlight the overall program value to agencies, the public and the D.C. community at large.
Goal 3: **Be innovative, adaptive and maintain a multi-platform geospatial technology strategy.**	*Expand awareness and support utilization of alternative platforms (e.g. Google, CartoDB, Mapbox, Open Source) for consumption of DC GIS geospatial data and services through documentation and outreach.*
	Further enable agencies to map business data from non-geospatial sources and business systems.
	Leverage citizen participation in data creation, maintenance and quality control, where appropriate.
	Enable and encourage "real time" mapping to show trending of events or issues in the District.
	Promote the availability of new tools and resources (e.g. street level imagery from

	CycloMedia) to the broader DC GIS community through the GISSC and social media channels.
	Create an innovation lab to test and apply emerging platforms and technologies that may be useful to agencies and the DC GIS community at large.
Goal 4: **Sustain geospatial coordination through the GISSC and nurture new partnerships within the District.**	*Continue to facilitate GISSC meetings on a quarterly basis to provide a forum for the exchange of information and ideas among OCTO GIS, agencies and the broader DC GIS community with an emphasis on enterprise coordination and stakeholder participation.*
	Foster citizen and civic engagement through relevant public-facing applications and responsiveness to public feedback and inquiries.
	Maintain dialogue with community-focused organizations and non-profits and stay abreast of evolving needs for data and web services; create opportunities to engage and build awareness with new organizations.
	Showcase community success stories and foster a community sense of shared value.
	Support educational initiatives within the District (e.g. "adopt a school").
	Attract interest in the DC GIS program with innovative community events/outreach (e.g. geospatial hackathons).
Goal 5: **Support data-driven decision-making and performance measurement.**	*Enable agencies, through tools and training, to map agency-specific, non-geospatial data sources (e.g. departmental business data) to measure performance and improve outcomes.*
	Leverage emerging geo-analytical and visualization tools to gain insight into events and patterns within the District and improve government responsiveness (see Success Factor 3f on innovation lab)
	Make use of emerging real-time data sources for situational awareness and decision making.
	Share agency use cases and success stories of data-driven decision-making and performance measurement.

5 PROGRAM JUSTIFICATION

5.1 Benefits

As with most government entities or programs, it is easier to quantify the costs associated with DC GIS operations than the benefits delivered to stakeholders. A broad set of stakeholders – both internal and external to DC Government – use the DC GIS System on a daily basis. The system provides data, maps, map/data services and applications to save time and money, inform decisions, generate revenue and improve the quality of life for the citizens of the District. During the stakeholder information gathering phases of this Strategic and Business Planning process, there was significant and meaningful acclaim from outside of OCTO for the value of the program. This positive feedback came from specific agencies within DC Government, other government entities in the DC region, citizens and businesses.

The 2011 DC GIS Business Plan achieved an important "first" by openly presenting the costs of the DC GIS program in terms of OCTO's budget but the investments exceed OCTO's spending on the program. For example, many agencies contribute valuable data and deliver applications and tools to the broader DC community. The DC GIS System has become an integral part of agency operations and the need for ongoing support for the program is evidenced by:

- Continued and growing demand for current, spatially accurate geographic data for the District
- Increased implementation of custom GIS applications to deliver geospatial services to District customers
- Success of Web services as a platform for application development
- Administrative priorities for measurable outcomes and transparency in DC government
- Strong governance with stakeholder input and support c/o the DC GIS Steering Committee, a multi-agency body formed by Mayoral Executive Order
- Perception of shared value with citizens, government, and business interests in the District

These benefits increase and DC GIS achieves the largest return on investment when geospatial assets are widely accessible and utilized as much as possible. While the dollar value of these benefits was not captured as part of the business planning process, it is widely accepted that the free and open distribution of data, applications, and services achieves efficiency of distribution and maximizes return on investment. This has been the historic practice with DC GIS and will most certainly continue as evidenced by support for the Open Data Portal. This positive ROI is supported by:

- Rational utility maximization (users who want it can have it – demand is satisfied)
- No perverse outcomes (unintended consequences of charging for public data such as demand rationing or double-charging are avoided)
- Lower marginal costs (no added costs of administration for delivery and billing)

- Innovation is fueled (no restrictions on use)
- Transparency and integrity in government are encouraged (facilitated access to open records)

DC GIS is more than just OCTO's GIS program – it is DC Government-wide, and more. OCTO is the custodian of a very important social compact for creating shared value when it comes to GIS, and has achieved a distinctive stakeholder-embraced approach for its GIS governance, stewardship, and value-added.

6 KEY TECHNOLOGY TRENDS

As technology evolves, keeping up to date with trends is an essential part of keeping DC GIS modern, relevant, and valuable to the growing user community. In an era where geospatial front-ends are often integrated into many systems, customer expectations are high for a diversity of platforms and ways to deliver data to both end-users and application developers.

The following sections will introduce some of the key technology trends that impact DC GIS, including:

- Data Analytics & Business Intelligence
- Performance Metrics
- Visualization
- Coud Platforms
- Open Data

6.1 Data Analytics & Business Intelligence

Data analytics is the process of examining data to uncover hidden patterns, previously unknown correlations and other useful information that can be used to make better decisions. Through data analytics and Big Data systems, analysts can now process and examine huge volumes of data that conventional analysis and business intelligence were unable to decipher. As the volume, variety and velocity of data collected and distributed by DC GIS grows, users will need guidance and tools to identify the information that matters most and understand how best to leverage data analytics.

During the information gathering phase of this project, DC GIS stakeholders described the variety of ways that data is already being analyzed to support better decision making. Examples mentioned include crime incident tracking, walkability scores, distribution of staff caseloads, and measuring the

success of intitatives such as the "bag law"[3]. Rather than simply tracking data as a source of information or inventory, agencies are thinking about how to use the data to measure performance and improve services. They are recognizing the value of data analytics and are very interested in increasing this capacity.

DC GIS will continue to play a pivotal role in providing access to the required data, tools and training and with the adoption of cloud-based platforms and technologies, they will have the capacity to deliver. Technology will provide the path for users to move beyond simple search and discovery of data to more advanced geo-processing and analysis including modeling, data mining, predictive analytics, forecasting and optimization.

6.2 Performance Metrics

Local governments in every part of the country are increasingly practicing data-driven decision support and performance management. According to a survey of 211 CIO's nationwide, Business Intelligence and Analytics was the area of largest spending increase in 2015. These techniques are now an expected part of manager's job and the District is no exception. Rather than simply tracking data as a source of information, agencies are repositioning to analyze the data to measure performance and improve services. This increase in performance management is no surprise given the current Bowser Administration's emphasis on quality service and accountability. The broad usage of geospatial data and analytical tools to meet these demands is notable and serves as a testament to the high quality data, tools and skills distributed amongst DC GIS stakeholders.

6.3 Visualization

As the volume and diversity of data available to DC GIS, the need for powerful data visualization tools will rise. Large data sets that used to require hours to process and display, can now be visualized and shared on mobile devices through web viewers and new platforms such as Mapbox and CartoDB. Through effective visualization, data becomes more accessible and more transparent. Trends, correlations and patterns can be detected. Change over time can be assessed. Ideas can be communicated more easily. The demand for these easy-to-use tools will only increase and DC GIS should invest in understanding, testing, and providing guidance to users for how best to leverage these new visualization tools and platforms.

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[3] The District's Department of Energy & Environment implemented the Bag Law on January 1, 2010. The law focuses on consumer behavior charging a nominal fee for disposable bags. Geospatial technology helps track where type, location and impact of trash in the District.

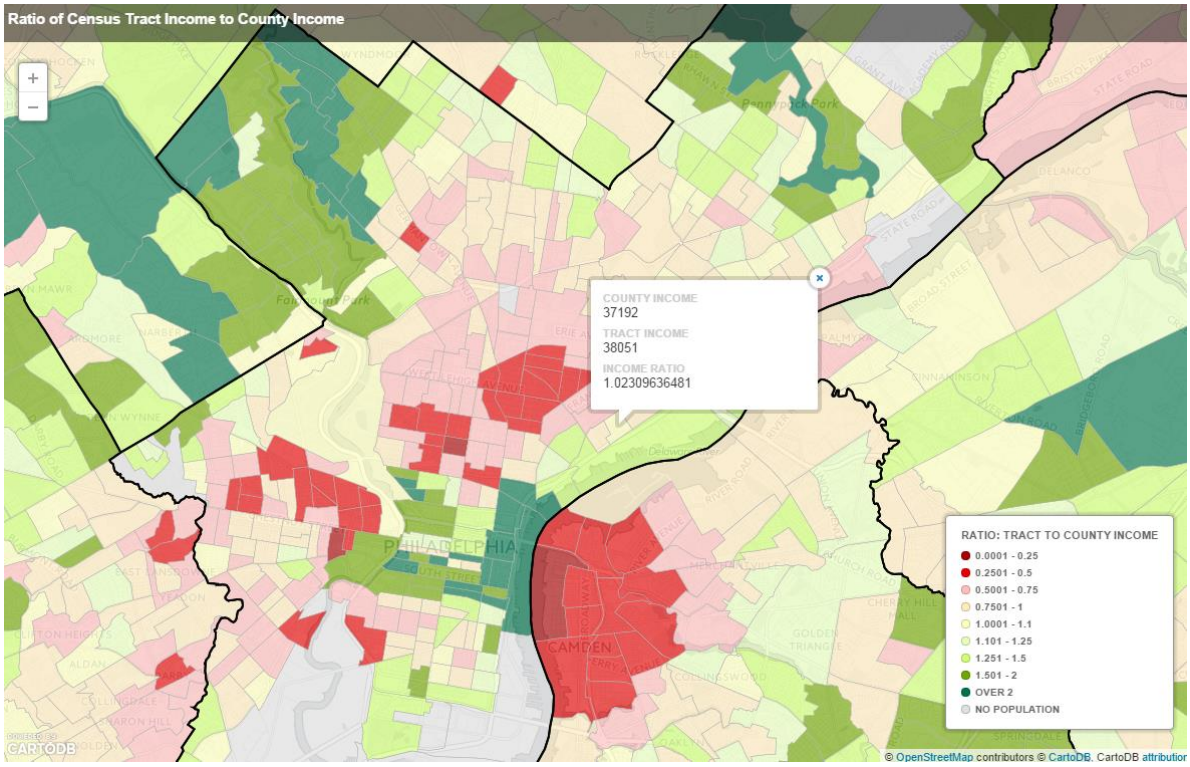


Figure 1. Example of CartoDB visualization "Ratio of Census Tract Income to County Income"

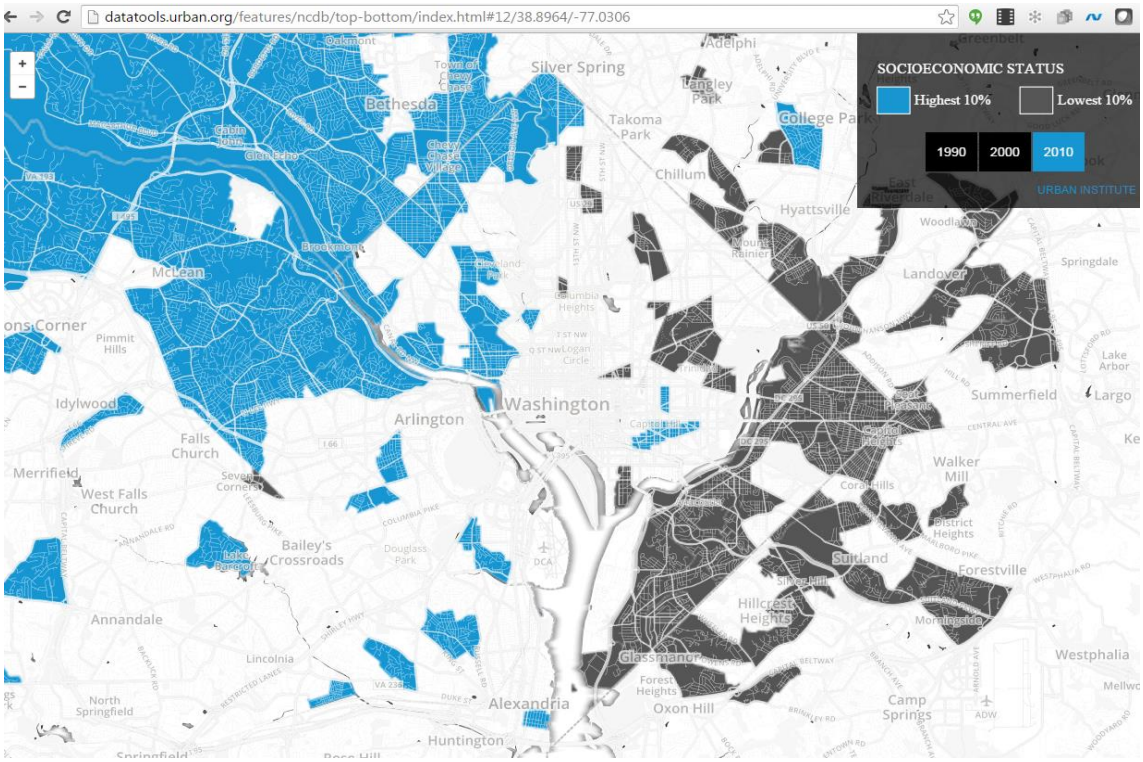


Figure 2. Example of Mapbox interactive map created by the Urban Institute showing the wealth divide in Washington D.C. http://datatools.urban.org/features/ncdb/top-bottom/index.html#12/38.8964/-77.0306

6.4 Cloud Platforms

In the context of national trends, it is essential to consider the impact of the "cloud" on the District's geospatial strategic and business planning. OCTO was an early advocate for cloud-computing as a platform alternative for DC agencies, when other Cities were doubtful. Cloud computing is transforming the way businesses and governments manage information technology and deploy applications and the impact on the geospatial industry is significant. The cloud offers an environment which is extremely flexible and dynamically scalable, an advantage over previous GIS system architecture models. It is clear that adoption of cloud-based infrastructure, platforms and software will only accelerate in the coming years, offering great opportunity for DC GIS as it plans and prioritizes initiatives for the next five years.

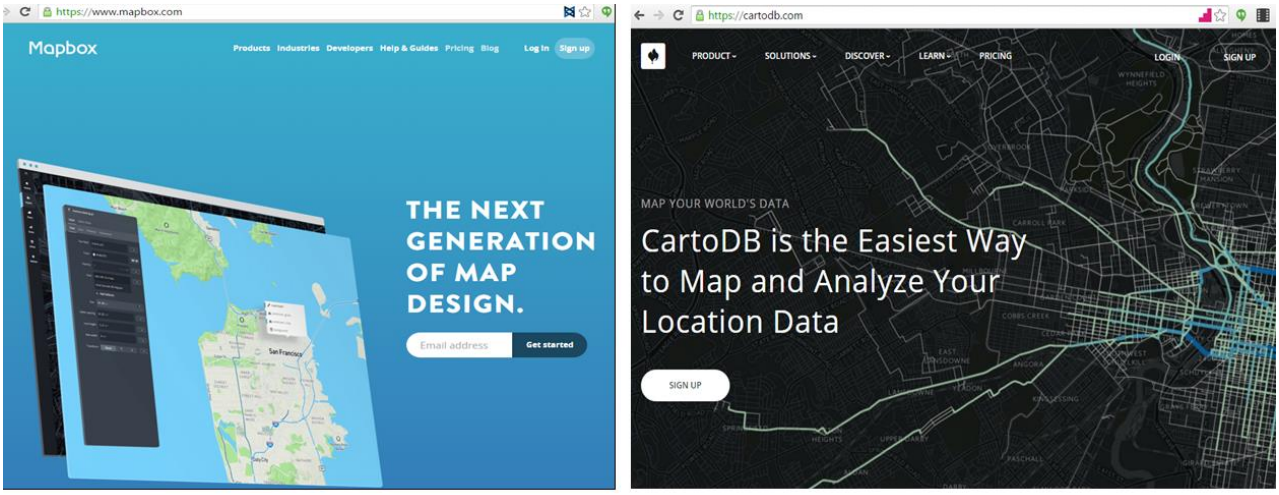


Figure 3. Mapbox and CartoDB Cloud platform sites.

The cloud will continue to offer DC GIS new ways of delivering products and services and new opportunities for diversifying its use of geospatial technology. New cloud-based products, such as CartoDB, MapLarge and Mapbox, can be leveraged for their powerful analytical and visualization capabilities. They can also potentially be integrated into existing Esri-based workflows and applications such as ArcGIS Online, Esri's cloud-based platform. As demand for specialized, cloud-based tools increases, OCTO GIS will likely face the growing complexity of integrating heterogeneous platforms. OCTO GIS web developers will increasingly be asked to leverage Platform as a Service (PaaS), Software as a Service (SaaS), and Content as a Service (such as imagery) to integrate disparate web services and deliver seamless experiences to users.

The impact of the cloud cannot be overstated in the context of IT and GIS infrastructure, platform and software planning.

Figure 4. District of Columbia ArcGIS Online cloud instance.

6.5 Open Data

Open data is a movement that is gaining momentum at all levels of government, including the District of Columbia. The District's specific Open Data Policy is described at greater length in Section 7.1.4 of this document. According to the Open Data Handbook "*Open data is data that can be freely used, re-used and redistributed by anyone - subject only, at most, to the requirement to attribute and share alike.*" The goals of the open data movement are similar to those of other "open" movements such as open source, open hardware, open content, and open access. In essence, it is the need for interoperability that is behind all of the demand for "openness" with governments, business and citizens recognizing the benefits of sharing tools and data and working collaboratively toward common goals. There has been great movement in recent years for large and progressive cities to publish their geospatial and non-geospatial data in web portals and other web-accessible platforms, and this has been well received by citizens and businesses. As data consumers have become more sophisticated and adept at leveraging open data, there has been great demand for ensuing that the data is "useful, usable and used". In other words, it is no longer enough to just stand up an open data portal – that portal must provide current and accurate data in a format that is useful. A government open data portal must be designed in a way that provides a positive user experience and actively tended to ensure quality content.

IMPLEMENTATION PLAN

6.6 Applying Portfolio Management

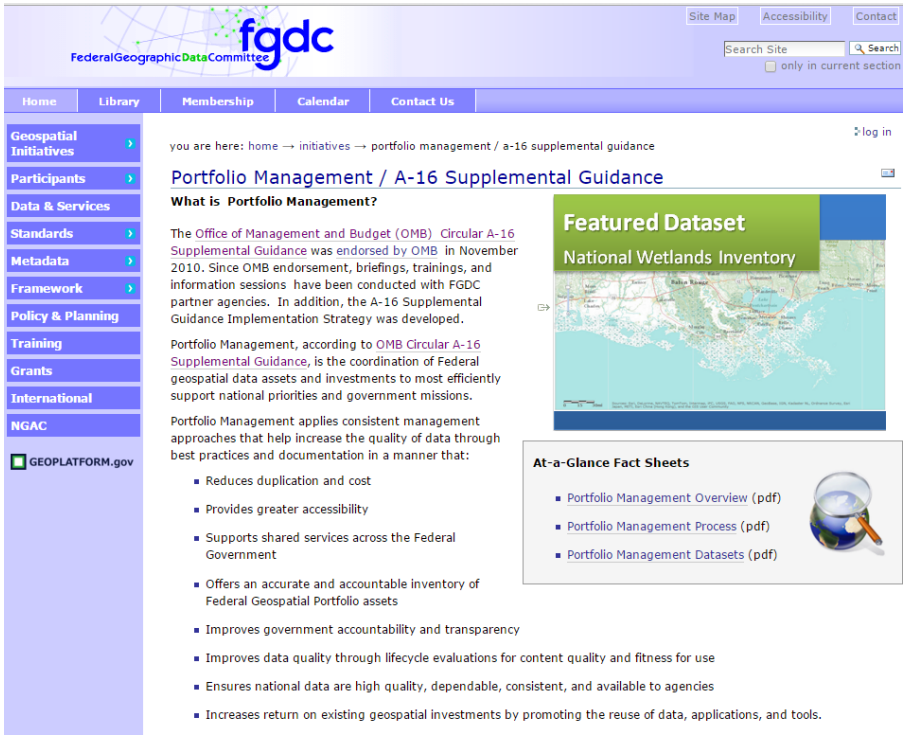


Figure 5. Portfolio Management is applied by the Federal Geographic Data Committee.https://www.fgdc.gov/initiatives/portfolio-management

In the 2011 DC GIS Business Plan, OCTO GIS embarked on a pioneering effort to apply portfolio management to the DC GIS geospatial assets to guide investments in new data and technology, maintain existing assets, and appropriately "sunset" data and technology that has lost its utility. Portfolio management has historically been better known in IT circles, but is gaining traction in the geospatial industry and government circles as an approach to geospatial asset management. Most notably, the Federal Office of Management and Budget (OMB) endorsed the application of a portfolio management approach to the National Geospatial Data Asset Themes and their associated National Geospatial Data Asset Datasets[4]. Portfolio management, according the OMB Circular A-16 Supplemental Guidance, is the coordination of geospatial assets and investments to most efficiently support priorities and missions. This approach proved to be a successful lens or tool for guiding DC GIS investments over the past 5 years and is leveraged again in this updated version of the Business Plan. Some key considerations and applications are described, below.

[4] https://www.fgdc.gov/policyandplanning/a-16/index_html#supplemental-guidance "Circular A-16 Supplemental Guidance"

6.7 Platform Definition and Characteristics

The first step in applying portfolio management is to define the platforms that are being managed. DC GIS, working within the District's IT ecosystem, is either managing or leveraging a variety of platforms to support its mission and its customers. The following definition of platform is adapted to fit the DC GIS portfolio management and business planning needs.

6.7.1 Platform Definition

> **A platform is a base technology (or technologies) on which other technologies, services, or processes are built. In addition, it may be construed as a whole "economic unit" in terms of aggregating budget costs to support it.**

Thus platform is the unit at which an economic decision to invest, maintain, or divest can be made. This plan divides platforms into groups related to major DC GIS program elements, including data, applications, and Web services. As platforms evolve, different investment strategies become more or less relevant, depending on both user demand and the technology life-cycle. Below are some important platform characteristics:

- The cost of one platform may increase overtime while another one decreases
- One platform may cost more than another
- Platforms can be analyzed in isolation or as part of a portfolio
- Future alternatives will arise and be different than today's alternatives
- The expected utility and business value of platforms will differ
- Any one application can depend on multiple platforms

6.8 Asset Classes

In addition to defining the platforms that are being managed, Portfolio Management calls for the classification of assets according to their value-generating characteristics[5]. The table below describes the asset classes used in this plan and the strategic objective of each.

[5] Derived from Weill and Broadbent, "Leveraging the New Infrastructure: How Market Leaders Capitalize on IT," Harvard Business School Press, 1998. The classes and objectives have been modified to fit the DC GIS technology ecosystem and operating environment.

ASSET CLASS	STRATEGIC OBJECTIVE	CLASSIFICATION CRITERIA
Innovation	Achieve progress and modernization by leveraging the full power of GIS	▪ Long lead time ▪ Will achieve modernization and higher productivity ▪ Considered essential to the vitality of the enterprise
Information Utility	Provide better information	▪ Better information delivery – Improved quality – Better integration ▪ High business value (responsive to departmental and citizen needs)
Economy	Reduce cost of business	▪ Reduces cost of doing business ▪ Increases throughput (faster results)
Infrastructure	Provide shared platforms and expand interoperability	▪ Provides shared base capability ▪ Enables faster deployment of applications ▪ Easier integration with business processes ▪ Supports standardization and interoperability

These classes provide another lens through which to look at and categorize the DC GIS portfolio of investments. Applying the classification criteria to OCTO's GIS portfolio is not an exact science; but, it results in an organized view of assets that can be the basis of future investment strategy.

6.8.1 Program Area Value Matrix

As described above, this plan divides platforms into groups related to major DC GIS program elements, including data, applications, Web services, and customer service. Collectively, the DC GIS program areas add tremendous value to the DC GIS program by:

- Improving District government operations (e.g. time and money savings by minimizing duplication of effort)
- Promoting quality of life and economic progress in the District (e.g. better decisions based on accessible and timely data)
- Building trust and understanding (e.g. by bringing transparency to how resources are distributed and utilized in the District, geographically)

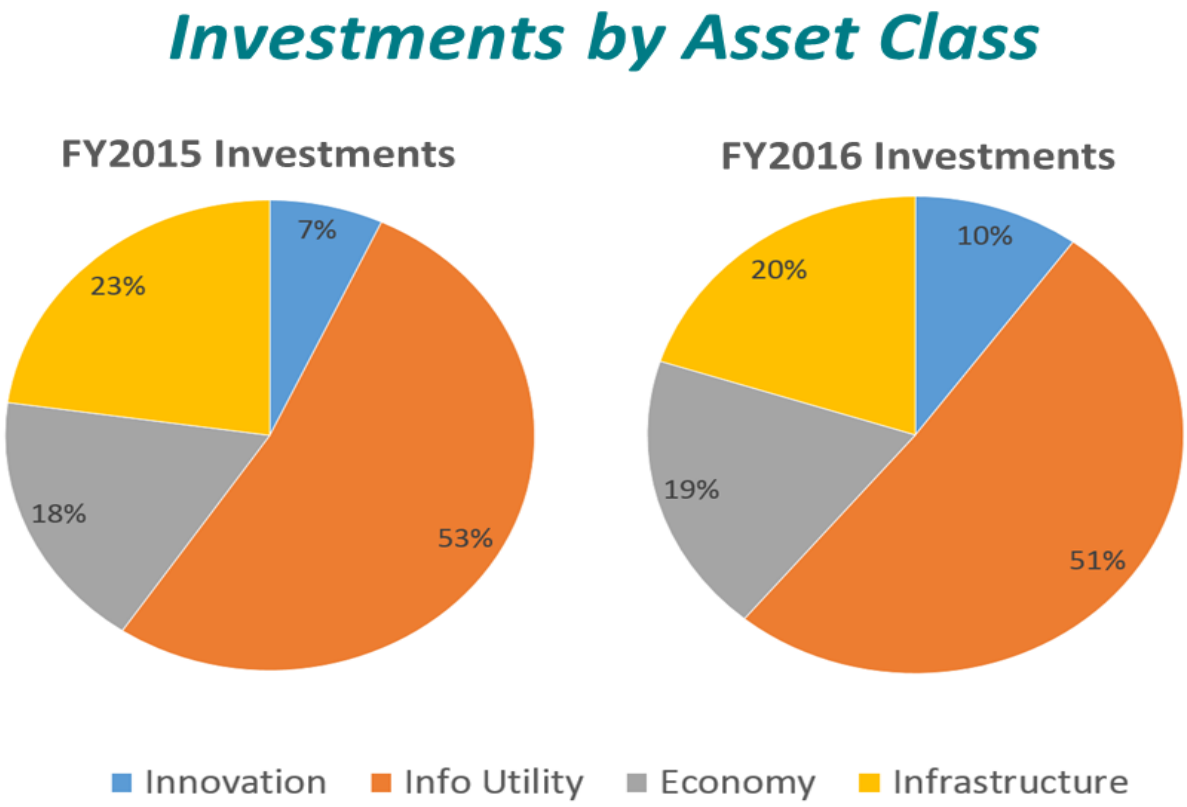
Each of the featured DC GIS program areas – Geospatial Data, Geospatial Applications, Web Services, and Customer Service – is listed on the left, and the desired outcomes are described in terms of the asset classes of: Innovation, Information Utility, Economy, and Infrastructure. These desired outcomes for each program area and asset class are directly congruent with goals and success factors described in the Strategic Plan.

ASSET CLASSES & VALUE GENERATING QUALITIES				
PROGRAM AREAS (BELOW)	**Innovation**	**Information Utility**	**Economy**	**Infrastructure**
Geospatial Data	Investigate and apply new data acquisition methodologies to keep DC GIS data as accurate and current as it should be	Provide user community with enhanced geospatial intelligence for improved decision-making, transparency, and superior quality data products	Reduce unnecessary redundancy, conflict, and duplicate spending in data creation and maintenance efforts	Produce a common operating basemap across District IT systems (*)
Geospatial Applications	Expand and enhance application platforms to avoid vendor lock-in and preserve openness and encourage innovation	Leverage untapped spatial data in existing business systems	Automate and streamline business processes to make DC government more efficient	Expose business information across the enterprise through spatial and map-centric reporting for intra-agency benefit
Web Services	Create enterprise assets that can be accessed widely via open Web services for data and applications	Exploit the web and its protocols to facilitate integration of mapping into existing systems	Deploy free, re-usable functionality to the development community to increase efficiency in application development efforts	Offer a standardized development platform to deliver consistent GIS functionality across disparate District IT systems
Customer Service	Apply modern methods to information exchange and knowledge development	Provide training and support to expand and enhance the utilization of geospatial information	Minimize wasteful 'futzing' around by users by providing a resource for answering GIS questions	Promote best practices for consistent and productive application of geospatial data and technology

6.8.2 Investments by Investment Strategy & Asset Class

Investments by asset class were similar for fiscal year 2015 as well as the first half of fiscal year 2016. A majority of the budget supports information utility (data acquisition, maintenance and improvements) followed by investments in infrastructure (platforms to support geospatial technology use/analysis). In

both years, less that 20% of the budget was aimed at economy (increasing efficiencies and productivity) and only fraction of the budget (10% or less) was targeted at innovation (investigating and implementing new technology and approaches for solving problems). Given the implementation priorities described in Section 7.3, it will be necessary to allocate a larger portion of the budget to the innovation asset class. While information utility and infrastructure will always require significant staff time and budget, fiscal years 2015 and 2016 were especially demanding in these areas with a major platform migration/modernization and basemap updates. With these projects largely completed, there may be an opportunity to shift resources toward investments in the innovation asset class.



6.9 Investment Strategies & Recommendations

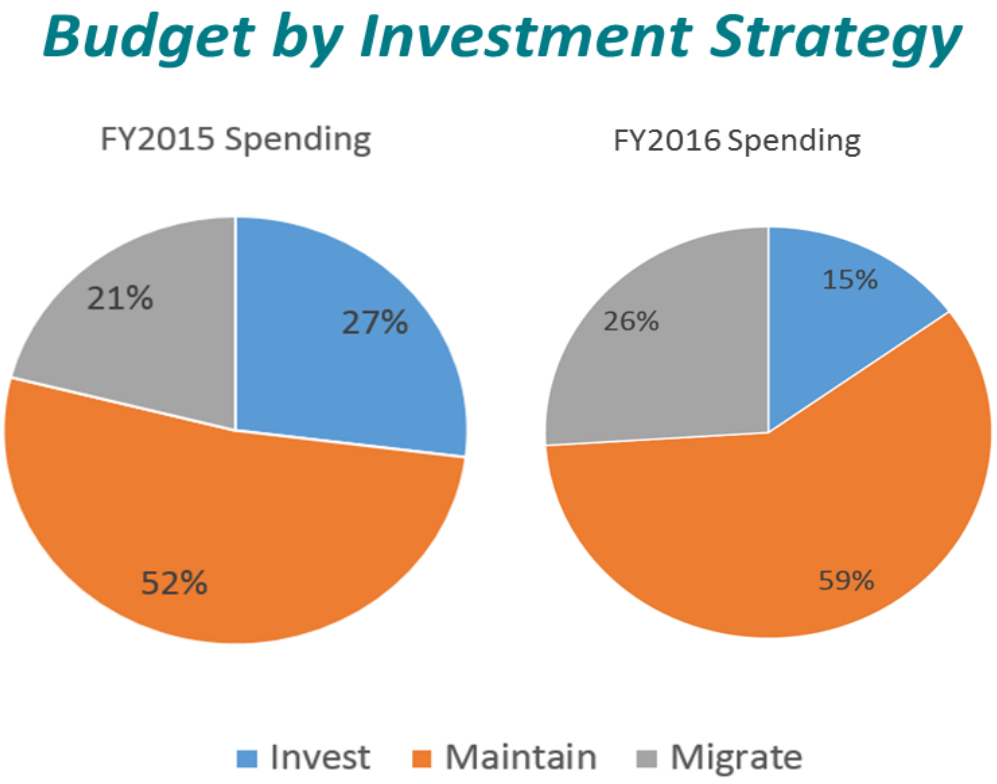
A repeatable planning process is needed to periodically assess GIS investments, to help determine customer satisfaction and performance improvements, and to make sure that business value is being delivered to the DC Government as an enterprise. The OCTO GIS Group has established a precedent for periodically reporting on noteworthy GIS project spending at regular GISSC meetings, but executive leadership has not always participated; and assessment of both risk and return on investment, whether qualitative or quantitative, has not been formal.

As a step toward a more formal and business-like approach, an annual DC GIS Budget Meeting was recommended in the 2009 DC GIS Strategic Plan, to convene the GISSC Executive Committee to review investment decisions and priorities. This is still relevant, and should be reinvigorated. The purpose of the meeting is threefold: (1) for executive leadership to review overall DC GIS investment plans; (2) to share and discuss information about non-OCTO agency departmental investments in the utilization of GIS; (3) Identify funding sources and opportunities. This will help the District at-large assess how much spending on GIS is being done throughout the enterprise, and ensure alignment with strategic goals and District priorities.

Platforms (and projects), depending on life-cycle management considerations, have different associated investment strategies, as follows:

INVESTMENT STRATEGY	DESCRIPTION
Invest	Build or enhance; develop new capabilities
Maintain	Provide basic support; hold steady and keep the status quo; version upgrades only; no active development of new capabilities
Migrate	Move or 'reinvent' onto a new or different platform
Sunset	Set expectations for shutting-off spending at some point, completely; the path to retirement
Divest	Shut-off spending and "kill;" discontinue all spending and support

In comparing current and recent spending across these investment strategies in the pie charts below, we see that budget expenditures dedicated to maintaining assets was similar for fiscal year 2015 and the first half of fiscal year 2016. However, expenditures aimed at investing in new assets actually decreased. In both years a majority of the budget supports a maintenance strategy in order to keep enterprise data sets up to date and provide continued support to agencies. In fiscal year 2016, expenditure aimed at migration increased to support modernization of important platforms, i.e., ArcGIS Server from Esri. Expenditure aimed at investment strategies decreased, however. Given the implementation priorities and investment strategies going forward (described in Section 7.3), it will be necessary to allocate a larger portion of the budget to new investments to achieve the strategic goals and priorities described in this business plan. The specific investment recommendations are described below.



For each investment strategy described above (i.e. invest, maintain, migrate, sunset, and divest), recommendations are made, respectively, for data and services delivery in the sections below.

6.9.1 Invest

Data

The data asset table included as Appendix 1 presents a detailed view of the recommended investment strategy for all current data assets. Key DC GIS data investments are described in more detail below.

- Continued investment in the **District of Columbia Open Data Portal** is an essential component to ensuring that data is accessible, discoverable and usable. The Portal demonstrates DC GIS's commitment to "openness" with the broader community and fostering a participatory and collaborative environment. Investments should include establishing the workflows that will ensure the Portal data is current and authoritative, following an "eat what you cook" philosophy in which the Portal contains the same data used by agencies on a daily basis. DC GIS will also need to continue to work diligently to add new data sets, remove outdated data sets, migrate data from the legacy environment, communicate with data consumers and improve the overall the user experience.

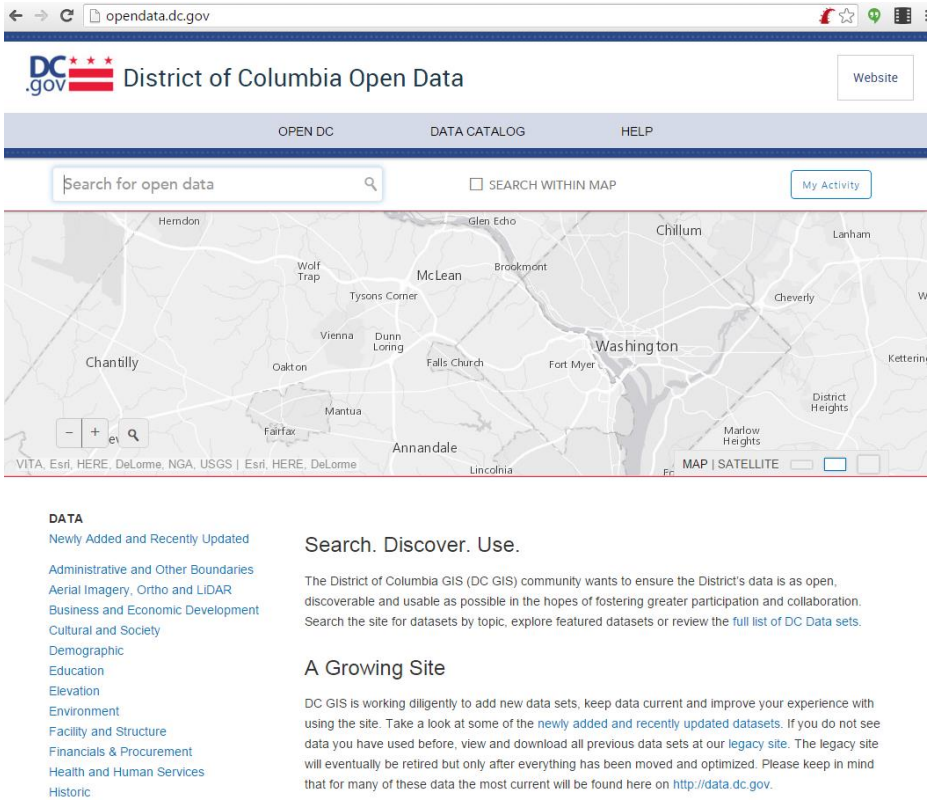


Figure 6. District of Columbia Open Data Portal: opendata.dc.gov

- DC GIS should invest in the development and acquisition of **new "high value" data sets**. These are data sets that are commonly requested for assessing citizen quality of life, via FOIA, identifying patterns of incidents or behaviors, predicting the need for services, exposing financial investment or spending, or assessing performance of District agencies. Examples include pedestrian and cycling accidents, moving and parking violations, parking meter locations and usage, or certificates of occupancy.
- DC GIS should invest in making **high quality, feature-level metadata** discoverable, current and accurate. This will require significant agency participation and commitment as they are the authoritative source for much of the geospatial data of interest. The Open Data Portal platform can be leveraged to improve discoverability.
- Investments in the capture of **Big Data** will allow DC GIS to identify previously unknown correlations and other useful information that can be used to improve decision making. Sources and data sets of particular interest include aggregated tax information, moving violations, permit locations, real-time data, emergency response times, and wireless cellphone coverage. As access to data increasingly opens, DC GIS can leverage new sources and broaden their Big Data analytical possibilities. Users will need guidance and tools to identify the information that matters most and understand how best to leverage these data.

- The capture and integration of **crowd-sourced data** is an opportunity to increase citizen engagement and encourage contributions to DC GIS. Successful crowd-source efforts like the DDOT and OCTO GIS Vision Zero effort to capture public input of real and perceived dangers along the roadway from the perspective of either a pedestrian, bicyclist or motorist are only increasing. While DC GIS should invest in tapping into this valuable source of data, it will also be important to devote resources to vetting the source, quality and even motivation behind the creation of such data. Social media (e.g. tweet mapping to discover what's trending and where) provides new opportunities for valuable crowd-sourced data, but it should be made clear to users which data is authoritative and which is un-vetted.
- With the increased availability of **3D data and tools** to visualize and analyze such data, DC GIS will need to aim investments at this new geospatial frontier. Three dimensional data offers users an immersive mapping experience to support planning projects, emergency situations, or code enforcement. 3D building data and a 3D representation of the Master Address Repository (MAR) would be particularly useful in the District providing a more realistic representation of locations (such as underground Metro stations). These data will potentially require new platforms and data services to make it accessible and useful to the DC GIS community.

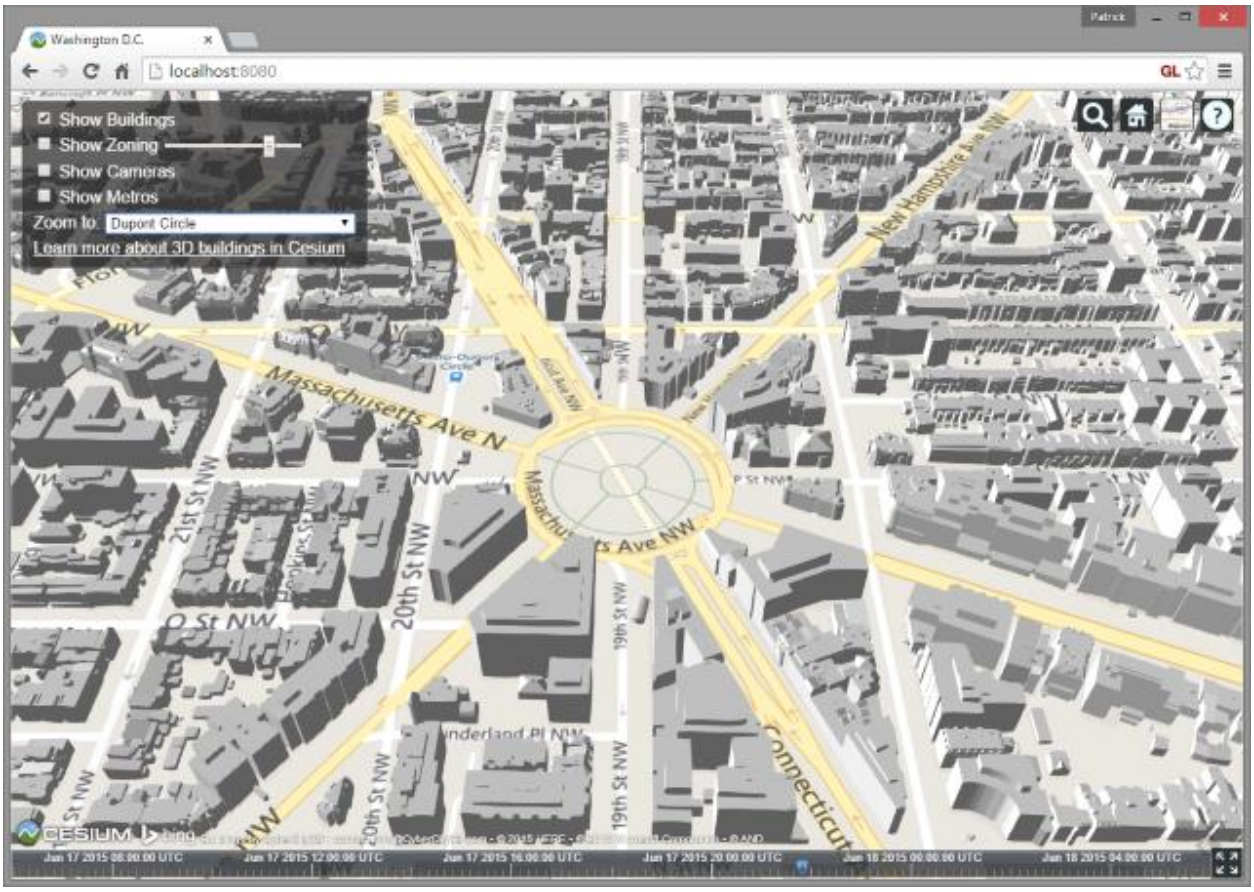


Figure 7. Example of 3D map of Washington D.C. (https://cesiumjs.org/2015/06/19/Washington-DC-in-3D/)

- The demand for **temporal geospatial data** is increasing and DC GIS needs to invest in the capture and delivery of this data. Temporal data may include near real-time data related to traffic accidents, events, or other highly dynamic data sets. It may also include the capture and archive of historic data for the purposes of visualizing and analyzing change over time within the district.

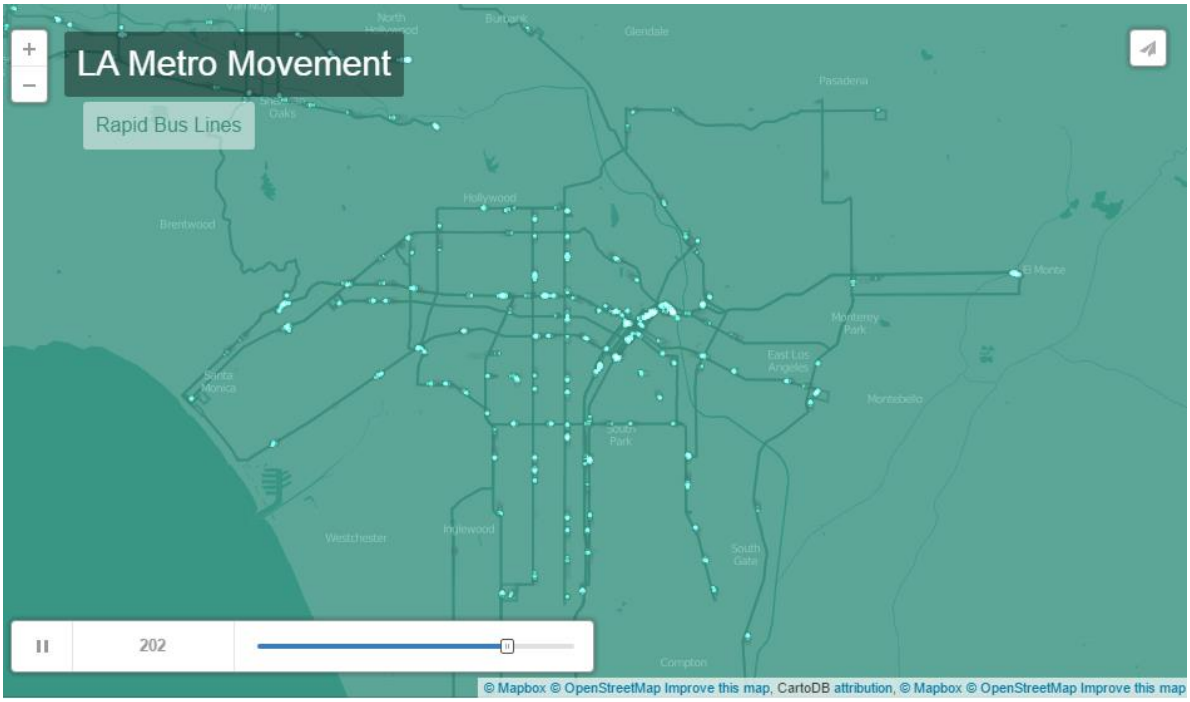


Figure 8. Example of urban temporal map showing current bus locations along bus lines in Los Angeles.

- DC GIS will need assess the feasibility and potentially invest in fulfilling **specific data needs** including:
    - **Utility data.** This data will be very difficult to obtain but it has been sought after for many years (as documented in the 2009 Strategic Plan). Utility networks as well as accurate outage information would be tremendously valuable to the Department of Transportation and other agencies.
    - **Authoritative Federal property boundaries**. Again, this data has been desired for many years but have never made available to the District. Visualizing these boundaries could potentially have a significant impact on public works and maintenance operations.
    - **Enhanced 911 Data and CAD systems solution integration**. There is a need to align the CAD street file with the DDOT roads and highways and spatial streets database. DC GIS should work with DDOT to improve data set and establish the maintenance workflow. Enhancements may include marking parks, trails and other un-addressed locations to meet the needs of 911. Prioritizing this public safety oriented investment will require executive level prioritization and commitment.

- DC GIS should prioritize the adoption of “Database 2.0”, an enhanced enterprise database that more fully meets the needs of the program. It adopts the strengths of the current database but provides for broader utility for users.

Service Delivery

- DC GIS should invest in **agency and public customer support** that encourages and enables users to “help themselves” to answer questions, create maps and perform geospatial analysis. This support may include:
    - Technical support for web and desktop applications
    - Guidance in the principles of good data management (e.g. do not create local copies, always point to authoritative sources)
    - Best practices for application development (e.g. responsive design, avoid the use of plug-ins)
    - Information and guidance on leveraging evolving technologies and understanding the technology lifecycle
    - Guidance for adopting and implementing the District’s philosophy of open data
    - Providing the tools, guidance and training for agencies to create single-purpose applications for internal use and engagement with the public.
    - Outreach to agency CIOs to build awareness of geo technology best practices including “mini” training courses, templates or boilerplate language for vendor agreements that supports integration with distributed enterprise resources, and potentially creating a formal mechanism for outreach to and engagement with agency CIOs.
- Invest in **new applications** to meet the growing demand of agencies and the public including:
    - 3D data viewer
    - LiDAR viewer
    - VPM Lookup
    - DCRA FileNet on Web (aka Survey Docs)
    - Routing Service
    - Solar/Green Buildings
    - Big Data solution
    - Electronic submission for new developments
    - Crime Map (expanded capabilities over current Crime Map including improved visualization capabilities)
    - Adding temporal data element to existing applications

    - Citizen-focused applications such as multi-modal transportation support

- Invest in **new map services and data services** (e.g. buffer services, MAR web service improvements, MySchoolsDC data services, District priorities API and data replication routines). This may also include investing in real-time or nearly real-time services indicating changes coming out of DCRA (although is deemed to be a big challenge).
- Invest in **new software platforms and improvements to existing platforms** including Google Maps API, ESRI ArcGIS Server and Extensions, GeoServer and PostGIS, Cyclomedia, ArcGIS Online, Safe Software's Feature Manipulation Engine (FME), Elastic Search, Hadoop, and cloud-based geoanalytics platforms. The notion of a "software platform" has evolved tremendously in the past 5 years and the definition, in the context of this Business Plan, should be expanded to include cloud computing and Platform as a Service (PaaS). By leveraging the cloud and PaaS, DC GIS can reasonably manage a much more diversified set of platforms to meet the needs of their user community.
- DC GIS should continue to invest in and support **alternatives to the Esri geospatial platform** including Google, CartoDB, Mapbox, MapLarge, other open source, and options yet to emerge. It is important that DC GIS remain geospatial technologists in the ever-evolving field of GIS, offering their users tools to explore alternatives and leverage all that the industry has to offer – not just one vendor. This plan recommends the creation of a **"Pilot Lab"** or otherwise named entity to test and explore new geospatial technologies and stimulate new thinking to solve problems.
- As the volume and diversity of data available to DC GIS grows, the need for powerful **data visualization tools** will rise. Large data sets that used to require hours to process and display, can now be visualized and shared on mobile devices through web viewers and new platforms such as ArcGIS Online and CartoDB. Through effective visualization, data becomes more accessible and more transparent. Trends, correlations and patterns can be detected. Change over time can be assessed. Ideas can be communicated more easily. The demand for these easy-to-use tools will only increase and DC GIS should invest in understanding, testing, and providing guidance to users for how best to leverage these new visualization tools and platforms.

Figure 9. Example of CartoDB visualization focused on crime in the Washington D.C. area.

- As identified in the Strategic Plan, DC GIS should invest in **Business Intelligence and performance metrics analysis tools** to meet the growing demand from agencies and the public. Rather than simply tracking data as a source of information or simple inventory, agencies are wanting to use the data to measure their own performance and improve services. DC GIS should invest in providing access to the required data, tools and training – most likely through new cloud-based technologies that allow advanced geo-processing, modeling, data mining, predictive analytics, forecasting and optimization.

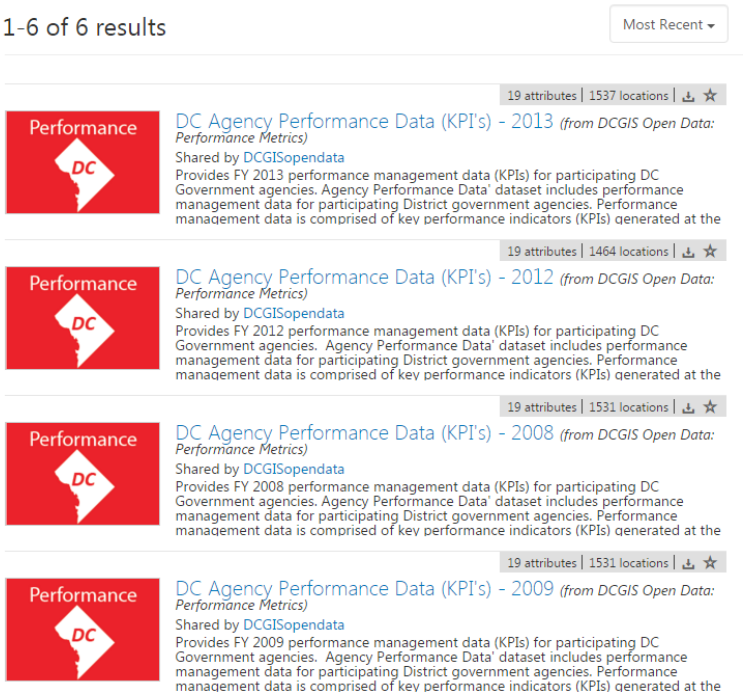


Figure 10. Search results for available data related to performance metrics.

6.9.2 Maintain

Data

The data asset table included as Appendix 1 presents a detailed view of the recommended strategy for all current data assets, including those with a "Maintain" investment strategy. Key DC GIS data to be maintained are described in more detail below.

- Providing access to current and accurate **enterprise data** is an essential function of OCTO GIS. While agencies share in the responsibility of geospatial and metadata maintenance by contributing agency-specific data, OCTO GIS must continue to devote resources to maintaining and acquiring enterprise data such as elevation, imagery, and planimetric data as well as an "enhanced" basemap data derived from a sensor flight such as oblique imagery or LiDAR data.
- Maintain a shared understanding among DC GIS agencies that the **role of the OCTO GIS Group is to support data sharing and coordination across all stakeholders** – not act as the data steward for all geospatial data. Every DC GIS stakeholder has a role and responsibility in contributing to the success of the shared program and agency data (e.g. tax data) is essential component. Along these lines, data ownership and stewardship should be made more explicit. It is OCTO GIS' responsibility to keep enterprise data and infrastructure stable, but it is every agency's responsibility to maintain and share data. Point-to-point data sharing between agencies or with citizens is inevitable but sharing agreements should be clear that geospatial data should be shared as part of the OCTO GIS Enterprise within appropriate user access constraints.
- In its role as coordinator, OCTO GIS should maintain and communicate **data standards** (described in more detail in Section 8.1.1) and provide tools to improve data sharing. The may include **data coordination/collaboration and review tools** (e.g. for reporting agency data issues to the source agency) or data feedback mechanisms.

Service Delivery

- OCTO GIS should continue to provide **technical support to agencies and the public** in the spirit of "helping users to help themselves". This support should focus on providing the platforms, tools, training and guidance for agencies to build their own business-specific applications, create their own maps and perform their own analysis.
- In its role as a service provider, it is essential that OCTO GIS maintain the **reliability of its infrastructure.** Agencies rely on this infrastructure daily for operations, planning and decision making and gaps in service can cause delays in service and increased costs. A full listing of the current infrastructure that must be maintained is presented in the "Existing Service Delivery Portfolio Status" table in Section 7.6. Highlights from that list of assets are presented below.
    - **Web Services.** Agencies and the public have come to rely on the existing map services and data services provided by OCTO GIS and these will need to be maintained. For

future investment strategy planning, it is important that OCTO GIS begin collection metrics on the usage of these services so they understand where demand is increasing and decreasing.

- Key **applications** to maintain include the Flood Risk Zone, Trash/Recycling Pick-up, Leaf Collection, DC GIS Tool bar, School Boundaries, Atlas Plus, Crime Map, DDOT Occupancy, WiFi Hotspot, School Profile, MAR Batch Geocoder, Tech Locater, Property, Fire & EMS Location Search, 311 Service Request, and CESAR.
- While OCTO GIS will be investing in new software platforms offering expanded options and capabilities, it is essential that core **existing platforms** are also maintained. These include CitrixGIS, Oblique Viewer/API, ArcGIS desktop, Roads and Highways, and the MAR.

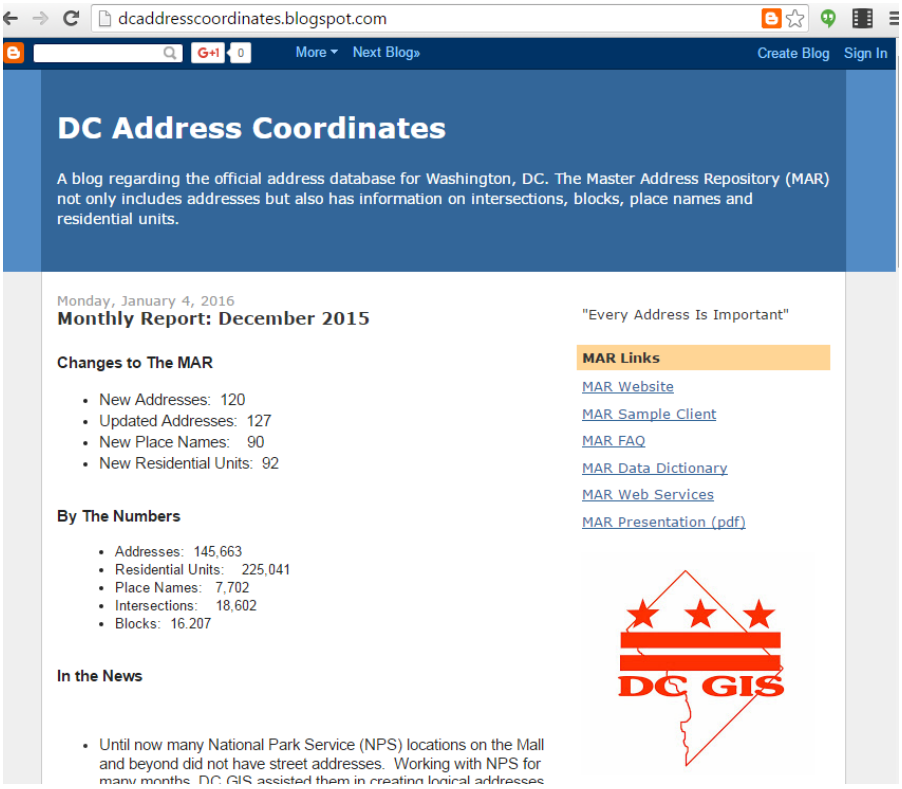


Figure 11. Maintaining heavily-used platforms such as the Master Address Repository (MAR) are essential.

6.9.3 Migrate

Data

The data asset table included as Appendix 1 presents a detailed view of the recommended strategy for all current data assets, including those with a "Migrate" investment strategy.

Service Delivery

This plan recommends that OCTO GIS focus on **migrating GIS technical capabilities to agencies** through the provision of platforms, tools, training and guidance. Service delivery to agencies should no longer include custom application development or other "work for hire" that takes OCTO resources away from enterprise responsibilities. This will include the migration of several applications to agencies (such as the "Freight" application moving to DDOT). For agencies that cannot take on technical tasks themselves but require custom application development, OCTO GIS should offer procurement advice for leveraging the private sector for such application development support.

6.9.4 Sunset

Data

The data asset table included as Appendix 1 presents a detailed view of the recommended strategy for all current data assets, including those with a "Sunset" investment strategy.

Service Delivery

OCTO GIS should sunset software platforms such as Google Earth and Esri's ArcPad that are no longer supported by the vendor and/or no longer of utility to DC GIS. If the functions are still required and of value to DC GIS, appropriate replacement platforms should be identified and implemented.

6.9.5 Divest

Data

The data asset table included as Appendix 1 presents a detailed view of the recommended strategy for all current data assets, including those with a "Divest" investment strategy.

Service Delivery

In general, OCTO GIS should move away from deploying tools and applications on the desktop development in favor of technologies that are not device-specific.

6.10 Existing and New Application Portfolio Status

Existing Application Portfolio Status (table)

Application	Software Platform	Audience	User Type	Asset Class	Investment Status	Migration Required? Status?
DC GIS Tool Bar	ArcGIS Desktop via Citrix & Desktop	DC Gov't	Professional	Economy	Invest/ Maintain	No

DC ArcGIS Online for Org	AGOL	General Public	Casual	Infrastructure	Invest/ Maintain	No
Flood Risk Zone Viewer	AGS, MAR	General Public	Casual	Information Utility & Economy	Maintain	No
DPW Trash/Recyc-ling Pickup Data Lookup	AGS, MAR	General Public	Casual	Information Utility & Economy	Maintain	No
VPM Maintenance Tool (formerly RPGM)	ArcGIS Desktop	DC Gov't	Professional	Information Utility & Economy	Maintain	No
DPW Seasonal Leaf Collection	AGS, MAR	General Public	Casual	Information Utility	Maintain	No
Real Property	AGS, MAR	General Public	Casual	Information Utility	Maintain	No
MAR Sample Client	MAR	General Public	Casual	Economy	Maintain	No
DC Public Schools (DCPS) Boundary Information System	AGS, MAR	General Public	Casual	Information Utility	Maintain	No
DC Atlas Plus	AGS, MAR	General Public	Casual	Information Utility	Maintain	No
Crime Map	AGS, MAR	General Public	Casual	Information Utility	Maintain	No
DDOT Occupancy / Transportation Permiting System (TOPS)	Google Maps, AGS, MAR	General Public	Casual	Information Utility & Economy	Maintain	No
DC WIFI Hotspot	Google Maps, AGS, MAR	General Public	Casual	Information Utility & Economy	Maintain	No
DCPS School Profile	Google Maps, AGS, MAR	General Public	Casual	Information Utility	Maintain	No
Snow Response Reporting System	Google Maps, AGS, MAR	General Public	Casual	Information Utility	Maintain	Yes
Sex Offender Lookup	Google Maps, AGS, MAR	General Public	Casual	Information Utility	Maintain	No
MAR Batch Geocoder	MAR	General Public	Application Developer	Infrastructure	Maintain	No

DC Opendata Portal	Esri	General Public	Casual	Information Utility & Economy	Maintain	No
Tech Locator	Google Maps, AGS, MAR; Quickbase	General Public	Casual	Information Utility	Maintain	No
Property Web Services	MAR	General Public	Application Developer	Economy	Maintain	No
Fire and EMS Location Search	Google Maps, Quickbase; MAR	General Public	Casual	Information Utility	Maintain	No
311 Service Request Map	AGS; AGOL; MAR	General Public	Casual	Information Utility	Maintain	No
DC ArcGIS Online App Templates	AGS; AGOL; MAR	DC Gov't	Professional	Information Utility	Maintain	No
CESAR	AGS; AGOL; MAR	General Public	Casual	Information Utility	Maintain	No
MAR Unverified Unit Submission	ASP.NET	General Public	Casual	Information Utility & Economy	Maintain	No
OFC campaign funds info site	ASP.NET	General Public	Casual	Information Utility & Economy	Maintain	No
Sex Offender Lookup	ASP.NET using Web Service	General Public	Casual	Information Utility & Economy	Maintain	No
Broadband Map	AGS, MAR, Geoserver	General Public	Casual	Information Utility & Economy	Sunset	No
District Government Property Search	AGS, MAR	General Public	Casual	Information Utility	Sunset	Yes; AGOL; WIP
Watershed/Sewershed Finder	AGS, MAR	General Public	Casual	Information Utility	Sunset	Yes; AGOL; WIP
Pictometry Viewer	N/A	DC Gov't	Professional	Information Utility	Sunset	No
BOEE	N/A	General Public	Casual	Information Utility & Economy	Sunset	No
Google (Earth) DC	Google Earth, MAR	DC Gov't	Professional	Infrastructure	Sunset	No

Evacuation Route Finder	Google Maps, AGS, MAR	General Public	Casual	Information Utility	Sunset	Yes; AGOL
Senior Lead Agency Locations	Google Maps, AGS, MAR	General Public	Casual	Information Utility & Economy	Sunset	Yes; AGOL; WIP
WDCEP Retail Site Search	Google Maps, AGS, MAR	General Public	Casual	Information Utility & Economy	Sunset	Yes; ?
DC Business Incentives Map	Google Maps, AGS, MAR	General Public	Casual	Information Utility	Sunset	Yes; AGOL; WIP
Health Search	Google Maps, AGS, MAR	General Public	Casual	Information Utility	Sunset	Yes; AGOL; WIP
RSA One Stop Location (DDS One Stop	Google Maps, AGS, MAR	General Public	Casual	Information Utility	Sunset	Yes; AGOL; WIP
Police Service Area Finder	AGS, MAR	General Public	Casual	Information Utility	Sunset	Yes; AGOL; WIP
Notary Public Search	Google Maps, AGS, MAR	General Public	Casual	Information Utility	Sunset	Yes; AGOL; WIP
DHS Service Locator (ESA Centers)	Google Maps, AGS, MAR	General Public	Casual	Information Utility	Sunset	Yes; AGOL; WIP

New Application Portfolio Status (table)

NEW APPLICATIONS (PLANNED OR UNDERWAY)				
Application	**Platform**	**Asset Class**	**Deployment Status**	**Investment Status**
VPM Lookup & Map View Web Site	ArcGIS Server using Web Service and Flex	Information Utility & Economy	Near Deployment	Invest
Google Map based point picker	ASP.NET	Innovation & Infrastructure	Planned	Invest
DCRA FileNet on Web (a.k.a. Survey Docs)	TBD	Information Utility & Economy	Planned	Invest
Routing	TBD	Infrastructure	TBD	Invest
Solar/Green Buildings	TBD	Information Utility & Economy	TBD	Invest

Big Data Solution	TBD	Infrastructure	TBD	Invest

6.11 Existing and New Web and Data Services Portfolio Status

Existing Web and Data Services Portfolio Status (table)

Existing and New Web and Data Services Portfolio Status						
Service	**Description**	**Type of Service**	**Software Platform (previous)**	**Software Platform**	**Asset Class**	**Investment Status**
Political Area Summary	Get all political area information based on Maryland State Plane Coordinate System	Data	DC Guide	AGServer	Information Utility	Maintain
Administrative and Other Boundaries	Administrative and Other Boundaries	Map	AGS Server	AGS Server	Information Utility & Economy	Maintain
Annotation	Annotation	Map	AGS Server	AGS Server	Information Utility & Economy	Maintain
Business and Economic Development	Business and Economic Development	Map	AGS Server	AGS Server	Information Utility & Economy	Maintain
Cultural and Society	Cultural and Society	Map	AGS Server	AGS Server	Information Utility & Economy	Maintain
DC Basemap	DC Basemap	Map	AGS Server	AGS Server	Information Utility & Economy	Maintain
Demographic	Demographic	Map	AGS Server	AGS Server	Information Utility & Economy	Maintain
Education	Education	Map	AGS Server	AGS Server	Information Utility & Economy	Maintain
Elevation	Elevation	Map	AGS Server	AGS Server	Information Utility & Economy	Maintain
Environment	Environment	Map	AGS Server	AGS Server	Information Utility & Economy	Maintain

Facility and Structure	Facility and Structure	Map	AGS Server	AGS Server	Information Utility & Economy	Maintain
Health	Health	Map	AGS Server	AGS Server	Information Utility & Economy	Maintain
Historic	Historic	Map	AGS Server	AGS Server	Information Utility & Economy	Maintain
Location	Location	Map	AGS Server	AGS Server	Information Utility & Economy	Maintain
Orthophoto 2010	Orthophoto 2010	Map	AGS Server	AGS Server	Information Utility & Economy	Maintain
Orthophoto 2008	Orthophoto 2008	Map	AGS Server	AGS Server	Information Utility & Economy	Maintain
Orthophoto 2007	Orthophoto 2007	Map	AGS Server	AGS Server	Information Utility & Economy	Maintain
Owner Polygons	Owner Polygons	Map	AGS Server	AGS Server	Information Utility & Economy	Maintain
Planning, Landuse and Zoning	Planning, Landuse and Zoning	Map	AGS Server	AGS Server	Information Utility & Economy	Maintain
Property and Land	Property and Land	Map	AGS Server	AGS Server	Information Utility & Economy	Maintain
Property Square Labels	Property Square Labels	Map	AGS Server	AGS Server	Information Utility & Economy	Maintain
Public Safety	Public Safety	Map	AGS Server	AGS Server	Information Utility & Economy	Maintain
Public Service	Public Service	Map	AGS Server	AGS Server	Information Utility & Economy	Maintain
Transportation	Transportation	Map	AGServer	AGServer	Information Utility & Economy	Maintain
Utility and Communication	Utility and Communication	Map	AGServer	AGServer	Information Utility & Economy	Maintain
Recreation	Recreation	Map	AGS Server	AGS Server	Information Utility Economy	Maintain
Political Area Report	Query political area information	Data	DC Guide	AGServer	Informational	Maintain

Coordinate Converter	Converts MD State Plane Coordinate System to USNG or Lat/Long	Data	.Net	.Net	Infrastructure	Maintain
MAR Web Data Service	Verify or find a DC address, intersection, block, square suffix lot and place name	Data	.Net	.Net	Infrastructure	Maintain
Property Data Services	Functions to retrieve property identifiers from Vector Property data.	Data	AGS Server	.Net	Infrastructure	Maintain
Basic Map	Generate a jpeg map with user defined parameters including map width, height and layers	Data	DC Guide	AGServer	Infrastructure	Maintain
Category Contents	View category information based on Category ID	Data	DC Guide	AGServer	Infrastructure	Maintain
Category Features	A point-to-polygon service using Category ID and Maryland State Plane Coordinate System	Data	DC Guide	AGServer	Infrastructure	Maintain
Feature Details	Query a feature based on Feature ID	Data	DC Guide	AGServer	Infrastructure	Maintain
Point Area Report	Returns results based on Maryland State Plane Coordinate System and Category ID	Data	DC Guide	AGServer	Infrastructure	Maintain

Existing Web and Data Services Portfolio Status (table)

NEW WEB AND DATA SERVICES (PLANNED OR UNDERWAY)				
Description	**Platform**	**Asset Class**	**Deployment Status**	**Investment Status**
Buffer	Web Service by ArcGIS Server 10.3	Infrastructure	Planned	Invest
MAR Web Service Improvement (adding REST/JSON endpoint; CORS)	VS.NET 2008	Strategic and Infrastructure	Planned	Invest
MySchoolsDC Data Service	.NET	Infrastructure	Deployed	Invest

District Priorities API	.Net	Innovation & Infrastructure	Deployed	Invest
Data Replication Routines	Multiple	Infrastructure	Deployed	Invest

6.12 Existing Platforms Portfolio Status

Existing Platforms Portfolio Status (table)

SOFTWARE PLATFORMS AND INVESTMENT STATUS	
Software Platform	**Investment Status**
Google Maps API	Invest
ESRI ArcGIS Server (and Extensions)	Invest
GeoServer and PostGIS	Invest
Cyclomedia	Invest
ArcGIS Online	Invest
Data Catalog	Invest
Safe FME Desktop	Invest
Elastic Search	Invest
Hadoop	Invest
Cloud-based GeoAnalytics (e.g. CartoDB, Mapbox, MapLarge)	Invest
CitrixGIS	Maintain
Oblique Viewer/API	Maintain
ESRI ArcGIS Desktop (and Extensions)	Maintain
Roads and Highways	Maintain
Oracle RDBMS	Maintain
VM Ware (OCTO Environment)	Maintain
Master Address Repository (MAR)	Maintain
Google Earth	Sunset & Migrate
ESRI ArcPAD	Sunset & Migrate

7 POLICY, GOVERNANCE & OUTREACH

7.1 Data

7.1.1 Data Quality & Metadata Standards

OCTO GIS makes every effort to ensure the availability of high quality geospatial and metadata. This includes performing Quality Assurance and Quality Control (QA/QC) on enterprise data sets and reviewing data sets submitted by agencies to assess general quality. The program also collects planimetric mapping layers using aerial photography and photogrammetric principles meeting the American Society of Photogrammetry and Remote Sensing (ASPRS) standards. QA/QC procedures as well as descriptions of data checks and error handling are published on the OCTO website and these processes are incorporated into the maintenance program at OCTO GIS. While source agencies have varying levels quality standards, the published core standards for data distribution and storage allow OCTO to leverage QC tools.

OCTO GIS also maintains standardized metadata for all geospatial data following the Federal Geographic Data Committee (FGDC) standards for metadata. District agencies that contribute data asked to maintain and provide current and accurate metadata as well. The FGDC standards are designed to provide a common set of terminology and definitions for the documentation of digital geospatial data documenting the names, definitions, and descriptive information about the values within the data elements. The major benefits of standardized metadata to DC GIS include (a) support for its investment in geospatial data and (b) provision of useful information needed to process and interpret data obtained through the data catalog.

As described in the Strategic Goals presented in both the Strategic Plan and this Business Plan, a key Success Factor and recommendation of this plan to ensure geospatial data and feature level metadata are current, accessible and discoverable. This will require investing time in the maintenance and "housekeeping" of enterprise geospatial data and metadata and removing outdated records from the data catalog to avoid confusion among users. This will also require the continued maintenance of geospatial data quality standards and metadata standards and continued outreach and education to District agencies about the importance of these standards and their role in supporting them.

7.1.2 The Federated Data Model

The DC GIS "Federated Geospatial Data Model" has been guiding DC GIS activities for many years, and continues to be relevant. The goal is to promote a model with both centralized and distributed responsibility for creation, use, and maintenance of geospatial data at the least possible cost, while providing District agencies and the public easy access to this resource. A version of the diagram below first appeared in the Federated Geospatial Data Model (FGDM) document (c.2006 or earlier) as well as

the 2009 Strategic Plan. It should be noted that the current DC GIS shared system goes beyond a "Federated Data Model" and may be more appropriately characterized as a "Federated System" where all agencies contribute and benefit from shared data, applications, web services and systems.

In order for all to benefit from this shared model, this plan recommends that responsibility for agency data maintenance, stewardship and sharing be more explicitly documented. Agency CIO's should be aware and encouraged to actively support this responsibility.

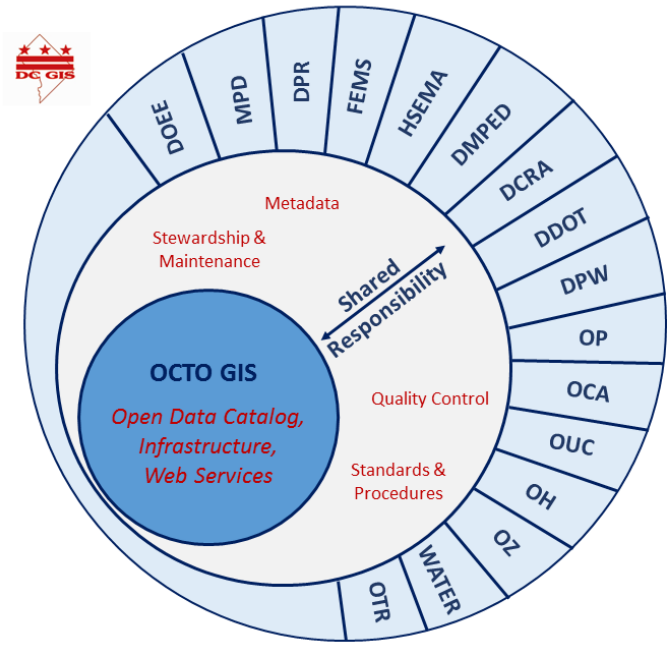


Figure 12. The DC GIS Federated Geospatial Data Model diagram

7.1.3 Governance

The OCTO GIS Program has supported data sharing and coordination across agencies through the DC GIS program and GISSC meetings for many years. DC GIS operates on a shared services model funded centrally within OCTO and provides common data, software, training, and tools at relatively no cost to District agencies. As a result, the District of Columbia is generating meaningful returns from geospatial investments through transparent data sharing and collaboration among the DC GIS community. DC GIS performs data maintenance and data enhancements, provides training to District agency employees, publishes web map and data services for integration with agency web applications, and provides guidance for data acquisition, development and coordination with stakeholders.

Over the course of time, interest and participation in DC GIS and the GISSC has shifted to more front-line technologists, rather than the executive leaders who helped to establish it many years ago. Some of these leaders, or their successors, have seen the GISSC become very focused on the technology more so than the original policy matters, and are now focused on other things that they feel require more of

their attention. However, with a new Mayoral Administration in place, a briefing or Mayoral Memo on the DC GIS program to raise awareness of it as an important and essential DC asset could be timely to ensure sustainability and agency commitments.

Given the maturity of DC GIS and the GISSC, it is an opportune time to create focus groups or subcommittees on specifically targeted program areas, such as data and web services, to tackle important details on behalf of the larger group to advance its overall effectiveness. These groups could also be tasked with documenting relationships and interdependencies between related data sets such as between streets and addresses in order to synchronize updates and improve overall quality.

Specific organizational governance recommendations include:

- Request a Mayoral Memo on the DC GIS program to raise awareness of it as an important and essential DC asset.
- Formally establish GISSC subgroups for Data and Web Services to concentrate appropriate GISSC resources and attention on important DC GIS program areas.
- Make data ownership and stewardship responsibilities for OCTO GIS and for agencies explicit
- Modernize the DC GIS federated data model to leverage new data platforms and organizing concepts for data.
- Reinvigorate Annual GISSC Budget Meeting for DC GIS to assure participation in prioritization of spending to support DC GIS.
- Schedule annual vote on GISSC Executive Committee members to continue multi-departmental representation.
- Invest in Workforce Development to educate and train personnel on the value and uses of geospatial data and technology for problem-solving.
- Implement Business Process Change to incorporate geospatial data and technology into workflows to improve the delivery of government services to citizens.

7.1.4 Open Data Policy

DC GIS has been an exemplar of Open Data in practice for more than 10 years. The District Government recently published a Draft Open Data Policy[6] (January 2016), and the Policy's Guiding Principles have long been reflected in the DC GIS mission statement and implemented practices, including transparency,

[6] https://drafts.dc.gov/docs/draft-open-data-policy

collaboration, openness, and discoverability – at least in terms of data provision and governance. DC GIS, and OCTO as its caretaker, has operated with both a Strategic Plan and Business Plan that address long-term data strategy, formulated with input from both DC government and non-government stakeholders, who are represented on the formally chartered and managed GIS Steering Committee (GISSC), which is chaired by OCTO.

The long-standing DC GIS strategy, which has been implemented and sustained for many years, includes unfettered access to geospatial data for government, public, and private users – basically, the DC GIS data catalog, which is an inventory of available geospatial data, and the actual data sets have been available to all, for many years. (It should be noted that this excludes sensitive data such as that that contains personally identifying information). The data holdings are discoverable, accessible via web services and APIs, and downloadable, too. The GISSC, as part of the current planning cycle, has defined the need for a subcommittee on DC GIS Data, to advise on prioritization and provisioning of geospatial data sets.

In the DC GIS 2011 Business Plan, in Section 3.0 on "Key Technology Trends," a subsection described the "Coming of Age of Open Source for GIS." However, there was no explicit goal that specified the adoption of specific open source software alternatives. Now, the Districts' draft Open Source Policy states a requirement for an Open Source Program, and this needs attention with regard to DC GIS. The primary software and application formats used by DC GIS have been proprietary, with rights controlled by Esri. Esri itself, and its community of developers, has made progress in publishing more open source code[7] during the past few years but it's core products are still proprietary licensed technology. Going forward, as part of the current DC GIS Business Plan, there will be an explicit goal to adopt specific open source software for geospatial data and applications (i.e. PostGIS and GeoServer). An Open Source Program for GIS will require work and commitment on the part of OCTO GIS, which is now planned.

[7] https://esri.github.io/

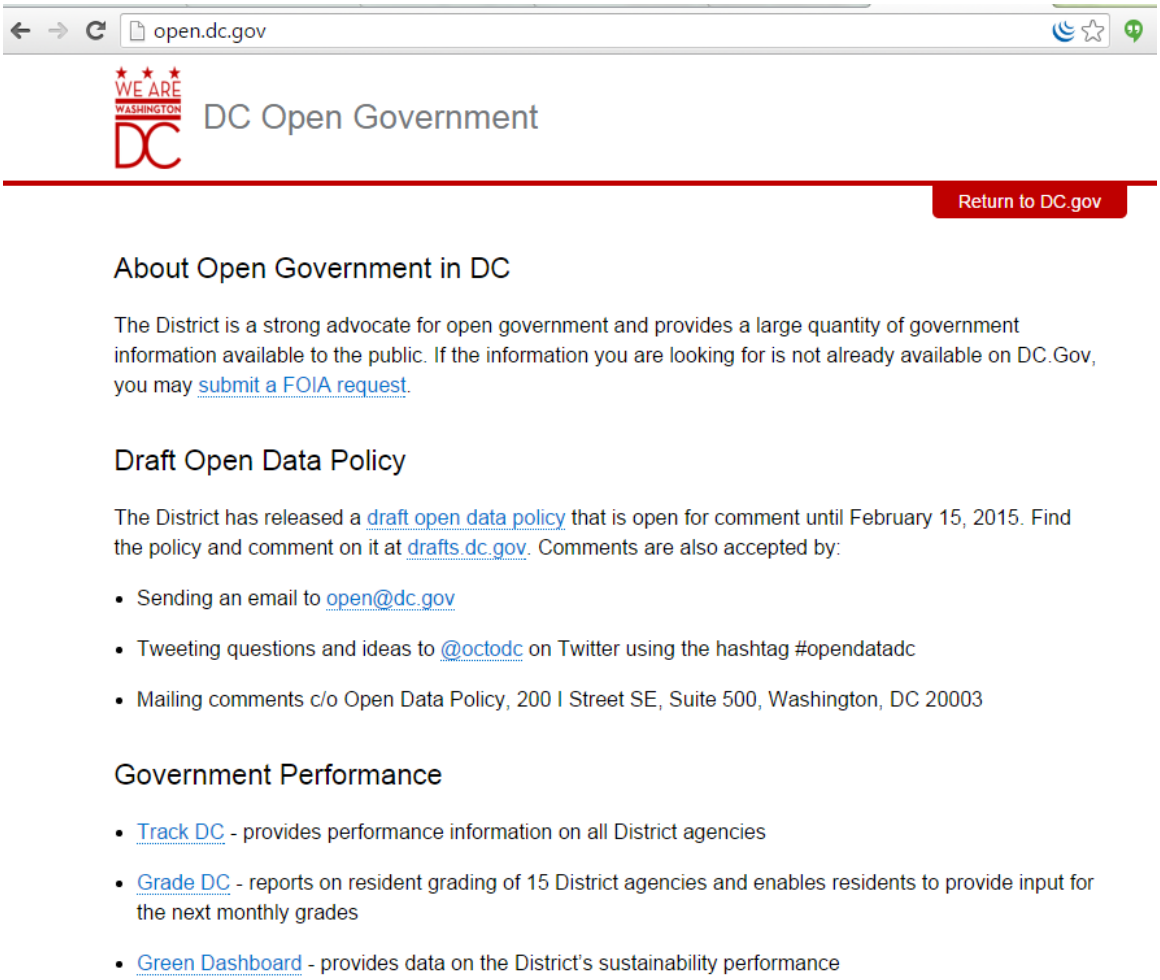


Figure 13. The DC Open Government page with links to the Open Data Policy.

7.2 Service Delivery

7.2.1 Education and Awareness of Services

An area where the DC GIS Program has fallen short at times is the promotion of the program's value to DC Government and District citizens. A regular effort has been maintained to inform stakeholders of new and existing data and services, primarily through the GISSC, but these communications are typically aimed at a technical, GIS user audience. For agencies and citizens to recognize the true value of the program, DC GIS activities and investments should be explicitly tied to demonstrable benefits and successful outcomes within the District.

An opportunity to engage agencies directly is through the formation of a GISSC Focus Group on Service Delivery. This group would presumably be comprised of representatives from several agencies and

would discuss in detail and recommend actions related to DC GIS services – including ideas for effective education and outreach to the broader community.

Recommended outreach and education regarding the value of DC GIS services includes:

- Promotion of this updated plan and progress documented since original 2009 Strategic Plan
- Schedule presentation/training for DC agency CIO's focused on benefits and opportunities
- Form a GISSC Focus Group on Service Delivery to engage interested agencies directly
- Continued use of the Steering Committee email distribution list for broad notification
- Series of presentations geared toward executive leadership and the new administration about user success stories, innovative ideas and overall value to the District Priority Goals
- Use of social media to share information, successes, interesting maps/analysis on current District issues/events, tweet mapping
- Engage with technology outreach initiatives, such as Connect.DC, to assist with hosting a "DC GIS Open House". Connect.DC aims to make technology easier to use, more accessible and more relevant -- broadening awareness of DC GIS resources for the public would align with its mission.
- Share relevant findings from the technology "Pilot Lab"
- Launch quizzes or online surveys to engage stakeholders in informal manner (e.g. the "Are you smarter than DC GIS?" quiz that was distributed on GIS Day)
- Issue press releases on newsworthy items and success stories
- Create and maintain a developer "opt in" list for notifications aimed at developer tools, best practices, APIs and other relevant information

7.3 Budget Plan

The current operating budget for OCTO GIS is $2.55 million for FY16. This supports 12 full-time equivalent (FTE) staff members supporting program management, data, customer service and application development (but does not include staff for the Citywide Data Warehouse). The budget also covers travel, contractors, training and software expenses. While not finalized at the time of this report, the operating budget for FY17 is expected to reflect an increase of 15% over the FY16 budget. As large enterprise data expenses such as orthoimagery and planimetric data capture are no longer eligible for capital budget support, the OCTO GIS budget will likely be strained. It should be noted that DC GIS does not, in general, receive funding from agencies for the services provided but in the case that an agencies needs expand beyond what OCTO GIS can reasonably provide, the agency may contribute funding to cover the additional demands. Several agencies (e.g. DDOT) budget for GIS separately and their investments often benefit DC GIS as a whole (e.g. DDOT purchased Cyclomedia and NearMap imagery but makes this resource available to all agencies).

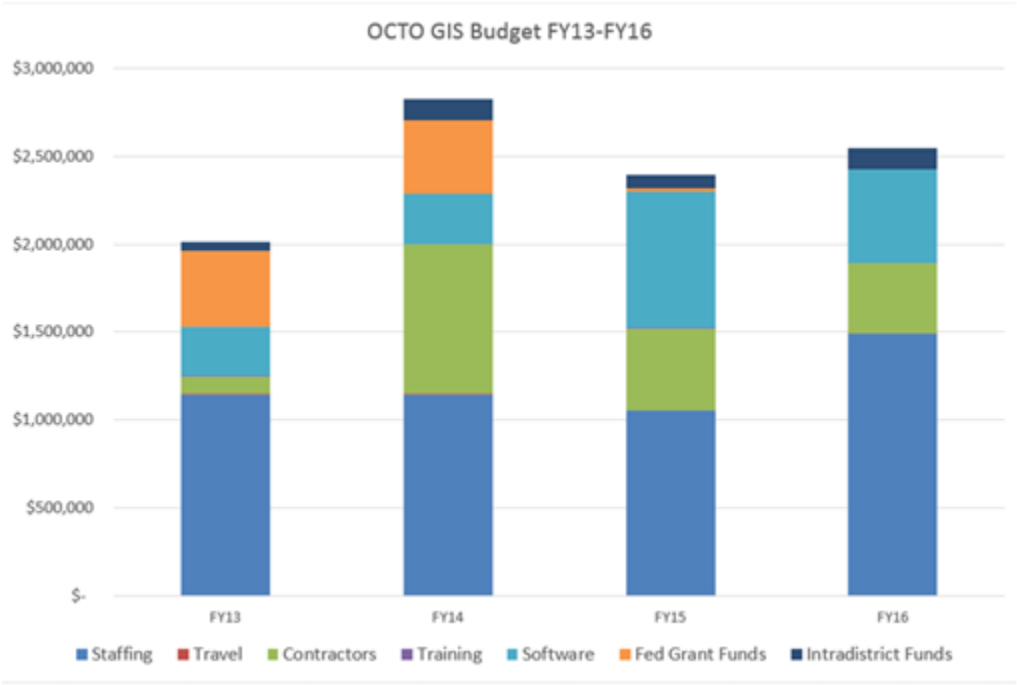


Figure 14. OCTO GIS budget for Fiscal Years 2013-2016.

As described in both the Strategic Plan and earlier in this Business Plan, DC GIS should implement an annual budget meeting to review assets and plan for important investments. The process would convene the GISSC Executive Committee to review investment decisions and priorities. The meeting would allow:

1. Executive leadership to review overall DC GIS investment plans
2. Sharing and discussion of agency geospatial investments
3. Discussion of funding sources and opportunities

This will help OCTO GIS assess how much spending on GIS is being done throughout the enterprise, and ensure alignment with strategic goals and priorities. The demonstrated need for maintenance of OCTO GIS enterprise geospatial assets -- including data, platforms, and services -- plus the demand for new investments described in this plan will likely require additional funding. The annual budget review meeting can be used to prioritize these investments and strategize about how to support them. From an implementation standpoint, it is notable that the DCAMS blanket contract has expired. It would be beneficial to many if a similar contract were put in place.

7.4 Annual Review of Assets and Investment Strategy

This plan recommends that annually OCTO GIS shall review existing assets (listed in the tables in Sections 7.4, 7.5 and 7.6) and update the investment status. A sunset or divest strategy should be

assigned to assets that have lost their utility. Assets that are still useful but need modernization should be marked for migration. Key data, software, platforms, or programs should be maintained and new assets should be considered for investment based on stakeholder needs. Updated investment strategies should be presented to the GISSC on an annual basis for general awareness.

8 APPENDICES

8.1 Data Assets

Data Assets				
NAME	**TYPE**	**DC GOV DATA?**	**ORIGINATOR**	**UPDATEF REQ**
2030 Proposed Bus Rapid Transit	Polyline	YES	DDOT	
2030 Proposed Rapid Bus	Polyline	YES	DDOT	
2030 Proposed Street Car	Polyline	YES	DDOT	Annually
Abandoned Vehicle Inspection Area	Polygon	YES	DPW	
Above Ground Storage Tanks	Point	YES	FEMS	Annually
Acisa intersection	Point	YES	DDOT	
Address Points	Point	YES	OCTO	Weekly
Advisory Neighborhood Commission - 1990	Polygon	YES	BOEE	5 years
Advisory Neighborhood Commission - 2002	Polygon	YES	BOEE	5 years
Advisory Neighborhood Commission - 2013	Polygon	YES	OP	Annually
Aging Services	Point	YES	OA	Quarterly
Air Emission Locations	Point		EPA	Annually
Air Rights Lots Polygons	Polygon	YES	DCRA,OTR	
Air Space Restrictions	Polygon		NGA	Annually
Alley Frontage Lines	Polyline	YES	DCRA,OTR	
Alternate Polling Place	Point	YES	BOEE	
AM Towers	Point		FCC	Yearly
Ambulatory Surgical Centers	Point	YES	DOH	Quarterly
Antenna Structure Registration Locations	Point		FCC	Yearly
Appropriations	Polygon	YES	OTR	As Needed
Architect of the Capitol	Polygon		AOC	5 years
Assessment Neighborhoods	Polygon	YES	OTR	Yearly
Assessment Sub-Neighborhoods	Polygon	YES	OTR	Yearly
Baker Plan	Image		OCTO	None
Bank Locations	Point	YES	DCISB	Annually
Basketball and Other Recreation Courts	Polygon	YES	DPR	Annually
Bicycle Count Locations	Point	YES	DDOT	Annually
Bicycle Lanes	Polyline	YES	DDOT	
Bike Trails	Polyline	YES	DDOT	Yearly
Block - Street	Point	YES	OCTO	Quarterly
Bollards	Point	YES	OCTO	5 years

Boundary Stones Location	Point	YES	OCTO	Annually
Bridge Polygons (DDOT)	Polygon	YES	DDOT	Annually
Bridges and Tunnel Entrances	Polygon	YES	DDOT	5 years
Bridges Points (DDOT)	Point	YES	DDOT	
Broadband Adoption Residential	Polygon	YES	OCTO	Semi-Annually
Building Footprints	Polygon	YES	OCTO	5 years
Building Restriction Lines	Polyline	YES	DCRA,OTR	
Buildings 3D	Polygon	YES	OP	As Needed
Business Improvement Districts	Polygon	YES	Individual BIDs	Yearly
Campus Areas - Zoning	Polygon	YES	OZ	Annually
Capital Bike Share Locations	Point	YES	DDOT	Monthly
Capital Projects - 2011	Point	YES	OCTO	Annually
Capital Projects - 2012		YES	OP	Annually
Capital Projects of DC government	Point	Yes	EOM	
Capital Projects of DC government - 2014	Point	Yes	EOM	
Car Share Locations	Point	YES	DDOT	Annually
Cellular Service Area Boundaries	Polygon		FCC	Yearly
Cellular Towers	Point		FCC	Yearly
Cemeteries	Polygon	YES	OCTO	5 Years
Census Block Groups - 2000	Polygon		Census Bureau	10 years
Census Block Groups - 2010	Polygon	YES	OP	10 Years
Census Blocks - 2000	Polygon		Census Bureau	10 Years
Census Blocks - 2010	Polygon	YES	OP	10 Years
Census Tracts - 1930	Polygon		Census Bureau	10 Years
Census Tracts - 1940	Polygon		Census Bureau	10 Years
Census Tracts - 1950	Polygon		Census Bureau	10 Years
Census Tracts - 1960	Polygon		Census Bureau	10 Years
Census Tracts - 1970	Polygon		Census Bureau	10 Years
Census Tracts - 1980	Polygon		Census Bureau	10 Years
Census Tracts - 1990	Polygon		Census Bureau	10 Years
Census Tracts - 2000	Polygon	YES	Census Bureau	10 Years
Census Tracts - 2010	Polygon	YES	Census Bureau	10 Years
Central Employment Areas (CEA)	Polygon	YES	NCPC	Yearly
Certificate of Occupancy Points	Point	YES	DCRA	Quarterly
Charter Schools	Point	YES	DCPCSB	Yearly
Child Care Locations	Point	YES	DOH	Quarterly
Civic and Neighborhood Associations	Point	YES	EOM	Annually
Clean Team Trash Areas	Polyline	Yes	EOM	
Collaborative Area	Polygon	YES	CFSA	Annually
Combined Sewer Outfall (CSO) - Sewer Shed	Polygon	YES	DDOE	5 Years

Commercial (CAMA)	Point	YES	OTR	Quarterly
Commission of Fine Arts Jurisdiction Area	Polygon	YES	OP	Annually
Commission of Fine Arts Review Area	Polygon	YES	CFA	Annually
Community Gardens	Polygon	YES	DOE	Annually
Community Rating System - Special Flood Hazard Area	Polygon	Yes	OCTO	
Commuter Bus Locations	Point	YES	DDOT	
Comprehensive Plan Planning Areas	Polygon	YES	OP	Annually
Condo Approval Lots	Polygon	YES	DCRA	Annually
Condo Tables - Relate, Regime, and One to Many	Tabular		DCRA,	
Condominium (CAMA)	Point	YES	OTR	Quarterly
Conventinoal Trash Days	Polygon	YES	DPW	As Needed
Conventional Recycling Days	Polygon	YES	DPW	As Needed
Cultural Areas (parks, zoos, gardens, and cemeteries)	Polygon	YES	OCTO	5 years
Cultural Tourism - Heritage Trail	Polyline	YES	Cultural Tourism	Annually
Cultural Toursim - Heritage Trail Signs	Point	YES	CulturalTourism DC	Annually
DC Circulator Routes	Polyline		DDOT	Annually
DC Circulator Stops	Point	YES	DDOT	Annually
DC Government Locations	Point	YES	DGS	Yearly
DC Government Property	Point	YES	DGS	Semi-Annually
DC Main Street Corridors	Polygon	YES	OP	Annually
DC Parks	Polygon	YES	DPR	Yearly
DC Quadrants	Polygon	YES	OCTO	5 years
DHS Catchment Area	Polygon	YES	DHS	Annually
DHS Service Centers	Point	YES	DHS	Annually
Dialysis Clinics	Point	YES	DOH	Quarterly
Digital Inclusion Sites	Point	YES	OCTO	Annually
District Boundary	Polygon	YES	OCTO	10 years
District Boundary as defined by boundary Stones	Polygon	YES	OCTO	Annually
District Revitalization Areas	Polygon		OP	Yearly
Downtown Development Comprehensive Plan	Polygon	YES	OP	Yearly
DPW Parking Beats	Polygon	YES	DDOT	Yearly
Economic Development Zones	Polygon	YES	OP	Annually
Electric SubStations	Polygon	YES	OCTO	5 years
Elementary School Attendance Zones (New)	Polygon	YES	DCPS	
Elementary School Attendance Zones (Old)	Polygon	YES	DCPS	Yearly

Elementary Schools Attendance Zones (Change Area)	Polygon		DCPS	
Elementary Schools Attendance Zones (New)	Polygon		DCPS	
Ellicott Plan	Image		OCTO	None
Embassies	Point	YES	OCTO	Yearly
Energy star buildings	Point	YES	DDOE	
Enforcement Camera locations	Point	Yes	MPD	
Enterprise and Empowerment Zones	Polygon	YES	EOM	Yearly
Fire Alarm Districts	Polygon	YES	FEMS	Annually
Fire Battalions	Polygon	YES	FEMS	Annually
Fire Hydrants	Point		WASA	Quarterly
Fire Stations	Point	YES	FEMS	Yearly
Floodplains - 1985	Polygon		FEMA	5 years
Floodplains - 2010	Polygon		FEMA	5 Years
Floodplains - Base Flood Elevation	Point		FEMA	
Floodplains - Cross Section	Polyline		FEMA	
Floodplains - FIRM panel	Polygon		FEMA	
Floodplains - General Structure	Polyline		FEMA	
FM Towers	Point		FCC	Yearly
Future Land Use	Polygon	YES	OP	Annually
Gas Stations	Point	YES	DCEO	Quarterly
Geodetic Control Points	Point	YES	OCTO	5 years
Golf Courses	Polygon	YES	OCTO	5 Years
Good Plan	Image		OCTO	None
Grates	Polygon	YES	OCTO	5 years
Great Street Program Areas				
Green Sites or Resources	Point	YES	DDOE	
Grocery Store Locations	Point	YES	OP	Quarterly
GSA Federal Locations	Point		GSA	Yearly
Guardrails and Barriers	Polyline	YES	OCTO	5 years
Halfway Houses - Correctional	Point	YES	DOC	6 Months
Hawkins Topography	Image		OCTO	None
Hazardous Waste Locations	Point		EPA	Annually
Heliports	Point		USDOT	Yearly
High Schools Attendance Zones (Change Area)	Polygon		DCPS	
High Schools Attendance Zones (New)	Polygon		DCPS	
High Schools Attendance Zones (Old)	Polygon	YES	DCPS	Yearly
High Technology Development Zones	Polygon	YES	EOM	Yearly
Highway Advisory Radio	Point	YES	DDOT	
Highway Plan Lines	Polyline	YES	DCRA,OCFO	
Historic Districts	Polygon	YES	OP	Yearly

Historic Landmark Sites	Polygon	YES	OP	Annually
Historic Landmarks	Polygon	YES	OP	Annually
Historic Landmarks Points	Point	YES	OP	Annually
Historic Sewer Survey	Image		OCTO	None
Historic Shaded Relief	Image		OCTO	None
Historic View of DC	Image	YES	OCTO	None
HIV/AIDS Clinic	Point	YES	DOH	Annually
Homeless shelters	Point	Yes	DHS	
Hopkins Survey	Image		OCTO	None
Hospital Grounds	Polygon	Yes	OCTO	
Hospitals	Point	YES	DOH	Yearly
Hotel Locations	Point	YES	OCTO	Annually
HUB Zones (Historically Underutilized Business Zones)	Polygon	YES	OP	Yearly
Human Service Locations	Point	YES	DHS	Quarterly
Hydrography	Polyline	YES	OCTO	5 years
Hydrography Centerline	Polyline	YES	OCTO	5 years
Impervious Surface - 2010	Polygon	YES	OCTO	
Independent Schools	Point	YES	OCTO	Yearly
Intersection Points	Point	YES	OCTO	Quarterly
Jattnig Plan	Image		OCTO	None
Johnson and Ward Survey	Image		OCTO	None
Keily Survey	Image		OCTO	None
Kroe Plan	Image		OCTO	
L'Enfant Plan	Image		OCTO	None
L'Enfant Plan Boundary	Polygon		OP	5 years
L'Enfant Plan Street Boundaries	Polygon	YES	OP	Yearly
L'Enfant Plan Street Centerlines	Polyline	YES	OP	Yearly
Land Cover - 2006	Image	YES	DDOT	Annually
Land Mobile Broadcasting Towers	Point		FCC	Yearly
Land Mobile Commercial Towers	Point		FCC	Yearly
Land Mobile Private Towers	Point		FCC	Yearly
Land Use - Existing	Polygon	YES	OP	Annually
Land Use - Planned 2006	Polygon	YES	OP	As Needed
Latrobe Survey	Image		OCTO	None
Leaf Boundary	Polygon	YES	DPW	Annually
Libraries	Point	YES	DCPL	Yearly
LIDAR -2009	Image	NO	NGA	
Liquor License Locations	Point	YES	ABRA	Annually
Litter Cans	Point	YES	DPW	Annually
Marinas	Point	YES	DDOE	Yearly

MDS/ITFS Towers	Point		FCC	Yearly
Metro Bus Lines	Polyline		WMATA	Yearly
Metro Bus Stops	Point		WMATA	Annually
Metro Entrance Structures	Polygon	YES	OCTO	
Metro Lines (Regional)	Line		WMATA	Yearly
Metro Park-N-Ride Lots	Polygon	YES	WMATA	Yearly
Metro Station Entrances	Point	YES	WMATA	Yearly
Metro Station to Line Cross Reference	Tabular	YES	WMATA	Yearly
Metro Stations (Regional)	Point		WMATA	Yearly
Microwave Towers	Point		FCC	Yearly
Middle Schools Attendance Zones (Change Area)	Polygon		DCPS	
Middle Schools Attendance Zones (New)	Polygon		DCPS	
Military Bases	Polygon	YES	OCTO	Yearly
Misc. Polygons (Planters)	Polygon	YES	OCTO	5 years
Municipal Separate Storm Sewer Systems (MS4) - Sewer Shed	Polygon	YES	DDOE	5 years
Municipal Separate Storm Sewer Systems (MS4) - Sewer Shed Dissolve	Polygon	YES	DDOE	5 years
Municipal Separate Storm Sewer Systems (MS4) - Sewer Shed Impervious Area	Polygon	YES	DDOE	5 years
National Parks	Polygon	YES	OCTO	Yearly
Neighborhood Clusters	Polygon	YES	OP	Yearly
Neighborhood Composition	Polygon	YES	OP	Yearly
Neighborhood Investment Fund (NIF) Areas	Polygon	YES	EOM	Yearly
Neighborhood Name Label Points	Point	Yes	OP	
Neighborhood Plannig Areas	Polygon	Yes	DDOT	
New Supercan Days	Polygon	YES	DPW	As Needed
No Fly Zones	Polygon		NGA	Annually
Non Depository banks	Point	YES	DISB	
NonProfit Tax Abatement Zones	Polygon	YES	EOM	Annually
Notary Public Locations	Point	YES	ONCA	Monthly
NPS Trails	Polyline		NPS	Yearly
Nursing Homes	Point	YES	OA	Yearly
Obscured areas	Polygon	YES	OCTO	5 years
Office of Aging Lead Agency Locations	Point	YES	OA	Annually
Office of Aging Lead Agency Service Boundary	Polygon	YES	OA	Annually
Orthophoto of DC - 1995	Image	YES	OCTO	Yearly
Orthophoto of DC - 1999	Image	YES	OCTO	Yearly
Orthophoto of DC - 2002	Image	YES	USGS	Yearly
Orthophoto of DC - 2005	Image	YES	OCTO	Annually
Orthophoto of DC - 2008	Image	YES	OCTO	

Orthophoto of DC - 2010	Image	YES	OCTO GIS	Semi-Annually
Orthophoto of DC - 2012	Image		NGA	None
Other Bus Routes	Polyline		OCTO	Annually
Other Bus Stops	Point	YES	OCTO	Annually
Other traffic signs	Point	YES	OCTO	5 years
Outdoor Recreation Amenities	Polygon	YES	DPR	Annually
Overlay Zones	Polygon	YES	OZ	Quarterly
Owner linework derived from owner polygons	Polyline	YES	DCRA\OTR	
Owner Points	Point	YES	OTR	Weekly
Owner Polygons (Common Ownership Layer)	Polygon	YES	DCRA,OCFO	
Ownerpoint - Field Descriptions	Tabular	YES	OTR	Yearly
Ownerpoint - Use code descriptions	Tabular	YES	OTR	Yearly
Paging Towers	Point		FCC	Yearly
Parcel Lots Polygon	Polygon	YES	DCRA,OCFO	
Partial Light Plow Routes	Polygon	YES	DDOT	Annually
Pavement Marking	Point	YES	DDOT	Annually
Places of Worship	Point	YES	OCTO	Yearly
Planned Unit Development (PUDs)	Polygon	YES	OZ	Quarterly
Points of Interest - MAR Aliases	Point	YES	OCTO	Monthly
Police Districts (MPD)	Polygon	YES	MPD	Yearly
Police Service Areas (PSA)	Polygon	YES	MPD	Yearly
Police Stations	Point	YES	MPD	Yearly
Polling Place	Point	YES	BOEE	2 years
Portable Dynamic Message Sign	Point	YES	DDOT	Annually
Post Offices	Point	YES	USPS	Yearly
Potential Districts	Polygon	YES	OP	Annually
Potential Landmarks	Polygon	YES	OP	Annually
Primary Care Facilities	Point	YES	DOH	Quarterly
Primary Signed Routes	Polyline	YES	DDOT	
Property Sale Points	Point	YES	OTR	Weekly
Public Easements	Polyline	YES	DCRA,OCFO	
Public Housing Areas	Polygon	YES	HA	Annually
Public School Grounds	Polygon	YES	DCPS	Annually
Public Schools	Point	YES	DCPS	Yearly
Public Use Microdata Areas (PUMA)	Polygon		Census Bureau	Semi-Annually
Railroads	Polyline	YES	OCTO	5 years
Record lot lines	Polyline	YES	DCRA	weekly
Record Lots Polygon	Polygon	YES	DCRA,OTR	
Recreation Facilities	Point	YES	DPR	Yearly
Red Light Cameras	Point	YES	MPD	6 months

Regional Evacuation Routes	Polyline	YES	EMA,DDOT	Yearly
Reservations Polygon	Polygon	YES	DCRA	Annually
Reservoir parcels in DC	Polygon	YES	OCTO	
Residential (CAMA)	Point	YES	OTR	Quarterly
Residential Parking Permit Blocks	Polyline	YES	DDOT	Annually
Retail Priority Area	Polygon	YES	DCRA	Annually
Retail Sites	Point		WDCEP	Quarterly
Right of Way Scans - 1998	Image	YES	DDOT	
Roads (All)	Polygon	YES	OCTO	5 years
RSA Counselor Locations	Point	YES	DDS	Annually
Salt Domes	Point	YES	DDOT	Annually
School Attendance Zones (Middle School) - old	Polygon	YES	DCPS	Yearly
School Crossing Guards	Point	YES	DDOT	
School Election Districts	Polygon	YES	DCPS	Yearly
School Garden Sites	Point	YES	DCPS	Annually
Secondary Signed Routes	Polyline	YES	DDOT	Annually
Service Locations - DDS	Point	YES	DOH	
Shaw Historic Sites	Point	YES	OP	Yearly
Shipstead-Luce Act Boundary	Polygon		OP	
Shopping Centers	Point	YES	OCTO	Annually
Sidewalk Cafe	Point	YES	DCRA	Annually
Sidewalks	Polygon	YES	OCTO	5 years
Signalized Intersection	Point	YES	DDOT	Annually
Signed Bike Routes	Polyline	YES	DDOT	Annually
Single Member District - 2002	Polygon	YES	BOEE	2 years
Single Member District - 2013	Polygon	YES	OP	Annually
Small Area Plans	Polygon	YES	OP	
Smart Bike Locations	Point	YES	DDOT	Annually
Snow Emergency Routes	Polyline	YES	DDOT	Daily
Snow Plow Routes	Polyline	YES	DDOT	Annually
Snow Removal Areas	Polygon	YES	DDOT	Yearly
Snow Removal Routes - All	Polyline	YES	DDOT,DPW	Yearly
Snow Removal Zones	Polygon	YES	DDOT,DPW	Yearly
Soil Type	Polygon		USDA	10 Years
Specialty Lighting	Point	YES	DDOT	Annually
Speed Camera	Point		DDOT	Annually
Speed Detector	Polyline	YES	DDOT	Annually
Speed Humps	Polyline	YES	DDOT	Annually
Square Boundaries	Polygon	YES	DCRA,OTR	Daily
Stairs	Polygon	YES	OCTO	5 years
Storm Sewer System	Polygon	YES	WASA	Annually

Strategic Neighborhood Investment Program Areas	Polygon	YES	OP	Yearly
Street Centerlines	Line	YES	DDOT	Quarterly
Street Lights	Point	YES	DDOT	Annually
Street Right Of Way	Polyline	YES	DDOT	Annually
Street Right Of Way Polygons	Polygon	YES	DDOT	Annually
Street Segments	Polyline	YES	DDOT	Quarterly
Subwatersheds	Polygon		USGS	5 years
Supercans	Point	YES	DDOT	
Supermarket Tax Credit Zone	Polygon	YES	OCTO	Annually
Swimming pools	Polygon	YES	OCTO	5 years
Targeted Employment Area	Polygon	YES	OCTO	Annually
Tax Increment Financing (TIF) Areas	Polyline	YES	EOM	Annually
Tax Lots Polygons	Polygon	YES	DCRA,OCFO	
Tennis Court Sites	Point	YES	DPR	Annually
Thackara Vallance Plan	Image		OCTO	None
Topography - 10 Foot Contours	Polyline	YES	OCTO	
Topography - 2 Foot Contours	Polyline	YES	OCTO	5 years
Topography - 20 Foot Contours	Polyline	YES	OCTO	Annually
Topography - Breaklines	Polyline	YES	OCTO	5 years
Topography - Spot Elevations	Point	YES	OCTO	5 Years
Toxic Release Inventory Locations	Point		EPA	Annually
Traffic Analysis Zones	Polygon	YES	COG	Annually
Traffic Camera	Point	YES	DDOT	Annually
Traffic Control Officer	Point	YES	DDOT	Annually
Traffic Monitoring Stations	Point	YES	DDOT	Annually
Traffic Pole	Point	YES	DDOT	Annually
Traffic Push Button	Point	YES	DDOT	Annually
Traffic Sign	Point	YES	DDOT	Annually
Traffic Signal	Point	YES	DDOT	Annually
Traffic Signal Arm	Point	YES	DDOT	Annually
Traffic Signal Cabinets	Point	YES	DDOT	Annually
Transfer of Development Rights - Zoning	Polygon	YES	OZ	Monthly
Transportation Study Areas	Polygon	YES	DDOT	Annually
Triangles and Medians	Polygon	Yes	DDOT	
TV - Digital Towers	Point		FCC	
TV - NTSC Towers	Point		FCC	Yearly
TV Contours	Polygon		FCC	Yearly
UFA Street Trees	Point	YES	DDOT	Semi-Annually
Underground Storage Tanks	Point	YES	EHA	Yearly
Universities and Colleges	Point	YES	OCTO	Yearly

University and College Campuses	Polygon	YES	EMA	
Utility poles	Point	YES	OCTO	5 years
Voting Precinct - 1990	Polygon	YES	BOEE	2 years
Voting Precinct - 2002	Polygon	YES	BOEE	2 years
Voting Precinct - 2008	Polygon	YES	BOEE	
Voting Precinct - 2012	Polygon	YES	BOEE	Annually
Ward - 1990	Polygon	YES	OP	5 years
Ward - 2002	Polygon	YES	OP	5 years
Ward - 2012	Polygon	YES	OCTO	Other
Water Discharge Permit Locations	Point		EPA	Annually
Waterbodies	Polygon	YES	OCTO	5 years
Watersheds	Polygon		DOE	5 years
Weigh in Motion Sites	Point	YES	DDOT	Annually
Wetland Types	Polygon		USFWS	5 Years
Wheelchair Ramps	Point	YES		
Wireless Hotspots - DC Government	Point	YES	OCTO	Annually
Wooded Areas	Polygon	YES	OCTO	5 years
Zip Codes	Polygon	YES	USPS	Yearly
Zoning	Polygon	YES	OZ	Quarterly

8.2 Document History

Version #	Date	Description	Responsible Party
First Draft	2/11/16	DC GIS Business Plan V1	AppGeo
Secon Draft	3/3/16	DC GIS Business Plan V2	AppGeo
Final	4/8/16	DC GIS Business Plan Final	AppGeo

8.3 Acknowledgements

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