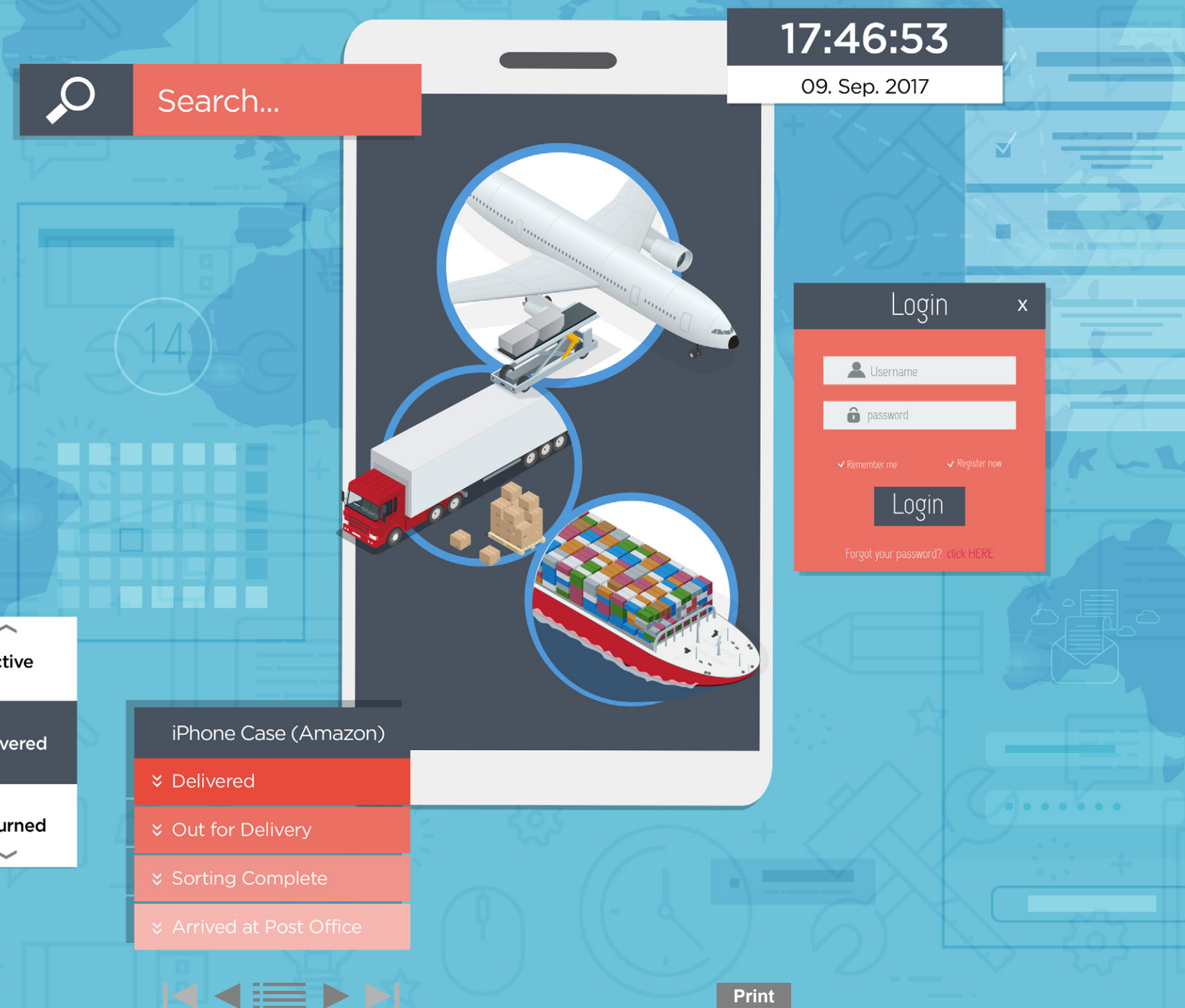
OFFICE OF INSPECTOR GENERAL
UNITED STATES POSTAL SERVICE

Application Programming Interface Strategy

Audit Report

Report Number
IT-AR-17-006

September 7, 2017



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Highlights

We determined that the Postal Service Web Tools APIs are configured and generally managed in accordance with Postal Service standards and industry best practices.

Background

The U.S. Postal Service's Web Tools Application Programming Interfaces (API) provide a means for web developers and customers to integrate online Postal Service information and services into their websites. For example, ecommerce companies can help their customers track orders shipped by the Postal Service directly from their own websites. This is possible because companies can use Postal Service APIs to seamlessly retrieve shipping and tracking information and display that information on their websites automatically, saving its customers time and effort.

Currently, the Postal Service offers 34 external APIs to its customers. In 2016, these APIs processed over 46.4 billion requests (an average of about 3.8 billion each month) for over 70,000 customers. As the Postal Service strives to achieve the USPS Future Ready goals of improving the customer experience and investing in digital platforms, APIs can provide more automated services to meet customer needs.

Our objective was to determine if Postal Service APIs were configured and managed in accordance with Postal Service standards and industry best practices, and if opportunities exist to enhance API services.

What the OIG Found

We determined that the Postal Service Web Tools APIs are configured and generally managed in accordance with Postal Service standards and industry best practices. Defined processes exist for customers to register online in order to gain access to the APIs, and the Postal Service follows their internal software development process for implementing new APIs. The Postal Service also maintains an inventory of all external Web Tools APIs and user guides, and has an automated process to collect customer usage data. Overall, the Postal Service has taken measures to establish governance over its external Web Tools API services.

Based on our benchmarking, the Postal Service offers more external APIs to its customers than its major competitors do; however, opportunities still exist to enhance its API services. Our benchmarking analysis identified several APIs offered by competitors and foreign posts that the Postal Service should consider offering to external customers. Examples include APIs for locating post offices, estimating duties and taxes for shipments, and allowing customers to select a delivery address. The Postal Service has not conducted a comparative analysis of its API offerings against competitors and foreign posts, therefore, it may be missing opportunities for creating additional APIs to improve the customer experience.

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We also identified that, while the Postal Service collects customer API usage data, it is not currently using that information to plan for future needs. This occurred because management did not agree on which group was responsible for reviewing and making decisions about the captured usage data. Without a process in place to analyze customer usage data, the Postal Service may not have information readily available to make decisions regarding future API demands or to determine whether or not to retire APIs.

In 2017, the Postal Service procured an API management tool that should enhance governance over its external APIs. This tool offers monitoring capabilities that have the ability to track customer usage information and performance metrics. Management stated that they are in the process of defining functional requirements and plan to have this tool implemented by October 2017.

What the OIG Recommended

We recommended the Postal Service consider the feasibility of implementing API services offered to external customers by its competitors and foreign posts, assign a responsible organization to review the Web Tools API customer usage data, and define functional requirements and implement the API management tool as planned.

Transmittal Letter

OFFICE OF INSPECTOR GENERAL
UNITED STATES POSTAL SERVICE

September 7, 2017

MEMORANDUM FOR: GARY C. REBLIN
VICE PRESIDENT, PRODUCT INNOVATION

E-Signed by Kimberly Benoit
VERIFY authenticity with eSign Deskt

FROM: Kimberly F. Benoit
Deputy Assistant Inspector General
for Technology

SUBJECT: Audit Report – Application Programming Interface Strategy (Report Number IT-AR-17-006)

This report presents the results of our audit of the Application Programming Interface Strategy (Project Number 17TG004IT000).

We appreciate the cooperation and courtesies provided by your staff. If you have any questions or need additional information, please contact Jason Yovich, Director, Information Technology, or me at 703-248-2100.

Attachment

cc: Postmaster General
Corporate Audit and Response Management
Vice President, Information Technology
Chief Information Security Officer Vice President

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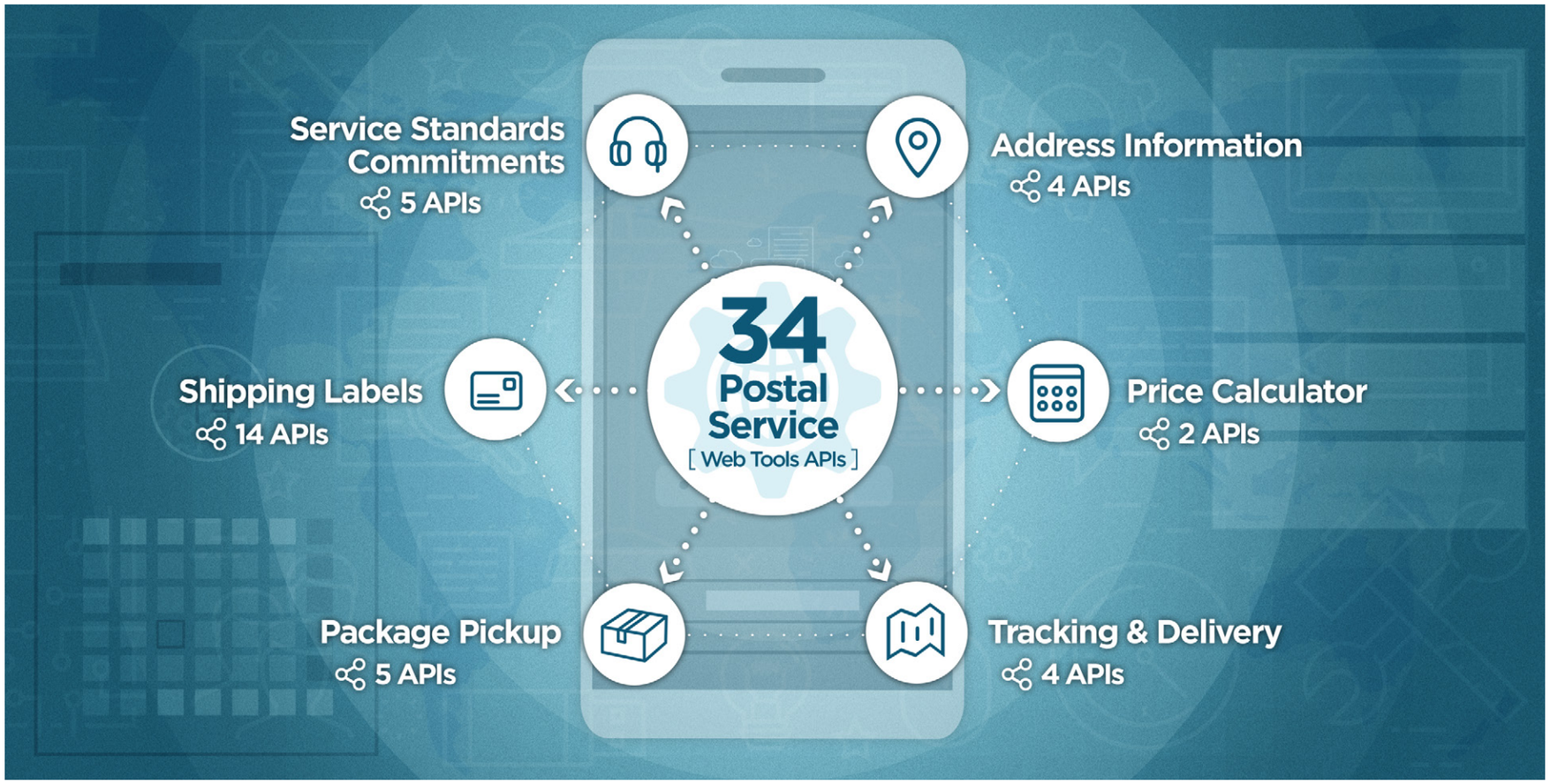
Findings

Introduction

This report presents the results of our self-initiated audit of the U.S. Postal Service's Application Programming Interface (API) Strategy (Project Number 17TG004IT000). Our objective was to determine if Postal Service APIs were configured and managed in accordance with Postal Service standards and industry best practices, and if opportunities exist to enhance API services. See Appendix A for additional information about this audit.

The Postal Service's Web Tools[1] APIs provide a means for web developers and customers to integrate online Postal Service information and services into their websites. For example, ecommerce companies can use Web Tools APIs to seamlessly retrieve shipping rates and tracking data from the Postal Service and display that information on their own websites. This allows their customers to track orders shipped by the USPS directly from the seller's website, saving them time and effort.



The Postal Service currently has 34 publicly available Web Tools APIs, which are available by requesting access on usps.com. As the Postal Service strives to achieve the USPS Future Ready goals of improving the customer experience and investing in digital platforms, APIs can provide more automated services to meet customer needs.

1 A single external interface for customers to use Postal Service APIs. The site also provides documentation for each API offered.

The Postal Service has established API governance over its Web Tools APIs.

The Postal Service should consider offering these API services to external customers to improve service, enrich the customer experience, and meet its strategic goals.

Summary

We determined that Postal Service Web Tools APIs are configured and generally managed in accordance with Postal Service standards and industry best practices. The Postal Service provides a registration process for customers to gain access to the APIs and follows their internal software development process for implementing new APIs. It also maintains an inventory of all external Web Tools APIs and associated user guides, and collects customer data related to customer usage. Further, we conducted vulnerability scans of 16 Web Tools APIs[2] and determined that the selected APIs were securely configured.

While the Postal Service offers more external APIs than its competitors and foreign posts, opportunities exist to enhance API services for its customers. We identified several API services offered by competitors and foreign posts that the Postal Service should consider offering to continue meeting the needs of its customers.

We also determined that, while the Postal Service collects customer API usage data, it is not using that data to plan for future API needs. Without a process in place to analyze this data, the Postal Service may not have detailed information readily available to make decisions regarding current and future API demands.

Application Programming Interface Governance

The Postal Service has established API governance over its Web Tools APIs, which includes maintaining an inventory of all external Web Tools APIs. The Postal Service has implemented a registration process that customers must complete before gaining access to the APIs and has set up a Web Tools API portal to provide customers with technical documentation about the APIs (e.g., a developer guide, user guides, and announcements on upcoming releases). Our review noted that the portal also offers enrollment in email notifications about Web Tools maintenance updates and provides answers to frequently asked questions.

The Postal Service follows its Technology Solution Life Cycle (TSLC)[3] process for developing each API. This process ensures that APIs meet security requirements and that the Postal Service completes proper testing before offering the APIs to customers. We used an automated tool (Secure Pro)[4] to test whether external APIs are functioning as intended and evaluated certain security parameters for known vulnerabilities. Based on our analysis and discussions with Postal Service management, we determined that they configured the selected Web Tools APIs securely.

Application Programming Interface Benchmarking Against Competitors and Foreign Posts

While the Postal Service offers more external APIs than its competitors and foreign posts, opportunities still exist to enhance API services for its customers. We benchmarked[5] the Postal Service with its competitors and select foreign posts. The competitors included Dalsey Hillblom and Lynn (DHL), Federal Express (FedEx), and United Parcel Service (UPS); the foreign posts included Canada Post, New Zealand Post, and Swiss Post. We identified 10 API services offered by these competitors and foreign posts that may be appropriate Postal Service offerings. The Postal Service should consider offering these API services to external customers to improve service, enrich the customer experience, and meet its strategic goals. These APIs are used for locating post offices, estimating duties and taxes for shipments, and allowing customers to select a delivery address. See Table 3 in Appendix B for a listing of the 10 APIs we identified.

2 We judgmentally selected the APIs that customers can access after initial registration including select high usage APIs.
3 A project methodology for developing and implementing technology solutions.
4 Provides several built-in security scans to identify and address API vulnerabilities.
5 In May 2017, we benchmarked the USPS against DHL, FedEx, UPS, Canada Post, New Zealand Post, and Swiss Post. This benchmark compared the Postal Service's external Web Tool API listing with each competitor's API listing on their respective public-facing website. Our comparison identified the APIs that competitors offered but the USPS did not.

In March 2017, the Postal Service procured an API management solution that should streamline governance over its external APIs.

The Postal Service has not conducted a comparative analysis of its API offerings against those of competitors and foreign posts. As a result, the Postal Service may be missing opportunities to further improve the customer experience.

Monitoring Customer Usage of Application Programming Interfaces

The Postal Service captures customer API usage data and distributes it to stakeholders outside of the Web Tools team via spreadsheets every month. However, management is not using that data to plan for future API needs. This occurred because management did not agree on which group was responsible for reviewing and making decisions about captured usage data.

According to industry best practices,[6] management should use customer usage data to plan for future development and capacity planning. Without a process in place to analyze customer usage data, the Postal Service may not have detailed information readily available to make decisions regarding future API demands and determine whether or not to retire APIs.

In March 2017, the Postal Service procured an API management solution that should streamline governance over its external APIs. This tool offers monitoring capabilities with the ability to track customer usage information and performance metrics. Management stated that they are currently defining functional requirements and plan to implement this solution by October 2017. Once the tool is operational, the Postal Service should use the information to monitor and plan for future API needs.

6 The General Services Administration (GSA) 18f group's maturity model describes an advanced capacity planning element as formally capturing and tracking usage metrics and using them for future development and capacity planning. This guidance is used by other government agencies, such as the FBI, Department of Education, and the Securities and Exchange Commission, to plan and develop their APIs.

Recommendations

We recommend management conduct a periodic benchmark against competitors to identify API services that could be feasible to offer to external customers.

We recommend the Vice President, Product Innovation, instruct the Director, Product Technology Innovation, to:

1. Coordinate with the appropriate application owners and stakeholders to consider the feasibility of offering the 10 Application Programming Interface services identified in the U.S. Postal Service Office of Inspector General benchmark analysis to external customers.

2. Conduct a periodic benchmark against competitors to identify Application Programming Interface services that could be feasible to offer to external customers.

3. Assign a responsible organization to review and analyze the Web Tools Application Programming Interface customer usage data.

4. Define the functional requirements and complete the implementation of the Application Programming Interface management solution as planned.

Management's Comments

Management generally agreed with all of the findings and recommendations in the report. See Appendix C for management's comments in their entirety.

Regarding recommendation 1, management agreed to share the recommended APIs with application owners and consider the feasibility of implementing them. The target implementation date is March 31, 2018.

Regarding recommendation 2, management agreed to periodically benchmark against competitors to identify APIs the Postal Service could offer to external customers. The target implementation date is March 31, 2018.

Regarding recommendation 3, management stated they provide customer usage data upon request to the program managers responsible for the product or service which is exposed via the API. They added that this method aligns properly with the USPS API management process. Management did not provide a target implementation date because they believe their current process meets the intent of the recommendation.

Regarding recommendation 4, management stated they have purchased the API management solution and plan implementation for FY 2018.

Evaluation of Management's Comments

The U.S. Postal Service Office of Inspector General (OIG) considers management comments responsive for recommendations 1, 2, and 4 and corrective actions should resolve the issues identified.

Regarding recommendation 3, management has not met the intent of this recommendation. Although management stated they provide customer usage data to program managers upon request, there is not a requirement for any organization within the Postal Service to review and analyze this data. Assigning a responsible organization to analyze this data would ensure management has customer usage information readily available for capacity planning and determining future API demands.

All recommendations require OIG concurrence before closure. Consequently, the OIG requests written confirmation when corrective actions are completed. Recommendations 1, 2, and 4 should not be closed in the Postal Service's follow-up tracking system until the OIG provides written confirmation that the recommendations can be closed. Recommendation 3 will remain open as we coordinate resolution with management.

Appendices

Click on the appendix title to the right to navigate to the section content.

Appendix A: Additional Information

Background

The Postal Service offers 34 Web Tools APIs in six categories to their external customers. These APIs provide online access to a wide range of USPS services: (1) Address Information, (2) Tracking and Delivery Information, (3) Price Calculator, (4) Shipping Labels,[7] (5) Package Pickup, and (6) Service Standards and Commitments. The purpose of these APIs is to ensure usps.com service offerings are available for business partners and developers to integrate into their websites, ultimately creating a better user experience. See Table 1 for a description of these services.

Table 1. Web Tools API Service Descriptions

Category	Category Description
Address Information	Verify addresses and correct errors in street addresses at no charge, including abbreviations and missing information, before packages are sent.
Tracking and Delivery Information	Get updates about shipments.
Price Calculator	Calculate postage rates quickly and easily online for domestic and international shipping.
Shipping Labels	Print a complete shipping label with a barcode to track packages seamlessly with one of USPS's Click-N-Ship® Business Pro™ partners.
Package Pickup	Submit a pickup request and USPS will pick up packages for free.
Service Standards and Commitments	Get estimates on delivery and money-back guarantees with Priority Mail Express.

Source: Postal Service intranet.

In 2016, the Postal Service's external Web Tools APIs processed over 46.4 billion requests (an average of 3.8 billion each month) for over 70,000 customers.

Objective, Scope, and Methodology

The objective of this audit was to determine if Postal Service APIs were configured and managed in accordance with Postal Service standards and industry best practices, and if opportunities exist to enhance API services. The scope of this audit was limited to the Postal Service's external Web Tools APIs hosted on usps.com. Further, we excluded from our scope Postal Service APIs that are not available on usps.com and any internal APIs.

In order to accomplish our objective, we:

- Obtained an understanding of the Postal Service's external APIs, including the functionality and management structure.
- Determined if the Postal Service had an enterprise-wide strategy for the creation and implementation of customer-facing APIs.

7 The Postal Service has three categories for Shipping Label APIs including Domestic, International, and eVS International.

- Obtained applicable supporting documentation related to the strategy and management of APIs.
- Determined if the Postal Service had a process to monitor and track customer usage.
- Identified policies, procedures, and best practices governing external APIs for benchmarking purposes. Since internal Postal Service standards for APIs were not defined, we relied solely on industry best practices in benchmarking the Postal Service's external APIs with those of competitors and foreign posts, and evaluating the API management solutions.
- Obtained an inventory of all external Web Tools APIs offered from Postal Service management including the associated applications, interfaces, and services offered.
- Conducted interviews with Postal Service personnel to discuss the details of the external Web Tools APIs and services offered.
- Evaluated the architecture and implementation of external facing APIs and their effectiveness. We used an automated tool (Secure Pro) to test if the external APIs are functioning as intended and evaluated certain security parameters.
- Based on the sample selection, evaluated the services and features offered for each external Web API hosted on usps.com.

We conducted this performance audit from March through September 2017, in accordance with generally accepted government auditing standards and included such tests of internal controls as we considered necessary under the circumstances. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objective. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objective. We discussed our observations and conclusions with management on August 8, 2017, and included their comments where appropriate.

We assessed the reliability of computer-generated data by performing electronic testing of required data elements, reviewing existing information about the data and the system that produced them, and interviewing agency officials knowledgeable about the data. We determined that the data was sufficiently reliable for the purposes of this report.

Prior Audit Coverage

The OIG did not identify any prior audits or reviews related to the objective of this audit.

Appendix B: Application Programming Interface Benchmark Results

Table 2 shows the results of our benchmarking exercise, which compared the Postal Service's external API offerings with those of its competitors and select foreign posts.[8]

Table 2. Benchmark Results

API Function		USPS	FedEx	DHL	UPS	Canada Post	New Zealand Post	Swiss Post
Address Information								
1	Address Validation[9]	✔	✔		✔		✔	
2	City and State Look-Up	✔			✔			
3	Zip Code Look-Up	✔			✔			
4	Hold for Pickup Facility Information	✔				✔		✔
Price Calculator								
5	Domestic Rates V4	✔	✔	✔	✔	✔	✔	✔
6	International Rates V2	✔	✔	✔	✔	✔	✔	✔
Tracking and Delivery								
7	Track and Confirm V2	✔	✔	✔	✔	✔	✔	✔
8	Track and Confirm Email	✔						
9	Proof of Delivery	✔	✔		✔			
10	Return Receipt Electronic	✔	✔					
Service Standards Commitments								
11	Express Mail Commitments	✔						
12	Priority Mail Service Standards	✔						
13	First Class Mail Service Standards	✔						
14	Package Services Service Standards	✔						
15	Service Delivery Calculator	✔						
Shipping Labels								
16	Delivery Confirmation V4	✔			✔			
17	Signature Confirmation V4	✔			✔			
18	eVS Domestic Label	✔					✔	
19	Express Mail Label	✔						
20	Hold for Pickup Express Mail Label	✔				✔		✔
21	Hold for Pickup Priority Mail Label	✔				✔		✔

8 Our benchmark was limited to the information available from the competitor's public website.
9 The companies use different names for their respective APIs; therefore we benchmarked based on the API functions.

	API Function	USPS	FedEx	DHL	UPS	Canada Post	New Zealand Post	Swiss Post
22	Hold for Pickup First-Class Mail Label	✔				✔		✔
23	Merchandise Return V4	✔	✔	✔	✔	✔		
24	Priority Mail Open and Distribute V2	✔						
25	Custom Forms CN22 V2	✔	✔	✔	✔			
26	Custom Forms CP72 V3	✔	✔	✔	✔			
27	Express Mail International	✔						
28	eVS Cancel Label	✔						
29	eVS International Cancel Label	✔						
Package Pickup								
30	Carrier Pickup Availability	✔	✔	✔	✔	✔	✔	✔
31	Carrier Pickup Schedule	✔	✔	✔	✔	✔	✔	✔
32	Carrier Pickup Cancel	✔	✔	✔	✔	✔	✔	✔
33	Carrier Package Pickup Change	✔	✔	✔	✔	✔	✔	✔
34	Carrier Pickup Inquiry	✔	✔	✔	✔	✔	✔	✔

Source: OIG benchmarking results.

Table 3 shows API services the Postal Service does not currently offer but which competitors and foreign posts offer. The Postal Service should consider the feasibility of offering these services to external customers.

Table 3. Benchmark Results

	API Function[10]	USPS	FedEx	DHL	UPS	Canada Post	New Zealand Post	Swiss Post
1	Quantum View[11]				✔			
2	UPS Tradability[12]				✔			
3	Locations Service[13]		✔		✔	✔	✔	✔
4	In-Flight Shipment Service[14]		✔					
5	Estimated Duties and Taxes (Express and Ground)		✔					
6	Open Shipping[15]		✔					
7	Ecommerce Platforms[16]					✔		
8	Address Complete[17]					✔		
9	Service Info[18]					✔		
10	Delivery Addresses (Change of Address, Forwarding, and Alternate addresses)							✔

Source: OIG benchmarking results.

10 We benchmarked against other posts and competitors and selected APIs the Postal Service should consider offering to its external customers. However, this table does not represent a full listing of competitor offerings, but only those we determined to be applicable.
11 Provides a comprehensive suite of services that gives details about UPS shipments and access to Quantum View Data.
12 Allows applications to access UPS Tradability services for international forms, restrictions and regulations, and other international trade information.
13 Provides Post and collection locations where customers can go for their shipping needs.
14 Provides the capability to request a redirect to hold for an in-flight package.
15 A highly flexible feature that allows users to create and enter information for a shipment as it is received throughout the day, rather than entering all of the shipping information only when the shipment is ready to be processed.
16 Use the platform web services if you are an ecommerce platform and want to register your merchant customers with Canada Post so that they can ship with Canada Post from your platform.
17 Enables intelligent and rapid searching to increase accuracy and relevancy. Instantly see the address search working as you type.
18 Use the Service Info web service if you are an ecommerce platform and you want to inform your merchant customers about scheduled outages to web services. A request to this service will return dates and times of upcoming service outages and a prepared message that you can display to your merchants.

Appendix C: Management's Comments

GARY C. REBLIN
VICE PRESIDENT
PRODUCT INNOVATION

UNITED STATES POSTAL SERVICE

August 29, 2017

Lori Lau Dillard
Director, Audit Operations

SUBJECT: Application Programming Interface Strategy
Report Number IT-AR-17-DRAFT

USPS agrees with the OIG's conclusion that USPS offers a robust suite of APIs which often exceed those of its competitors. USPS accepts the recommendations of the OIG audit with the comments and clarifications below.

Recommendation 1:

Coordinate with the appropriate application owners and stakeholders to consider the feasibility of offering the 10 Application Programming Interface services identified in the U.S. Postal Conduct a periodic benchmark against competitors to identify Application Programming Interface services that could be feasible to offer to external customers Service Office of Inspector General benchmark analysis to external customers.

Management Response/Action Plan:

USPS will comply by sharing these with the appropriate program owners. It should be noted that, with the exception of location services, 9 of the 10 API's recommended are not industry standard as evidenced by the fact that none have been implemented by more than one carrier. Additional details on each recommendation are included below.

- Quantum View – USPS provides functionality similar to the browser based Quantum View via its Product Tracking and Informed Delivery programs. USPS currently provides APIs to access this data where appropriate to meet customer requirements.

475 L'ENFANT PLAZA SW
WASHINGTON, DC 20260-1010
WWW.USPS.COM

- UPS Tradability – USPS currently provides APIs to create customs forms. In regard to international restrictions and other information, as discussed during the audit, the role of the API management team (Web Tools) is to externalize USPS services as directed by program owners of the services. This recommendation will be shared with the Global Business department.

- Locations Service – USPS Web Tools APIs currently offer this functionality and USPS is considering enhancements.

- In-Flight Shipment Service - USPS currently provides an API interface to its Package Intercept program allowing a shipper to redirect a package to an alternate address or request its return. As other in-flight services are developed they will be considered for implementation via APIs where appropriate.

- Estimated Duties and Taxes (Express and Ground) – As with tradability, this recommendation will be shared with the Global Business department for their consideration.

- Open Shipping – USPS offers open shipping capabilities via its shipment creation tools as appropriate (e.g.: Click-N-Ship for Business Pro). However, it does not consider this well suited to an API nor has it received any requests for this functionality from its customers.

- Ecommerce Platforms – USPS offers several similar programs to support eCommerce, generally supported via third-parties. Registration security is not managed by the API team and this recommendation will be shared with the appropriate department.

- Address Complete – With nearly 300 million more addresses than Canada (10 times increase) USPS does not consider this well-suited to an API environment. Nor has this been requested by customers. A number of third-party providers provide offline solutions with similar capabilities.

- Service Info – USPS Web Tools uses several communication methods to inform users of outages including eMail and Social Media (Twitter®). USPS will take this recommendation under advisement.

- Delivery Addresses (Change of Address, Forwarding, and Alternate addresses) – Web Tools does support APIs for this functionality, however, they are not externally exposed as USPS believes that the target user for these functions is better served by a browser or mobile-based interface.

Target Implementation Date:

Coordination with program owners to be complete by March 31, 2018.

Responsible Official:

Douglas Magrath, Program Manager.

Recommendation 2:

Conduct a periodic benchmark against competitors to identify Application Programming Interface services that could be feasible to offer to external customers.

Management Response/Action Plan:

USPS agrees with this recommendation.

Target Implementation Date:

March 31, 2018.

Responsible Official:

Douglas Magrath, Program Manager.

Recommendation 3:

Assign a responsible organization to review and analyze the Web Tools Application Programming Interface customer usage data.

Management Response/Action Plan:

USPS Web Tools management currently provides customer usage data, upon request, to the Program Managers responsible for the product or service which is exposed via the API. This method aligns properly with the USPS API management process in which API requirements are driven from the responsible Program Manager.

Target Implementation Date:

N/A.

Responsible Official:

N/A.

Recommendation 4:

Define the functional requirements and complete the implementation of the Application Programming Interface management solution as planned.

Management Response/Action Plan:

USPS Agrees with this recommendation. Software has been purchased and implementation is planned for FY2018.

Target Implementation Date:

September 30, 2018.

Responsible Official:

Douglas Magrath, Program Manager.

Gary Reblin
Vice President, Product Innovation

cc: Robert E. Dixon, Director, Product Technology Innovation, USPS.
Jeffrey Johnson, Vice President, Information Technology, USPS.
Greg Crabb, Vice President, Chief Information Security Officer, USPS
Sally K. Haring, Manager, Corporate Audit and Response Management, USPS.
Douglas Magrath, Program Manager, USPS.
Peter Klausner, Manager, Digital Media, USPS.
Brad Parish, Manager, Technical Solutions, USPS

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