Accessible JavaScript: Easier than you think!

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CONF42

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Agenda – Types of JavaScript functionality

1. Binding functionality to existing interactive components, such as links, buttons and text fields.
2. Non-interactive functionality that presents information.
3. Creating custom components that are both interactive and informative.

Agenda – Ten accessibility principles

1. All functionality must take a form that can be interpreted as text
2. All functionality must be accessible to all input devices
3. Information and structure can be programmatically determined
4. A meaningful sequence and logical focus order is maintained
5. Instructions do not rely on sensory characteristics or nonsensical characters

Agenda – Ten accessibility principles

6. Timed activity can be controlled
7. Provide mechanisms to help people find and interact with content correctly
8. Do not cause a change of context or content unexpectedly
9. Identify components consistently
10. Identify and describe errors and error suggestions in text

JavaScript Factsheet

www.accessibilityoz.com/factsheets/javascript/

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Types of JavaScript functionality

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Type 1

Binding functionality to existing interactive components, such as links, buttons and text fields.

Assistive technologies can derive information from their attributes and text; for example, a dynamic menu would be made using links organised into nested lists, in which the menu levels are denoted by the hierarchy, and by the use of structural labels around each top-level link

Type 2

Non-interactive functionality that presents information.

This must be implemented in such a way that the information can be derived from associated text; for example, a visual progress-meter would also show a % figure, or JavaScript might be used to identify and highlight form validation errors.

Type 3

Creating custom components that are both interactive and informative.

These components must be implemented using elements that are already understood by assistive technologies, so that their content and interactions can be programmatically determined; for example, a calendar widget would have a LABEL to describe it and a button to trigger it, while the calendar itself would be made using TABLE markup, which assistive technologies can understand and interpret as structured text.

Accessibility principles

JavaScript

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Principle 1

All functionality must take a form that can be interpreted as text

Principle 1: Text alternatives

People with disabilities may rely on assistive technologies, such as a screen reader, a Braille reader, or a speaking browser. These technologies represent all information as structured text.

If visual information has no text equivalent, assistive technologies will not be able to relay that information to the user.

Principle 1: Text alternatives

If interactive components do not have a descriptive label, people who use assistive technologies, or who have a cognitive disability, may not understand what it is.

Accessibility Basics webinar

www.youtube.com/watch?v=ysTDAu2zViM

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Accessibility Basics article

tinyurl.com/a11y-basics

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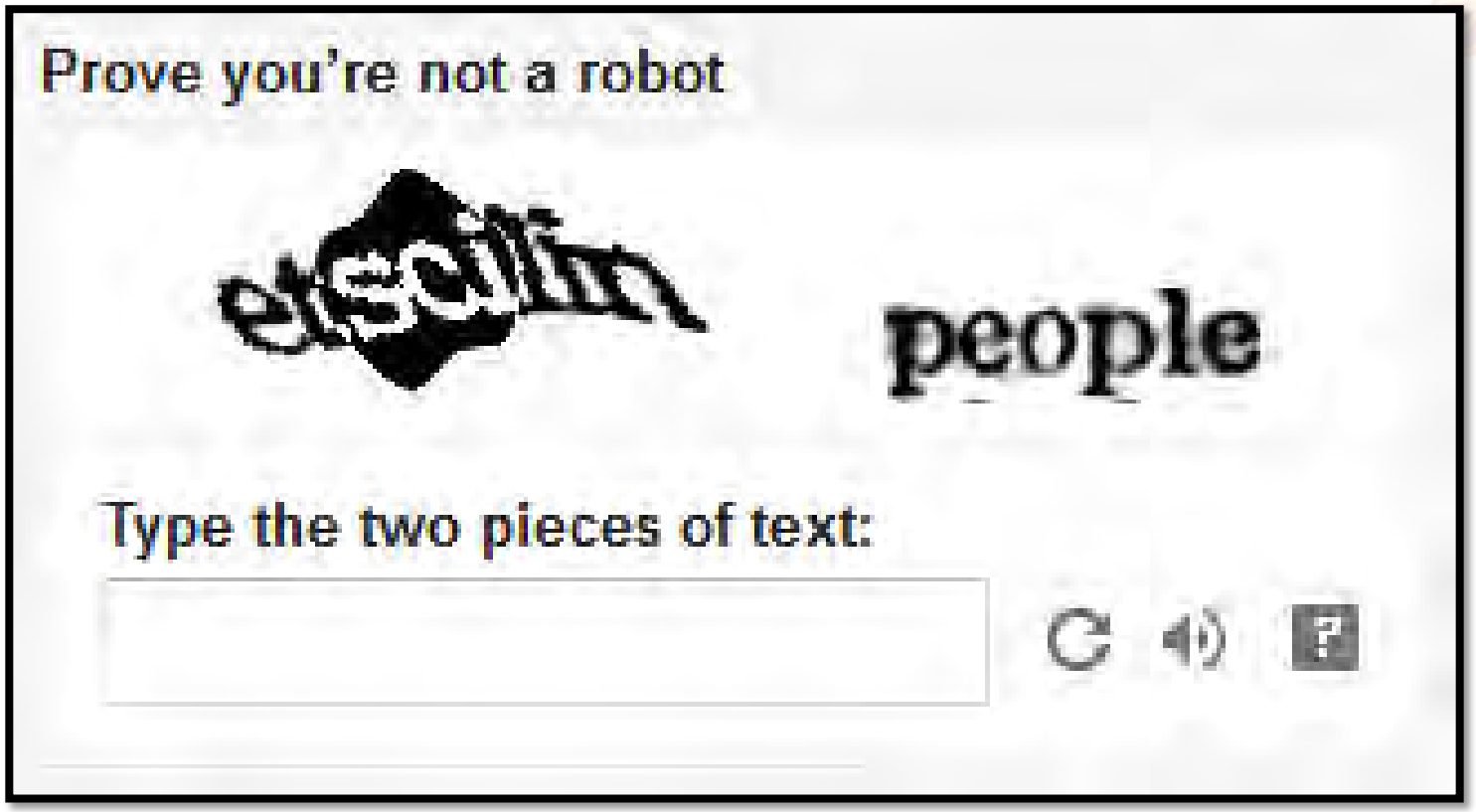
CAPTCHA

Example: CAPTCHA



Want to learn more?

tinyurl.com/2025-captcha

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Example: CAPTCHA

CGI-Mailer Response

Please confirm

The university is concerned about email harvesting and spam. Please complete the question below to confirm that you are not an automated web crawler

4 + 4 = ? continue

Visually-dynamic content

Examples: Visually-dynamic content

Visually-dynamic information (such as a progress meter) should have a text equivalent

Incorrect example: http://jqueryui.com/progressbar/

Correct example: Psalaciak, JS_G_A1

Image buttons

Examples: Image buttons

Form image button ALT attributes must be correct

Correct example:

Incorrect example:

Complex content

Examples: Long descriptions for non-text content

Functionality that can't be made accessible must have a long description that provides the same information

Correct example: JS_G_A2

Text alternative requirements

- ✓ Image buttons must have a valid ALT attribute
- ✓ Any images conveying information must have a valid ALT attribute
- ✓ If the Submit button is an image then it must have an ALT attribute
- ✓ CAPTCHAs must be multiple sensory modalities
- ✓ Complex systems must have a valid long description

Interactive Maps Factsheet

www.accessibilityoz.com/factsheets/interactive-maps/

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Principle 2

All functionality must be accessible to all input devices

What are input devices?

- Mouse
- Keyboard
- Touchscreen on a mobile device or laptop

Assistive tech that mimic input devices

- Joystick (mimicking a mouse)
- Onscreen keyboard (mimicking a keyboard)
- External keyboard on a mobile device (mimicking a keyboard)
- Thumb switch (mimicking a keyboard)
- Headwand (mimicking a mouse)

Principle 2: Input device accessiblity

Assistive technologies are usually controlled with the keyboard, rather than with a mouse or pointing device, and there are also many people who are simply unable to use a mouse or trackpad, because of a motor impairment.

Principle 2: Input device accessiblity

If interactive content can’t be operated with the keyboard, it will be entirely inaccessible to people who can’t use a mouse or pointing device.

There are also people entirely reliant on other input devices; so it is essential that all the site functions using only one type of input device.

Keyboard

Using the keyboard

1. Use TAB, ESC or arrow keys to exit, or
2. Document the feature needed to exit, prior to entering application
3. Must be able to TAB from start to finish

Example: Keyboard trap

Interactive content should be accessible to the keyboard, using common keystrokes like Tab, Enter and Arrow Keys

Keyboard factsheet

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Keyboard focus video

www.accessibilityoz.com
/resources/videos/
keyboard-focus/

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Examples: Keyboard focus indicator

Do not use events to restrict keyboard access or remove focus indication

Incorrect example: `onfocus="this.blur()"`

Correct example: Disability Rights Texas

Examples: Dynamic menus

Dynamic menus should be fully accessible to the keyboard, using Tab and Arrow Keys

Correct example: AccessibilityOz, JS_N_A1

Keyboard requirements

- ✓ There must be no keyboard traps
- ✓ When creating a modal window / dialog box focus must remain within the modal window / dialog box
- ✓ Dynamic menus must be fully keyboard accessible
- ✓ Ensure that mouse-only functionality has a keyboard equivalent
- ✓ Ensure everything has a keyboard focus indicator

Touchscreen

Mobile Accessibility Guidelines

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Principle 3

Information and structure can be programmatically determined

Principle 3: Information and structure

If scripting is used to implement standard functionality, assistive technologies will not understand what it is, and will therefore not be able to describe it or provide the appropriate keystrokes.

If custom widgets are built using non-semantic markup, assistive technologies will similarly fail to understand what they are.

Principle 3: Information and structure

When content requires user input, labels or instructions should be provided to assist the user with completing their task, and to minimise mistakes made:

- If labels and instructions are not provided and associated with a form input, a blind user will not know what information to enter.
- Similarly, labels and instructions that are not visually located closely to a form input can prevent users of screen magnifiers from seeing this information.

Principle 3: Information and structure

...

- Labels and instructions that do not give examples of expected user input can reduce the likelihood of users with cognitive, language and learning disabilities entering the correct information.
- Keyboard users may submit incomplete forms if required fields are not labelled; trying to find the incomplete input is a tiresome task when information is not provided to assist.

Labels and fieldsets

Examples: Field Labels

Fields must have an associated and coded field label.

Correct example: Amazon

FIELDSET requirements

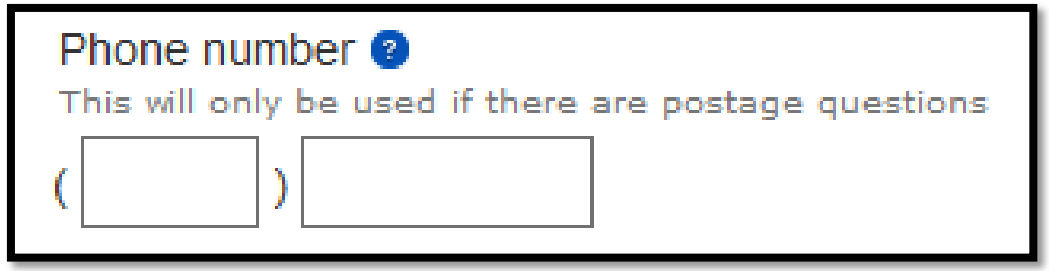
FIELDSETs are for grouping fields only.

There are three ways fields can be related:

1. They belong in one particular group

FIELDSET requirements

2. They don’t make sense without the other fields



3. They only make sense in conjunction with an overarching heading

Forms factsheet

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Forms videos

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Accordions

Examples: Bypass blocks

Use an expandable/collapsible menu to bypass blocks of content

Correct example: TAC forms, JS_G_A8

Accordion Pattern

tinyurl.com/a11y-accordion

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Principle 4

A meaningful sequence and logical focus order is maintained

Principle 4: Sequence and focus order

The visual reading order of form content should be presented in a meaningful and logical sequence i.e. left to right and top to bottom (assuming a left-to-right language).

Screen readers will read form components in the order that it appears in the source mark-up. When meaningful sequence is not maintained, form content may be displayed incorrectly when presented in alternative formats by assistive technologies.

Principle 4: Sequence and focus order

Users of assistive technologies sometimes do not have access to the entire page at once, so changes before the user's current focus or elsewhere on the page may be missed.

Navigating with the keyboard is a one-dimensional process, and users who rely on speech output can only hear one thing at a time, so content which is not in a logical order is harder to comprehend and use. When a keyboard user presses a button and new interactive content appears, they'll expect that content to be immediately next in the Tab order, not to have to jump around the page to get to it.

Why sequence is important

Websites are accessed by a variety of devices including mouse, keyboard, touchscreen, switch, joystick and assistive technologies such as screen readers and magnifiers. When the source order, keyboard focus order and visual reading order of a webpage are inconsistent with each other this can greatly impact their ability to navigate and access a web page effectively.

Three orders

Source order

The order that the underlying HTML or other mark-up is written.

Keyboard focus order

The order of interactive page elements, such as links and form controls, when accessed by the keyboard i.e. the order in which items receive keyboard focus.

Visual reading order

The logical and intuitive order in which a sighted user naturally reads the page content. This is generally left to right and top to bottom – all content should be presented in a meaningful sequence so that any relationship within the data is clear.

Source Order factsheet

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Source order vs Display Order vs Keyboard Focus Order video

tinyurl.com/three-orders

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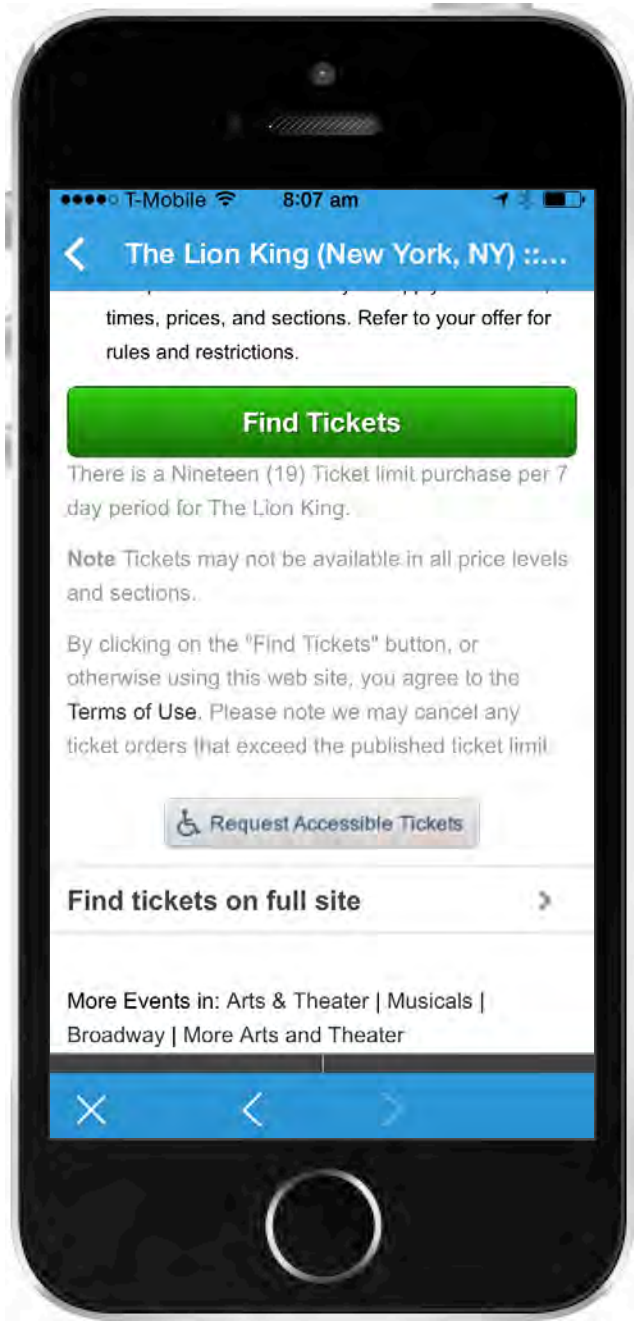

Visual reading order

Important information should never be after a Submit button

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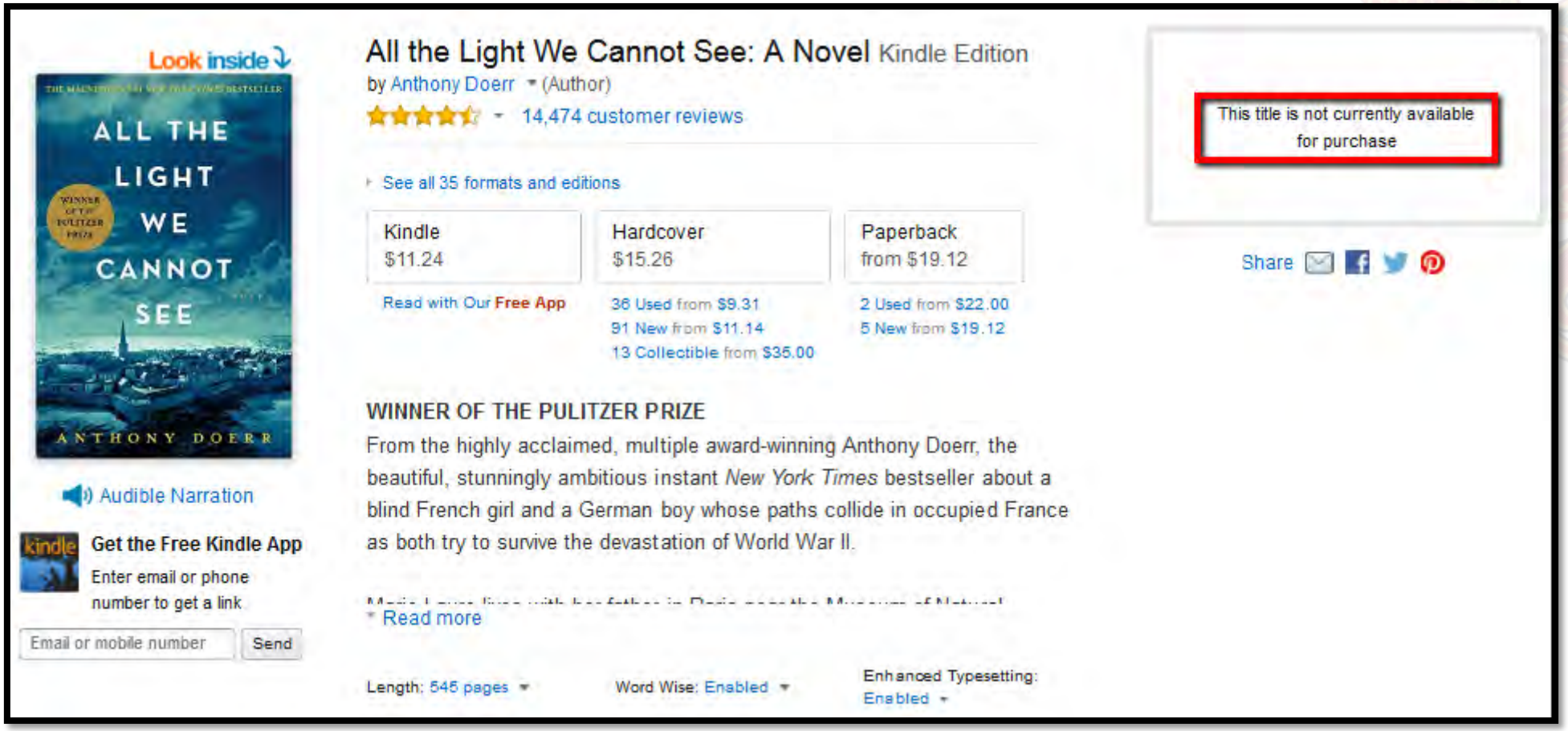
Visual reading order – Important information



Logical focus order

Logical focus order

Insert dynamic content into the DOM immediately following its trigger element

Correct example: JS_C_A9

Use scripting to re-order content in the DOM

Incorrect example: Scripting to re-order DOM

Correct example: Sortable list, JS_C_A11

Correct: Focus order

Principle 5

Instructions do not rely on sensory characteristics or nonsensical characters

Principle 5: Illegible instructions

When sensory characteristics (colour, shape and location) or nonsensical characters (asterisks, dashes etc) are used instead of text, users of screen readers may not be able to understand the meaning of the content. Often these are ignored by the screen reader which means information is omitted completely.

Fields

Incorrect: Mandatory fields

All fields in red are mandatory fields and must be filled in. The quality of your user experience is of the utmost importance to us. In order that we may resolve any issues that you may be experiencing in an efficient manner, please provide us with as much information as possible.

Thank You,

Customer Support

USER INFORMATION:

First Name:

Last Name:

E-mail:

PLEASE PROVIDE AS MUCH INFORMATION AS POSSIBLE:

Username:

Password:

Subscription ID:

Website:

Principle 6

Timed activity can be controlled

Principle 6: Timed activity

Users of assistive technology often take a lot longer to read a page or undertake required functionality, either because of a cognitive disability, or because they can only focus on a few words at once, or because it takes longer to listen to synthesized speech than to visually read. It would be confusing and disorientating for people if content were to change while they were reading it.

Principle 6: Timed activity

Continual animation or flickering effects may trigger a seizure in someone who has photosensitive epilepsy. It's also more difficult for someone with a cognitive disability to ignore these effects, which makes the actual content harder to focus on.

Flickering

Pokemon Shock

Electric Soldier Porygon is the 38th episode of the anime series Pokemon. It was broadcast in Japan on December 16, 1997 on 37 stations to 4.6 million households.

There were repetitive visual effects (flashing red and blue lights) – effectively strobe lights at a rate of 12 Hz for six seconds

Pokemon Shock

The most **common** side effects:

- Blurred vision
- Headaches
- Dizziness
- Nausea

The most **serious** side effects:

- Seizures
- Blindness
- Convulsions
- Loss of consciousness
- Breathing difficulties

4. No flashing

- Flashing images, especially those with red, should not flicker faster than three times per second. If the image does not have red, it still should not flicker faster than five times per second.
- Flashing images should not be displayed for a total duration of more than two seconds.
- Stripes, whirls and concentric circles should not take up a large part of the television screen.

Flickering

Use the PEAT tool:

https://trace.umd.edu/peat/

Incorrect: Flickering

Kickstarter campaign - LiFX

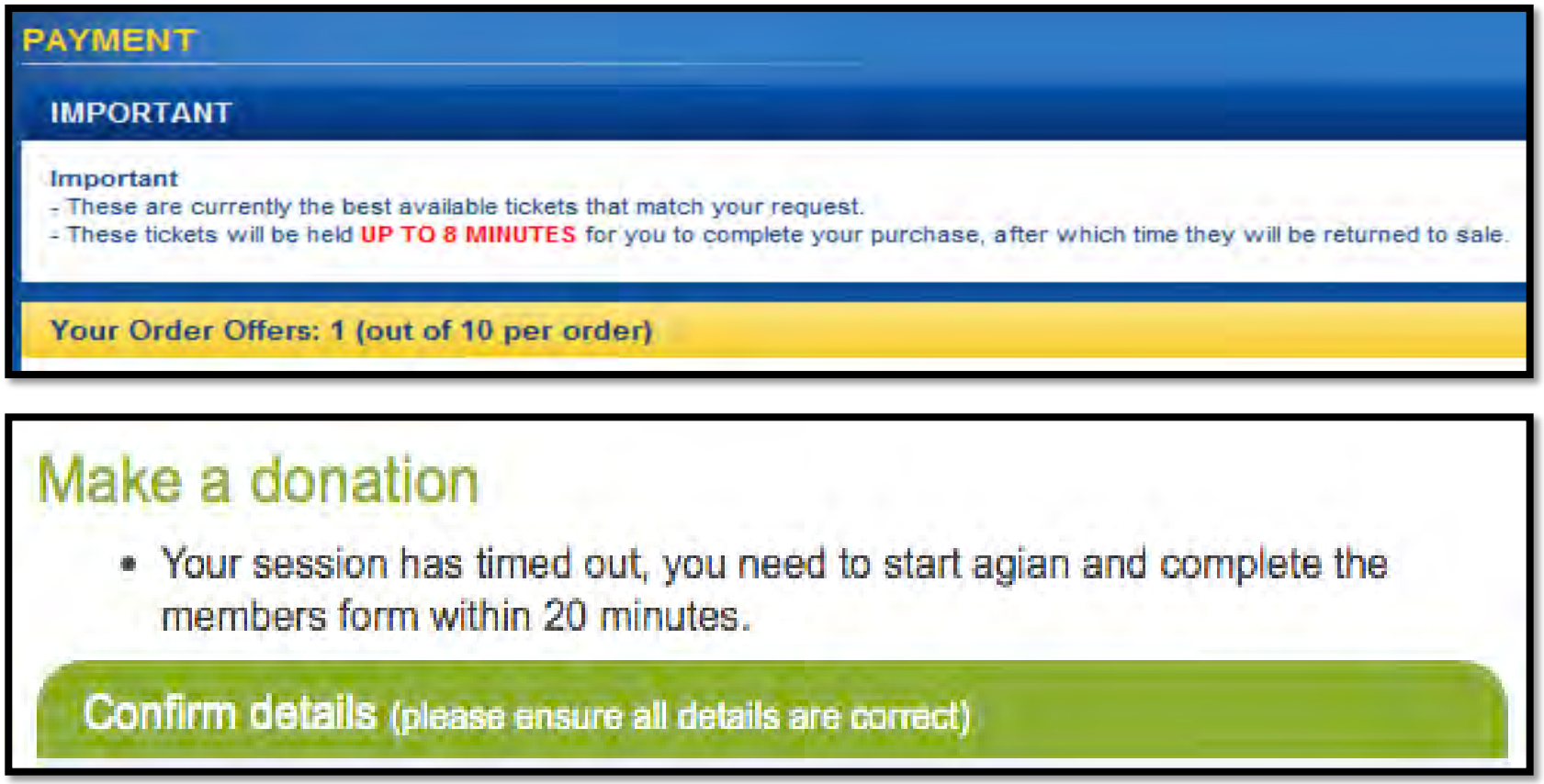
Time limits

Timed activity

Warn the user when a time-limit is about to expire, and provide a mechanism for extending it

Correct example: JS_C_A5

Incorrect: Timing



Movement

Timed activity

Use scripting to scroll content and provide a mechanism to pause it

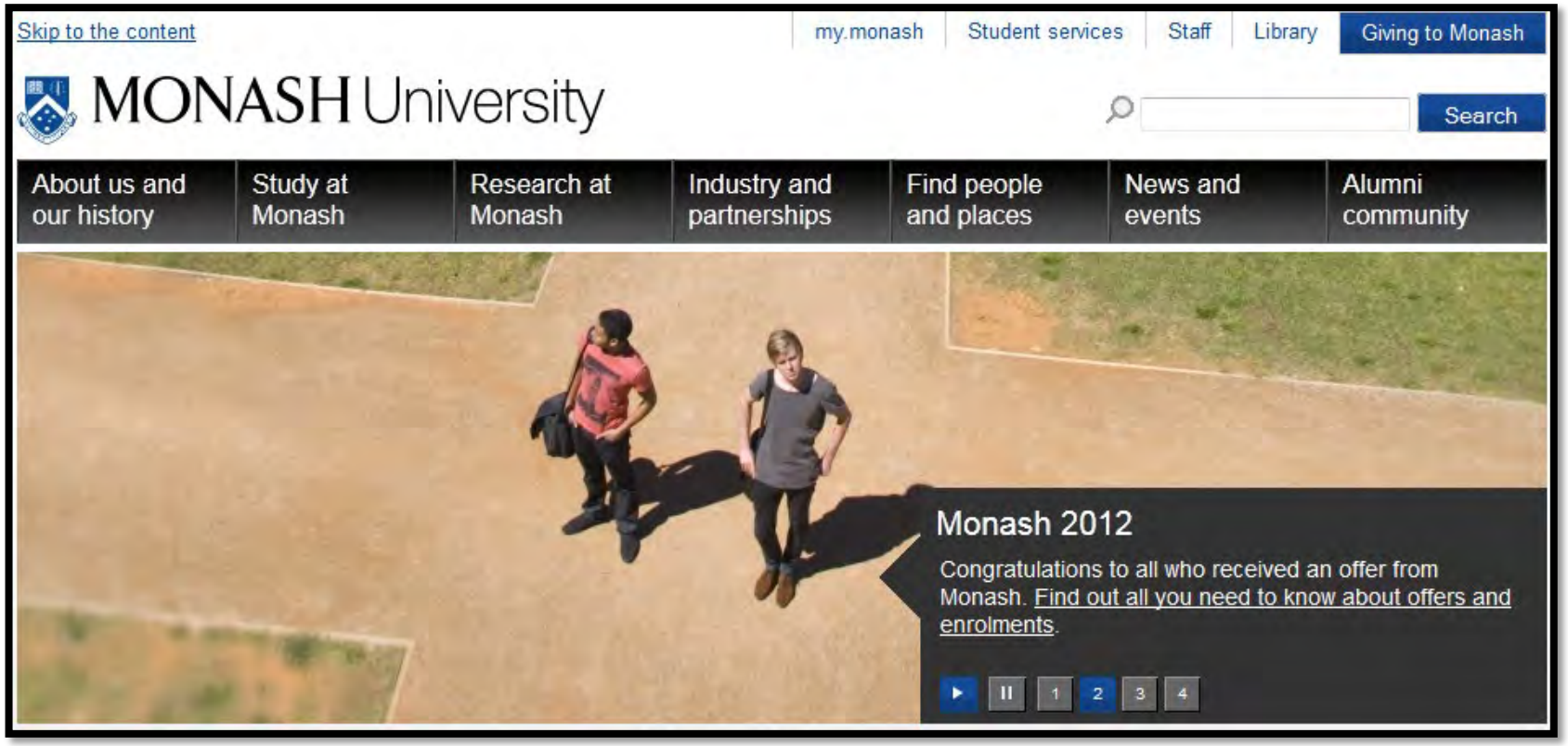
Correct example: AccessibilityOz

Use scripting to create a blinking animation that stops in 5 seconds

Correct example: JS_C_A8

Incorrect: Pause, stop, hide

Correct: Pause, stop, hide



Alternatives to moving content

Timed activity

Use scripting to create an alternative, static version of scrolling content

Correct example: JS_C_A6-A7

Timed redirects

2.2.2: Pause, stop, hide

- ✓ Timed server redirects not allowed
- ✓ Non-timed server redirects ok
- ✓ Animated GIF must stop moving in 5 seconds
- ✓ Do not use BLINK
- ✓ Stop by:
  - Stop moving content with user agent stop button or ESC key; and/or
  - Reloading page stops the blinking; and/or
  - Link to stop content.

Principle 7

Provide mechanisms to help people find and interact with content correctly

Principle 7: Finding & interacting with content

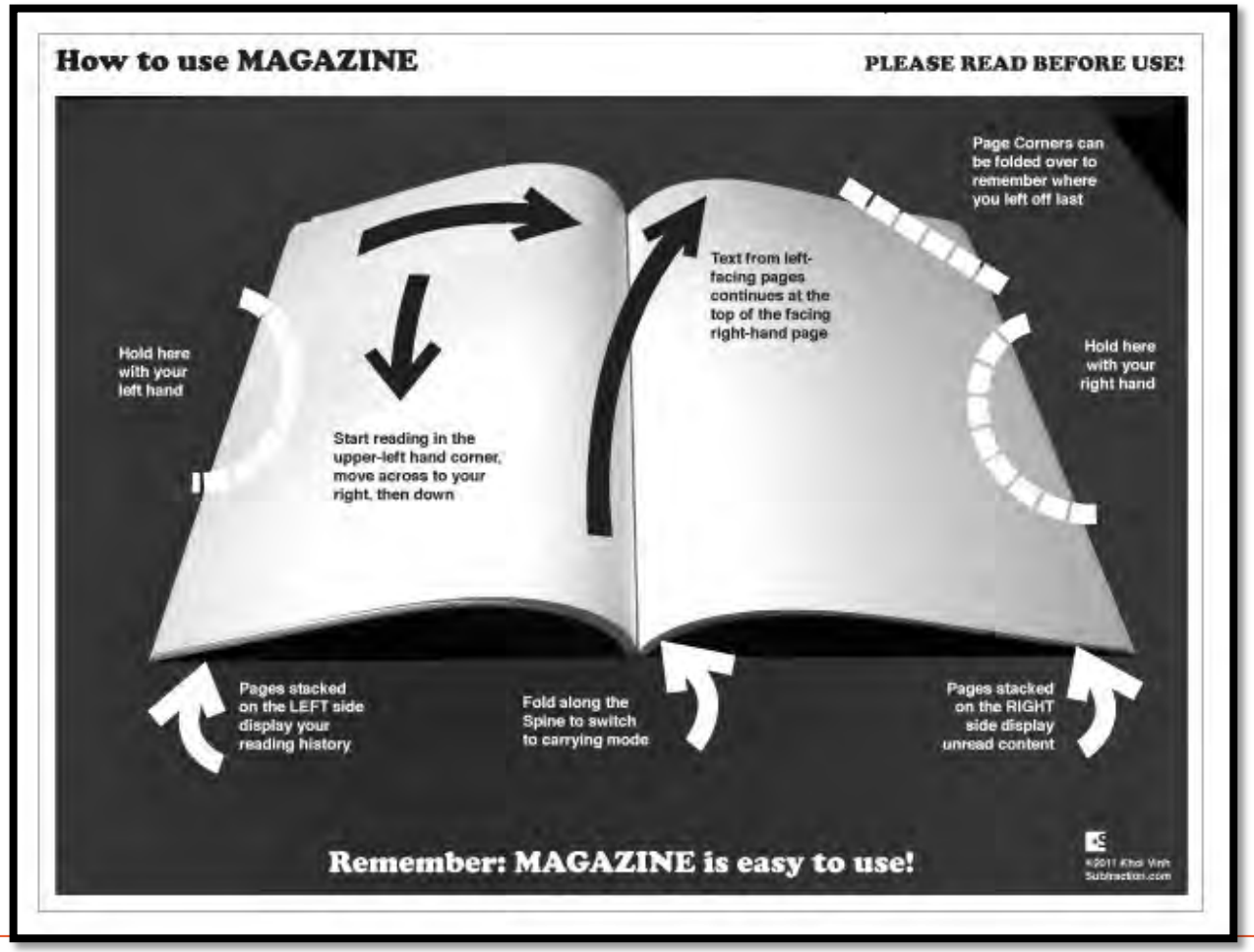
People rely on mechanisms to find information that are most suited to their needs. On a large website, if a search is not provided, blind users may find it cumbersome to tab through a large navigation block, or visually impaired users may find it difficult and confusing when doing the same with a screen magnifier or screen reader. Providing a search benefits everyone by allowing information be to found quickly.

Principle 7: Finding & interacting with content

In addition, it may be obvious to you how a system works, but that's not always the case for everyone! And for people with disabilities, often contextual information (like imagery) may not be available, or an alternative presented. Therefore, it is important to always provide instructions on how to use unusual content or functionality, or on how to use functionality that does not operate as the user expects.

Instructions

Example: Instructions



Complex content should have instructions

Non-text content (JavaScript)

Functionality that can't be presented in text must be descriptively identified

Correct example: JS_G_A3

Principle 8

Do not cause a change of context or content unexpectedly

Principle 8: Change in content and context

Navigating a document or inputting data into a form should be a predictable experience for all users. People with visual, cognitive or motor impairments may become disoriented if changes in context or content occur unexpectedly, such as a new window popping up or the focus being moved to another form component. The user may be not aware that a change has occurred as a result of their actions if they were not adequately informed or did not initiate the change.

New windows

Initiated on user request

Use an actuation event, rather than focus or load event, to programmatically open links or trigger popup windows

Incorrect example: JS_N_A2

Use progressive enhancement to open windows on user request

Correct example: JS_N_A3

Change on user request

Initiated on user request

Do not use the change event of a SELECT element for navigation

Incorrect example: phpBB Forums, JS_N_A4

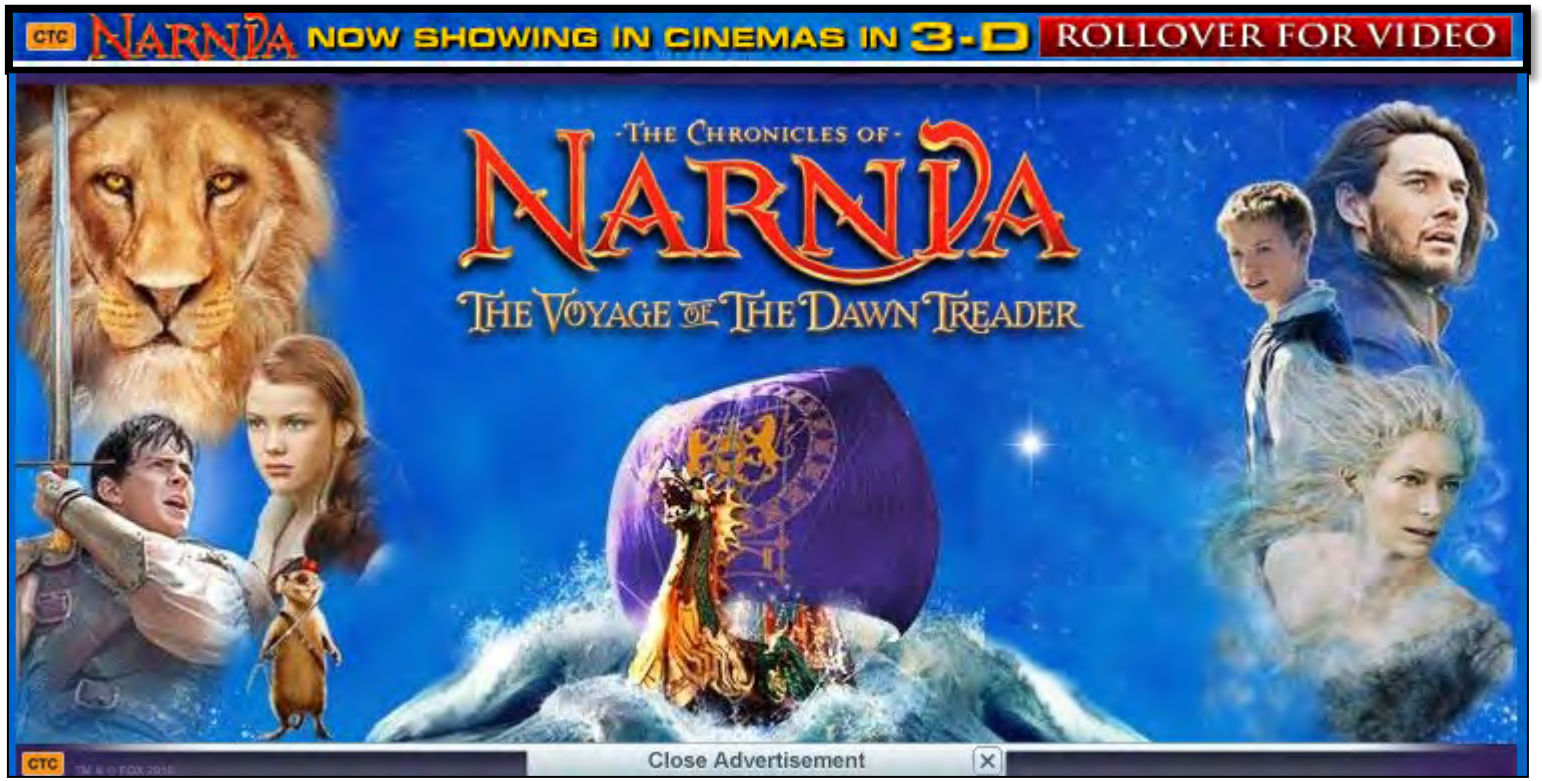
Initiated on user request

Do not automatically refresh the page without user confirmation or control

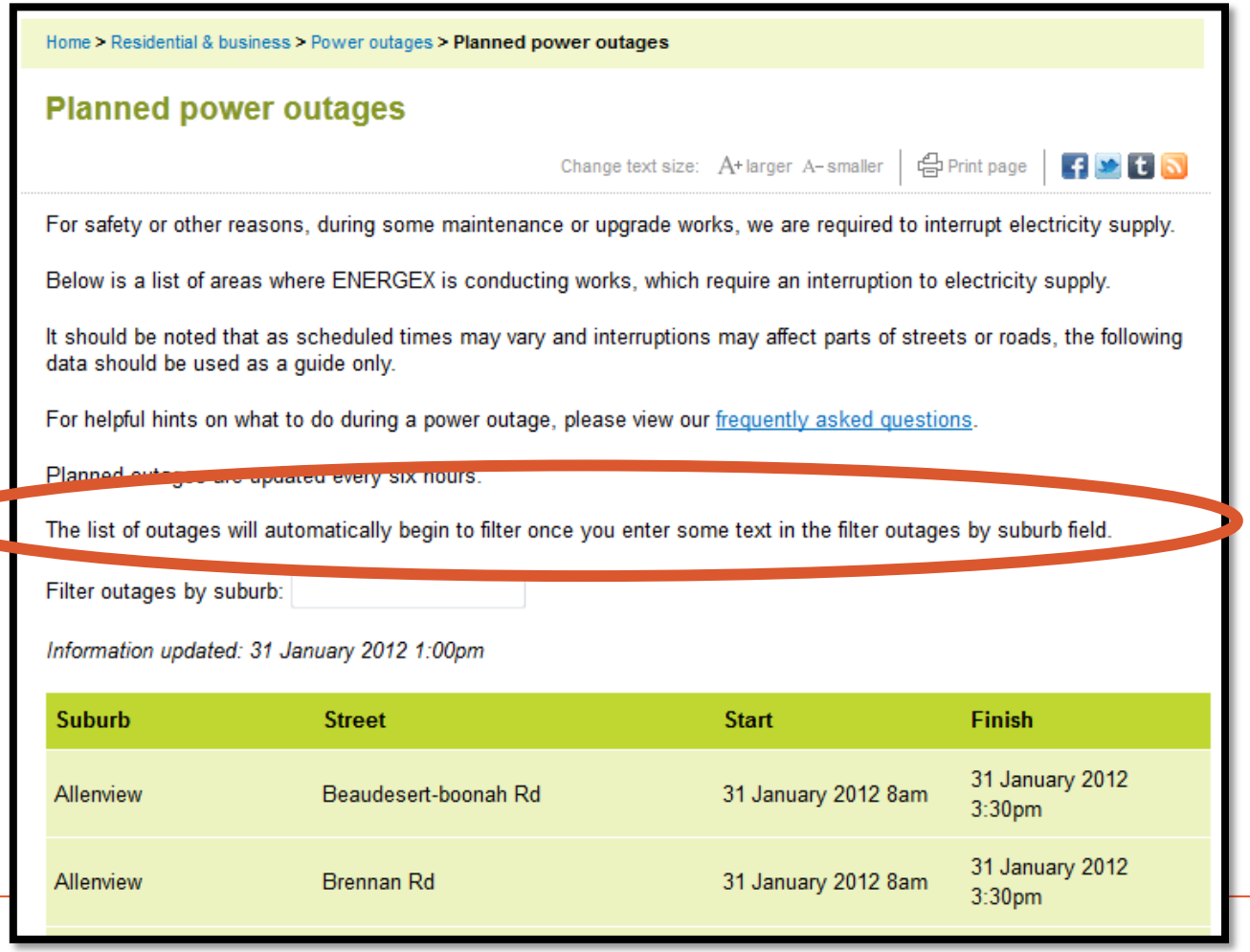
Correct example: JS_N_A6

Incorrect: On focus

Incorrect: On focus



Correct: On input with instructions



Home > Residential & business > Power outages > **Planned power outages**

Planned power outages

Change text size: A+ larger A– smaller | Print page

For safety or other reasons, during some maintenance or upgrade works, we are required to interrupt electricity supply.

Below is a list of areas where ENERGEX is conducting works, which require an interruption to electricity supply.

It should be noted that as scheduled times may vary and interruptions may affect parts of streets or roads, the following data should be used as a guide only.

For helpful hints on what to do during a power outage, please view our frequently asked questions.

Planned outages are updated every six hours.

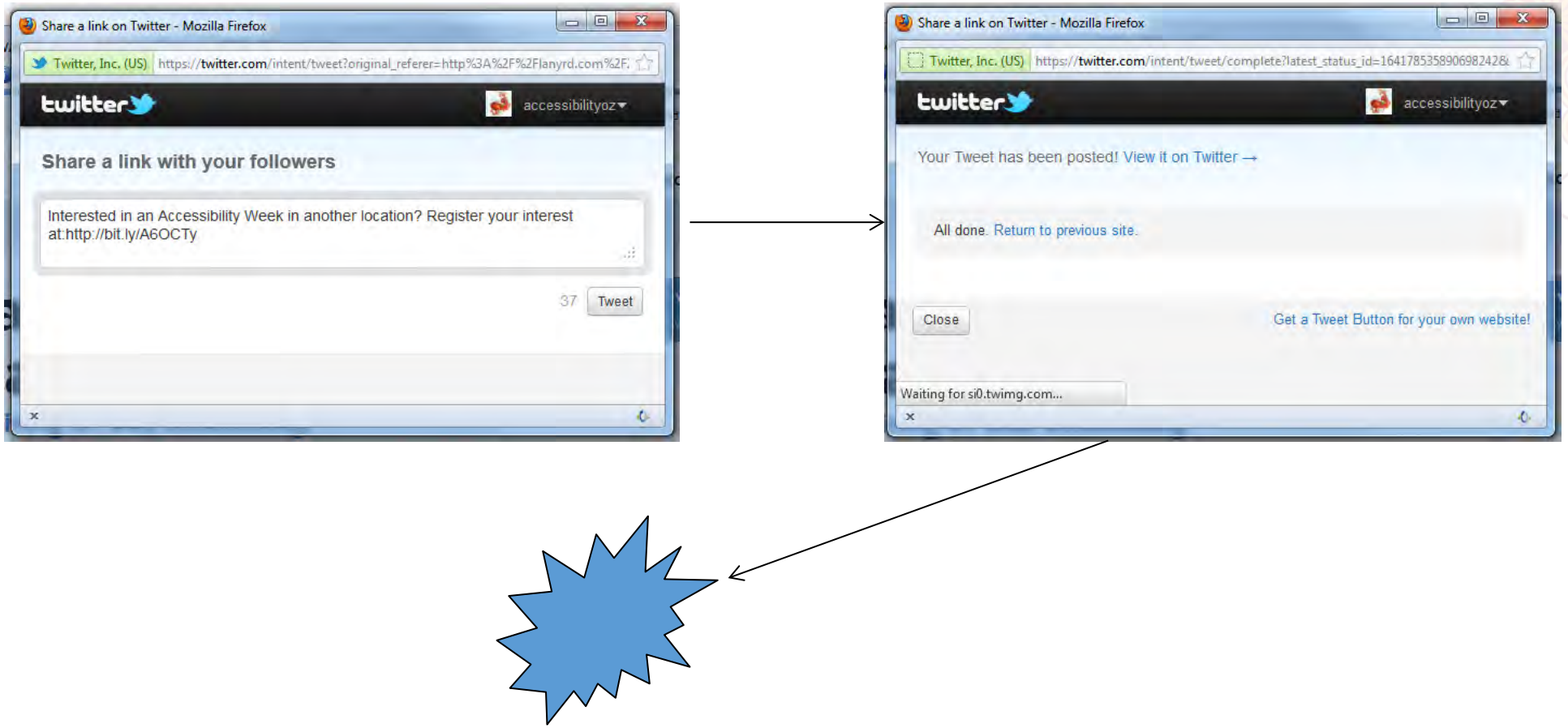
The list of outages will automatically begin to filter once you enter some text in the filter outages by suburb field.

Filter outages by suburb:

Information updated: 31 January 2012 1:00pm

Suburb	Street	Start	Finish
Allenview	Beaudesert-boonah Rd	31 January 2012 8am	31 January 2012 3:30pm
Allenview	Brennan Rd	31 January 2012 8am	31 January 2012 3:30pm

Incorrect: On input



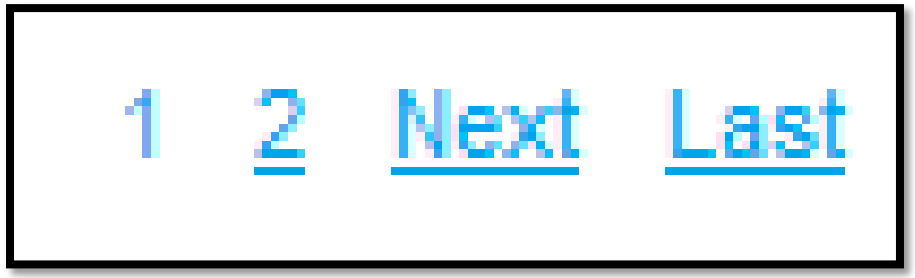
Principle 9

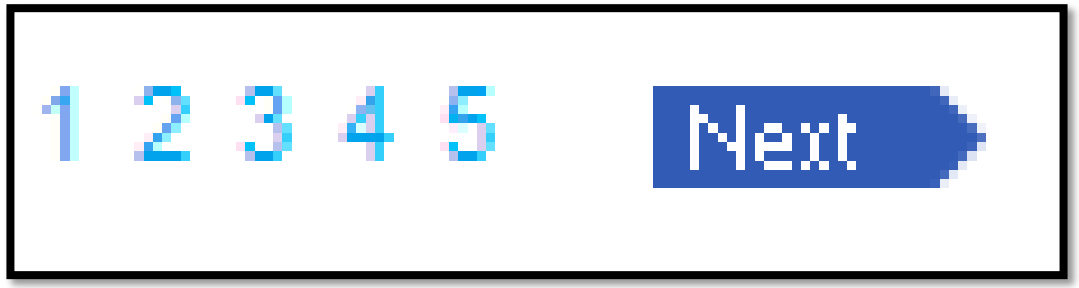
Identify components consistently

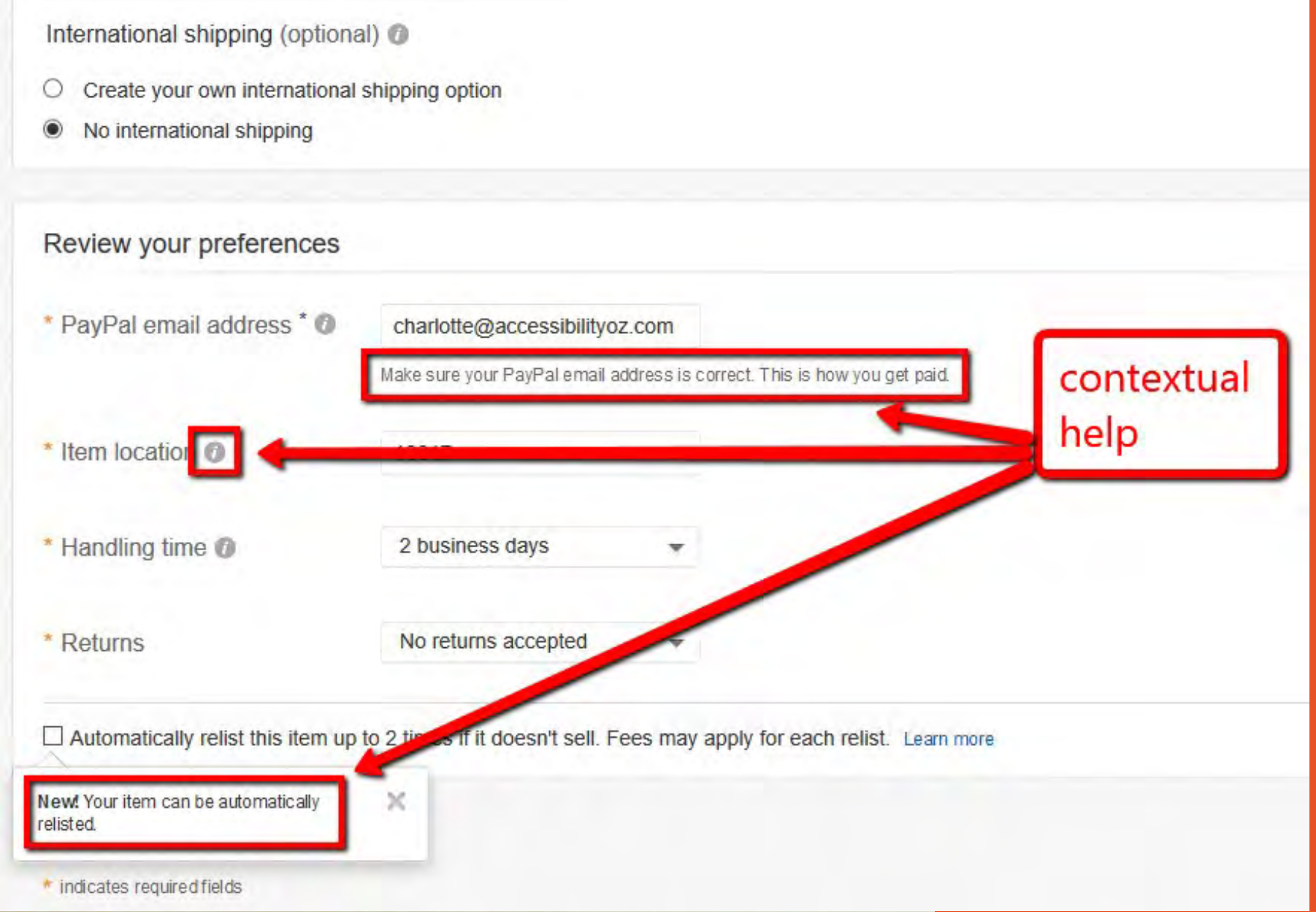
Principle 9: Consistent components

Functionality that is similar or used more than once on a website should be labelled consistently to create familiarity and ease of use. This improves a user's ability to find information or use similar functionality on other pages without having to relearn how.

Incorrect: Inconsistent pagination







Incorrect: Inconsistent Contextual help

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Principle 10

Identify and describe errors and error suggestions in text

Principle 10: Error descriptions & suggestions

When an error is detected it should be identified in text and described in detail. Without specific information about the error, screen reader users may believe a form is not functioning and may abandon it altogether. Errors that are identified with colour alone, or symbols or icons, may not be understood or recognised by users who are blind or colour blind. This may also be the same for users with learning or language difficulties, or other cognitive impairments.

Principle 10: Error descriptions & suggestions

When error messages are provided, they should include suggestions on how to correct mistakes, such as examples of the correct user input. Without suggestions, people with visual or motor impairments, or cognitive, language and learning difficulties may not understand what the required input is and may not be able to correct their mistakes.

Principle 10: Error descriptions & suggestions

After repeatedly trying to input the correct information, which can be very tiresome; users may ultimately abandon the form altogether.

When a form is used to initiate a legal or financial commitment, or to modify or delete user data, a step to reverse, check or confirm the user input before submitting the form should be provided to prevent users from making a serious mistake. Users with visual or cognitive, language and learning difficulties may have input incorrect characters, or users with a motor impairment may have hit incorrect keys.

Field errors

Describe input errors

Form validation should be triggered by submission, rather than individual field events

Form validation should trigger an alert then set focus on the first invalid field

Validation error messages should be programmatically inserted directly after the field they relate to, using functions of the DOM (and in the LABEL element)

Incorrect example: Smashing Magazine, Validation library

Correct example: JS_F_A1-A3-A4

Describe input errors

Form submission should be bound to the form's submit event, not to the submit button's click event

Incorrect example: `<input type="submit" onclick="return validate(this)">`

Correct example: `<form action="/search" onsubmit="return validate(this)">`

Do not force the focus to remain in invalid fields

Incorrect example: JS_F_A5

Where form fields require a specific format or range of values, contextual help-text can be programmatically inserted directly after the field it relates to, using functions of the DOM (and in the LABEL element).

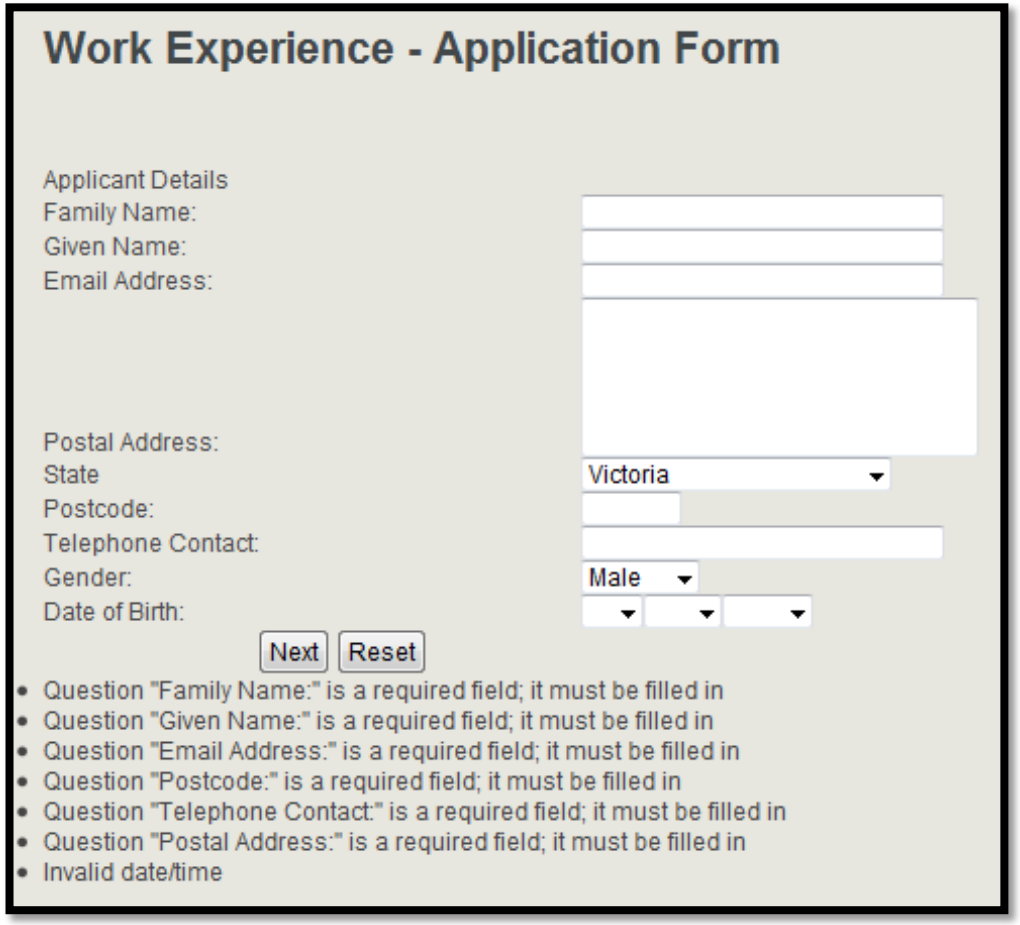
Correct example: JS_F_AA1

3.3.1: Error identification

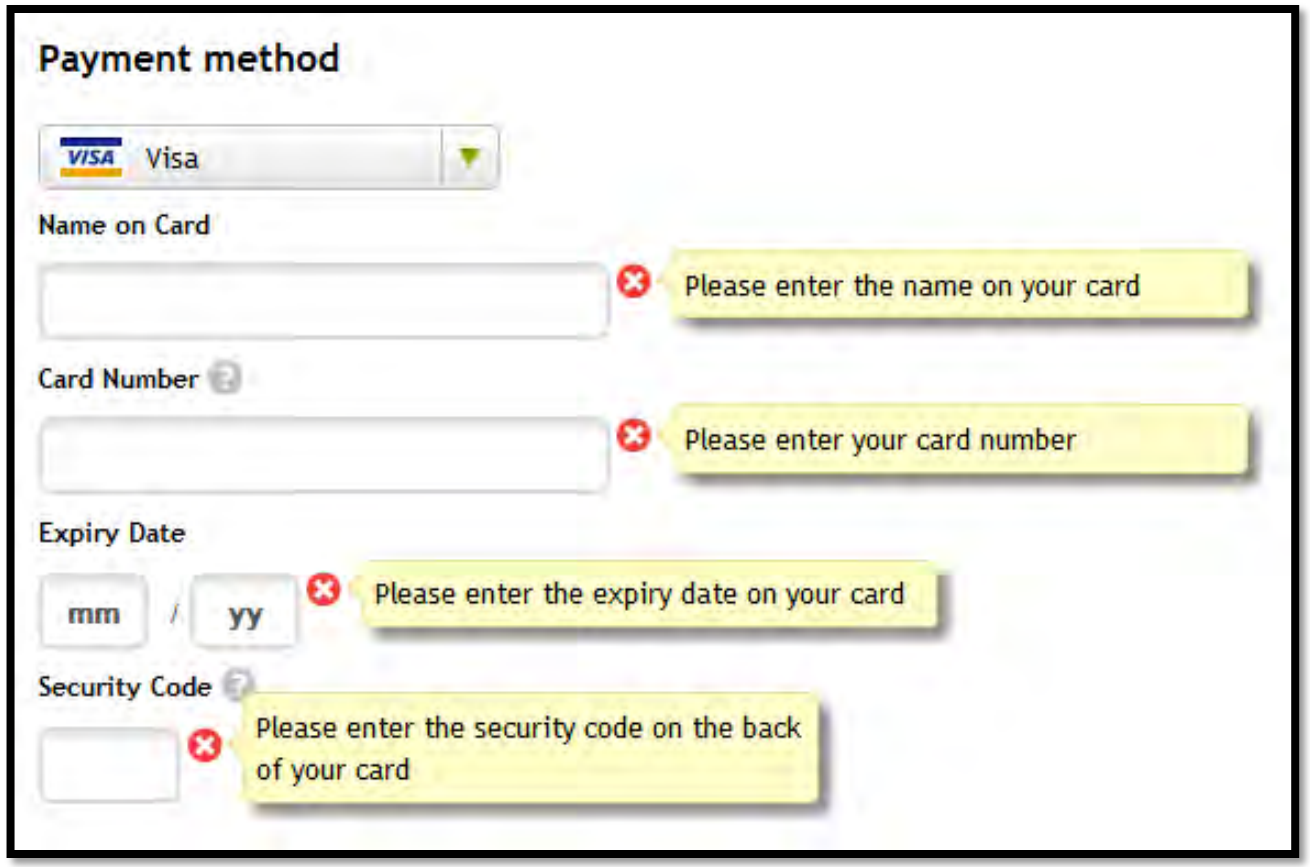
Error must:

- Be in text
- Be at the relevant field
- Be included in the relevant LABEL FOR element

Incorrect: Field errors



Correct: Field errors



Forms factsheet

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JavaScript Factsheet

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In conclusion

Agenda – Types of JavaScript functionality

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2. Non-interactive functionality that presents information.
3. Creating custom components that are both interactive and informative.

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Resources

W3C ARIA APG - Patterns

- Accordion
- Alert
- Alert and Message dialogs
- Breadcrumb
- Carousel
- Checkbox
- Combobox
- Dialog (Modal)
- Slider
- Switch
- Table
- Tabs
- Toolbar
- Window Splitter

... and many more!

W3C ARIA APG - Practices

- Landmark Regions
- Providing accessible names and descriptions
- Developing a keyboard interface
- Grid and table properties
- Communicating value and limits for range widgets
- Structural roles
- Hiding semantics with the presentation role

AccessibilityOz Factsheets

- Images
- PDF
- Video
- Interactive Maps
- HTML5
- Content
- JavaScript
- Tables
- Coding
- Keyboard
- Source Order
- Forms

AccessibilityOz Developer Videos

HTML:

- HTML headings
- Well-formed and valid markup
- Keyboard focus
- Source Order vs Display Order vs Keyboard Focus Order

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AccessibilityOz Developer Videos

Forms:

- Explicit & implicit form labels
- Fieldsets and legends
- Checkboxes & radio buttons
- Required form fields
- Accessible form instructions
- Error messages in forms
- Accessible session timeouts

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AccessibilityOz Developer Videos

ARIA:

- What is ARIA and why use it?
- How not to use ARIA
- ARIA landmark roles
- aria-labelledby vs. aria-describedby vs. aria-label
- Using aria-live

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Mobile Accessibility Testing Guidelines

- Guidelines on both Native App and Mobile Site
- Information on how to choose devices, capture errors, assistive technologies
- Step-by-step instructions with examples

www.accessibilityoz.com/resources/mobile-testing/

Thank you!

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