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Web Components

The Lego bricks of web developers

Aaron Czichon

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- Aaron Czichon
- Head of Software Development
- NodeJS & Web Components

The basic problem of HTML elements

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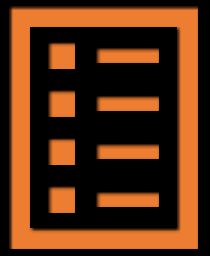

Building a login form...

```
<!doctype html>
<html lang="en">
    <head>
        <meta charset="utf-8">
        <title>Dev Days Europe 2019</title>
        <meta name="description" content="Example for Web Components">
        <meta name="author" content="Aaron Czichon">
        <link rel="stylesheet" href="./assets/edel-elements.css">
    </head>

    <body>
    <!-- CONTENT HERE  -->
    </body>
</html>
```

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```
<div class="login-card card">
        <div class="card-meta">
                <h3>Login</h3>
                <p>Please login first</p>
        </div>
        <div class="login-card-form">
                <div class="form form--grid">
                        <div class="form-item">
                                <label>Username or email</label>
                                <input placeholder="Username or email" type="text">
                        </div>
                        <div class="form-item">
                                <label>Password</label>
                                <input placeholder="Super Secret Password" type="password">
                        </div>
                        <div class="form-item">
                        <button type=“submit“ class="button button--primary">Login</button>
                        </div>
                </div
        </div>
</div>
```

Want using it in multiple applications?

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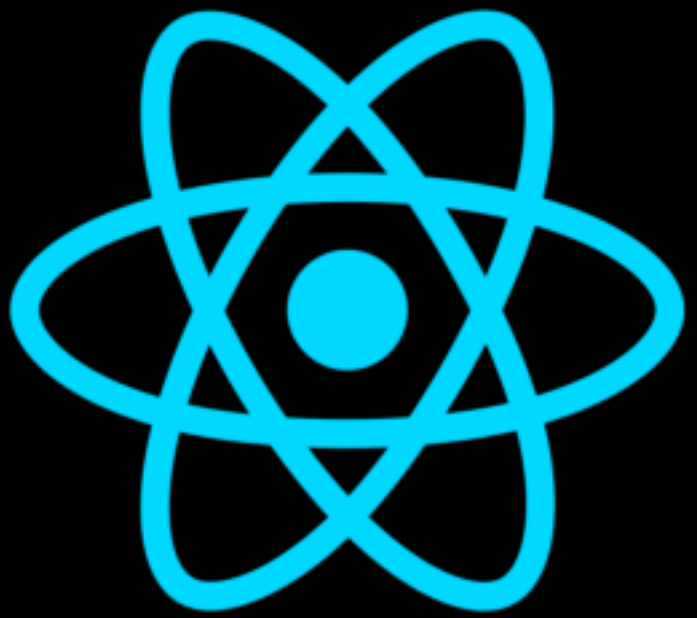

Multiple Framework Options

Downsides

- Mostly only usable inside the framework
- (Angular has export options for web components)
- Sometimes a lot of overhead which is not needed

Web Components!

„Web components are a set of web platform APIs that allow you to create new custom, reusable, encapsulated HTML tags“

Source: webcomponents.org

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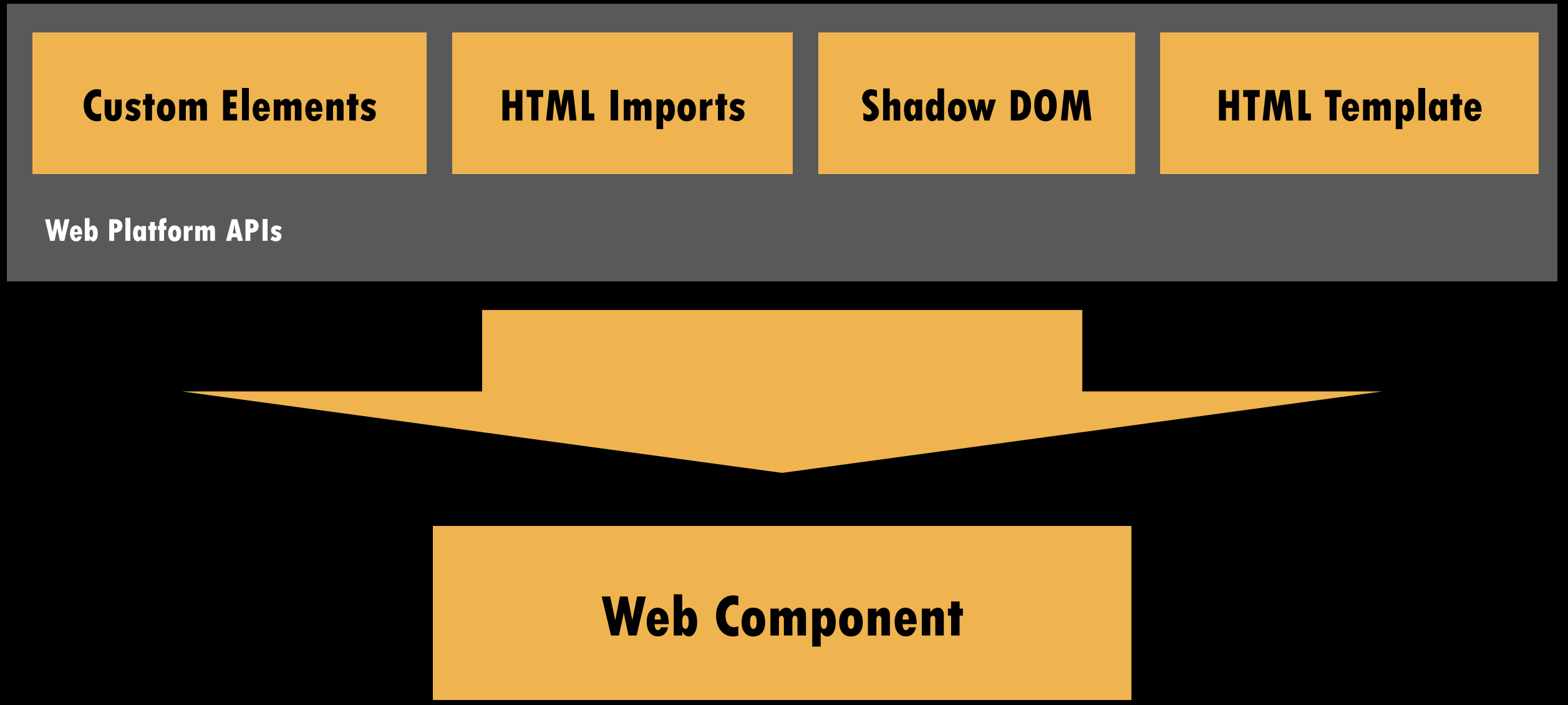
Custom Elements
HTML Imports
Shadow DOM
HTML Template
Web Platform APIs
Web Component

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Custom Elements

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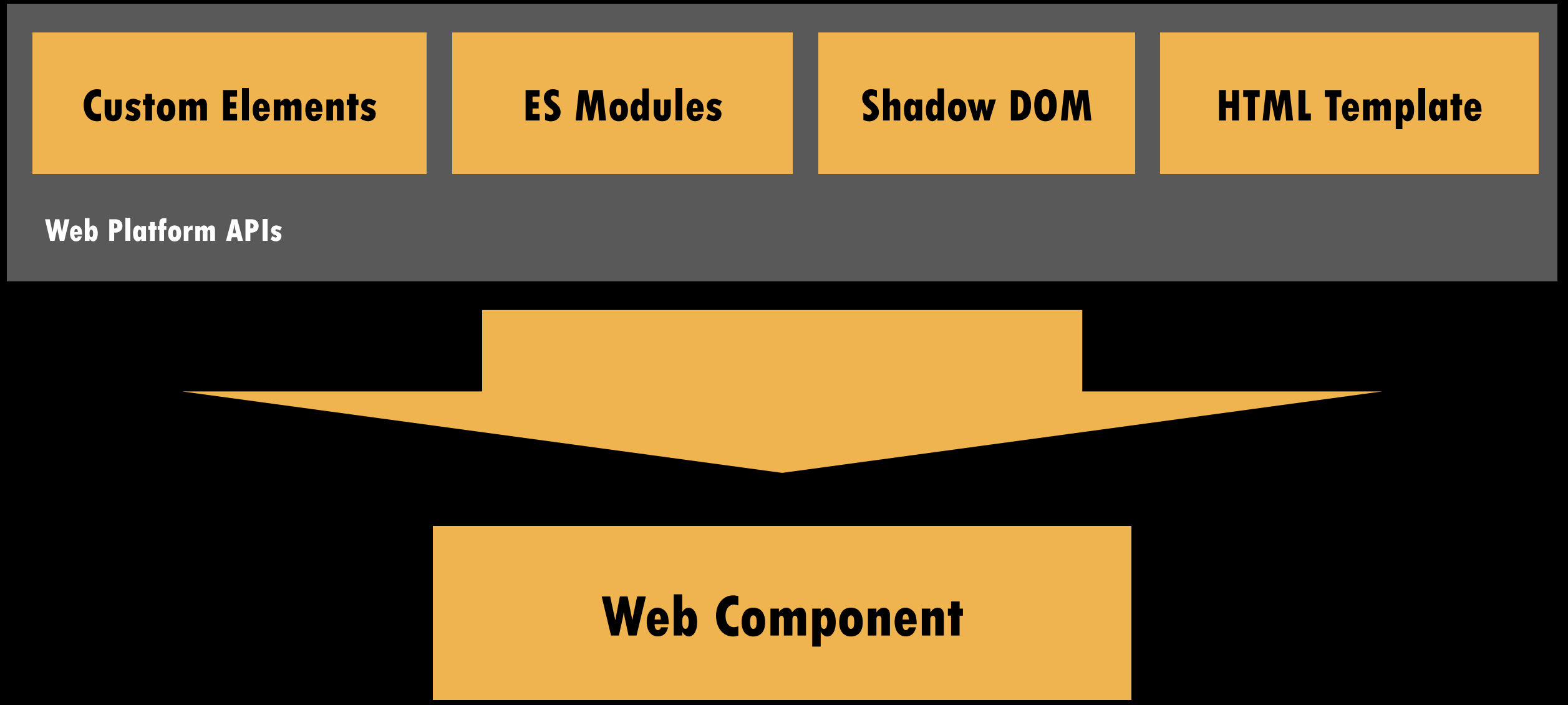
Custom Elements
ES Modules
Shadow DOM
HTML Template
Web Platform APIs
Web Component

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Custom Element

```
customElements.define('star-wars-character', StarWarsCharacter, { extends: 'p' });
```

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Custom Element

```
class StarWarsCharacter extends HTMLParagraphElement {
    constructor() {
      // Call super for trigger Praagraph constructor
      super();

      // Element implementation here
    }
}
```

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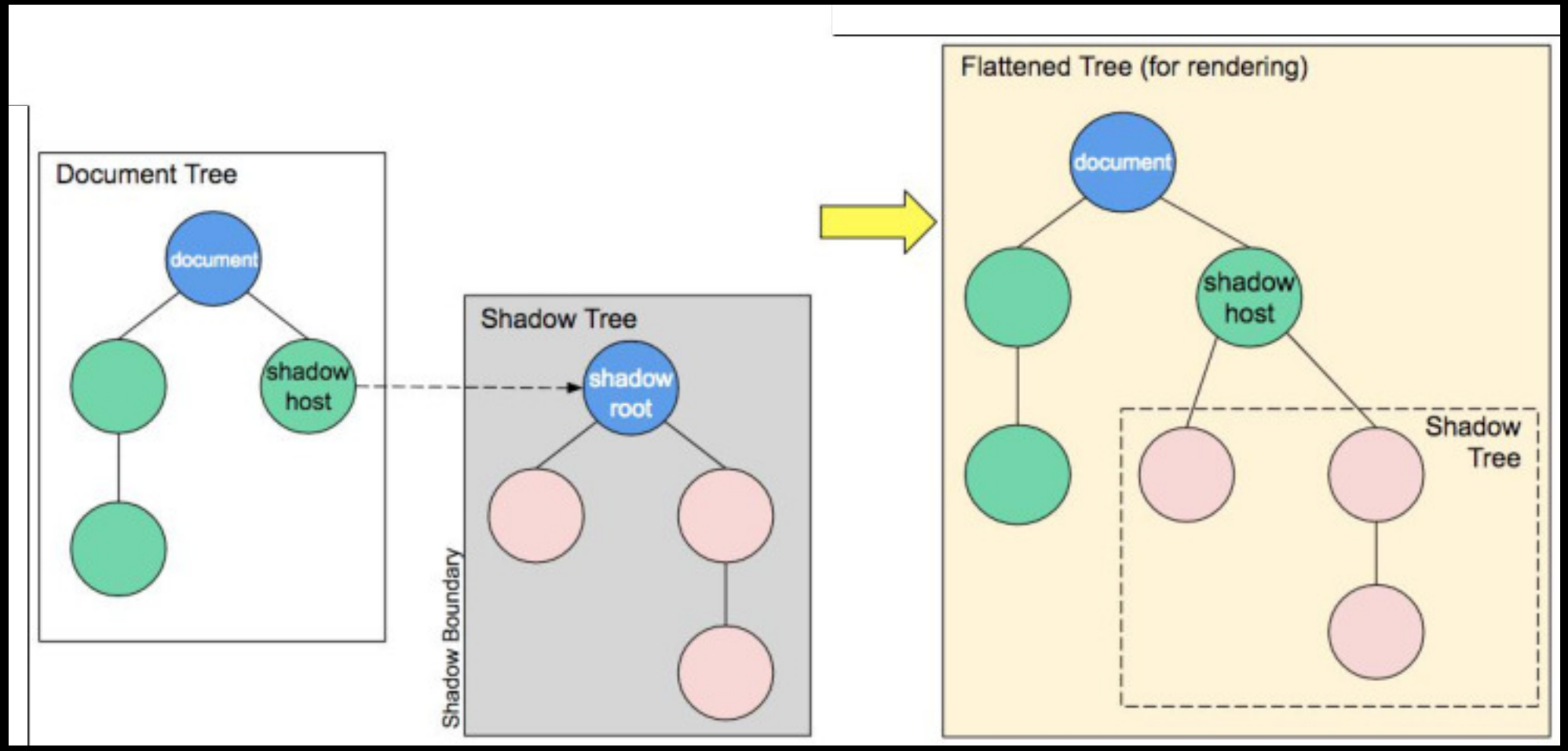
Shadow DOM

-> Shadowed rendering of DOM Nodes



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Shadow DOM

-> Attach shadow to existing element (shadow host)

```
let shadow = elementRef.attachShadow({ mode: 'open' });
```

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Shadow DOM

-> Create new element and attach it to the shadowed element

```
const characterName = document.createElement('h1');
shadow.appendChild(characterName);
```

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HTML Imports

-> Importing HTMLmarkup like script files (W3C Working Draft)

```
<!-- Currently a W3C working draft -->
<link rel="import" href="star-wars-template.html">
```

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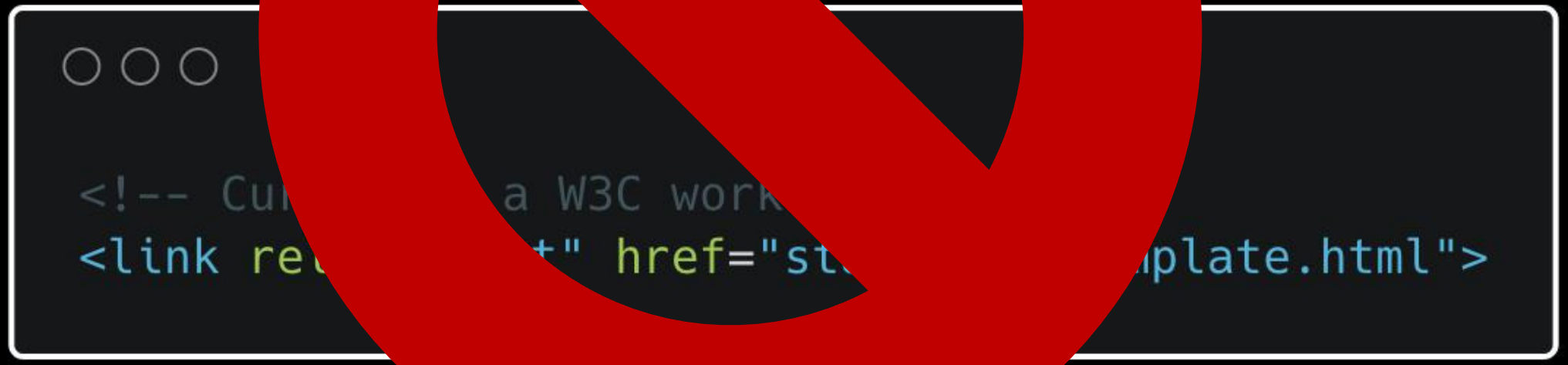
HTML Imports

-> Importing HT… …e script files (… …Draft)



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ES Module

-> Using your module inside your website/application

```
<script type="module" src="star-wars-character.js"></script>
```

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HTML Templates

-> Render templates on specific location with JS

```
<!-- Define HTML Template -->
<template id="sw-character-component">
  <h1>Yoda</h1>
</template>
```

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HTML Templates

-> Render templates on specific location with JS

```
// Render with JS
const template = document.getElementById('sw-character-component');
const clone = document.importNode(template.content, true);
document.body.appendChild(clone);
```

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Combine everything!

-> Create Javascript component

```
// component.js
class SwCharacter extends HTMLElement {
    constructor() {
        super();
        const template = document.querySelector('#star-wars-template');
        const clone = document.importNode(template.content, true);
        const shadowRoot = this.attachShadow({mode: 'open'});
        shadowRoot.appendChild(clone);
    }
}

customElements.define('sw-character-component', SwCharacter);
```

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Combine everything!

-> Create Markup

```
<!-- index.html -->
<head>
    <script src="component.js"></script>
</head>

<body>
    <sw-character-component></sw-character-component>

    <template id="star-wars-template">
        <style> /* CSS HERE */</style>
        <h1>Yoda</h1>
    </template>
</body>
```

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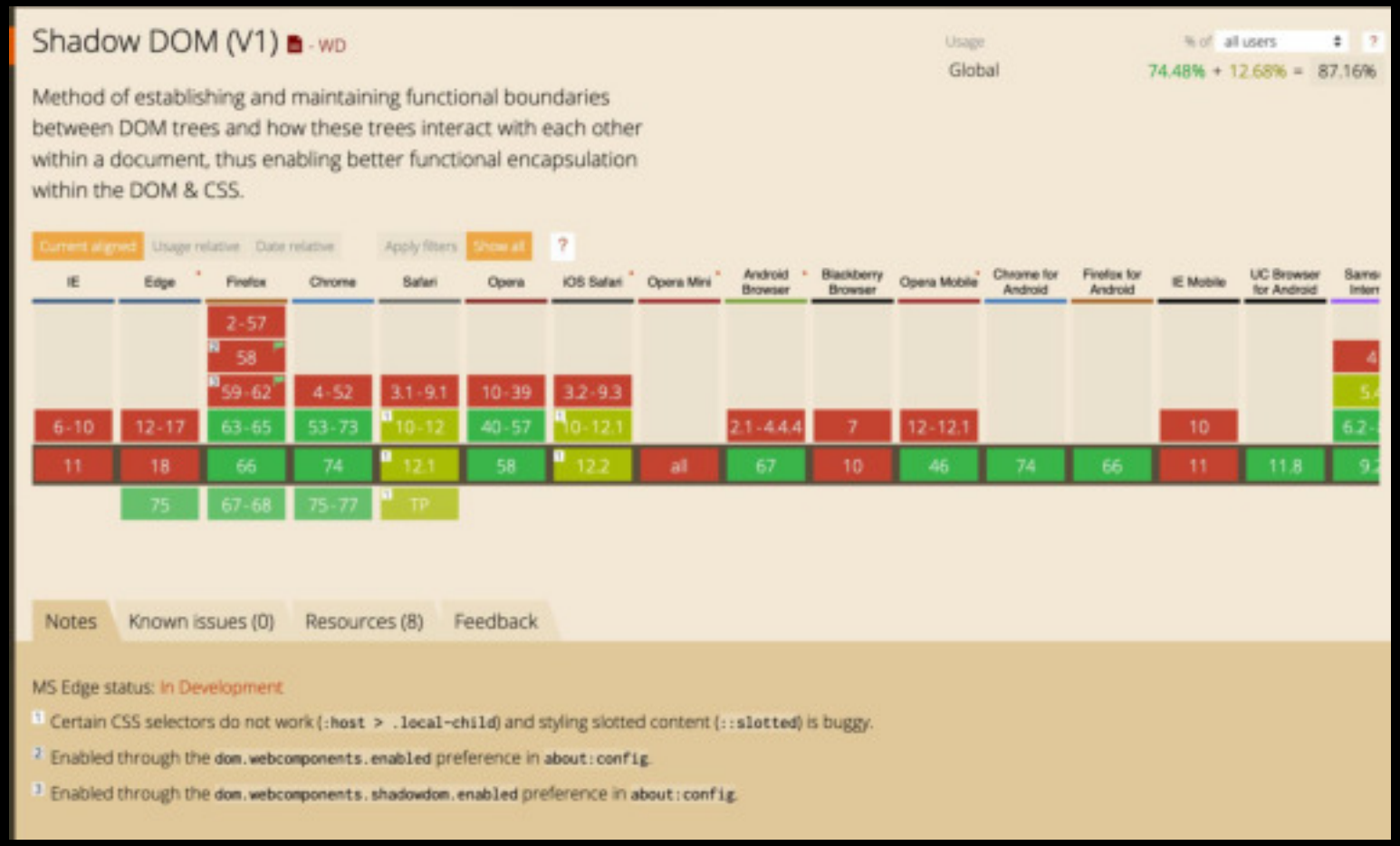
Let‘s talk about browser support…

Support – HTML Templates

Support – Custom Elements

Support – Shadow DOM



Support – HTML Imports

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Use Polyfills

- Add support with Polyfills
- This extends browsers with new features
- Downside: Needs more bandwith (larger websites)

- -> Webcomponents.js on Github
  https://github.com/webcomponents/webcomponentsjs

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Easier development with libraries

POLYMER 2

STENCILJS

SKATEJS (WITH PREACT OR LIT-HTML)

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Web component

```
class TodoItem extends HTMLElement {
    constructor() {
        super();
        this._root = this.attachShadow({ 'mode': 'open' });
        this._checked = false;
        this._text = '';
    }
    connectedCallback() {
        this._root.innerHTML = `
            <style></style>
            <li class="item">
                <input type="checkbox">
                <label></label>
                <button class="destroy">x</button>
            </li>
        `;
        this.$item = this._root.querySelector('.item');
        this.$removeButton = this._root.querySelector('.destroy');
        this.$text = this._root.querySelector('label');
        this.$checkbox = this._root.querySelector('input');
        this.$removeButton.addEventListener('click', (e) => {
            e.preventDefault();
            this.dispatchEvent(new CustomEvent('onRemove', { detail:
            this.index }));
        });
        this.$checkbox.addEventListener('click', (e) => {
            e.preventDefault();
            this.dispatchEvent(new CustomEvent('onToggle', { detail:
            this.index }));
        });
        this._render();
    }
    disconnectedCallback() {}
    static get observedAttributes() {
        return ['text'];
    }
    attributeChangedCallback(name, oldValue, newValue) {
        this._text = newValue;
    }
    set index(value) {
        this._index = value;
    }
    get index() {
        return this._index;
    }
    set checked(value) {
        this._checked = Boolean(value);
    }
    get checked() {
        return this.hasAttribute('checked');
    }
    _render() {
        if (!this.$item) return;
        this.$text.textContent = this._text;
        if (this._checked) {
            this.$item.classList.add('completed');
            this.$checkbox.setAttribute('checked', '');
        } else {
            this.$item.classList.remove('completed');
            this.$checkbox.removeAttribute('checked');
        }

    }
}

window.customElements.define('todo-item', TodoItem);
```

Polymer 2

```
<link rel="import"
href="../../bower_components/polymer/polymer-element.html">

<dom-module id="todo-item">
  <template>
    <style>
    </style>
    <li class$="item [[isCompleted(checked)]]">
      <input type="checkbox" value="{{checked}}" checked="{
      {checked::change}}">
      <label>{{text}}</label>
      <button class="destroy" on-click="handleOnRemove">x</button>
    </li>
  </template>

  <script>
    class TodoItem extends Polymer.Element {
      static get is() { return 'todo-item'; }
      static get properties() {
        return {
          checked: {
            type: Boolean,
            value: false
          },
          index: {
            type: Number,
          },
          text: {
            type: String,
            value: ''
          }
        };
      }
      handleOnRemove(e) {
        this.dispatchEvent(new CustomEvent('remove', { detail: this.index }
        ));
      }
      handleOnChecked(e) {
        this.dispatchEvent(new CustomEvent('toggle', { detail: this.index }
        ));
      }
      isCompleted(completed) {
        return completed ? 'completed' : '';
      }
    }

    window.customElements.define(TodoItem.is, TodoItem);
  </script>
</dom-module>
```

Angular Elements

```
import { Component, EventEmitter, Input, Output, ViewEncapsulation }
from '@angular/core';

@Component({
    selector: 'todo-item',
    template: `
    <li class="item" [class.completed]="checked">
        <input type="checkbox" [checked]="checked" (change)
        ="handleOnChecked()">
        <label>{{text}}</label>
        <button class="destroy" (click)="handleOnRemove()">x</button>
    </li>
    `,
    styles: [`
    `],
    encapsulation: ViewEncapsulation.Native
})
export class TodoItem {
    @Input() checked: boolean;
    @Input() text: string;
    @Input() index: number;
    @Output() onTodoItemChecked = new EventEmitter<number>();
    @Output() onTodoItemRemove = new EventEmitter<number>();

    handleOnRemove = () => this.onTodoItemRemove.emit(this.index);
    handleOnChecked = () => this.onTodoItemChecked.emit(this.index);
}
```

Vue-wrapper

```
<template>
  <li :class="['item', {'completed':checked}]">
    <input type="checkbox" :checked="checked" @click="handleOnToggle" >
    <label>{{text}}</label>
    <button class="destroy" @click="handleOnRemove">x</button>
  </li>
</template>

<script>
module.exports = {
  name: 'TodoItem',
  props: ['index', 'text', 'checked'],
  methods: {
    handleOnRemove() {
      this.$emit('onremove', this.index);
    },
    handleOnToggle() {
      this.$emit('ontoggle', this.index);
    },
  },
};
</script>
```

StencilJS

```
import { Component, Prop, Event, EventEmitter } from
'@stencil/core';

@Component({
  tag: 'todo-item',
  styleUrl: 'todo-item.scss',
  shadow: true,
})
export class TodoItem {
  @Prop() checked: boolean;
  @Prop() text: string;
  @Prop() index: number;
  @Event() onTodoItemChecked: EventEmitter;
  @Event() onTodoItemRemove: EventEmitter;

  handleOnRemove = () => this.onTodoItemRemove.emit(this.index);
  handleOnChecked = () => this.onTodoItemChecked.emit(this.index);

  render() {
    return (
      <li class={this.checked ? 'completed' : ''}>
        <input type="checkbox" checked={this.checked} onChange=
        {this.handleOnChecked} />
        <label>{this.text}</label>
        <button onClick={this.handleOnRemove}>x</button>
      </li>
    );
  }
}
```

SkateJS + Preact

```
// @jsx h
import { props } from "skatejs/dist/esnext";
import { h } from "preact";
import { Component } from "./util"

export default class extends Component {
  static events = ["check", "remove"];
  static props = {
    checked: props.boolean,
    index: props.number
  };

  handleCheck = e => {
    this.onCheck({ index: this.index, value: e.target.checked });
  };
  handleRemove = () => {
    this.onRemove({ index: this.index });
  };

  render({ checked, handleCheck, handleRemove }) {
    return (
      <div>
        <style>{`
        `}</style>
        <li class={checked ? "completed" : ""}>
          <input type="checkbox" checked={checked} onChange={handleCheck} />
          <label>
            <slot />
          </label>
          <button onClick={handleRemove}>x</button>
        </li>
      </div>
    );
  }
}
```

SkateJS + lit-html

```
import { props } from "skatejs/dist/esnext";
import { html } from "lit-html/lib/lit-extended";
import { Component } from "./util";

export default class extends Component {
  static events = ["check", "remove"];
  static props = {
    checked: props.boolean,
    index: props.number
  };

  handleCheck = e => {
    this.onCheck({ index: this.index, value: e.target.checked });
  };
  handleRemove = () => {
    this.onRemove({ index: this.index });
  };

  render({ checked, handleCheck, handleRemove }) {
    return html`
      <style></style>
      <li class="${checked ? "completed" : ""}">
        <input type="checkbox" checked="${checked}" on-change="${handleCh
        <label>
          <slot></slot>
        </label>
        <button on-click="${handleRemove}">x</button>
      </li>
    `;
  }
}
```

Building the login with Web Components

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How we use it for

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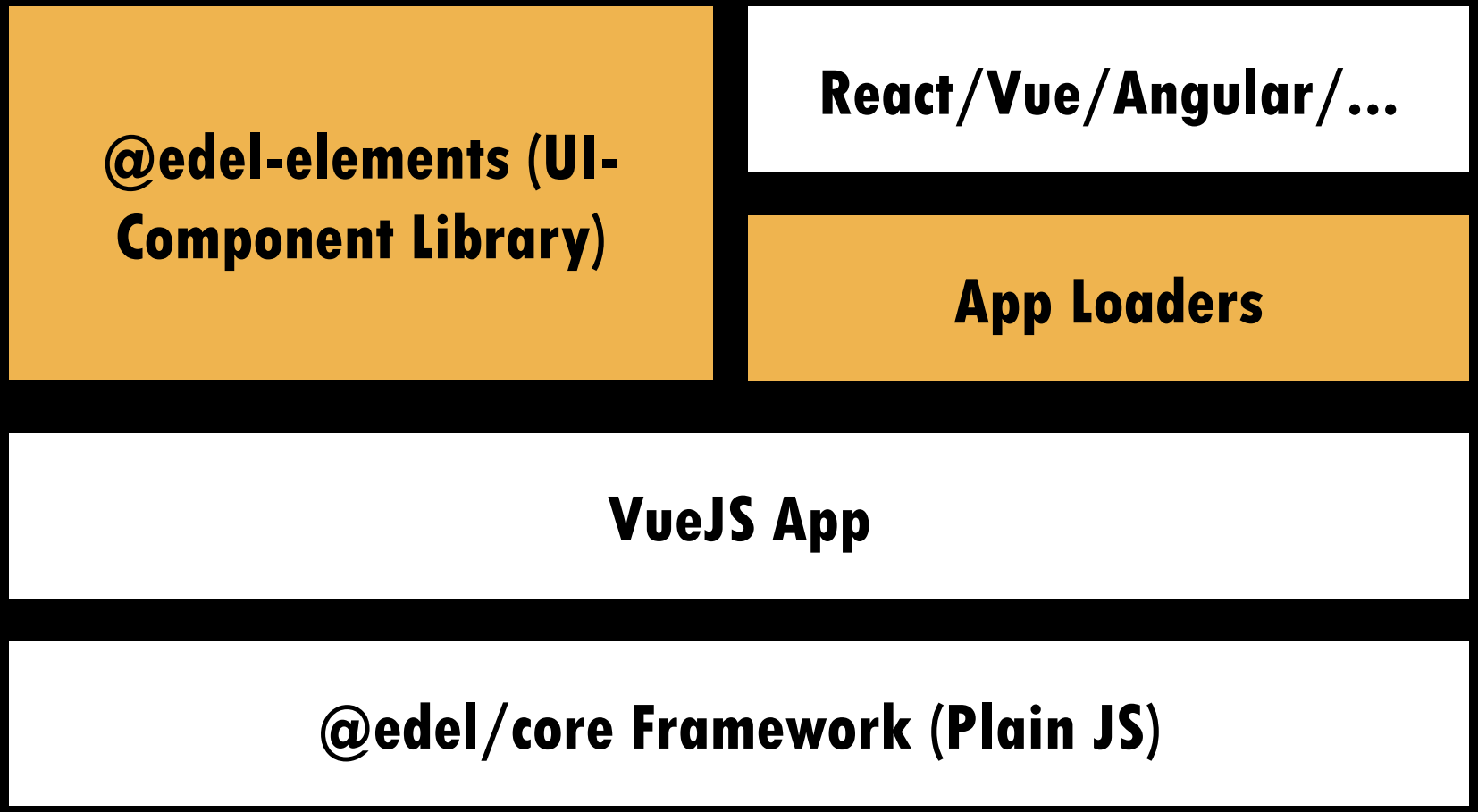
How we use it



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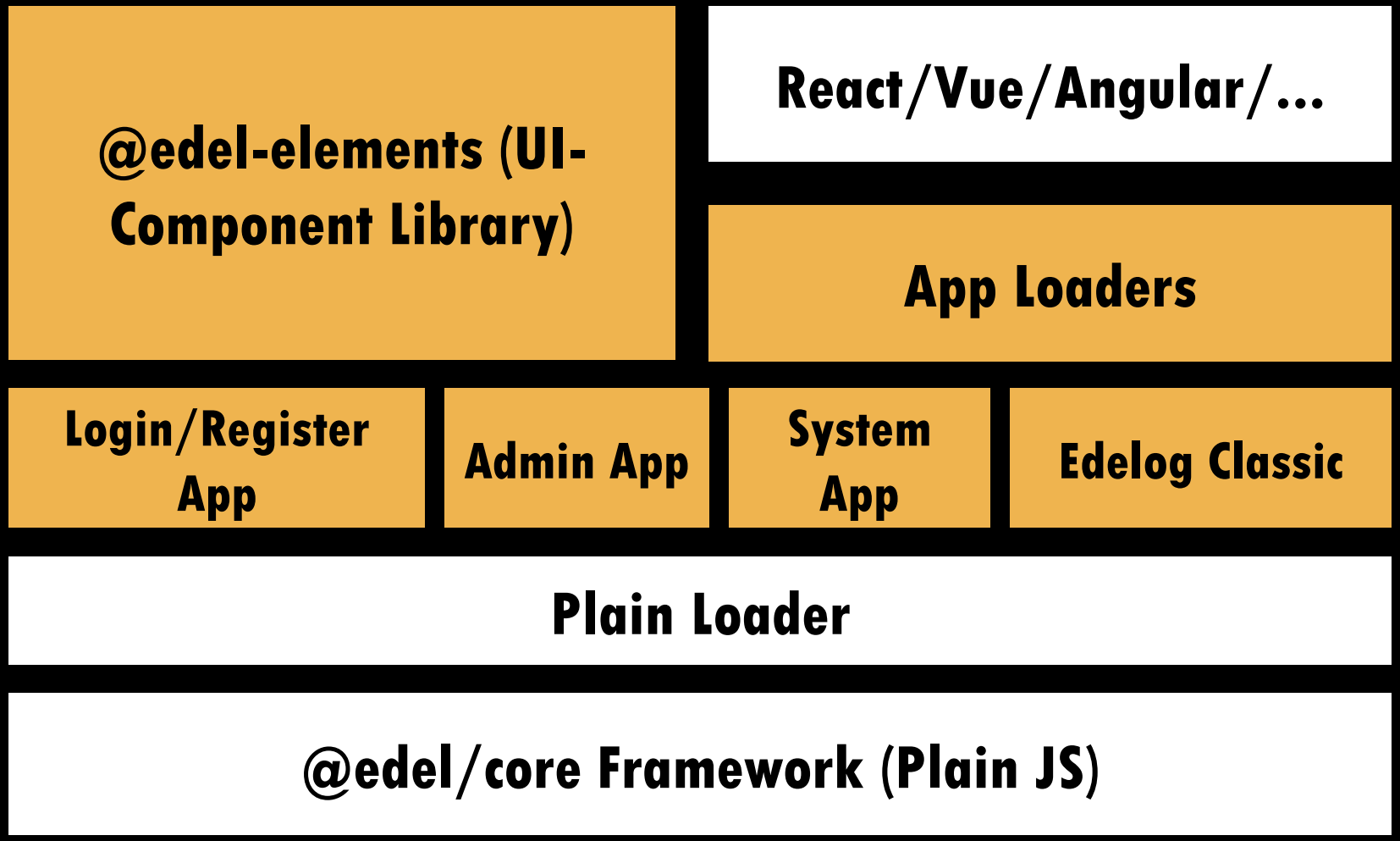
How we use it



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Edelog & Edel-Elements

- www.edelog.com
- Publishing Edelog and Edel-Elements Open Source @ End 2019

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Thank you!

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