



ASP.NET Web API 2

Delivering Rich User Experiences with API-centric design and AngularJS

Joshua Barron



Sandia
National
Laboratories

*Exceptional
service
in the
national
interest*



U.S. DEPARTMENT OF
ENERGY



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Outline

- Problem Domain & Challenges
- Design Goals
- Technical Architecture
- Key Outcomes & Innovations

Problem Domain

- **Foreign National Request (FNR) application**
 - Manages security plans for foreign nationals requiring access to Sandia
 - Visits
 - Employment
 - Intensive data entry
 - Complex rules and policies
 - Extensive approval process with many parties involved

Challenges

- User experience problems
- Performance
- Maintenance & interoperability

Current Interface

[General Info](#) | [Justification](#) | [Host](#) | [Sandia Locations](#) | [Non Sandia Locations](#) | [IS Resources](#) | [FN Info](#) | [Required Approvals](#)

Foreign National Information

You must enter all required information for each foreign national. Use the Add/Change links for each field. If you need to obtain or update this information, you may send the foreign national an [information worksheet](#).
For additional help with this screen please see the [User Guide](#).

Foreign Nationals

Select a Foreign National to view/edit
Foreign National: Mouse, Mickey ▼ [Add/Remove Foreign Nationals for this FNRSP](#)

Biographical Information [Add/Change](#)

Family (Last) Name:	Mouse	Category:	Visitor	Military ID:	
Given (First) Name:	Mickey	Birth Date:	12/10/1956	Gender:	M
Middle Name:		Birth City:		Citizenship1:	Albania
Nickname:		Birth State:		Citizenship2:	
US SSN:		Birth Country:	Belgium		

Employer Information [Add/Change](#)

Current Employer
Employment Information Not Entered

Education Information [Add/Change](#)

Education Information Not Entered

Lawful Status Document Information [Add/Change](#)

U.S. Lawful Permanent Resident: ☐

Passport Information

Passport Information Not Entered

Government Issued Identification (Visa) Information

Government Issued Identification Information Not Entered

Design Goals

- Highly responsive, intuitive interface
 - Reduce cognitive load
 - Suited to specific tasks
 - Reduce data entry
- Increase performance (client-side & server-side)
- Reduce the number of interfaces the application exposes

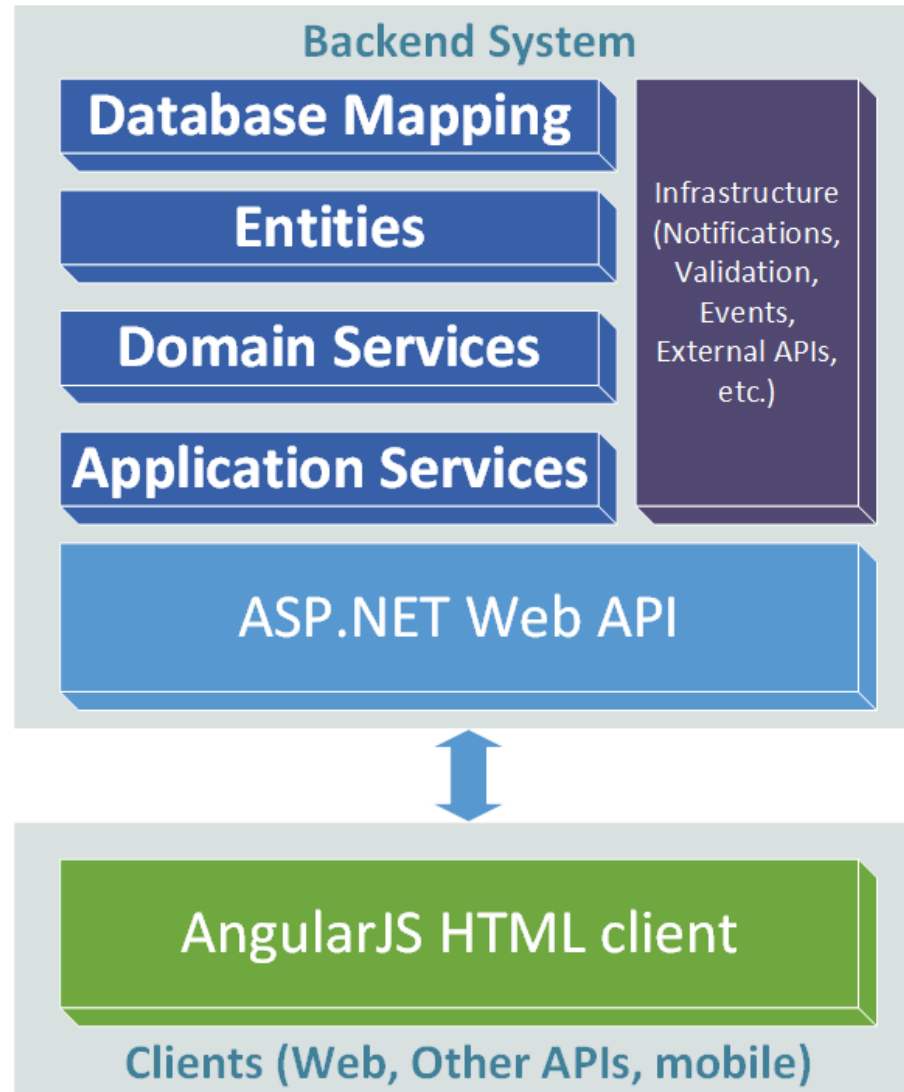
Prototype & Technical Problems

- Created a prototype application with ASP.NET MVC and jQuery
- Innovative features were well received but difficult to implement
- Hard to support multiple clients

Architecture

- ASP.NET Web API (v2) backend
 - REST(-ish)
 - Self-describing
 - Easier than MVC
- HTML5, AngularJS web client (SPA)
 - CoffeeScript
 - Bootstrap foundation
 - “MVC” but all on the client

Architecture Diagram



Example Component

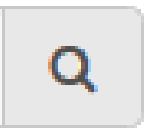
```
app.directive "snlautocomplete", ->
  return
    restrict: "E",
    controller: ["$scope", "$http", ($scope, $http) ->
      $scope.required = $scope.required || false
      $scope.limitTo = $scope.limitTo || 7
      $scope.placeholder = $scope.placeholder || "Search for a person"
      if $scope.ngModel
        $scope.ngModelName = $scope.ngModel.prettyName
      $scope.searchPeople = ($viewValue) ->
        return $http.get('api/people/search/' + $viewValue)
          .then (result) ->
            people = result.data.results
            if people == null or people.length == 0
              people.push
                isEmptyMessage: true
                message: "Your query returned no results."
            return people
    ]
    templateUrl: 'Content/views/components/autocomplete/snlautocomplete.html'
```


Example Component (cont.)

```
<div class="input-group">
  <input type="text" class="form-control"
    ng-model="ngModelName"
    dynamic-name="inputName"
    typeahead="p for p in searchPeople($viewValue) | limitTo:limitTo"
    typeahead-loading="isLoading"
    typeahead-min-length="1"
    typeahead-wait-ms="200"
    typeahead-editable="false"
    typeahead-on-select="onSelect($item, $model, $label)"
    typeahead-template-url="app/views/components/autocomplete/snlaautocompleteitem.html"
    placeholder="{{placeholder}}"
    ng-required="required" />
  <span class="input-group-addon">
    <i ng-class="isLoading ? 'fa fa-refresh fa-spin' : 'fa fa-search'"></i>
  </span>
</div>
```

Example Component Usage

```
<snlautocomplete ng-model="plan.hosts.host"  
placeholder="'Search for host'" input-name="'host'" />
```





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Usability Testing


- Key to improving user experience
- Validates existing designs
- Generates new ideas


Automatic Saving & Validation


- We save each section of the main data entry form as the user completes fields
- Errors are delivered in a timely manner
- Side effects of changes can be communicated immediately


Automatic Saving & Validation


 FNR

 Security Plans

 Search Plans

 3 Workbox

 Administration ▾

 Help ▾

Dev ▾

Barron, Joshua Franklin (jfbarr)

Security Plan #60025 (v. 1) Sensitivity: **Generic** [Why?](#) [View Security Plan](#) Last saved 2 minutes ago

Jump to Section

General Info

Foreign Nationals

Justification

Export Control

Hosts

Locations

Cyber Access

Comments

Attachments

Help Articles

Scroll to each section to view help articles.

[View Complete User Guide \(FAQ\)](#)

Justification

Why are you requesting access for foreign nationals? Explain the purpose and benefits in the justification field. You must also select a DOE goal that will be met by this visit, and explain the kinds of information that will be discussed during the visit or assignment.

Justification and Anticipated Benefits *

Explain why this visit is necessary, and what the benefit(s) will be.

Certification of DOE Mission Advancement *

Select the goal that best applies to this request.

CRADA Project Numbers

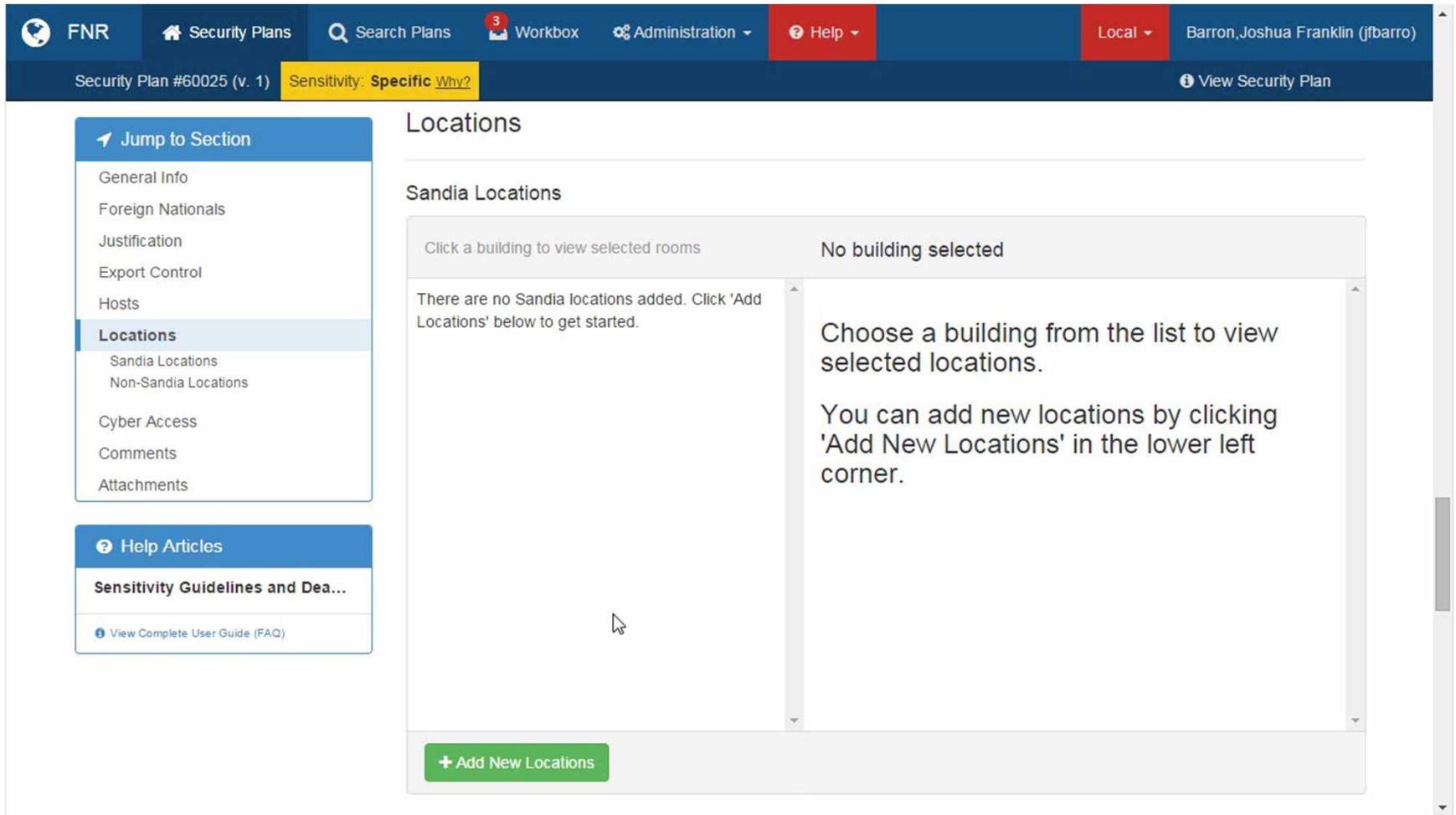
If there are any associated CRADA project numbers with this plan, enter them as a list above. Otherwise, leave this field blank.

Technologies *

Select technologies...

Select at least one and no more than three technologies

Tailored Interfaces



The screenshot displays a web application interface for Sandia National Laboratories. The top navigation bar includes links for FNR, Security Plans, Search Plans, a notification badge on the Workbook, Administration, Help, and a Local dropdown menu. The user is identified as Barron, Joshua Franklin (jfbarro). Below the navigation bar, the main content area is titled 'Locations'. On the left, a sidebar menu allows users to 'Jump to Section' with options like General Info, Foreign Nationals, Justification, Export Control, Hosts, Locations (selected), Sandia Locations, Non-Sandia Locations, Cyber Access, Comments, and Attachments. Below this is a 'Help Articles' section with a link to 'Sensitivity Guidelines and Dea...'. The main content area shows a message: 'There are no Sandia locations added. Click 'Add Locations' below to get started.' A green button labeled '+ Add New Locations' is visible at the bottom of the main content area. The interface also includes a search bar and a 'View Security Plan' link.

Locations

Sandia Locations

Click a building to view selected rooms

No building selected

There are no Sandia locations added. Click 'Add Locations' below to get started.

Choose a building from the list to view selected locations.


You can add new locations by clicking 'Add New Locations' in the lower left corner.

[+ Add New Locations](#)


Context-Sensitive Help


- JavaScript is used to detect when different sections of the form are in focus – this triggers a context-sensitive search on the user guide
- Delivers relevant guidance to users automatically


Context-Sensitive Help


 FNR

Security Plans

 Search Plans

 3 Workbox

 Administration

 Help

Dev

Barron, Joshua Franklin (jfbarro)

Security Plan #60026 (v. 1) Sensitivity: **Generic** [Why?](#) [View Security Plan](#)

Edit

Security Plan #60026 v. 1

Enter or update the following information to complete your Security Plan. When you are ready, select the "Submit" button at the bottom of this form to begin approvals.

Jump to Section

[General Info](#)

[Foreign Nationals](#)

[Justification](#)

[Export Control](#)

[Hosts](#)

[Locations](#)

[Cyber Access](#)

[Comments](#)

[Attachments](#)

Help Articles


[View Complete User Guide \(FAQ\)](#)


General Info

* indicates required fields

Name of Plan ✓
Enter an optional name to help you identify this plan, such as *IAEA Conference 2015* or *Benedict Cumberbatch - Employee*.

Security Plan Type *







Start Date * MM-dd-yyyy 

End Date * MM-dd-yyyy 

Visit Reason *
Select the reason that best applies to this request.

Foreign Nationals [+ Add a Foreign National](#)

Performant Interface




 FNR  Security Plans  Search Plans  Workbox  Administration  Help Dev Barron, Joshua Franklin (jfbarr)

Create a New FNR Security Plan

Create a new security plan from scratch, from a template, or by cloning an existing plan.

Before You Begin...

The FNR Security Plan process requires a lot of information. Before you create a new security plan, complete the following:

- [Is an FNR Security Plan required?](#)  — This flowchart includes time required to approve.
- [Host Information Worksheet](#)  — If you are not the host, have the host complete this form.
- [Foreign National \(FN\) Information Sheet](#)  — Have one completed for each FN that has not been here within the past year.

New

This option will allow you to create a brand new security plan.

★ Create from scratch

Template

This option will allow you to create a new security plan using a template that you or FIO have defined.

You cannot create a plan from a template because you have no templates to use as a source.

Clone

This option will allow you to create a new security plan by cloning (copying) one of your existing plans.

Select the plan you want to clone


Do you want to copy existing foreign nationals to the new

Revise


This option will allow you to make changes to an existing approved security plan.


You cannot revise a plan because you have no approved plans to change.

Responsive Design

 FNR

Security Plans

 Search Plans

 3 Workbox

Administration ▾

Help ▾

Dev ▾

Barron, Joshua Franklin (jfbarr)

Security Plan #60026 (v. 1) Sensitivity: **Generic** [Why?](#) [View Security Plan](#)

Edit

Security Plan #60026 v. 1

Enter or update the following information to complete your Security Plan. When you are ready, select the "Submit" button at the bottom of this form to begin approvals.

Jump to Section

[General Info](#)

[Foreign Nationals](#)

[Justification](#)

[Export Control](#)

[Hosts](#)

[Locations](#)

[Cyber Access](#)

[Comments](#)

[Attachments](#)

Help Articles

[Sensitivity Guidelines and Dea...](#)

[View Complete User Guide \(FAQ\)](#)

General Info

Name of Plan


✓

Enter an optional name to help you identify this plan, such as *IAEA Conference 2015* or *Benedict Cumberbatch - Employee*.


Security Plan Type *

▾

Start Date *



End Date *



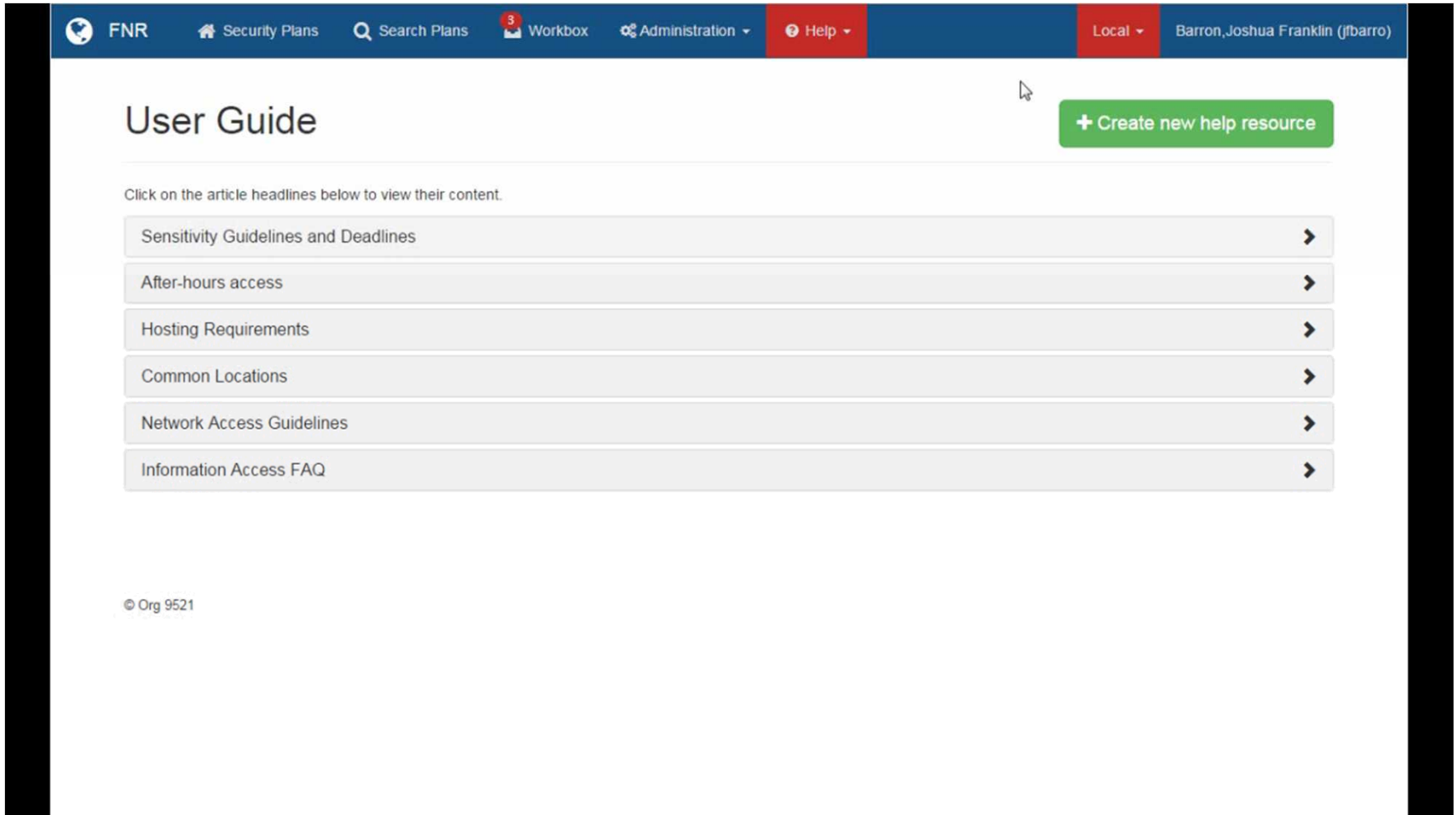
Visit Reason *

▾

Select the reason that best applies to this request.

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API Documentation



The screenshot shows the top navigation bar of the FNR (Federal Network Resource) system. The bar is dark blue with white text and icons. It includes links for 'Security Plans', 'Search Plans', 'Workbox' (with a red notification badge showing '3'), 'Administration' (with a dropdown arrow), 'Help' (with a dropdown arrow), 'Local' (with a dropdown arrow), and the user's name 'Barron, Joshua Franklin (jfbarro)'. Below the navigation bar, the main content area is titled 'User Guide'. To the right of the title is a green button with a white plus icon and the text '+ Create new help resource'. Below the title, there is a line of text: 'Click on the article headlines below to view their content.' This is followed by a list of six article headlines, each in a light gray box with a right-pointing chevron icon at the end: 'Sensitivity Guidelines and Deadlines', 'After-hours access', 'Hosting Requirements', 'Common Locations', 'Network Access Guidelines', and 'Information Access FAQ'. At the bottom left of the page, there is a small copyright notice: '© Org 9521'.

FNR

Security Plans

Search Plans

Workbox 3

Administration

Help

Local

Barron, Joshua Franklin (jfbarro)

User Guide

+ Create new help resource

Click on the article headlines below to view their content.

- Sensitivity Guidelines and Deadlines
- After-hours access
- Hosting Requirements
- Common Locations
- Network Access Guidelines
- Information Access FAQ

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Key Outcomes

- Web interface that allows for creativity in design and innovative features that enhance user experience
 - Responsive design allows basic cross-platform usage
- Performant, rich API that exposes the business layer to clients in a uniform manner
- Opportunity to develop multiple client applications using the same API

QUESTIONS / COMMENTS?