

Creative Coding I

Interaction I

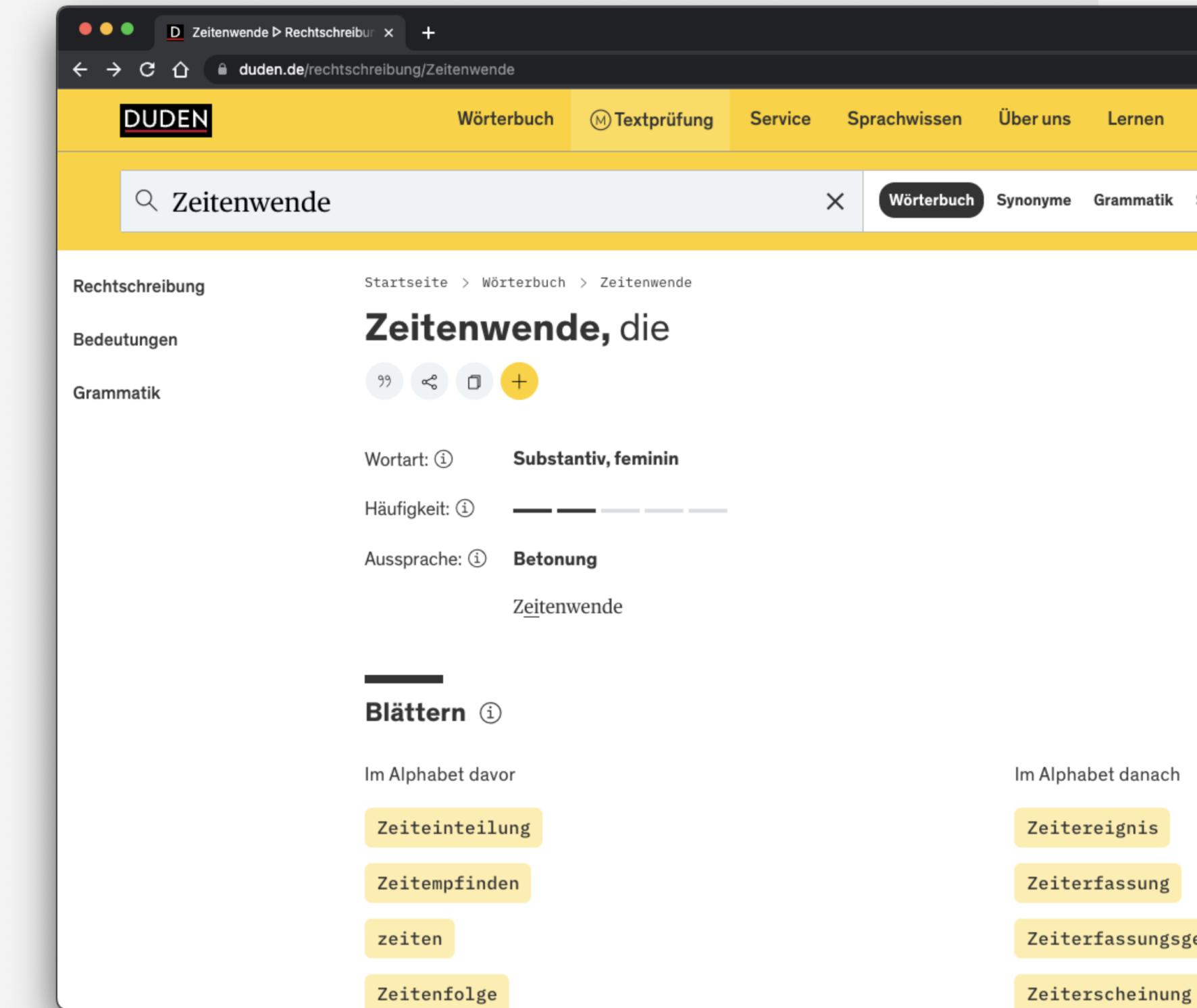
Prof. Dr. Gabriel Rausch

Content

Provide information (e.g. with **HTML**)

The screenshot shows the browser's element inspector with the following HTML structure:

```
> <nav class="breadcrumb" role="navigation">...</nav>
<article role="article"> = $0
  <div class="lemma">
    <h1 class="lemma__title">
      <span class="lemma__main">Zeitenwende</span>
      ", "
      <span class="lemma__determiner">die</span>
    </h1>
  </div>
  <dl class="tuple" grid>
    <dt class="tuple__key">...</dt>
    <dd class="tuple__val">Substantiv, feminin</dd>
  </dl>
  <dl class="tuple" grid>
    <dt class="tuple__key">
      "Häufigkeit: "
      <a class="tuple__icon" href="/hilfe/haeufigkeit" target="1" data-gtm-vis-has-fired-8011686_560="1" data-gtm-fired-8011686_684="1"> ⓘ</a>
    </dt>
  </dl>
```



Content

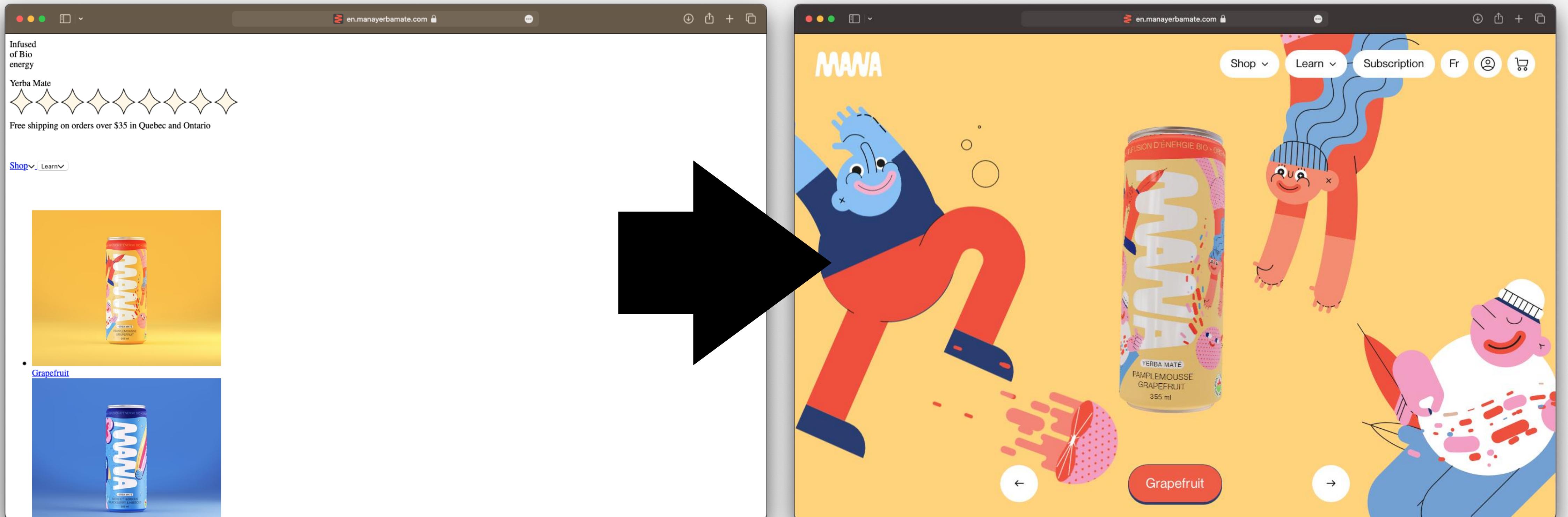
Provide information (e.g. with **HTML**)



<https://www.pocket-lint.com/de-de/software/news/98900-tolle-geek-tattoos.webstory>

Visualization

Making things perceptible and aesthetic (e.g. with **CSS**)



<https://en.manayerbamate.com>

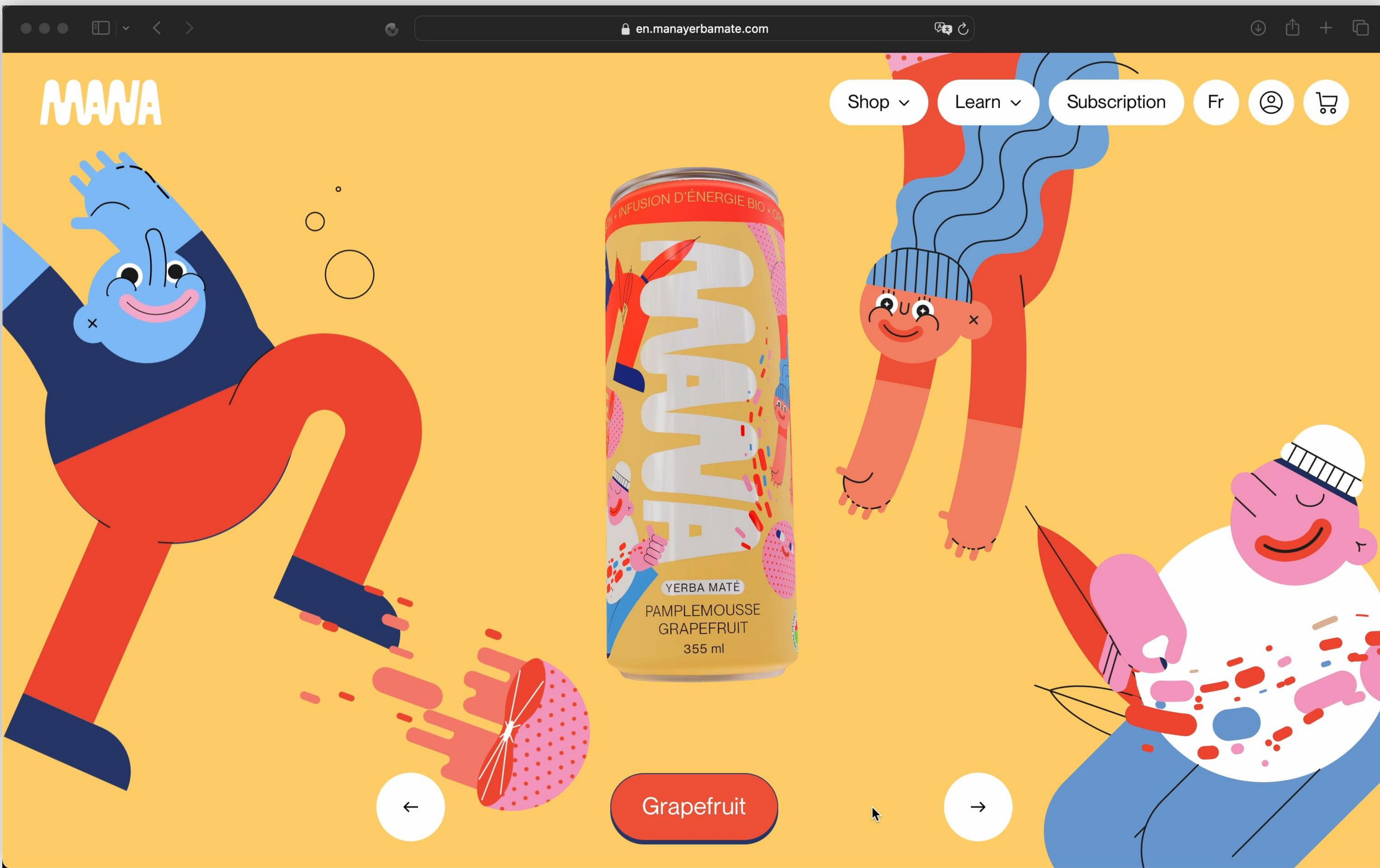
Visualization

Making things perceptible and aesthetic
(e.g. with **CSS**)

```
.ninja {  
    color: black;  
    visibility: hidden;  
    animation-duration: 0.00001s;  
}
```

Interaction

<https://en.manayerbamate.com>



**“Interacting in the world,
participating in it and acting through it,
in the absorbed and unreflective
manner of normal experience.”**

—Paul Dourish in “Where the Action is“

Interaction to drill deeper into information

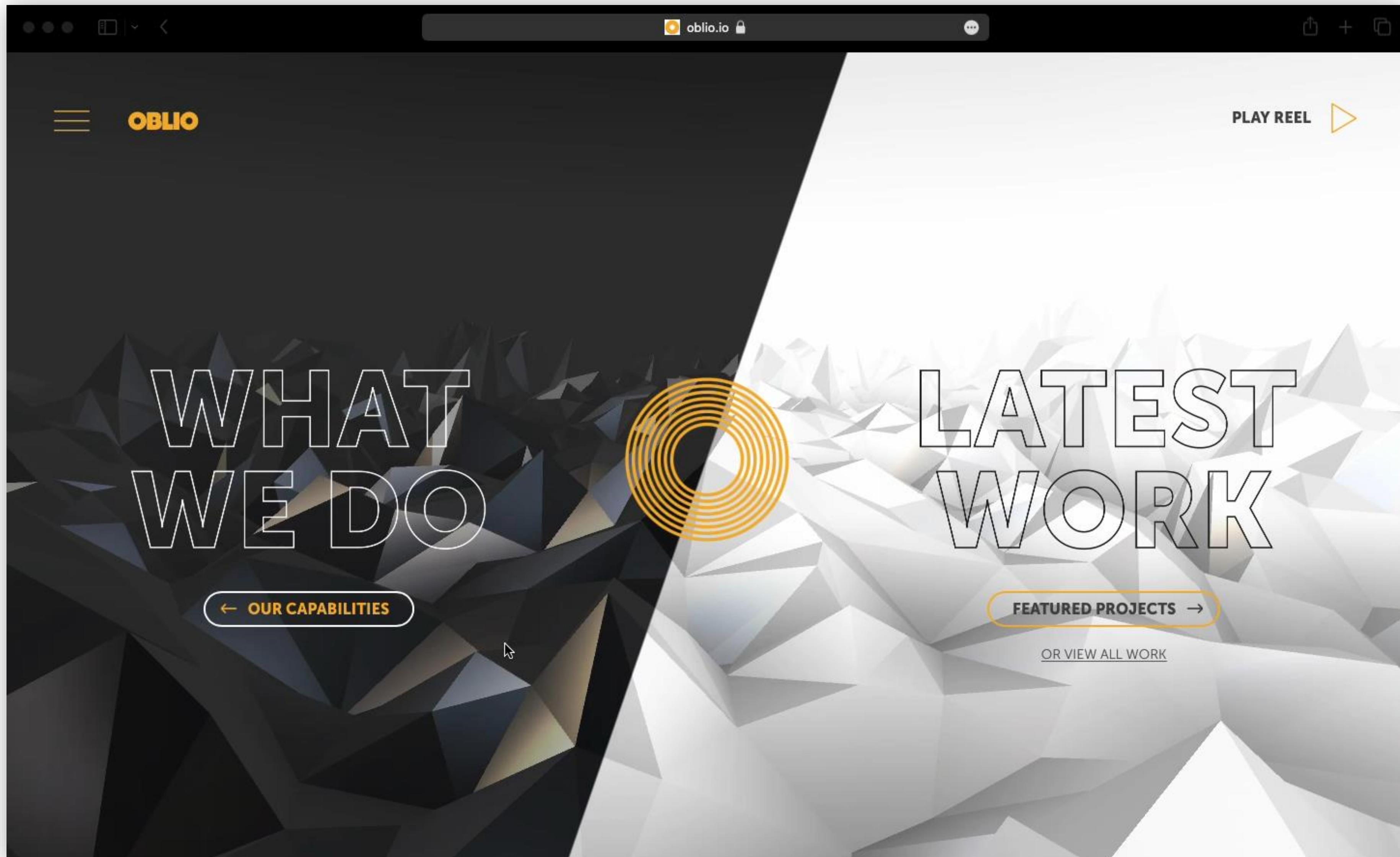
<https://www.zeit.de/wirtschaft/2023-07/soziale-ungleichheit-einkommen-armut-reichtum-rechner>

The screenshot shows a web browser window for Zeit.de. The page title is "Soziale Ungleichheit" and the main heading is "Bin ich wirklich Mittelschicht?". Below it, a subtext reads: "Deutschland streitet über die Frage, wer arm ist und wer reich. Vermögen, Arbeit, Wohnen: Finden Sie in unserem Rechner heraus, wo Sie in der Gesellschaft stehen." A timestamp indicates the article was published on "14. Juli 2023, 9:59 Uhr / 769 Kommentare".

The central feature is a visualization titled "Deutschland in 1.000 Personen" showing a grid of 1,000 stylized human figures. The grid is divided into four horizontal sections: "Wohlhabenheit" (top), "Wohlstand" (second), "Mitte" (third), and "untere Mitte" (bottom). A callout box over the "Mitte" section states: "Mit Ihren Angaben befinden Sie sich in der sozialen Lage **Mitte**, so wie **39,2 Prozent** der Menschen in Deutschland." To the right of the visualization, a yellow box displays the message: "Ihre Daten werden zu keinem Zeitpunkt gespeichert." Below this, there are input fields for "Haushaltseinkommen (netto)" (set to 2.145 €) and "Haushaltsvermögen (netto)" (set to "bis 50.000 Euro"). Further down, sections for "Haushalt und Beschäftigung" and "Wohnsituation" are visible, each with dropdown menus and additional input fields.

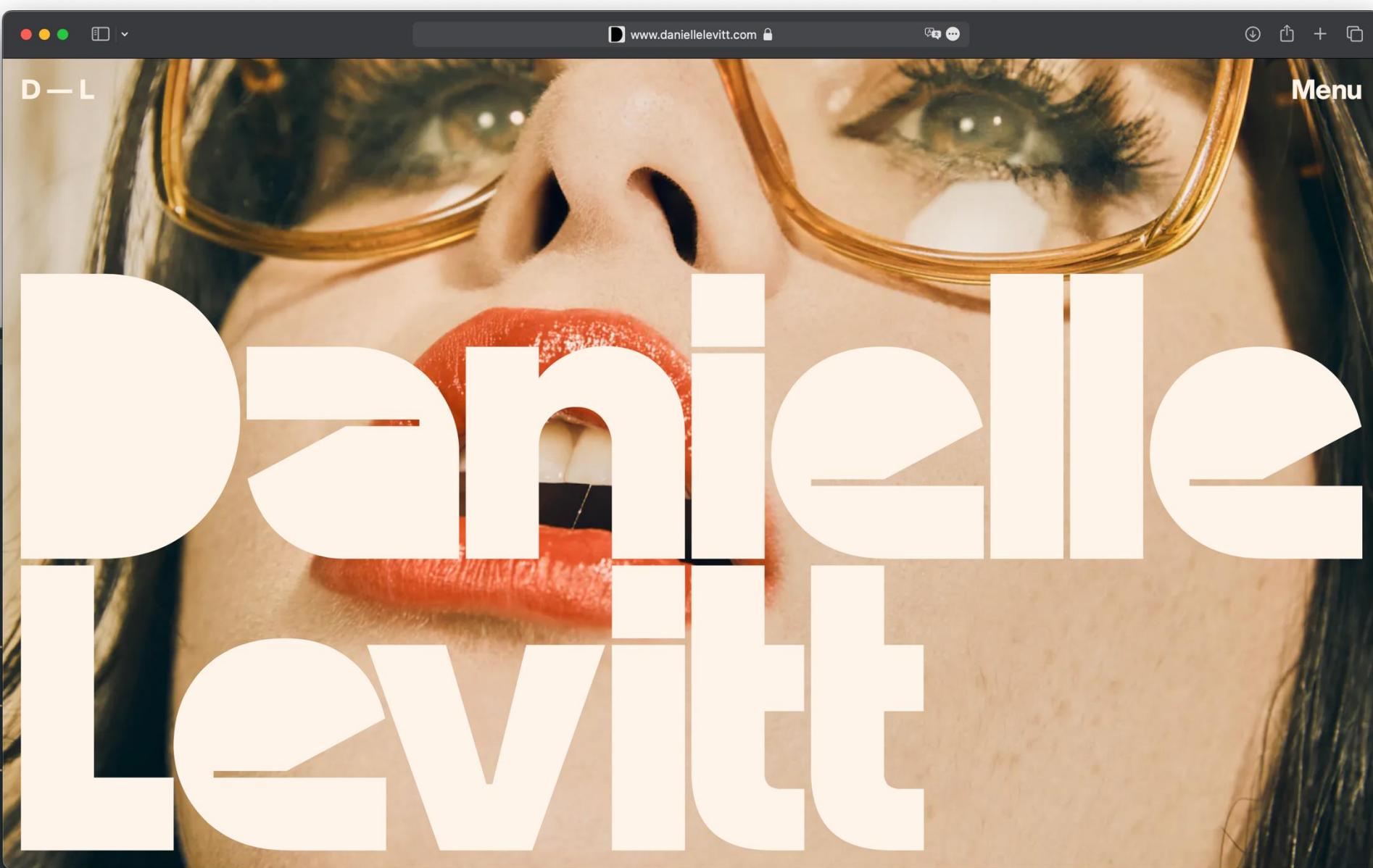
Interaction for immersive virtual worlds

<https://oblio.io>

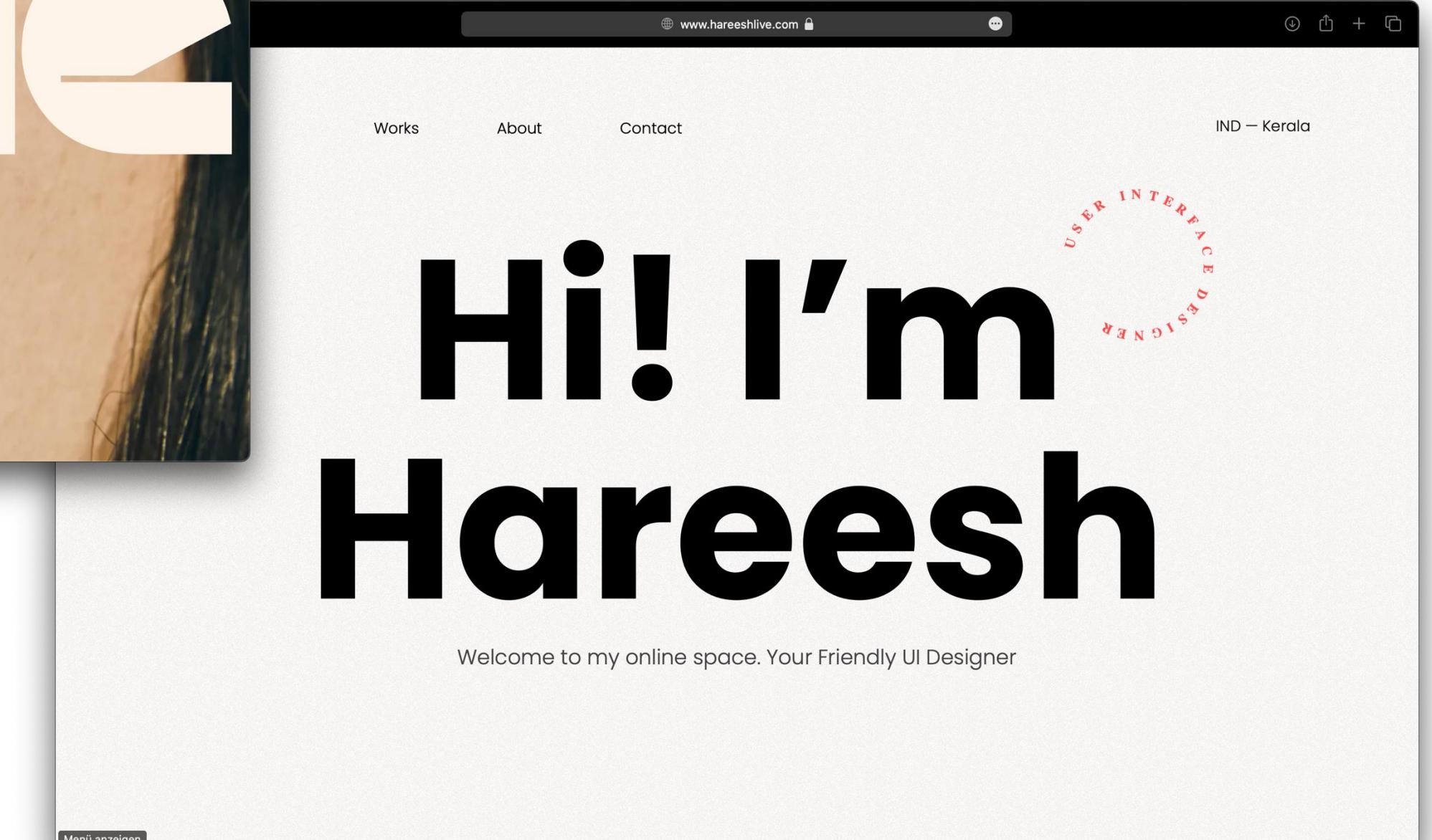


Microinteractions to create signature moments

<https://www.daniellelevitt.com>



<https://maryamrika.com>

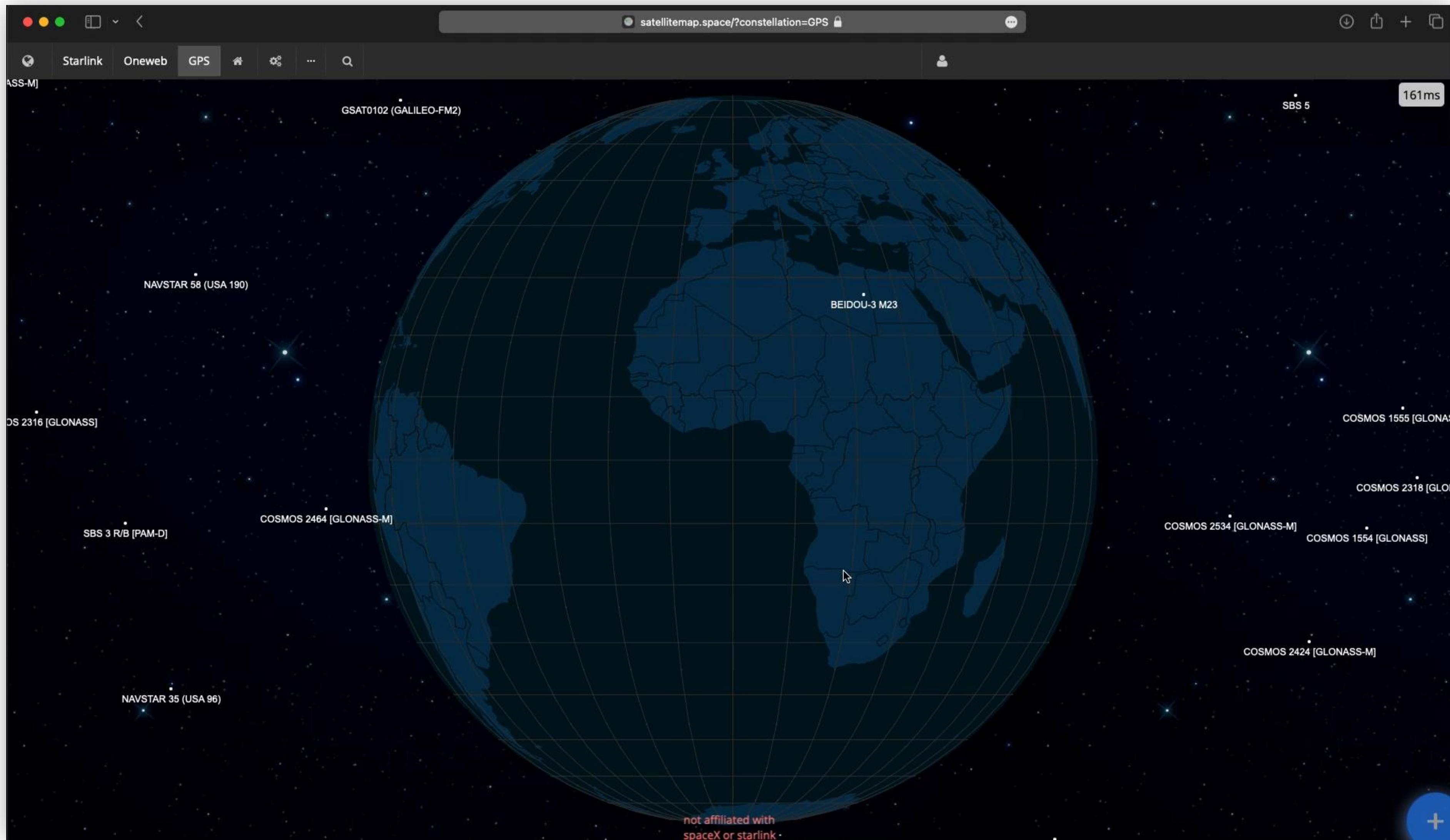


<https://www.hareeshlive.com>

Interaction

To connect people and things

<https://satellitemap.space/?constellation=starlink>



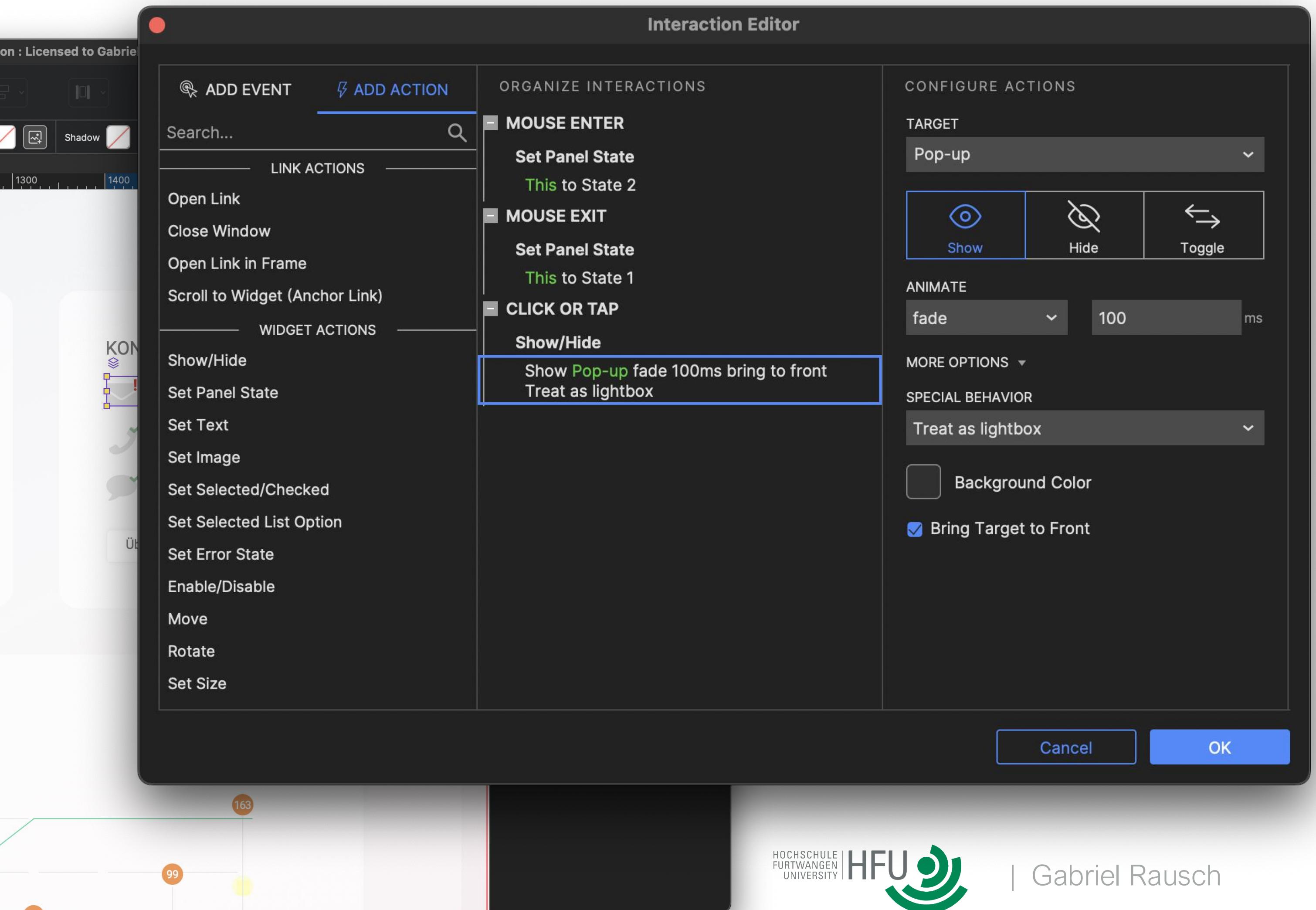
Use-Cases for HM- and MM-Interaction

- **Click or tap** a button
- **Shake** the smartphone to listen to a new music mic
- **Read data** to get latest weather information
- **Modify data** to add new item to the shopping cart
- **Calculate** the total of the shopping cart
- **Save data** to a user account
- **Set dependencies...**
- **Give feedback** to the user...
- **Manipulate content and styles...**

Create Interaction

With No-Code Prototyping Tools

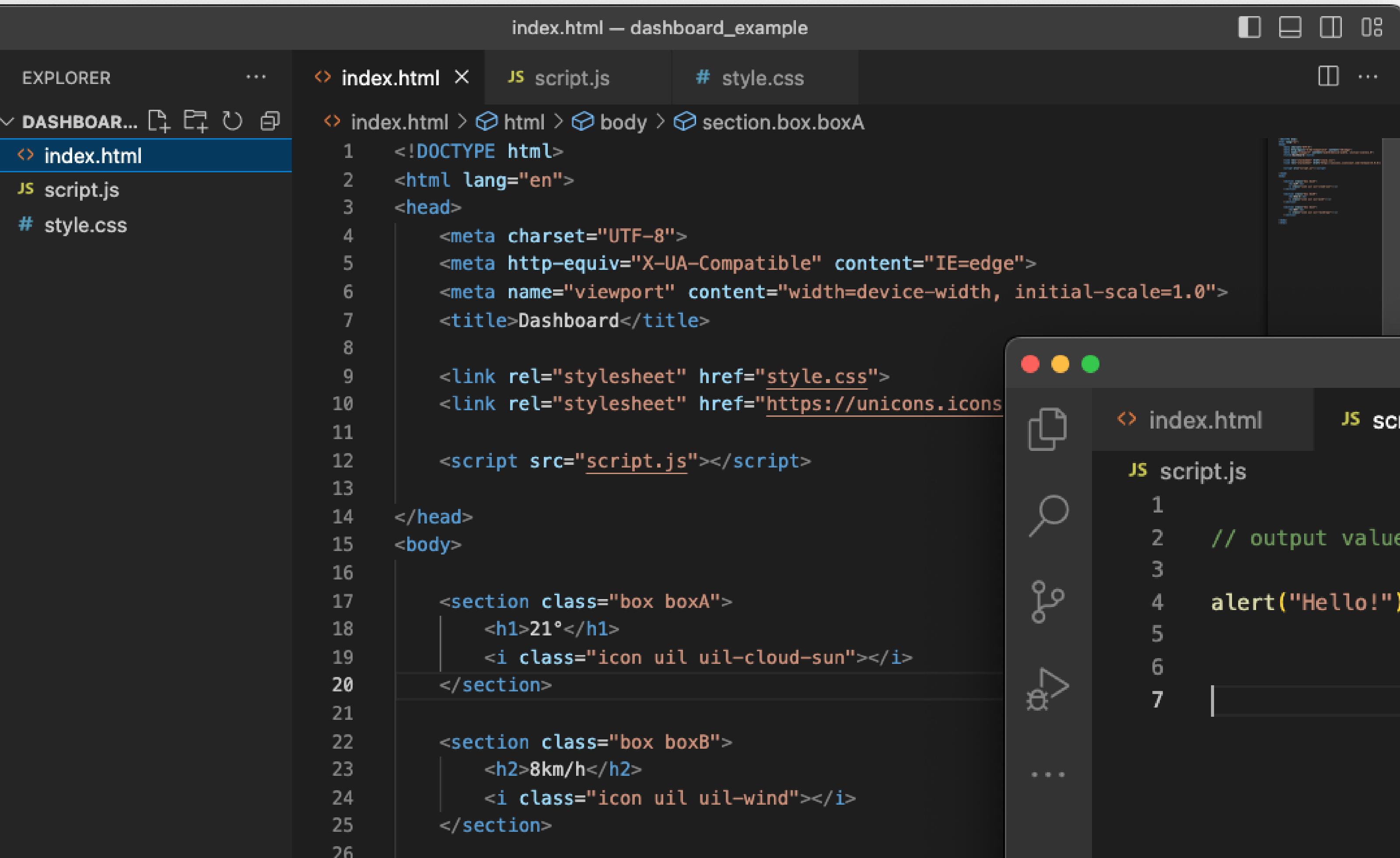
Interaction Editor in Axure RP



Provide many **common features** to handle **states**, handle user's input based on **events** (**click, tap...**) and modify content or **styles** at runtime.

Create Interaction

With JavaScript



The image shows a code editor interface with two tabs open: "index.html" and "script.js".

index.html — dashboard_example

```
<!DOCTYPE html>
<html lang="en">
<head>
    <meta charset="UTF-8">
    <meta http-equiv="X-UA-Compatible" content="IE=edge">
    <meta name="viewport" content="width=device-width, initial-scale=1.0">
    <title>Dashboard</title>

    <link rel="stylesheet" href="style.css">
    <link rel="stylesheet" href="https://unicons.icons"

    <script src="script.js"></script>
```

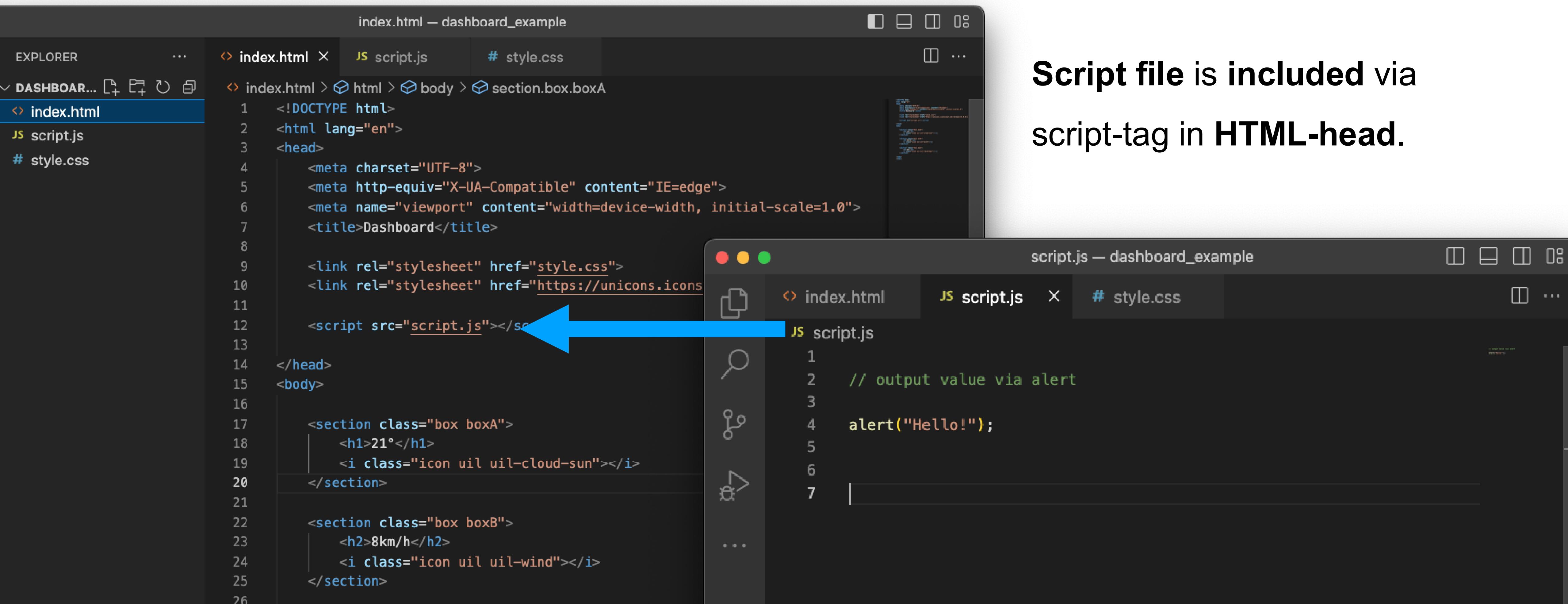
script.js — dashboard_example

```
// output value via alert
alert("Hello!");
```

**Use any type of interaction
that can be created **within the
browser.****

Create Interaction

With JavaScript



The image shows a code editor interface with two tabs: "index.html" and "script.js".

index.html — dashboard_example

```
<!DOCTYPE html>
<html lang="en">
<head>
    <meta charset="UTF-8">
    <meta http-equiv="X-UA-Compatible" content="IE=edge">
    <meta name="viewport" content="width=device-width, initial-scale=1.0">
    <title>Dashboard</title>

    <link rel="stylesheet" href="style.css">
    <link rel="stylesheet" href="https://unicons.icons">

    <script src="script.js"></script>
```

script.js — dashboard_example

```
// output value via alert
alert("Hello!");
```

A blue arrow points from the "script" tag in the index.html code to the "script.js" file tab.

**Script file is included via
script-tag in HTML-head.**

Creative Coding I

JavaScript

Prof. Dr. Gabriel Rausch

“JavaScript is a **programming language** to make **interactive webpages**. ...it is one of the **core technologies** of the World Wide Web. For example, when browsing the internet, anytime you see an image carousel, a click-to-show dropdown menu, or dynamically changing element colors on a webpage, you see the effects of JavaScript.”

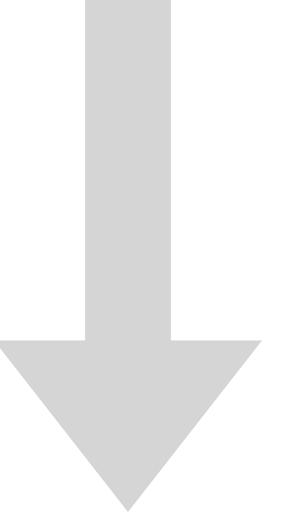
— MDN

https://developer.mozilla.org/en-US/docs/Learn/JavaScript/First_steps/What_is_JavaScript

Specification



Implementation



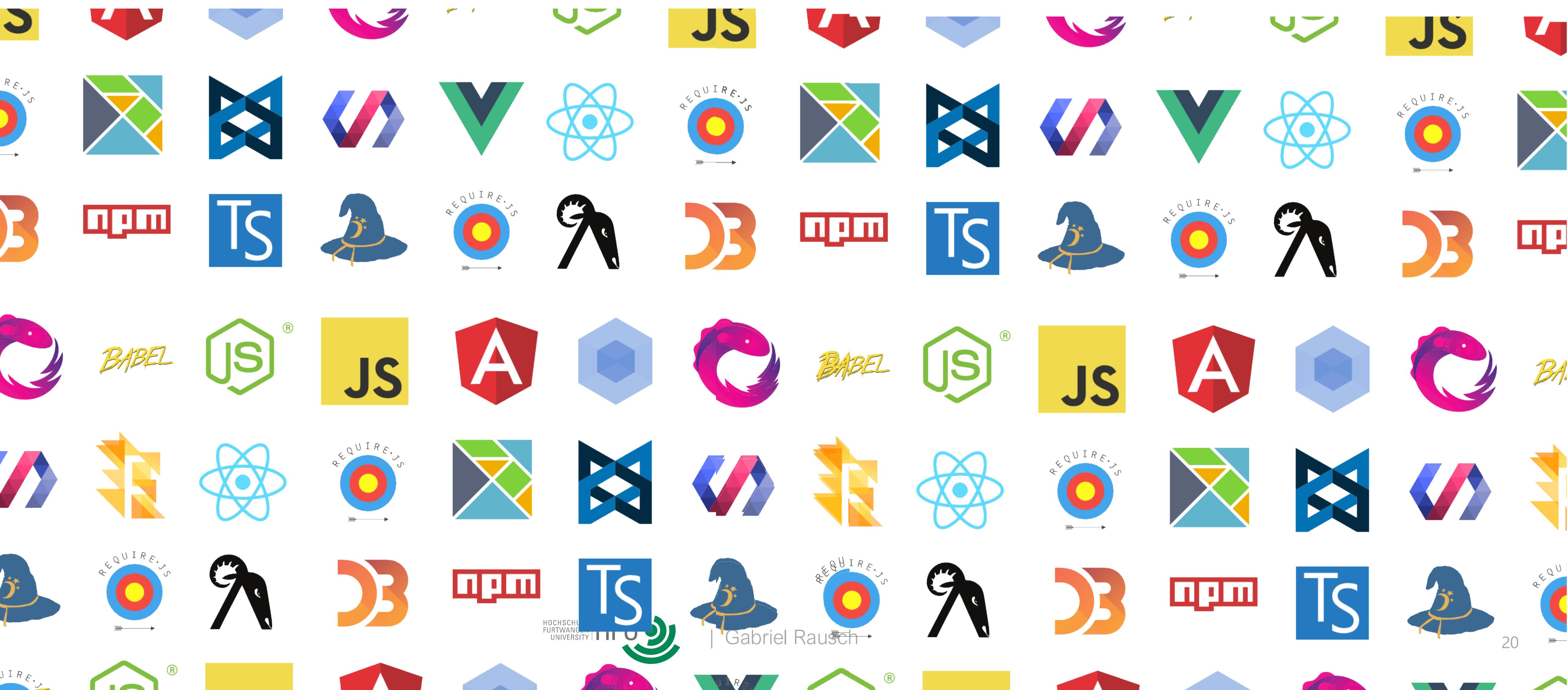
ISO/IEC 16262



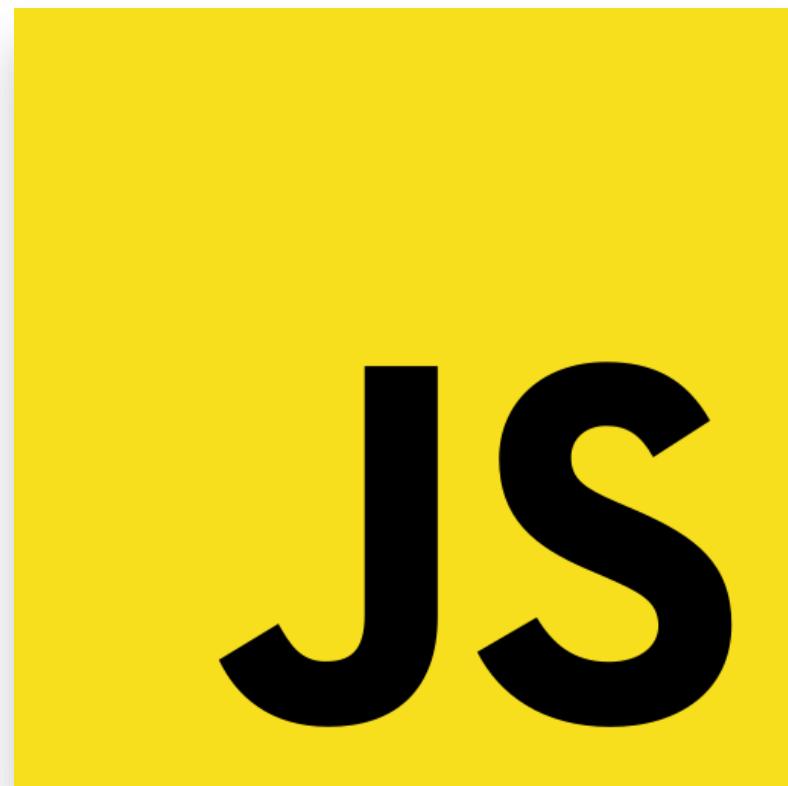


<https://medium.com/@basterrika/javascript-the-king-of-popularity-7dd50e2e40fe>

JavaScript is very **well documented** with one of the **strongest developer communities** and offers all **extensions**, libraries and framework.



JavaScript can be used on the **client** and **server side** to develop applications.



The first touch

Inline JavaScript

```
<body>
|   <button onclick="alert('Hello Welt!')>Klick mich!</button>
</body>
```



Mix HTML and JavaScript is a bad approach!

JavaScript Einbindung

Externe Script-Datei

```
<head>
  <meta charset="UTF-8">
  <link rel="stylesheet" type="text/css" href="css/styles.css">
  <script src="js/my-script.js"></script>
</head>
```

Script-Tag

External file that is
linked via src attribute

Creative Coding I

Variables and Values

Prof. Dr. Gabriel Rausch

Declaration of variables

```
let varName ;
```

Declaration of variables

let

varName

;

Keyword for declaration of a variable
Similar keywords: var, const

Declaration of variables

```
let varName ;
```

Name of variables, that is defined by the creator with the following syntactic restrictions:

- Exclusive use of digits (0-9), letters (a-z, A-Z), and two other characters (underscore and \$).
- ...must not start with a digit
- ...must not contain spaces and also no hyphen
- no use of a keyword from TypeScript/JavaScript (e.g. string, for, while,..)

Declaration of variables

let

varName

;

End of each script line

Find the bug

let varName ;

```
1 let name;  
2 Let age;  
3 let 1parameter;  
4 let likes Fish;  
5 let whatever;
```

Find the bug

let varName ;

```
1 let name;  
2 Let age;  
3 let 1parameter;  
4 let likes Fish;  
5 let whatever;
```

```
1 let name;  
2 let age;  
3 let parameter1;  
4 let likesFish;  
5 let whatever;
```



Creative Coding I

Variables - Value Assignments

Prof. Dr. Gabriel Rausch

Value Assignments

let varName = Value ;

Value Assignments



Value Assignments

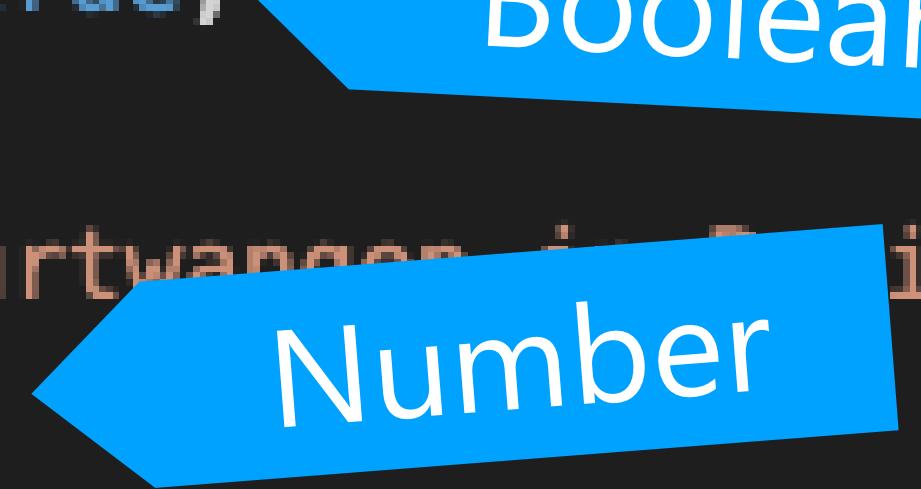


Examples

let varName = Value ;

```
1 let animal = "Pingu";
2 let age = 2;
3 let likesFish = true;
4
5 let braille = "Furtwangen in Braille: ☺☺☺☺☺☺☺☺";
6 let weight = 5.3;
7 let enable = false;
```

Types of values

```
1 let animal = "Pingu";  
2 let age = 2;  
3 let likesFish = true;  Boolean  
4  
5 let braille = "Furtwanger ist Brillen: ananananan";  
6 let weight = 5.3;  Number  
7 let enable = false;
```

Creative Coding I

Operators to process data

Prof. Dr. Gabriel Rausch

String operators

(Zeichenketten Operatoren)

Connection String and String	<i>Calculation:</i> “Hello“ + “World“	<i>Result:</i> “Hello World“
Connection String and Number	<i>Calculation:</i> 1 + “kg“	<i>Result:</i> “1kg“

Math operators

(Mathematische Operatoren)

+	$17+3$	20
-	$10-3$	7
*	$3*5$	15
/	$15/3$	5
%	$12 \% 5$	2
++	<pre>var i=10 i++;</pre>	11
--	<pre>var i=10 i--;</pre>	9
$+=$ $--$ $*=$ $/=$	<pre>var i=10; i+=5;</pre>	15

Creative Coding I

Functions (Basics)

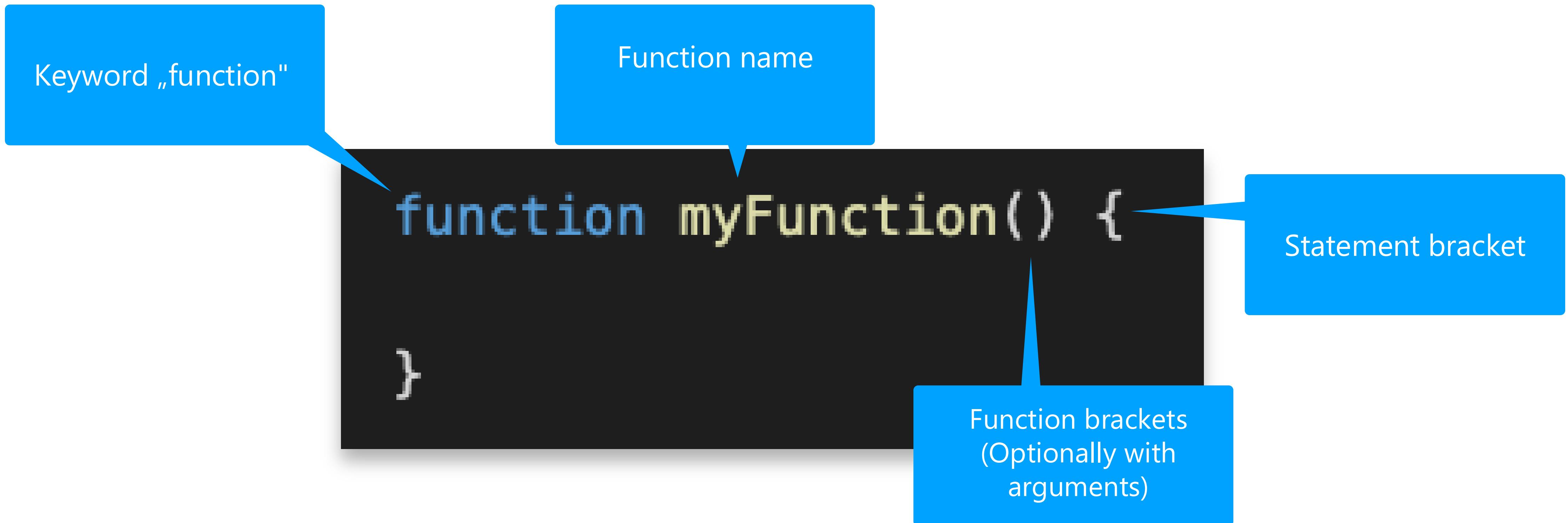
Prof. Dr. Gabriel Rausch

Function

"A function is a [...] procedure—a set of statements that performs a task or calculates a value. To use a function, you must define it somewhere in the scope from which you wish to call it."

— MDN, 2019

Function Declaration



Function Declaration

```
function myCoolFunction() {  
    let fuelConsumption = 7;  
    let kilometers = 30;  
    let emissionPetrol = fuelConsumption * kilometers * 0.238;  
  
    let result = "CO2-Ausstoß: " + emissionPetrol;  
  
    console.log(result);  
}
```

Call a Function

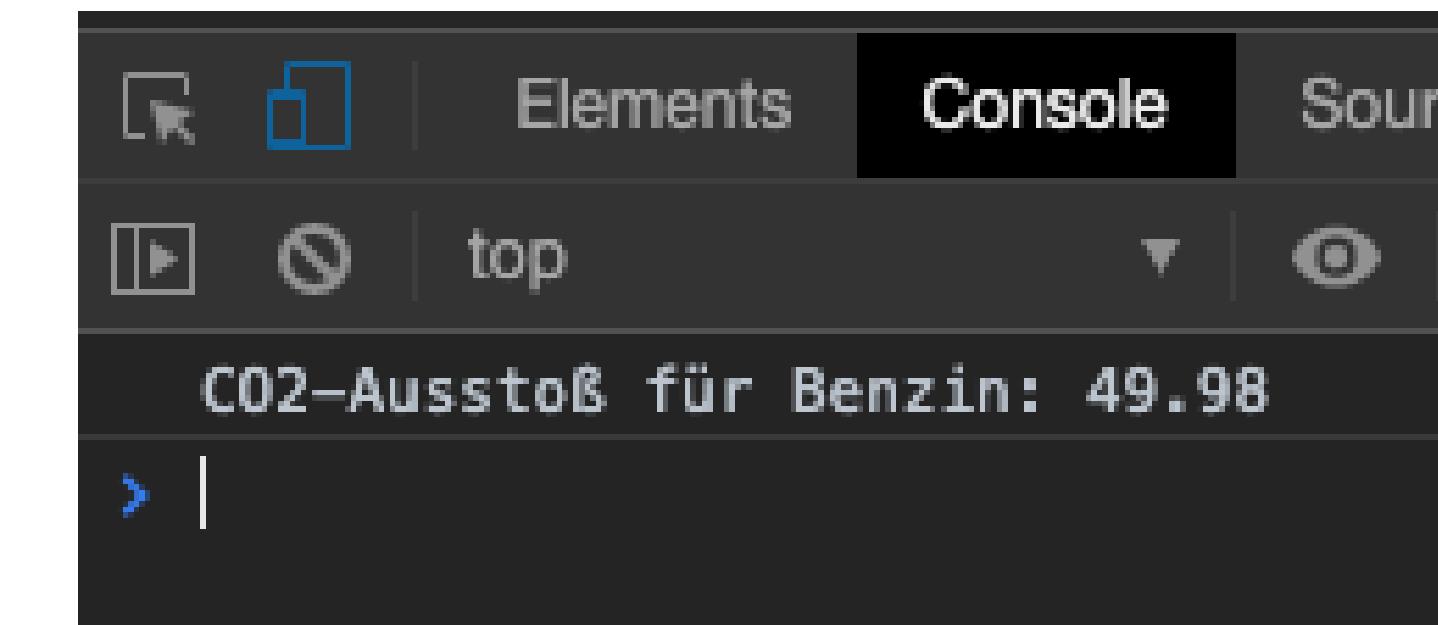
```
function myCoolFunction() {  
    let fuelConsumption = 7;  
    let kilometers = 30;  
    let emissionPetrol = fuelConsumption * kilometers * 0.238;  
  
    let result = "CO2-Ausstoß: " + emissionPetrol;  
  
    console.log(result);  
}
```

myCoolFunction();

Function call
with function brackets ()

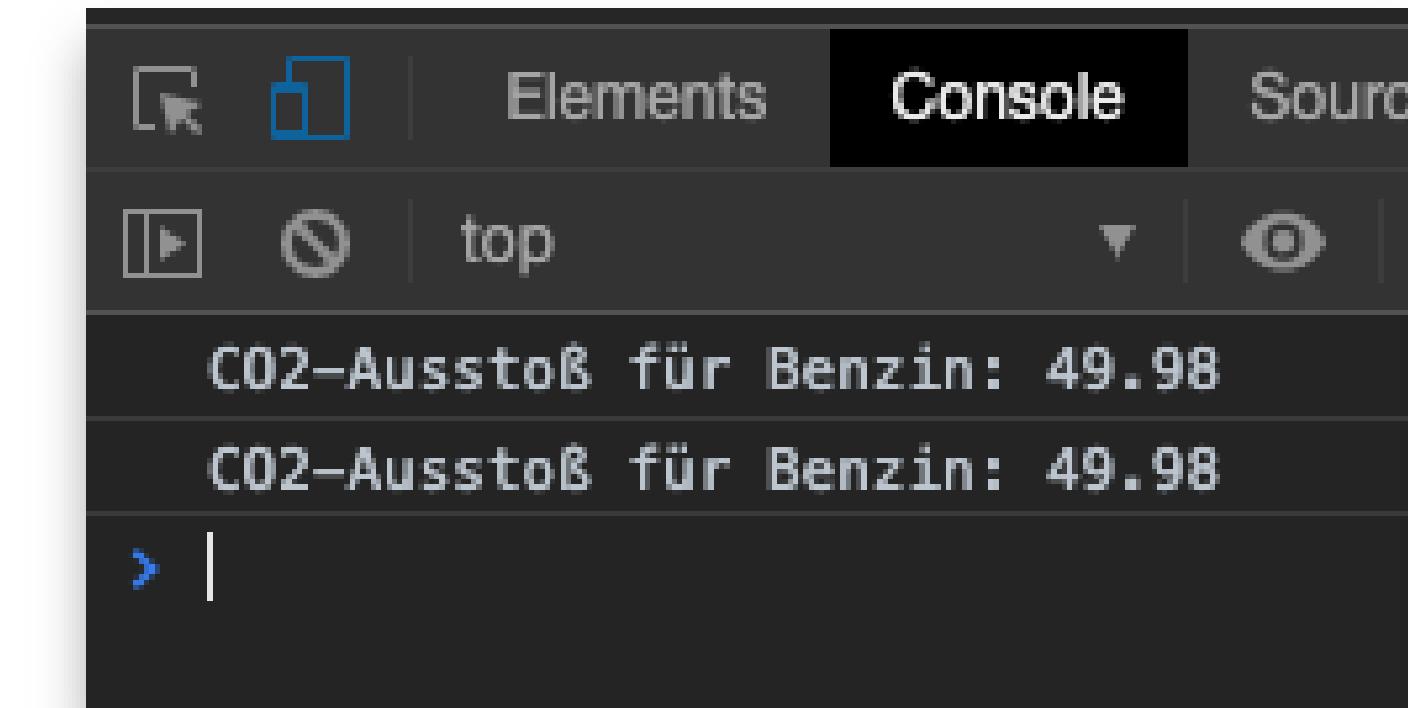
Function can be called multiple times

```
myCoolFunction();
```



Function can be called multiple times

```
myCoolFunction();  
myCoolFunction();
```



```
Elements    Console    Source  
top  
CO2-Ausstoß für Benzin: 49.98  
CO2-Ausstoß für Benzin: 49.98
```

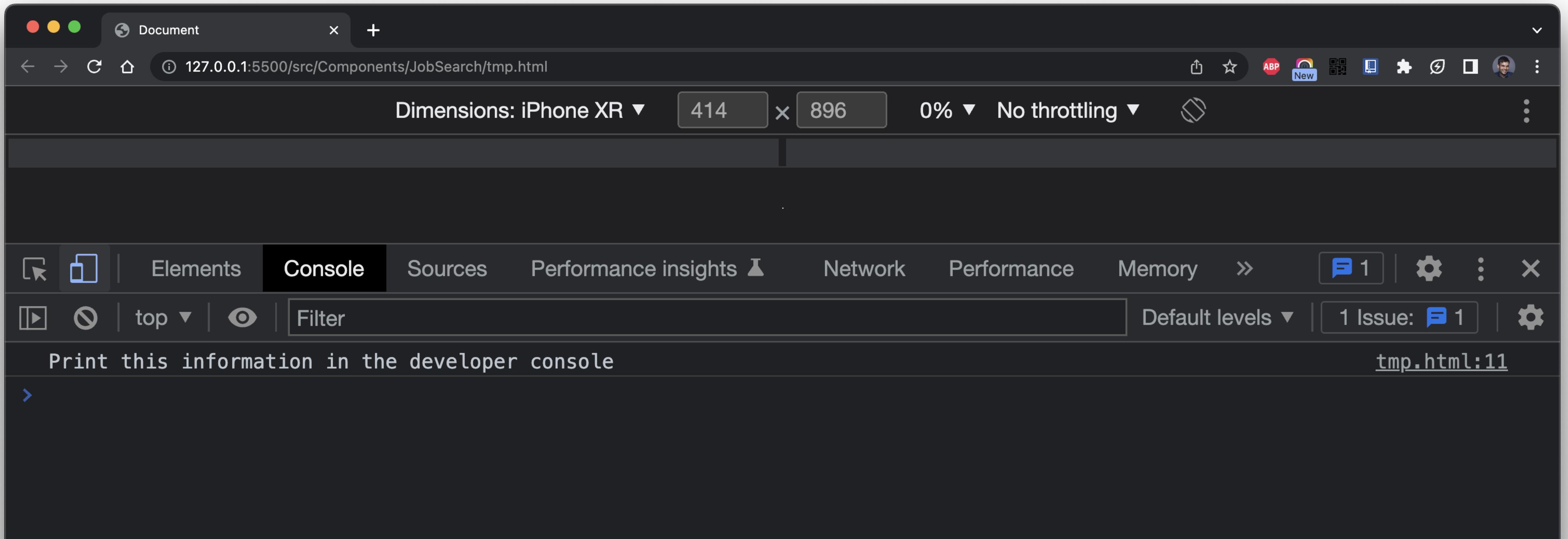
Functions

- The **execution** of the statements **of a function** (or the execution of a function) **can be controlled**
- A function can be **used again and again**

Quick guide: output data

Use developer console

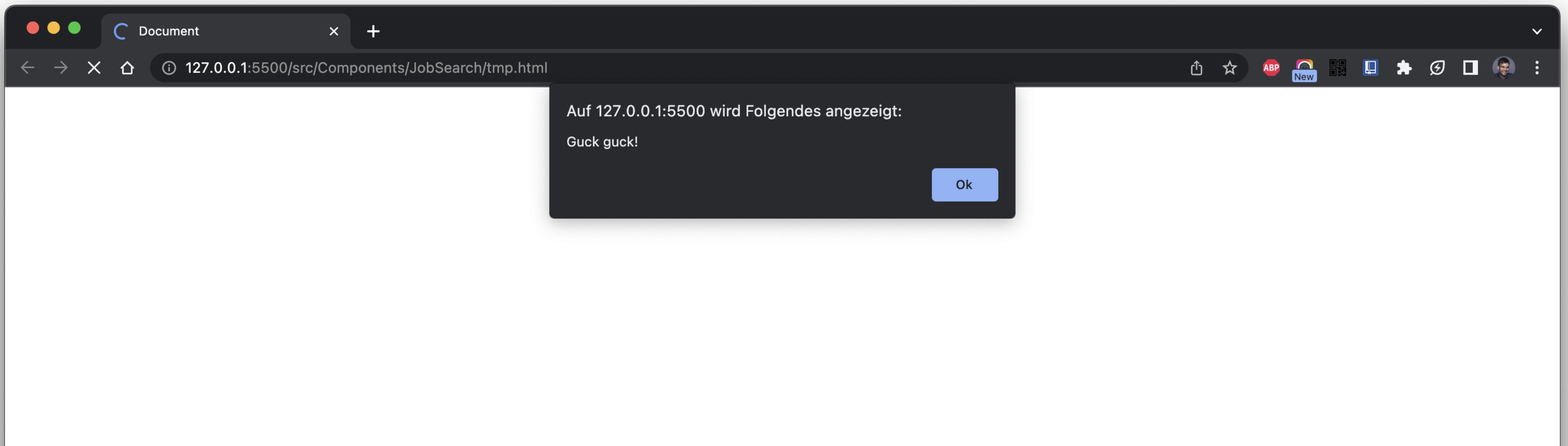
```
console.log("Print this information in the developer console");
```



Quick guide: output data

Use **alert** to create **dialog box** that pops up on the screen

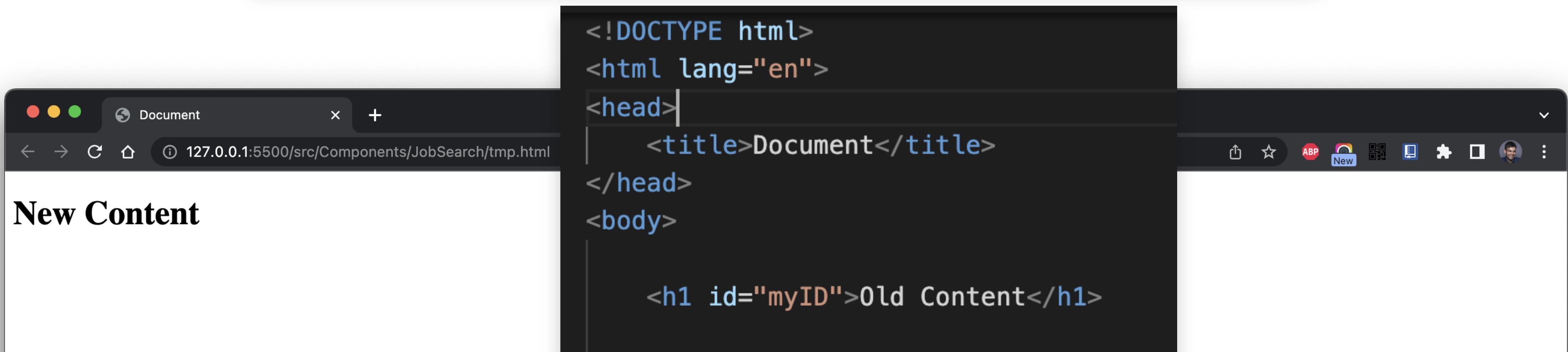
```
alert("Guck guck!");
```



Quick guide: output data

Replace the content of an HTML element

```
document.querySelector("#myID").innerHTML = "New Content";
```



A screenshot of a web browser window titled "Document". The address bar shows the URL "127.0.0.1:5500/src/Components/JobSearch/tmp.html". The main content area displays the text "New Content". To the right of the browser window, a code editor shows the corresponding HTML code:

```
<!DOCTYPE html>
<html lang="en">
<head>
    <title>Document</title>
</head>
<body>

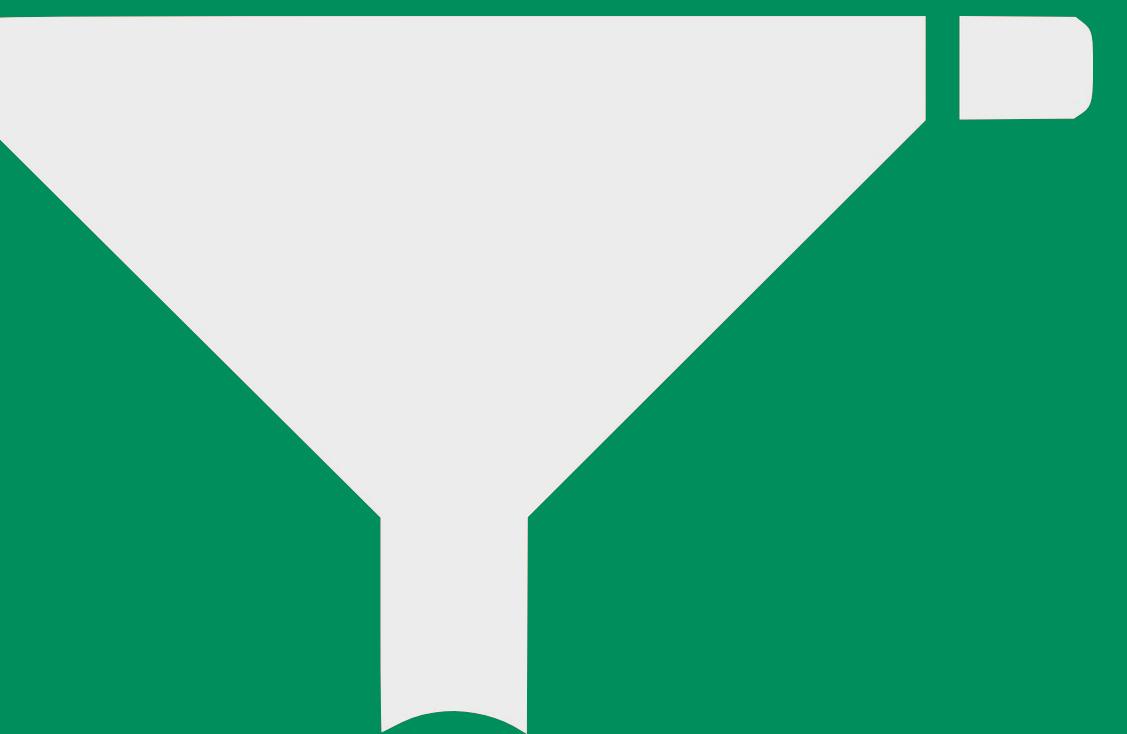
    <h1 id="myID">Old Content</h1>

</body>
</html>
```

Creative Coding I

Take Aways

Prof. Dr. Gabriel Rausch



Interaction is a fundamental aspect of digital applications.

Interactive features can be created with a scripting language, such as **JavaScript**.

ECMAScript is a specification that is mapped by **JavaScript** in the browser.

Declaring a variable and assigning a value was introduced.

**Operators can be used to process,
concatenate and calculate data.**

**Functions are
blocks of commands
that can be called.**