

Using ARIA and HTML5 to Enhance the Accessibility of Modern Web Pages and Applications

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Keyboard User

!=

Screen Reader User

Screen Reader User
(usually) =
Keyboard User

Keyboard Accessibility Testing

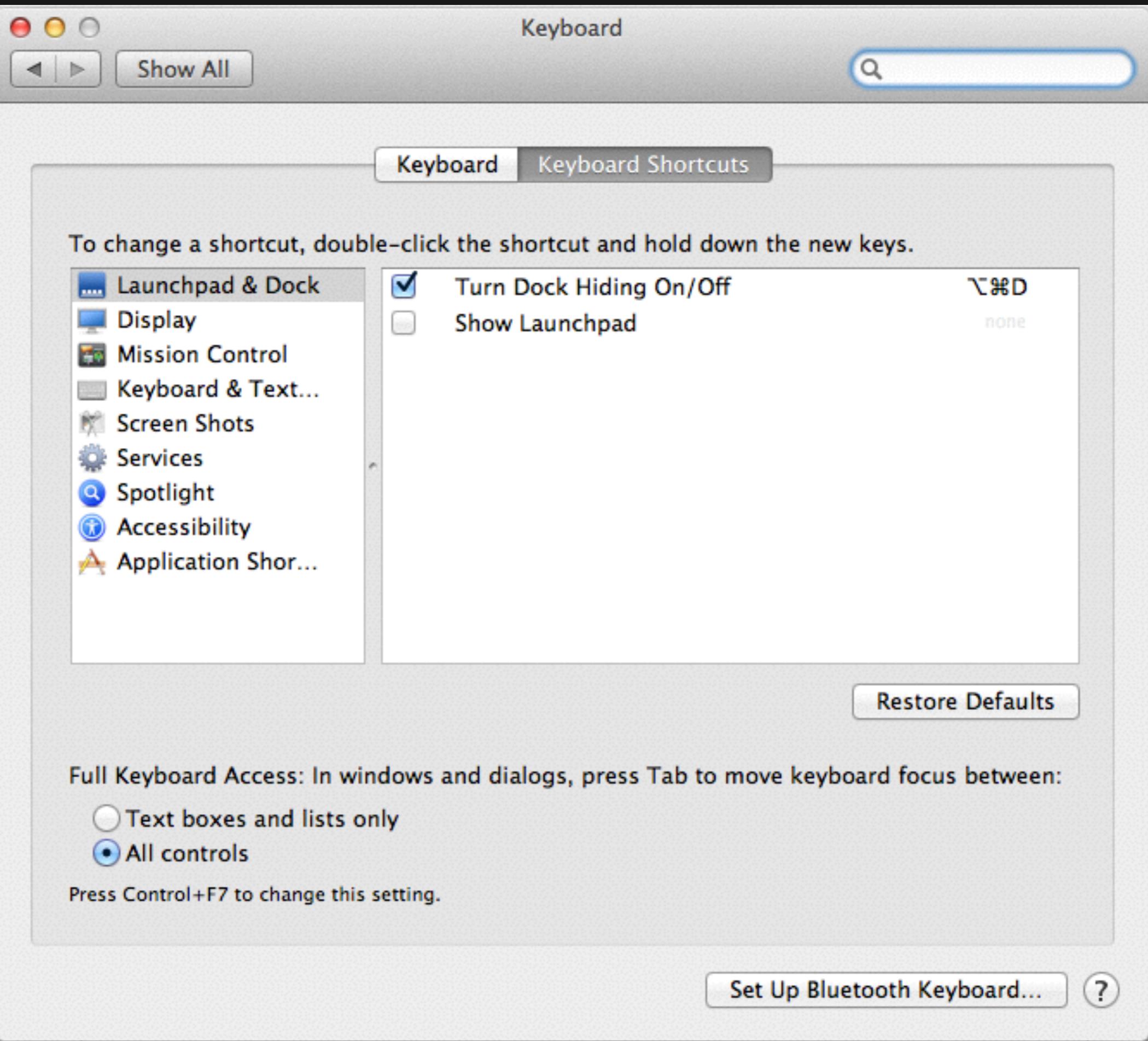


shift

+



return



Keyboard Accessibility is
Different When a Screen
Reader is Running

Source Code Order

=

Navigation Order

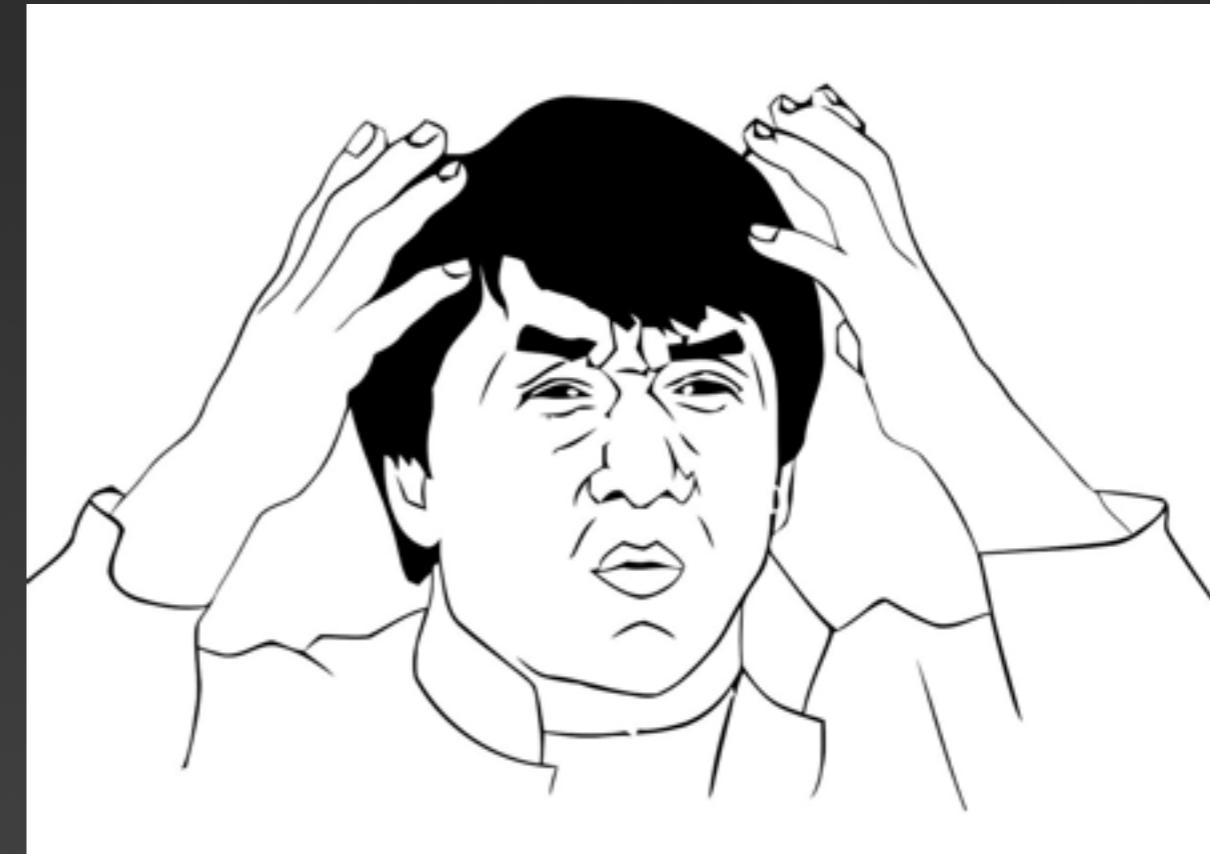
and screen reader reading order too!

Screen Reader Navigation

- Links and form controls
- Headings
- Landmarks
- Lists
- Forms
- Buttons
- etc.

Standard Browser Navigation

- Links and form controls



Do not remove the focus indicators from links

```
a {  
    outline:0;  
}
```

Enhance the default focus indicators

```
a:focus {  
    outline:1px;  
    background-color:#ff0;  
    text-decoration:underline;  
}
```

WCAG says...

Non-underlined links must become underlined (or other non-color designator) on hover and focus

a:hover { . . . }



a:hover, a:focus { . . . }

Ensure Interactive Elements are Links or Form Controls

or...

make non-focusable elements focusable with
tabindex

Device Independence

Use device independent event handlers

or

combine mouse (e.g, onmouseover) and
keyboard (e.g, onkeypress) dependent event
handlers

Avoid Tabindex

... unless you're sure you know what you're doing.

If the default tab order is not logical,
fix your source code order.

Avoid this

tabindex="1+" defines an explicit tab order

tabindex="0" allows things besides links and form elements to receive keyboard focus.

tabindex="-1" allows things besides links and form elements to receive programmatic focus (by scripting, links, etc.)

```
<div tabindex="0"  
onclick="submitForm ()">Submit  
Search</div>
```

```
<a onclick="submitForm()">Submit Search</a>
```

is better, but

```
<input type="submit" value="Submit Search">
```

or

```
<button onclick="submitForm()">Submit  
Search</button>
```

are best!

WARNING!

Click events do not always trigger via keyboard
for things other than links or form controls...

... even with `tabindex="0"`

Attach an onkeyup event and then check for Enter (13) and Space (32) key presses:

```
if(event.keyCode==13 || event.keyCode==32)
{
    doStuff();
}
```

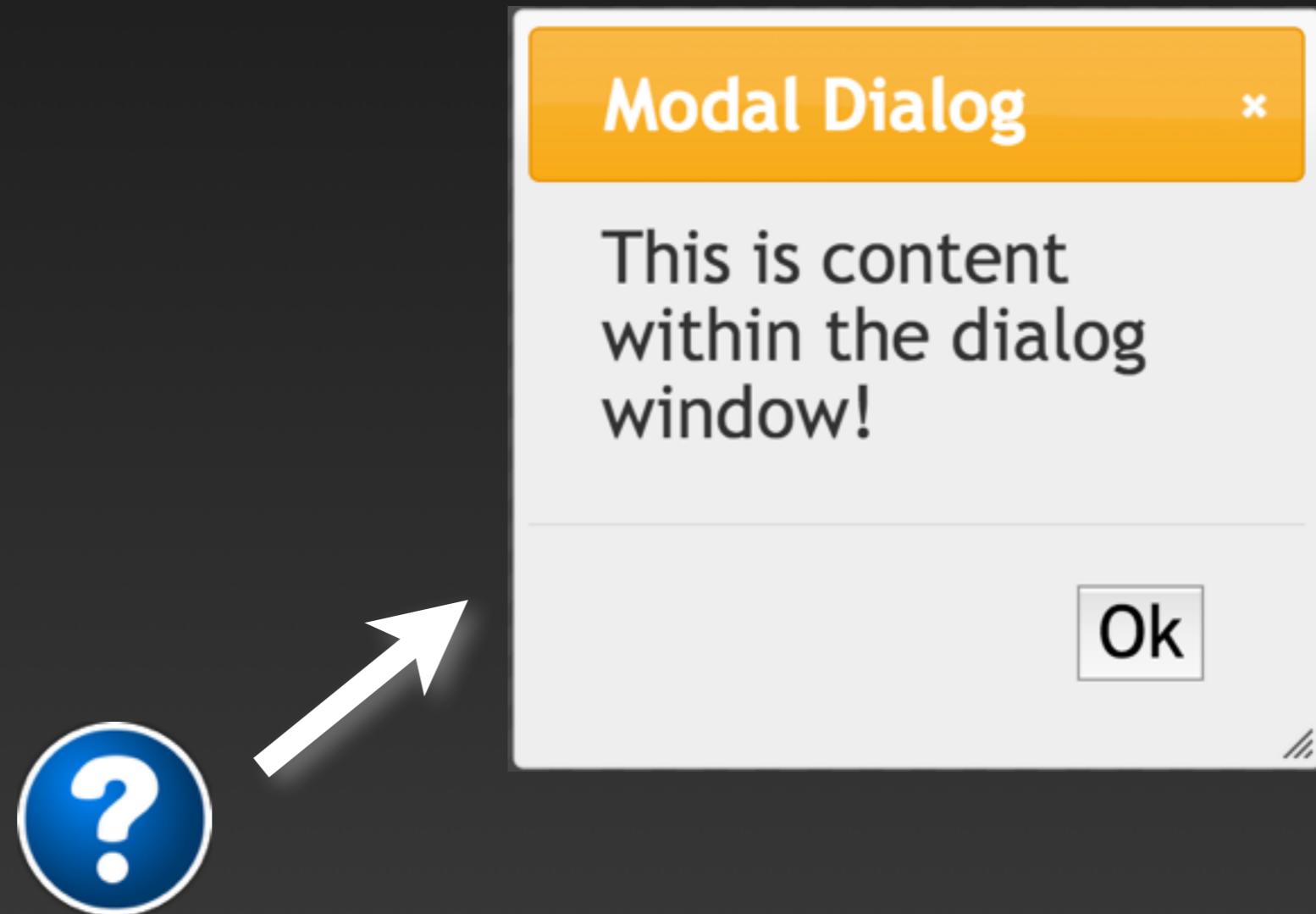
tabindex="-1"

- Allows non-focusable elements to receive programmatic focus (by scripting, links, etc.)
- Necessary for focusing dialog boxes, error messages, etc.
- **WARNING:** This removes the element from the default tab order.

Review

- Ensure all interactive elements are links or form controls, or make them focusable with **tabindex="0"**.
- If using **tabindex**, detect Enter and Space key events.
- Ensure non-focusable elements (such as dialog windows) have **tabindex="-1"** before focusing them programmatically.

Dialogs



Dialogs

tabindex="-1" then set focus to dialog (or focus a control inside the dialog)

Link, button, or tabindex="0"



Returns focus
when dismissed

Maintains
keyboard focus
if modal

Closes with
ESC key

“Freak-out” Mode

When the currently focused element disappears
or is significantly modified



Avoid it or address it with
`focus();`

Carousels

Carousels



so...

should i use a carousel?



<http://shouldiuseacarousel.com/>

Q&A by .net magazine

<http://www.netmagazine.com/news/accessibility-expert-warns-stop-using-carousels-132875>

.net

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NO!!!

seriously, you really shouldn't

FEATURED NEWS STORY

Accessibility expert warns: stop using carousels

by Craig Grannell

NEWSFLASH

Accessibility expert

▪ Open Device Lab reaches 1,000 bits of kit



THE C

An anti-carousel carousel featured in a carousel

Carousels

NO!!!

seriously, you really shouldn't



<http://shouldiuseacarousel.com/>

Carousel Issues

- Automated carousels violate WCAG 2.0 Success Criteria 2.2.2 (Level A) - Pause, Stop, Hide
- Distracting and confusing
- Difficult interaction model
 - No relationship between controls and content
- “Freak-out mode” when carousel changes
- Allow poor content decisions

Carousel Accessibility Solutions

- Avoid auto-playing (optimal) or include a visible pause button (preferably) before the carousel
- Pause carousel on mouse hover and on keyboard focus
- Provide context for controls
 - Descriptive text
 - ARIA tab panel?
- Ensure accessible content
- Ensure focused or activated items do not disappear, or set focus when they do

Roving tabindex

- Useful for controlling focus within interactive widgets (menus, tab panels, tree widgets, etc.).
- Set **tabindex="0"** on currently active item. This places it in the tab order.
- Set **tabindex="-1"** on all other items. This removes them from the tab order and makes them focusable with scripting.
- Use **focus()** to set focus as user navigates within widget (arrow keys, etc.).
- **tabindex="0"** roves or follows the active item allowing users to return directly to it later.

The screenshot shows a user interface with a top navigation bar containing three tabs: "Dogs", "Cats", and "Sheep". The "Dogs" tab is currently selected, indicated by a darker background and bolded text. Below the tabs, the word "Dogs" is displayed in a large, bold, black font. A detailed paragraph of text follows, describing the dog's scientific name, its relationship to the wolf, its classification in the Canidae family, and its historical significance as a domesticated animal. At the bottom of the content area, there is a link labeled "More information about Dogs on Wikipedia" in blue text.

Dogs

Cats

Sheep

Dogs

The dog (*Canis lupus familiaris*), is a domesticated form of the wolf, a member of the Canidae family of the order Carnivora. The term is used for both feral and pet varieties. The domestic dog has been one of the most widely kept working and companion animals in human history. The word "dog" may also mean the male of a canine species, as opposed to the word "bitch" for the female of the species.

[More information about Dogs on Wikipedia](#)

http://hanshillen.github.io/jqtest/#goto_tabs

In an ARIA tab panel, the entire tab group functions as one tab stop, then arrow keys are used to select the active tab.



tabindex=0

tabindex=-1

Dogs

Cats

Sheep

Dogs

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[More information about Dogs on Wikipedia](#)

Press ➤ to select the next tab

tabindex=0

tabindex=-1

tabindex=-1

Cats

The cat (*Felis catus*), also known as the domestic cat or housecat to distinguish it from other felines and felids, is a small domesticated carnivorous mammal that is valued by humans for its companionship and its ability to hunt vermin and household pests. Cats have been associated with humans for at least 9,500 years, and are currently the most popular pet in the world. Due to their close association with humans, cats are now found almost everywhere on Earth. This extreme adaptability and their worrying impacts on native animals has led to them being classed as an invasive species. Most of these problems are caused by the large number of feral cats worldwide, with a population of up to 60 million of these animals in the United States alone.

[More information about Cats on Wikipedia](#)

If you tab away from the tab panel and later return, “Cats” remains the active and focused tab because it has `tabindex=0`.

tabindex=0

Dogs **Cats** Sheep

Cats

The cat (*Felis catus*), also known as the [domestic cat](#) or [housecat](#) to distinguish it from other felines and felids, is a small domesticated carnivorous mammal that is valued by humans for its companionship and its ability to hunt vermin and household pests. Cats have been associated with humans for at least 9,500 years, and are currently the most popular pet in the world. Due to their close association with humans, cats are now found almost everywhere on Earth. This extreme adaptability and their worrying impacts on native animals has led to them being classed as an invasive species. Most of these problems are caused by the large number of feral cats worldwide, with a population of up to 60 million of these animals in the United States alone.

[More information about Cats on Wikipedia](#)

Focus on semantics and let CSS do the heavy lifting

```
[tabindex=0] {  
    background:#fff;  
    border-color:#ddd;  
    border-bottom:none;  
}
```

ARIA



ARIA

- Accessible Rich Internet Applications
- Specification developed by the PFWG of the W3C's WAI. Huh?
- W3C Recommendation

ARIA enhances accessibility of...

- ... dynamic content and AJAX
- ... scripted widgets and interactive controls
- ... keyboard interactions within a web page

ARIA expands the
vocabulary of HTML to
support what screen
readers already understand

<slider>???

ARIA Paves the Cow Paths



ARIA Paves the Cow Paths



ARIA Paves the Cow Paths



ARIA Paves the Cow Paths



ARIA Paves the Cow Paths



You can only make things
more accessible by
implementing ARIA now

... if you do it correctly

ARIA Core Components

Roles

```
<form role="search">
```

States

```
<input aria-disabled="true">
```

Properties

```
<input aria-required="true">
```

ARIA and Code Validation

 Line 15, Column 11: Attribute "role" is not a valid attribute.

If your (X)HTML is valid and your ARIA is valid...
valid + valid = ???

Rule #1 of ARIA

Don't use ARIA

... unless you need to

ARIA Landmark Roles

- banner, complementary, contentinfo, main, navigation, and search
- Allows easy access to major page components
- The end of "skip" links? Oh yeah... browser keyboard accessibility still sucks.

Landmark Roles

```
<div role="navigation"  
aria-label="Main navigation">
```

```
<div role="main">
```

```
<form role="search">
```

You can add aria-label to differentiate multiple landmarks of the same type.

HTML5 and Landmark Roles Mapping

```
<main> - role="main"  
<article> - role="article"  
<footer> - role="contentinfo"  
<header> - role="banner"  
<nav> - role="navigation"  
<aside> - role="complementary"
```

ARIA Support > HTML5 Support
so use both???

```
<main role="main">
```

Modifying and Enhancing Roles

Bad:

```

```

OK:

```
<a onclick="...">  

```

`role="application"`

... disables standard A.T. keystrokes to allow the page to function like a desktop application

Be very careful with

`<body role="application">`

Some ARIA elements (tree view, slider, table, tabs, dialog, toolbar, menus, etc.) have an assumed application role.

`role="document"` enables reading mode.

```
role="presentation"
```

```
<ul role="presentation">  
  <li>menu item</li>  
  ...
```

Hides native roles of elements (and all required descendants) from assistive technology. Useful on layout tables, lists, etc.

Is ignored if the element is navigable (e.g., links and controls).

Alert Role

```
<div role="alert">Read me  
right now</div>
```

Also role="alertdialog"

First Name: (required)

```
<label for="name">First Name</label>:  
<input name="name" id="name"> <em>(required)</em>
```

The information about the element being required is outside the form element and its label, so it's ignored by a screen reader navigating the form.

First Name: (required)

```
<label for="name">First Name</label>:  
<input name="name" id="name" aria-required="true">  
<em>(required)</em>
```

A screen reader now indicates the required status of the form element (and that's all).

Password:

```
<label for="password">Password</label>:  
<input name="password" id="password"  
aria-invalid="true">
```

A screen reader now indicates that the field is invalid or broken (and that's all).

Use ARIA attributes to control styling:

```
[aria-invalid=true] {border : 2px solid red; }
```

```
<input type="submit" disabled="disabled">  
vs.
```

```
<input type="submit" aria-disabled="true">
```

Disabled HTML buttons are not keyboard focusable
and have **very** poor contrast.

`aria-hidden="true"`

Indicates element (and all descendants)
are hidden from all users.

You can't unhide a child element.

Use ARIA attributes to control visual appearance:

`[aria-hidden=true] {display:none;}`

First Name:

```
<label for="fname" id="fnamelabel">First name</label>:  
<input type="text" id="fname"  
aria-labelledby="fnamelabel">
```

Redundant, but doesn't cause any problems.

ARIA always overrides native semantics.

Self destruct this page in **5** seconds

Enter the number of seconds until self destruction... and then run.

```
<input type="text"  
id="time"  
aria-labelledby="label time seconds"  
aria-describedby="instructions">
```

Happy	Aware	<input type="button" value="Choose"/>
Unaware	Sad	<input type="button" value="Choose"/>

<input type="button" value="Choose"/>	<input type="button" value="Choose"/>
---------------------------------------	---------------------------------------

```
<input type="button" value="Choose"  
onclick="showMessage('happy', 'aware');"  
aria-labelledby="happy aware">
```

Name	Age	Phone

```
<input type="text" name="name"  
aria-labelledby="namelabel">
```

Name	Age	Phone
Jared		
Jonathan		
Cyndi		

```
<input type="text" name="age1"  
aria-labelledby="jared agelabel">
```

Odds & Ends

```
<div role="list" aria-describedby="listheader">
<div role="listitem">

<p id="question">What is the air-speed velocity...</p>
<div role="radiogroup" aria-labelledby="question">

<a aria-haspopup="true">Open dialog</a>

<a aria-expanded="false">View details</a>
```

Odds & Ends

```
<ul role="menu">
```

```
<div role="tablist | tab |tabpanel">
```

```
<table role="grid">
```

etc.

ARIA Design Patterns for Widget Interaction

http://www.w3.org/WAI/PF/aria-practices/#aria_ex