Application Programming Interfaces (APIs) & GSA

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9/21/2017

I will be giving a non-technical overview of APIs with their purpose and a few examples
Then I will share some resources that GSA's Chief Technology Officer (CTO) organization have published to help groups roll out new APIs

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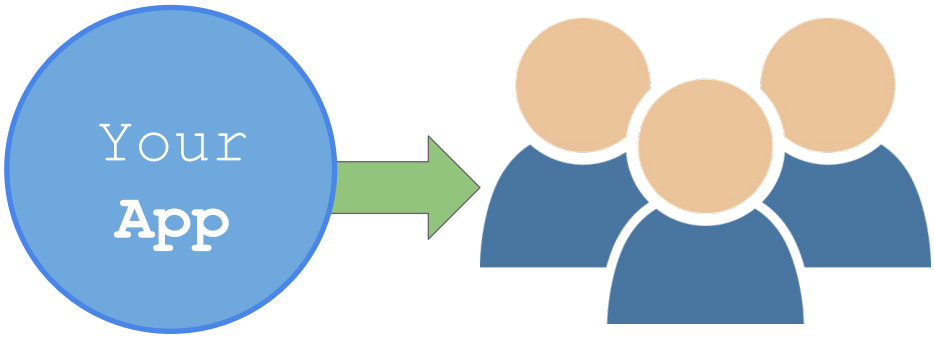
Users Directly Accessing Your App



- To understand APIs, let's think for a minute about how traditional applications or software work.
- Traditional software is built with a user in mind - a person on the receiving end
- For example, a user logs into your web page and performs actions.
- Or a user views your website to read information or articles
- We call the page or form they interact with the "User Interface" or in some situations Graphical User Interface or GUI.

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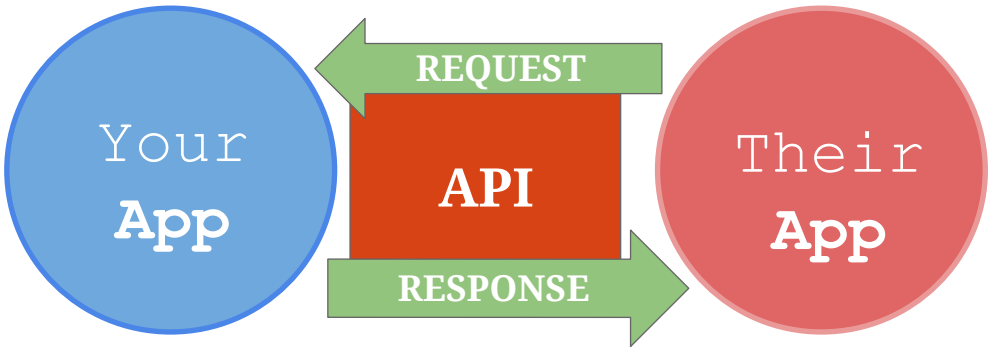
API = Application Programming Interface



- An API is another kind of interface - it's an interface to your application that is not intended for people to use directly. But instead intended for other computer programs or software to use.
- APIs are software programs that enable computer programs and systems to talk directly to each other.
- This simple diagram shows this concept.
-
- In the simplest form, an API lets another app make a request and your app provide a response with data or functionality.
-
- Just as a user interface lets people interact with an app
-
- APIs let applications interact with your app
- https://www.programmableweb.com/news/apis-are-user-interfaces-just-different-users-mind/analysis/2015/12/03

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For this presentation, we're talking about Web APIs

(web) API

Web APIs Generally:

- Use HTTP to communicate
- Have a web-accessible address
- Use a request and response
- Typically transfer data in XML or JSON formats

- Like a lot of computer terminology, the term API may mean different things to different people
- We are not trying to lost in a discussion about acronyms and terms
- So for this talk, we'll be mostly referring to "Web APIs"

(slide)

- Web APIs are a specific kind of API that generally:

(slide)

- Use HTTP to communicate
- Have a web-accessible address
- Use a request and response
- Typically provide data in XML or JSON formats

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An API is like a wall socket

Creative Commons Thatonewikiguy

- I'd like to use a real-world metaphor to explain the purpose of an API
- An API is like a wall socket
- A wall socket is a standard interface for providing electricity to electrical devices - in this case the three-prong U.S. version
- Different electrical devices can plug into it in a standard way
- (slide: flat panel TV)
- For instance a TV can be plugged into the wall outlet.
- (slide: hair dryer)
- Or a hair dryer can be plugged into the same outlet.
- There are some different types of plugs of course, but for the most part, a person can buy an appliance and count on it working in their wall socket.
- They don't have to spend much time thinking about how they are going to connect.
- An API is like that: it is a standard way for other computer programs or web sites to interact with your application or system.
- The API will have a consistent address that multiple applications can call.
- It will have a standard request format that they will call using standards like HTTP .
- It will return data or a response in a standard way using formats like JSON or XML

- If problems occur, it will share an error response in a standard way using standards such as HTTP error codes
- So each program that needs to interact with your applications does not have to figure out all of these details from scratch, they use well known industry standards
- https://www.programmableweb.com/news/what-are-benefits-apis/analysis/2015/12/03
- https://commons.wikimedia.org/wiki/File:A_200W_green_colored_OEM_hair_dryer.png

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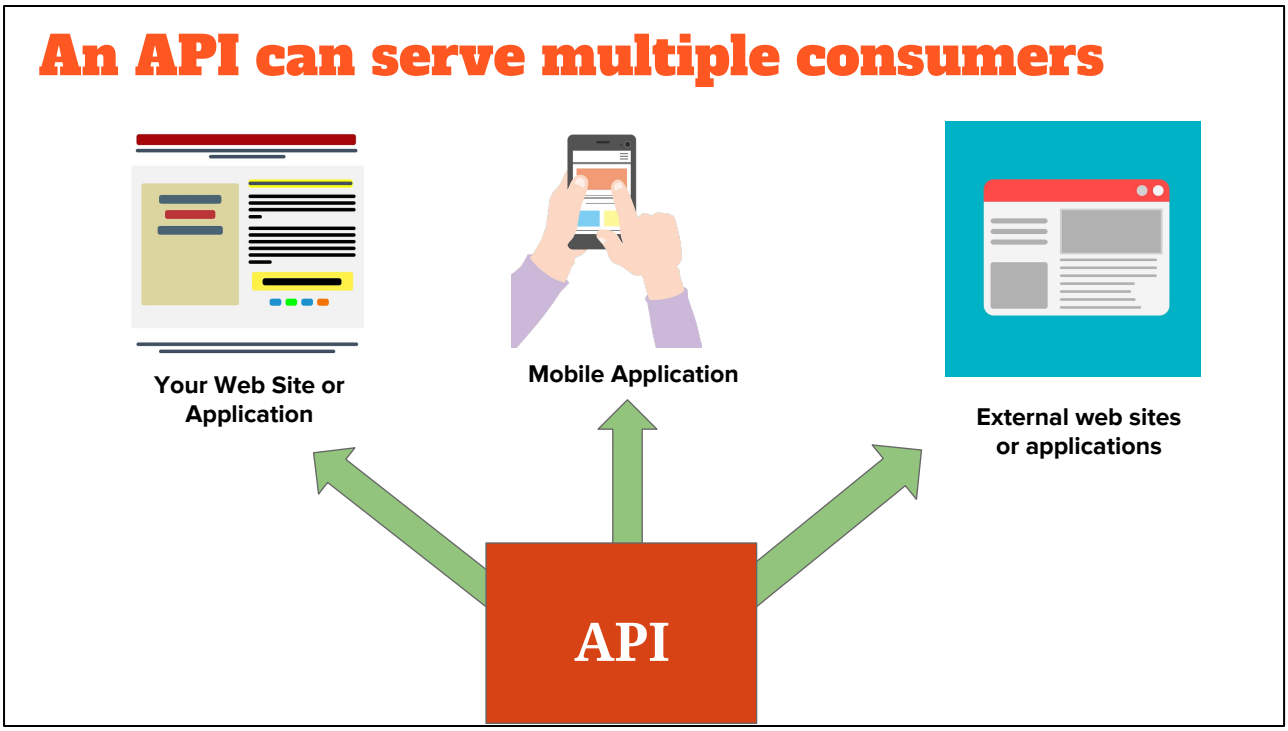

- And just like a wall socket can be used by multiple appliances, a single API can be used by multiple systems
- For example, if you create an API:
- You might use an API to feed your own web site or application
- You might also use it to feed a mobile app
- And a customer or partner might use it to feed their systems or web sites

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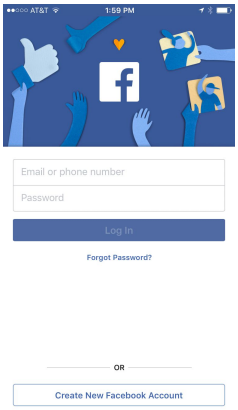
EXAMPLE



- At this point I would like to share a real-world example of an API
- A common example of an API provider is Facebook
- There are a lot of ways to interact with Facebook, such as their mobile apps or their web site
- But it is also possible to interact with Facebook on other web sites and apps
- For instance other web sites might display a user's feed or allow a user to share a link or photo on Facebook
- And there might be widgets or buttons on other sites that work with Facebook

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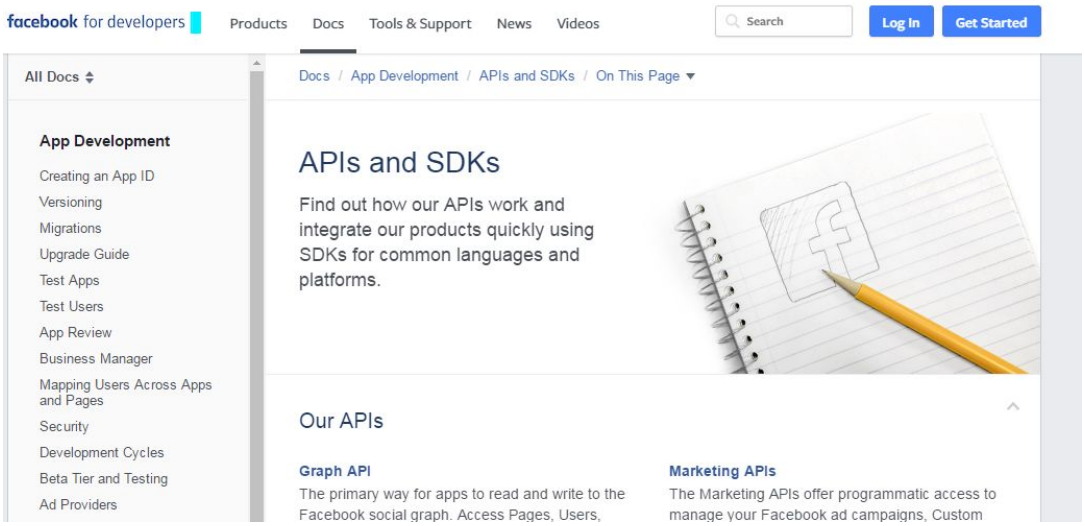
4:13

FACEBOOK APIs



https://developers.facebook.com/docs/apis-and-sdks

- What makes this possible is that Facebook creates and maintains APIs
- The Facebook information is stored by Facebook in a central place
- But the APIs provide a standard way for other programs, web sites, and applications to display it or even update it.
- Like that wall socket that provides electricity, the Facebook APIs provide a standardized way for other computer programs, web sites, and applications to interact with Facebook

- This page shows the developer portal that Facebook provides
- This developer portal provides documentation and examples that show developers how to use their APIs in their software
- Most API providers have some type of portal or web site like this that explains their APIs
- So in many cases, developers can begin using the APIs without ever contacting the provider directly

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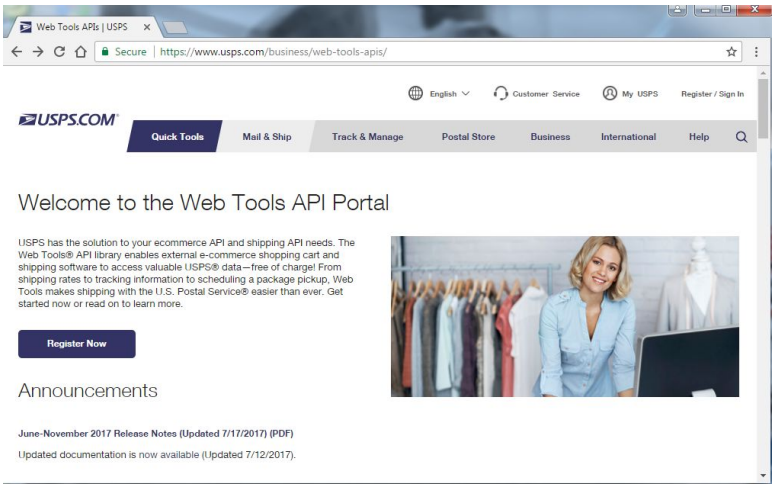
What other Government APIs are out there?



- Package tracking
- Postage price calculator
- Package pickup scheduling
- Address validation

https://www.usps.com/business/web-tools-apis/

- Many government agencies also provide APIs to allow the public to use their data and services
- A good example of a Federal Agency providing APIs is the U.S. Postal Service
- The postal service provides several APIs that allow customers and partners to use their data
- They have a developer portal that allows you to learn about their APIs and register to use them
- Some examples of APIs they provide are:
- (slide)
    - Postage tracking - to track the status of a package
    - Postage price calculator - to find out how much postage will cost
    - Package pickup scheduling
    - Address validation - to verify if an address is correct
- A customer might go to the USPS web site to do some of those tasks
- But you've probably seen some of those options in commercial web sites like Amazon or EBay
- These are examples of APIs that the Post Office created so that their services and data are available in many more places than just their own web site or applications.

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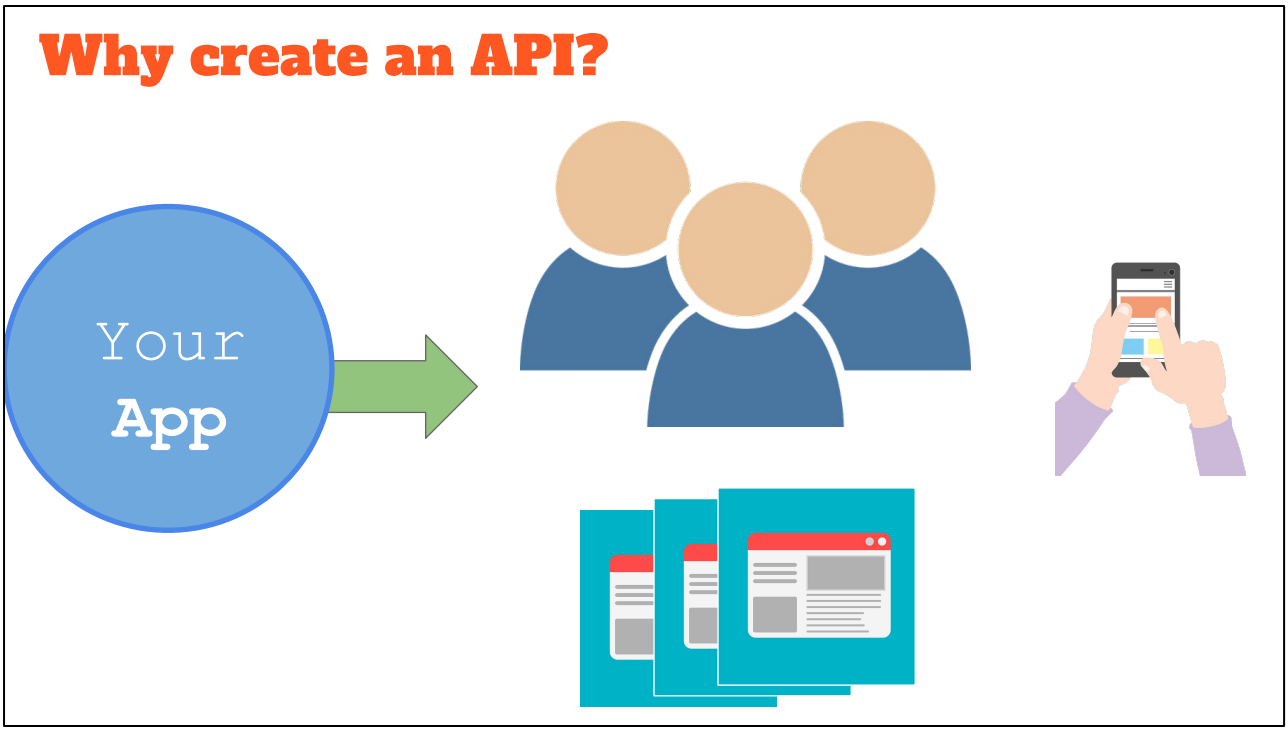

- So if you are a system owner or business owner, why would you want to create an API?
- If you are already reaching your customers, directly with your app.

(slide)

- You may have a need to reach customers through a mobile device.

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- Or you may need to share data with other applications inside GSA or other agencies or partners outside GSA.

APIs can help with that

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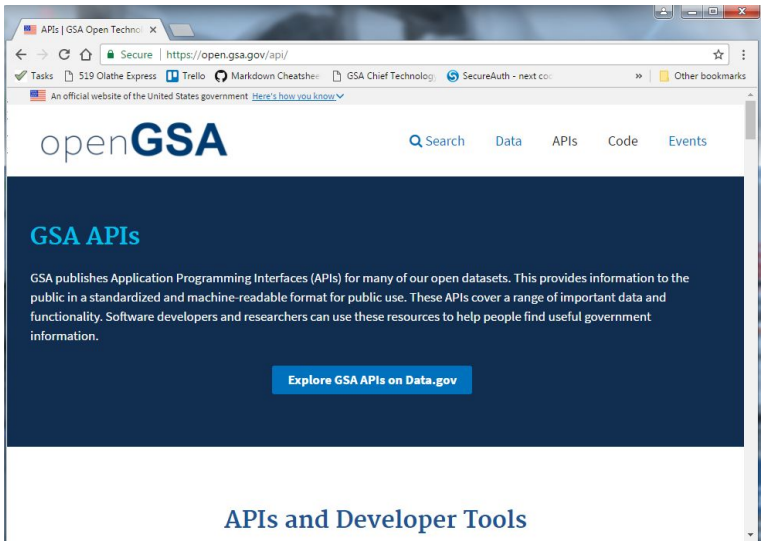
What GSA APIs are out there?



https://open.gsa.gov/api

- What GSA APIs are out there today?
- Several GSA business lines have already created APIs
- To view a current list, you can go to open.gsa.gov/api
- Scroll down the page to see a listing of the APIs
- Most are also published on the data.gov web site.

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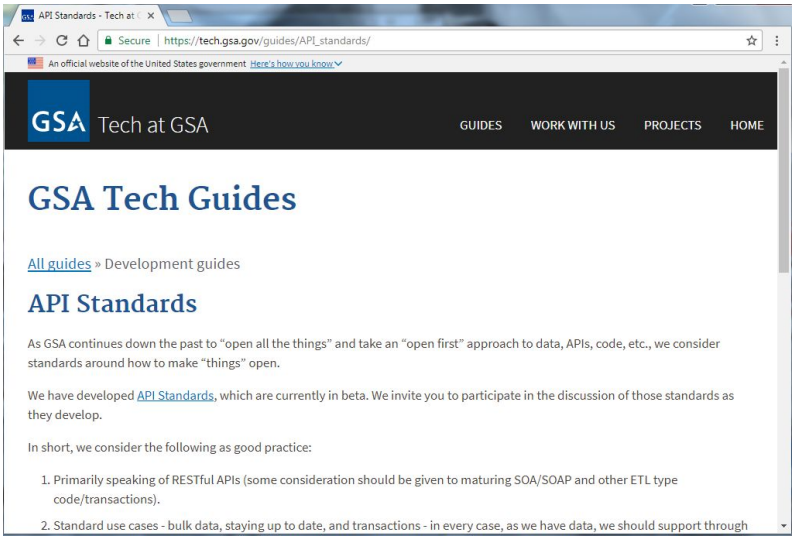
GSA API Standards



https://tech.gsa.gov/guides/API_standards/

- GSA's Chief Technology Officer (CTO) organization has developed API standards to assist program areas with developing new APIs
- These standards provide guidance on design of the APIs, technical specifications for development, and best practices for documentation providing support

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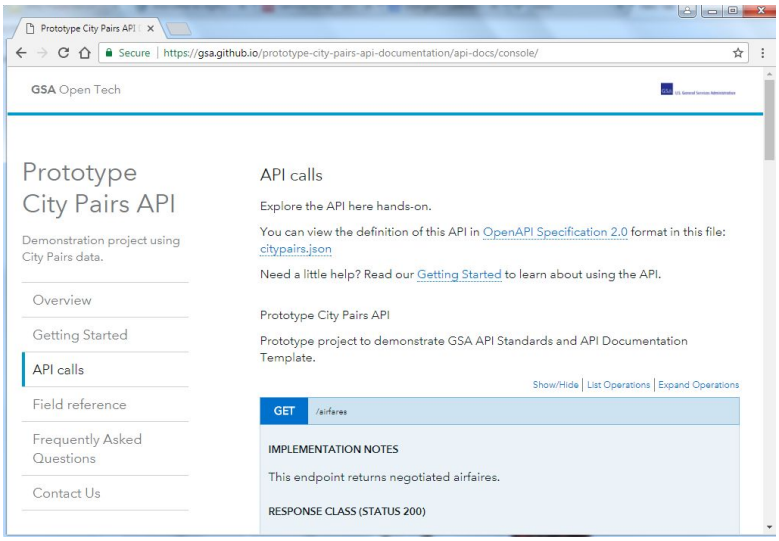
Prototype City Pairs API



https://gsa.github.io/prototype-city-pairs-api-documentation/api-docs/console/

- GSA has also published a prototype API to show as an example for how to use the standards
- The documentation for this API is displayed on the screen, and it includes an interactive console to submit requests and see the data response from the API.
- The source code for this API is also shared so that program areas and technical groups can review this sample to get design tips and see these standards in action

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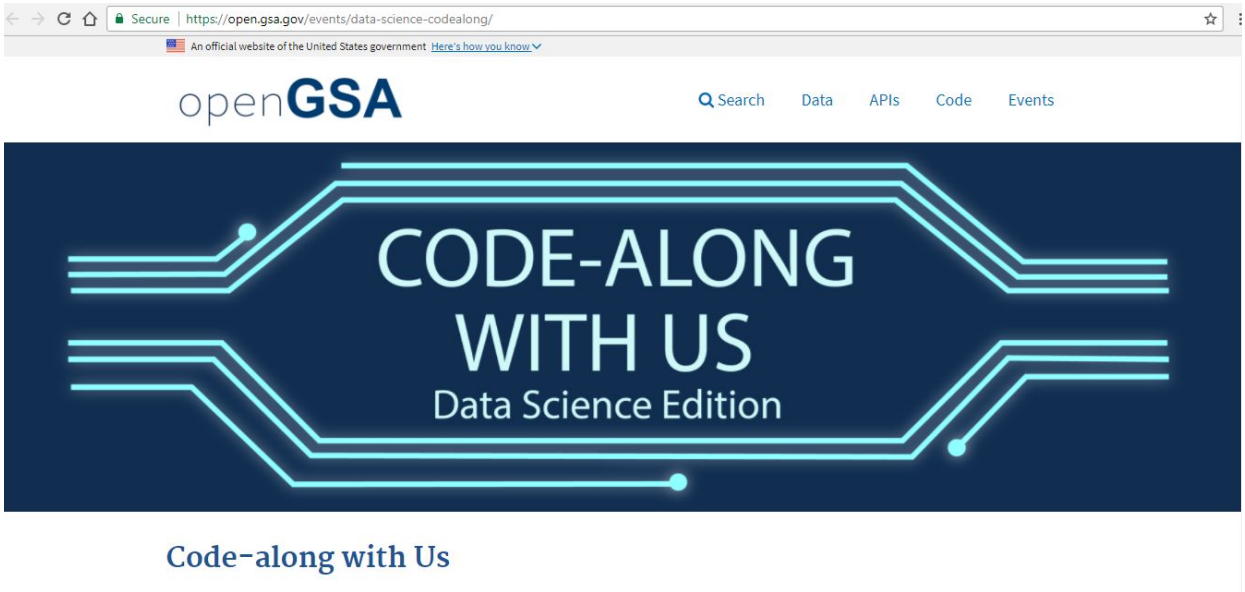
Join us October 20, 2017 @ 18th and F for the Data Science Code-Along



https://open.gsa.gov/events/data-science-codealong/

- I hope that this information has shown the benefits of publishing APIs
- If you would like more information and you are in DC, I would encourage you to attend the Data Science code-along that Sara mentioned.
- I will be leading a 90 minute code along session on working with APIs.

For More Information on APIs

Join our mailing list and attend quarterly meetings of the API Working Group.

Email Joe Castle (joseph.castle@gsa.gov) to be added to the list.

- Another great way to continue to learn more would be to participate in the API working group.
- The API working group has a mailing list, and quarterly meetings where GSA organizations demonstrate examples and techniques for using and developing APIs
- If you would like to join, please email Joe Castle (joseph.castle@gsa.gov) to be added to that mailing list.

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Thanks for your time!

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- Thanks very much for your time and attention today