WES BOS TALKS TRAINING
How this designer and developer built a community

PRETTY POP-UPS
Create custom messages with SweetAlert library

GRAPHIC SHADERS
Discover essential image post-processing techniques

The voice of **web design**

net

Issue 305 : May 2018 : *net.creativebloq.com*

*FEATURE

THE ART OF DATA VISUALISATION
Learn the secrets behind transforming information and data into infographics

CHANGING HOW WE DESIGN AND DEVELOP

AUGMENTED REALITY

- Why it's important
- How to create it
- Who's using it

AR.JS
Take a look at the project bringing you WebAR

+

ACCESSIBILITY AND UX

WEBASSEMBLY: WHAT IS IT?

PARALLAX EFFECTS WITH WEBFLOW

MOZILLA'S BROWSER COMPATIBILITY PROJECT

FUTURE

ISSUE 305

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*WELCOME

EDITOR'S NOTE

It's perhaps fitting that as I settle into my new role as editor of **net**, we're considering the new reality of web design. Having gotten devoted Pokefans out in the streets en masse and homeowners arranging flatpack furniture via their mobile phones, augmented reality (AR) is rapidly taking over in the web-design space. Thanks in no small part to AR.js and WebAR, it is now enabling developers to create designs that break the bounds of the page and offer a highly enriched experience as people browse the net.

That's why this issue we're doing a deep dive into all things AR. Alexandra Etienne, the AR/VR evangelist, is looking into the current state of play for AR and examining the many applications it could have for web design.

But this isn't our only look at how web design can reflect on reality this issue. Audrée Lapierre gives a breakdown of how you can craft deft data visualisations, covering everything from digging out the right datasets to crafting a silky smooth UX. Meanwhile, Tom Smith takes a look at how WebGL can be used to create immersive 3D in-browser experiences that take the user's breath away. Finally, in our Project section, Neil Pearce shows how you can whip up and wow fashionistas with your slick split-screen landing pages.

Enjoy the issue!

FEATURED AUTHORS

ALEXANDRA ETIENNE

Alexandra is a AR/VR evangelist currently working with Lightform, a startup founded by ex-Microsoft/Disney researchers. She delves into AR on page 60.
w: *medium.com/@AndraConnect*
t: @AndraConnect

AUDRÉE LAPIERRE

Audrée is creative director of FFunction, an award-winning data visualisation studio based in Montréal. On page 68, she offers up her expertise on crafting superlative data viz.
t:@audreelapierre

SUE BICKNELL

Sue's been involved in interviewing graphic design graduates for over 25 years. On page 20, she offers up essential advice to design students in their final year on rustling up their first design role.
w: *http://www.brownandco.co/*

CHRISTINA KING

Christina works as a social media executive at award-winning digital agency Createful. She curated our Gallery on page 40 this month, featuring wildlife and wine.
w: *createful.com*
t: @christina_king1

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Future PLC, Richmond House, 33 Richmond Hill, Bournemouth, BH2 6EZ +44 (0)1202 586200
@netmag /netmag *flickr.com/photos/netmag* netmag@futurenet.com *net.creativebloq.com* *medium.com/net-magazine*

EDITORIAL

Senior Art Editor **Will Shum** Editor **Josh Russell**

CREATIVE BLOQ

Acting Editor **Julia Sagar** *juliasagar@futurenet.com*
Operations Editor **Ruth Hamilton** Production Editor **Ella Taylor** Staff Writer **Dominic Carter**

CONTRIBUTIONS

Sarah Bankes, Sue Bicknell, Carl Cahill, Kyle Carpenter, Jo Cole, Tanya Combrinck, Alexandra Etienne, Natasha Hockey, Steve Jenkins, Sue Jenkins, Simon Jones, Francis Kagumba, Anna Kelian, Christina King, Audree Lapierre, Oliver Lindberg, Richard Mattka, Tom May, Jim McCauley, Christopher Murphy, Neil Pearce, Florian Scholz, Tom Smith

PHOTOGRAPHY

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ADVERTISING

Media packs are available on request
Commercial Director **Clare Dove** *clare.dove@futurenet.com* Advertising Manager **Michael Pyatt** *michael.pyatt@futurenet.com*
Account Director **Chris Mitchell** *chris.mitchell@futurenet.com*

INTERNATIONAL

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International Licensing Director **Matt Ellis** *matt.ellis@futurenet.com*

PRINT SUBSCRIPTIONS & BACK ISSUES

Web *www.myfavouritemagazines.co.uk* **Email enquiries** *contact@myfavouritemagazines.co.uk* **Tel** 0344 848 2852 **International** +44 (0)344 848 2852
Group Marketing Director, Magazines & Memberships **Sharon Todd**

CIRCULATION

Head of Newstrade **Tim Mathers** 01202 586200

PRODUCTION

Head of Production US & UK **Mark Constance** Production Project Manager **Clare Scott** Advertising Production Manager **Joanne Crosby**
Digital Editions Controller **Jason Hudson** Production Manager **Nola Cokely**

MANAGEMENT

Chief Operations Officer **Aaron Asadi** Commercial Finance Director **Dan Jotcham**
Group Content Director **Paul Newman** Head of Art & Design **Greg Whittaker**

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Photo: Jenna Bos, Bear and Sparrow Photography

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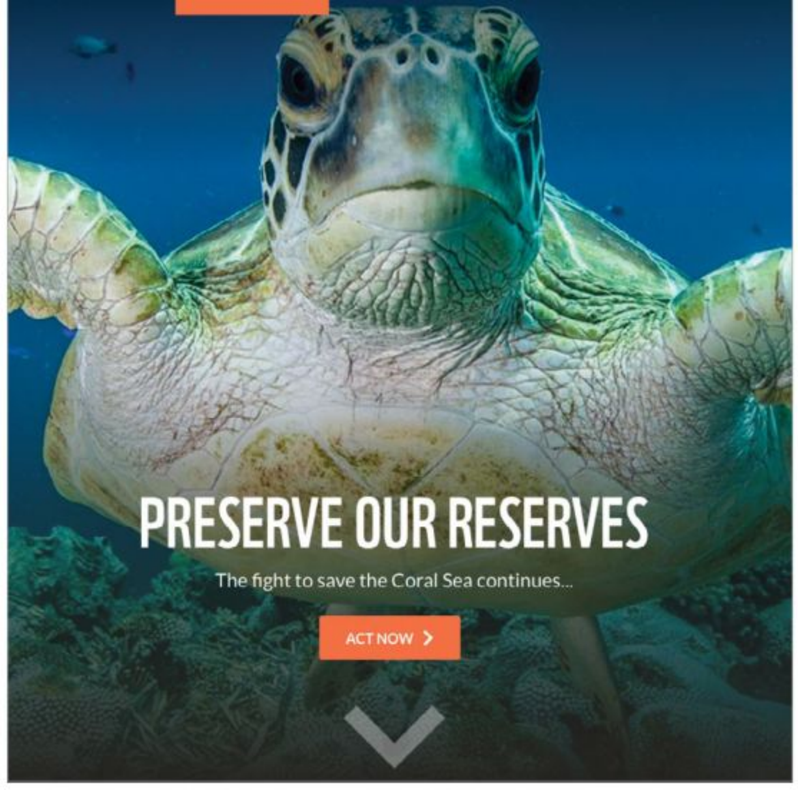

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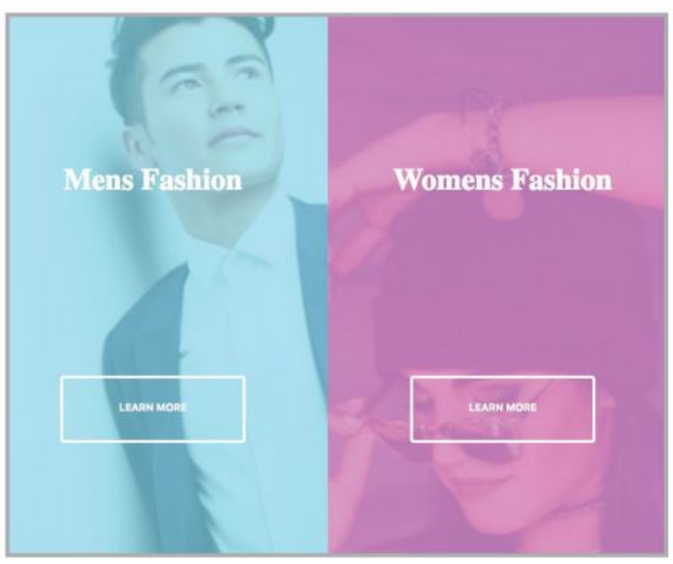

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Carl Cahill asks what lengths you should go to make sure you cater for accessibility

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EXCHANGE

Practical advice from industry experts

Send your questions to netmag@futurenet.com

THIS MONTH FEATURING...

ALEX RUSSELL

Alex is a web developer working on Chrome, Blink, and the Web Platform at Google. He helps lead the team building a new application model for the web, and serves on ECMA TC39, the standards body for JavaScript. He's also an elected member of the W3C Technical Architecture Group as well as tech lead for standards inside the Chrome team.

w: *infrequently.org*
t: *@slightlylate*

CATT SMALL

A product designer at Etsy, Catt specialises in UX design, visual design, and development. She not only designs stunning, usable products but also works directly with agile development teams in order to bring designs to life, and strives to make the world (and its wide web) a better-looking place.

w: *cattsmall.com*
t: *@cattsmall*

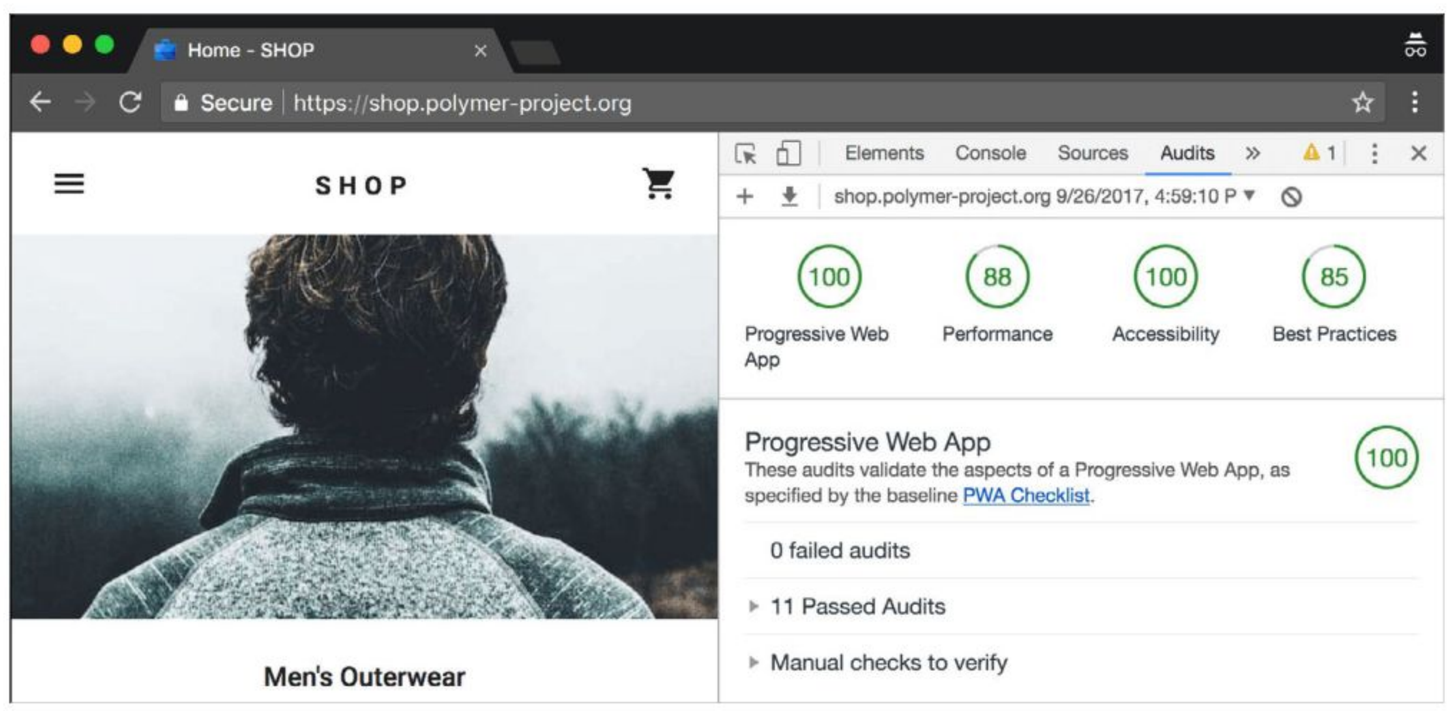
★QUESTION OF THE MONTH

What do you think are the biggest barriers to PWAs becoming more widespread, and how can we, as a web community, help?

Sally Lait, Suffolk, UK

AR: Uncertainty around browser support for some PWA features has caused partners and teams we're working with to question their value. I'm incredibly optimistic about that story changing in 2018: in addition to Chrome, Opera and Samsung's deep PWA support, Microsoft is bringing PWAs to the Microsoft Store, Apple has implemented service workers, and Firefox has added PWA support to its Android product. The biggest objections are falling away.

The web community can help by taking a longer-term view. The fact that something isn't implemented on one (or even a few) browsers can't continue to be an excuse that we trot out whenever a new progressive-enhancement feature, such as service workers, arrives. Making the experience better for users on modern browsers almost always pays off when trailing-edge engines catch up.



Browser support is growing for PWAs: useful tools include Lighthouse, an open-source, automated tool for improving your apps in Google Chrome

KPIS

WHICH KPI?

What KPIs do you have for your designers and front-end developers, if any?

Ben Christine, Exeter, UK

CS: Like all key performance indicators (KPIs), ones for designers and front-end developers should be directed by your company's own goals and KPIs. For example, if a company has a KPI tied

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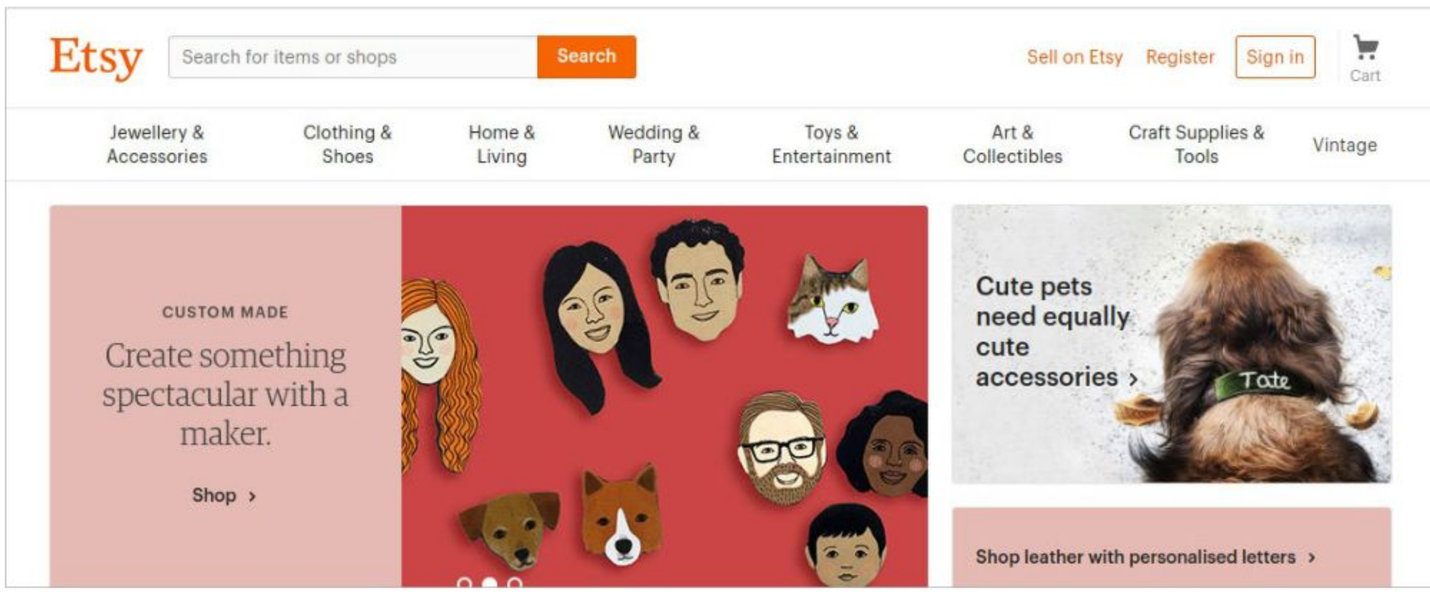


Etsy has its own design systems team, which builds systems and experiences that express Etsy's brand in a creative and usable way

to user engagement, a designer might have one centred around improving low-engagement experiences. A front-end developer at that same company might have KPIs focused on improving areas in the codebase that might deter engagement, such as page load times. This enables people with different skill sets to have a sense of fulfilment and understand how their work plays into the company's goals.

PWAS

NATIVE APPS

The year is 2023: what's the state of PWAs? What's adoption like, both by publishers and device manufacturers? How is their standing against native apps? Dare I ask: are they in app stores?

Remy Sharp, Brighton

AR: In 2023, PWAs are just 'how you web'. Starter kits and frameworks have become good at understanding that the model for your data, how you sync it, and choosing (or letting users choose) what to store offline is critical to the experience of a modern website. Versus native: there's a loss of legacy out there, but the fact that PWAs are understood by search engines continues to be their most important attribute. App stores: what are those again?

DESIGN

DESIGN SYSTEMS

Do you use a design system? If yes, how do you organise the maintenance between design and development?

Lisa Gringl, Austria

CS: Design systems are an extremely important part of digital products. I've worked with several during my career, including at Etsy. The best design teams understand the value of creating and maintaining design systems, especially once a product reaches a certain scale. The best method I've seen so far involves a company's designers focusing on digital product user experiences, while a few ensure that the design system evolves and stays cohesive.

A designer focused on product features will find it challenging to balance management of a design system with their regular work. Someone fully focused on design systems will be able to point out areas of overlap across an entire product and develop usage guidelines. If you're going to invest in building a design system, I strongly urge you to give it the attention it deserves.

PWAS

DESKTOP SUPPORT

What is the road map for desktop support of PWAs, and what desktops will be supported? Chrome OS? Windows?

Kenneth Rohde, Copenhagen, Denmark

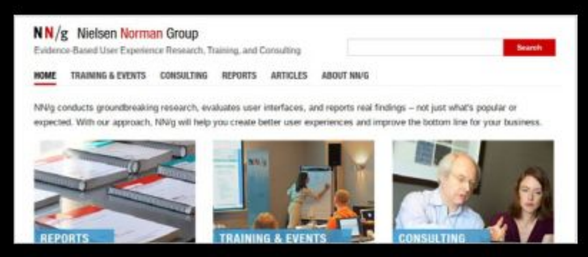
AR: Chrome is building support for Desktop PWAs in 2018, starting with Windows and CrOS. But we're playing catch-up, to some degree. Samsung has already shipped support for PWAs in its DeX environment, and Microsoft has committed to launching PWA support in the Microsoft Store early this year. I'm optimistic that we'll keep the pace, but there's a lot of work to do!

3 SIMPLE STEPS

I run a small open-source project. We have volunteers with great skills but not much CSS, UX and product design expertise. As the maintainer, anything we don't have falls to me. What's the best way to crash-course?

Kade Morton, New Zealand

+ CS: UX design takes a bit of time and practice to learn, but you can get some basics under your belt by reading books like *The User Experience Team of One* by Leah Buley, *Designed for Use* by Lukas Mathis, *Don't Make Me Think* by Steve Krug, and *Technically Wrong* by Sara Wachter-Boettcher.



+ If you have a usability question, Nielsen Norman Group's website may have research from which you can derive the answer.

+ Once you've done some reading, the best way to learn about user experience is to try things and get feedback from your users. They won't always know what they want, but they can help you find direction.

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COOL STUFF WE LEARNED THIS MONTH

MY INTERNET MEA CULPA

Back in the 1990s and early 2000s, we all thought the internet was going to bring on a kind of utopia, giving everyone an equal voice and allowing unencumbered access to massive amounts of data. Twenty years on… that's not what we have. Rick Webb looks at what went wrong, and what can be done about it.
http://bit.ly/2E0YGWL

A DESIGN SPRINT AT CLEARLEFT

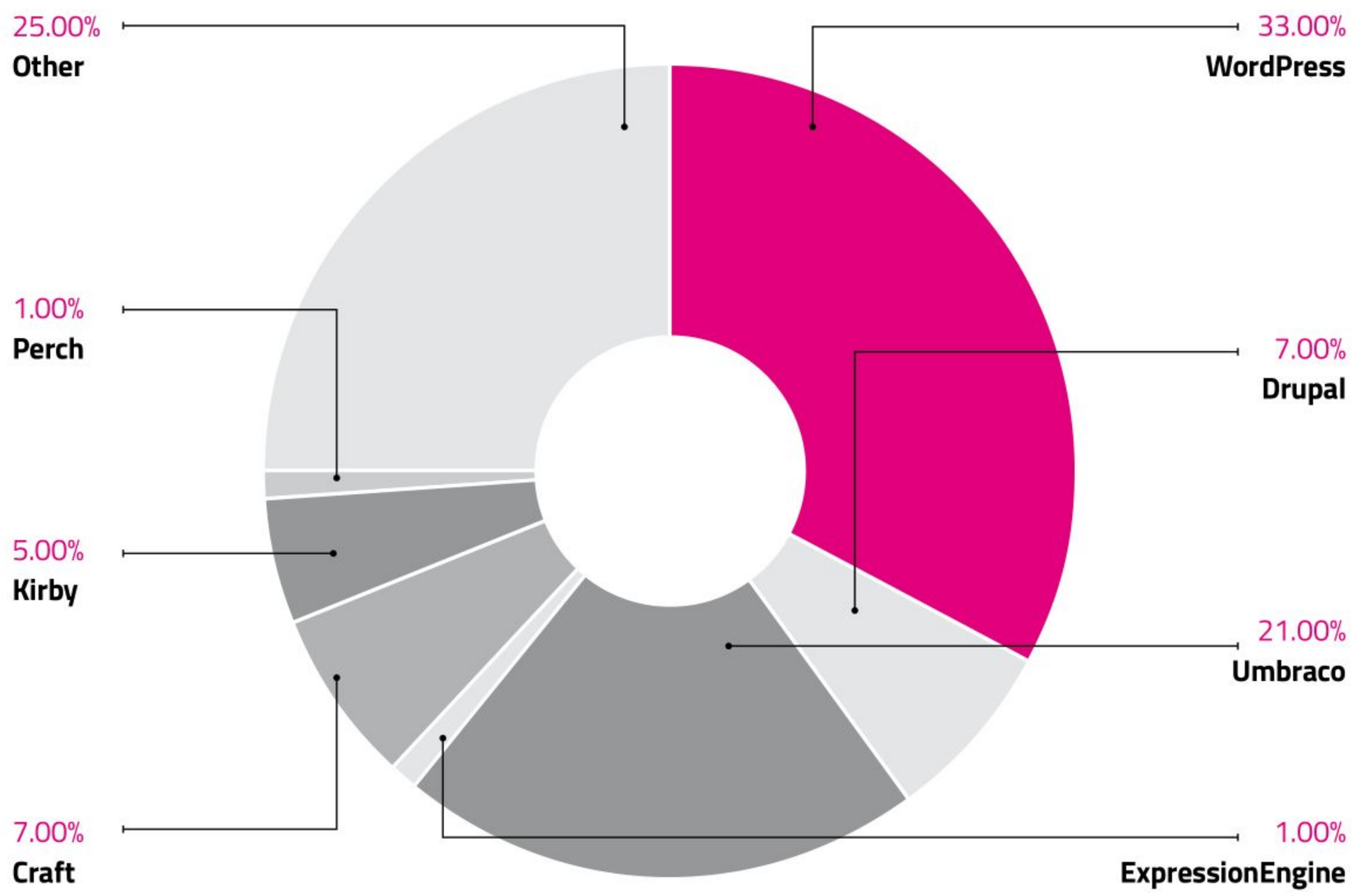
No doubt you've heard the term 'design sprint', but how does it play out in practice? This interesting and detailed case study tells the story of how the Clearleft team took just two weeks to fix issues with the checkout process at Attraction Tickets Direct.
http://bit.ly/2nTzOVH

HOW I GOT HIRED BY GITHUB

Joel Califa recently landed a job at GitHub and has kindly decided to share his answer to the assignment he was given as part of the recruitment process. It's a great resource if you're interviewing for jobs and want to get an insight into the recruitment process.
http://joelcalifa.com/blog/how-i-got-hired-by-github

*THE POLL

WHICH CMS DO YOU USE MOST FOR CLIENT WORK?



From our timeline

Which sites did you find most inspirational when you first started out in web design?

K10k the original designer's lunchbox. Am I showing my age? http://www.cubancouncil.com/work/project/kaliber-10000
@matthamm

I remember being fascinated by the @mediaBOOM site (in 2005/6 maybe?) That particular site isn't live anymore, but it was a city you could explore (all in Flash). The level of detail blew me away!
@de

2Advanced, BillyBussey, old Flash '05 Fantasy Interactive website. Sadly none of these are still up. These were amazing in how much they got out of Flash with the combination of video, animation, and interactivity. It was like FUI had come to life via the web.
@teksetta

choppingblock.com back in 2000. @choppingblock had a mix of animation, sound and their tech was ahead of its time. Oranges & graphic design song by @tmbg was clutch. Years later I ended up working there and it changed the whole trajectory of my career for the better!
@schutzsmith

praystation.com, yugop.com.com, flight404, k10k, kioken
@lsbf_digital

SPACE JAM! http://bit.ly/2muNkCh… Another one by an early Flash artist that I cannot find now. I recall it being gabbo dot com but I can't find it. Truly a visionary artist.
@_PatBrown

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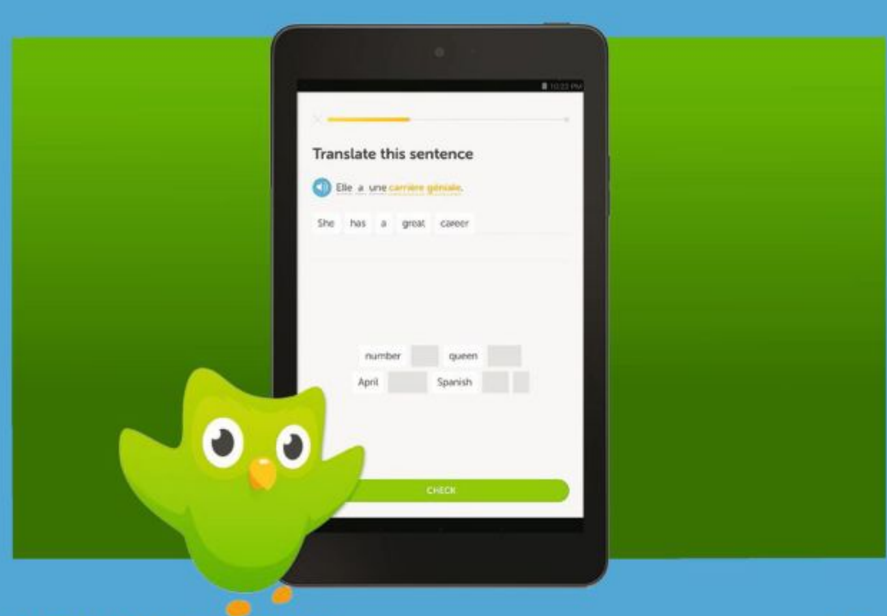
This month's Clients from Hell explores how 'urgent' no longer seems to apply when waiting for sign offs



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WORKSPACE 16
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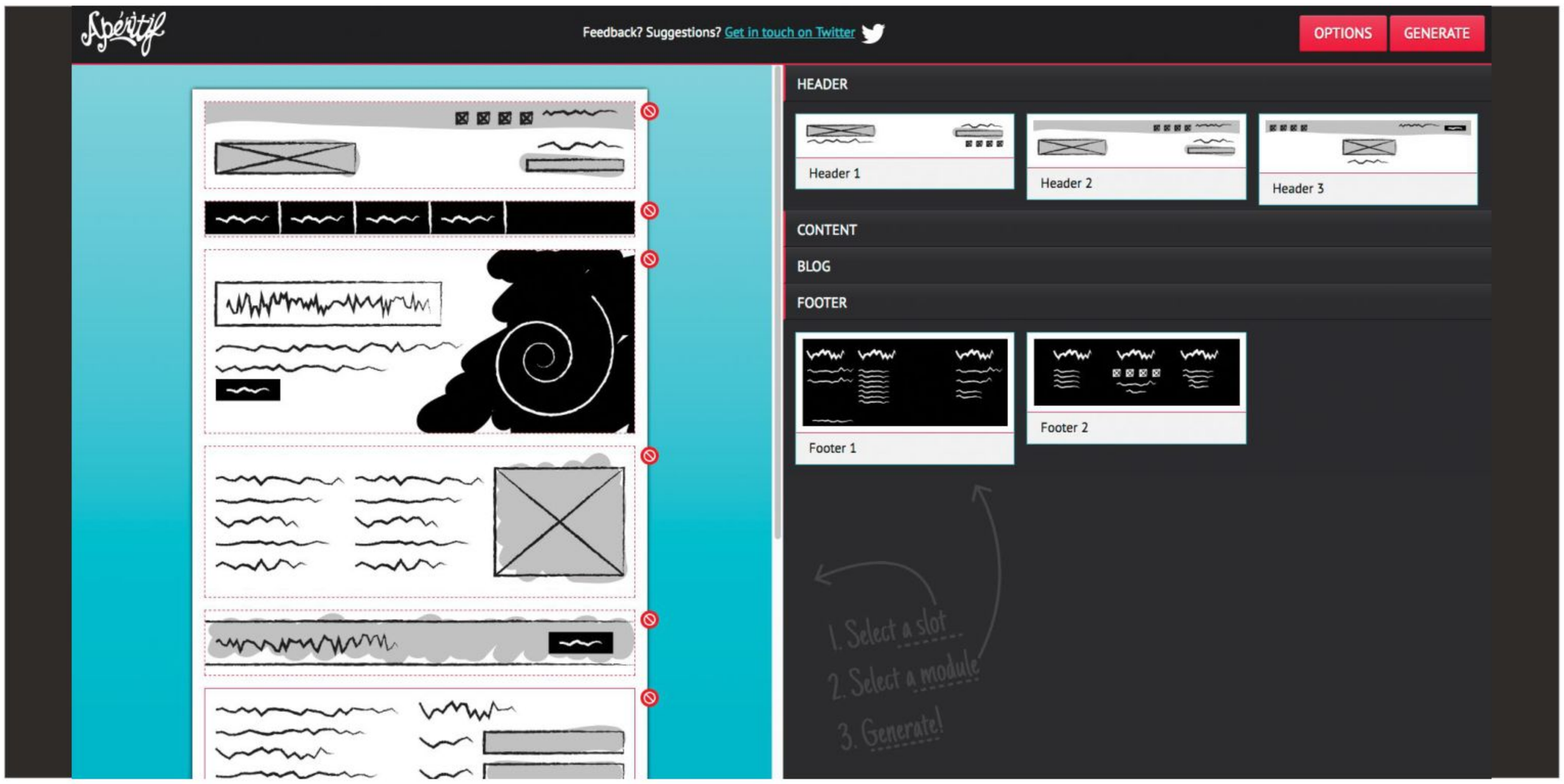

APERITIF

Aperitif enables developers and designers to build responsive HTML prototypes in seconds

* SIDE PROJECT OF THE MONTH

INFO

CHRIS ROSE

job: Full stack developer

w: *https://aperitif.io*

MATTHEW CROUD

job: Front end developer

w: *https://aperitif.io*

To kick off, can you give us a quick summary of what the site is about?

Aperitif is a simple online HTML prototype generator that allows designers and developers to quickly mock up a website layout or prototype within seconds.

The end product is a dynamic prototype, complete with the stylings of the selected theme and JavaScript to power the various modules available.

What was the inspiration for creating the service?

We wanted to give seasoned designers and developers the means to generate a quick starting point for their concept. This could then be used as a face-value prototype or the skeleton of a more ambitious development project. Users new to web design can also hit the ground running with Aperitif, generating pages and pulling them apart.

What did you hope to achieve when you first built the site?

We wanted to create something that allowed us to shorten the amount of time we spent producing prototypes for clients. Instead of giving them a high-fidelity Photoshop mockup, we could give them a functional responsive layout to look at. We wanted to create something that was rapid to use and self explanatory. Encouraging clients away from the expectation of a mockup drawn in a static medium would promote a more organic and iterative development process.

What were the key tools behind the build and development?

Aperitif was built using both vanilla JavaScript (ES6+) and PHP 7. We didn't want to get tied down with dependencies and frameworks. By keeping things simple, we were able to deploy a lightweight app in a matter of days.

How did you go about marketing the site?

In September 2017, we sent links to a couple of online web design and development magazines and blogs to ask them to spread the word. All of the exposure Aperitif has had is thanks to the word of mouth generated by social media.

How has the site performed?

After being promoted by a few online blogs and some exposure on Twitter, Aperitif has become a frequently used service worldwide. Since its conception back in September 2017, we have had over 14,500 unique visitors, with the average prototype design taking less than a minute to create. We would love any feedback and suggestions.

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*HOW TO

PRESENT IDEAS TO CLIENTS SO THEY WILL LISTEN

Sometimes getting clients to listen and take notice of your advice can be a tricky task.
We asked @netmag followers for their tips on how you can most convincingly sell your ideas.

NO SURPRISES

"Share early and often," says @LittleHelli. "Clients respond well to sketches. You don't have to present finished designs. Share live, rough-sketched wireframes and let them know they are a concept that you need their feedback on, not a design that's set in stone."

IT'S EASIER IN PERSON

"It may be clichéd but listen first then adapt your ideas to align with their goals," says @DigitalDotsCo. "Also do things face-to-face wherever possible. I still think this goes a long way; people do business with people after all."

MAKE A VIDEO

If you can't be in the same room as your client, @Web_Wise_Dan recommends a screen recording with narration as being the next best thing. "When I can present something in a video, with me explaining what's on the screen, clients really get it so much more than just an email or screenshots."

WHOSE IDEA?

Chris Cook, the global business director at Mirum, keeps it simple. He suggests: "Tell them it's their idea!"

GET IT DONE NOW

Exclusively for net: the latest in a series of anonymous accounts of nightmare clients

*CLIENTS FROM HELL

I work for a video production agency. Almost a year ago, my boss told me about an animated video project that needed to be done within two weeks and that I should drop everything as soon as the script was delivered. Two weeks later I received a rough outline of the project from the client but was told not to start work as it wasn't approved. Over the next month, I was CCed in a series of exasperated emails about the state of the script. Finally I got a full version and my boss told me to get it done. I made the video in two weeks and submitted it to the client to review. Almost a month passed without feedback. Then a few comments came in, mostly asking for word or colour changes.

I made the changes in a day and waited for approval. The silence this time lasted two months. This whole time, my boss had been sending follow-up emails every couple of days without response. Finally, I got an email:
Client: We have a few more revisions. Don't worry: they're only small changes.

But they didn't include any revisions. There wasn't anything attached. A whole month later, I received a new version of the script with entire sections rewritten and expanded, requiring tons of changes to the animation and a complete rerecording of the voice track.
Me: I might as well be starting over from scratch at this point. I'll need at least two weeks.
Client: That's unacceptable. We're in a rush and need this urgently.

I wound up pulling a series of late nights and made miracles happen, delivering a finished product in just under a week. By this time, the project had gained notoriety in my whole department, with a betting pool on how long it would take for the client to respond. It took them three months.

They approved the video, nearly 11 months after the 'urgent' deadline. They praised my work in their final communication, also noting:
Client: It sure takes you a long time to finish these animations!

CLIENTS FROM HELL
clientsfromhell.net

WorldMags.net

LA PENSÉE CRÉATIVE

Sue Jenkins is learning French for fun and also discovering how it offers new ways to think about life and design

* BEYOND PIXELS

By day I'm a freelance designer at Luckychair (*luckychair.com*) and an assistant professor of web and graphic design. By night I'm *un étudiant français*, blissfully and casually learning French by playing word games on my smartphone's Duolingo app.

There's something about learning that keeps life fresh for me. I love the 'beginner's mind', that awkward and exciting way it feels when you're at the very beginning of something new.

While studying the language as a teen, I remember how thrilled I was when French words came to mind just as readily as English. *J'aime ma chaise verte confortable. Regarde ce chat moelleux. Merde, il pleut: ou est mon parapluie?* The placement of words in a French sentence is often different to how they appear in English. Adjectives and verbs may come before or after the subject, which playfully shifts the mind's focus. Look at that fluffy cat; look at that cat fluffy. I love my comfy green chair; I love my chair green comfortable.

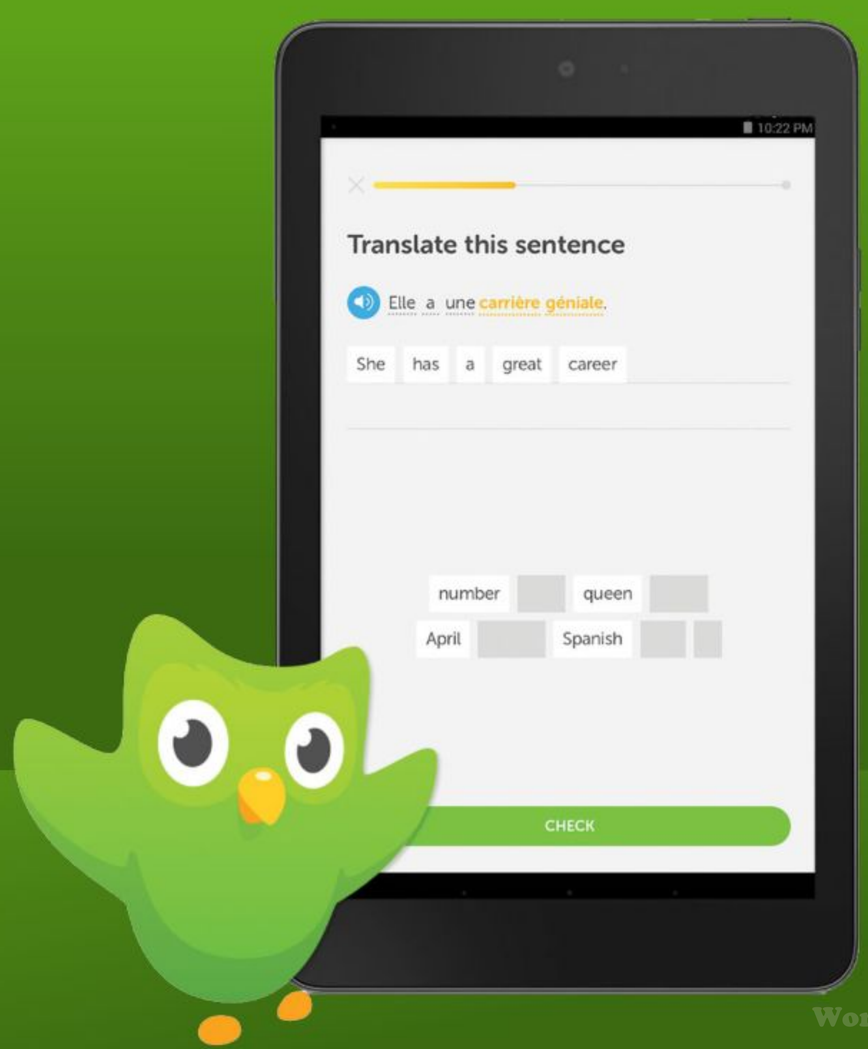
When my friend Jay – a Brazilian software developer who speaks excellent English and conversational French, Hebrew, and German – told me he was studying Japanese just for fun, a light bulb came on and I started relearning French. Practising French daily is helping me work more efficiently and creatively on projects that require innovative thinking, such as design, teaching, consulting, making art and writing.

Over the years I've discovered that keeping my brain in learning mode often helps me generate new ideas. I can more readily cross-pollinate concepts and create things that otherwise wouldn't have occurred to me. For example, I recently learned a new way to tie shoelaces, which gave me inspiration for an animation project in After Effects. Ultimately the thing I love most about learning is that it opens my eyes to new ways of thinking that are likely limited by my use of language.

The free Duolingo app for iOS, Android, Windows Phone and desktop helps you learn over 20 languages in as little as five to ten minutes a day. After just two months, I'm at 53% fluency. Come learn with me!

* PROFILE

Sue (*@LuckychairNews*) is a web/graphic designer, assistant professor of design, course author and creative director.



Duolingo helps users learn languages in as little as five to ten minutes a day

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STUFF I LIKE

CHRIS SILVERMAN
Senior designer at Vassar College
www.csilverman.com

TYPE SAMPLE

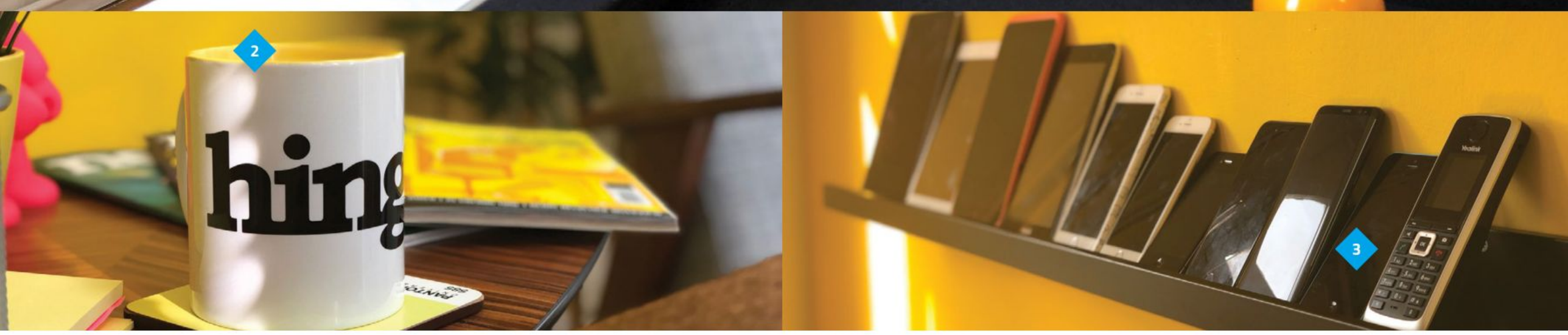
The first thing I typically wonder when visiting a site is: "What font is this?" Type Sample is a bookmarklet to tell you exactly that. I use it more than I probably realise; it's very simple and saves me from having to dig through the browser inspector.
typesample.com

THIS IS COLOSSAL

Colossal is one of my favourite art sites. It's art that's impressive in some way: unusually intricate, difficult or clever. Browsing through the amazing things people have created really helps ease mental tension: a screensaver for the soul.
thisiscolossal.com/

CODROPS

One of my goals is to integrate more movement and interactivity into my work, but I don't always know where to begin. Codrops presents beautiful design patterns for elements like navigation, galleries and links, offering loads of ideas.
tympanus.net/codrops/



HINGE

Natasha Hockey gives us a sneak peek inside the world of Hinge, a digital agency fuelled by pool and biscuits

* WORKSPACE

We're lucky enough to be based in Southampton on the sometimes sunny south coast, a few minutes walk away from the common. We've been in our quirky studio for just over two years and it's a friendly open space for our talented team of digital designers and developers.

A big feature in the office is, of course, the pool/meeting room table **(1)** where our team spends its breaks having pool tournaments. Let's see if you can spot a sneak peek of our makeshift scoreboard. If the team isn't playing pool then this is the space we use to host our workshops and client meetings. And what better way to treat your clients than by serving them a coffee in one of our Hinge branded mugs **(2)**?

Our day to day studio life is filled with working on a wide variety of websites and apps, which means our device lab **(3)** gets a lot of use. We currently have 11 devices in our ever-growing collection that we vigorously test projects on. And this hard work often means that we have to reward one of our developers, Martin, with all the biscuits **(4)**. It wouldn't be a normal day in the studio if he didn't munch his way through an entire pack of chocolate digestives.

Lastly and probably the most important item in our studio is Phil's trophy **(5)** from last year's Christmas party. We teamed up with another local agency, Moov2, for an evening of Virtual Grand Prix and – to no one's surprise – one of our directors, Phil, roared into a spectacular first place.

* PROFILE

Natasha is a designer at Hinge and co-organiser of Soton Women in Web. Follow @HingeAgency on Twitter/ Instagram or visit *wearehinge.com*

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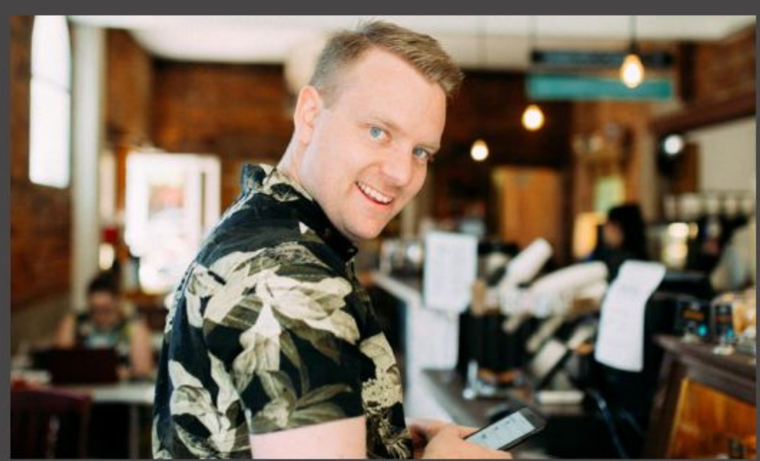
VOICES

Opinions, thoughts & advice

ESSAY 22

Tom Smith explores how 3D technologies can be used in-browser to create beautiful and highly engaging interactive experiences



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We catch up with **Wes Bos** and discover how he created and built a community around his courses, and why he initially hated JavaScript

Q&A 33

Microsoft evangelist, **Rey Bango**, explains the role he plays in enhancing relationships with web developers

* STUDENTS

TOP TIPS FOR DESIGN STUDENTS

Sue Bicknell offers essential advice for any design student in their final year

You're in the final year at uni and heading towards your major project. Now is the time to think about what you can do to get your dream job.

Here are ten top tips for getting it together while you're still at university so you're more likely to be successful when you graduate.

KEEP SKETCHES

Sketches help demonstrate your thought process and sometimes they can be better than the final design. They also show off your creativity and problem-solving abilities. If possible, keep the originals and put them together in an orderly fashion. At a face-to-face interview, it is always good to present tangible pieces as well as a digital portfolio.

GET INVOLVED

Whether online or in real life, it's a good idea to take an active part in the world of

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design. Join organisations, attend events, follow industry leaders and keep your eye on what's happening in design.

Do as many outside and award projects as possible. Take on competition briefs and give them your best. They often provide an opportunity for you to experience real design briefs first-hand, come into contact with people in the industry and test your skills.

It's your chance to show the design world what you can do and winning an award can open a lot of doors.

DON'T POLISH TURDS

It's your job to come up with fantastic ideas that solve problems. If you're going to spend time developing and crafting a concept, make sure it's worth it.

PROJECT THE RIGHT IMAGE

Whether it's a physical portfolio or a digital one, think about your portfolio as a whole. Edit it carefully and consider the order in which the projects should go.

Generally you open and close with your best two projects – they tend to be the ones that are remembered.

The top agencies get applications from numerous graduates all the time, so if it's not simple to view your work they probably won't bother.

Also, follow any instructions carefully when applying for a job.

WORK OUT WHO YOU ARE

Deciding what you want to do beyond earning money is easier said than done.

Where do you want to be? Do you want to work in a city, live in the countryside or do you want to travel? Do you want to work for a large agency, a small agency or for yourself? What type of work do you love to do and who would you love to work with? Whose work do you admire and why? Where would you like to be in six months? In two years? In five?

Be aware that the industry is continually changing and that new agencies and ways of working are providing fresh opportunities all the time.

Having a clear idea of what you want to do and where you want to be is the first step to getting there.

DO YOUR RESEARCH

By researching companies and potential clients, you'll find which ones suit you and whether you'd be a good fit for them.

Having identified your target market, you can hone your message especially for them. Tailor your portfolio to suit the job you want. Flag up anything relevant that might give you the edge.

The more research you do the better. The fact that you've gone the extra mile will also be appreciated.

IMPRESS ON PLACEMENTS

The more experience you get and the more contacts you make, the easier it will be to find the job that's right for you. When on a placement, make yourself indispensable. Show enthusiasm and be memorable – in a good way.

Even if you don't drink hot drinks, by offering to make people a cuppa you get chance to chat to other employees and find out about the projects they are doing.

The design industry is small. Be aware that if you do well at one place word will get around… and vice versa!

KNOW YOUR WORK

Learning to clearly explain your ideas, sell your work and yourself is as important as the design. It is about showing your understanding of the issues and explaining how your design(s) solved the problem set out in the brief. You need to show how you can be of value to the company or client.

Ask questions: it demonstrates interest. Sometimes even the simplest question can unlock a wealth of information.

TAKE CRITICISM

Learning to take criticism is a vital part of being a designer. You're always going to get negative reactions but don't take it personally. Setbacks should make you want to work harder.

TRY, TRY, TRY AGAIN

An agency or client may not want or need you now but they may in the future. n

* PROFILE

Sue has been involved in interviewing graphic design graduates for internships and junior positions for over 25 years.

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* 3D

THE IMMERSIVE WEB

Illustration by Kym Winters

Tom Smith explores how 3D technologies can be used in-browser to create beautiful and highly engaging interactive experiences

WebGL is a JavaScript API for real-time rendering of 3D and 2D graphics within a browser and is based on OpenGL ES – the software API used on embedded systems such as smartphones and tablets.

Traditionally, web browsers used the CPU to render content, but in recent years browsers have adopted support for hardware acceleration, which means web developers can now tap into a device's GPU to allow for rendering of complex graphics. It's a tough language to grasp, but luckily there are a number of JavaScript libraries that make WebGL more accessible, such as Babylon.js and three.js.

Such technology is merging skill sets between traditional web developers, game developers and VFX artists, where all these disciplines work together to develop interactive experiences on the web. Having an understanding on basic VFX principles is crucial – lighting, cameras, animation and 3D geometry all come into play – and it's vital to have a grasp of JavaScript frameworks and HTML.

EXPORT 3D FOR THE WEB

A particular problem associated with exporting 3D assets into a WebGL environment is the weight of the files. When dealing with heavy assets like 3D models, extra care has to be taken during asset creation to ensure the models are loaded efficiently. There are many factors that can increase a 3D model's size, but there are three good rules to follow to help reduce weight in a browser.

1. Good topology

Topology refers to the mesh flow of a 3D model – the cleaner the mesh the more efficient the model, meaning fewer polygons used and a reduction in the overall weight of the asset.

2. Normal mapping

This is an excellent approach in creating detailed raised textures on a 3D asset while maintaining a low poly count. The detail these maps create is fake but can be incredibly effective. Typically a higher resolution model is created with a detailed mesh, from this a normal map can be exported and wrapped around a lower poly model to create the illusion of a detailed object.

3. File formats

When WebGL was initially released, developers created custom exporters to deliver 3D assets into a WebGL engine; there was no standard or pipeline in place, which caused inconsistent results and errors. More recently the file format glTF has been created by The Khronos Group to develop an open, royalty-free interoperable format for sharing 3D graphics, and has been dubbed the 'JPEG for 3D.' GlTF was created to answer the need for a common graphics file format for 3D, in much the same way as JPEG is the standardisation for photographs. GlTF can retain complex information associated with 3D files such as scene data, materials, geometry, animation, skins, GLSL shaders, and texture files. GLTF is still a very new file format and time will tell if the big 3D packages adopt it, however Khronos Group has released several glTF exporters for popular tools such as Unity and Blender.

PRACTICAL USE CASES FOR WEBGL

As with any new medium, there was a burst of creativity when WebGL was first released that resulted in a variety of weird and wonderful experiences as developers and artists experimented with the technology. Only more recently have practical applications started to emerge as the adoption rate has increased. ►

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In the past, education institutions created Flash applications to use as interactive learning tools. While at the time these were great for engaging students and teaching complex subjects in a digestible format they are now dated, unscalable, and unsupported in modern browsers. WebGL replaces Flash and, in this case, is being used to create intuitive learning tools that can cope with complex graphics and interactions.

Big brands have also adopted WebGL to render graphics more efficiently. For example, the PS4 UI is powered by WebGL, enabling its menus and elements to run smoothly with minimal lag. When a user logs into their PS4, they're running WebGL code.

The architecture sector is also investing heavily in making 3D visualisations more accessible, going even further to incorporate WebVR to immerse clients when showcasing properties. And within e-commerce, especially with high-value items, WebGL is being used to render 3D models in intricate detail. It gives users a layer of interactive customisation tools that enable them to update their product visualisation in real time. This approach makes products become even more realistic and tangible to potential customers.

EXPLORING VIRTUAL REALITY

WebGL is the springboard that started the exploration of additional 3D technologies such as WebVR and WebAR. Google, Mozilla, and Microsoft are all helping define how VR and AR will be part of the future browsing experience.

The beauty of bringing VR to the web is the level of accessibility that comes along with it. Allowing easy access of VR content through a URL – and the ability to create and distribute content without the need to go through an app store – gives brands, educators, and retailers a level of reach never quite felt before. This is still a new world, but it's quickly gaining in popularity and demand.

Being strong pioneers of VR in the browser, in late 2015 Mozilla made the technology even more accessible with the introduction of A-Frame: a VR framework for three.js that supports the Vive, Rift, Daydream, Gear VR, Google Cardboard and desktop experiences. A-Frame provides an interface for VR on the web, enabling developers to create true VR experiences with relative ease. It handles setting up the left and right camera needed for virtual reality and supplies default behaviour, including making use of a mobile device's gyroscope to allow for free rotational movement around a scene using a headset. A-Frame also introduced a headset icon to enable the VR experience for compatible mobile devices.

A-Frame has paved the way for the browser specifications of what is today known as WebVR. However, experiencing VR in the browser can be somewhat unpredictable due to the range of devices it can be experienced on. There are still issues when viewing content on smartphones thanks to older generation phones struggling to render scenes and causing a drop in frame rates. It also requires a good internet connection due to the weight of the experiences. All of these factors can easily break the immersion of a VR experience. It's still early days for the medium but with VR becoming more mainstream, it's inspiring to see how the web is already adapting to offer a more accessible version of this type of content and watch developers exercise their creativity in this space.

AUGMENTED REALITY

WebAR is the next logical step for browsers, blending digital content with the real world to create an augmented reality. Though it's still very much in its infancy and experimental stage, Google has made great progress in this field and released several tools and demos.

WebARonARKit and WebARonARCore are both experimental apps for iOS and Android, enabling developers to create AR experiences using web technologies. Three.js released three.ar.js, making it easier to create AR experiences by adding helper classes on top of three.js. Because this technology is in such early stages, it does mean these experiences are only viewable in experimental browsers.

"With VR becoming more mainstream, it's inspiring to see how the web is adapting to offer a more accessible version of this type of content and watch developers exercise their creativity"

FINAL THOUGHTS

With the adoption of VR, AR and eventually mixed reality, it's inevitable for browsers to follow suit by offering an immersive online experience. The uptake of 3D web technologies is faster than it has ever been. With a big drive behind WebAR, it's exciting to see how the landscape develops and adds another dimension to browsing.

* PROFILE

Tom is co-founder at FX Digital, an agency specialising in digital immersion. Tom helps develop interactive experiences through immersive web technologies.

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Wes Bos

Words by Oliver Lindberg
Photography by Jenna Bos of Bear and Sparrow Photography

Wes Bos teaches hundreds of thousands of developers from his home office. Here he reveals how he created and built a community around his courses, and why he initially hated JavaScript

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It's easy for front-end developers to feel overwhelmed these days. What should you learn next? Which framework is going to take off? There are no absolute answers, of course, but if full-stack developer Wes Bos creates a course on a new technology, it's safe to say it has matured enough for you to be able to pick it up and not waste your time on it. The latest one is CSS Grid (*cssgrid.io*), a free video course that more than 35,000 people signed up to in the first week alone.

This new course took Wes around two and a half months of full-time work to build, requiring a lot of upfront investment so he could understand and explain it comfortably. To pay for this massive investment, Mozilla came on board as a sponsor and in exchange Wes used Firefox Devtools to demonstrate to viewers how they work and how effective they are when it comes to CSS Grid. Clearly Wes's courses are learning by doing at its best. Yet he says he's actually a very slow learner himself.

"It might seem like I can just consume anything and understand it," he laughs. "But the only thing I can attribute my understanding to is just pushing through those harder points and sheer time. I have a big chunk of my day dedicated to learning new skills, which is extremely lucky. That's why it seems like I'm always a bit ahead of the curve."

That was also the thinking behind JavaScript30 (*javascript30.com*), a free 30-day JavaScript coding challenge, which teaches vanilla JavaScript without frameworks, libraries, compilers or boilerplates. People were always asking Wes how they could learn faster and improve their skills. "My advice is always that you need to build 1,000 things," he suggests. "It's going to take some time, you need to actually put in the work, but once you get through those 1,000 things, I can guarantee you're going to be a lot better. The JavaScript30 are your first 30 of 1,000 things to get you rolling."

But Wes recognises it's not that easy to get started: even he hated JavaScript initially. "I very clearly remember being extremely frustrated with jQuery," he sighs. "It just breaks, so there's a possibility you waste four hours not getting anywhere. I see that all the time. Often I get nasty emails from people, and a couple of hours later they apologise. You just get that rage blindness of how hard it is to learn. I hated it for a long time, and there was no 'aha' moment for me. I just kept at it and slowly but surely, over the course of three or four years, it started to get a little bit easier and I became more confident."

His style of teaching has clearly tapped into a need. Around 220,000 people have taken at least one of Wes's courses. Often they enjoy them so much that they're willing to pay for others – such as ES6 for Everyone (*es6.io*), React for Beginners (*reactforbeginners.com*), and Learn Node (*learnnode.com*).

So what's his secret? "There are two parts to a successful course," he says. "I think I've cracked being good at both parts. The most important thread is obviously good content. It has to be up to date, engaging, a little bit funny, and the thing that you're building has to look nice. People need to be able to have fun, pause and have lunch halfway through. You can't overwhelm them too much."

Then there's the marketing side of the equation, which again carries Wes's personal

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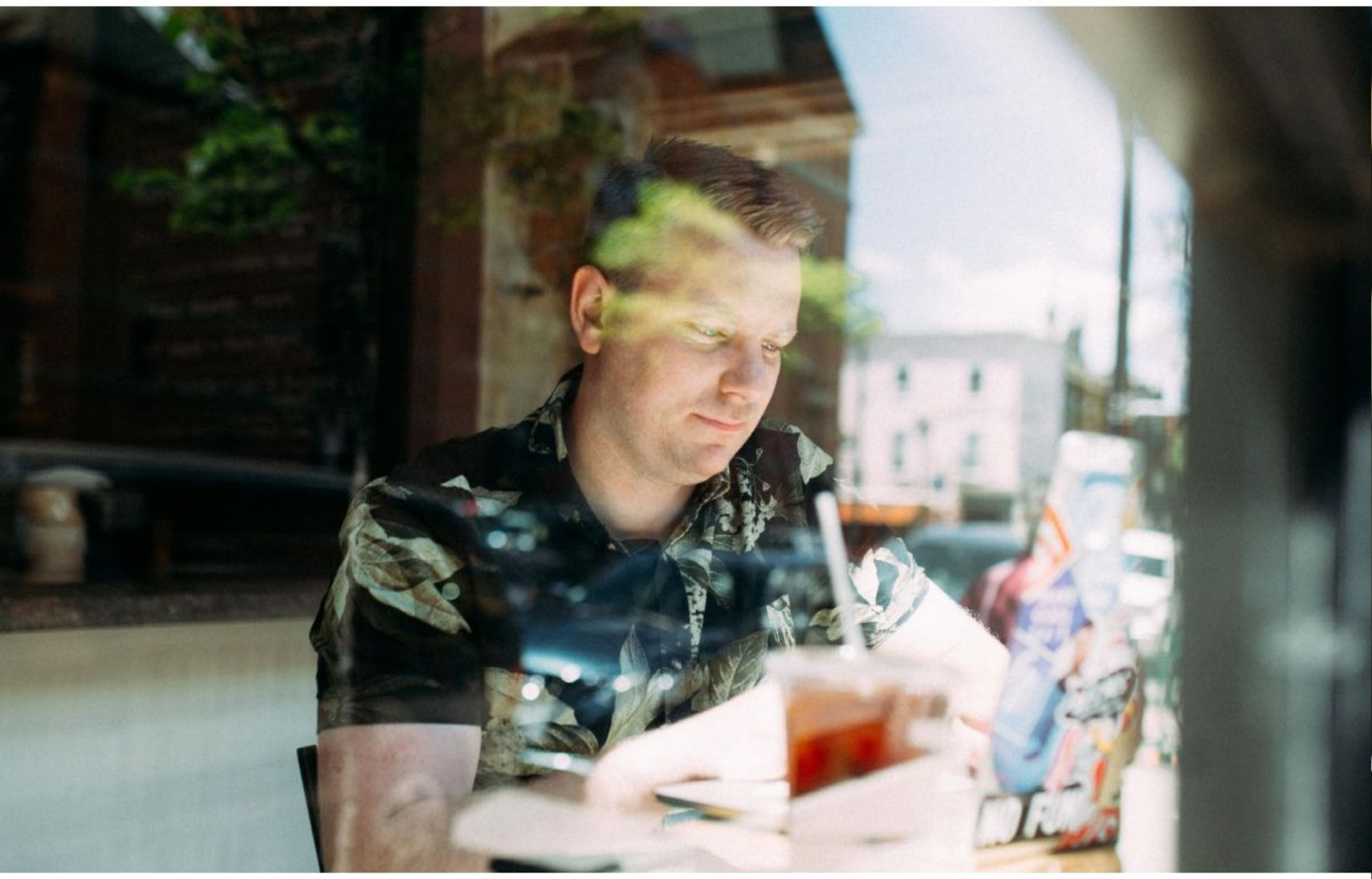

style. "Every single one of my courses has a different domain name, which people tell me is not a good idea," he chuckles. "Each course has a new design, look and feel, and different intro music. I have a certain style but I can use new fonts, colours and patterns for every course, which is really refreshing to me. Often people have really good stuff in their courses but they're not able to open that up to the landing page. That's an important piece."

Wes's strategy is relatively simple: to be on every single platform – whether that's Instagram, Facebook or YouTube – although he has found the most important are Twitter and email. On the former, he has more than 120,000 followers and often tweets helpful little nuggets of information to his eager audience. Email is an even bigger channel for him: his list boasts 208,000 subscribers.

"I don't do a lot of emailing, which is sort of against the book," he explains. "A lot of people say you should be having all these auto-responders and sending three emails a week. That's very true, it works really well, but developers have a very low bullshit tolerance. You can't do that stuff to developers and not leave a bad taste in their mouths. My emails are very much just me writing what's going on with my life and what people should expect next. The open rates are much higher than industry average, even though sometimes I go a month or two without sending an email."

Wes added around 85,000 people to his email list in the last year alone, something he puts down to JavaScript30, his most popular course, which stands at around 145,000 subscribers so far. Still, he hasn't done any marketing for it in over a year. People just keep recommending it to friends because it's one of the things you need to do in order to get better at JavaScript.

The latest channel Wes uses to reach his community is a new podcast called Syntax (*syntax.fm*), which he co-hosts with fellow web developer Scott Tolinski (*twitter.com/stolinski*). They call it a "tasty treats podcast for web developers" and cover the nitty gritty of JavaScript, CSS and HTML, as well as related technology and soft skills like managing email, productivity and getting on the conference circuit.

> "Often people have really good stuff in their course but they're not able to open that up on a landing page"

"With the exception of ShopTalk [hosted by Chris Coyier and Dave Rupert], I didn't like listening to most web development podcasts because they stress you out," Wes explains. "Scott and I have a good grasp on making it fun and being able to distil information to a general audience about web development. I think it's also important to remember that web developers are humans that have other interests, too." Wes sent out a few emails and almost instantly the show got between 20,000 and 30,000 downloads.

Amazingly, this training empire is basically a one-man operation. Wes now has an assistant, who manages his emails and sticker business (*https://bos.af/*), but the course design, development and promotion is all done by him. He has created a Node application, built on React and server render templates, that hosts all of the different parts of the platform, which he calls the Bos Monster. It handles free and ▶

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"My emails are very much just me writing what's going on with my life and what people should expect next. The open rates are much higher than industry average"

paid courses and includes an affiliate system, which is a big sales driver. People recommend the courses and Wes pays them a portion of the profits.

Wes has always been an entrepreneur. When he grew up he had a lawn-mowing business, sold pears by the side of the road, and fixed and cleaned up road bikes to resell them for ten times the amount he had bought them for. He studied Business Technology Management, but while doing work experience soon realised he hated working in an office for other people. He also discovered he could make much more money developing WordPress sites as a freelancer.

Local Canadian organisations Ladies Learning Code and HackerYou got him into teaching, where he ran in-person workshops on WordPress and introductory web development bootcamps. It was there that Wes honed his teaching skills. "It really helps being there in person, talking to people and working through their problems," he explains. "You're able to see their frustrations or how they react when things work. If someone watches a video and they don't get it, they just turn it off. You can have stats on that and see drop-off rates, but it's nowhere as good as being there in person."

Initially Wes wanted to learn how academics teach but quickly noticed that people started to latch on to the way he explained things. Now he regularly receives emails from people telling him he changed their lives.

"It's really weird, you don't expect it," he enthuses. "At the end of the day I'm just some guy recording my screen, but somebody emailed me recently saying they went through a bunch of my courses and got a C$15,000 raise from their boss [around £8,600], which is life-changing for a lot of people. Obviously, I'm not going to attribute just my courses to it – these people are self-starters – but they said that my courses played a large role in them either getting raises or jobs. They also said that I've reignited their love for web development. There's a lot of burnout in our industry, people get sick of it after a while, and need to continually update their skills. I want my courses to be fun and remind people of that little spark they experienced when they first started learning and worked things out."

At Generate New York, Wes is going to talk about new things coming to JavaScript that will make web development much easier and more enjoyable, while his workshop will be an introduction to React. "It will start you from the ground up and explain all the different React concepts," Wes describes. "You'll leave being able to build an application that fetches data from an API that is routed on the client side and pulls in your CSS."

An advanced React online course that will focus on GraphQL is also in the pipeline, as is a course on Visual Studio Code. In addition Wes has been trying to figure out how to teach the basics of JavaScript and CSS from scratch. "A lot of people tell me they can't take my courses because they don't understand the initial part of JavaScript," he explains. "I'd like to work out how I can teach those things in a really nice way. It's such a huge topic." If Wes manages to crack it, the intro courses will open him up to a whole new audience. The Bos Monster may still just be at the beginning.

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THE DESIGN OF BUSINESS

NEED

Christopher Murphy highlights an often-overlooked question: is there really a need for this?

INFO
job: Writer, designer and educator
t: *@fehler*
w: *tinybooks.org*

When you're embarking upon the design of a new product or service, one of the first questions you should ask is: is there a pressing need for this? If there is no need, stop. It's really not that complicated, yet – all too often – we turn our talents towards needlessness.

As designers we are faced with a choice about what we turn our talents to. We can use these talents to create and improve what the world needs, or we can add to the mass of products for which there really is no need – or for which there is often an artificially created need.

When millions of dollars – $120m to be precise – are being spent to solve the 'problem' of juicing (*http://bit.ly/juiceroguardian*), which was Silicon Valley startup Juicero's raison d'être, it's not hard to realise that design has a problem.

Juicero is just one of a number of recent products to prove – once again, if that were needed – that where there's no need for something, there's no business, and that solutions to non-problems are economically ill-judged and fundamentally doomed.

Reflecting on the ill-fated juicer, *The Guardian* notes that the company's demise was sadly yet another example of 'a startup collapsing after raising substantial funds under the guise of innovation and disruption, but failing to build a profitable business'.

Juicero's inability to build a profitable business hardly came as a shock, when it was announced in late 2017, to the many people – myself included – who had read about it initially, only to ask the question: 'Who the hell needs this over-engineered and over-priced product?'

FIRST THINGS FIRST

In a recent article titled 'Design's Lost Generation' (*http://bit.ly/dlgmonteiro*), Mike Monteiro makes a powerful and – thanks to his high profile – widely read case for design to be a licensed activity. As he wisely noted:

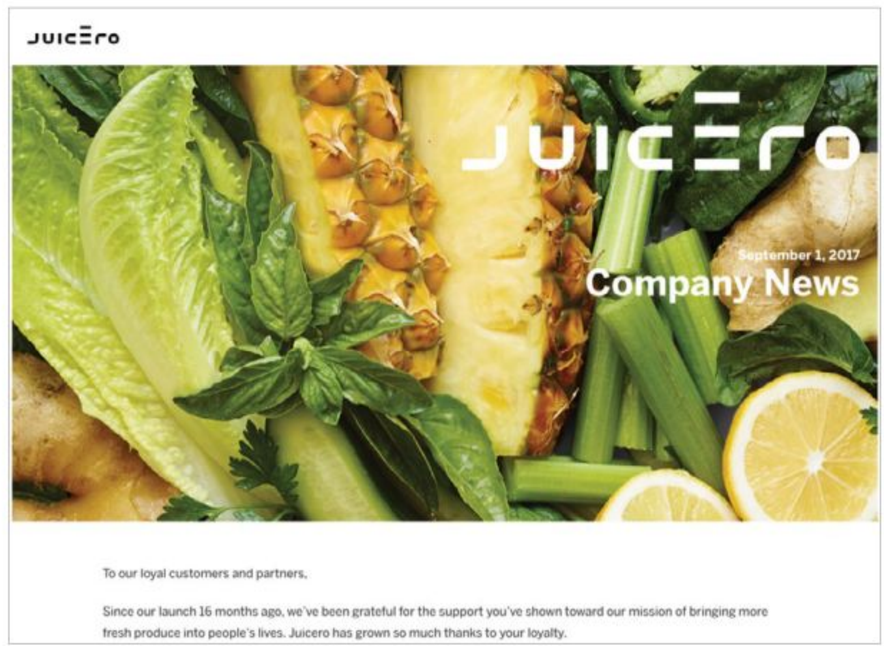
"There are two words every designer needs to feel comfortable saying: 'no' and 'why'."

Monteiro made an impassioned plea for designers to 'do the right thing'. I'd encourage anyone involved in design to read the article; it's filled with common-sense advice (as you'd expect from him).

It was a call to arms that wasn't just morally right, but economically sound. When there's no real need for your product or service, those two words – 'no' and 'why' – should be at the forefront of your mind. Fail to ask 'why?' and the cost could be high.

What's concerning is that many of the points Monteiro was making had echoes in the 'First Things First' manifesto (*http://bit.ly/ftfgarland*) published by Ken Garland over half a century ago, stressing the belief that design is not a neutral, value-free process. It seems we still have lessons to learn.

As the philosopher George Santayana famously put it: "Those who cannot remember the past are condemned to repeat it." When you're embarking upon a new venture, be sure there's a need. Fail to do so and you may well have a failure on your hands. The world doesn't need any more Juiceros.



It came as no surprise to many when, in late 2017, Juicero suspended sales

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*Q&A

REY BANGO

The Microsoft evangelist explains his role in enhancing relationships with web developers

INFO

job: Developer advocate for the web platform, Microsoft

w: *blog.reybango.com*

t: *@reybango*

net: What do you do in your job as developer advocate for Microsoft?
RB: I'm a feedback conduit working to ensure that the community has a voice in shaping Microsoft's product direction. Microsoft needs to know where and how it can contribute back to developers, whether that's through OSS, AI or developer tools. The only way to really get a pulse for what's happening is to get involved in things like open-source efforts, conferences, or hackathons; basically go where the developers are and actively engage them. It's why the role of developer advocate has become so important. We're able to speak with developers without all of the marketing mumbo jumbo and relate to their needs on a technical level.

net: What challenges face Microsoft in today's web?
RB: Microsoft has some very strong competitors. Companies like Google have grown up with a clear focus on the web and invest heavily in ensuring they continue to have a strong presence. Their rate of browser feature development is astounding, which is a testament to that investment. In many ways that's helped to push Microsoft to evolve the browser and the release cycles where developers can test features.

The Windows Insider builds are a great way to introduce new features in Edge in a way that considers the expectations of developers and the stability of the browser. We know that Chrome and Firefox (especially with Quantum) have a tremendous following and rightfully so. We need to continue to enhance Edge to bring the best features and developer capabilities that allow web developers to build great solutions and solve complex problems.

net: Do you think the industry is taking web security seriously enough?
RB: It's really hard to say. The big breaches of companies like Equifax have certainly highlighted the problems of not making the proper investments in your security infrastructure. As developers we sometimes forget that there's so much going on 'in the pipes' and don't fully appreciate the efforts that network professionals go through to ensure a safe experience. Security is really hard and it takes everyone to build a secure system.

What I find is that many web developers have a cursory understanding of application security and little knowledge of anything at the network layer. That has to change and, at the very least, needs to be a core tenet of designing your applications.

The OWASP Top Ten list continues to list SQL injections and cross-site scripting attacks as a primary attack vector and that's a clear message that we need to do better and think about the implications of the code we push. It's one of the reasons I've really embraced security by working to learn more about how these attacks work and how to patch them.

I'd recommend any web developer to create a VM running DVWA or OWASP Juice Shop and try to penetrate it. It's an eye-opening experience.

net: What's exciting you in web design right now?
RB: Progressive Web Apps because I feel they offer web developers a great opportunity to bring richer experiences to users. There are still many things being fleshed across all platforms but I'm looking forward to the day when there are great solutions for app discoverability and, yes, monetisation.

I'm a big believer in developers choosing how they want to distribute their apps. And I know there's a lot of discussion going on about that. I also love the performance experts who are continuously looking at ways to tweak every last bit of performance, especially on mobile devices.

I can't say how reliant I am on my smartphone but I'm in the position of having decent connections. These experts are taking into account low-bandwidth situations, which opens up new opportunities for those with devices that are less capable. n

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* BALANCE

HOW DO YOU ACHIEVE A GOOD WORK-LIFE BALANCE?

Our experts reveal the steps they've taken to stay happy and avoid burnout

ALEC EAST
Co-founder, Narrative Industries
www.narrativeindustries.com

When we started Narrative, we decided to keep a good work-life balance from the start, which meant learning how to delegate tasks, say no to jobs and push back on unrealistic deadlines. I imagined this would compromise the business, but the quality of our work actually went up. People were less stressed. The team are more willing to put the effort in when it matters. They know we don't ask them to do it when it doesn't. Only two people have left the company in seven years, and one of them was the cleaner.

ANDREW MALLALIEU
Co-founder, Nine Sixty
www.ninesixty.co.uk

Work-life balance is something I've been trying to get right for years. It's hard because like most people in our industry, I love what I do. For me, the balance came when I set up my own agency and had control over my time. There are times you have to work late to meet deadlines, but it's important to reward yourself and take the time back. It's not healthy to work all the time; you become less creative. So it's important to switch off and give time to the other things.

VIKTORIANA KOSTOV
Visual communication designer
komiska.com

Structure and focus are crucial when freelancing from a home office. Isolation, overworking, night hours, skipping meals and distractions are the omnipresent foes. Besides work, you take care of the administration and the finances, and no one tells you when the shift ends and the vacations start. I've tricked myself by getting a dog, who takes me out three times daily. [There's] nothing like a morning walk through the woods to focus! [I also] retook piano playing. [Then there's] gardening, taking naps and dancing lessons. I should go to events and meet-ups with other designers more often, though. And say: "Enough for today" more often, in order to spend time with family. But I'm improving.

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CASEY HALD

Product designer, Nasdaq

twitter.com/caseyhald

I've improved my work-life balance by picking up more hobbies. Now that I spend more evenings drawing, I have more energy for my day job than I ever did slaving over *more* side work. Being a workaholic isn't a good thing for anyone, while adding another discipline as a hobby is great for your mental health. Seeing yourself progress in something that has less to do with a paycheque, and more to do with the simple act of getting better, is incredibly rewarding. Also, getting lost in a sketchbook has given my eyes a break from all the bright screens in my life.

JACK NILAND

UX designer, Spacecraft Digital

spacecraft.digital

The flexible working policy that my employer offers is one of the best parts of working there. I have a nine-month-old son, and managing my own flexi time means that if I need to start earlier, or later, it's not an issue. We also have the option to work at home and connect with the office through Slack and Google Hangouts. I've recently been wrapped up in a project redesigning Camden Council's website, and have spent time on-site testing our prototypes with users. I've also found that video calls home really help when working away.

NAEMA BASKANDERI

UX researcher and designer, ADESA

twitter.com/msnaema

I've tried my best to be Superwoman. As a working mother of two, I've realised it's IMPOSSIBLE. So it comes down to priorities. For instance, my kids are number one during week nights, so in-person networking for me is non-existent. But I'm an active member of many designer Slack communities, allowing me to connect with people. There's also a lot of multitasking in my life. For example, on my commute I listen to podcasts and books to keep up with the latest trends. A little hack for audio: listen at 1.25x. You'll have to pay attention, but you'll be able to get more done.

NATHAN POWELL

Designer and founder of @nusiiapp

nusii.com

Last year I was able to make a change for the better. I'd been an all-or-nothing kind of person. I'd focus 100 per cent of myself on one area, leaving little room for others. It took a new business opportunity and the possibility of having even more work on my plate to see that something had to give. I realised I could only strike a healthy work-life balance if I stopped being so all-in. I *needed* to leave room for others. And it's working. My business is growing, I have time for my family and I still get to ride my bikes.

RESOURCES

DESIGNING THE PERFECT WORK-LIFE BALANCE

http://bit.ly/2CHMQ27

"Great designers aren't built from working 60-hour weeks. Great designers are built from treating their own lives with respect," says Cassius Kiani, partner at Mikleo, in this article for InVision's blog.

7 STEPS FOR MAINTAINING YOUR WORK-LIFE BALANCE

http://bit.ly/2F9wAwd

Award-winning art director Adi Goodrich has learnt from experience: making time for yourself is essential. Here, Goodrich talks through her biggest creative challenge: finding the right balance between work and life.

8 AGENCY FOUNDERS SHARE THEIR TIPS ON ACHIEVING (SOME) WORK-LIFE BALANCE

http://bit.ly/28TdEkI

There's a difference between a willingness to work hard, and being a full-blown workaholic, writes Anastasia Philopoulos in this article for the Shopify Partners blog.

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* WASM

WHAT IS WEBASSEMBLY?

Simon Jones looks at bringing the performance of compiled languages like C to the web

WebAssembly (wasm) is different to other web APIs you might have played with. Rather than adding new HTML or JavaScript features, it's a standard that defines a binary executable format for client-side applications on the web, which can be run in the browser while taking advantage of the speed and low-level hardware capabilities of machine code. While it's a relatively new standard only now gaining attention, it's already supported in all major browsers, and has a budding ecosystem of tools.

This represents a major change for the web, where JavaScript (or abstractions of it such as TypeScript) has been the only language available for coding. The introduction of WebAssembly means that there is now a platform to enable C, C++ and other code to be written and compiled to run in the browser. In essence, if you write a wasm module, you compile it to a bytecode format, which can be executed on any platform that supports WebAssembly. This is similar to Java bytecode running on the JVM. You wouldn't typically expect to write wasm code directly.

This is interesting for two reasons. First, it enables coding in languages other than JavaScript for the web. This is compelling to many developers who have stylistic preferences or experience in other languages. WebAssembly was originally designed to focus on C and C++ development, and it enables features of these languages, such as low-level memory management. There's also support available for Rust (*rust-lang.org/en-US/*), another language developed by Mozilla. However, it's also expected that a wide range of languages and compilers will become available, and it will at some point introduce support for garbage-collected languages such as Java. You'll find experimental compilers for other languages starting to become available.

The second benefit is performance. Experiments show that WebAssembly code can be parsed significantly faster than JavaScript (*webassembly.org/docs/faq/* indicates up to 20 times faster). This opens up the opportunity to develop more complex software for the web – things like 3D graphics engines, image processing and more. As a result, one of the early emerging practical-use cases for WebAssembly are games developers looking to produce high-end games that run in browser. Epic Games has demonstrated a version of the Unreal Engine that runs in-browser as a wasm module.

WebAssembly is also designed to integrate with existing JavaScript engines, which mean the two platforms' modules should be interoperable. Wasm modules can be imported into JavaScript code, which can then take advantage of its functionality. Currently WebAssembly cannot access the DOM or web APIs directly, but it can use JavaScript to do so.

Also, there's nothing constraining WebAssembly to run only in-browser, and it's expected it will be ported to other platforms. This could make it significantly easier to build cross-platform apps that support web and native environments.

You might be wondering about the security implications of WebAssembly, since this is a general concern for low-level languages. Rather than being true native machine code, however, wasm is designed to execute in sandboxed environment, and adheres to the same security constraints as JavaScript does in browser.

If you want to get started with WebAssembly, Emscripten (*kripken.github.io/emscripten-site/*) is a compiler that supports C and C++ compilation and conversion of existing applications. You won't find too many production applications using it yet, but it represents another step to bridging the gap between browser and native software. This is definitely one to keep an eye on, and if you're not building wasm modules, you could well be consuming them soon.

* PROFILE
Simon is a software engineering director with a background in banking and financial services. He leads teams working with Angular, React, Java and .NET.

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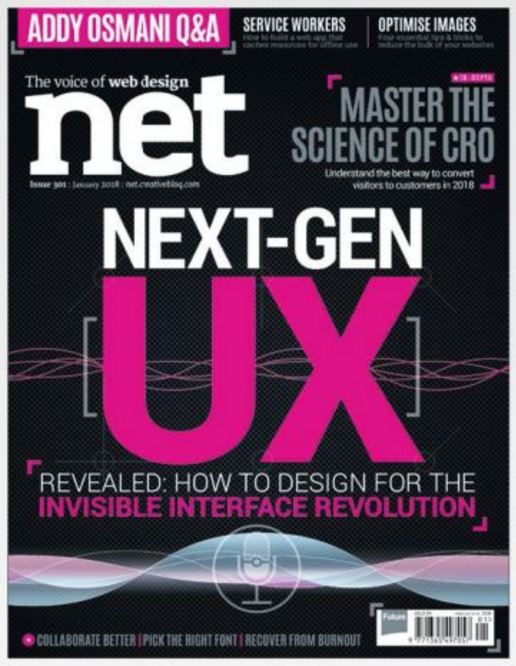

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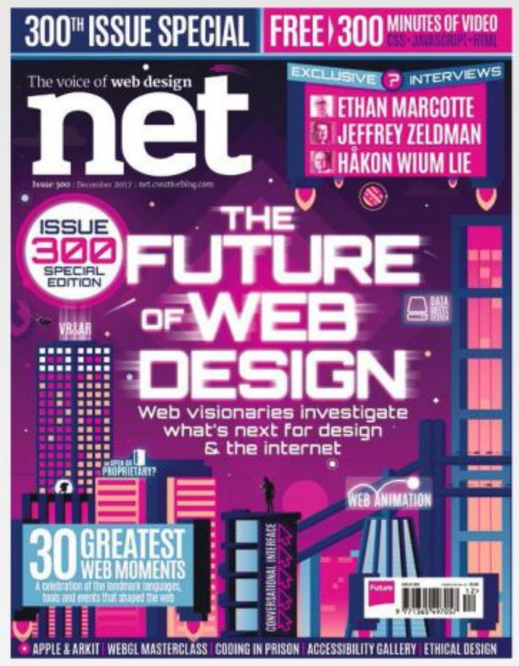

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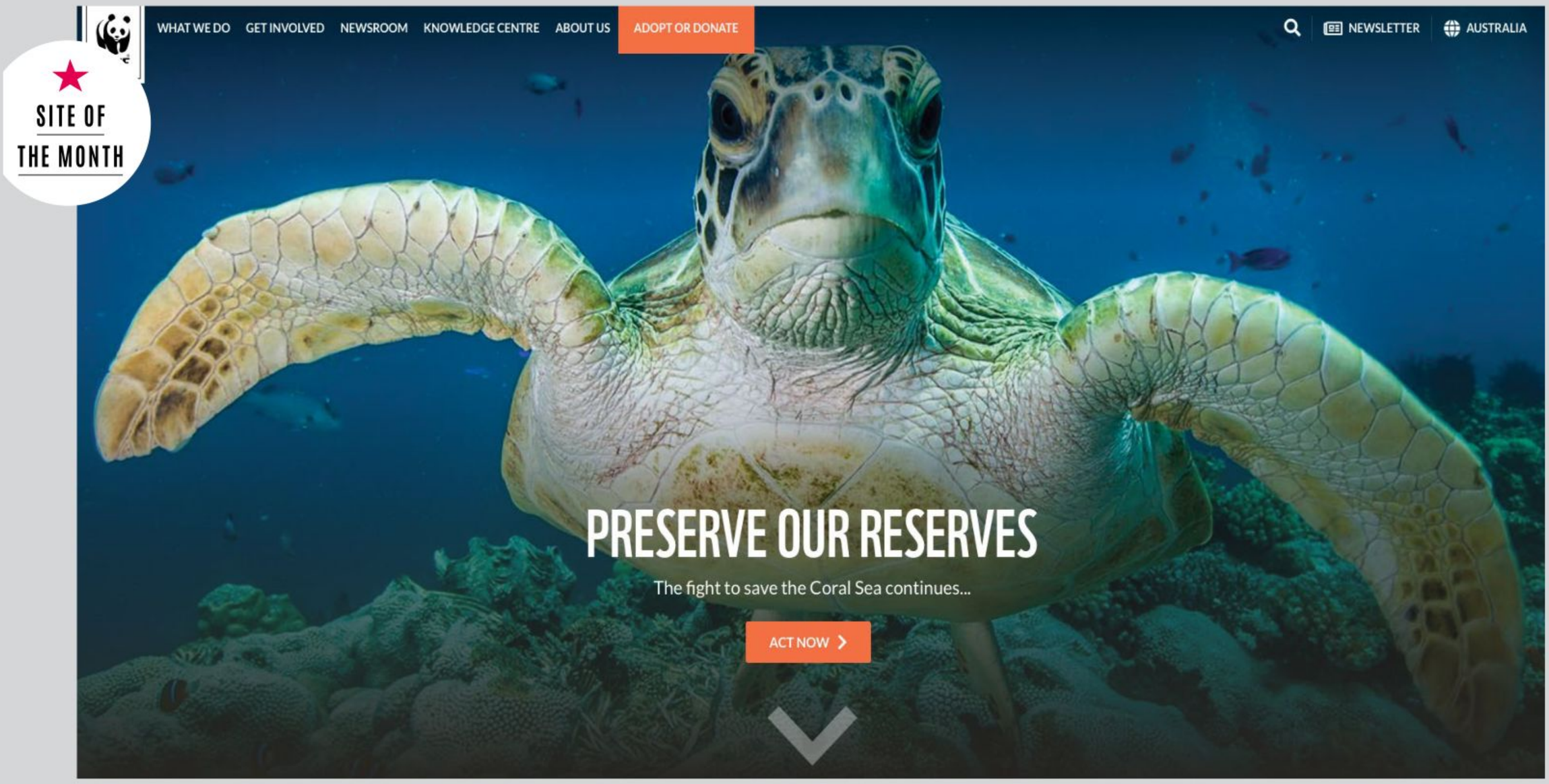
GALLERY

Sensational design and superb development

CHRISTINA KING

Christina works as a social media executive at award-winning digital agency Createful. She is based in Bournemouth, UK.
w: *createful.com*
t: *@christina_king1*



* HTML5, JAVASCRIPT

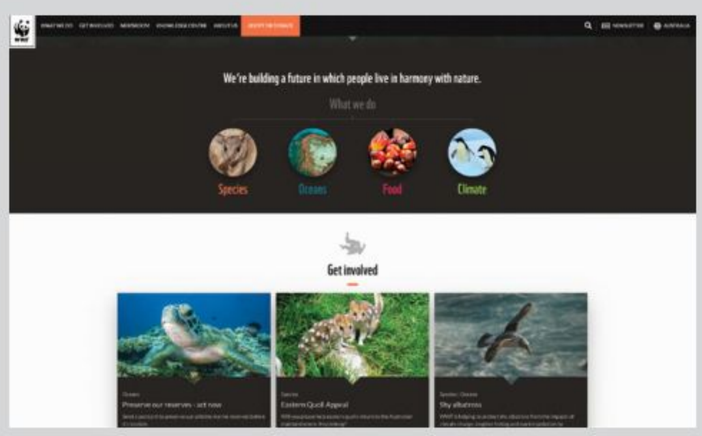
WWF AUSTRALIA

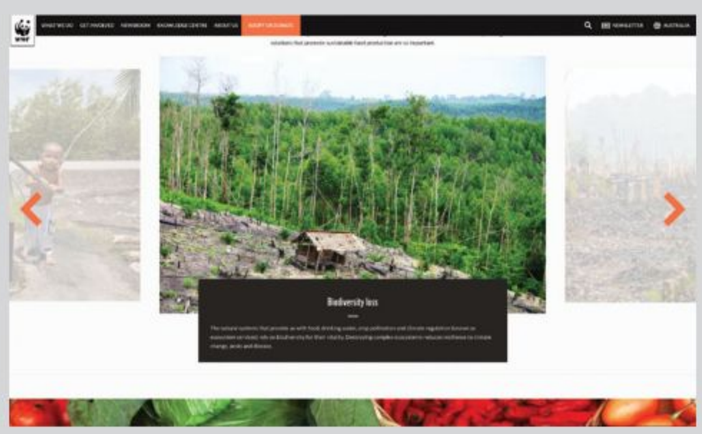
www.wwf.org.au

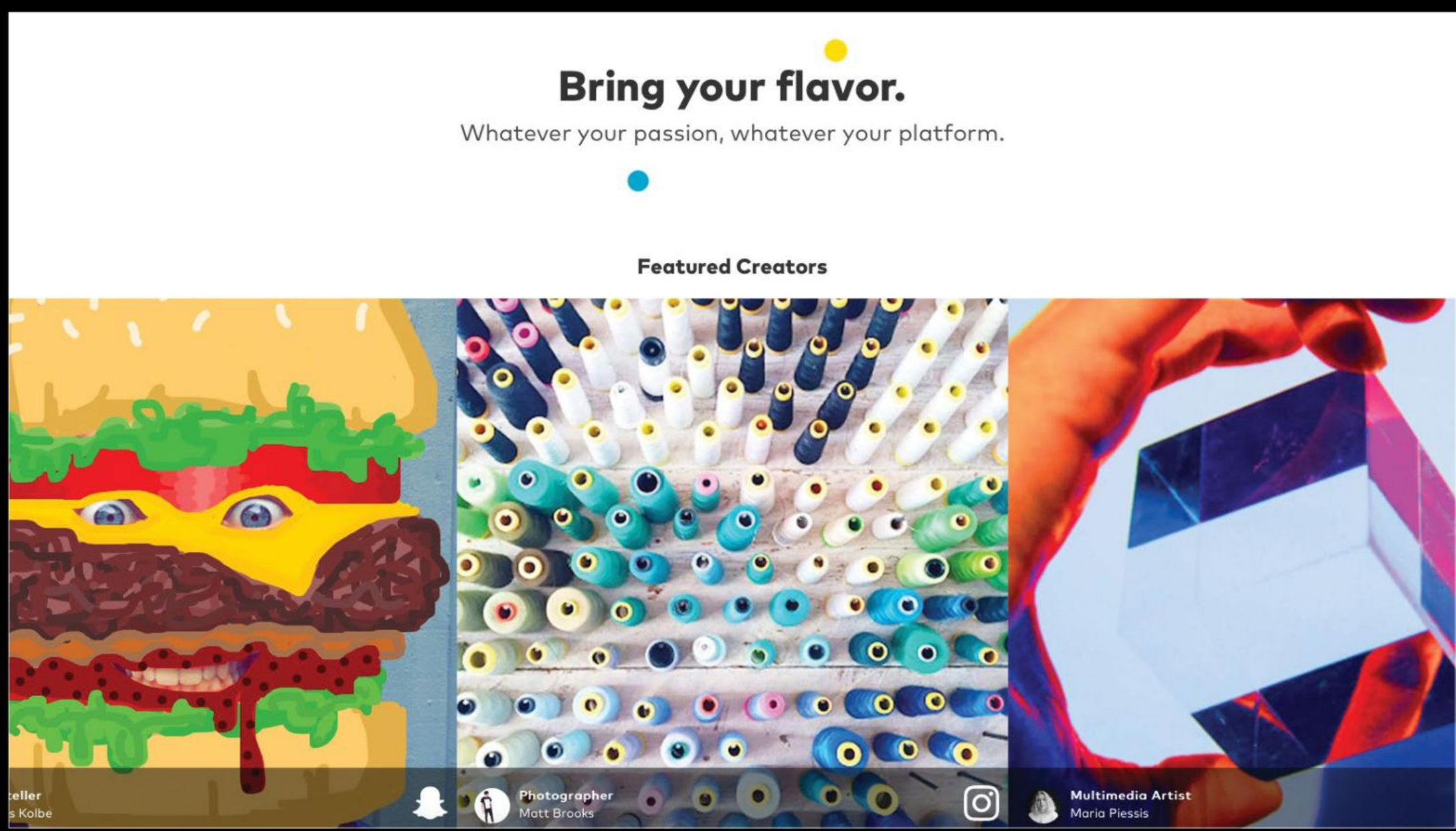
WWF Australia boasts a website worthy of its reputation. Celebrating wildlife and nature, the bold, colourful site invites users to become completely immersed in the natural world. Vibrant images showcase the beauty of amazing wildlife, and invite users to learn about different species. Videos enable visitors to understand the links between modern behaviours and the damage to some of the world's most beautiful habitats.

The website also sheds light on conditions of those working within the natural world. One video in particular opened my eyes to illegal fishing practices. I had no idea how common illegal, unregulated fishing vessels are, or how the food I eat may have been sourced through one of these practices.

As we begin to gain awareness of the issues surrounding the world we live in, it's great to see an organisation using its website to educate the public.







JQUERY

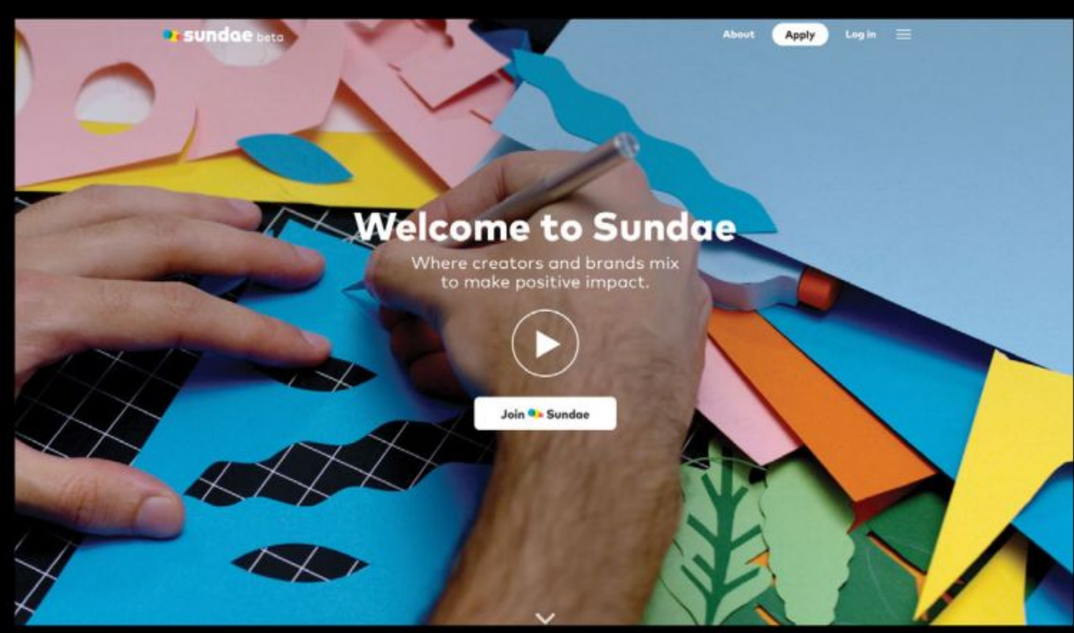
SUNDAE

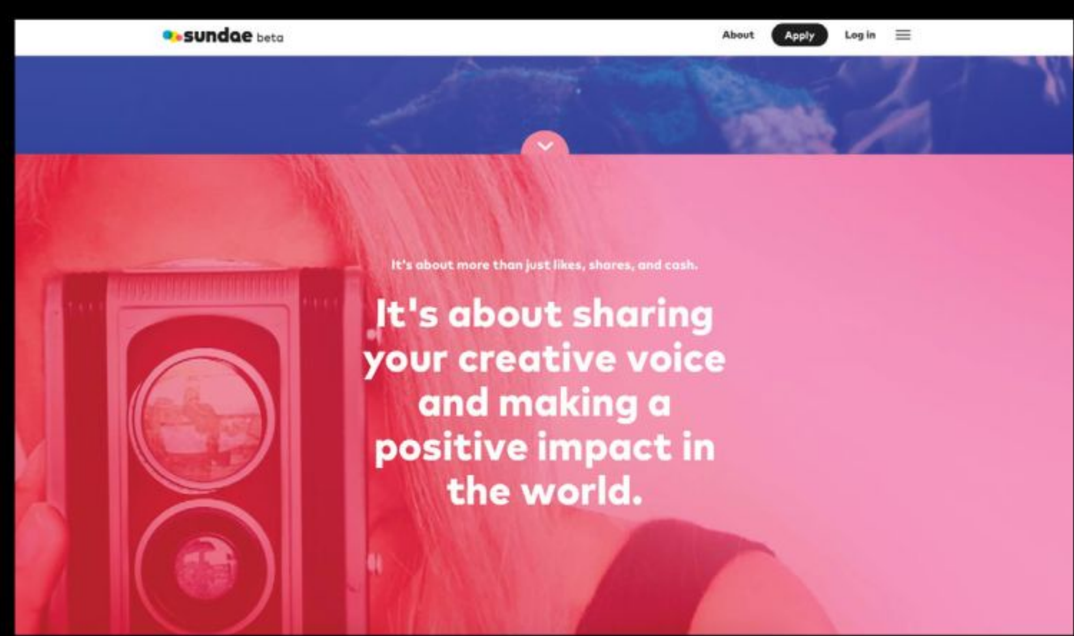
www.sundaecollective.com

The variety of websites and services available for recruitment today is extraordinary. However, in the creative sectors where freelancing is widespread, it can be difficult to find opportunities that enable you to pursue your interests and passions with other like-minded folk.

Sundae is a platform that aims to enable creators to collaborate with brands and other makers to bring ideas to life. Whether you're a choreographer, chef, mixologist, filmmaker, illustrator, coder or blogger, if you create, then this hub is for you. The concept itself is great, and the website quite simply makes you *want* to become part of a vibrant, creative community. The homepage video is a celebration of all things creative, and communicates the vast range of talent and possibility available within the creative industries. You're invited to share details of what you care about, including issues such as education, equality, sustainability and health, in order for Sundae to connect you with the most suitable collaborators.

As if that wasn't enough, Sundae's service also makes it possible for creators to connect with brands that share similar values. Sundae positions itself as a place 'where creators and brands mix to make positive impact'. At a time where global issues are at the forefront of our minds, this is a fantastic opportunity for people in the creative industries to work together to drive positivity and change where it matters the most.





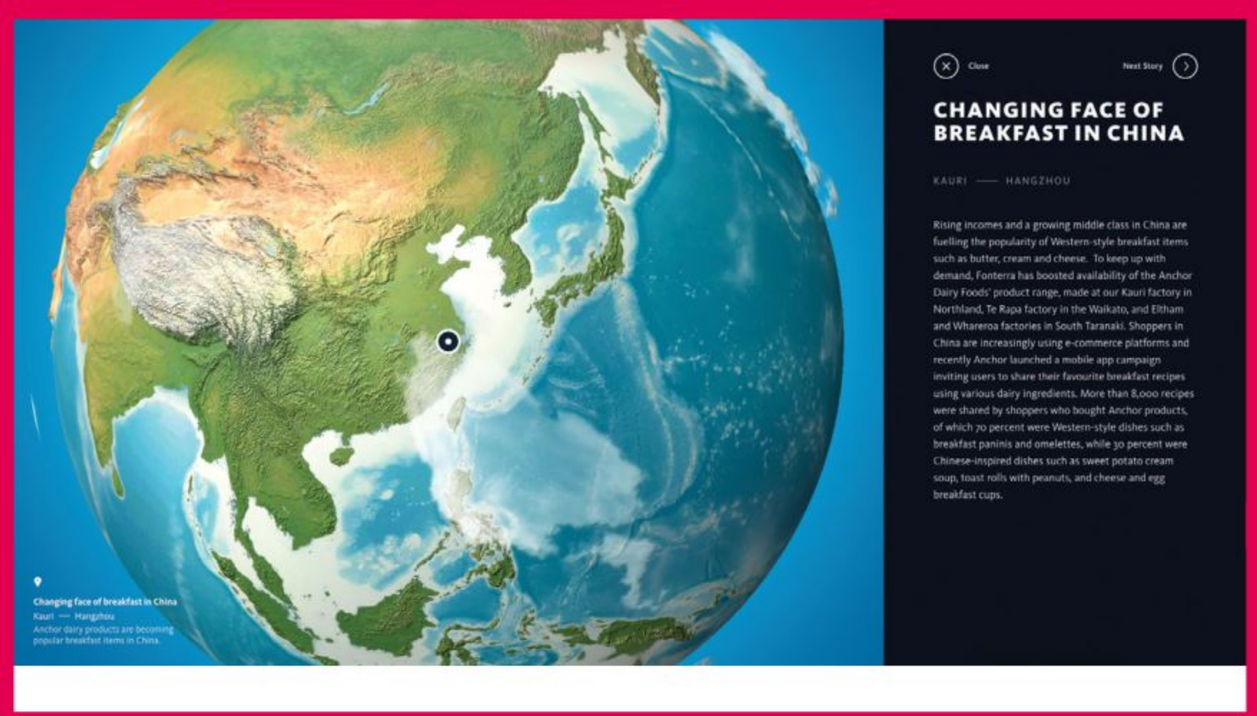
* WEBGL, 3D DESIGN, INTERACTIVE

FONTERRA: FROM HERE TO ANYWHERE

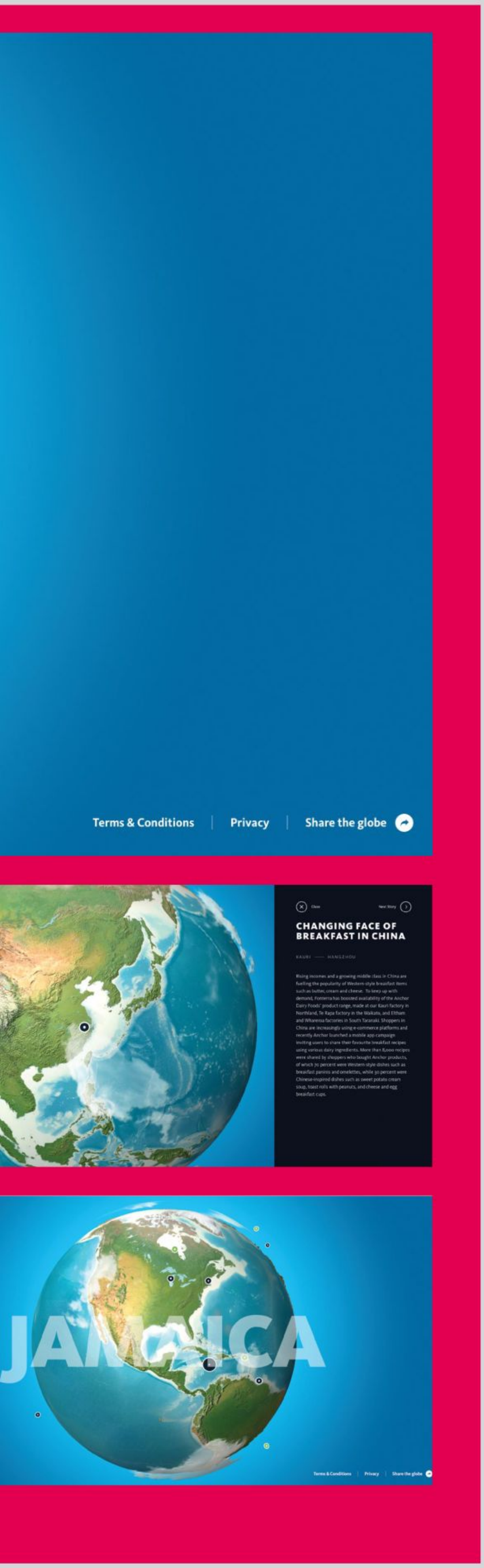
www.fonterra.com/nz/en/campaign/from-here-to-everywhere.html

Fonterra created a 3D experience using WebGL, to show how New Zealand dairy innovation has improved health and nutrition around the world. Visitors can explore the world by spinning and clicking the globe, to fully understand the 'everywhere' nature of Kiwi dairy innovation. It's slick, easy to navigate, and most importantly, provides users with an interesting way of understanding more about global distribution. As well as providing a unique and creative way of engaging users, I think it's a brilliant way to educate students and young people about the global economy.

The UX is the best element of this platform. Giving users the choice of which countries to explore makes the experience more memorable. It's grabbable, spinnable and zoomable – everything you need for a fully immersive experience.



"This type of design is needed in the constantly evolving digital landscape"
BRAD MARSH, @SCDBOURNEMOUTH



* INTERACTIVE, ERLANG, MAPS

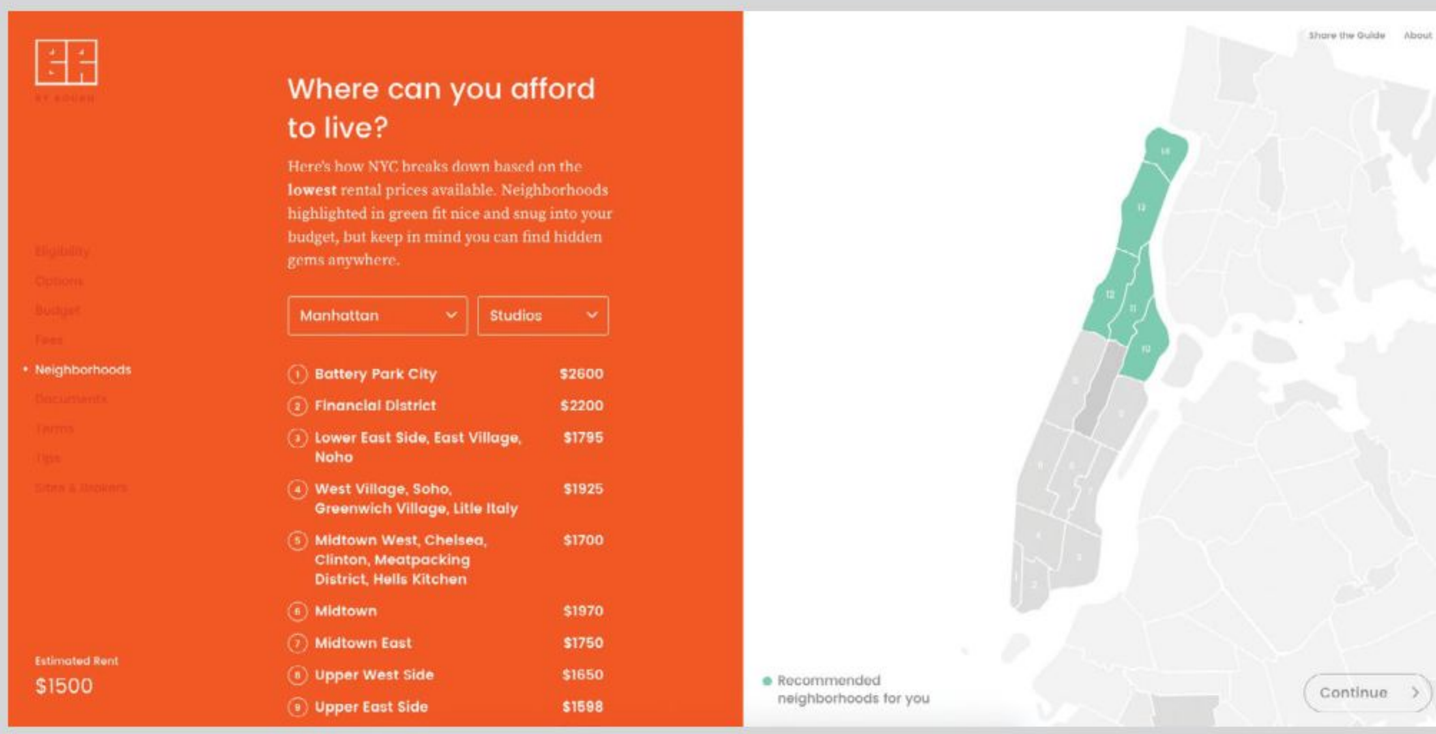
BITTER RENTER

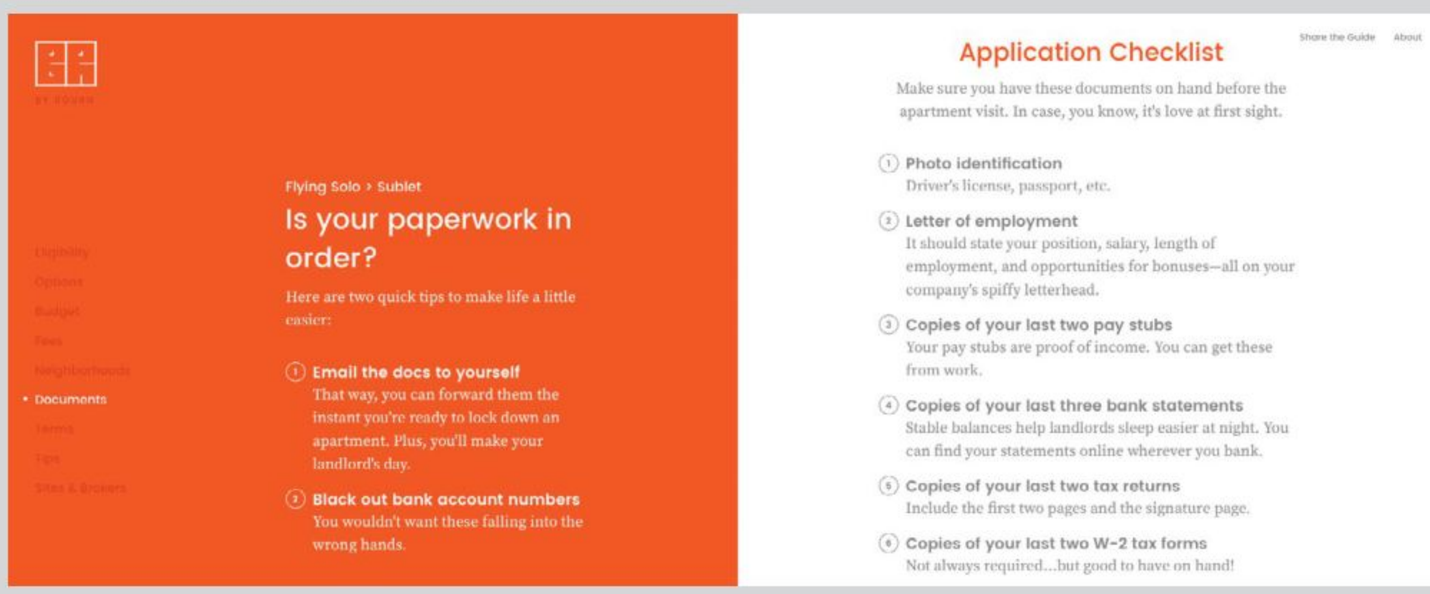
www.bitterrenter.nyc

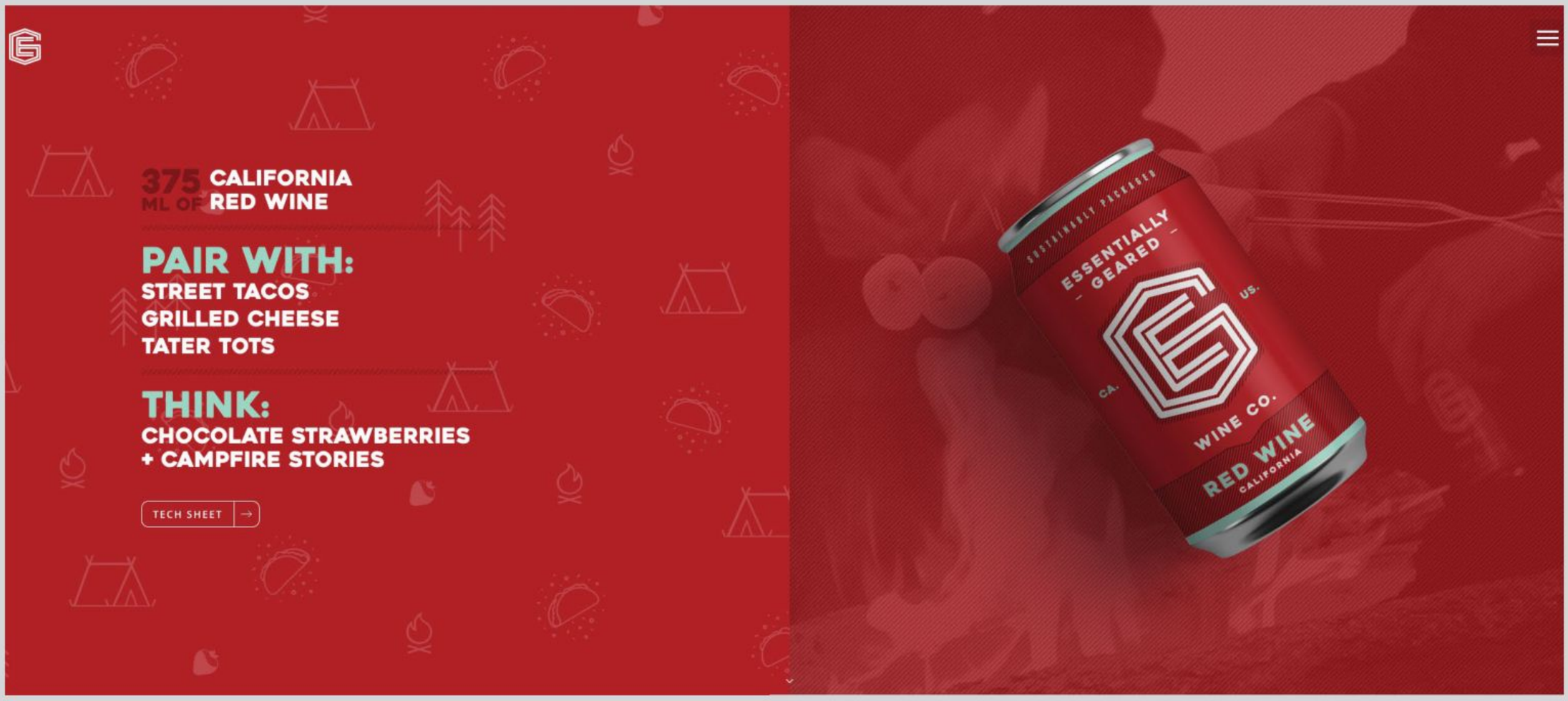
The journey from teenager to adulthood is a roller coaster of emotions. Before you know it, it's time to start looking for your own place. It's an exciting time, gaining independence and imagining all the fun you can have without anyone to nag you to clean up after yourself. But where do you start? Which area of your favourite city can you realistically afford to live in? Do you need to consider sharing for a while? There are so many questions in the minds of young property hunters. Luckily, for those in New York City, there's a platform that takes the hassle out of the process.

Bitter Renter is an interactive guide built by a New Yorker who had experienced the disheartening nature of apartment hunting in the city, from broker's fees to surprise last-minute increases in rent. With a clean, user-friendly interface, the step-by-step guide carries the user through each stage of finding an ideal apartment. From starting at the very beginning at eligibility and sublet options, to working out your budget and finding a neighbourhood, narrowing down your options couldn't be easier. You're even invited to enter your expenses for consideration, to ensure the suggestions are as realistic as possible. An 'Application Checklist' is also provided, along with a list of property terms that are worth knowing.

By the time you're finished, you're armed with an impressive selection of knowledge to impress any property manager or broker. I think this is a real gem in the world of renting, and I hope something similar appears in the UK.







* WORDPRESS, PHP, HTML5

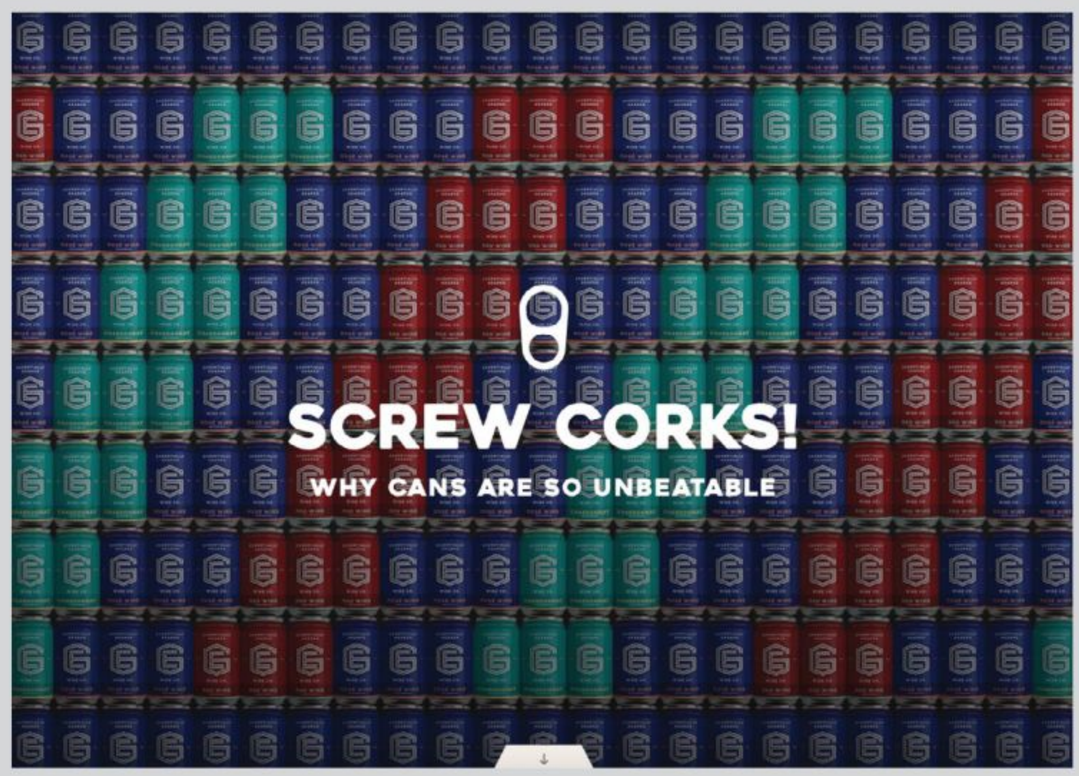
ESSENTIALLY GEARED WINE CO.

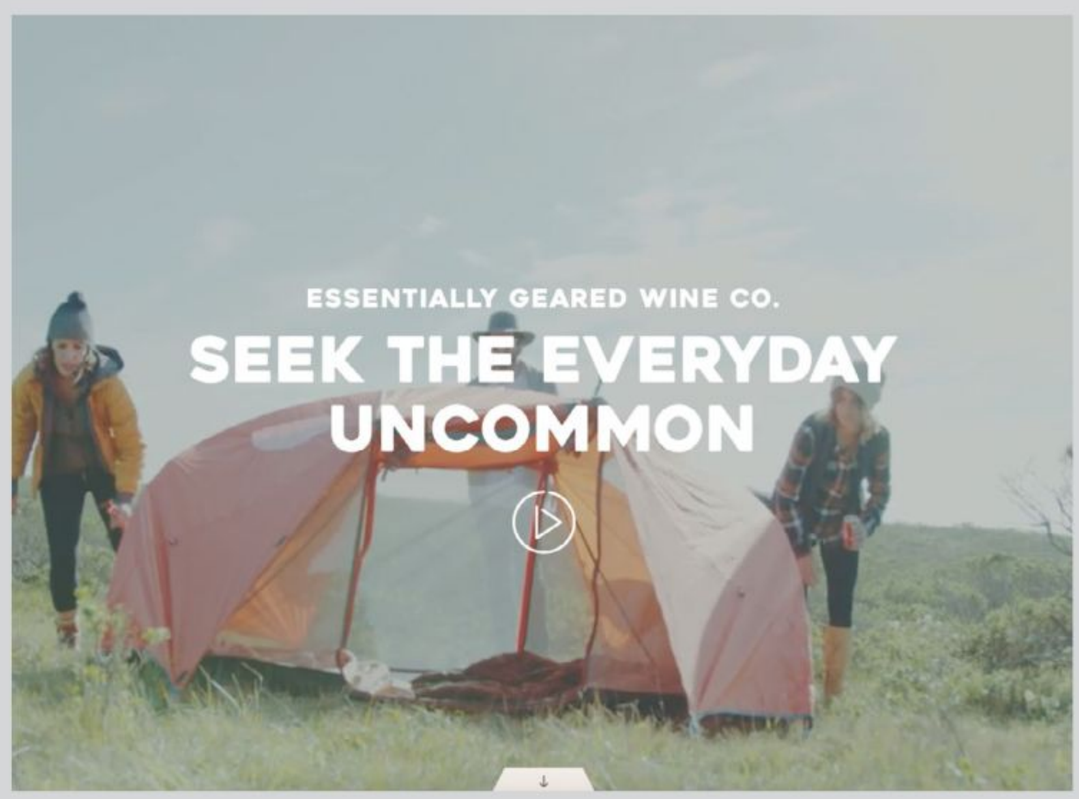
www.egwineco.com

Personality is one of the things you remember most prominently when you first meet someone, and it's similar when you visit a website for the first time. The site for Essentially Geared Wine Co. makes a great first impression, using vibrant colours, bold fonts and videos to engage its audience within seconds of entering the site.

The brand leverages its site to be the key communicator of its ethos: 'We're inspired by Mother Nature'. Packaging the wine in sustainable cans, Essentially Geared Wine Co. carries its 'no fuss' ethos through the site, implementing beautifully shot videos featuring people enjoying outdoor activities, quality time with friends or family, and the beauty of nature. A light-hearted and humorous persona is also evident through the way it recommends food pairings for the wines. Unlike many brands who might automatically attempt to name the most expensive-sounding dish on the planet, the suggestions appeal to the down-to-earth, unpretentious nature of the product and brand values. California Sauvignon Blanc with corn dogs? Okay!

What's most enjoyable about this website is how relaxed the experience makes you feel. Slow-motion videos with low saturation offer an almost nostalgic sense of longing for the simple pleasures life has to offer. The brand's strapline – 'Crafted to keep up with your everyday adventures' – couldn't be better illustrated. The selection of beautifully shot videos enable visitors to view how perfectly this product would fit into that idyllic lifestyle.





LAUNCH BEAUTIFUL UMBRACO WEBSITES WITH USKINNED

Get professional results with uSkinned's responsive starter kits for Umbraco CMS

Top Choose from a wide range of responsive themes

Bottom Flexible configuration options for content editors

Whatever your organisation, you need a great website. Creating and maintaining one that suits your ever-changing needs can be difficult and expensive. Thankfully, uSkinned's starter kits are future-proof, adaptable and easy-to-use, so no matter how much your site changes, they'll grow with it. And right now, you can get 15 percent off of your next uSkinned purchase with the code 15OFFCB. Head over to *http://bit.ly/2CpdGeY* for more.

uSkinned's themes are designed with users in mind, and make it easy for anyone to create a beautiful, professional-looking site. Whether you're a web designer or developer, marketing professional or non-profit volunteer, run your own business or work for a digital agency, or just want to create an exceptional website, uSkinned is the perfect solution.

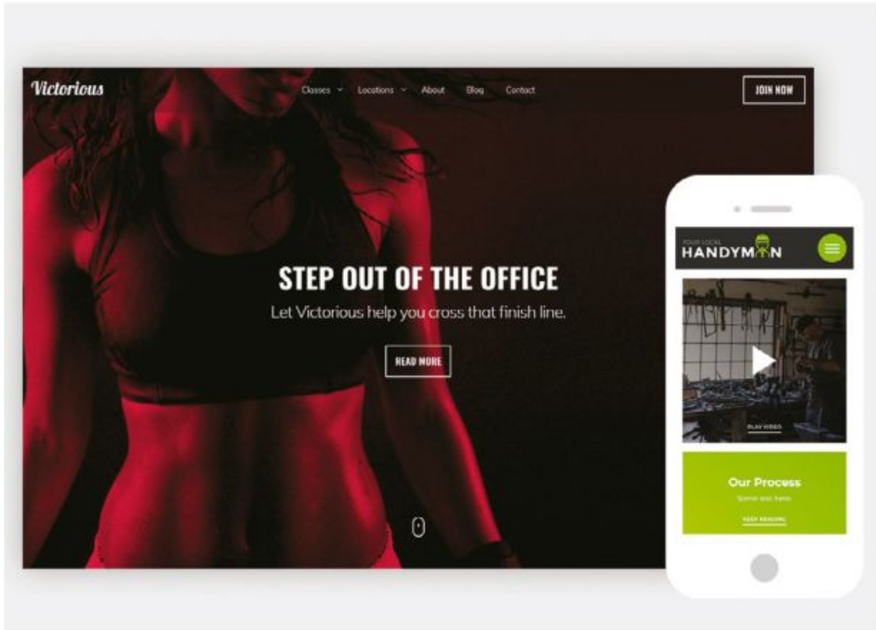
You need a website that's flexible and can be up and running quickly. uSkinned themes make it simple to launch a responsive content-managed site in no time – just customise the colour palette, add your logo and content, and hit Publish. You'll have a beautiful, SEO-optimised site in moments.

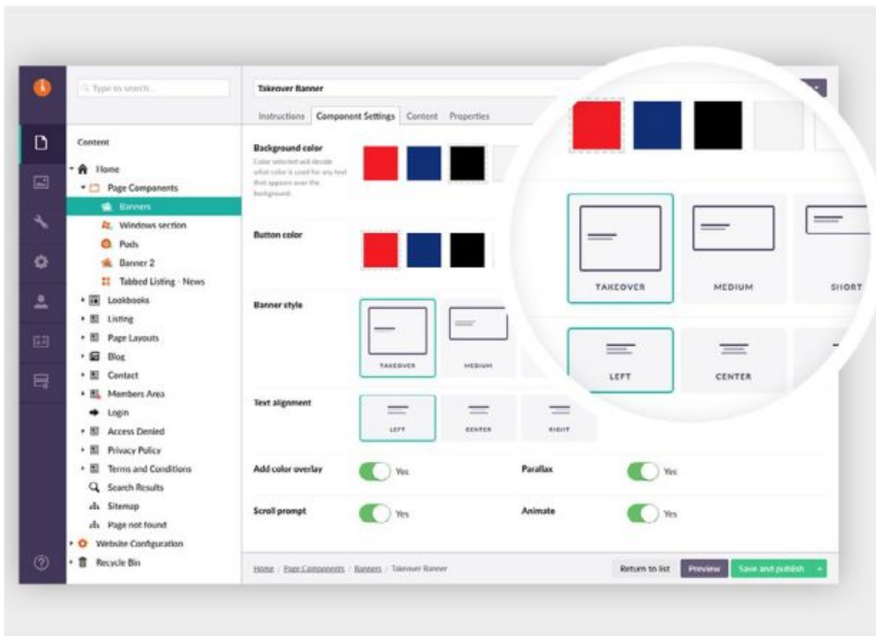
> "Each theme is an outstanding piece of work, packed with the features we need and our clients demand"
>
> **Jonathon Burton,** *NHS Webteam*

uSkinned sites are built on SEO best practice. It's easy to add metadata, as well as SEO-friendly URLs and code that will help you get to the top of the search results. With a fully featured blog you can keep your visitors up to date from day one. What's more, each theme integrates seamlessly with your tech stack, including connecting with MailChimp or Campaign Monitor, or adding video from Vimeo or YouTube.

Want to adapt the layout to fit your content? Every element is customisable. Make your content full-width, add columns, grids or stacked content. Need a banner that really stands out? Add movement with a video or parallax image.

uSkinned's responsive themes work seamlessly on every device, be it desktop, tablet or mobile. This means you build your site once and your users get the same great experience every time they visit, however they view the site.





Together, uSkinned and Umbraco CMS give you powerful functionality – but if you want to add your own stamp, the source code is fully customisable. If you have the coding skills, you can dig in and take your uSkinned site to the next level by adding your own elements. It's in your hands.

Some of the world's leading brands and development teams are already using uSkinned starter kits to launch amazing new websites for themselves and their clients. Check out some of their customer success stories (*http://bit.ly/2F7OlJw*).

Don't forget you can get 15 percent off of your next uSkinned purchase – just enter the code 15OFFCB at the checkout.

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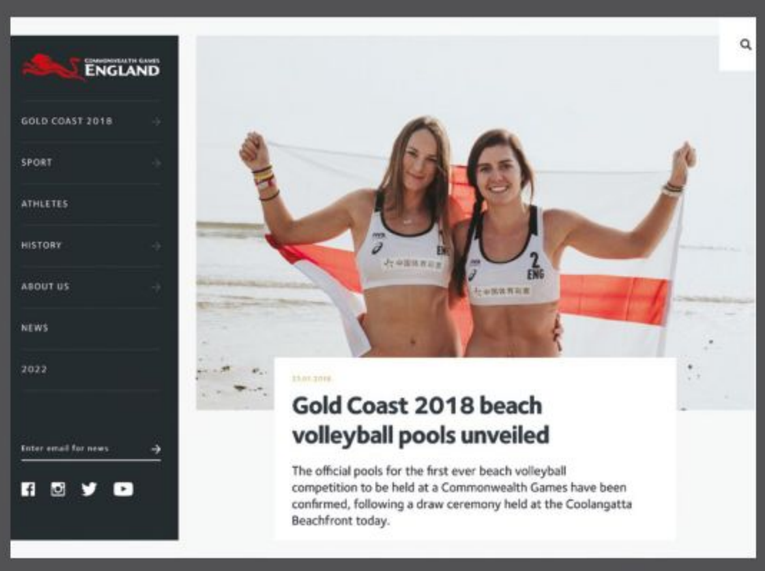
SHOWCASE

Sublime design & creative advice

THIS MONTH FEATURING...

PROFILE 50

Brighton-based designer and creative coder Luke Twyman talks Ninja Tune, data viz and the difficulty of staying motivated as a freelancer



HOW WE BUILT 56

Salad harnessed beautiful data to bring the Commonwealth Games to life for Team England fans during the Gold Coast Games

DESIGN CHALLENGE

This month...

STUDENT ACCOMMODATION

* PROFILES

GARETH LOCKETT

Gareth is a designer and front-end developer at 1976 Limited in Auckland, New Zealand.
w: *www.1976.co.nz* **t:** *@1976Ltd*

PAUL MCKAY

Paul is the co-owner and designer at Cocoon, a digital agency building cool stuff with its clients.
w: *wearecocoon.co.uk* **t:** *@McKay_1988*

WARREN CHALLENGER

Warren is the senior designer at JH, a leading eCommerce agency based in Nottingham, UK.
w: *warch.io* **t:** *@warchdesign*

BRIEF

This month we would like you to design a website for a company offering student accommodation. We'd like your site to showcase the accommodation itself as well as other facilities such as social spaces, and explain what this option offers over private renting.

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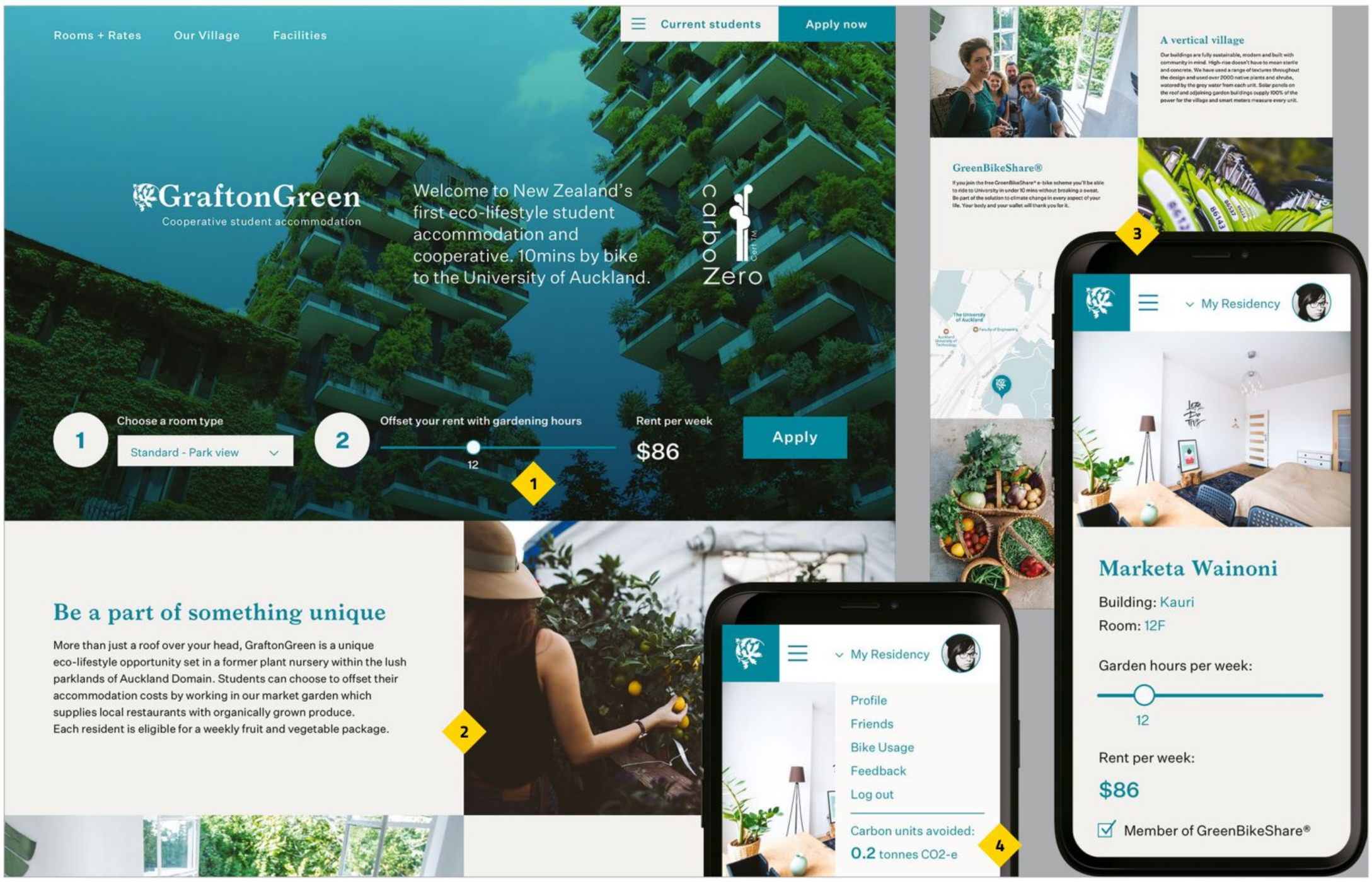

* GARETH LOCKETT

GRAFTONGREEN

A site that balances the need to appeal to two audiences: students and their parents

Set in a former plant nursery within the lush parklands of Auckland Domain, GraftonGreen is more than just student accommodation – it's a unique, carbon-neutral, eco-lifestyle offering. Students can choose to offset their accommodation costs by working in a market garden, which supplies local restaurants with organically grown produce. The website showcases the lifestyle aspect of the village with engaging photography and branding in a teal and warm-grey colour scheme. This keeps the 'green' aspect of the name and concept from getting too literal while still being in the greenish part of the colour wheel. A combination of Larish Neue and Untitled Sans mixes a character-filled serif with a plain workhorse font designed by Wellington type designer Kris Sowersby. The target audience is socially conscious millennials, so a crafted feel was important, but ultimately the parents of the students also need buy-in, so the site functionality is kept simple and directed.

CLOSE UP

(1) A key benefit of living at GraftonGreens is the ability to work in the organic gardens to reduce the weekly rent, so it was important to make this very visible by including a form on the homepage enabling the user to test the price reduction based on how many hours their study schedule allows. This would include a touchscreen friendly range slider and combo box. The Apply button would take the user through to a full application form.
(2) Homepage includes a fullscreen hero section with a fixed width grid below using mostly half-width content blocks that become full-width on smaller viewports.
(3) A resident login area allows students to manage their gardening hours/rent ratio, sign up for the GreenBikeShare scheme, message friends from within the village, and supply feedback to village management.
(4) As the village runs off solar electricity, an algorithm would calculate a total of tonnes of CO_2 avoided during the student's stay based on length of stay and size of room. This could be tied to an IPCC emissions database.

MY MONTH

What have you been doing this month? Mostly on summer holiday so kayaking, sailing, swimming and reading followed by summer music festivals. Just starting work on a designer furniture website.

Which two websites have you visited for inspiration? Typewolf, siteInspire for design and anything posted by @openculture.

What have you been watching? *Black Mirror, The End of the F***ing World* on Netflix.

What have you been listening to? Aldous Harding, Roger Waters, The War on Drugs, Marlon Williams, The Divine Comedy and podcasts, podcasts, podcasts...

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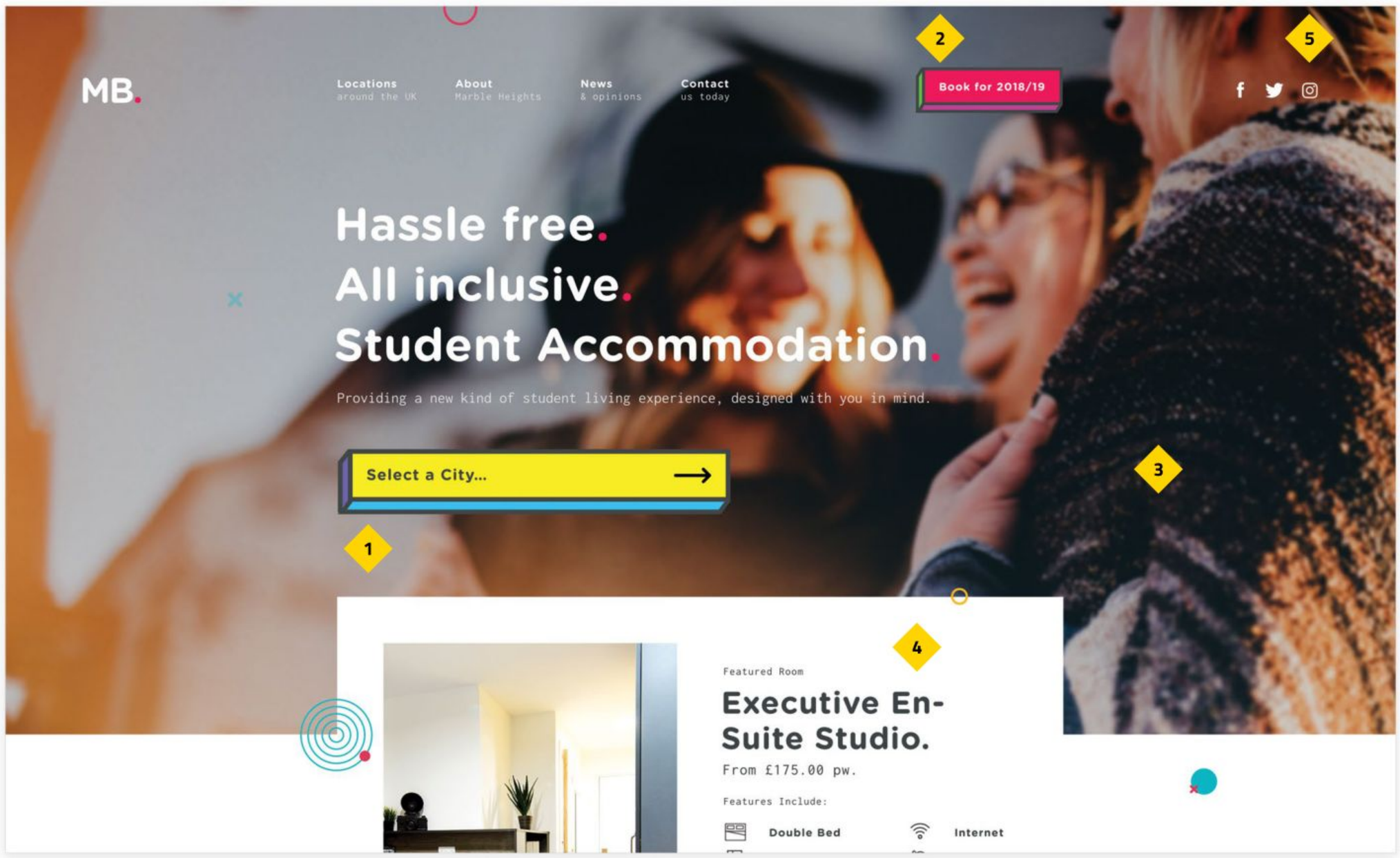


MY MONTH

What have you been working on this month? I've been working for the past five months on an app and accompanying site, looking to launch at the end of March – Travamigos. There's currently a holding page up that you can check: *travamigos.com.*

Which two websites have you visited for inspiration? I regularly visit *designinspiration.net* and *siteinspire.com.*

What have you been watching? Been binge watching a few series on Netflix: *Mindhunter* and *The Unabomber.*

What have you been listening to? When I need to get into the zone, AC/DC *Live at River Plate* is my first port of call.

* PAUL MCKAY

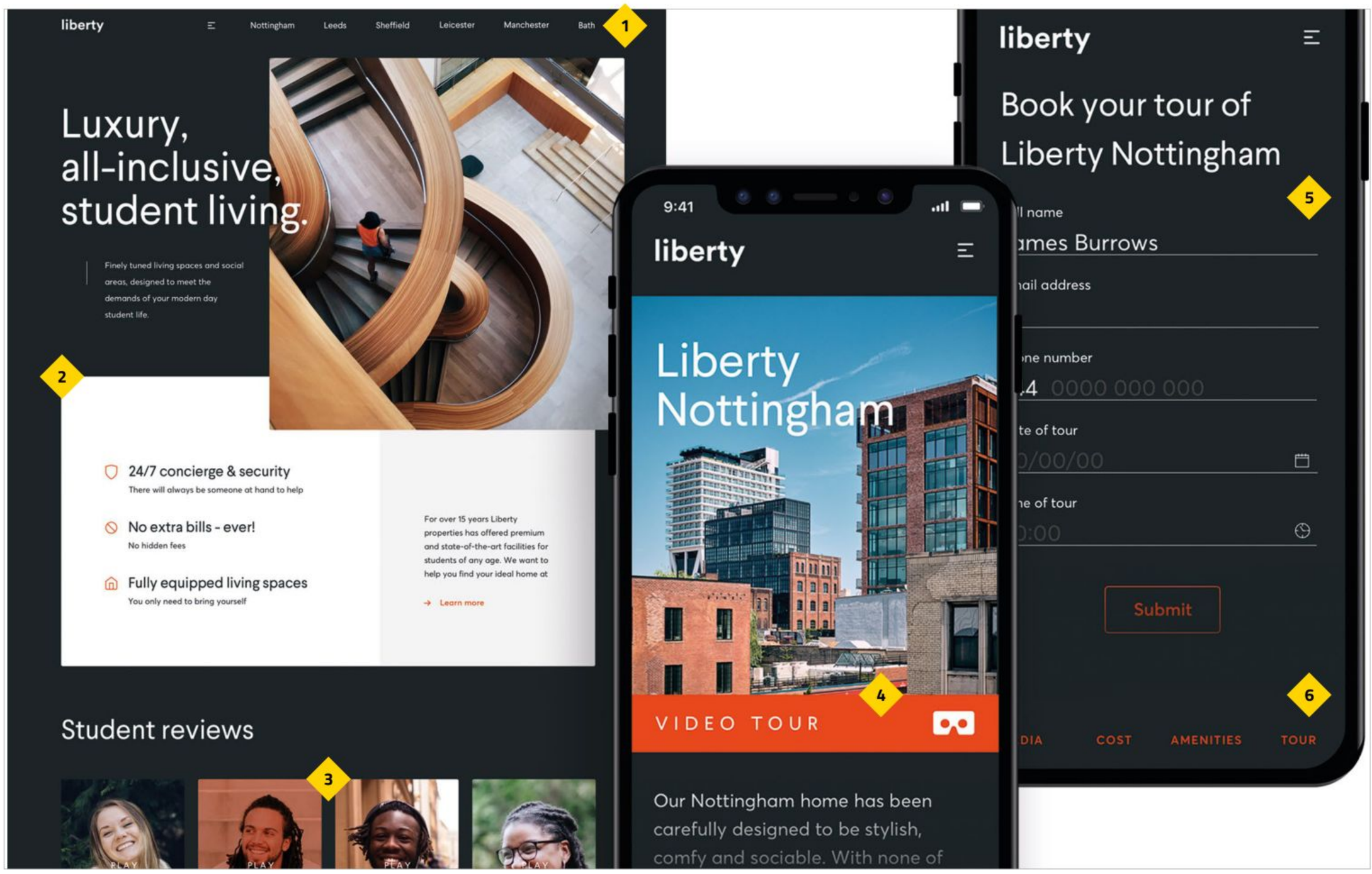
MARBLE HEIGHTS

A website that uses background video to give users a virtual tour

Marble Heights offers hassle-free, all-inclusive student accommodation, and a welcoming, reassuring and stress-free experience at university/college. With a variety of rooms to suit, it offers a comfortable, stylish and safe place to live. The site is designed to convey the impression of somewhere welcoming, supportive, happy and relaxed. Moving away from the accustomed static background image, the use of video will aim to increase engagement, while providing a glimpse of life at Marble Heights. Users will have access to an easy-to-use search narrative, enabling them to find accommodation in the city they'll be attending. And a simple yet effective typographical hierarchy will easily direct the user while scrolling and browsing throughout the site. To support the idea of a 'happy and relaxed' environment, the core font used was Gotham Rounded – a fun, cheeky typeface.

CLOSE UP

(1) It's important users can easily search for the city in which they'll be attending university, and through that, discover the accommodation Marble Heights can offer them. **(2)** With the current academic year underway and with new students beginning to search for universities, the ability to allow them to book a room for the new year is paramount. **(3)** The use of video rather than a static image or slideshow will enable the company to show in a few seconds the kind of living space available when booking with Marble Heights. **(4)** A 'Featured Room' will work in tandem with the video and provide the user with further understanding of what features are included in the accommodation without the need for lots of searching. **(5)** Links to social media allow for a larger picture to be painted with regard to the culture of Marble Heights. Integration of Twitter, Facebook and Instagram feeds will also be found under the News & Opinions tab to provide a wide variety of news sources.



WARREN CHALLENGER

LIBERTY PROPERTIES

This site for luxury facilities uses Progressive Web App technology

Liberty Properties offers luxury facilities to university students of any age in the UK. The name 'Liberty' alludes to freedom away from control, restriction or hampering conditions. It is aimed at students willing to spend a little bit more cash on their accommodation.

Implementing a premium look and feel was essential. I achieved this by using clean lines within the layout and typography, setting the design to a horizontal and vertical grid, and keeping the UI simple and not overcrowded. On the homepage, we have immediate reassurance messaging and student interviews from various stages. Liberty Properties uses state-of-the-art technology, and so does the site. It's built as a PWA, offering a seamless experience with fast-loading, smooth transitions, push notifications, and PWA features that work offline. Liberty also provides video tours that you can take advantage of by using Google Cardboard VR.

CLOSE UP

(1) The navigation primarily shows locations so the user can quickly navigate to the appropriate property and learn more. As the user scrolls down the page, the navigation follows. **(2)** Giving the user immediate reassurance and headline service messaging differentiates Liberty from other student-property offerings. **(3)** You cannot get better than reviews from existing students staying at Liberty Properties. Clicking any of these options expands the preview image, and the video starts playing. **(4)** When clicking or tapping the Video Tour button, the screen changes into a navigable video where users can view any angle they wish, using the cursor, touchscreen or Google Cardboard. **(5)** It's important the user can see the property for themselves, so this simple and elegant form enables them to book a tour. **(6)** Additional footer navigation appears on mobile location pages, which will save the user scrolling through all the content.

MY MONTH

What have you been working on/doing this month? Redesign of a publisher's website and a personal project to promote Japan.

Which two websites have you visited for inspiration? I looked through many for inspiration on this, but I particularly liked the simplicity of Bang & Olufsen's website.

What have you been watching? *Blade Runner 2049* plus binge-watching *Altered Carbon.*

What have you been listening to? My taste varies but writing this I'm listening to Lorn.

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PROFILE

LUKE TWYMAN

www.whitevinyldesign.com

The Brighton-based designer and creative coder talks Ninja Tune, data viz and the difficulty of staying motivated as a freelancer

Luke Twyman comes from a background of music and video games, and you can see these influences in his work. He most recently caught our eye with a stunning site for the record label Ninja Tune, revisiting its 2017 releases, and his portfolio is thick with inventive approaches to data viz, procedural generation and interactive music. We caught up with him to find out how he does it.

Hi Luke! Can you tell us a bit about your background?
I guess I started about 16 years ago. I'd been making small video games as a hobby, initially just using some drag-and-drop software, and then gradually dipping into code and making some simple audio and visual experiments.

While I was at uni I attended some crash courses in HTML and Flash and realised I could apply some of what I'd already been doing to web design. After uni I focused on trying to get my first jobs while teaching myself how to do more inventive things with Flash. It took a while to get the ball rolling but eventually I started getting agency work and I was developing my skills through that while creating interactive projects for myself. Since then I mainly code in JavaScript, but a lot of the elements of game design, interaction, audio and visuals are still very much present in my work.

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INFO

Location: Brighton, UK

Designing since: 2006

Expertise: Interactive experiences, audio and visual, creative coding/generative/experimental, data visualisation

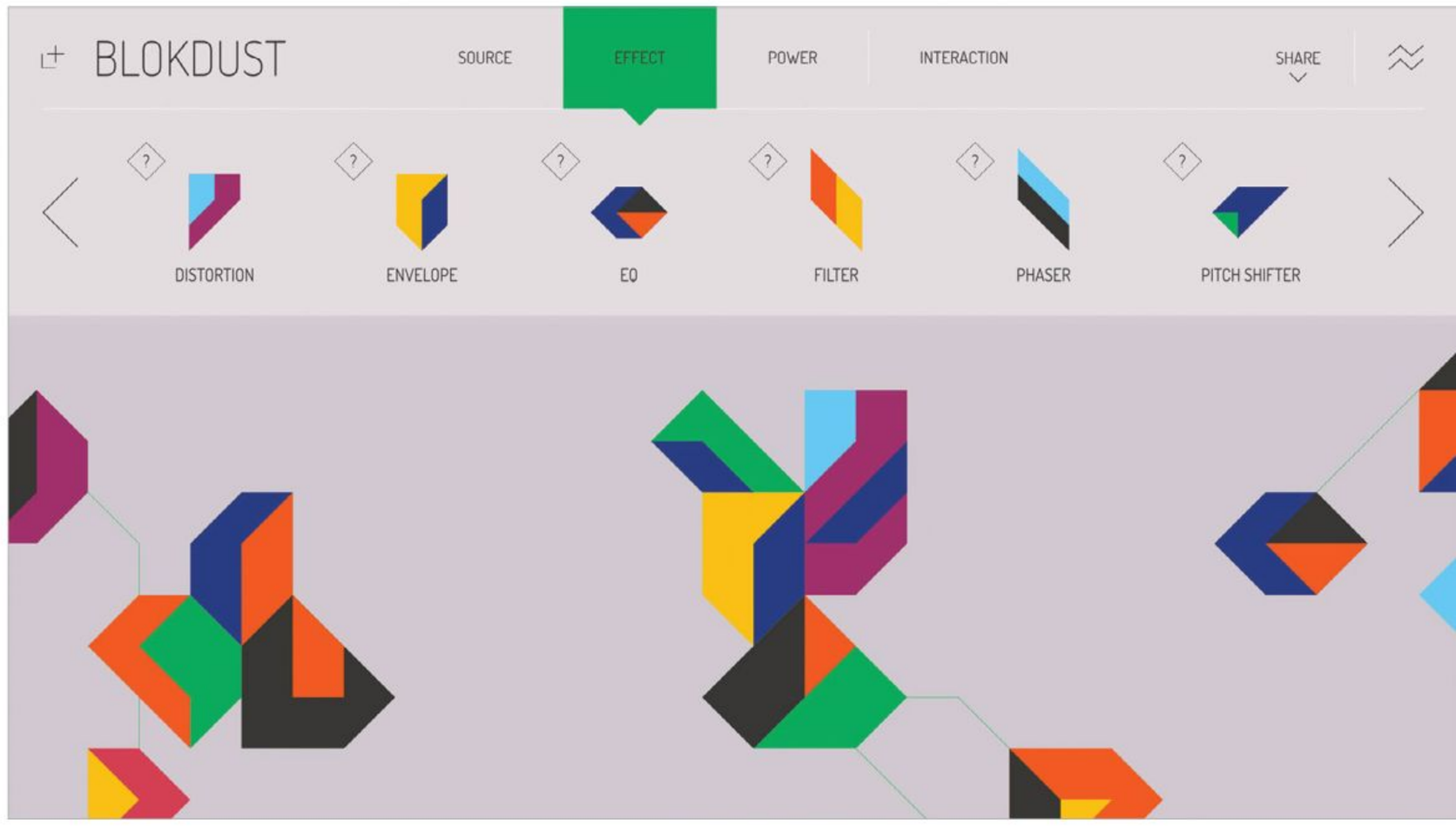
Clients: Ninja Tune, Helios

Awards: FWA SOTM, FWA Cutting Edge Award, AWWWARDS SOTD and Developer Award

How would you describe your job?
Most of the time I'll work as both a designer and developer, taking on a complete project. I do a fair amount of straightforward websites, but I guess the stuff I'm most known for is a mix of visuals, audio and creative coding, which might take the form of data visualisation, an interactive music project, or just some neat way of presenting something.

Much of your work is music-oriented; is this by accident or design?
I was a musician first. I've gone through several recording/performing projects plus it's what I studied, so it just felt natural for me to keep doing that through design and code and creating visual and interactive work that accompanies music. I still regularly make music now and I've found that recently if I'm doing more electronic stuff, it's been shaped quite a lot by what I've learned from coding synths or randomly generating sounds.

How do you stay fresh in the world of data viz?
Tone is important to me – when I was making Here is Today (*hereistoday.com*), there were a lot of infographics/data visualisations that had this very cutesy, babyish, overly friendly aesthetic. It came across as patronising. I wanted to kick against that and have a mood more like a slightly stern teacher, or even like some kind of all-knowing being. I try to say the minimum and present things with a lot of space for contemplation. Another common web trend is the idea that everything needs to be snappy because people are impatient, but I love the reflective mood of slower pacing. In the case of Here is Today, the animations intentionally start to take longer as you click into it more. It's something most people won't notice, but it forces a viewer to really take in the relative scale of what they're seeing.



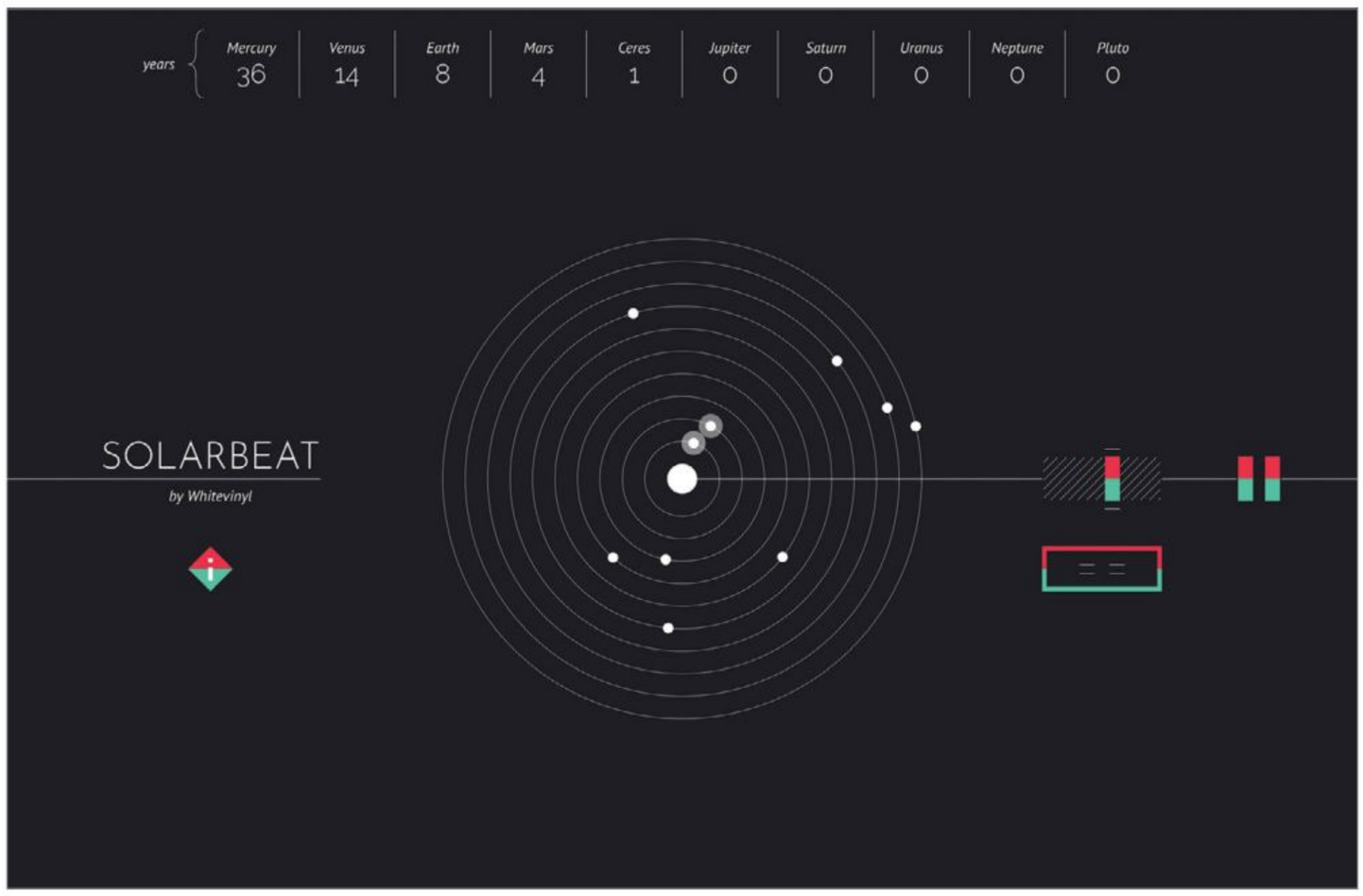
BlokDust is an absorbing audio sandbox with which you can build a virtual synthesiser out of assorted geometric components

For the Ninja Tune 2017 site, Luke combined his creative coding, design and animation skills

Whose work do you admire?
I'm really into what DIA (*dia.tv*) are doing. As well as being experimental and feeling genuinely new, their work embraces some roughness around the edges and isn't always concerned with friendliness or good taste. Lately I've found inspiration in that and it's really liberating – I feel like I'd been quite a scared and safe designer for a long time, and coming out the other side of that I find myself embracing imperfections, and exploring unexpected results. I also follow a lot of unconventional illustrators, modellers, game developers and people just doing interesting or strange experiments. For example, Jun seo Hahm who has this very recognisable style of 3D modelling; Carl Burton who made *Islands*, an ambient game with a heavy visual style; and Takashi Komiyama aka Hermippe who does pixel illustration, embroidery and custom musical instruments and effects.

What tools couldn't you do without?
I don't think I really get too attached to specific tools; even if I'm away from a computer I still get to come up with ideas and visuals for projects. The main thing I don't like to be without is a pad and pencil. Most of my design and layout work happens as sketches, same goes for when I'm coming up with potential future projects. Several of my favourite projects didn't just come from a single instant idea, but from the combination of part-formed ideas over a period of time, and so I like going back through old pads.

Your Ninja Tune 2017 site has drawn critical acclaim. Can you tell us about it?
I was really pleased to work on this project (*ninjatune.net/2017*), and with how it turned out. Ninja Tune is a label I already admired and they asked me to create an 'End of Year' site to celebrate many of the records they'd released throughout 2017. They wanted something that was fairly minimal and used kinetic type and animation to showcase the artists.
The visual style I went with was a bit glitchy but trying to avoid most techno clichés, and with a modern typographic style. I tried to put a lot of focus on great feeling animations and not getting too



SolarBeat uses the movement of the major bodies in our solar system to generate an endless melody that users can manipulate

heavy handed with effects. In construction it became a fun chance for me to combine skills that I don't often get to use within a single project – creative coding alongside straight, informative graphic design, and creating animations and interactions with a hybrid of JS and CSS.

Yume is a unique album promo experience. How did it come about?
I'd worked on a project with Keith Kenniff (Helios) years ago – he and his wife Hollie had put together a charity compilation called *For Nihon*, and I made a very simple audio/visual site to help promote it.
He got in touch again while prepping his album *Yume* (*unseen-music.com/yume*) for release. At this point he wasn't sure exactly what he wanted but was keen for me to come up with an idea, and I love open creative briefs. He already had isolated samples of each instrument for the title track, and we figured we could do something interesting with those. The track has a lot of different sections, and I started thinking about each section as a different setting. I drew a few abstract sketches, which lead to this idea of these floating rock shards that act like music controllers – fading in/out sample loops, or manipulating synth sounds and effects. I'm really into slightly mysterious interfaces and rewarding exploration, so I present this interface without explanation, and allow visitors to freely move between the different scenes rather than being led by the song. I don't think there are many artists so keen to have their music pulled apart like this, but Keith was really happy to run with the ideas, which was amazing.

ARP Observatory (*twitter.com/arpobservatory*) isn't your average Twitter bot. What's the story?
When I first started planning out the idea, I didn't know it was going to be a Twitter bot. I'd been experimenting with coding my own generative synths – using random processes to create audio waveforms. It felt like a whole new area to explore and I became keen on the idea of using it to create something closer to sound design, where it could be dark and textural and embrace randomness in ways that can be difficult within structured music. I started thinking about generating distorted radio signals and toyed with a few different concepts before settling on this idea of a fictional radio telescope observatory, receiving messages from space. I figured a Twitter bot would be a great medium, because I could make it automatically post ▶

*SPOTLIGHT

LUKE TWYMAN

What's on your desktop today?
Some notes, some MIDI controllers, a load of mess.

Little things that make your life worthwhile
The things that help me are teaching, walking, making things that people enjoy and playing/writing music.

What do you have on the walls?
A big paper cutout of crossed branches and a tree trunk cross-section.

What hours do you work?
I don't have set hours, but I often work better in the evening. If it proves useful I'll sometimes match a client's working hours.

What else do you do in the office?
I don't really have an office, it's just my room, or wherever else I'm working that day.

How often do you hang out with other designers?
Not loads, but I have a couple of designer friends, and I teach code most Tuesdays and meet a few new designers through that.

Describe your working culture in three words
Quiet fragmented daydream.

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TIMELINE

Key dates for Luke Twyman

JANUARY 2001
Started making hobby video games.

JANUARY 2006
Began freelancing, primarily using Flash.

MARCH 2008
First digital agency work.

APRIL 2010
Released SolarBeat.

AUGUST 2012
Shifted focus to using JavaScript.

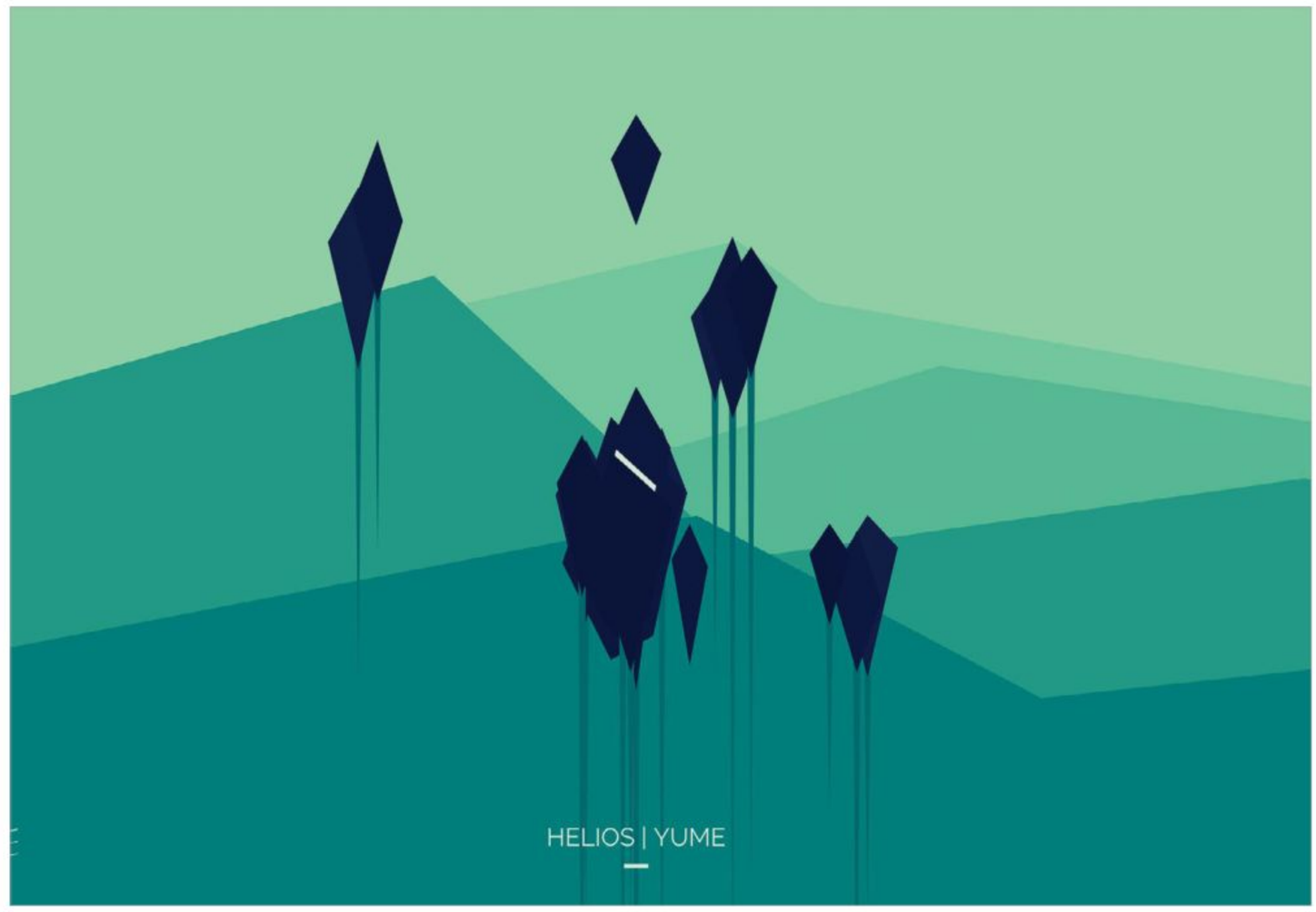
APRIL 2013
Released Here is Today.

AUGUST 2016
Launched BlokDust.

APRIL 2017
Started teaching code at codebar.

OCTOBER 2017
Launched creative-coding experiments hub.

DECEMBER 2017
Launched Ninja Tune 2017.



In Yume the environment is a mixing desk, enabling you to create your own versions of the album's songs

the audio, while creating an illusion of a working observatory.

I ended up doing a huge amount of research; I knew nothing about radio astronomy and in order to flesh out the narrative I had to learn a lot about northern Chile, where it was set. It's a region where a large concentration of real observatories exist, so I figured it was the most discreet place to slip in a fake one. I ended up creating a character who runs the Twitter account, posting from a personal perspective both about their research, and also just day to day life and observations.

BlokDust (*blokdust.com*) is an amazing audio toybox. What inspired it?
Initially it was partly inspired by a trend of video games that allow players to design and build their own contraptions within a game, along with my own difficulties whenever I'd attempted electronics in the past. Also some of the visual style came very early on, and so I was thinking about creating this sandbox with a bunch of different geometric components that people could hook together to create visuals, interactions, animations and games, and then share them. However the 'clicking moment' of how to realistically put that together and have it be good, never came. I started revisiting it after my friend Luke Phillips was telling me about the Web Audio API, which allows for audio processing in the browser. Rethinking it as an audio sandbox made so much more sense, and I worked some more on fleshing out the visual/interaction style followed by a whole lot of audio experimentation to see what exactly we could make it do.

How do you stay motivated?
Honestly I find it difficult a lot of the time; I'm not great at managing myself. Creatively I try and remember to work on small personal projects when I can – it's easy for me to get stuck into a long project and get overwhelmed or disinterested halfway through, so being able to finish things is really important. And then the response from people when I do release something is hugely motivating, I'm lucky that people send me some really kind messages. Work-wise I just try to give myself some time and not let myself feel guilty for it. It's difficult balancing that with making sure I'm working enough; I often don't have the contingency that other freelancers might, but I also know how vital to my fundamental wellbeing it is to have my own time. It's still an area I'm trying to get right.

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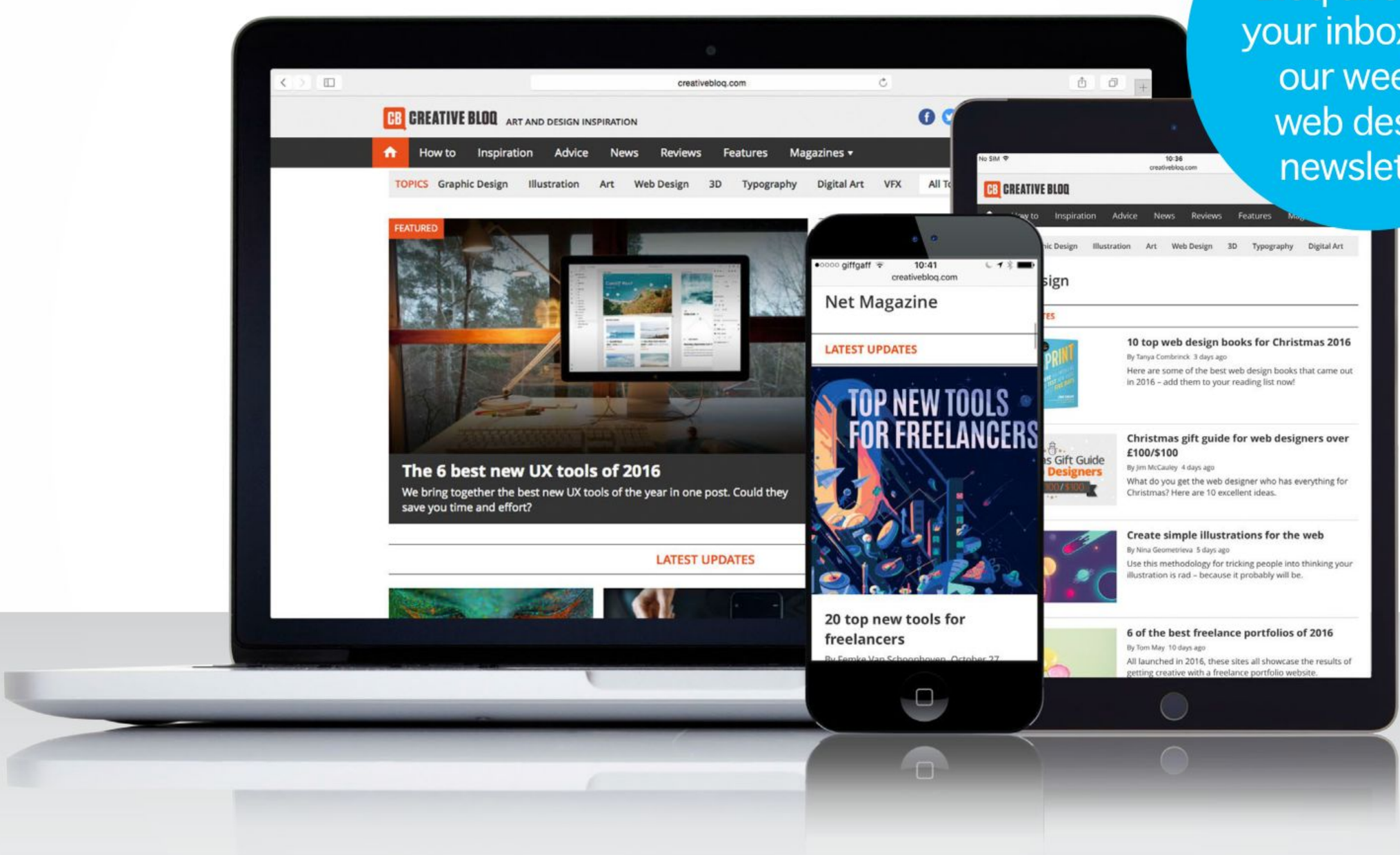

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HOW WE BUILT

COMMONWEALTH GAMES ENGLAND

Salad harnessed beautiful data to bring the Commonwealth Games to life for Team England fans during the upcoming Gold Coast Games

BRIEF

Salad was tasked with delivering an intuitive website for Commonwealth Games England ahead of April's Gold Coast Games. The new site acts as the home for information about Team England and their participation in the Games.

CLOSE UP

(1) The site offers fans a dynamic online experience, detailed content and up-to-the-minute news and results. **(2)** Previous game medals are visualised using subtle animations and hover states – a compelling way to discover information about past competing athletes. **(3)** A simple design ensures the latest results are easily accessible, with the option to filter by your favourite sport. **(4)** The intuitive Algolia search function makes it easy for users to access the information they need as quickly as possible. **(5)** Each sport has its own page, outlining Team England's participation in the sport, key facts for fans and individual athlete profiles. **(6)** The site hosts an impressive archive of interesting historical information about Team England's performance in the Games.

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DAN YOUNG

Dan is the design manager at Salad and led the creative for the Commonwealth Games England digital experience.
t: *@eggsandlogs*

ADAM MORLAND

Adam is Salad's digital director and oversaw the development for the Commonwealth Games England site.
t: *@adammorland*

GEMMA LANE

An account manager at Salad, Gemma managed the Commonwealth Games England project from pitch win to the end.
w: *saladcreative.com*

Commonwealth Games England (CGE) leads and manages the participation of Team England at the Commonwealth Games and helps to raise awareness of this great sporting event. Its new website, built by Salad (saladcreative.com), will offer fans live results, fixture updates, athlete profiles and more during the Gold Coast 2018 Games. With beautiful data at its heart, the new site is already generating a good amount of excitement around Team England's participation.

The Commonwealth Games are a big deal. How did the agency get involved in the project?
GL: Our involvement in the project sparked from our ongoing work with the Clipper Round the World Yacht Race, which has equipped us with the unparalleled experience of managing a complex live sporting event. Commonwealth Games England had been following the Clipper Race using the race viewer, and were keen to speak to the agency that had built the site. After initial conversations we entered into a pitch process and after demonstrating the knowledge we'd gained from the project, we were successful in winning the work.

There are a lot of disciplines and athletes involved, meaning there's a lot of data and information to squeeze into the site. How did this influence the UX?
AM: With a wealth of content to convey, two of our key UX considerations were the main website navigation and the website search. To deliver user-friendly navigation we opted for a sidebar menu design that expands to fill the browser window when accessing larger submenus such as sports and history. For the search we chose to use Algolia (*www.algolia.com*). This intuitive tool allowed us to create a fast and refinable website search, giving users quick and easy access to the information they need.

How did the brief influence the design of the site? Were you given the opportunity to be expressive or was it very much a case of sticking to what the client wanted?
GL: CGE wanted a modern, intuitive and on-brand website. They provided us with an existing set of brand guidelines alongside some recent brand development work, which helped form the foundations for the site's design. With a logo, typography and core colour palette in place, we had the freedom to interpret the design without any significant constraint.
DY: One of the key elements of the site's design is the distinctive crimson block behind each key page title, inspired by the stripes of Saint George's Cross in England's Union flag – a symbol of national pride and belonging. The homepage also offered us a creative opportunity to generate a buzz in the lead up to the Games, which led us to design a Gold Coast countdown clock to engage visitors as soon as they landed on the site. The clock was inspired by a ▶

TIMELINE

Significant dates in the CGE website project

SEPTEMBER 2017
Following a highly competitive pitch process, Salad is appointed to plan, design and build Phase 1 with a go-live date of December.

OCTOBER 2017
Website planning phase begins including sitemap, SEO research and IA as well as UX, design and build considerations.

OCTOBER 2017
A presentation of initial designs is given to Commonwealth Games England.

NOVEMBER 2017
A complete rollout of the design throughout the site is completed.

NOVEMBER 2017
Development commences for the Phase 1 launch including all website pages, the countdown clock, athlete profiles and past medal tables.

DECEMBER 2017
The user acceptance testing and population phase begins.

DECEMBER 2017
Go live! Phase 1 is completed with Phase 2 development commencing.

MARCH 2018
Go live! Phase 2 includes integration of live data, Algolia Search, schedule, medal map and intelligent data visualisation.

APRIL 2018
The Commonwealth Games begins on Australia's Gold Coast (4-15 April) and fans can follow Team England every step of the way.

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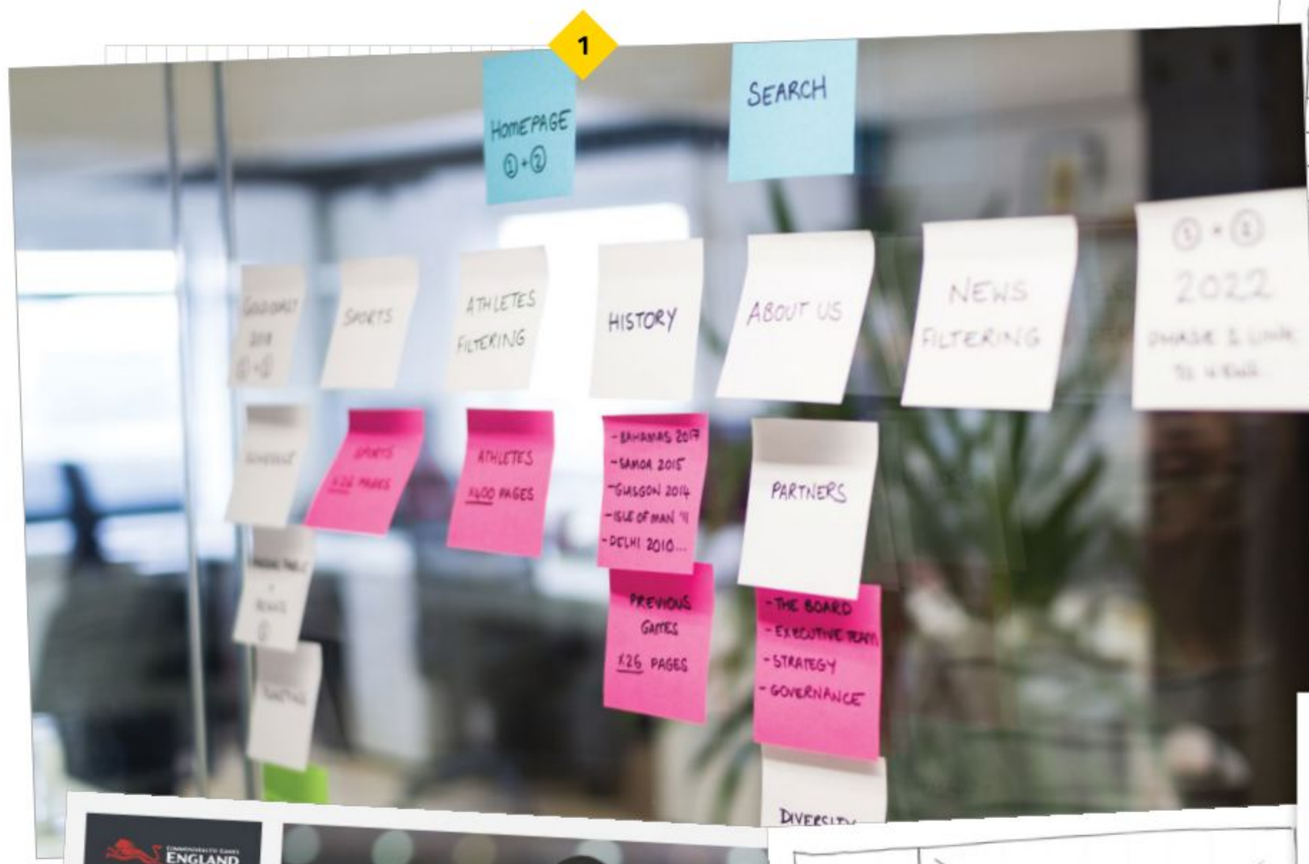
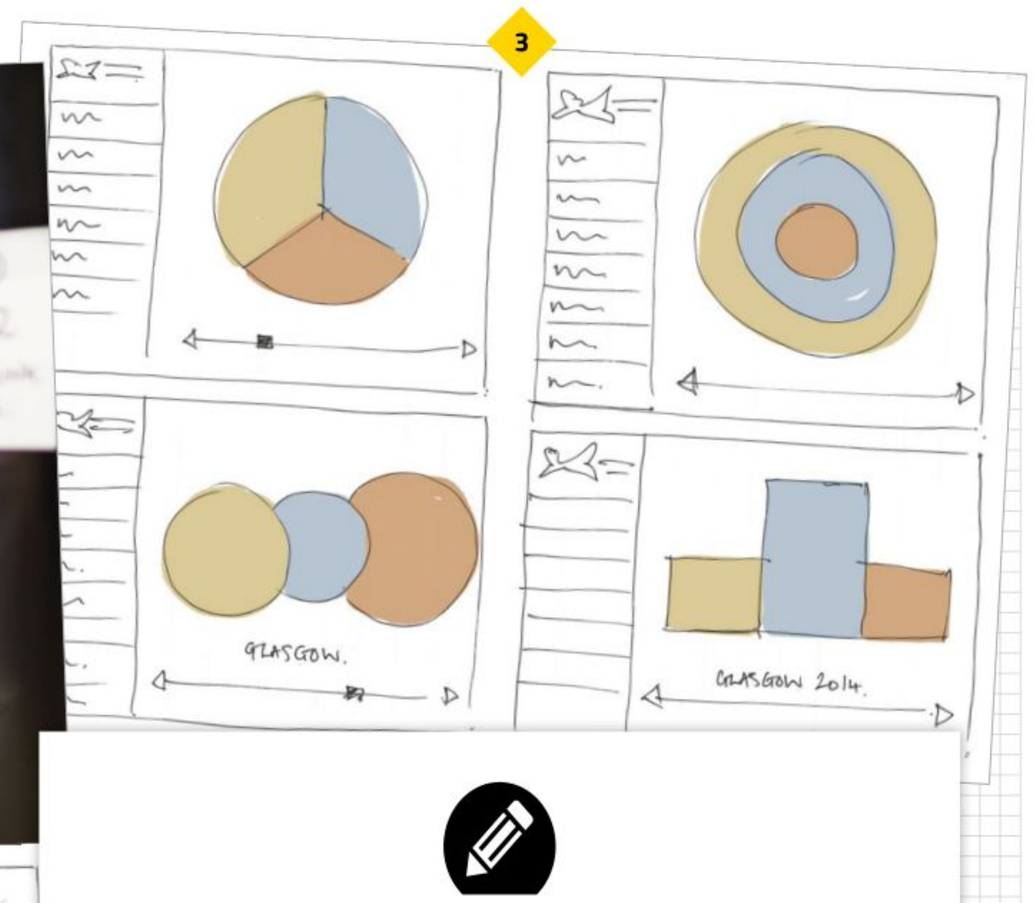




***EVOLUTION**

(1) During the planning phase we discussed content for each page and mapped out the site's navigation meticulously. **(2)** A hand-drawn wireframe and screenshot of the finished athlete page demonstrates the design process. **(3)** With a vast amount of rich data to work with, we sketched out a number of alternative ideas for visualisation of the data. **(4)** Phase 1 included the addition of a Gold Coast countdown clock, to build anticipation for the upcoming Games. **(5)** We had regular meetings to review the site's progress at each stage in the lead up to the Games.

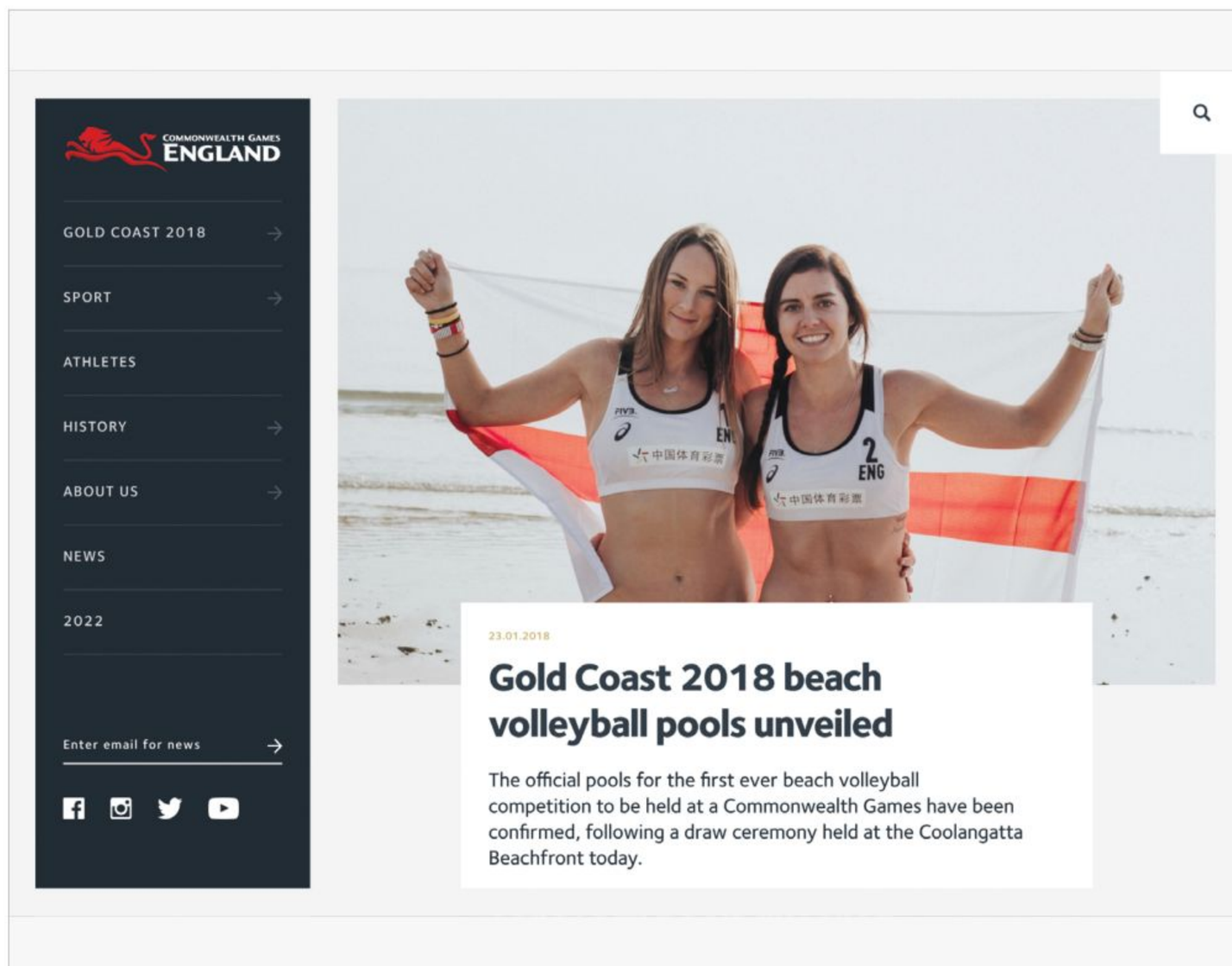
WorldMags.net

stopwatch and the time-keeping that plays such pivotal role in many of the Commonwealth sports. This dynamic feature combined with a background video helps to create a sense of pride and expectation for the games themselves.

Every site needs to be mobile-friendly. What approach did you use to ensure that the desktop and mobile experiences were equally rewarding?
AM: The way the site looked and functioned on mobile devices was crucial to the build, with 58% of users accessing the previous site on a mobile or tablet device. Throughout the development phase we tested on multiple devices and viewport sizes to ensure that when our flat visuals came to life they were both beautiful and user-friendly.

What were the favoured tools and technologies for creating the site?
AM: For the website build, we chose Laravel. Having developed our own CMS on Laravel, we knew that it was the perfect match for the CGE website requirements. It is able to handle large volumes of data across the site and facilitated our need for a bespoke Instagram API integration. During the Commonwealth Games, live results and scheduling data is pulled through from an API and visualised in a simple, digestible way to keep fans up-to-date. We also chose to employ Algolia as our search tool for the site.

With a lot of information, fullscreen images and video backgrounds, how did you ensure that the site ran as smoothly as possible on all devices?
AM: Under the bonnet, one of the core reasons for building the website on Laravel was speed. It was crucial not to have a large, cumbersome 'off the shelf' CMS slowing things down, so Laravel provided the ideal framework.
DY: With impressive visuals featured throughout the site, we ensured all images were resized and a cached version stored on the server. We also dedicated the time to perfectly optimise any background videos, keeping file sizes low whilst maintaining quality.



Staying up-to-date A dedicated news page offers fans all the latest insight about Team England's participation in the Games

Testing is a key process of any build. What processes did you use/are you still using to ensure that users receive the full experience?
AM: As with any digital project, we continuously test throughout the build. Once we arrive at the UAT phase we use Trello to enable our internal team and the client to collaborate without any overlap. We test on a number of varied devices and use BrowserStack to test the website on all other browsers. Once the CGE website went live we analysed user behaviour through analytics and heat mapping. We also listened to user feedback and monitored server performance to ensure the site was delivering an optimum experience.

After the completion of the site, what feature gave the team the most satisfaction overall?
GL: As an agency that crafts Beautifully Effective digital solutions, we know that all data has the potential to be beautiful; what we do is both art and science. The interactive medal map on the homepage is the show-stopping feature for us, and was a great opportunity to visualise data in an engaging and compelling way. We're really happy with the site's intelligent capability and its strength in visualising Team England's success. We can't wait to watch the games in the studio!

The site has a specific shelf life. Are you constantly updating and tweaking the site? And what happens to the site once the games are over?
GL: We were challenged with crafting a website that would not only serve the needs of Team England fans during the 2018 Gold Coast Games, but would also showcase the success of the team all year round. During the Games, the website focuses on delivering live news, schedules and results at the height of the sporting event. After the Games, it will continue to act as the home for information about Team England and will also provide the perfect platform for announcements about the upcoming 2022 Birmingham Games.

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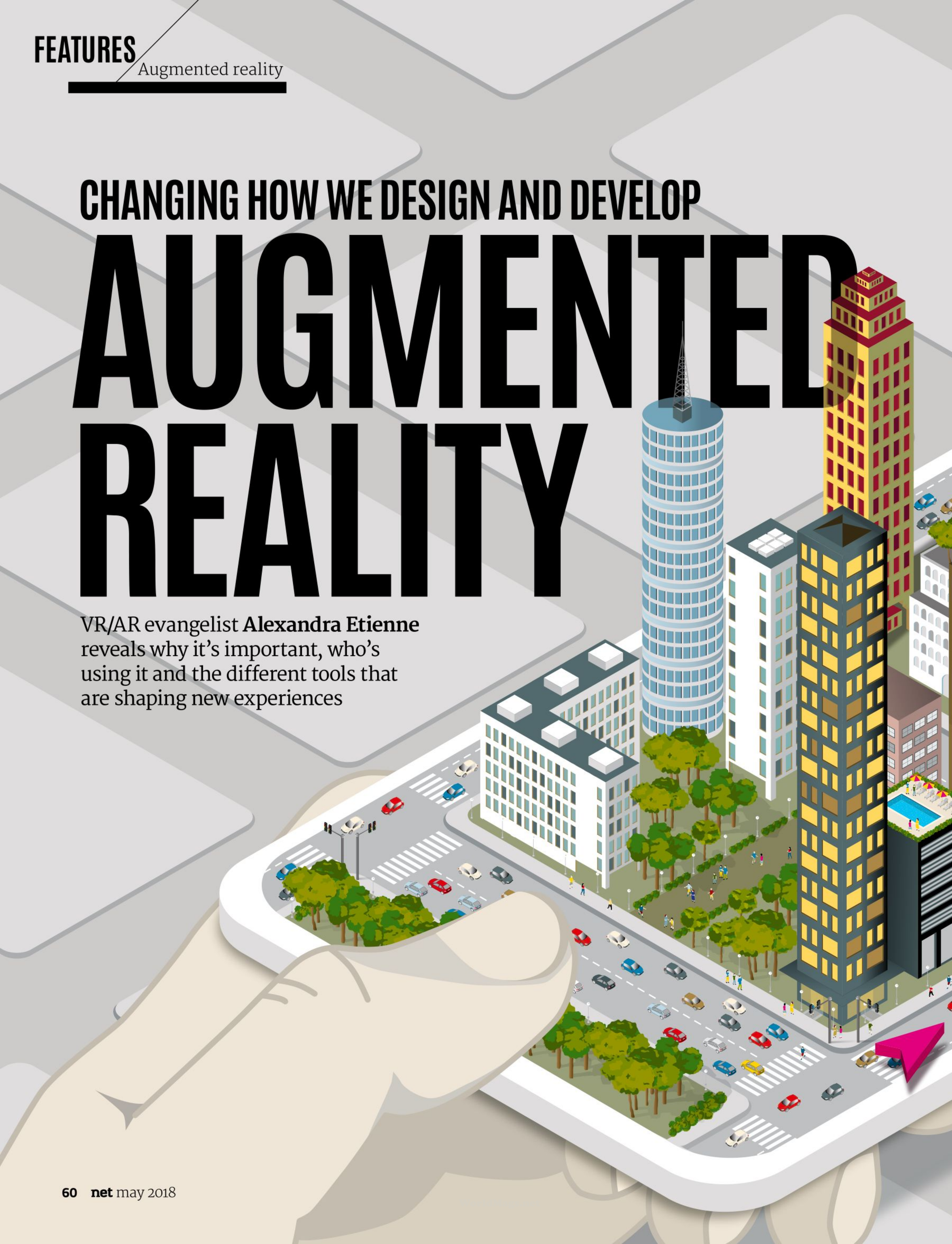
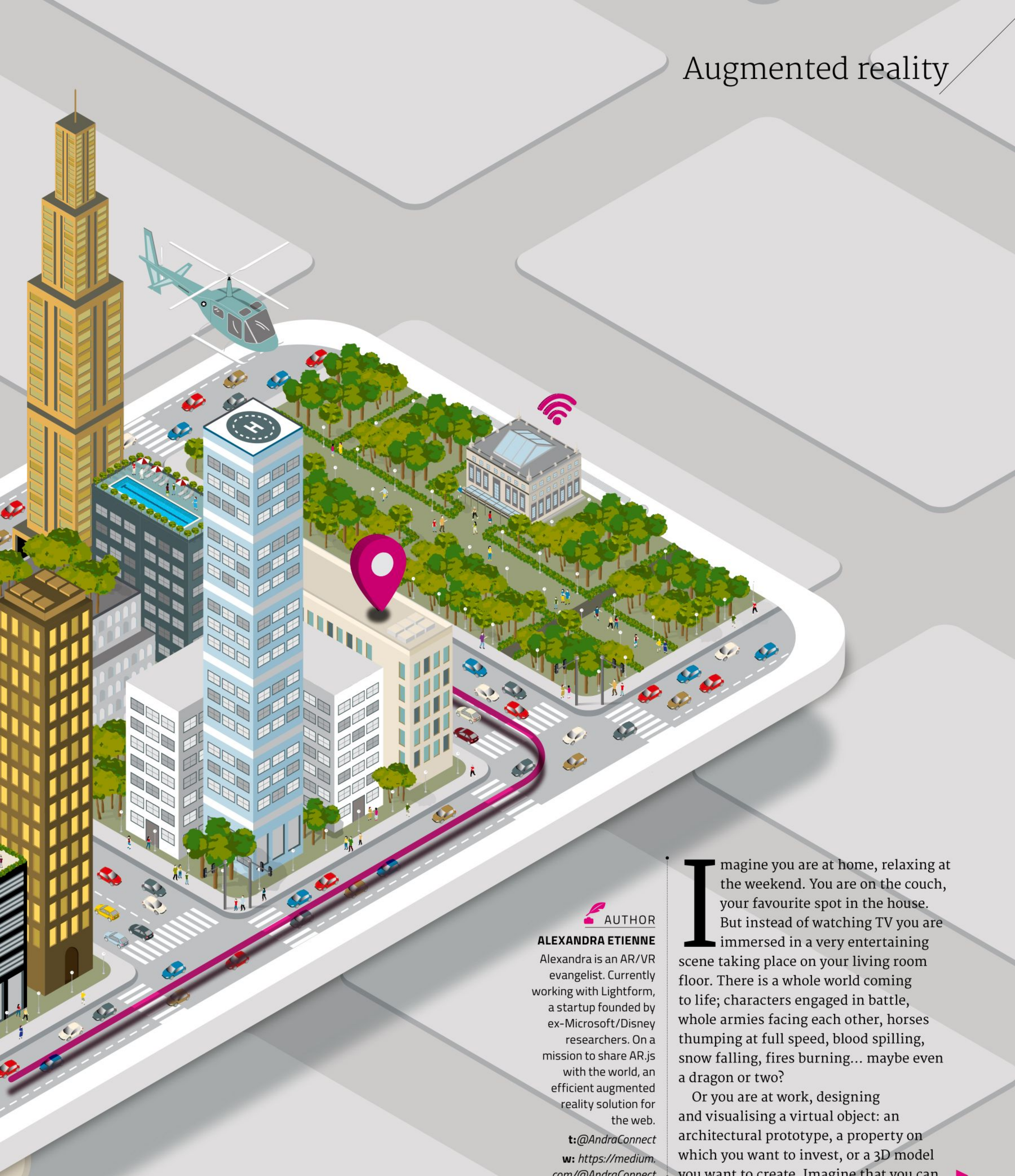
CHANGING HOW WE DESIGN AND DEVELOP

AUGMENTED REALITY

VR/AR evangelist **Alexandra Etienne** reveals why it's important, who's using it and the different tools that are shaping new experiences



Augmented reality



AUTHOR

ALEXANDRA ETIENNE

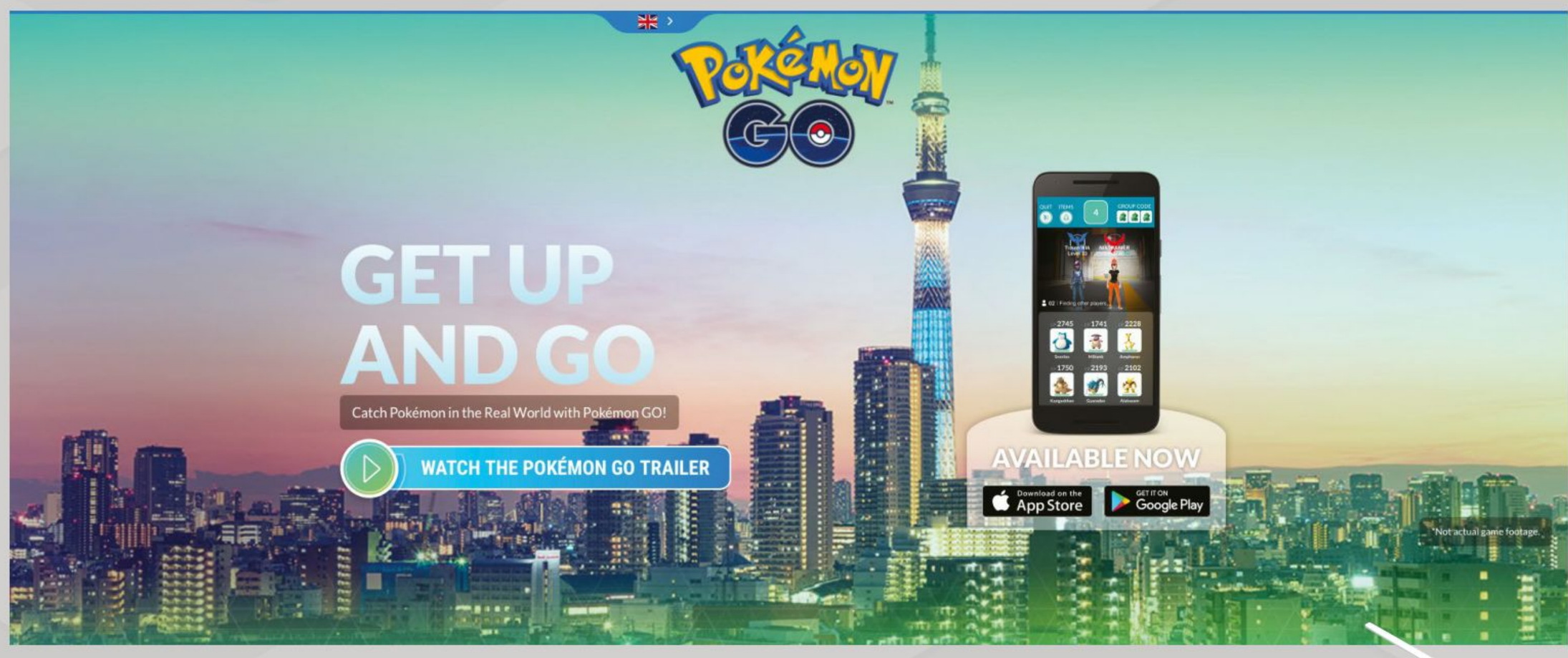
Alexandra is an AR/VR evangelist. Currently working with Lightform, a startup founded by ex-Microsoft/Disney researchers. On a mission to share AR.js with the world, an efficient augmented reality solution for the web.

t: *@AndraConnect*

w: *https://medium.com/@AndraConnect*

Imagine you are at home, relaxing at the weekend. You are on the couch, your favourite spot in the house. But instead of watching TV you are immersed in a very entertaining scene taking place on your living room floor. There is a whole world coming to life; characters engaged in battle, whole armies facing each other, horses thumping at full speed, blood spilling, snow falling, fires burning... maybe even a dragon or two?

Or you are at work, designing and visualising a virtual object: an architectural prototype, a property on which you want to invest, or a 3D model you want to create. Imagine that you can



Above Pokémon GO was instrumental in bringing the world of AR to the masses

modify it just by zooming, swiping, or with drag/drop movements onto empty space. You are not crazy! You can see it, the process and the final result. They are as real as your desk and your computer.

Or you are a student, captivated by an interesting subject, reading a book that with every turn of a page brings something marvellous into action. When it describes physical components and chemical reactions you can see them for yourself, not just read about them. This is the world of augmented reality – and it will change the way we live.

AR has been around for longer than we think, but it's still a new field for most of us. Head mounted displays with visually coupled systems were being used by the military back in the 1960s and 1970s.

But it wasn't until the 1990s that we started having motion-stabilised displays and fiducial marker tracking, like ARToolKit with its now famous Hiro marker. With the arrival of location-aware phones in 2008, companies like Layar started working on "outdoor information overlay". In its December 2009 issue, *Esquire* featured AR on the cover, catching the public's attention.

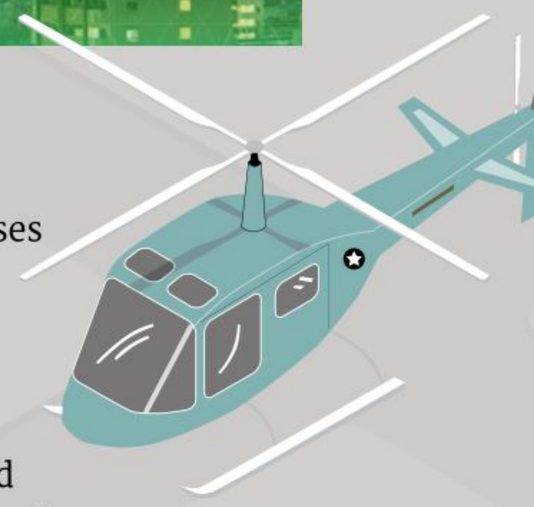
It still took a while for AR to really come into the public's imagination. And this happened... with a Pokémon. Well, with lots of Pokémon. The Pokémon GO app exploded on the scene in 2016. Everybody had to catch them all! But most importantly, people from outside the tech industry started talking about augmented reality.

So today AR is trending. But why? Maybe it's because we have dreamed about the possibilities, and now we are starting to consider them as real. This tech could actually have useful purposes that will help society develop. AR taps into our natural tendency to want to evolve even further. Plus, it has that cool factor that will help promote it for massive user adoption, for widespread uptake around the globe.

Who are the big players in AR?

With Hollywood and the gaming industry behind it, it's no wonder that augmented reality is considered a hot topic. But there's more. Another reason why AR is becoming popular is the financial backing, support and the innovation from big players in the tech industry. This plays an important role. AR is predicted to have a market revenue of $90 billion by 2020, with VR largely behind with a $30 billion forecast.

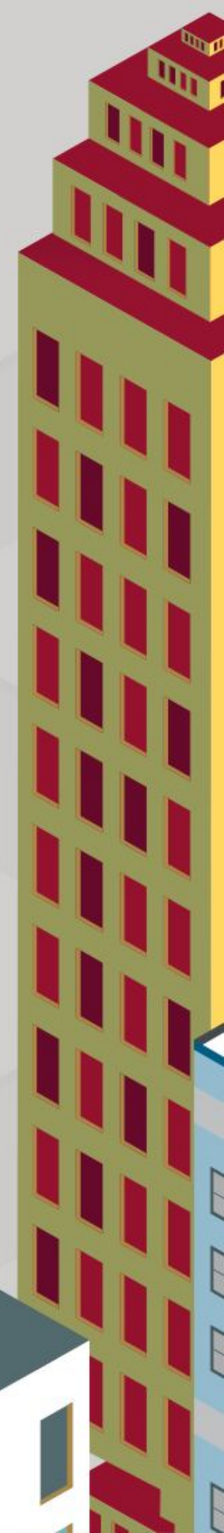
So let's take a look at some of the contributions of the big players in the field, from early successes to the most recent.



Google

Google has made so many efforts in the field of AR and VR that it's hard to know where to begin. It released Google Glass in June 2013, and although some pretty interesting developments have been made – for example in wearable socio-affective aid and disability (*https://humanfactors.jmir.org/2018/1/e1/*) – these smartglasses haven't been a major success. Last year, it announced an enterprise version of Google Glass so we'll have to wait and see.

The long but steady path into AR continued with Project Tango, back in June 2014. Although discontinued, Project Tango was one of the most advanced AR computing platforms seen. Google Cardboard was way more successful than Tango; its low-budget and accessible feel appealed to users around the world. There have been more than 10 million Cardboards shipped. And although you can technically use it to display AR, it was first conceived (also in June 2014) as a VR device. Thanks to its success and popularity, Google announced in May 2016, that it would focus its efforts on



building a new, improved and enhanced platform for VR, called Daydream (*https://vr.google.com/daydream/*).

Finally, its latest effort in AR has been the greatest to date. Enter ARCore.

The coming of ARCore

In August 2017, Google shook the augmented world by publishing ARCore (*https://developers.google.com/ar*). Android users finally had their own AR platform. With ARCore people started creating AR experiences on a massive scale.

So how does ARCore work? First of all, it has stable motion tracking, an advanced inside-out tracking with monocular camera. Google was not the first to make AR available on a monocular camera; Apple had introduced it before with ARKit (more on that later).

ARCore also has hit-testing to detect some planes (floor, table, wall) in the space around you and give you their location (environmental understanding). Another important feature is real-world light estimation. ARCore can estimate ambient and directional light. This is key because with good lighting AR merges smoothly in the real world. ARCore is currently available on Google-specific devices like the Pixel, but it will soon be open to millions of Android devices.

The consolidation of WebAR

Another major contribution from Google is the importance and relevance that it has given to WebAR. Efforts existed before (open-source libraries like AR.js) but Google has made the focus shift and the world notice. Before, when people considered AR they thought only about HMD devices and funny-looking glasses, but now, Google has consolidated AR on the web. It has built two apps to expose both ARCore and ARKit with web tech: WebARonARCore (*http://bit.ly/2toGnK4*) and WebARonARKit (*http://bit.ly/2oMAzpo*). So, by exposing AR to a modified version of Chrome, developers only need a single API to reach both markerless tracking platforms.

Ultimately the goal is to create a WebAR standard, much like the WebVR standard (*http://bit.ly/2D3ah5Z*) that you can use to write cross-platform AR applications. Read more at *http://bit.ly/2Ft6eoR*. Now we can reach ARCore and ARKit from a web browser, and Google will probably include that in a Chrome implementation. Exciting times for WebAR.

Microsoft

Microsoft HoloLens was introduced to audiences in March 2016. It was one of the first modern AR head-mounted displays or smartglasses. The HoloLens offers precise high-quality tracking. The advantage of transparent devices like the HoloLens is that you don't have to hold the device in your hand (like you would a phone or tablet). Applications include a catalogue of 'holographic' 3D objects

Above Google introduces its Glass Enterprise Edition

THE OPEN WEB

The web is a white canvas for AR, the setting where multiple scenes can come alive. But why is AR on the web so interesting? Why is WebAR a concept that we consider so important and the key for AR development? Simple: the web represents distribution and shareability, both essential factors for massive user adoption. On the web, anybody can experience or create AR.

For developers, the web has many advantages over native apps. For example, you only have to write your code once and it will run everywhere; you don't have to write a version for iOS, another for Android, and another for Windows phone. So there's no need to learn mobile-specific technologies. Devs can work with usual web technologies. It's hard for most companies to staff and build mobile apps. For most businesses, web devs are easier to find and recruit. Which is why Max Lynch, CEO of Ionic, has remarked: "Learning technologies that can run practically anywhere, like HTML5, JavaScript, CSS, and frameworks such as Angular, Ember, or React is a smart thing for devs to do." (*http://bit.ly/2G09QMX*)

Users won't have to download applications to their phones that consume disk-space and that will probably get uninstalled in a few days. They can access contextual data on the go and easily share information no matter which mobile carrier they have, or country they are visiting.

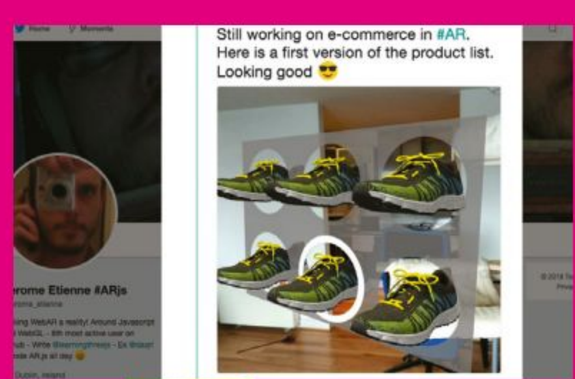
Now more than ever efforts to make WebAR a reality are taking shape, with many contributions and supporters – one of the big ones being Google with its WebAR proposal. But there is one library that came before, enabling users to come a bit closer to AR, and start playing around with it on the web. The open-source project that made WebAR a convincing idea, running efficiently on browsers and mobile phones: AR.js.

AR.JS: THE OPEN-SOURCE PROJECT

AR.js (*http://bit.ly/2yFnznw*) was developed by Jerome Etienne with the idea of making AR available to everybody. It improved the performance and made augmented reality run faster on mobile. Thanks to this optimisation, AR went from running at 4fps on high-end phones to 60fps on three-year-old phones. The AR.js (*http://bit.ly/2FhJRnj*) library was first built on projects like three.js, ARToolKit 5, emscripten and Chromium. It was, and is, a pure web solution, based on standards. So it works on any phone with WebGL and WebRTC. And it is completely free and also open-source.

AR.js made AR accessible without the need to install any applications and obtainable without having to buy specific and expensive devices. At the time ARKit and ARCore hadn't been announced, so this was a great advantage. With AR.js, everybody already had an AR enabled device in their pockets: their own phones.

AR.js saw the light in February 2017 and it quickly became a trending repository on GitHub. To this day, it has a great number of followers, contributions, and has gathered more than 9,000 stars.



that you can play around with, and the HoloStudio to create them. It uses mostly Unity and Vuforia to build the apps. Microsoft has also implemented Skype and Cortana, its virtual assistant, into the HoloLens. And of course, there are a lot of gaming applications that you can try. All in all, the HoloLens is a very interesting device – the price is currently a bit restrictive but it's still a great platform to play with.

Apple

Early in 2017 Tim Cook, CEO of Apple, had made some comments on AR. However, it was all very non-committal. Apple had previously made many acquisitions in the AR field, but it had never got round to releasing anything. Then in June 2017, ARKit (*https://apple.co/2I9fBZl*) was announced. It was also integrated on the iOS 11 release. ARKit introduced monocular camera support for AR on the iPhone. Markerless tracking and the ability to do hit-testing on the real world were also part of the package.

From June 2017, until the release of ARCore, Apple was the leader in the AR world. Not because of the tracking accuracy of its tracking technology: HoloLens and Project Tango had better tracking, but they both required specific hardware. Apple was the best because you got AR in your pocket by default… as long as you had an iPhone.

ARKit basically offers the same features ARCore offers, but for iOS users. One difference is that Google uses a process called COM, concurrent odometry and mapping, to understand and map the world, while Apple's ARKit uses VIO, visual inertial odometry, to do the same thing. However, iOS is only 12% of the world's mobile market. That's why we needed AR on Android for the other 88%.

ARKit was definitely a key step towards massive user adoption. Everybody was rightfully impressed. But, the thing about Apple is that it likes to keep a tight grip on what it does, meaning that it provides closed – rather than open-source – solutions. Apple was pushing for native App Store and less for WebAR. Even so, ARKit is pretty slick and there are some terrific demos online made with Unity.

Mozilla

The year 2017 was great for AR development, and following Google and Apple's lead, Mozilla had to throw its hat in the ring. A-Frame (*https://aframe.io/*), its easy to learn web framework for building VR experiences, has been gaining massive popularity since it was released in July 2017. In October 2017, Mozilla also announced (*https://mzl.*

Above Shot from Google VR, the *Afraid of the Dark* video

Above Hiro marker from ARToolKit
Left Showcasing things built with ARCore: @builtwithARCore

la/2FW8SRP) a new development program for mixed reality that "would expand their work in VR and AR". It drafted a WebXR API proposal. Later it started experimenting with WebAR on iOS with ARKit. The result: a WebXR viewer app (*https://apple.co/2FgVtTb*) available for download on iPhone devices. The app lets you view web pages created using Mozilla's own JavaScript library.

Facebook

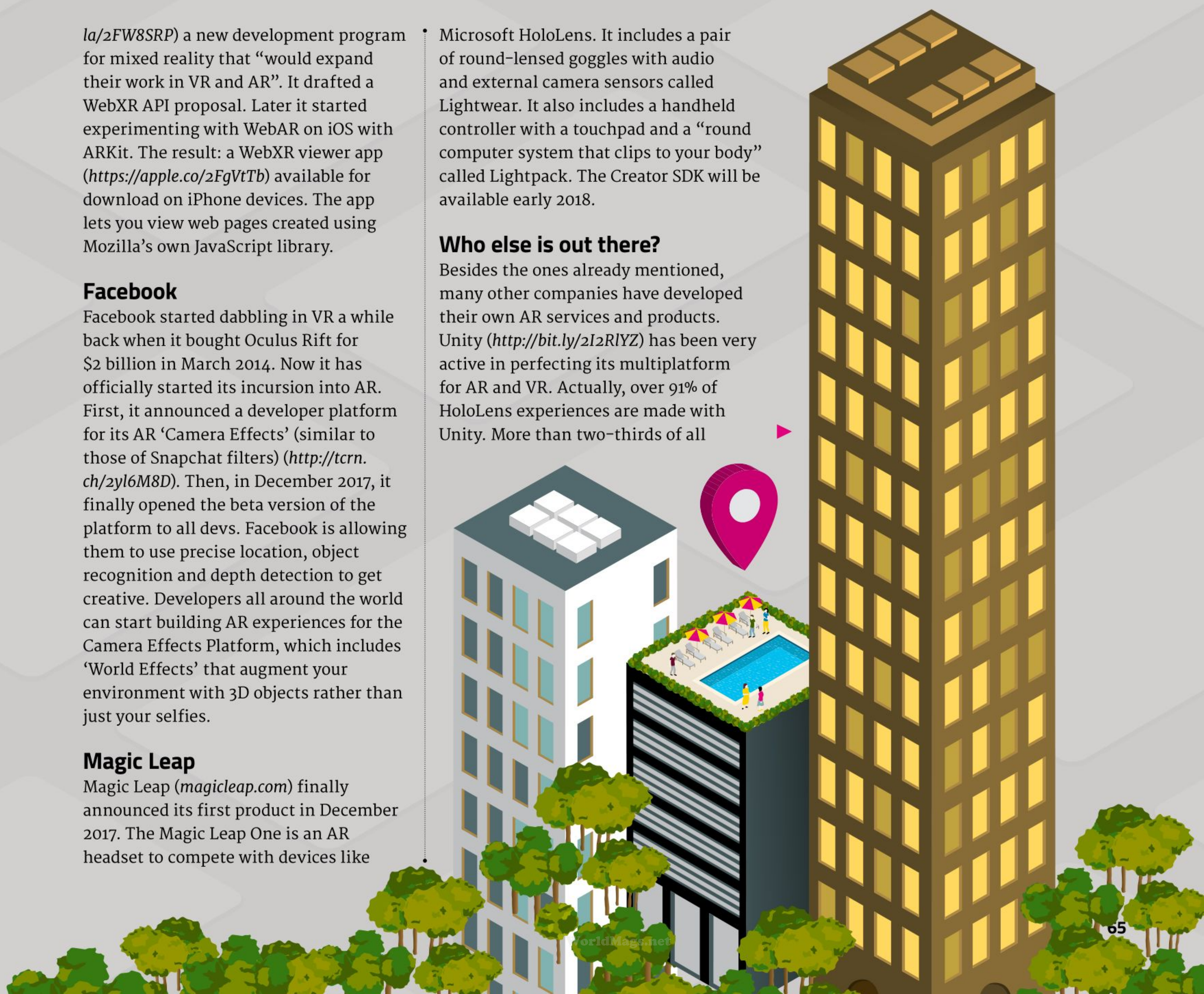
Facebook started dabbling in VR a while back when it bought Oculus Rift for $2 billion in March 2014. Now it has officially started its incursion into AR. First, it announced a developer platform for its AR 'Camera Effects' (similar to those of Snapchat filters) (*http://tcrn.ch/2yl6M8D*). Then, in December 2017, it finally opened the beta version of the platform to all devs. Facebook is allowing them to use precise location, object recognition and depth detection to get creative. Developers all around the world can start building AR experiences for the Camera Effects Platform, which includes 'World Effects' that augment your environment with 3D objects rather than just your selfies.

Magic Leap

Magic Leap (*magicleap.com*) finally announced its first product in December 2017. The Magic Leap One is an AR headset to compete with devices like Microsoft HoloLens. It includes a pair of round-lensed goggles with audio and external camera sensors called Lightwear. It also includes a handheld controller with a touchpad and a "round computer system that clips to your body" called Lightpack. The Creator SDK will be available early 2018.

Who else is out there?

Besides the ones already mentioned, many other companies have developed their own AR services and products. Unity (*http://bit.ly/2I2RlYZ*) has been very active in perfecting its multiplatform for AR and VR. Actually, over 91% of HoloLens experiences are made with Unity. More than two-thirds of all



content created for AR and VR uses its engine. It offers support for Vuforia (*http://bit.ly/2oToDky*), and there are Unity plugins for ARCore (*http://bit.ly/2Ff9wwG*) and ARKit (*http://bit.ly/2rtfFip*).

Another company building an editor specifically targeted towards AR/VR experiences is Amazon, with Sumerian (*aws.amazon.com/sumerian/*). The premise is that it's quick and easy to use without requiring any specialised skills or 3D graphics expertise.

Other companies that have produced AR include Epson with MOVERIO (*http://bit.ly/2keueoh*), Sony with SmartEyeglass (*http://bit.ly/2Fgmbzv*), IKEA with its Place app (*http://bit.ly/2trISeL*), Snapchat with Lens Studio (*http://bit.ly/2zesAqq*), Blippar (*https://web.blippar.com*), Meta (*metavision.com*), Wikitude (*wikitude.com*), Augment (*augment.com*)… to name just a few. Even NASA has been making use of AR/VR (*http://bit.ly/2y6bNqk*) for several projects on space research.

The market and its applications

Now that there is more visibility around AR, an increasing excitement about its possibilities, and that the tech is made available to more people, what's next? Well, one word: creation. Content creation. This means building applications for the many fields where AR can play an important role. Let's take a look at some of the ways society is making use of AR.

Education

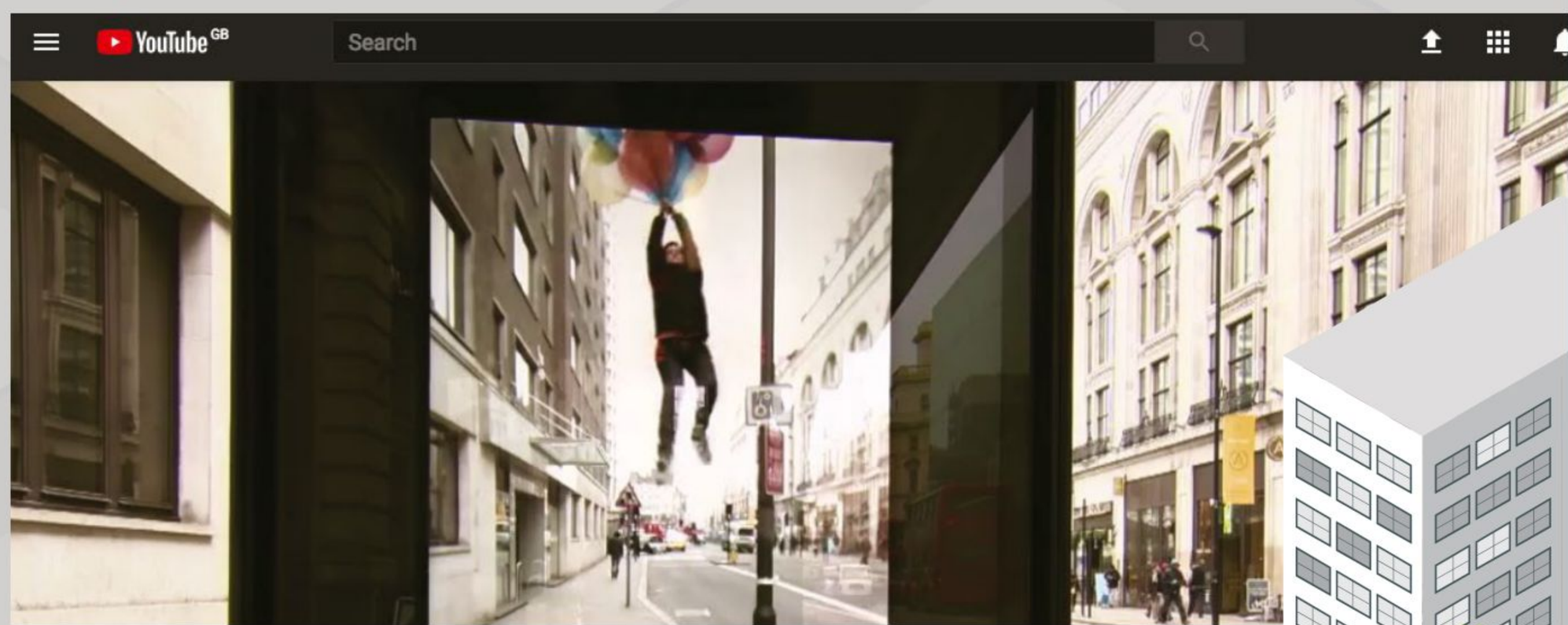
AR is already making changes in the way we learn. Apps for education (*http://bit.ly/2hk1NTv*) are being deployed in classrooms around the US and some parts of Europe. Imagine children having trouble being attentive at school. Imagine that instead of reading a boring textbook, they see history happening live in AR. Also, mixing elements in chemistry and seeing the reactions fume or explode. The classroom is way more appealing this way. The love of learning will come back to our schools. You can learn with your phone, which means there are fewer materials to buy, the retention rate will be higher, lessons will become more interactive and foster intellectual curiosity. Children can benefit greatly from apps like Aurasma (http://bit.ly/2FfaVDs), Quiver (*www.quivervision.com*), or the amazing flashcards and anatomy app from Octagon Studio, which are both recreational and educational.

AR in the workplace

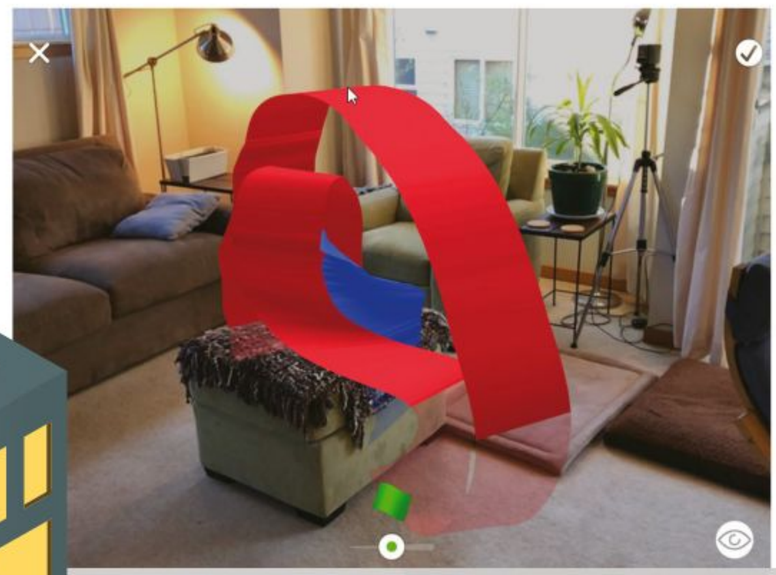
AR in the workplace has also started to be implemented. Industrial applications are being tested on factories to teach workers how to use the machinery, or to extract information like the current state of the equipment, temperature, location, etc. Obviously this is very interesting for industrial customers because it minimises error and cost. It can also help with maintenance procedures. The Microsoft HoloLens has been used by thyssenkrupp engineering for elevator maintenance, and by Volvo (*http://bit.ly/1HhAi39*) for complex assembly. The same device was a finalist for the RIBA Stirling Prize 2017 with applications for architecture and BIM (building information modelling). Assuring quality is the most important thing for these industries, and the expert support, automation and even AI that AR can bring is a big advantage to be invested upon.

Retail and advertising

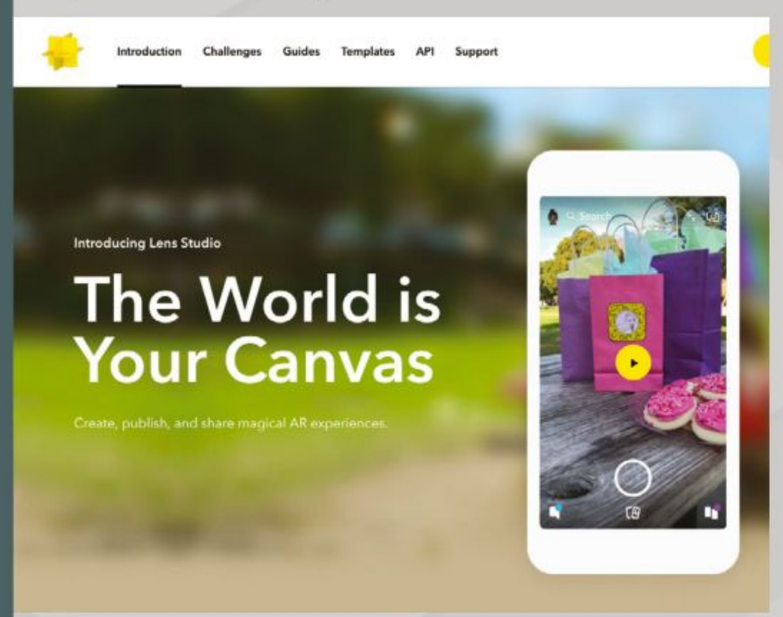
AR for retail and advertising is also being developed. AR could reactivate this field. The amount of revenue is interesting enough for advertisers to be willing to learn how to use AR/VR editors and mobile apps. By being able to visualise the product in AR, the user will be more tempted to purchase it, or at least to interact with it. It will boost sales. In the case of e-commerce the experience can be triggered either from a website or from a printed ad on the street. All they need is a QR code to scan and launch the experience. Remember the window shop from Net-a-Porter (*http://bit.ly/1p6xEzV*), or the Pepsi Co's unbelievable bus experience, and even Tesco has a AR app. Other companies



Above The Unbelievable Bus Shelter from Pepsi Max is a mind-blowing use of AR



Above Mozilla's WebXR Viewer app is looking to bring together VR, AR and MR technology



Above Lens Studio, a tool for creating your own AR effects

like ModiFace have made a name for themselves by offering AR tech to beauty brands. Sephora (*http://bit.ly/2vTGTQR*) has launched an AR app to try different makeup looks and products. The possibilities are endless.

Gaming

Gaming is another field where AR has left its mark. Although mostly a VR thing, popular games like Pokémon GO are what actually made the consumer market massively aware of AR. But there are many other apps to choose from (*http://bit.ly/2FjbBI4*), like shooting games, horror games, sports games, even table and card games.

The future of medicine

AR is also present in other areas like medicine, where it could actually improve the way surgeons train or approach a complicated operation. The Gregorio Marañón Hospital in Madrid decided to use the HoloLens to help surgeons perform procedures on patients. With the device they can quickly see data from CT scans, ultrasounds, X-rays, and 3D models, all through an interactive holographic panel system. In April of 2017, a team of surgeons used the HoloLens to operate on a patient with a malignant muscular tumour, using the headset to visualise MRI and radiography information during the surgery. This is simply outstanding and promises some exciting things to come.

The next step

As we have seen, AR has a wide scope of application. Now we need to keep creating content and get that killer app. This killer app will help us find out how people will use AR in a meaningful way that transform their lives. We need to figure out how to make AR a tool of choice, easy to use and shareable. Also, companies need to focus on making transparent devices available for massive use. Maybe these devices will end up having the same market penetration as video game consoles. Manufacturers need to improve interaction and control of the 3D being displayed, making the gestures feel more natural and the devices themselves less cumbersome.

AR will be perfected on mobile phones, localised in space (home, workplace, classroom, coffee shop) with high quality data visualisation and real-time sharing. WebAR will play an important role in this democratisation, creating visibility but especially opportunity for anybody to experience and create AR... and with opportunity comes change, and this change is closer than we think.

There's a lot to look forward to. n

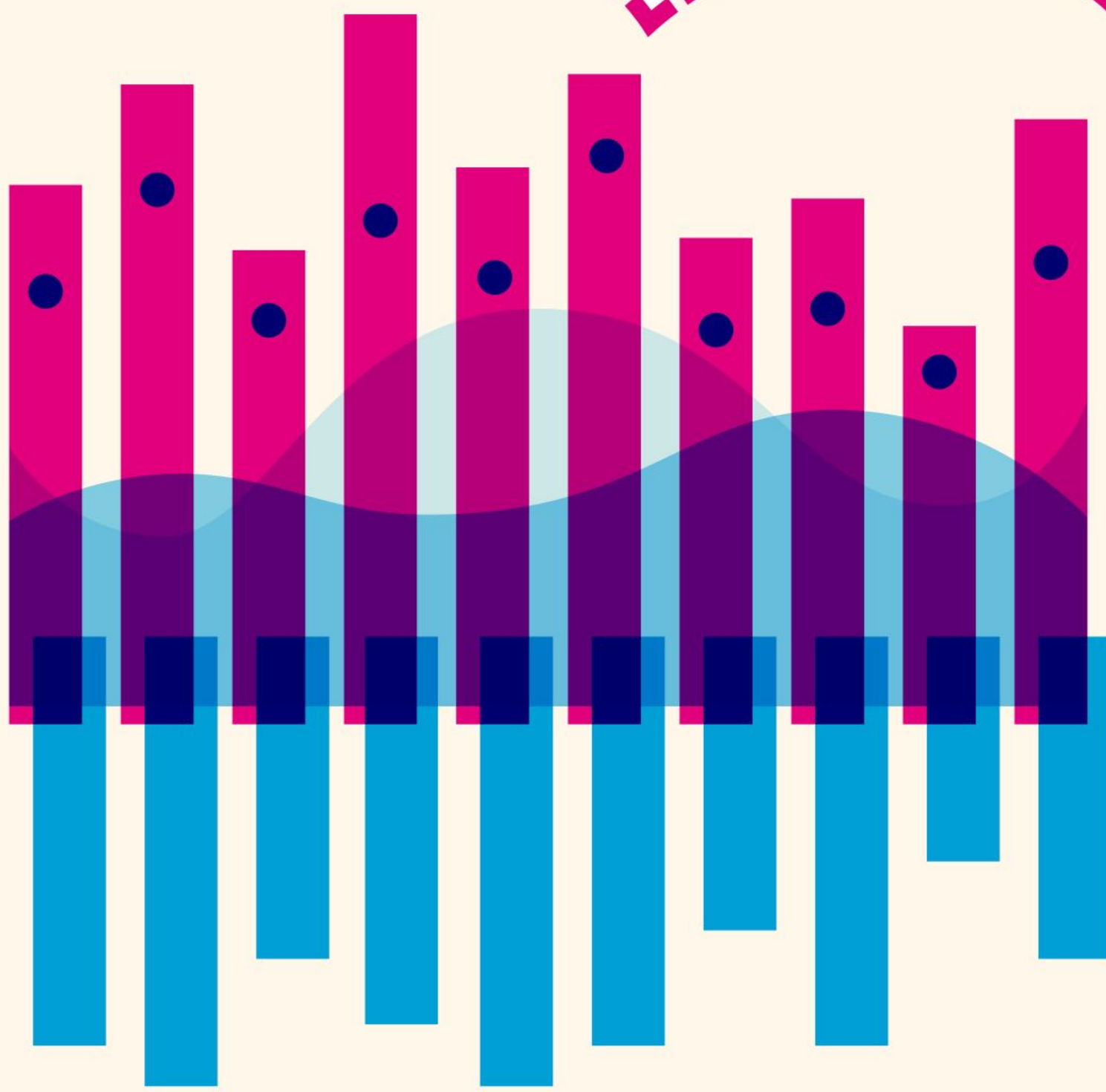
AR.JS: CODE AND INSPIRATION

The initial success of AR.js was based on its performance (AR was faster than ever!) and simplicity. With AR.js you could – and you still can – code AR in only 10 lines of HTML (http://bit.ly/2ocIKrv) using Mozilla's A-Frame. See below:

```
<script src="https://cdn.rawgit.com/jeromeetienne/AR.js/1.5.0/aframe/examples/vendor/aframe/build/aframe.min.js"></script>
<script src="https://cdn.rawgit.com/jeromeetienne/AR.js/1.5.0/aframe/build/aframe-ar.js"></script>
<body style='margin : 0px; overflow: hidden;'>
        <a-scene embedded arjs='trackingMethod: best;'>
    <a-anchor hit-testing-enabled='true'>
                <a-box position='0 0.5 0' material='opacity: 0.5;'></a-box>
    </a-anchor>
                <a-camera-static/>
        </a-scene>
</body>
```

This simplicity triggered interest and experimentation, trial and error from people with and without a technical background and it is what ultimately led to the adoption of the library.

AR.js has evolved since then. Some innovations include improving the workflow with multi-markers (*http://bit.ly/2tnzp7Q*); creations like Augmented Website (*http://bit.ly/2Ffr3Vy*), a way to display AR directly on the web-page by scanning a QR code (an idea that you can apply to e-commerce or advertisement). And of course, support for ARKit and ARCore. AR.js is now able to provide the best tracking available on any device and it runs in all platforms. It is a great library if you want to get started with AR.



THE ART OF DATA VISUALISATION

WorldMags.net

AUTHOR

AUDRÉE LAPIERRE
is creative director of FFunction, an award-winning data visualisation studio based in Montréal. She's created interactive dataviz for clients including UNESCO Institute for Statistics, HP, National Geographic and Deloitte.
@audreelapierre

Audrée Lapierre, creative director of FFunction, reveals the process required to turn crude data into captivating visualisations. This comprehensive guide offers ideas on finding data sets, case studies, dataviz 'rules' and tool recommendations

Illustration by Newton Ribeiro

Data visualisation – or dataviz – is a hydra-headed beast that brings together a variety of disciplines: visual communication, data journalism, information, UI and design.

A great data visualisation should be:

- **beautiful (visually striking)**
- **informative (true to the data)**
- **useful (easy to manipulate, filter and also explore)**
- **interesting and insightful (providing strong communication)**

When done well, a data visualisation solution can help people understand relationships and patterns, see the significance of data through a particular lens, and communicate effectively by telling data-driven stories. The reason for this is that the human brain is very good at identifying trends if given the right visual cues. To get from A to B, or rather, from raw data to insight, dataviz designers create a kind of codified language using data.

Let's unpack the process of making a successful data visualisation.

WorldMags.net

Start with the data

> "Data! Data! Data!" he cried impatiently. "I can't make bricks without clay."
> Arthur Conan Doyle

It seems an obvious point to labour, but in order to make data visualisation, you must start with the data.

First, let's quickly break down some different types of information, which is made up of two different types of data: quantitative and categorical. 'Quantitative' is about measuring things, while 'Categorical' divides those things into groups. An example might be:

Quantitative: -30C
Category: Temperature

These elements are going to give shape to all your tables and graphs, and help you describe relationships clearly, which is a – or perhaps even *the* – cornerstone of data visualisation.

Some other concepts you should have a perfunctory grasp of before you attempt a dataviz include measures of distribution, correlation, ratio, average, mean, and the relationships within categories, such as nominal and ordinal. Stephen Few gives a solid foundation in his excellent book *Show Me the Numbers*, so if you need some revision in this area, that would be a good place to start.

Where to find data sets

One of the key challenges of dataviz is locating 'good' data that is clean, well-sourced, credible and not full of holes and discrepancies. There are a number of repositories that link to interesting data sets if you want to practice or need good data for a client project.

Open data portals

- **OECD data portal** *https://data.worldbank.org/products/tools*
- **EU Open Data Portal** *http://data.europa.eu/euodp/en/home*
- **UNESCO data portal** *http://uis.unesco.org/*
- **The World Factbook** *https://www.cia.gov/library/publications/the-world-factbook/*

Data-related mailing lists and resources

- **Jeremy Singer-Vine's Data is Plural** *https://tinyletter.com/data-is-plural*
- **Reddit** *https://www.reddit.com/r/datasets/*
- **Banana Data News** *http://banana-data.com/*
- **Data Elixir** *https://dataelixir.com/*
- **PolicyViz** *https://policyviz.com/*

A note on big data

Big data means you're dealing with data sets that are so voluminous and complex that traditional data-processing software is inadequate to deal with them. A big data set might be petabytes (1,000 terabytes) or exabytes (1,000 petabytes) of data consisting of billions to trillions of records of millions of people – all from different sources.

In practice, it's rare to do data visualisation with big data; you'll want to reduce the data to a more manageable subset, say hundreds or thousands instead of millions of elements.

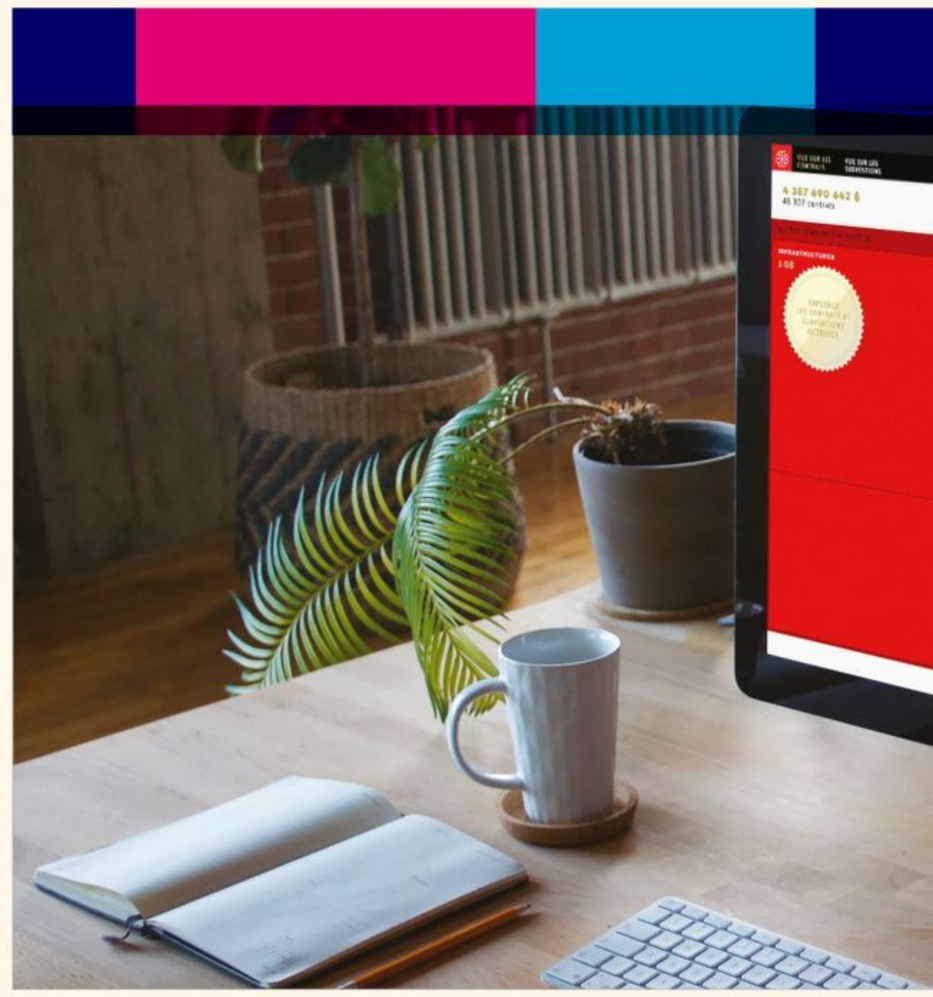
Download, normalise, validate, process (rinse and repeat)

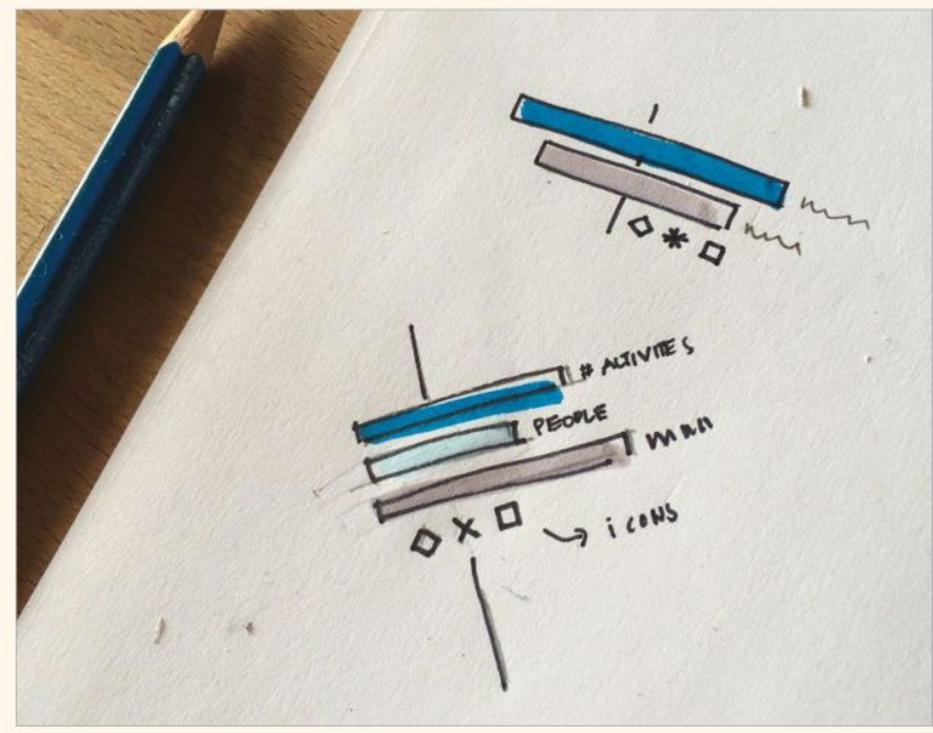
> "Above all else show the data."
> Edward Tufte

If you look at the data available in most data portals, you're likely to find a mix of CSV, XML and Excel spreadsheets. Any given data set will probably contain a variety of formats, especially when it comes to dates; you'll find YYYY-MM-DD alongside DD/MM/YYY and, for good measure, MM/DD/YYYY.

Because of this, you usually need to properly format the data to get all the fields sorted out and ready to visualise. You can use a free tool like OpenRefine, which is an open source power tool for working with messy data and improving it. As well as being free, OpenRefine has a familiar spreadsheet interface so the barrier to usage is really low. Find tutorials on how to use it at *https://github.com/OpenRefine*.

Often you'll need to write some code to prep your data, and Python is one of the most popular – and well suited – tool for this job. For a start, Python comes out-of-the-box with excellent CSV, XML and JSON parsing/formatting modules, but it also has modules to work with formats such as SPSS or Excel files. And if you're pulling your data from a more structured pool of data, the pandas library is defintely the way to go.





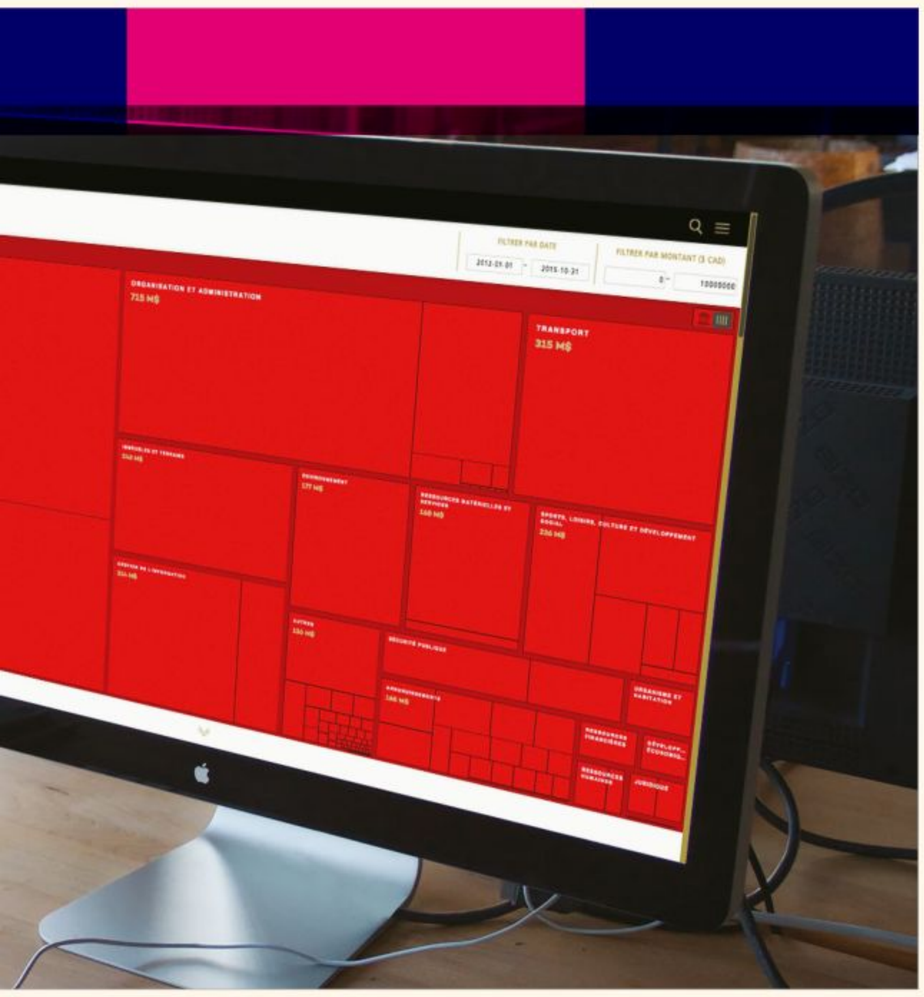
Top: This research project for the City of Montreal had a unique set of navigation challenges

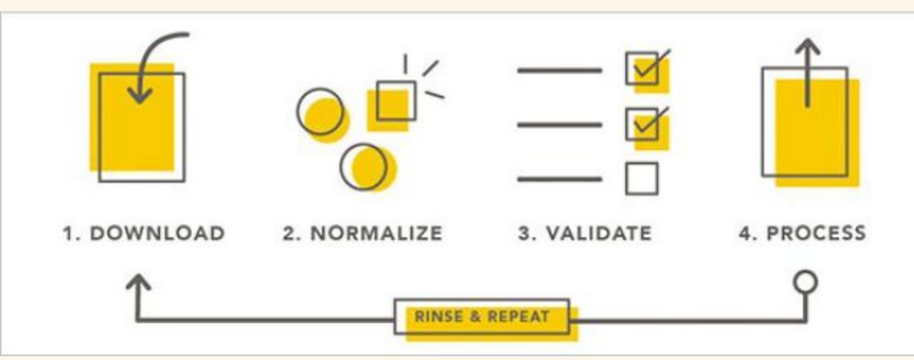
Above: Sketching can help decide your angle and what aspect of the data to show. This is important in dataviz; showing everything is the equivalent of showing nothing

Right: There are several steps that usually need to happen before you start visualising

Converting to JSON

JSON is the de facto standard for communicating data between web applications, and certainly the standard in data visualisations (libraries like





D3 even introduced new JSON formats such as TopoJSON to encode GIS data, traditionally shipped as 'Shapefiles').

JSON also works well with large data sets (10,000+ entries), but in that case you have to make sure the server that serves the JSON files does on-the-fly gzip compression. A 50MB file can be reduced to a couple of megabytes.

Note that if the client has an API, you can skip the rigmarole of normalising and validating the data and ensuring its credibility. However, keep in mind that the API might break or change. So you still need to think of a back-up plan if you'd like your visualisation to work for a long time. Otherwise your visualisation will die from bitrot.

The visualisations

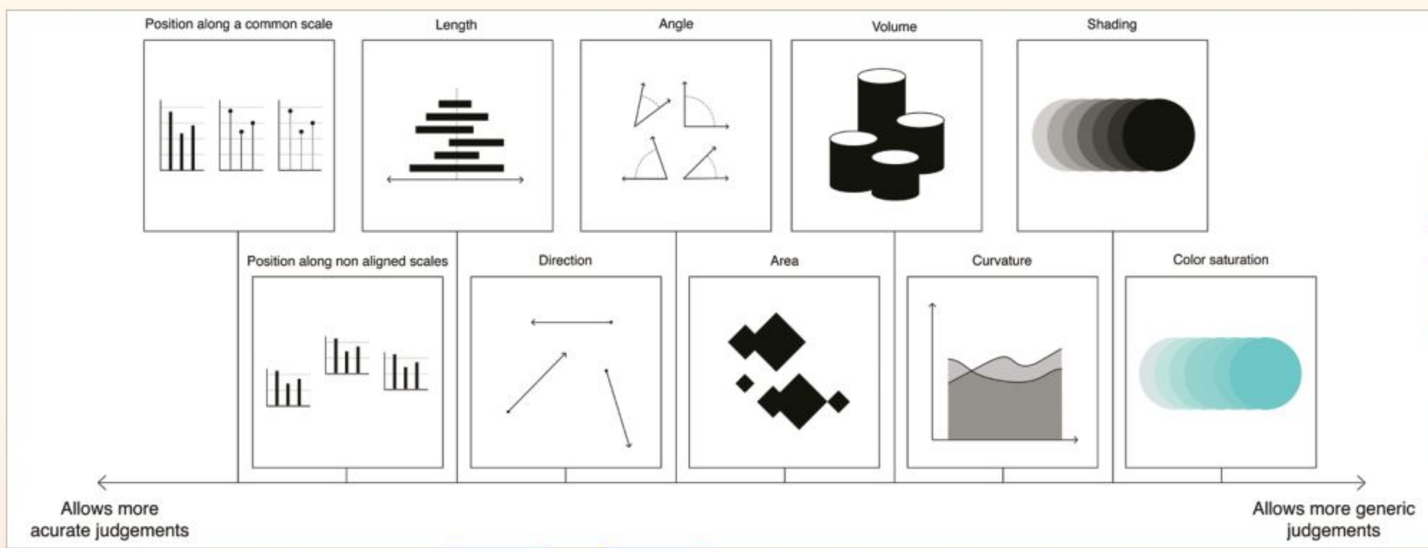
"There is a magic in graphs. The profile of a curve reveals in a flash a whole situation – the life history of an epidemic, a panic, or an era of prosperity. The curve informs the mind, awakens the imagination, convinces."
Henry D Hubbard

'Getting' the data is more than just downloading the files or connecting to the API; it's about understanding its structure and meaning. It's about sketching and testing different shapes for the different dimensions of your data.

Just like graphic design, simply drawing can help uncover the best visual approach. It's also best to know what you want to depict before you jump to coding. A complementary approach is to explore the data and do some preliminary charts to get a feel for what the data is saying. Most experts still use Excel to create quick bar graphs at the beginning of projects to understand it better and see how it might look visualised.

As you begin to come up with concepts, it's important to think carefully about the end user and how they will receive and process the information. You have to find a way into the numbers that is relatable and engaging, and really brings the data to life in every sense of the word.

One good trick is to start with a question and to create a visual that answers it.



Choose wisely You can take many different approaches in your dataviz. Beware though, these treatments can yield quite different stories!

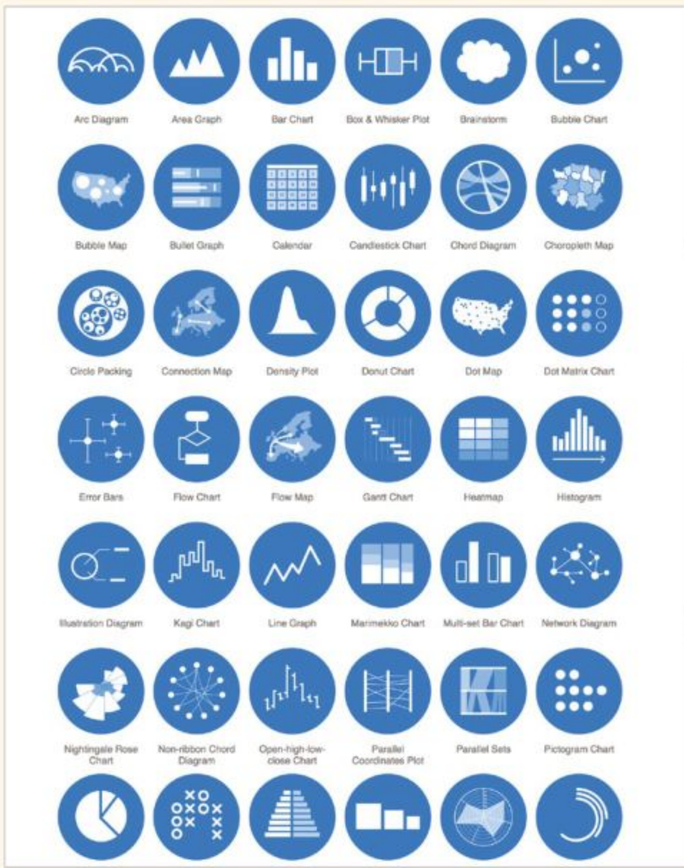
CASE STUDY: FATALITY MAP

It bears pointing out that dataviz isn't just about making charts. A couple of years ago, FFunction was working on a project for the Coalition for a Safer 63 & 881 (*https://safer63and881.com/*). The client had geolocated data on accidents that happened along two major highways in Alberta, Canada, and wanted to find a way to connect people to the data.

Above: Fatalities of 63 & 881 is an interactive experience that uses geolocated data to start a conversation about driving safely

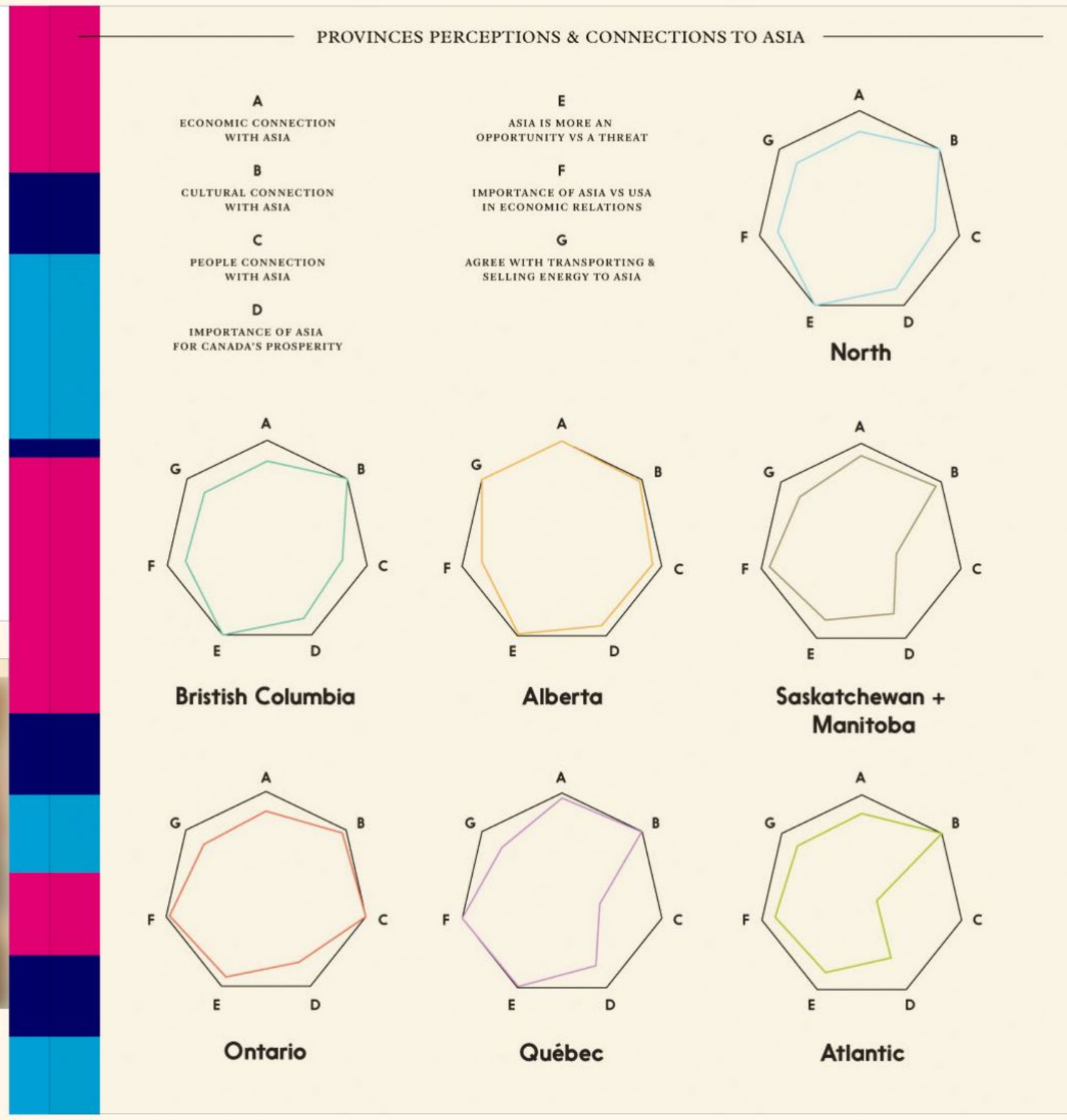
We decided to take the users on an interactive drive and map all of the fatalities along the highways. The geography component was incredibly important, as Albertans are familiar with the roads and this helped to ground the fatality references in their reality. We downloaded the vectors of the road from Google Maps and then made tests to determine the dimensions of the map based on the viewport of the user's browser and the speed at which the car travels down the road. At 120km/h it takes three and a half hours to drive the full highway, so we changed the speed to 10,000 km/h to have an experience that lasts just under three minutes. To give the impression of going at a normal speed, we had to exaggerate the width of the highway and zoom out, which resulted in a sort of caricature, or simplified version of the landscape.

Finally, we geolocated the collisions on the road. When the car hits a marker, it opens a tooltip with the description of the accident. This was a good way to bring data to life without leaning on traditional graphs and charts.



Top The good people over at Dataviz Catalogue (*datavizcatalogue.com*) have created some icons that offer a solid overview of all the major graphs commonly used

Above Choose colours carefully & don't overload charts



Above: Readability is vital when presenting data, so brush up on some fundamental design skills

There is an entire lexicon of charts out there, providing many options for visualising your data.

If you create a custom, unique visual for the dimensions in your data, it's worth knowing how different treatments will be understood by the brain. Researching Gestalt theory can be helpful if this is not already an area of expertise for you.

Dataviz rules in a nutshell

Here are some of the more crucial considerations to bear in mind.

- Pie charts and doughnut charts are read clockwise, starting at 12 o'clock.
- Pie charts must always add up to 100%.
- No 3D charts. Or to be more specific, you can do a 3D dataviz, just don't use 3D for styling.
- Horizontal timelines should always show the future to the right.
- For bar charts, the numerical axis (often the y axis) must start at zero.
- Don't use too many colours. Different colours should be used for different categories (eg, male/female, rural/urban), not different values in a range (eg, age, temperature).
- Don't overload your charts – be selective about what comparisons you want to draw.
- Test your viz and colour choices for accessibility – some people are colour blind and red/green are not the only colours that can cause problems. There are a bunch of web-based tools that can help you with this.
- Your dataviz should point back to its original data source, both for transparency and also to enable any further research.

UX and usability

"You can achieve simplicity in the design of effective charts, graphs and tables by remembering three fundamental principles: restrain, reduce, emphasize."
Garr Reynolds

Dataviz brings its own challenges to interaction design, because you require the user to interact, navigate, filter and understand non-common elements such as treemaps or some crazy visual you just came up with. In the old days, you could get away with a UX nightmare, but now data visualisations are expected to be a functional interface for the data.

There's no silver bullet for usability, but there are a number of tricks that will make your dataviz intuitive and also make it easier for your dataviz to live comfortably on any device.

Legends

The order of the legend should match how the visual elements are displayed. Keep your labels short. In general you want to label directly on the chart elements because a separate legend requires the reader to go back and forth between the image and the key, making your user do more work than is strictly necessary. With interactive visualisations, you can set the legend to appear directly on the visualisation, to eliminate this distance. This trick is extremely useful on a mobile screen, where you don't want users to scroll up and down to decode the legend.

Navigation and filtering

As with any application, you want users to understand where they are. Let's say users can select a category in a treemap (*https://datavizcatalogue.com/methods/treemap.html*) to see the proportional quantities for its subcategories; the user could get lost easily. How does he or she come back to the top category? A simple breadcrumb could help. If the user can filter the data, you have to make it easy for them to see what selections they have made. Animated transitions are also a good way to show how filters are affecting the visual elements, without disrupting the flow of interaction.

Dealing with small screens

Comparing data points is an often-overlooked part of data visualisation but it's a critical feature for anyone who wants to understand the big picture without having to keep going back to refer to a spreadsheet.

A small multiple (AKA Trellis chart, lattice chart, grid chart, or panel chart) is a series of similar graphs or charts using the same scale and axes, which enables them to be easily compared. In other words, it uses multiple views to show different partitions of a data set. Putting these elements side by side encourages the eye to identify similarities and differences, and also show how things relate to each other. In the desktop version they can sit next to each other, and in the mobile version you can stack them up. This is a good way to get around the lack of screen real estate.

Development

An interactive dataviz needs a tight coupling between design and development. Obviously HTML/CSS/JavaScript are the building blocks of the web, but the tools and widgets that sit on top of these core technologies are changing almost every day. Here at FFunction we like to try out new tools and plugins as soon as they come out. For most of our projects we use custom languages that transpile to JavaScript/HTML/CSS and a custom set of libraries for component-based UI and animated, interactive data visualisation.

Final thoughts

The design aspect of dataviz is there for a reason: to imbue meaning, control pacing and offer the user an easy way into the numbers. You should never underestimate the importance of the old-fashioned design principles like contrast, repetition and good typography when you approach data visualisation.

If you want to find out more about information design, investing in these books is a good place to start:

1. *The Wall Street Journal Guide to Information Graphics*
2. Nathan Yau's book *Visualize This* and his website *flowingdata.com*
3. *Semiology of Graphics* by Jacques Bertin
4. *Show Me the Numbers* by Stephen Few
5. *The Functional Art* by Albert Cairo

Happy visualising!

YOUR DATAVIZ TOOLKIT

Maps: This viz was made using CARTO. As a piece of software it's good, but with the free version everything you create will be published

This is a curated list of tools that you may find useful to create a data visualisation.

Dataviz tools for non-developers or beginners

- Lyra: design dataviz like you draw on Illustrator. Experimental tool being developed by a university. *http://idl.cs.washington.edu/projects/lyra/*
- **Processing** *https://processing.org/*
- Vega *https://vega.github.io/vega/*
- NodeBox *https://www.nodebox.net/*
- Chart.js *http://www.chartjs.org/*
- Plotly *https://plot.ly/*
- Tableau *https://www.tableau.com*
- CARTO *https://carto.com/*
- Flourish *https://flourish.studio/* (sign up for the waiting list or use now if you're a developer)
- Kartograph *https://kartograph.org/*
- Gephi *https://gephi.org/*

Tools for developers

- Python for getting and normalising the data.
- IPython and Jupyter to use for any 'data-dive' sessions.
- D3.js is great for data visualisation in general, especially map-based visualisations, but it lacks the structure needed for larger applications or more complex interactive visualisations.
- React has some good points for more complex applications, but it has an overhead that is proportional to the number of data points you're mapping, and is not optimal for animating elements of the dataviz.
- Most people use React and D3 together, where React is for rendering HTML and D3 for rendering SVG.

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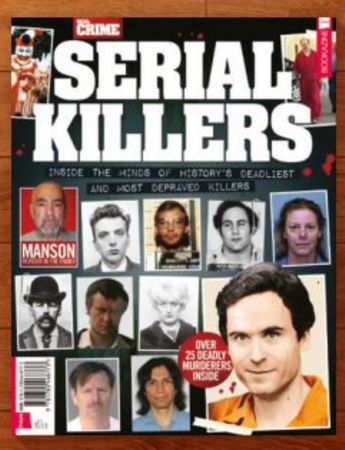

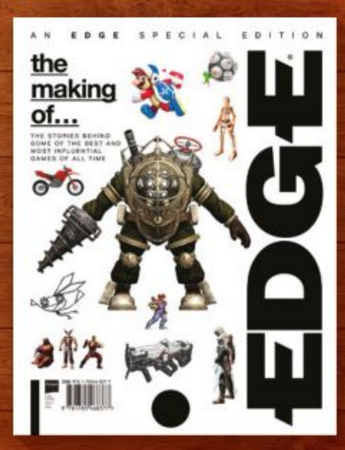

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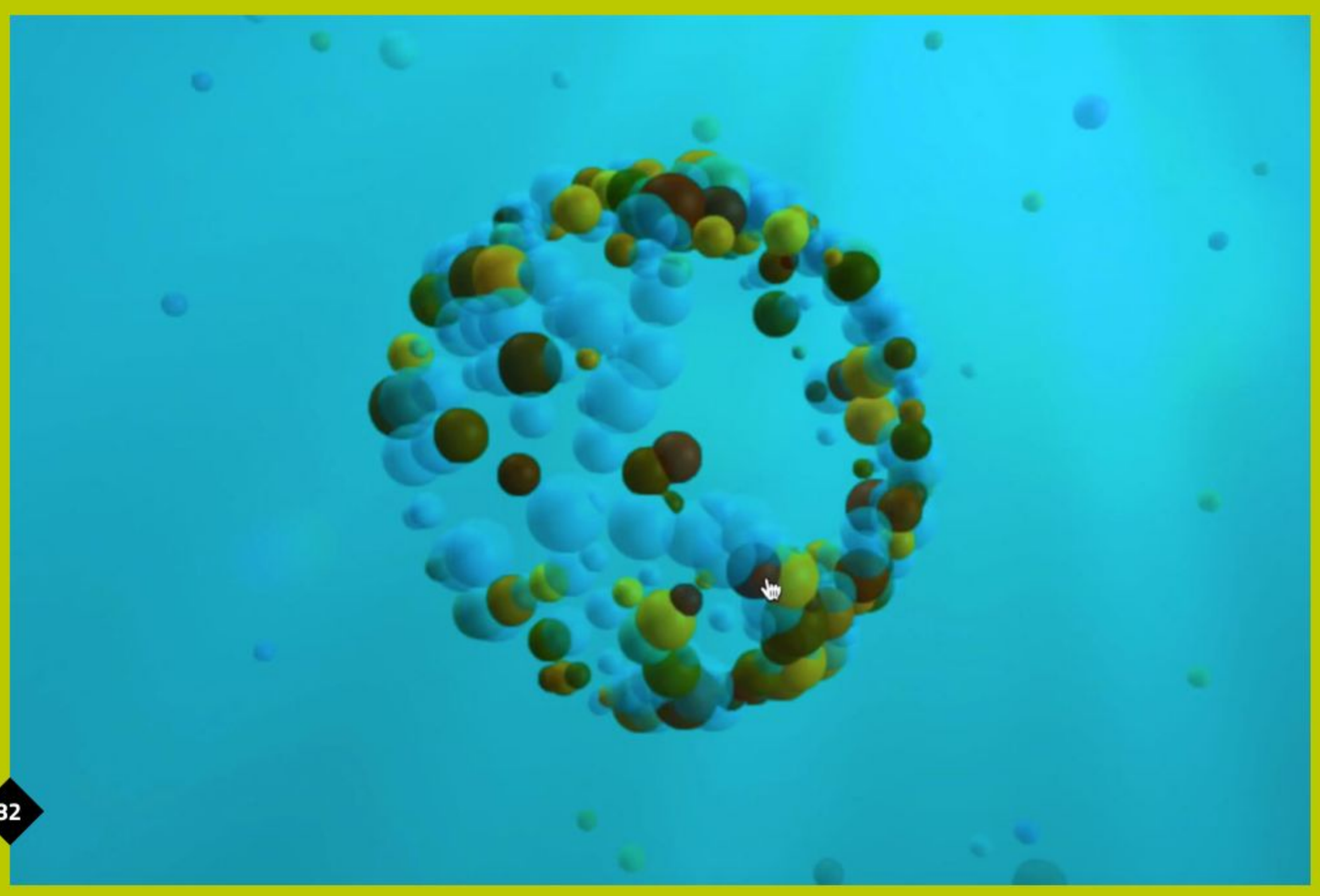

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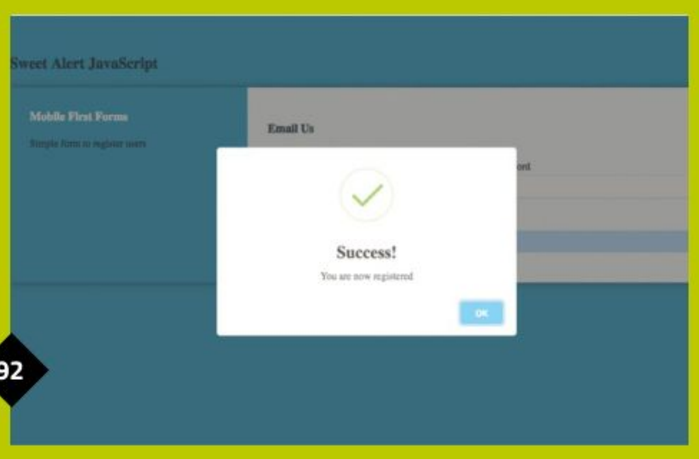

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ABOUT THE AUTHOR

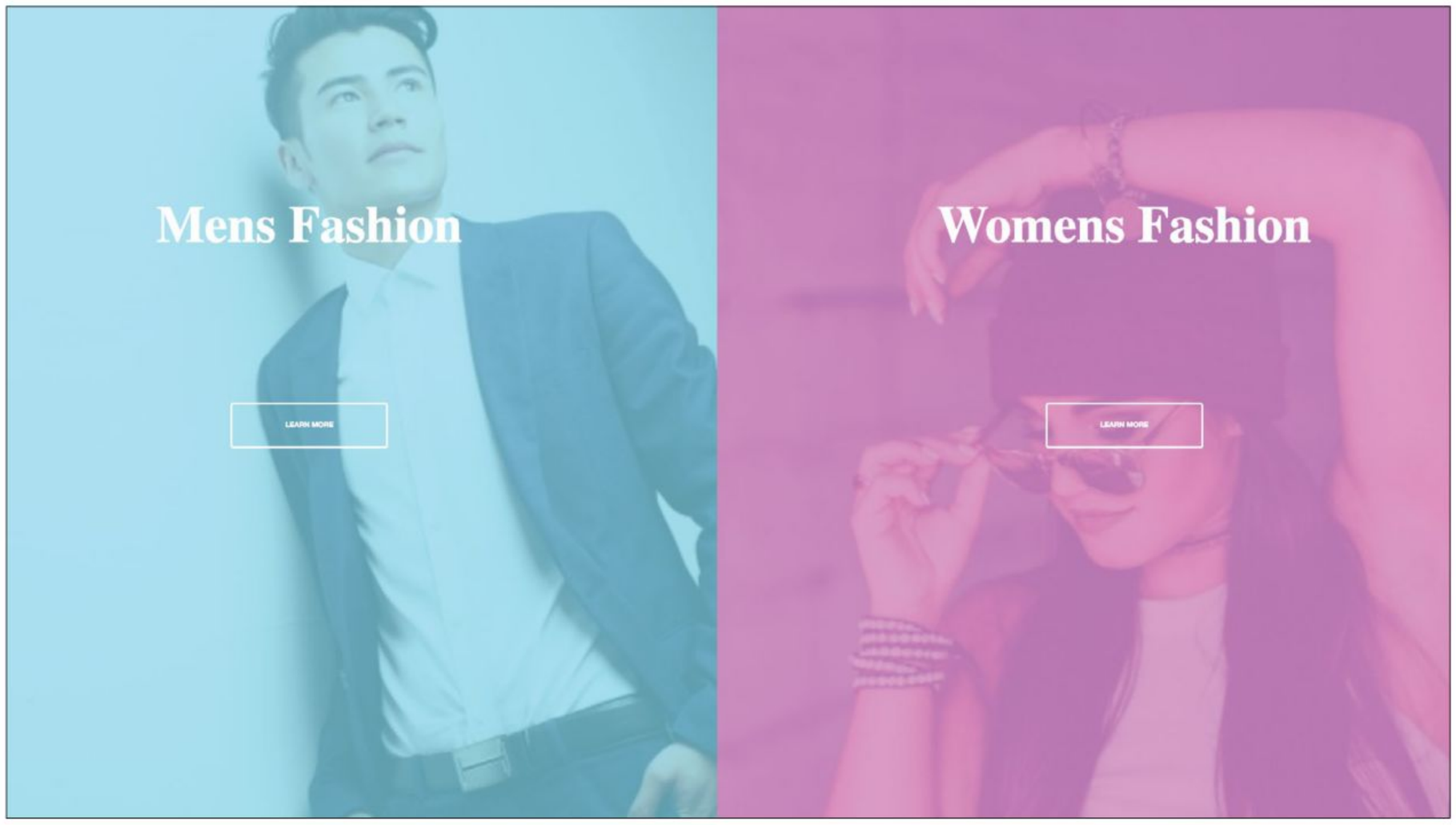
NEIL PEARCE

w: *neilpearcedesigns.co.uk*

t: @neilpearce

job: Front-end developer and designer

areas of expertise: All-round front-end developer, style guides, pattern libraries, architecture, team work, speaking, workshops



* HTML, SASS & JAVASCRIPT

BUILD A SPLIT-SCREEN LANDING PAGE

Using HTML, Sass and JavaScript, develop an animated split screen landing page, ideal for a fashion brand website

Your website landing page is a crucial element in web design. Its effectiveness can translate to increased conversions and when it involves an ecommerce website, this can be very important. Landing pages are designed with a single focused objective – known as a Call to Action (CTA). This CTA needs to be simple and obvious enough to work – simplicity is key here as your landing page is the first real opportunity you have to introduce your business, or the product or products you sell. So the use of nice colours and images to compliment the calls to action and the user experience is a must.

So, in this tutorial, we will look at how we can build a simple landing page for a fashion brand for both men and women. We will be giving the user a nice pleasant design with nice large images and animated transitions that happen on hover. This page will have two clear calls to action buttons and we'll be using HTML, Sass (.scss) for styling and a touch of vanilla JavaScript that uses the ES6 syntax. To make things easier for us, we will develop this project within Codepen (https://codepen.io). You can use your own local set up but we will be using Sass, so if you want to follow along with everything I'll be doing without using Codepen, then you'll need Sass installed and running before we can begin.

GETTING SET UP

If you're using Codepen, make sure the CSS is set to 'SCSS' in the Pen settings. You can make this change by clicking on the settings tab, choose 'CSS' and change the CSS Preprocessor to SCSS in the dropdown options. Then we can begin adding in our HTML. We're going to wrap a section called 'left' and a section called 'right' within a container class, with both sections given a class of 'screen'.

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```
<div class="container">
 <section class="screen left">
 </section>
 <section class="screen right">
 </section>
</div>
```

FINISHING UP THE HTML

To finalize our HTML, we will add in a title for each section using an 'h1' tag. Underneath that we will need to add in a button, which would link to another page if this was a real-world project. We will give this a class of 'button' to keep things nice and simple.

```
<div class="container">
  <section class="screen left">
   <h1>Mens Fashion</h1>
    <button>
     <a href="#" class="button">Learn More</a>
    </button>
  </section>

  <section class="screen right">
    <h1>Womens Fashion</h1>
     <button>
      <a href="#" class="button">Learn More</a>
     </button>
   </section>
```

SASS VARIABLES

The one thing we all love about Sass is the use of variables. Even though native CSS variables are getting more support, we will keep things safe by using Sass. We will put these at the top of our '.scss,' and you can choose whatever colours you want, but using the 'rgba' values will give us more flexibility.

```
/** Variables **/

$container-BgColor: #444;
$left-bgColor: rgba(136, 226, 247, 0.7);
$left-button-hover: rgba(94, 226, 247, 0.7);
$right-bgColor: rgba(227, 140, 219, 0.8);
$right-button-hover: rgba(255, 140, 219, 0.7);
$hover-width: 75%;
$small-width: 25%;
$animateSpeed: 1000ms;
```

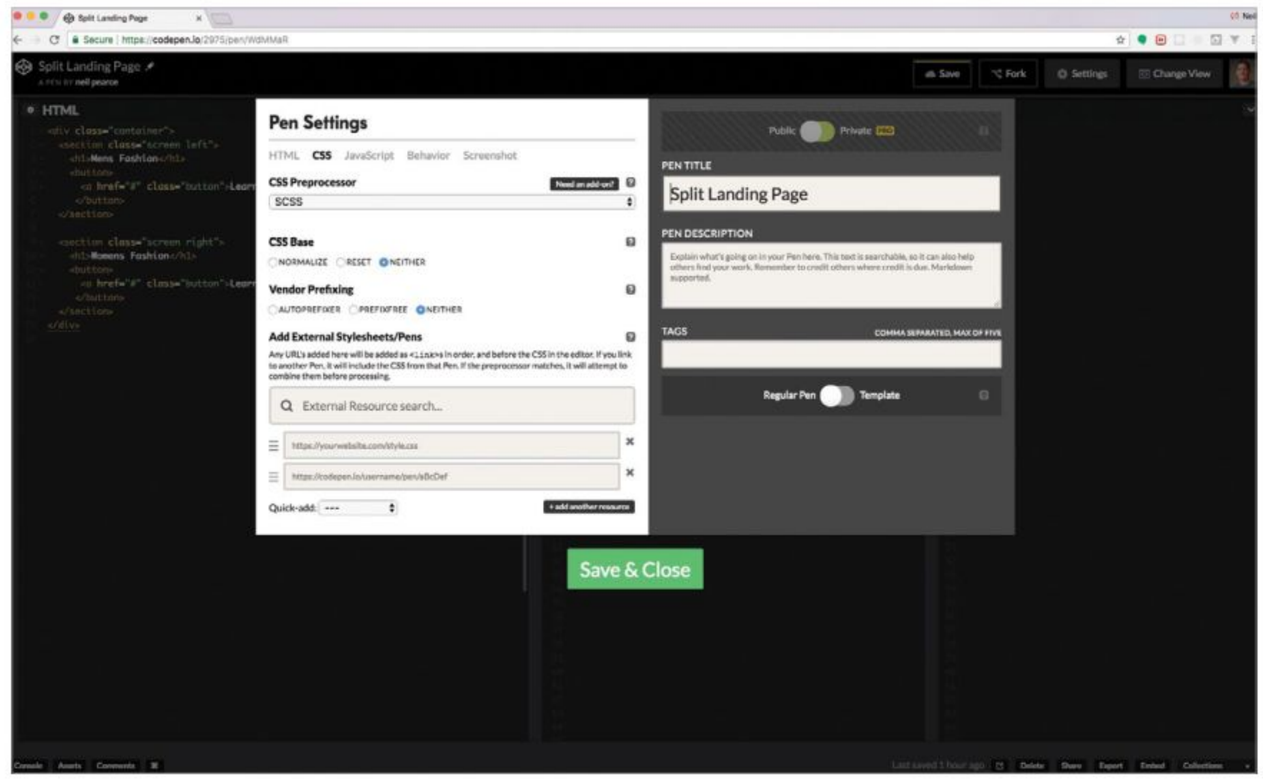
BODY STYLING

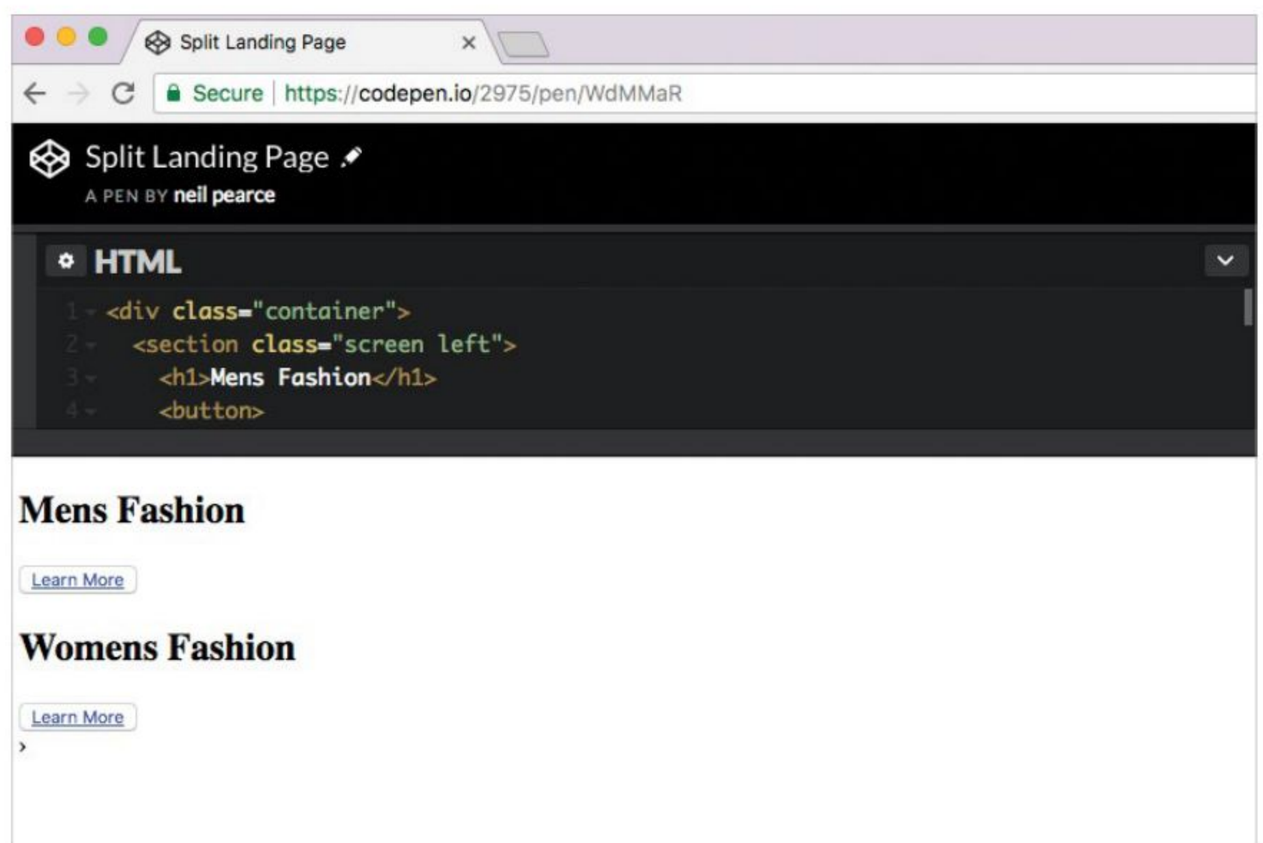
Firstly, we will clear all default padding and margin to the body and then set the font family to 'Open Sans'. This will only effect the button, so it doesn't matter too much on what font we use. Then we will set the width and height to 100% and make sure that anything that overflows on the X axis gets hidden.

```
html, body {
 padding:0;
 margin:0;
 font-family: 'Open Sans', sans-serif;
 width: 100%;
 height: 100%;
 overflow-x: hidden;
}
```

STYLING THE SECTION TITLES

In print, fashion magazines use specific fonts. The most common is 'Didot'. However, this font isn't a Google font so we will use one called 'Playfair Display' – which is close enough. Then using 'translateX' we can make sure the section titles are always centred on the x axis. ▶





Top In the CSS section in Codepen, set the preprocessor to SCSS using the drop down options, before continuing on

Above With our HTML now completed, we can start to add in some CSS by giving the body some styling

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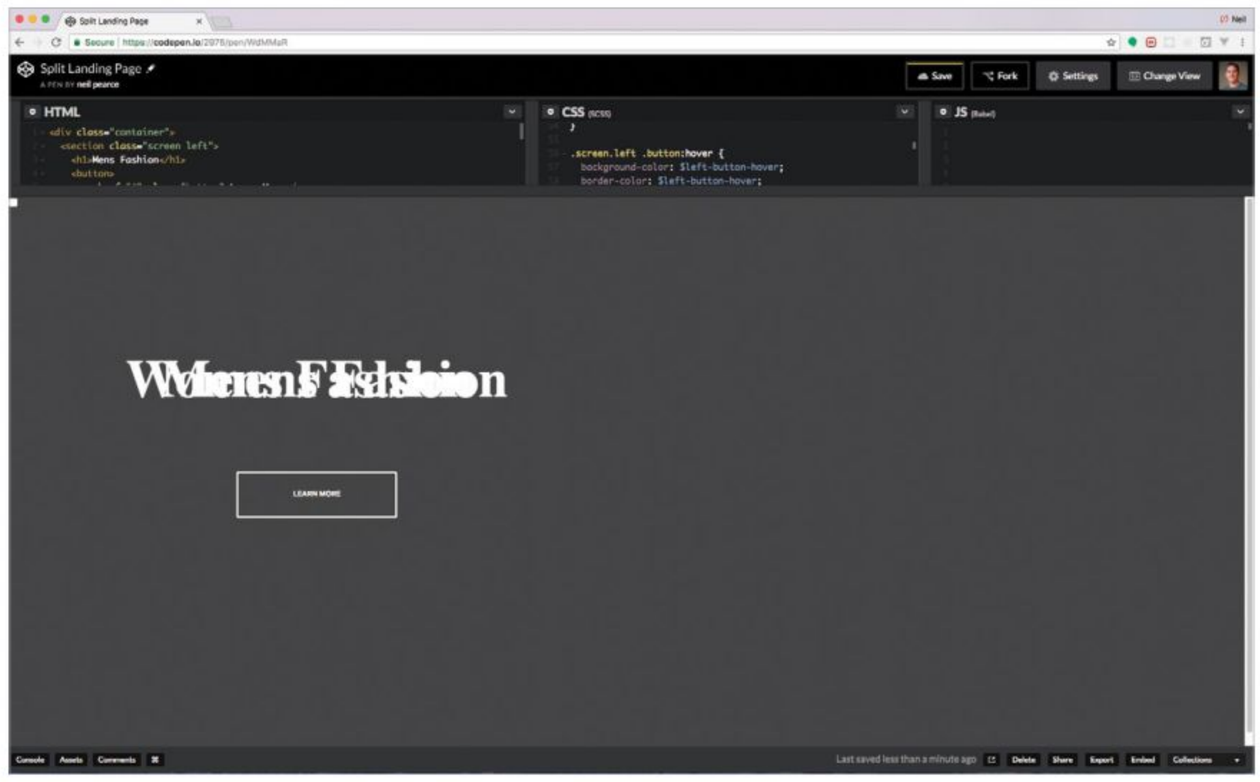

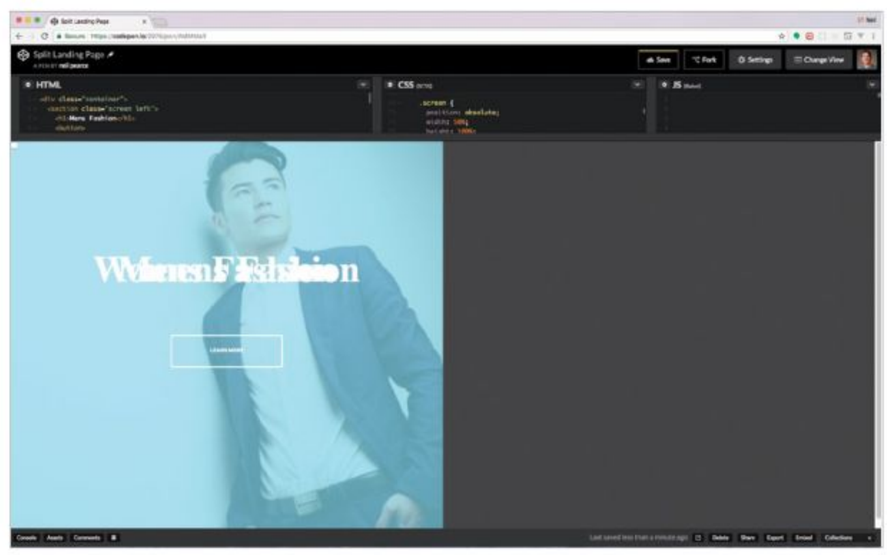

Above The default background colour is set to a dark grey, which won't be seen. We then style the buttons and page titles

Right Both the left and right sections will display an image, and you can find royalty-free stock images from websites such as Unsplash, Pixabay or pexels

```
h1 {
  font-size: 5rem;
  color: #fff;
  position: absolute;
  left: 50%;
  top: 20%;
  transform: translateX(-50%);
  white-space: nowrap;

  font-family: 'Playfair Display', serif;
}
```

BUTTON CSS

The button is of course our call to action (CTA). So, these would need to be big, bold and positioned where they are easy to click. Both buttons will have a white border and have a nice transition effect. The default styles for both buttons will be the same, however we will change their colours on hover in the next step.

```
.button {
  display: block;
  position: absolute;
  left: 50%;
  top: 50%;
  height: 2.6rem;
  padding-top: 1.2rem;
  width: 15rem;
  text-align: center;
  color: white;
  border: 3px solid #fff;
  border-radius: 4px;
  font-weight: 600;
  text-transform: uppercase;
  text-decoration: none;
  transform: translateX(-50%);
  transition: all .2s;
```

BUTTON HOVERS

The main buttons will have a nice simple hover effect and we will use the Sass variables we specified for the colour, which will be a similar colour to the background of the page.

```
.screen.left .button:hover {
  background-color: $left-button-hover;
  border-color: $left-button-hover;
}

.screen.right .button:hover {
  background-color: $right-button-hover;
  border-color: $right-button-hover;
```

CONTAINER BACKGROUND AND SCREENS

The container class will act as our page wrapper and we will set the position of this to relative, simply because we want to position the screens to absolute positioning. We will give the container a default background colour, but of course this won't be seen because we will be setting different colours to both screen backgrounds.

```
.container {
  position: relative;
  width: 100%;
  height: 100%;
  background: $container-BgColor;

  .screen {
    position: absolute;
    width: 50%;
    height: 100%;
    overflow: hidden;
  }
}
```

BACKGROUND IMAGES

Both the left and right sections will display an image, and you can find royalty-free stock images

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from websites such as Unsplash, Pixabay or pexels (which is what I've used in this tutorial). To make things easier, I've used a free image hosting and sharing service called imgbb which we can link to in our CSS.

```
.screen.left {
 left:0;
 background: url('https://preview.ibb.co/cpabRm/pexels_photo_450212_1.jpg') center center no-repeat;
 background-size: cover;

  &:before {
    position:absolute;
   content: "";
   width: 100%;
   height: 100%;
   background: $left-bgColor;
  }
}
```

> "We have set the background size to 'cover'."

WOMEN'S SECTION

Like we did in the last step, our right sided women's section will display a background image using imgbb and we will set the background colour to pink.
Like we did in the previous step, we have set the background size to 'cover'. This will allow us to cover the entire containing element, which in our case is the .screen class.

```
.screen.right {
 right:0;
 background: url('https://preview.ibb.co/mToPCR/seth_doyle_82563_1.jpg') center center no-repeat;
 background-size: cover;

  &:before {
   position:absolute;
   content: "";
   width: 100%;
   height: 100%;
   background: $right-bgColor;
  }
}
```

TRANSITIONS

The animation speed for our hover effect on both screens will be controlled by a transition that holds the value of our variable '$animateSpeed,' which is 1000ms (one second). Then we'll finish off by giving the animation some easing, which is an ease in and out that will help to give us a smoother animation.

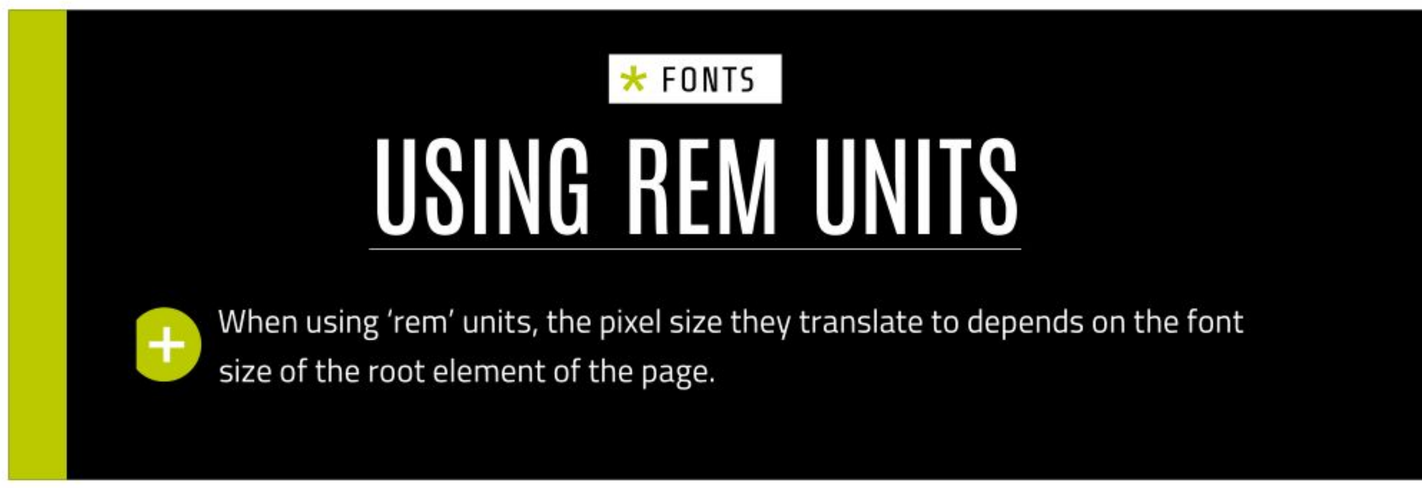
```
.screen.left, .screen.right, .screen.right:before, .screen.left:before {
 transition: $animateSpeed all ease-in-out;
}
```

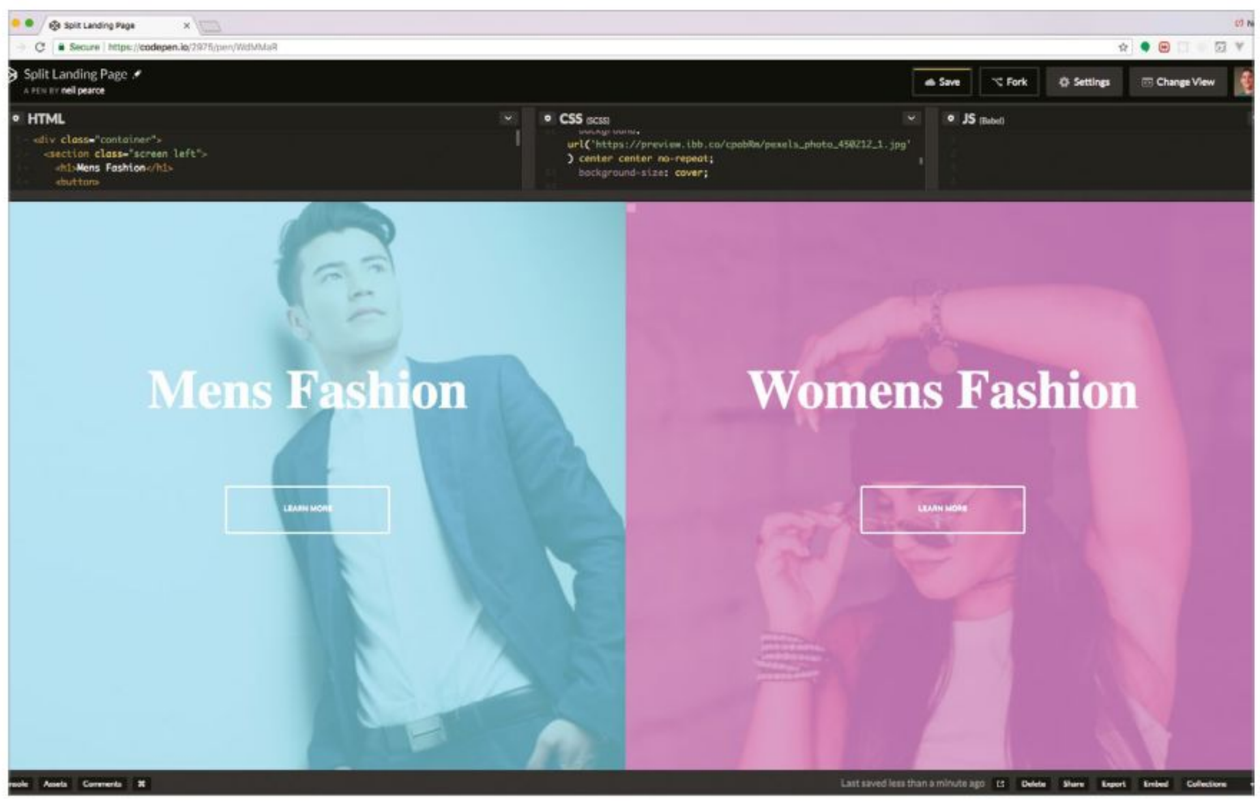
HOVER LEFT SECTION

What we want to happen now is when you hover over the left screen, there will be a class added to that section using JavaScript (which we will write in a later step). When this class is added, then that screen will stretch to whatever the width of the variable we specified – which will be 75%, and then the right side will be set to the smaller width variable (25%)

```
.hover-left .left {
 width: $hover-width;
}

.hover-left .right {
 width: $small-width;
}
```





Above We now have both screen sections styled and with nice hover transitions on the CTA buttons

* CSS

USING NATIVE CSS VARIABLES

CSS native variables (CSS custom properties) are getting more and more browser support, so using Sass or any other CSS preprocessor may at some point in the near future become obsolete. So, it doesn't hurt to start using CSS variables now, and I thought it would be a good idea to take a closer look at how we could actually use native variables in this tutorial.

First of all we target the global ':root' element, which is similar to the 'html' element, but with higher specificity.

```
root {

}
```

CSS variable syntax is relatively straightforward. To instantiate a CSS variable, simply use two dashes (--) followed by one or more valid characters as shown.

```
:root {

--container-BgColor: #444;
--left-bgColor: rgba(136, 226, 247, 0.7);
--left-button-hover: rgba(94, 226, 247, 0.7);
--right-bgColor: rgba(227, 140, 219, 0.8);
--right-button-hover: rgba(255, 140, 219, 0.7);
--hover-width: 75%;
--small-width: 25%;
--animateSpeed: 1000ms;

}
```

To use a variable, you have to use the 'var()' function and provide the named property inside as shown:

```
.screen.left .button:hover {
 background-color: var(----left-button-hover);
 border-color: var(----left-button-hover);
}
```

The syntax may not be as simple as using Sass (using the $ sign), but not having to install Sass and starting it up every time you make changes to the CSS, is very appealing and will become the norm in the very near future.

```
.hover-left .right:before {
 z-index: 2;
}
```

HOVER RIGHT SECTION

This works exactly the same as the left side, where a new class will be added on mouse hover using JS, and the right screen will stretch out accordingly. We also need to make sure the 'z-index' is set to '2' so the CTA button becomes more prominent.

```
.hover-right .right {
 width: $hover-width;
}

.hover-right .left {
 width: $small-width;
}

.hover-right .left:before {
 z-index: 2;
}
```

ADDING THE JAVASCRIPT

We will be using a touch of vanilla JavaScript to help us add and remove CSS classes and we will also be using some of the new ES6 features. The first thing we need to do is to declare some constant variables. Because we will be using 'document' more than once, we will set a constant variable called 'doc' and store the document within that so we can keep the word 'document' nice and short.

```
const doc = document;
```

MORE CONSTANTS

Now we need to set three more constants that will store the '.right,' '.left' and '.container' selectors. The reason we are using constants is because we know we don't want to change the value of these, so using a constants makes sense. With these now set, we can go ahead and add some mouse events to them.

```
const right = doc.querySelector(".right");
const left = doc.querySelector(".left");
const container = doc.querySelector(".container");
```

ADDING MOUSE EVENTS

Using the 'left' constant variable we declared in the last step, we can now add an event listener to it. This event will be the 'mouseenter' event and instead of using a callback function, we will use another ES6 feature called 'Arrow Functions' (() =>)

```
// adds a class to the container element on hover
```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```
left.addEventListener("mouseenter", () => {
  container.classList.add("hover-left");
});
```

ADDING AND REMOVING A CLASS

In the last step, our event listener added a mouseenter event that targets the main container class and adds a new class called 'hover-left' to the 'left' section element. With this called added, we now need to remove it when we hover off it. We'll do this by using the 'mouseleave' event and the '.remove()' method.

```
// removes the class that was added on hover
left.addEventListener("mouseleave", () => {
  container.classList.remove("hover-left");
});
```

> "We need to set three constants that will store the '.right' '.left' and '.container' selectors"

FINISHING OFF THE JS

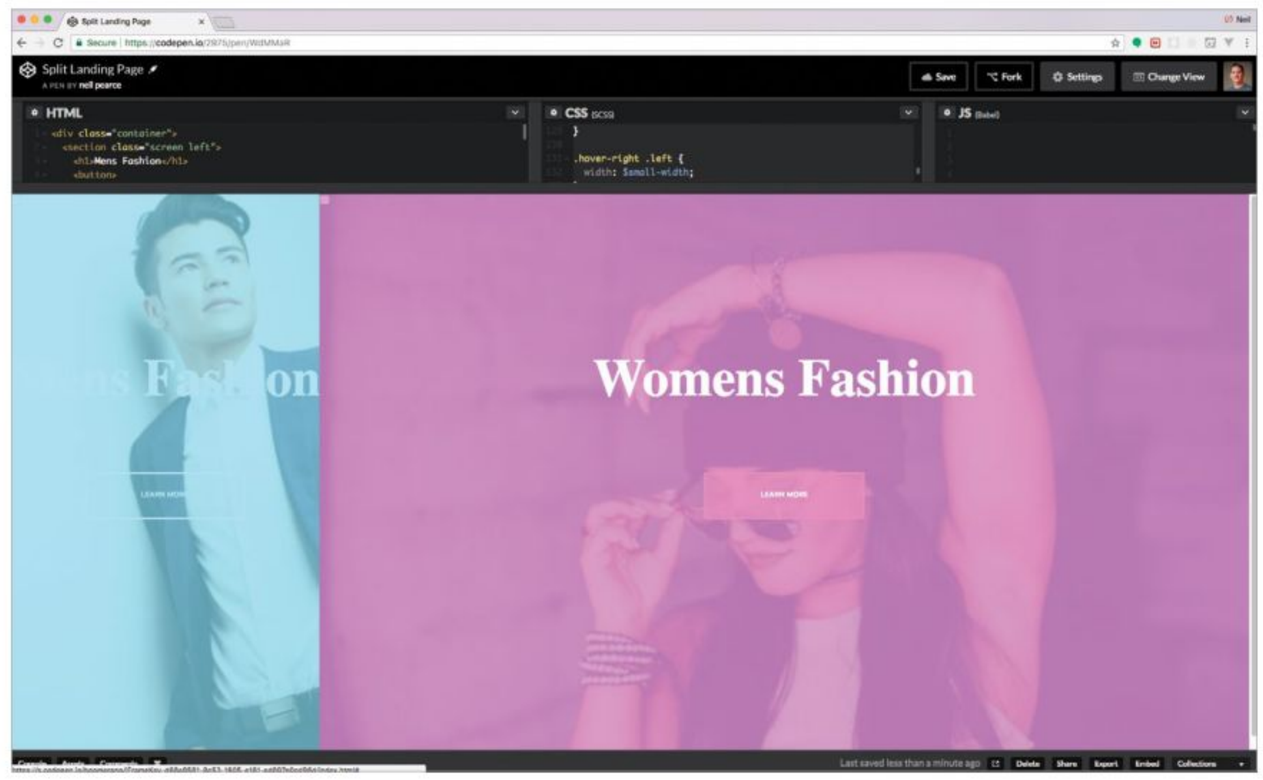
Up until now we have done everything on the left screen. Now we will finish off the JavaScript and add and remove classes on the right section elements. Again we have used the arrow function syntax here to keep everything looking nice and tidy.

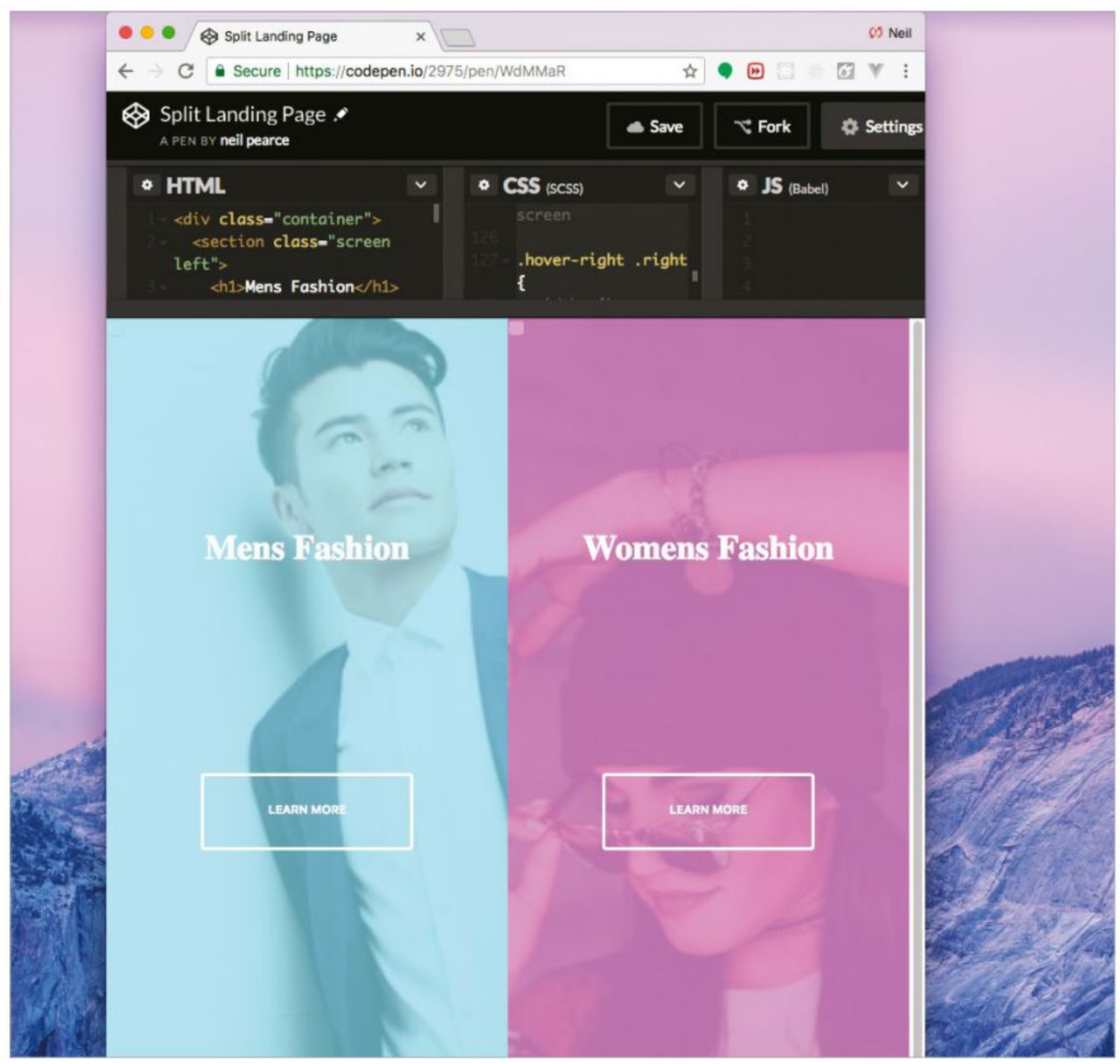
```
right.addEventListener("mouseenter", () => {
  container.classList.add("hover-right");
});

right.addEventListener("mouseleave", () => {
  container.classList.remove("hover-right");
});
```

RESPONSIVE

No project – no matter how big or small – should avoid being made responsive. So, in this step we will add some media queries to our CSS, and make this small project as adaptive to mobile devices as best we can.

```
@media(max-width: 800px) {
  h1 {
    font-size: 2rem;  }

  .button {
    width: 12rem;
  }
```





Top Now that the JavaScript has been added, we can see our screen animations working when we hover over each screen

Above To finish things off we added some media queries to make our landing page more mobile friendly

FINISHING UP

In the last step, we made sure that when the width of our page gets down to 800px, we want the font size and the buttons to reduce in size. So, to finish things off we want to target the height too and make sure our buttons move down the page when the page height gets below 700px.

```
@media(max-height: 700px) {
  .button {
    top: 70%;
  } }
```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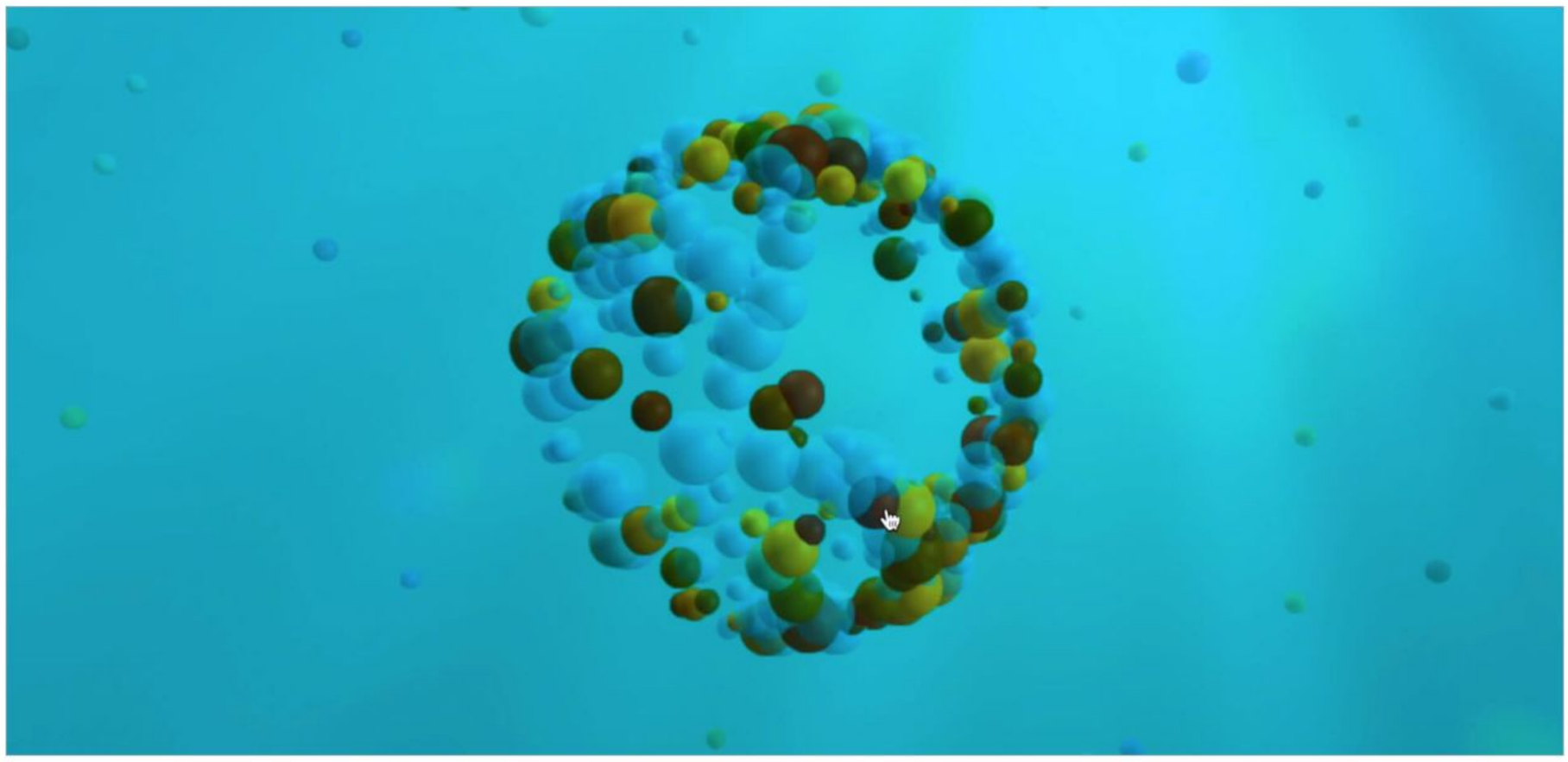
ABOUT THE AUTHOR
RICHARD MATTKA

w: *http://richardmattka.com*

t: *@synergyseeker*

job: Interactive director, designer, developer

areas of expertise: Shaders, VFX, WebGL



* GRAPHIC SHADERS

PROCESS IMAGES WITH GRAPHIC SHADERS

Richard Mattka continues to explore graphic shaders, focusing on image post-processing in this second tutorial of an ongoing series

Graphic shaders are an incredibly powerful technology that enable a vast array of effects, by working directly with the graphics hardware of devices. Some aspects are hardwired to the hardware, while others are programmable. It's these programmable 'shaders' where we can get in and create some amazing results.

In last issue's article we learned about what shaders are, and dug into creating our first ones. This tutorial is going to focus on processing images in our shaders. It's going to scratch the surface of what can be done, but will give you something practical you can use. Again, the primary goal is to get you inspired so you can start creating as soon as possible.

IMAGE POST-PROCESSING

We see image processing everywhere today. Instagram filters, blur effects, transformations and colour grading for film are just a few examples. And what we do with images works with video, since it is simply a stream of images.

So how do we use shaders to accomplish this? Recall, we are working with fragment shaders, which is the last shader in the graphics pipeline. The function of this shader is to take in the position of the fragment (pixel) and return a colour it should be.

The most basic shader could simply pass through the current colour values of an image and do no manipulation to the pixels. We sometimes call this a 'pass through' shader, when we are pushing unmodified data down the pipeline.

So let's start there. Let's load an image into our shader, without doing anything to it, and simply show it as it is, unprocessed.

If we are using an interface like Shadertoy, we can simply select an image using the interface, and it takes care of the vertex shader bits for us. For the purposes of this tutorial, we're going to use Shadertoy again. This will let us focus on the code, and not the external process of loading images, since that will vary depending on your particular scenario and language.

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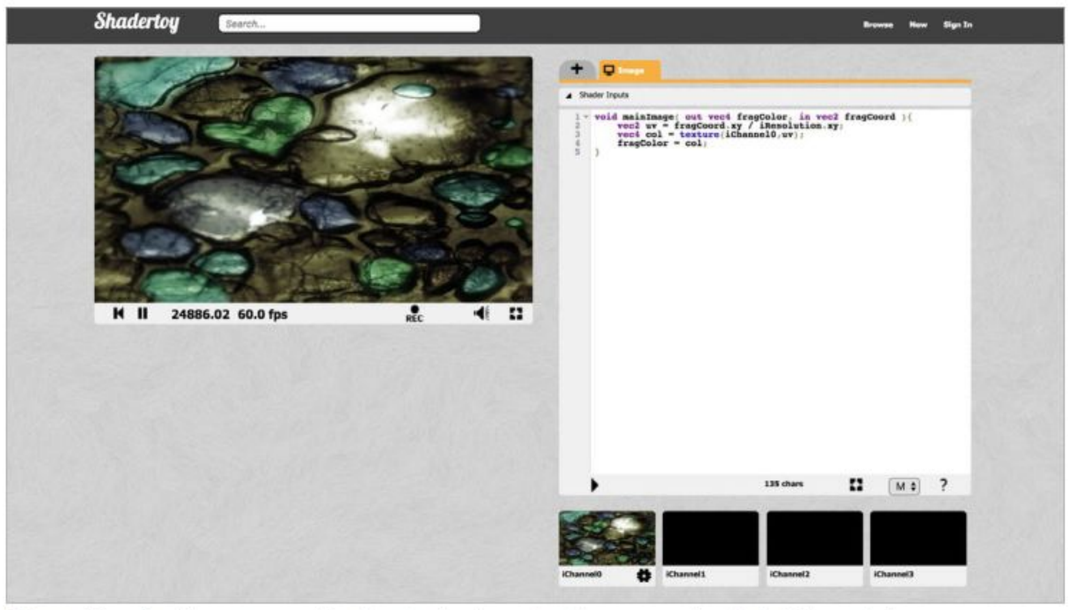

Above Your first image graphic shader; just a naked image – simple but it works!

OUR FIRST IMAGE SHADER – RAW IMAGE

In order to see our shader executed, we need to render it. A quick method is to use a WebGL rendering tool, such as Shadertoy. It gives us a nice code window to practise in and a render window to see our work.

To get started, open up *https://www.shadertoy.com/new* in a browser that supports WebGL.

Just below the code window, you will see four boxes. Click on the first one labelled Channel0. Select the Texture tab and pick an image you'd like to use as a texture.

You'll see a sample shader code all ready to go for you in the code window. Let's delete it so we can write our own.

Type in this new code and press the black play icon at the bottom of the window. This will execute the shader code.

```
void mainImage( out vec4 fragColor, in vec2 fragCoord ) {
        vec2 uv = fragCoord.xy / iResolution.xy;
        vec4 col = texture(iChannel0,uv);
        fragColor = col;
}
```

You should now see your image. Not too exciting, but it works. We are passing the image data through the pipeline and rendering it to screen. Because we can now program this shader, we will be able to manipulate these pixels.

So what's going on in the code?

To start, we normalised the current fragment pixel xy by dividing by the iResolution uniform. This enables the shader to work regardless of resolution. In the second line, we grab the current colour value for that corresponding pixel fragment in the image texture using the `texture` function, which takes a texture (loaded via the iChannel0) and a position (2D). Then we simply set this value as our `fragColor` value. Done.

SHADERS

GET FAMILIAR WITH VERTEX

An RGB colour shift shader effect was applied on these custom panels for the Independence Day Resurgence project

We are focused on the fragment shaders in this tutorial, but just for context, we should mention the vertex shader's role in image processing. The vertex shader (the first in the pipeline) defines a uniform variable for us that samples the image data that we refer to as a Texture. A typical declaration for this would be:

```
`uniform sampler2D iChannel0;`
```

This gets passed down the pipeline so we are able to access this data in our fragment shader (the last shader in the pipeline).

We define the uniform again in the head of shader and then can access it via a built-in GLSL function called Texture or Texture2D in some contexts, like this:

```
`texture(iChannel0,xy);`
```

This function returns a vec4 (four part) variable for the specific pixel we are processing. This exactly corresponds to the vec4 variable we need to return in our main function. Recall, shader code processes just the pixel (fragment) it is focussed on. It does this in parallel for every pixel, which is why it is so fast.

If you are using a WebGL library such as three.js you have a method to load images as textures, which then you can load into that uniform variable you've declared. For example:

```
`iChannel0: { type: 't', value: THREE.ImageUtils.loadTexture(
'assets/tex1.png') }`
```


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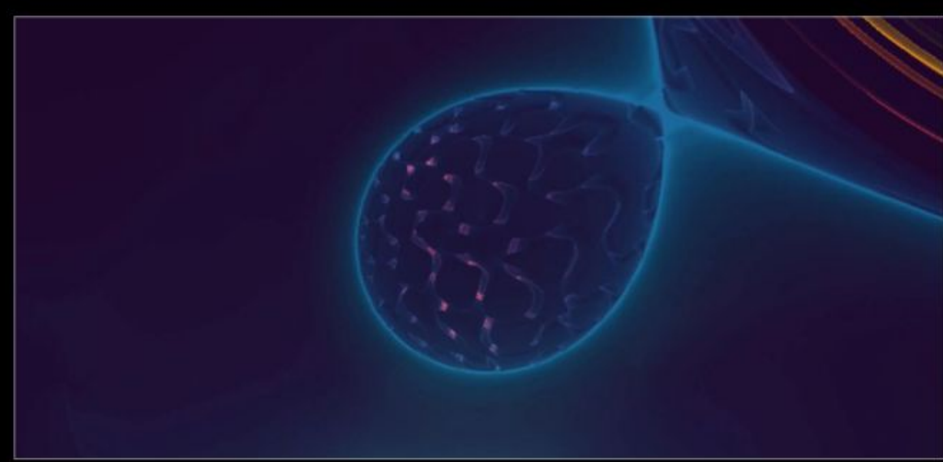
SHADERS

DIFFERENT SHADES



Bringing up the green tones and washing out the rest a little gave this shot an alien feel

Uniforms

Each render tool will have its own little nuances, such as built-in uniforms (variables) passed to the fragment shader, for things like Time or Resolution. Shadertoy uses iTime, iResolution and iMouse, for example. These are incredibly easy to port across other implementations, such as three.js or Unity or even your own custom WebGL, as most are standard and have only slight variations in name.

Normalised values

Often in shaders we work with normalised values. This means they range from 0.0 to 1.0. They can be more precise (more digits past the decimal), but they have this range. RGBA values are normalised. We also typically use screen resolution and fragment position to create normalised uv or position values. For example:

```
`vec2 uv = fragCoord.xy / iResolution.xy;`
```

Macros

Fragment shaders can use preprocessor macros, which may be familiar if you know C. Macros are part of a pre-compilation step. It is possible to #define global variables and do some basic conditional operation (#ifdef and #endif). Macro commands begin with a hashtag (#).

As an example of this, you could add this to your code before the main function:

```
`#ifdef GL_ES
precision mediump float;
#endif`
```

You can define lowp, mediump or highp for the precision of float values (how many digits past the decimal). Lower precision means faster performance, higher means slower.

▶ You might notice that your image is flipped. You can correct this in two ways. First, click the little gear icon on the Channel0 button below the code. There is a checkbox in there for flipping your image orientation, vFlip. You can also try out linear or nearest for the first option instead of mipmap. This should give you a crisper image to work with.

The other option is doing it in our code. Try adding this line after line 2:

```
`uv.y = 1.0 -uv.y;`
```

Challenge: Try flipping your image vertically via this line above. Then try horizontally flipping, using the x component of the uv. What happens if you multiply the uv by .5? Play around with these values to see how easily you can use the shader to manipulate the image through simple transformations like this.

OUR SECOND IMAGE SHADER – GREYSCALE

Let's do some post-processing of our image. Try this code out:

```
`vec3 dCol = vec3(.3, .6, .1); // desaturation color
void mainImage( out vec4 fragColor, in vec2 fragCoord ){
   vec2 uv = fragCoord.xy / iResolution.xy;
   vec4 col = texture(iChannel0,uv);
   float grey = dot(col.rgb,dCol);
   vec3  greyCol= vec3(grey, grey, grey);
   fragColor = vec4(greyCol, 1.0);
}`
```

You should see your image is now black and white, or 'greyscale'. Perfect!

Let's break down what we are doing. To start, we are defining a colour to use to desaturate the image. This particular set of values works nicely by not darkening or lightening the image too much. You can tweak these to taste, but you'll notice these add up to exactly 1.0. Darkening the image might be something you wish to do, so use lower values. You can experiment with these values to see how it darkens or lightens aspects of your image.

The new lines we have added are for defining our desaturated colour (grey) and also updating our fragment colour to use it. We use a function called `dot`, which simply calculates the dot product of the two vectors. This is handy because it returns a `float` value between 0.0 and 1.0 that retains the brightness of the overall pixel. Its total value is now a 'brightness' value.

By assigning this same value to the red, green and blue channels, we end up with a colour that ranges

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between black and white without any colour tinting. Just what we want.

Challenge: **Try altering the code to desaturate the blue only. You can pass in the col.r and col.g instead of grey into the col value in the second to last line. Spend some time playing with these values and see what effects you get, by stripping only certain colours.**

OUR THIRD IMAGE SHADER – SEPIA

What if we wanted to do a nice sepia tone, or a similar colour filter effect?

Give the code below a try:

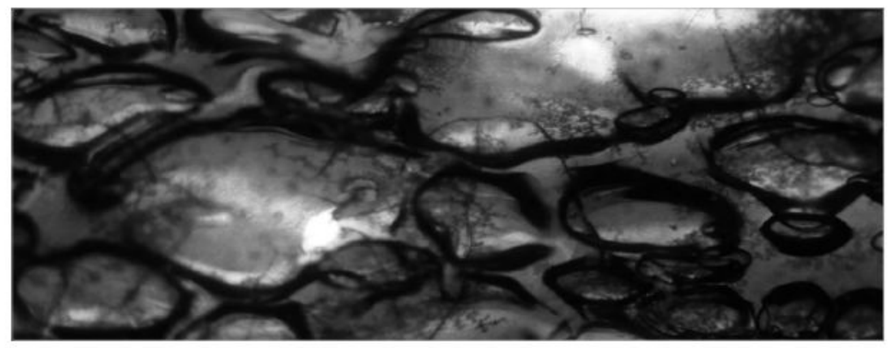
```
`vec3 dCol = vec3(.3, .6, .1); // desaturation color
vec3 sepia = vec3(1.2, 1.0, 0.8);
void mainImage( out vec4 fragColor, in vec2 fragCoord ){
   vec2 uv = fragCoord.xy / iResolution.xy;
   vec4 col = texture(iChannel0,uv);
   float grey = dot(col.rgb,dCol);
   vec3 greyCol= vec3(grey, grey, grey);
   vec3 sepialCol = greyCol * sepia;

   vec3 colFinal = mix(col.rgb,sepialCol.rgb,.8);
   fragColor = vec4(colFinal, 1.0);
}`
```

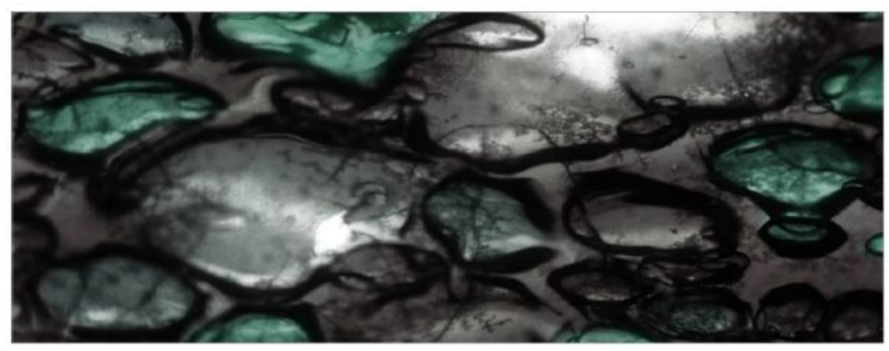
You should now see a nice sepia-tone effect on your image. We added a new sepia colour at the top of the code. Then we converted the image data to greyscale just like before. By applying this sepia 'tinting' to a greyscale colour, we end up with just this one shade ranging from dark to bright. The sepia colour we defined says make the reds 120% more, keep the greens the same, and reduce the blues to 80%. Notice how the average of the sepia tint RGB values still does not exceed 1.0. This means when we multiply the sepia effect against our RGB values, we avoid saturating them with more colour or brightness.

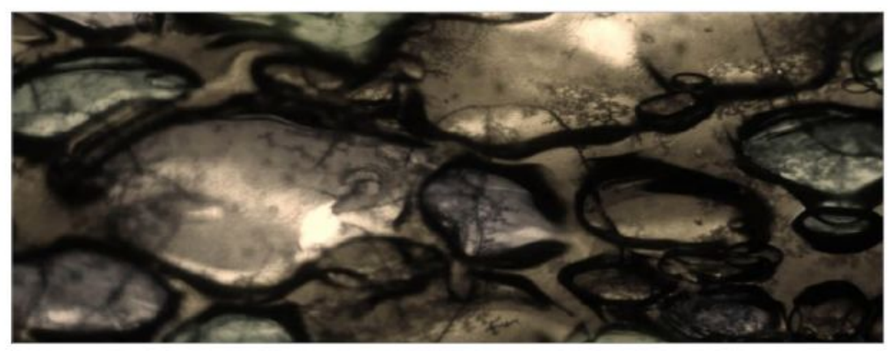
Next, we used a function called `mix`. This enables us to mix two sets of values in a ratio defined by a third value. You could also think of this as linear interpolation between the two values, which is defined by the third.

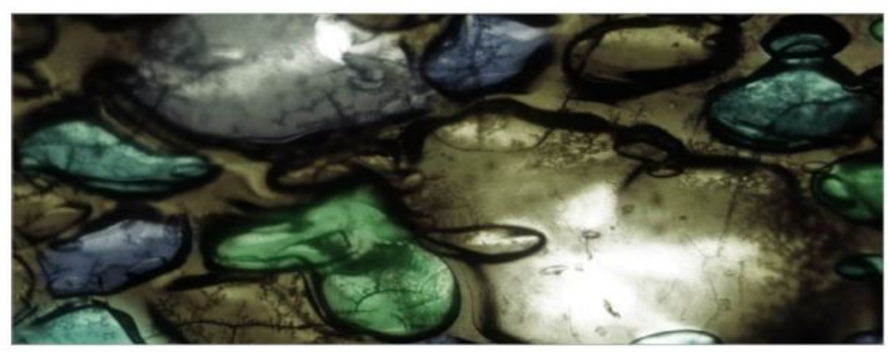
By using this 'mix' approach, we can dial in the amount of the effect we want to apply to the original `col.rgb` values. It is useful setting up effects like this for maximum flexibility later on. That third value could be a variable you pass into the shader from external code, and then controlled by user input such as a nice effect slider.

Challenge: **Try making other colours instead of sepia. Try experimenting with the mix and which channels you apply the effect to. Try intentionally saturating your image with more colour.**









Top Nice, simple, greyscale image. Useful, and required as a base for other effects

Middle top Cool effect. Applying greyscale to red and blue channels only makes the green pop out

Middle bottom You should see a sepia-tone image similar to this one

Bottom Animated effects like this simple water example can make for some great backgrounds or surface details

FINAL SHADER – WATER ANIMATION

We really couldn't end this without a quick animated shader. It's a great way to show how easy it is to make great effects. Try this code out:

```
`void mainImage( out vec4 fragColor, in vec2 fragCoord ){
        vec2 uv = fragCoord.xy / iResolution.xy;
         uv.x += (sin((uv.y - (iTime * 0.1)) * 10.0) * 0.005) ;
        uv.y += (cos((uv.y - (iTime * 0.05)) * 40.0) *
0.003);
        vec4 texColor = texture(iChannel0,uv);
        fragColor = texColor;
}`
```

Like the last animation from last issue's tutorial, we use the simple math function `sin` in combination with the built-in variable for time called `iTime`. We're simply manipulating the `uv.x` value using a smooth `sin` function against the `uv.y` and time. It yields a simple and effective wavy motion that could easily pass for a basic water effect.

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* STANDARDS

MDN BROWSER COMPATIBILITY

Florian Scholz looks at the data set aiming to ease checking browser compatibility

Many browsers on countless devices aim to support a growing web technology stack. Unfortunately, finding out what works where often means extensive manual testing.

Web content should be compatible with as many browsers as possible. Compatibility, like accessibility, is an important concern if you wish to avoid excluding people from your website or app. However, it is often difficult to tell whether a certain feature works in a given browser; for example is it supported correctly, does it require a prefix, or is it supported with a non-standard name or behaviour? This can quickly multiply – do you research every feature in your code to tell if they are supported enough? If your CSS files use more than 200 properties, you will probably start guessing how far back browsers are likely to support your layout. Having no real answer about the compatibility of an entire code base is not ideal.

The mission of MDN Web Docs is to document the features of the Open Web. It contains thousands of reference pages about CSS properties, HTML elements, HTTP headers, JavaScript objects, Web APIs and much more. Most docs also contain compatibility tables, so you can check if you're able to use a certain feature. This has been very helpful in the past, but in the age of linters and programmatic access to (big) data sources, it's not enough.

In 2017, the MDN community started to migrate the compatibility information currently stored on thousands of wiki pages to a machine-readable JSON format in a GitHub repository.

Having the data available in a structured form enables tools to integrate this information and flag compatibility issues at the point you're writing code. This means you no longer have to treat compatibility as an afterthought.

The first project that started to use this data set is compat-report, a browser extension made by developer Eduardo Boucas as a side project. It adds a compatibility panel to the Firefox developer tools and audits CSS usage. It can give an initial overview about potential compatibility problems with the main browsers already, and sometimes tries to suggest ways to address the problem.

In the future, more tools like this could get integrated into code editors, for example offering tips about browser support, or giving warnings when your project requirements are incompatible with a certain browser version. Maybe compatibility could even be tested as part of continuous integration! A compat bot could comment on your pull request to give you hints about where support is going to break, for example.

For now, the MDN community focuses on maintaining the compatibility data set and keeping it up-to-date together with other browser vendors. Last year Mozilla brought Microsoft, Google, the W3C, and Samsung together to form an MDN Product Advisory Board. While the MDN community always tried to provide information about web development for many browsers, this collaboration now formalises existing relationships. For the compatibility data, the board members agreed to drive updates for Chrome, Edge and Samsung Internet and help review compatibility data Github pull requests (PRs) that are flagged for their browsers. As opposed to the old static compat tables, the new structured compatibility data is now updated regularly. That's an enormous benefit for the maintainers of the MDN compat tables and everyone interested in using this data.

Everyone should be able to use the web with any devices and browsers. Having data available about possible incompatibilities should help with this.

* PROFILE
Florian (@floscholz) is a technical writer at Mozilla working on MDN Web Docs. He is passionate about documenting Open Web technologies and making them accessible to everyone.

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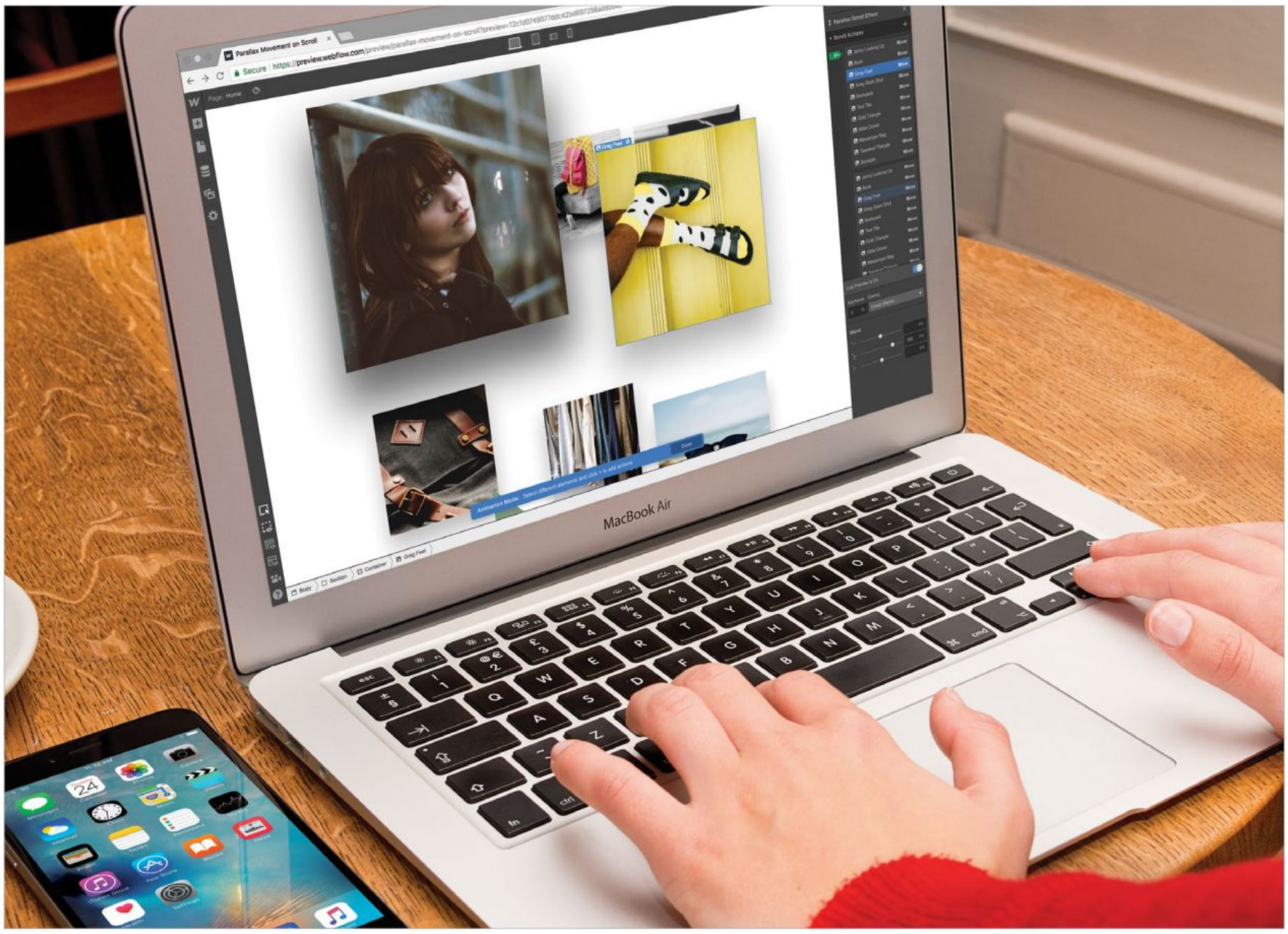
ABOUT THE AUTHOR
ANNA KELIAN

w: *http://annakelian.webflow.io/*

t: @Anna_Kelian

job: Education writer at Webflow Inc

areas of expertise: Teaching, writing, web design



* WEBFLOW

PARALLAX MOVEMENT ON SCROLL USING WEBFLOW

Use the power of the Interactions feature to animate images and create the illusion of depth and perspective as you scroll through a web page

The parallax effect creates an illusion of depth and perspective. You can achieve it by moving visual elements at different speeds. Creating animations using the parallax effect can serve many purposes, and enables your visitors to engage with your site's content in various ways, for example showing how something works or highlighting the anatomy of a product. Or it can create a visual effect that keeps your site's visitors surfing for longer. Webflow's new Interactions 2.0 makes integrating such animations in your website a snap, without you having to write a single line of code.

In this tutorial, you'll learn how to apply a scroll-based interaction to multiple images. The images in the section will appear to be moving at varying velocities. This simulates a realistic feeling of depth because images that appear closer also appear to move faster.

To check out how this animation is made and interact with it within the Webflow Designer, you need to pay a visit to Webflow University (*university.webflow.com*). The lesson is titled Parallax Movement on Scroll. It is part of the Interactions and Animations course.

* EXPERT TIP

ILLUSION OF DEPTH

Simulate a credible 3D space by following depth perception principles. These include the size and position of elements and various shadow distances. Even blur effects can be used to simulate depth of field.

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ADD A SECTION

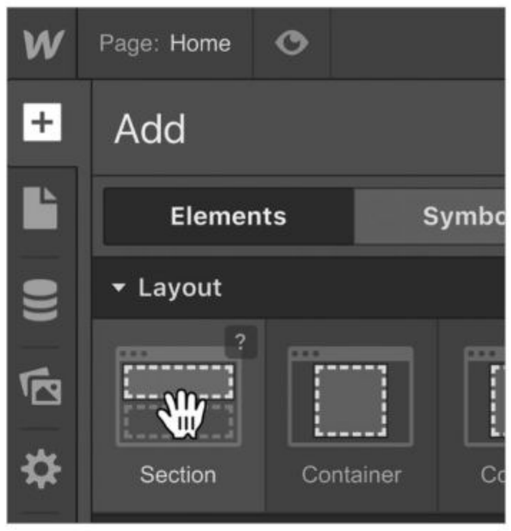
1 First, let's create a section that can be scrolled into and out of view. Drag a Section element onto the canvas from the Elements panel found on the left. Place it below the fold and also above the other sections.

SET THE SECTION

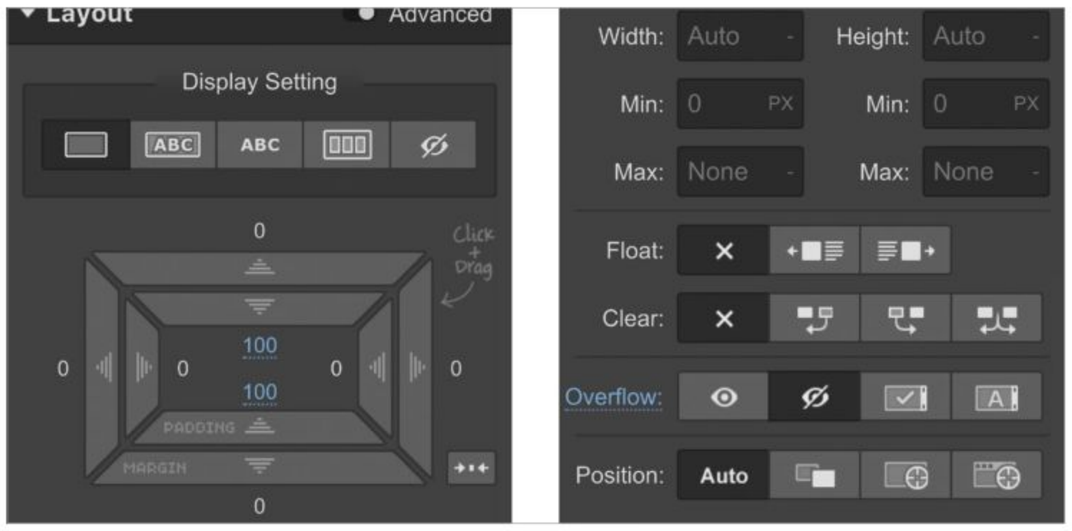
2 While the section is selected, in the Style panel on the right, add some top and bottom padding. Also, set the overflow to Hidden to keep the content within the bounds of the section.

ADD A CONTAINER

3 Drag a Container element from the Elements panel and drop it inside the section. Set its Height to 1200px and its Position to Relative. This will enable you to position images absolutely within the container.



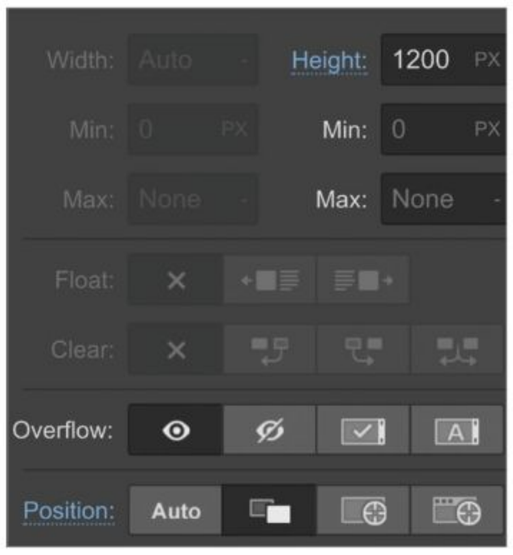
Step 1 Introduce a new section



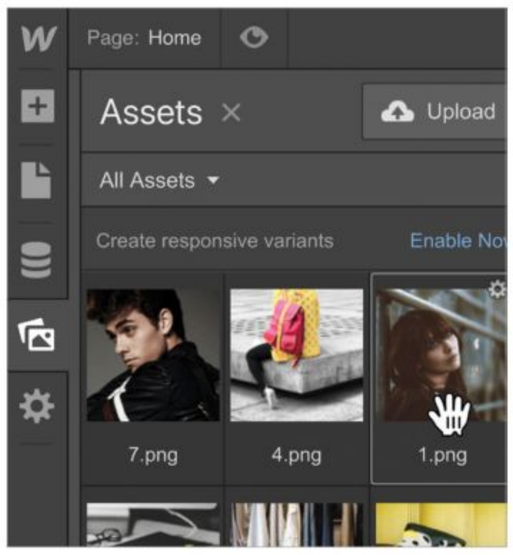
Step 2 Add some padding

POSITION THE IMAGES

6 The next task is to set the position of each image to Absolute. Then position each image by changing any of the position values using the UI, or by manually typing them in each input. Specify a z-index for images. Set a higher z-index for those images that you want to appear closer and also overlap any images that appear in the background.



Step 3 Position the container



Step 4 Select the images for your project

> "Understanding the animation helps you identify the trigger and action that you need to define"

BRING IN IMAGES

4 Drag an image from the Asset Manager into the section. Set an appropriate width and repeat the procedure for all images. Since you want to create an illusion of 3D space, make sure you take that into consideration when setting image dimensions.

STYLE THE IMAGES

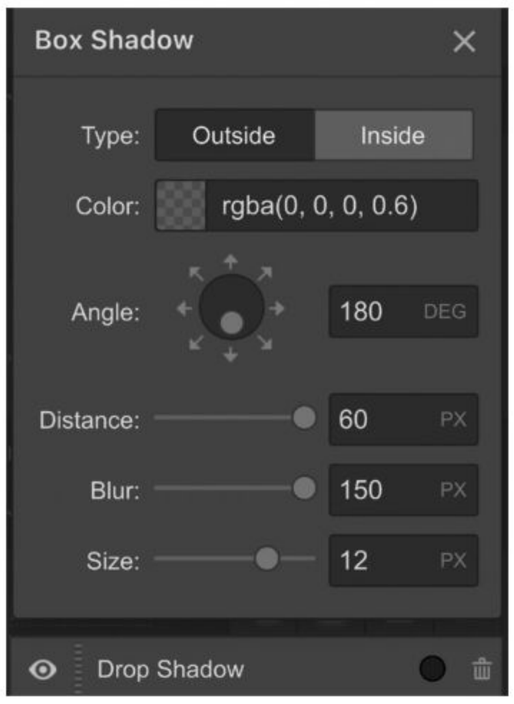
5 Add a drop shadow to each image. Make sure all images have the same shadow angle. Change the colour and opacity of the shadow. Set its distance from the image boundaries. Add some blur and set the size or spread of the shadow relative to the image boundaries as well.

DEFINE THE ANIMATION

7 Understanding the animation helps you identify the trigger and action that you need to define in order to achieve the aim you have in mind. In this animation, you want to animate the images when the section (an element) scrolls through the viewport. So, the trigger is an Element Trigger of While Scrolling in View. And the action will be an On Scroll animation.

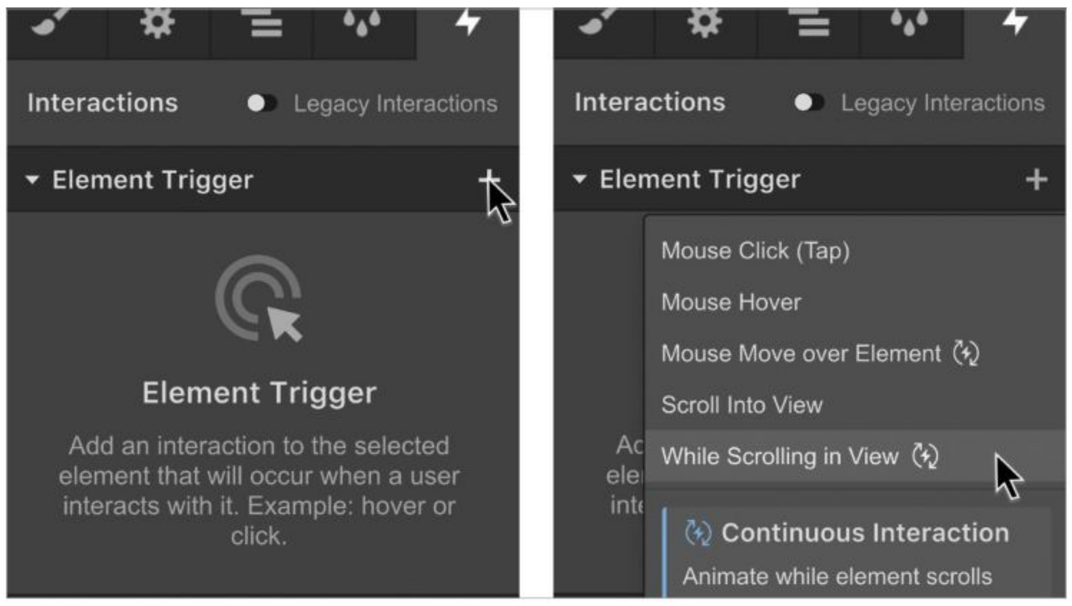
SET THE TRIGGER

8 Now that you've identified the elements of your interaction, you can start creating it. Select the section that contains the images you ▶



Step 5 Add drop shadows

Step 6 Specify the z-index for images



Step 8 Now it is time to introduce an interaction

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created. Open the Interactions Panel. Create an Element Trigger of While Scrolling in View.

CONFIGURE THE TRIGGER

9 Choose to Play Scroll Animation. Change the animation boundaries if you'd like. This enables you to set when the animation starts and ends. By default, the animation begins when the section starts entering the viewport, and it ends when it leaves the viewport. Keep the default for this tutorial.

DEFINE THE SCROLL ANIMATION

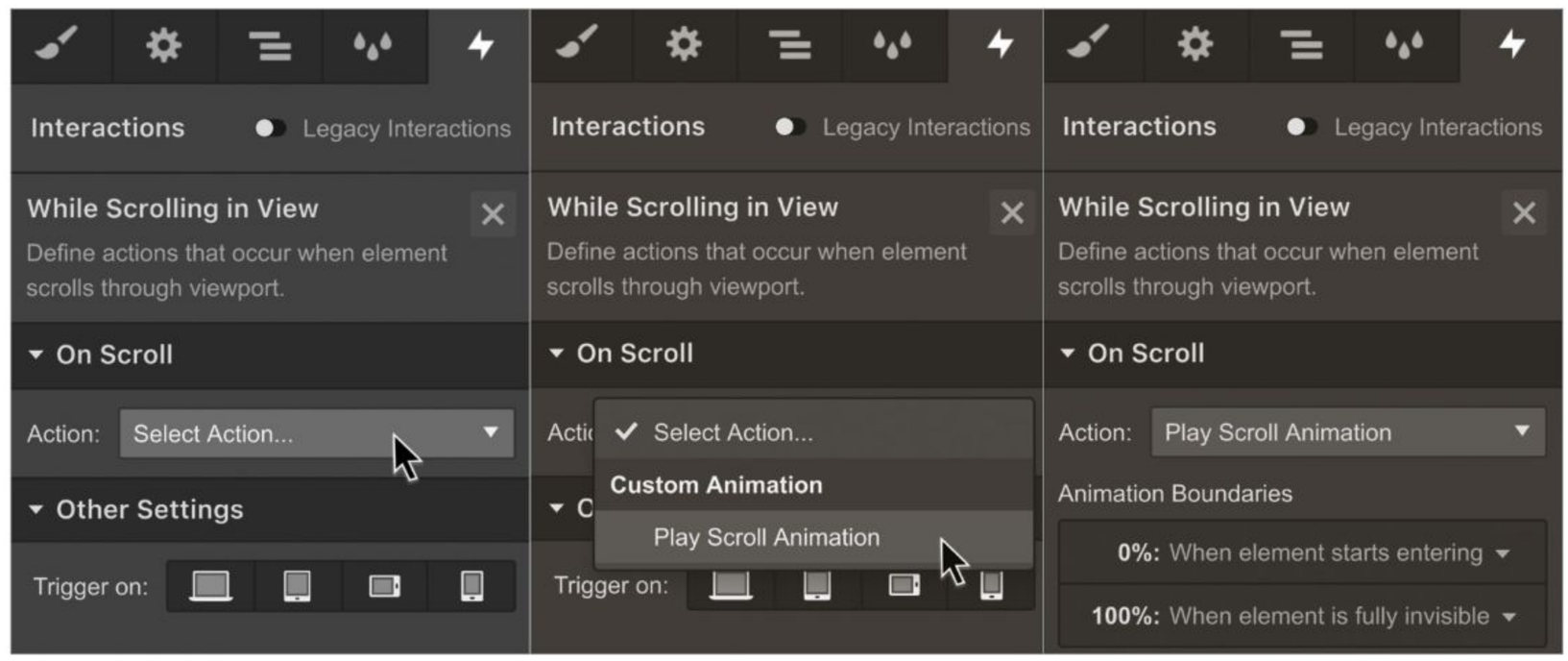
10 Defining your aim can help you identify the actions that you need to set. The aim at this point is to move the images at various speeds. Those in the front should appear to be moving faster than those in the back as you scroll through the section. So, you'll be creating a scroll action of Move for each image. Then, set the position of each image on the y-axis at the beginning and end of the animation.

CREATE THE SCROLL ANIMATION

11 Before creating the animation, let's talk about smoothing. Smoothing, or damping, softens and smooths out the approaching velocity towards the correct position on the animation timeline. You can adjust the value of smoothing under Scroll Animations. For this tutorial, you can leave it at 50%. Now, create a new Scroll Action and then rename it to Parallax Scroll Effect.

PERFORM A MOVE ACTION

12 Select the image that has the highest z-index and appears to be the closest to your viewpoint. Add a scroll action of Move to alter how the image moves during the animation. Two keyframes or instances of the image are added to the animation timeline. One is set at 0% – the beginning of the animation; and one at 100% – the end of the animation.



Step 9 Decide when an animation begins and ends

SET AN INITIAL POSITION

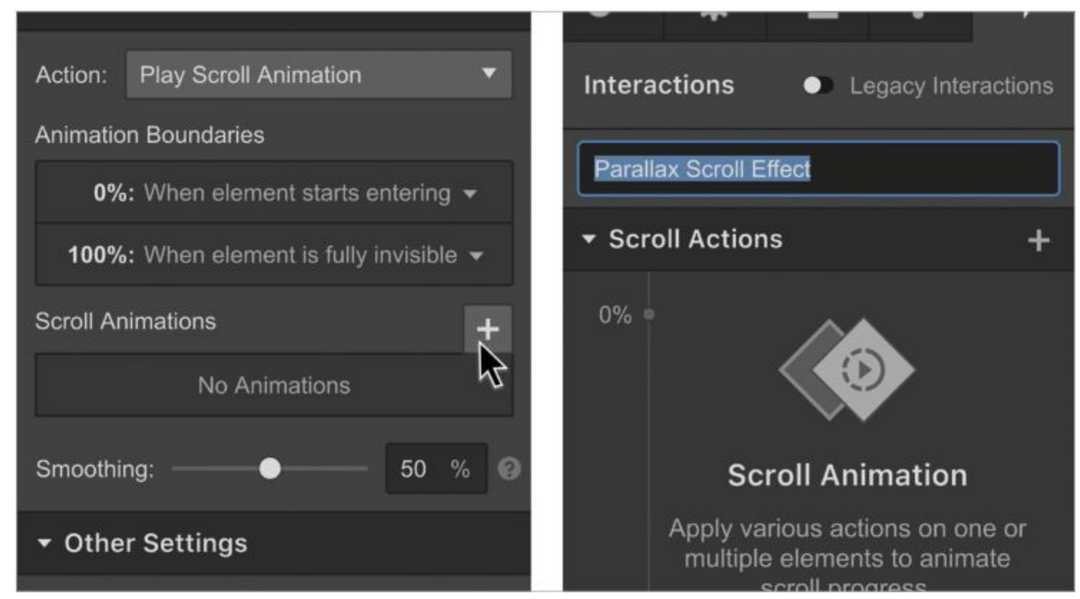
13 Select the first keyframe at 0%. In the Move transform settings, move the image down by setting its position on the Y-axis to 1000px. This will be the position of the image as the section first scrolls into view.

ESTABLISH A FINAL POSITION

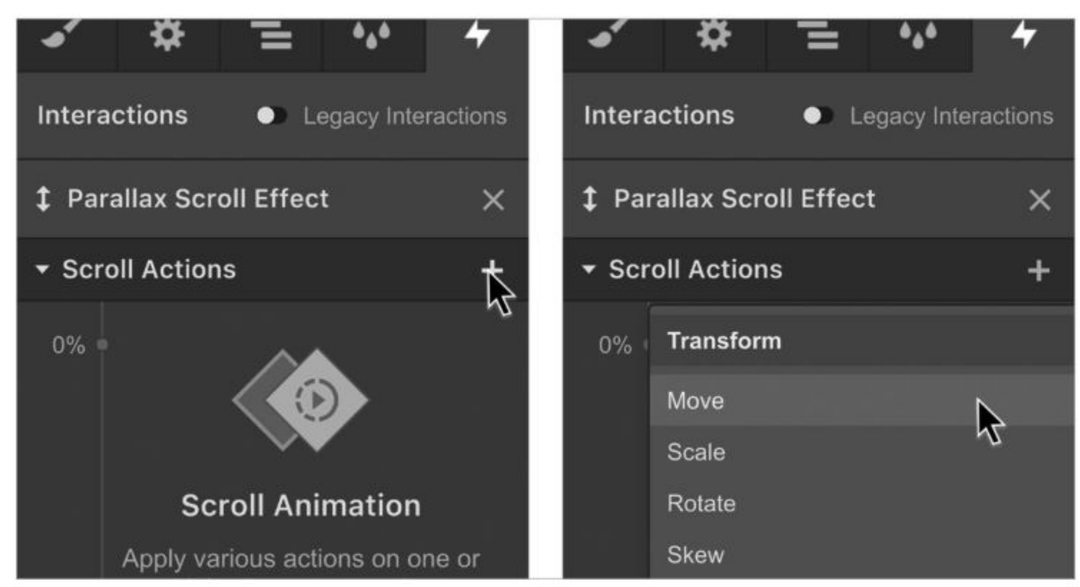
14 Select the second keyframe in the animation timeline, and move the image up by setting its position on the y-axis to -1000px. This will be the position of the image as the section scrolls out of view.

GET READY FOR A SECOND ACTION

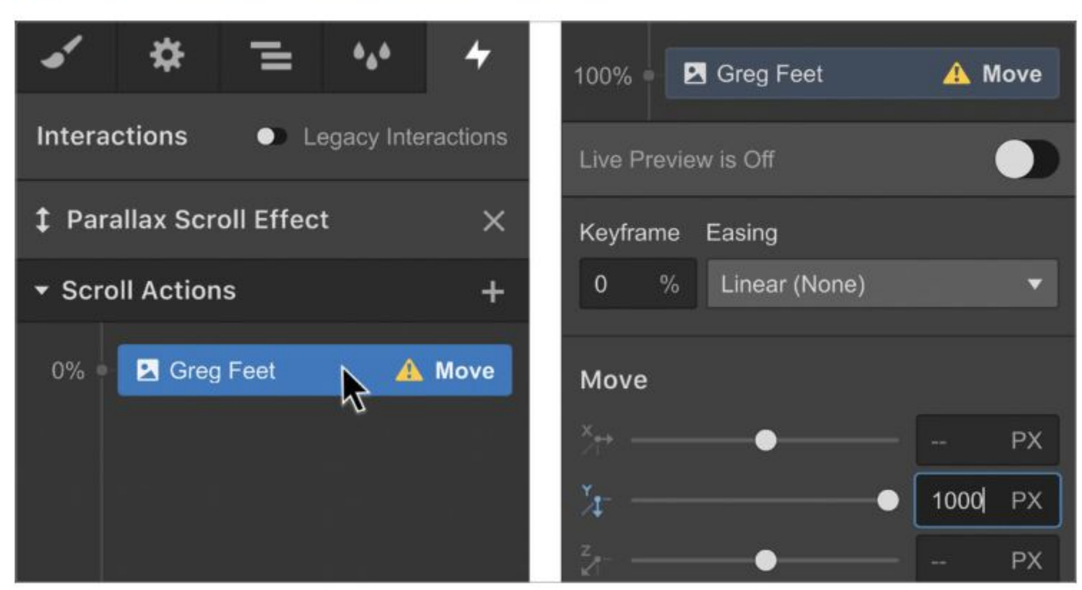
15 Select the image that has the lowest z-index and appears to be positioned way in the back of the section. Add a scroll action of Move. Two new keyframes are added to the animation timeline for this new image, one at 0% and another at 100%.



Step 11 Smooth out the animation; try something other than the default



Step 12 Select Move to affect how an image moves



Step 13 With the scroll action selected it's time to select the first keyframe

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Step 14 Select the final keyframe and how it animates

DEFINE THE INITIAL POSITION

16 Select the keyframe at 0% for this new image. In the Move transform settings, move the image up by setting its position on the Y-axis to -352px. This image will start moving from this position as the section scrolls into view.

SET THE FINAL POSITION

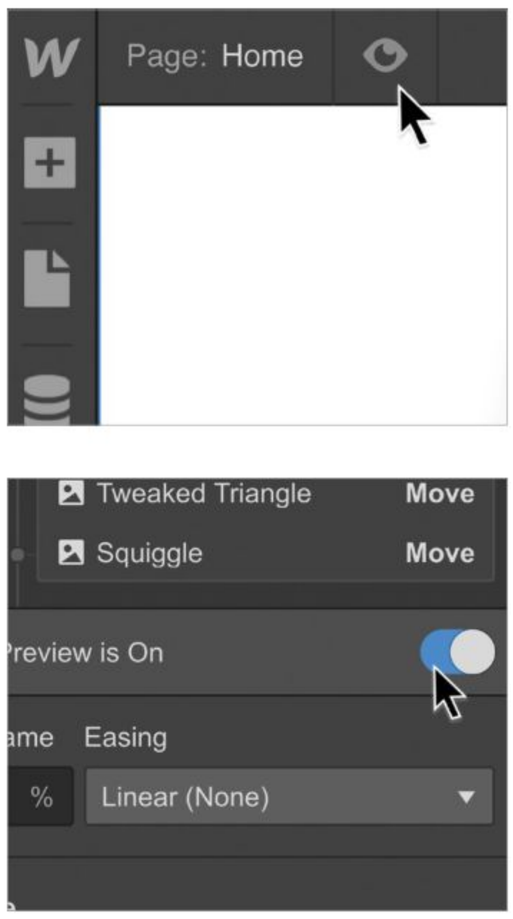
17 Select the keyframe at 100% for the same image, and set the position on the Y-axis to 352px. This image will travel down to this position as you scroll down the page. If you've changed the Easing setting for the previous actions, make sure you set the same Easing on all actions.

BRING IN A THIRD ANIMATION

18 Select another image in the foreground. Add a scroll action of Move. For the first keyframe, move it down. Set a Value of 300px. For the second keyframe, move the image up. Now set a Value like -500px. This will make the image travel a distance of 800px, which is slower than the closest image and faster than the farthest one.

PREVIEW THE ANIMATION

19 Preview the animation in preview mode of the Designer or live on the canvas by toggling Live Preview on. Now the parallax effect is more pronounced, and you've created what appears like another level of depth in this animation. Make adjustments to the positions or easing to achieve the desired result.



Step 19 Switch on one of the preview options to see the animation in action

ADD MORE ANIMATIONS

20 Continue adding scroll actions to each of the images you want to animate during this scroll animation sequence. Make sure you follow this logical pattern to create a good parallax scrolling animation: elements in the front (those with higher z-index) appear to be moving at a faster rate than those in the back (those with lower z-index).

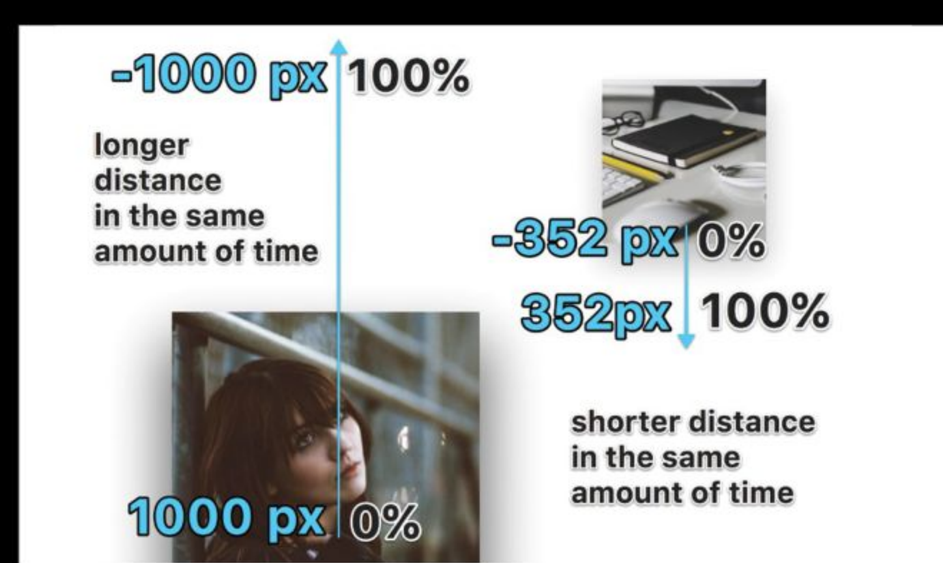
TURN OFF FOR DEVICES

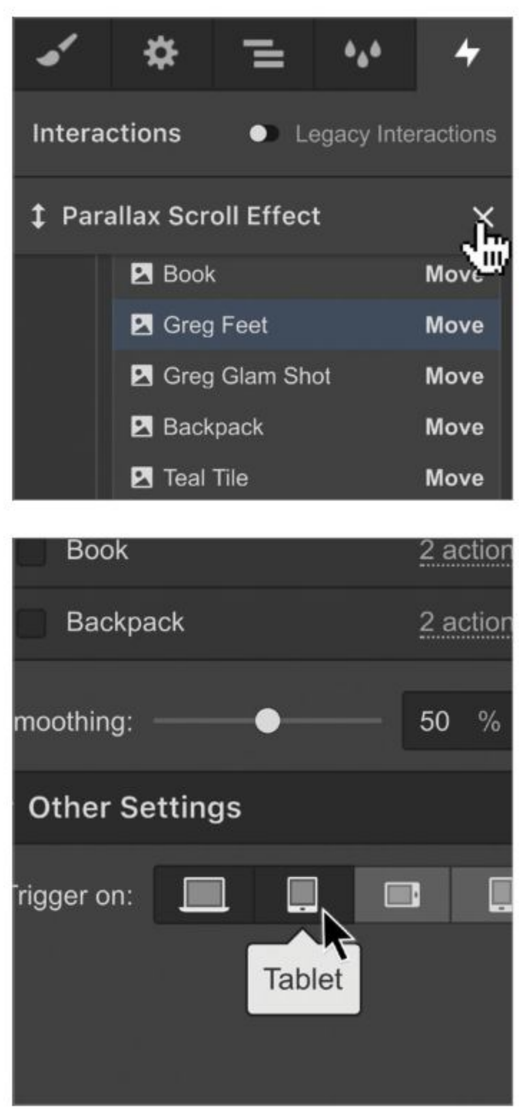
21 You can choose to turn off this animation on mobile devices. Close the animation timeline by clicking on the X next to Parallax Scroll Effect. Then under Other Settings, toggle off the devices that you don't want this interaction to be triggered.

IMAGES

SPEED OF MOTION

When you're setting the position of the images on the y-axis, you're also setting the speed of motion. That's because as you scroll through the section, the first image travels from y-position of 1000px to y-position of -1000px – a distance of 2000px. The second image travels a shorter distance of 704px as it moves from a y-position of -352px to a y-position of 352px. So it appears there are three planes or levels of depth in that section: the first level, in which the image appears closer and also to be moving faster; the second, where almost all the other images appear to move at a normal rate; and the third, in which the image appears farther back, and to be moving at a much slower rate.





Step 21 Use the Other Settings area to define the devices the effect works on

EXPERT TIP

LIVE PREVIEW

Turn on Live Preview to see the effect as you scroll the canvas. The image appears to move at a faster rate, which gives us that parallax effect because the image also appears closer to us.

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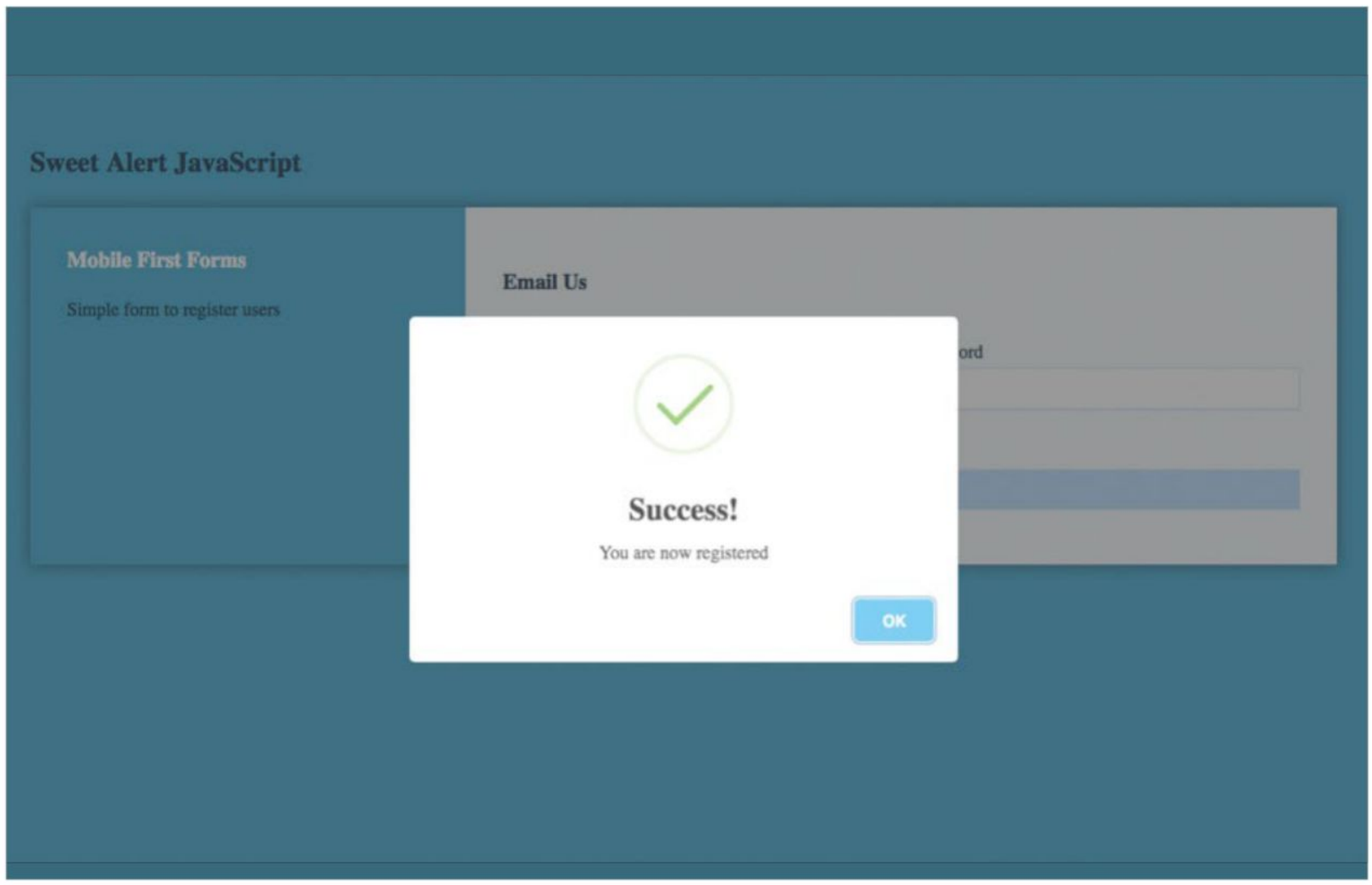
ABOUT THE AUTHOR
FRANCIS KAGUMBA

w: *behance.net/Studio_Eight*
t: @fkagfrancis
job: Freelance tech writer and front-end designer
areas of expertise: HTML5, JavaScript, CSS and WordPress CMS



* SWEETALERT.JS

CUSTOMISE DIALOG BOXES WITH SWEETALERT

Francis Kagumba reveals the basics of using SweetAlert, a standalone JavaScript library that provides a consistent UI feel for your dialog boxes

Whether you are starting out as a JavaScript developer, or have been using the language for some time now, you would no doubt agree that one area that breaks the consistency of your user interface is the traditional JavaScript dialog box. While dialog boxes enable user interactivity across different browsers using either the alert ( ), prompt ( ) or confirm ( ) functions, they are somewhat unappealing and inflexible, let alone breaking away from the UI/UX of your website.

One approach to solving this problem that has gained in popularity is the use of SweetAlert JavaScript library. The library, which is developed using CSS and JavaScript, comes in as a replacement for the traditional JavaScript dialogs and modal windows. It's easy to use, wonderfully simple to learn, and transforms boring traditional dialogs into attractive modal windows that appeal to your users even further.

In this tutorial, we will go through the basics of installing and using the library, and then proceed to create a simple web registration form that employs SweetAlert to inform users of their different actions on the website. We will use the library to demonstrate how we can alert a notification to the user, prompt the user for feedback, and confirm their different actions. We will be using Brackets editor to code the tutorial, however you are free to use an alternative. For the browser, we are using Google Chrome but you are not limited to the same.

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SETTING UP

01 Kick things off by creating a new folder, called SweetAlert, on your desktop. Open your code editor and create two new files: index.html and style.css. Save these in the folder. At this phase, the files are blank.

CREATE THE FORM HEAD

02 Open index.html and begin by defining the HTML structure. First we define the head section, which contains meta content to inform web pages that our form will be responsive.

```
<html lang="en">
  <head>
    <meta charset="utf-8">
    <meta name="viewport" content="width=device-width", initial-scale=1.0>
    <meta http-equiv="x-ua-compatible" content="ie=edge">
    <title> Sweet Alert Form </title>
    <link rel="stylesheet" href="style.css" href="//fonts.googleapis.com/css?family=Roboto">
  </head>
```

ESTABLISH THE BODY OF THE FORM

03 In the body section, we will define three divs. This is because we want the information describing the form and the form itself to be wrapped in a container. The main div is named 'container' while the div describing the form is named 'form-info'. The div containing the form is named 'contact'. This sets up a simple-looking form.

STYLE THE FORM BODY AND ALL ELEMENTS

04 Now that we have the form in place, open the styles.css file. This is where we will define CSS styles for the different divs and classes. Add this code snippet to the head section to define the location of our CSS file and font we are using in the project:

```
<link rel="stylesheet" href="style.
css" href="//fonts.googleapis.
com/css?family=Roboto">
```

Define the styles for the body and all elements in the page.

```
*{
  box-sizing: border-box;
}
body {
  background: #67BCDB;
  color: #485e74;
  line-height: 1.6;
  padding: 1em;
}
```

border-box informs that all elements have padding and border included in their width and height. The body styles define background colour, text colour, line height and padding respectively.

ADD STYLE TO THE FORM DIVS

05 Now it's time to define styles for the different divs:

```
.container{
  max-width: 1170px;
  margin-left: auto;
  margin-right: auto;
  padding: 1em;
}
```

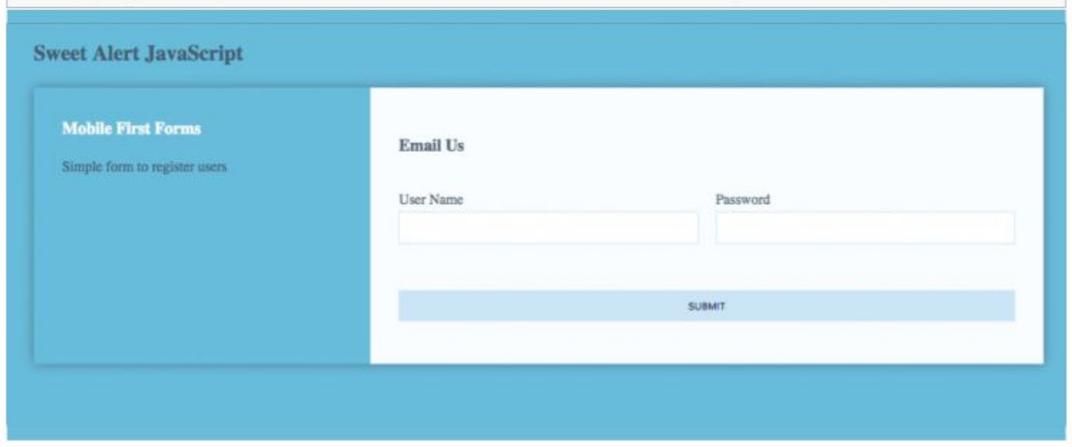
It's easy to use, simple to learn, and transforms boring traditional dialogs into attractive modal windows

```
9     <body>
10    <div class="container">
11            <h2 class="brand">Sweet Alert JavaScript </h2>
12            <div class ="wrapper">
13                <div class="form-info">
14                    <h3>Mobile First Forms</h3>
15                    <p>
16                        Simple form to register users
17                    </p>
18                </div>
19
20                <div class="contact">
21
22                    <h3> Email Us </h3>
23                    <form>
24
25                        <p>
26                            <label>User Name</label>
27                            <input type="text" name="name" id="name">
28                        </p>
29
30                        <p>
31                            <label>Password</label>
32                            <input type="password" name="password" id="pass">
33                        </p>
34                        <p class="full">
35                            <button>Submit</button>
36                        </p>
37                    </form>
38                </div>
39            </div>
40        </div>
41    </body>
42
43  </html>
```

Step 3 Defining these three divs sets up a simple looking form

```
55  .contact form {
56      display: grid;
57      grid-template-columns: 1fr 1fr;
58      grid-gap: 20px;
59  }
60  .contact-form label {
61
62      display:block;
63  }
64
65  .contact-form p{
66
67      margin: 0;
68  }
69
70  .contact form .full{
71
72      grid-column: 1/3;
73  }
74
75  .contact form button, .contact form input{
76
77      width: 100%;
78      padding: 1em;
79      border: 1px solid #c9e6ff;
80  }
81
82  .contact form button {
83
84      background: #c9e6ff;
85      border: 0;
86      text-transform: uppercase;
87  }
```

```
89  /* LARGE SCREENS */
90
91  @media(min-width:700px){
92
93      .wrapper{
94
95          display: grid;
96          grid-template-columns: 1fr 2fr;
97      }
98
99      .wrapper > *{
100
101         padding: 2em;
102
103     }
104     .form-info h3, .brand{
105
106         text-align: left;
107     }
108 }
```



Step 5 The style sets CSS grids for the contact form in addition to styling its input elements

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The style sets the maximum width of the main container to 1170px while margins are set to auto.

```
.wrapper{
  box-shadow: 0 0 20px 0 rgba(72, 94, 116, 0.7); }
.wrapper > *{
  padding: 1em;
}
```

The style sets a box-shadow for the wrapper container, while also setting padding for all other elements apart from it.

The style sets css grids for the contact form in addition to styling its input elements.

Finally, we add a code snippet to ensure the form is responsive on screens larger than 700px.

After this styling, your form should look as it does in image 5.

INSTALL THE SWEETALERT LIBRARY

06 There are two alternatives to installing the library. First is through bower, where you type the following command:

```
bower install sweetalert
```

Or if you have npm, type in the following command:

```
npm install sweetalert
```

This option installs SweetAlert files to your project in either node modules or bower components.

The second alternative, which we will be using, involves manually downloading the library from the GitHub repository: *https://github.com/t4t5/sweetalert*. Scroll to the Clone or Download section and click the Download Zip option to download your files to your local machine. Extract the files and navigate to the docs/assets/sweetalert folder. Copy sweetalert.min.js file.

Create a new folder in your SweetAlert folder, and name it js. Paste sweetalert.min.js file here.

Add this code snippet in the head section of your code, directly after the title.

```
<script type="text/javascript" src="js/sweetalert.min.js"></script>
```

The library is now ready to use.

USE SWEETALERT TO ALERT THE USER THAT THE FORM IS BLANK

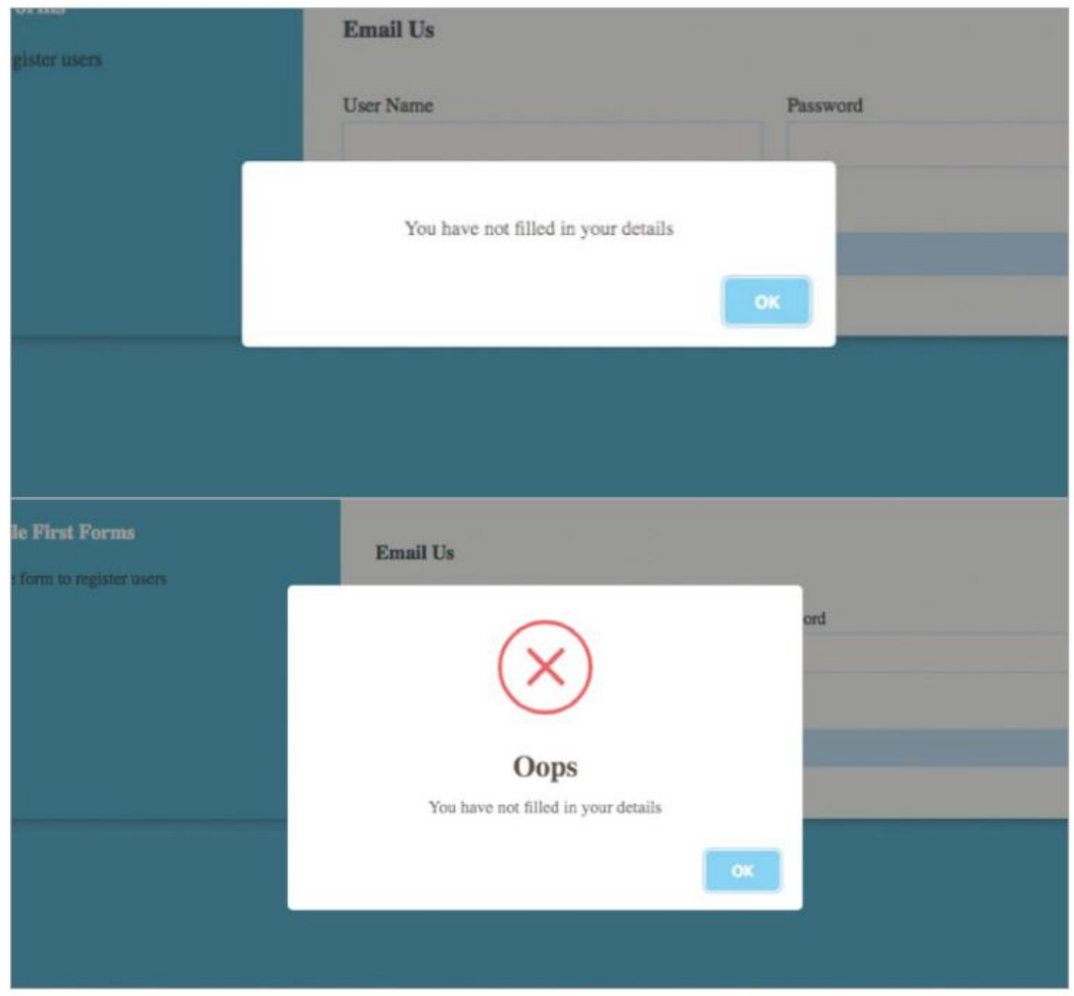
07 An aspect that we would like to inform users about is if the form is left blank but an attempt is made to submit the form. In such a scenario, we use SweetAlert to alert them to the problem.

To do this, create a JavaScript function in the body section enclosed by script tags. The function will check whether the input fields are blank, in which case it will alert the user. The function is as follows:

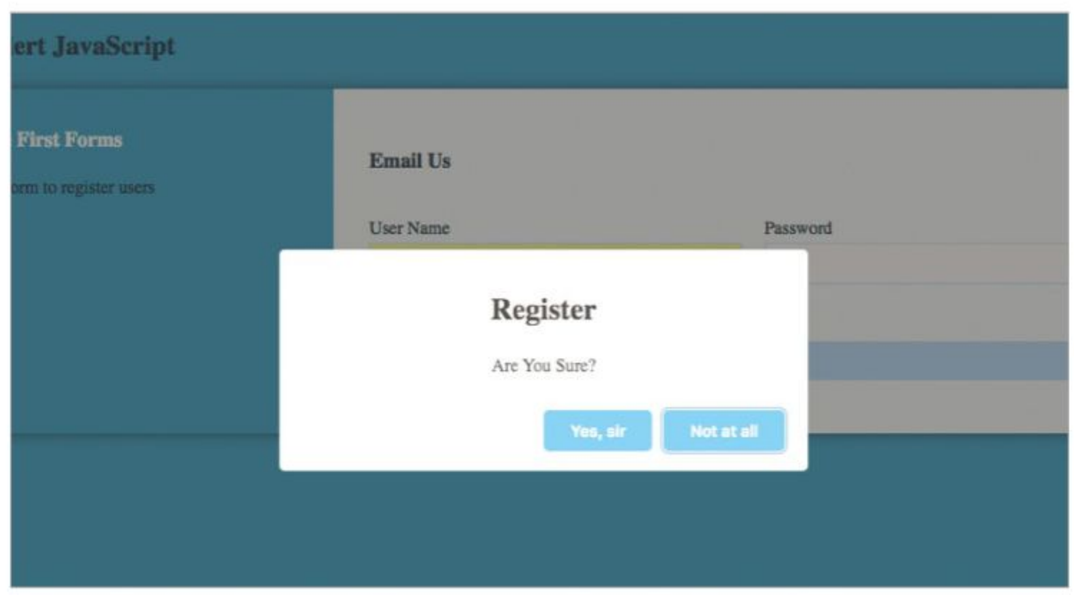
```
<script>
function validation ()
{
  var name = document.getElementById('name').value;
  var pass = document.getElementById('pass').value;
  if ((name ="") && (pass == "") )
    {
      swal ("You have not filled in your details");
      return false;
    }
}
</script>
```

SweetAlert provides both a short and long procedure of alerting users. In its most basic use, we pass the error message 'You have not filled in your details' to the SweetAlert function swal, thereby alerting the short message to the user as shown in image 7.

However, it also provides a longer method where we pass three arguments (title, text and type) to the swal function as shown below.



Step 7 This approach enables you to customise the look and feel of your messages



Step 8 This step enables users to confirm their details by either clicking 'yes' or 'no'

```
swal (title, text, type)
```

This approach enables you to customise the look and feel of your messages. In the example, we change it to appear as follows:

```
<script>
function validation ()
{
  var name = document.getElementById('name').value;
  var pass = document.getElementById('pass').value;
  if ((name ="") && (pass == "") )
    {
      swal ("Oops", "You have not filled in your details","error");
      return false;
    }
}
</script>
```

In the second option, we now have an icon, a title and the text (also seen in image 7). These three arguments can be customised further to your own preferences.

SET UP SWEETALERT TO ENABLE THE USER TO CONFIRM BEFORE SENDING DATA

08 In the second step, we want users to confirm their details before registering by either

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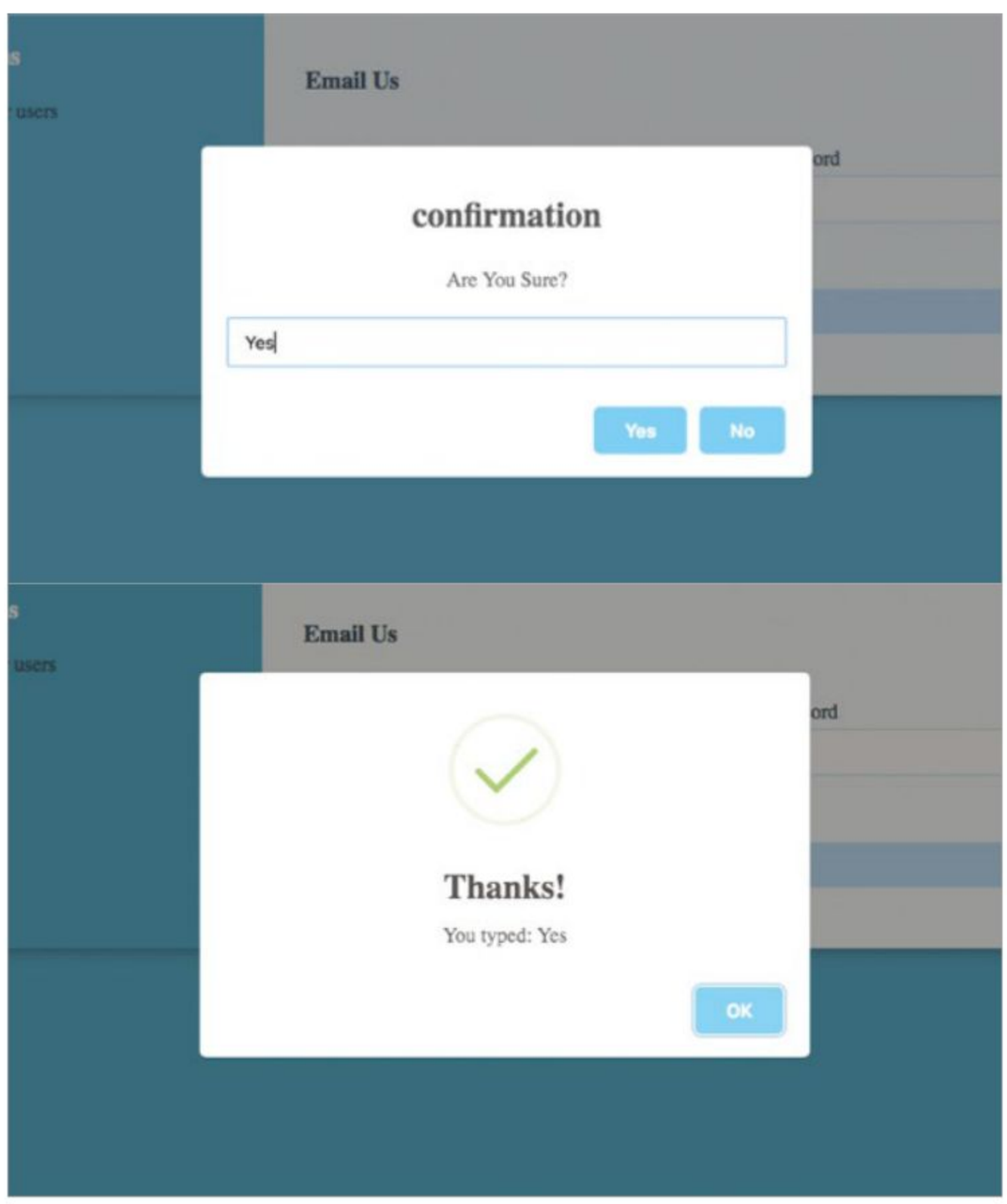

Step 9 Requesting users to type yes to register via the prompt dialog

clicking 'yes' or 'no'. Replace the if code with the following:

```
if ((name != "") && (pass != "") )
  {
    swal({
      title:"Register",
      text "Are You Sure?",
      buttons: {
      confirmButtonText: 'Yes',
      cancelButtonText: 'No'
        }
      });
    return false;
}
```

The result appears as in image 8. Notice that we left out the type argument, hence the missing icon.

USE SWEETALERT TO COLLECT USER INPUT

09 In the final step, we want to collect input from users via the prompt dialog. Suppose we want to request the users actually type yes in order to register their details? In such a scenario, replace the if code with the following:

```
if ((name != "") && (pass != "") )
  {
    swal({
      title:"confirmation",
      text: "Are You Sure?",
      content: "input",
      buttons: {
      confirmButtonText: 'Yes',
      cancelButtonText: 'No'
        }
      }).then( val => {
      if(val) {
      swal({
        title: "Thanks!",
        text: "You typed: " + val,
        icon: "success"
        });
        }
      });
    return false;
  }
}
```

The result appears as in image 9 (top); after entering the yes option, the dialog appears as in 9 (bottom).

TIPS

Theme your dialog boxes

SweetAlert is packed with theme effects that you can use to make your pop-ups more appealing. These range from generating colour overlays over the main page to create contrast with the popups, to customising the header, footer or the main message in order to pass your message more distinctly. What follows is a simple example where you can create a green overlay for your pop-up dialog.

In such instances, the developer can set up danger mode on confirm dialogs, an action that turns the confirm button red and shifts focus to the cancel option. Such an option is handy when preventing users from deleting images in the website.

To activate the option, simply set dangerMode variable to true in the swal function. Read more here: *https://sweetalert.js.org/docs/#configuration.*

Set up timers for your dialogs

Sometimes, you may require to set up timers for your confirm and alert dialogs to avoid burdening the user too much. In such instances, the dialog disappears as soon as the time you have set is exhausted, unlike in scenarios where the user has to manually click on the dialog to close it.

To set up a timer, simply create the timer variable and set time in milliseconds for the dialog life. In the swal function, simply add the following variable:

```
swal ("Are you sure?", {
                timer: 3000,
});
```

Read more here *https://sweetalert.js.org/docs/#configuration.*

SweetAlert comes packed with cool theme effects that you can use to make your pop-ups more appealing

While maintaining our code from the main tutorial, add the following css style to the styles.css file. This makes a call to the overlay style while passing the RGB colour code.

```
. swal-overlay {
        background-color:
rgba(43, 165, 137, 0.45); }
Read more on the different
effects HYPERLINK "https://
sweetalert.js.org/docs/" \l
"theming"here
```

Set up Danger Mode in your dialogs

Although it is important to enable users to make their own choices while interacting with the website, unfortunately there are times where their actions can be detrimental, especially when they choose the wrong actions. For instance, a user might delete images from the website, despite a pop-up dialog being generated to warn them.

CONCLUSION

It's hoped that you will easily pick up the library and begin using it in your front-end projects. The library is easy to use and learn, and significantly transforms your projects. Indeed, there's no reason why you shouldn't be using it.

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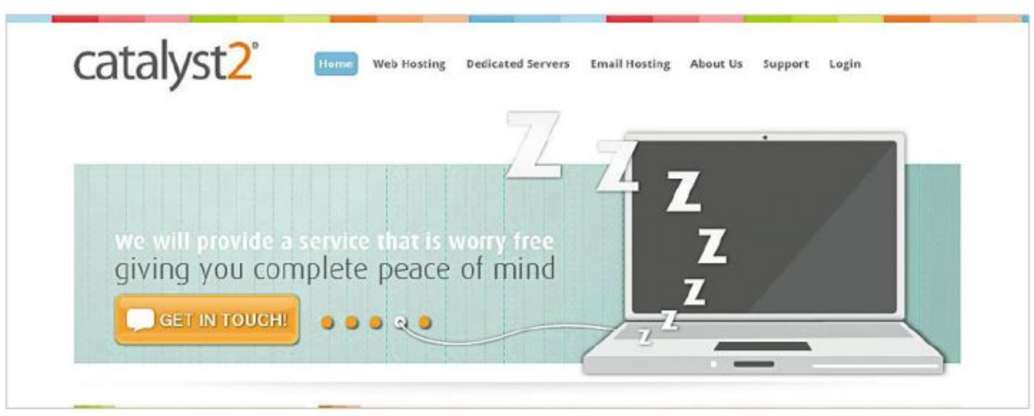

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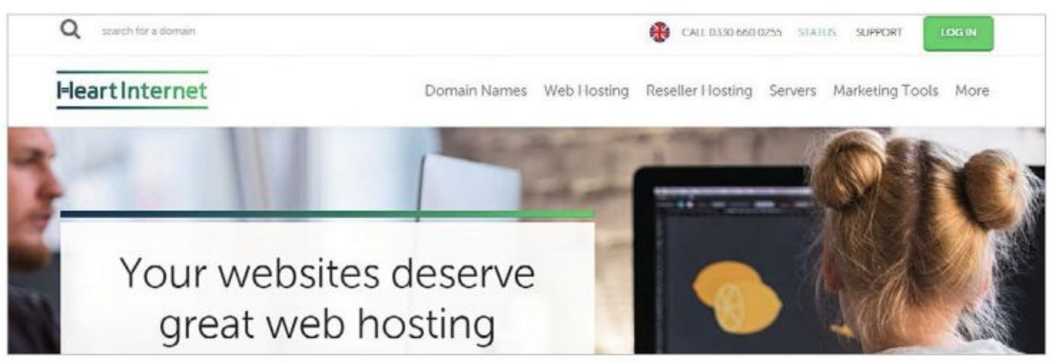

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*ACCESSIBILITY

ACCESSIBILITY IN MIND

Carl Cahill asks: at what point does web accessibility become something you care about and how far do you go to make sure you cater for it?

Web accessibility is something you know we should be acknowledging. In the UK, it is reported there are over 11 million people with recorded disabilities and many require assistive technologies to help perceive content. There should be no excuse for not thinking about accessibility. But I bet you won't be surprised to hear there are a lot of websites out there that suffer with poor accessibility.

It's easy to say that you should be thinking about web accessibility right from the start but with every project, there are plenty of things to be doing first. The best opportunity to start thinking about accessibility is when you're writing copy and deciding on the architecture of your site.

This is because 29% of users that require assistive technologies use screen readers and are dependant on voice-controlled programs to help deliver content. So when structuring content, read it aloud and make sure it flows without any visual enhancement.

It even pays to think what a machine might make of your content. We all know home devices are paving the way for voice control over smart-home technologies but these devices are also amazing for people with disabilities.

In terms of design, there might be a more obvious task where accessibility needs to be addressed. When designing a site, there are useful rules to follow when accommodating great web accessibility. Mostly it's all about the visual accessibility of your project and being aware of things like font sizes, contrasting colours and navigational elements. Screen magnifiers make up 30% of used assistive technologies, so scale and readability are important.

The W3C and the Web Accessibility guide (WCAG 2.0) propose four key principles to be aware of:

1. Perceivable
Information and user-interface components must be presentable to users in ways they can perceive.

2. Operable
The user interface components and navigation must be operable.

3. Understandable
Information and the operation of user interface must be understandable.

4. Robust
Content must be robust enough that it can be interpreted reliably by a wide variety of user agents, including assistive technologies.

Always think about these principles and run your site through accessibility tests. Use the assistive technologies and you could also try using your site without a mouse or trackpad.

*PROFILE
Carl Cahill is a UX and UI creative for brands, awarded Creative of the Year and with over 10 years experience.
Follow him @carl_cahill.

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