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net

Issue 292 : may 2017 : net.creativebloq.com

MASTER MOBILE DESIGN

Revealed: The golden rules of great mobile UX

15 WEB APIs YOU'VE NEVER HEARD OF

The APIs still in beta set to revolutionise the web

*FEATURE

PLUS! TOP TUTORIALS

- Bootstrap 4 masterclass
- Build serverless apps
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Future



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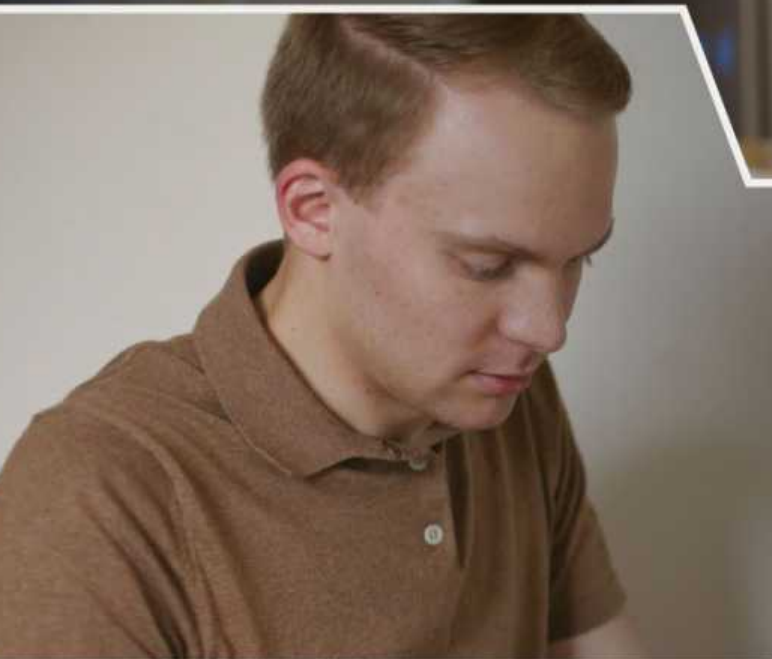
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* WELCOME

EDITOR'S NOTE

➤ Welcome to issue 292 of **net** magazine, brought to you from its brand-new home in Bournemouth on the UK's south coast. Bournemouth has the fastest-growing digital economy in the UK, and so it seems like a match made in heaven with the world's favourite web design publication.

A big thanks to Ruth Hamilton for looking after the mag for the last few issues, and making sure the handover to our new team went as smoothly as possible. We'll strive to continue the brilliant work by making every issue of **net** the best it can be. We'll seek only the essential topics and be sure to commission experts at the top of their field. Long may **net** magazine be the voice of web design.

And with that in mind, issue 292 is packed with all the good stuff you've come to expect. Our cover feature, Master Mobile Design, reveals the golden rules behind great mobile UX (page 68). Software developer Nick Babich's must-read guide explains how to create great mobile apps. We're also showcasing 15 web APIs still in beta set to revolutionise the web (page 76) and giving you 26 pages of expert tutorials, including a brilliant guide to writing superfast CSS. Hopefully you'll enjoy the issue as much as we enjoyed putting it together.

Philip Morris, Editor
@philipmorris8

FEATURED AUTHORS

NICK BABICH



In this month's cover feature, Nick, a software developer with a love of all things UX, reveals his top tips for creating great mobile content. Head to page 68 to get started

w: babich.biz
t: @101babich

PHILIP ACKERMANN



We tasked Philip with investigating web APIs you've never heard of. They're still in beta but head to page 76 to discover why they will change web design forever

w: philipackermann.de
t: @cleancoderocker

JEREMY WAGNER



The CSS you write can quickly get bloated. Turn to page 98 to see Jeremy's guide to getting superfast CSS and improving your page-rendering speeds

w: jeremywagner.me
t: @malchata

MAX IGNATYEV



Max is the CTO and founder of Symply so who better to show us around the new design collaboration tool. Check out why it's so good over on page 90

w: symply.io
t: @maksimignatyev



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NEXT ISSUE ON SALE 20 APRIL 2017

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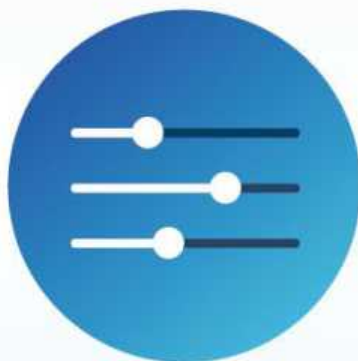


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Turn to page 22 to find out more about
the savings on offer for subscribers

Nagano

*REGULAR

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> **Senongo Akpem** runs down his favourite new sites, including a classic typography effort from Stupid Studio



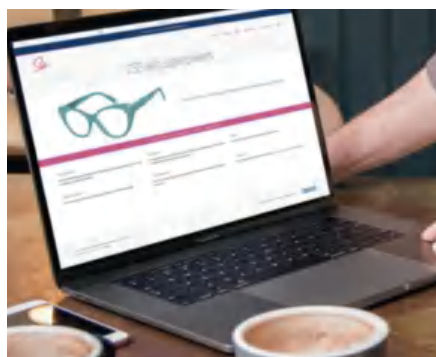
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BEHIND THE ILLUSTRATION

Often in illustration we are asked to visualise the abstract... whether it's a feeling, a far away future or a new concept. This month's commission was no different – how best to communicate the 15 modern APIs we need to keep an eye on? The idea came very quickly to me but required a little fleshing out.

What if there was a technological crystal ball that allowed us to see into the future? What if it cut through all the noise and showed us the essential tools that we *will* need, without having to sift through all the stuff we don't. I love testing myself with new illustrative styles and this piece is no different. I wanted to keep the look and feel very flat and geometric, whilst adding a sense of depth

with simple hatching and gradient fills. The crystal ball is a combination of built-up layers and a simple gradient mesh. And the enclosed isometric cube was used as a way of marrying together the background elements with the foreground whilst also tackling the tricky idea of visualising APIs. The mechanism inside the ball's base hints at something more than magic and the cabling running to the article's title aim to show the reader that **net** magazine knows exactly what you need.

Lastly, I wanted the colours to feel very primary and to pop off the dark background. I really wanted the ball to draw the eye of the reader and to get them asking questions

– questions that the article undoubtedly answers.

Marcus Faint, Bath, UK



AGENCY vs IN-HOUSE

After working in agencies for years I recently chose to move to an in-house role. My main reasons were to have a stronger focus on quality of work and working towards the best results for the business, regardless of time or budget.

Whilst I found agency work full of variety, the level of quality for the project deliverable is ultimately, understandably, determined by timeframes and client budgets. This means the quality of the work is sometimes compromised and

isn't always the best or the most fit for purpose. Further to this, agency projects are often shorter term where revisiting projects is less likely. This can mean more emphasis is placed on project turnaround, instead of quality or scalability. This can be the case for both design and development.

@ashconnolly

net: This is brilliantly put, Ash. It's a fine balance to find, but there are positives to both sides. Good luck!

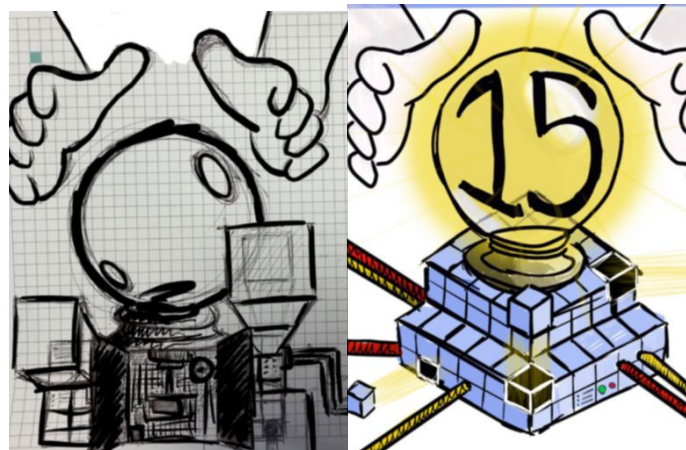


GAME-CHANGING DEVELOPMENTS

net: While Java still is, and probably will remain, a staple technology, it now faces more competition than ever. We looked at four of the most game-changing developments in tech at [netm.ag/bloq-292](#) and here's one comment and a blog that we found a really interesting read. Thanks for sharing with us, Stephen!

I think the rise of AI will fundamentally change the customer-service industry in the next few years. I have written an article on this subject that people might find of interest: [netm.ag/AI-292](#).

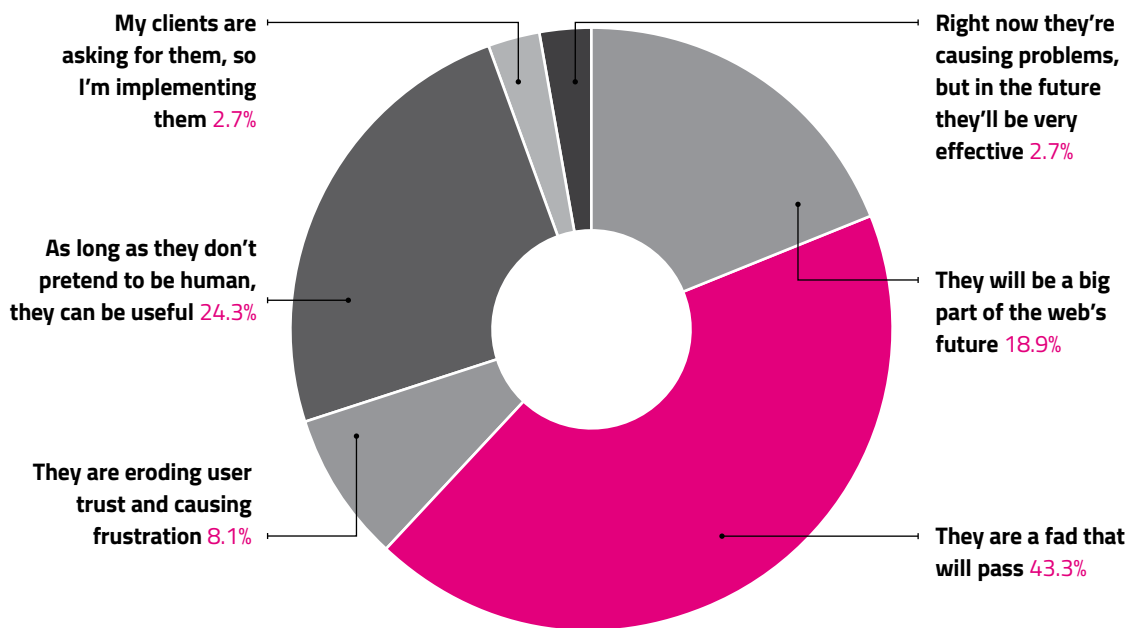
Stephen Garside



Work in progress Here's a behind-the-scenes look at how Marcus Faint went about creating his first **net** magazine illustration

*THE POLL

WHICH STATEMENT BEST DESCRIBES YOUR THOUGHTS ON CHATBOTS?



From our timeline

What's the longest coding session you've ever had to do?



8am till 4pm the next day. Few hour breaks in between. At that point I decided major last minute changes are no longer tolerated.
@LuckGary



Last minute University Final Year Project, 48 hours of PHP.
@caroseuk



2 straight days on a QA team making sure domain registration

processes worked across reseller sites. Horrible.
@woodss



30+ hours to get 3rd year group project done. Eating hot cross buns in the corridor (no food or drink in the labs) at 4am for fuel.
@kwilson81



26 hours pushing, testing and finishing a site for a well known UK holiday firm. Many last minute

"changes". #badtimes
#agencywork
@siphilp



7yrs ago a freelancer didn't deliver. Built the app from scratch in 18 hrs straight. At the time it didn't seem as mad as it does now.
@JimTattersall



Finishing the final part of a project after pulling a 100+ hour week on top of a pallet of dog food.
@ibuilddigital



56 straight hours. Done without any energy drinks or caffeine.
@shanemielke

COOL STUFF WE LEARNED THIS MONTH

LOSSLESS WEB

NAVIGATION WITH TRAILS



A team at Mozilla are working on a project to evolve the model of tabbed browsing into something that preserves information about how you got from one page to the next via a 'trail'. The aim is to make the browser into a tool that "enhances our cognitive process, rather than increasing our cognitive load."
netm.ag/trails-292

DO WE NEED A NEW HEADING ELEMENT?



Jake Archibald discusses the prospect of a <h> element, which would have some benefits around making headings portable within your document. If you've ever wondered why it's so difficult to get such things implemented, this article and discussion provides an interesting insight.
netm.ag/heading-292

WHAT'S AMP?



Episode 248 of ShopTalk Show is all about AMP, the open source web components format and library led by a collective of Google employees. The show explains exactly what AMP is, what it can do for you and a general discussion of whether AMP is a force for good or evil.
netm.ag/show-292

EXCHANGE

Send your questions to netmag@futurenet.com

Practical
advice from
industry experts

THIS MONTH FEATURING...

SURAJ KIKA



Suraj is founder and group CEO of Jadu, a global content management system provider
w: jadu.net

t: [@surajkika](https://twitter.com/surajkika)

SYD LAWRENCE



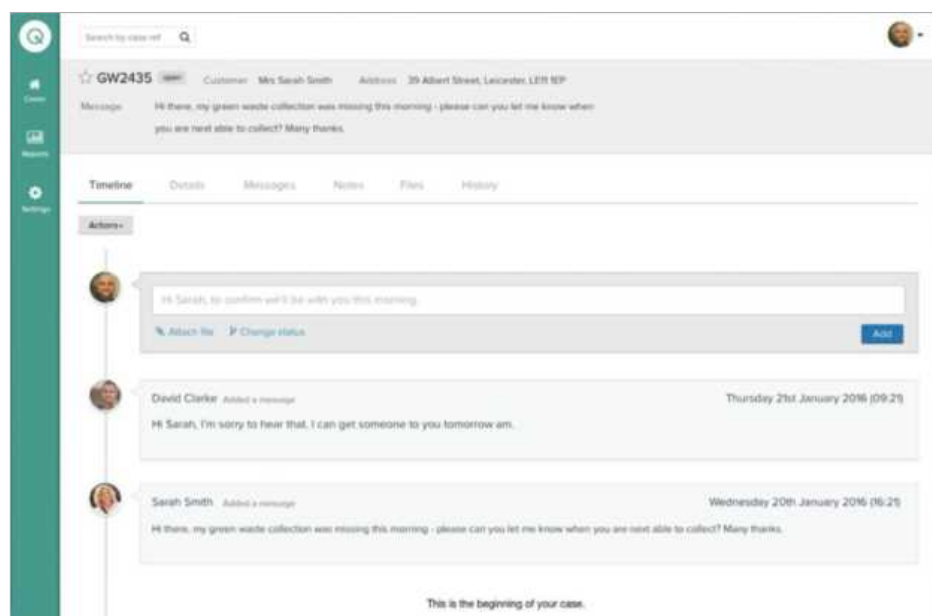
Syd is CEO and co-founder of The Bot Platform, a platform for building bots on Messenger
w: Thebotplatform.com

t: [@sydlawrence](https://twitter.com/sydlawrence)

*QUESTION OF THE MONTH

What do you think the limitations of chatbots will be?

Ben Nipper, Lincoln



Problem solvers Chatbots are useful, but they shouldn't be confused with artificial intelligence, which we're still a long way away from

SL: Even though I'm the CEO and co-founder of The Bot Platform, I'm not a 'hyper'; I don't think we're on the verge of bots taking over. I also don't think we're even at a point where AI is useful in these situations; I believe we're far from a machine passing the Turing test. I'm not saying it will never happen, but we're years away from it. What I will say is that there are some really excellent uses of bots right now – especially messaging bots – whether it's automated responses, simply accessing data or performing tasks. These things are great. But chatting with them? Nah.

CHATBOTS

ARTIFICIAL INTELLIGENCE

Why haven't I seen any good chatbots?

Jane Williamson, Leeds

SL: I'm really pleased you asked

that question. See, here's a common misconception. It seems that the hype is all around AI chatbots. AI is all around intelligence, it's around learning. Do you want a machine to learn by itself?



Templating engine Twig compiles templates down to plain optimised PHP code

Secondly, by ‘chatbot’ do you really want to chat with a bot? I can reel off a long list of successful non-AI bots. The other thing to remember is that as these things are one-to-one private communications, there’s no way to see how they perform without having one yourself.

CMS

TEMPLATING ENGINES

What are your thoughts on best practice around templating?

Simon Bocko, London

SK: Templating is all about enabling designers to work at speed, whilst retaining control of style and structure. At Jadu, now that we continuously release (every two weeks), it’s much easier to accommodate preferred ways of working. Twig, for example, is a great templating engine that’s now natively supported in Jadu and allows true separation of business logic from templates. Use of preprocessors like Sass with BEM methodology has meant designers/developers can be more productive without dulling their creativity. Aside from that, we would advocate HTTPS on everything, a focus on accessibility as best practice and, of course, responsive design now is a global standard.

CHATBOTS

THE RISE OF THE BOT

People used to complain about not speaking to a human on the phone. What’s changed? Why the rise in bots?

Dan Wiseman, London

SL: I don’t think people wanted to speak with a human. They just wanted the quickest and easiest way to solve their problem. An endless menu of press one, two and so on works great if you can solve your problem in the first or second step; otherwise, it’s far easier speaking with a human. But in the same scenario, we’ve been using cash machines for years. I’d much rather use a cash machine than to have to join a queue in the bank to get my money out. We don’t want to speak with a human sometimes. We want to solve a problem/perform a task as quickly and easily as possible.

CMS

CHAT WORKING WITH CMS

Do you think off-the-shelf chatbots are a welcome mass-market CRM solution or an accident waiting to happen?

Simon Bibby, London

SK: Chatbots are great at helping users find answers to questions that you’ve already answered and that’s often the majority of queries that come into a CRM solution. Off-the-shelf chatbots may work here in time, but you can’t beat dealing with a human being for personality and intelligence (at the moment). For us, the mission for Jadu is a combination of CMS, instant chat and CRM, and for that to happen websites need to be intelligent and as automated as they possibly can. Right now, you definitely have to teach AI first and to avoid mishaps, it needs to hand novel problems over to humans. **■**

3 SIMPLE STEPS

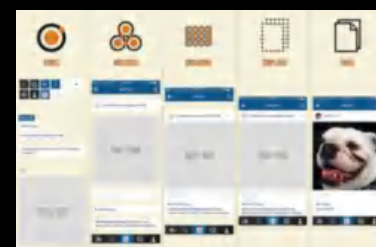
Are there any critical limitations for a designer creating a website for a CMS like Jadu?

Alexandra Lofthouse, Nottingham

SK: Any framework, including a CMS, is going to have a set pattern you need to follow to benefit from its features.

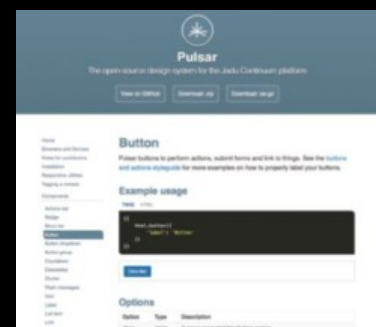
KNOW HOW

+ It’s key to know how to manipulate features in your CMS to enhance the UX. You can make any good CMS work hard for you.



PICK THE RIGHT METHOD

+ Jadu’s out-of-the-box templates follow Atomic design methods (atomicdesign.bradfrost.com), which allows for modular, reusable components.



USE TOOLS

+ Templating engines like Twig (twig.sensiolabs.org) help designers craft beautiful experiences, as do tools like patternlab (patternlab.io). At Jadu, we’ve open sourced our design system Jadu Pulsar for creating UIs; that’s been made possible by tools like Twig.

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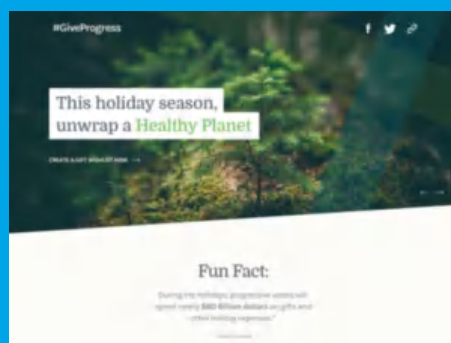
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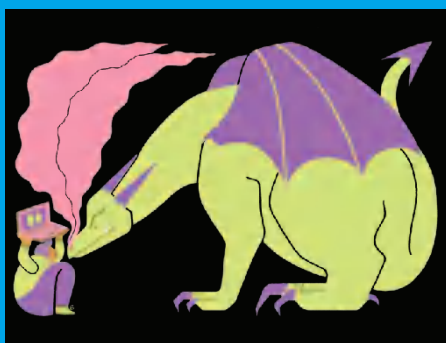
People, projects
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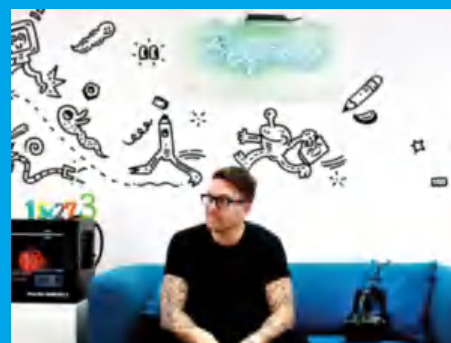
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Inside **Griffin Johnston**'s website that encourages users to donate to charity



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How one free favour resulted in a week of wasted time and effort



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General Manager **Charlie Lyons** shows us around Beyond LDN's creative office space



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Sue Jenkins swaps frontend development for life as an award-winning photographer



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The stuff we want this month, from the newest books to the latest software



EVENT REPORT 21

Eddie Rich soaks up everything the Bristol leg of World IA Day 2017 has to offer



#GIVEPROGRESS

Griffin Johnston's side project encourages the gift of giving and donating to charity

* SIDE PROJECT OF THE MONTH



INFO

job: Freelance designer/
developer

w: griffinjohnston.net

t: @GriffinJohnston

> **net:** In a nutshell, what is #GiveProgress? What inspired the idea?

GJ: Give-progress.org is a website that lets its users create a digital wishlist of high-quality, vetted charitable organisations. They can send these wishlists to friends and family to ask for donations instead of gifts on holidays, birthdays and so on. I came up with the idea after Trump won the election. The holidays were coming up, and I started thinking about all the money that would go into buying gifts, and how that money might be better spent.

net: How did you go about putting it together. Was it a collaborative effort?

GJ: I started by sending out a short survey to friends and colleagues to gauge interest. I got an extremely positive response, and a number of people offered to help in various ways. Having collaborators was crucial to this project, since it let me focus on designing and building the site, while the team wrote press releases, vetted charities and took care of pretty much everything else. Shout outs to Elaine, Eva, Hannah, Mary, Penny, Susan and Susan!

net: Tell us a bit about the design. What kind of look were you going for with the site?

GJ: I had very little time to get something out the

door, so I had to create a design that was attractive but easy to implement. I settled on a flat look with large areas of solid colour, and a focus on fun typography and simple shapes. I think it works pretty well!

net: What technologies did you use to build it?

GJ: I'm using Gulp to pre-compile Handlebars, Sass and good old HTML for the marketing pages. The wishlist portion of the site is built entirely with vanilla ES6 transpiled by Babel. The interaction was simple enough that a library like React seemed unnecessary, and it let me get down to a single 18K JS file for the entire site. Speed matters!

net: Did you have to overcome any big hurdles when putting this together? How did you manage to tackle them?

GJ: The biggest challenge on this project was the extremely short time I had to go from conception to a functioning website (about a week and a half of spare time during a busy work season). I was only able to make this happen with an unhealthy amount of coffee, and huge amounts of help from my amazing volunteer team.

net: How did you drum up interest in the public? Have they responded well?

GJ: We have a zero-dollar marketing budget, so our primary strategy has been organic social media spread and word of mouth. We've gotten a lot of attention from our featured charities tweeting about us. Overall the response has been pretty amazing! Especially considering that it was launched just before the holidays, when many people had already done their gift shopping. 📺



★ HOW TO

BUILD YOUR SKILL SET

If you're intending to take a new step in your career this year, it's a good idea to consider what skills employers are looking for. We asked the @netmag followers what skills they think are in highest demand at the moment.

BUZZWORDS RULE

A few people mentioned UX as a sought-after skill. "Anything with a saleable buzzword attached," said @thepixelgrid. "Being 'good at UX' seems to be a hot-button as companies try to save their bounce rate!" @simonminter agreed, "though it has no real meaning."

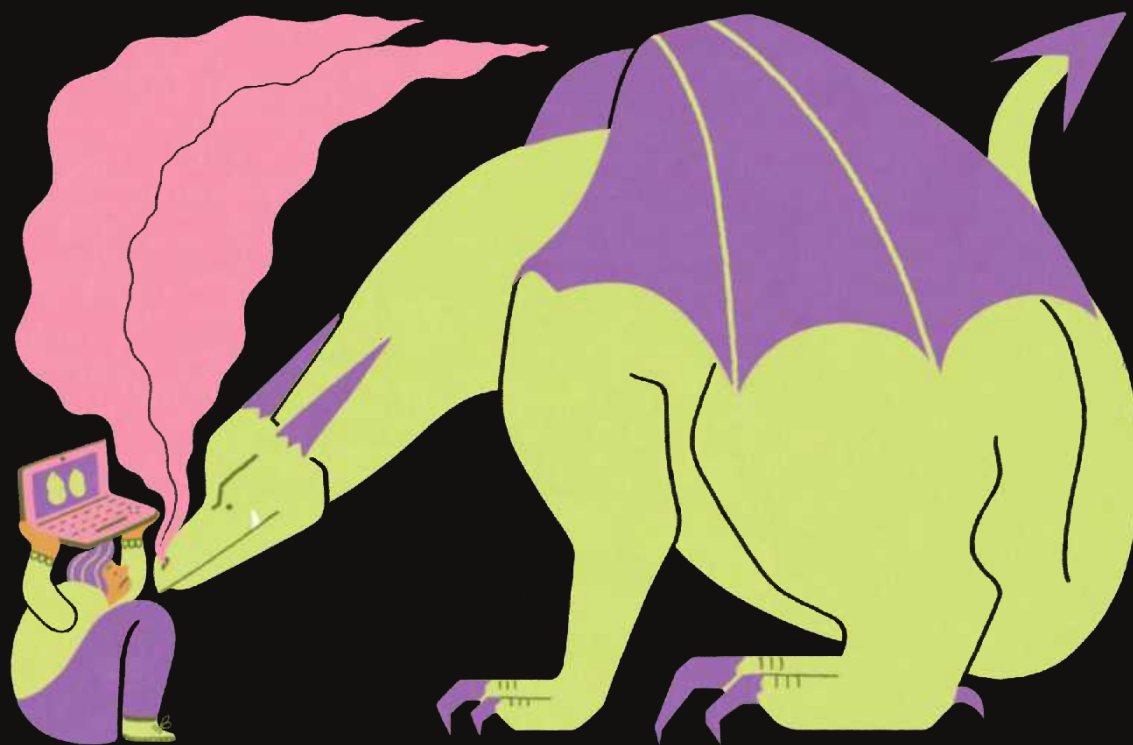
DESIGN SYSTEMS

The implementation and maintenance of design systems was @Benjieboo's pick, seconded by @mattecook. Top picks for him are "designing animation within a design system, and developers who can collaborate on design via in-browser prototyping."

@simoncarr chose SVG use, OnScroll animations as well as CMS customisation.

MULTITASKING AND ORGANISATION

@Buck_Mild thinks you need to "juggle 40 projects, remember 400 items for each of those projects, and not lose your cool during day-long meetings", while @frontendben says that "being reliable, communicative and delivering what was promised" will get you far.



THE RAGE OF A DRAGON

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

★ CLIENTS FROM HELL

> My boss asked me to do a design on a sound panel for a client once. I wasn't given any instructions for the design or concept other than to make it "bold, edgy and fun" and "put some flames on it."

Me: "Those instructions are a little vague to me. Do you have anything more specific that I can go off of?"

Client: "Just go ahead with that. I'm sure you'll come up with something great."

So I did a flame design and subsequently sent it to the client. He loved it. But then he showed the design to his wife.

Client: "My wife has a few suggestions." He then asked for three different designs as a variation on the theme.

I did that.

Client: "My wife doesn't like it. She says there shouldn't be any orange." The orange that I was using was the company's pantone.

Client: "Instead of using the orange, my wife thinks that the flame should be purple instead to really contrast."

I sent him a purple flame design.

Client: "My wife thinks the flame should be orange now."

I sent another orange variation, but she said it didn't contrast enough. I eliminated the gradient shading and she said it still wasn't right, asking me to move away from the company's orange. I did, and then she complained that it wasn't the right pantone.

After she rejected my sixth revision, I complained about the entire situation to my boss, who then called the client. The client started apologising to him before he had even said a word.

Client: "I'm so sorry, we've unleashed a dragon on you. Everyone liked the first one, she just went on her own rampage after that. We will take what you've sent, I'll make sure she doesn't ask for any more changes."

Of course, the worst part was they weren't paying for this design. It was a favour that took over a week of my time.

CLIENTS FROM HELL
clientsfromhell.net



DOODLE DEN

Charlie Lyons gives us a guide to Beyond's London-based studio, which prides itself on being a creative space for all

* WORKSPACE

> At Beyond, creativity isn't limited to the creative department – because we don't have one. We believe in harnessing creativity from our whole team, so it's important for us to have an environment that's conducive to a collaborative way of working.

We moved to London Bridge three years ago, into Kurt Geiger's old warehouse, after outgrowing our old office in Soho.

Since then, we've been making our mark on the space, most notably with our bespoke walls by the Doodle Man (thedoodleman.co.uk) [1]. The Beyond team submitted their favourite memories from our seven-year history, which the Doodle Man

wove into his signature style, resulting in walls that contain a story personal to everyone who has worked in the LDN office.

Another item that tells you who we are – quite literally – is our neon sign [2]. We got this two years ago from God's Own Junkyard, a warehouse in Walthamstow that houses one of the largest neon collections outside the US. We are lucky enough to own one of the last pieces created by Chris Bracey, the artist, designer and creative junkie who owned God's Own Junkyard.

Beyond is a design and technology ideas company, so we're always looking to fill our studio with technology that helps facilitate and inspire ideas. Our

VR kit [3] allows our designers to draw in 3D, resident gamers to immerse themselves in virtual landscapes like never before and, crucially, it allows our whole team to experiment and keep up to date with tech that will no doubt have a huge impact on the way we work in the not-so-distant future.

Similarly, we have our 3D printer [4]. After years of enabling our ideas to jump from our heads, to our screens, to something tangible, the front of the printer started to crack. This was easily solved, though. We just printed a new face!

So, the printer is still going strong, printing everything from pen pots to toys and figments of the team's imagination and, most importantly, awards for our Beyond birthdays [5], which you can usually find proudly displayed on the top of our monitors. ■

* PROFILE

Charlie is the general manager of Beyond London (bynd.com). You can follow the studio on Instagram ([instagram.com/bynd/](https://www.instagram.com/bynd/)) for more behind-the-scenes access

(mt)

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STUFF I LIKE



TIMOTHY SMITH

Designer and developer
theboldreport.net

CSS LAYOUT NEWS

With new tools like CSS Grid Layout and Flexbox, it can be difficult to know what to read to stay informed. Rachel Andrew curates this incredibly helpful newsletter with links to tutorials, conference talks and workshops, and other layout-related news.
csslayout.news

CSS REFERENCE

I've been writing CSS for ten years but I forget properties and rules all the time. CSS Reference is a guide to some popular properties with live examples you can play with. The search and collections grouping helps you find what you're looking for quickly, too.
cssreference.io

PIGMENTS

Pigments is an Atom package that displays colours in CSS, Sass, Less and Stylus files. It'll even display the colour of variables. It's easy to search for colours, see a nicely formatted colour palette for the entire project, and convert colours to other syntaxes.
atom.io/packages/pigments



PHOTOGRAPHY

This month... alongside her web work, Sue Jenkins has found national acclaim for her photographs

★ BEYOND PIXELS


> My love for photography began at five years old when my mother let me take a whole roll of photos with her 126 Kodak Instamatic. Getting those pictures back was like magic! At seven, I got my first camera: a Kodak Pocket Instamatic that used tiny 110 film. Then, at nine, I got a 35mm SLR Minolta XG 1 with a 45mm lens. That was the camera that taught me how to see. I became a keen observer of life; obsessed with capturing ideas and moments.

During college, I discovered my passion for fine art photography and began taking self portraits to make political statements about gender roles in society and the idea of 'women's work'. I even worked out a system of coordinated mirrors, a tripod, and the camera's self-timer to get the shots I wanted. Later, I added a cable release for even greater control over capturing, as Henri Cartier-Bresson has famously coined, 'the decisive moment'.

My work began to shift as I discovered photographers like Cindy Sherman, Sally Mann, William Wegman, Andreas Gursky, and Bernd and Hilla Becher. I no longer felt the inner urge to create political art and instead began to pursue something more wordless: a sense of time, a moment, a memory. In 2008 I enrolled in an MFA

photography program. That's when things really took off. Since then I've been lucky enough to win several awards and exhibit my work nearly 50 times around the US.

Today my photography reflects my personal aesthetic, and is heavily influenced by minimalism and colour field painting. It includes elements of repeating images or image sets, grids, and a strong horizontal framework. I enjoy capturing the everyday details that may not seem noteworthy, and deliberately photograph spaces without people. I also try to print my photographs on unexpected materials such as canvas, cotton, glass and melamine.

I've also started to get involved in social and political art again, and am thrilled to have participated in the first Nasty Women exhibition in New York City. I'm excited to see where this new direction might take me. Photography has given me a beautiful way to express myself more deeply than I ever could with words. 



Sue (@LuckychairNews) is a web designer and frontend developer, trainer and creative director of Luckychair Design Studio

★ PROFILE

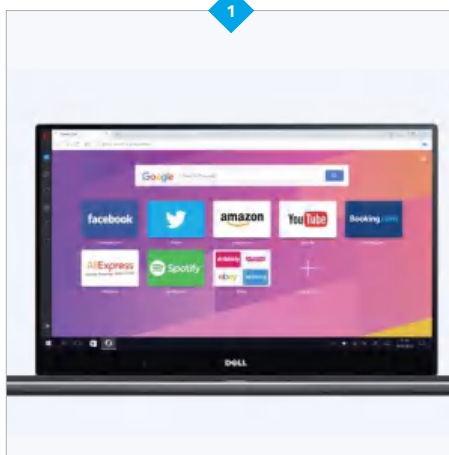


★ NEED LIST

STUFF WE WANT

Small objects of design wonder: from a new browser update all the way through to an exciting book release

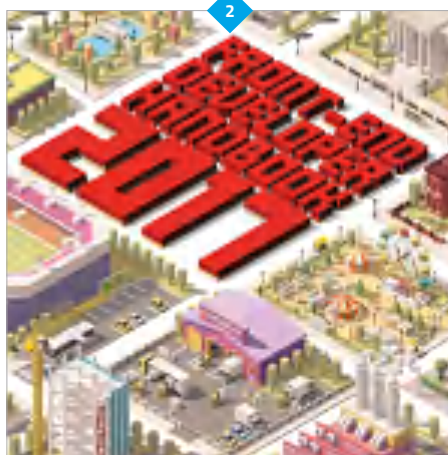
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OPERA BROWSER

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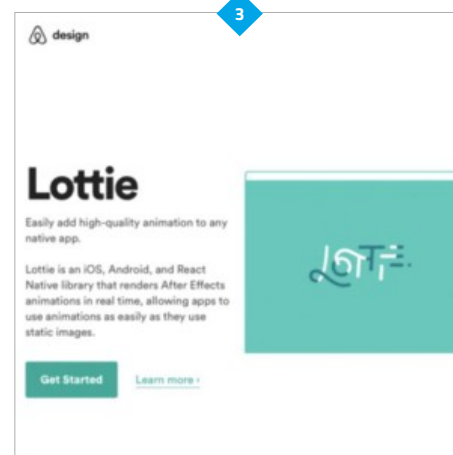
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FRONT-END DEVELOPER HANDBOOK 2017

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3



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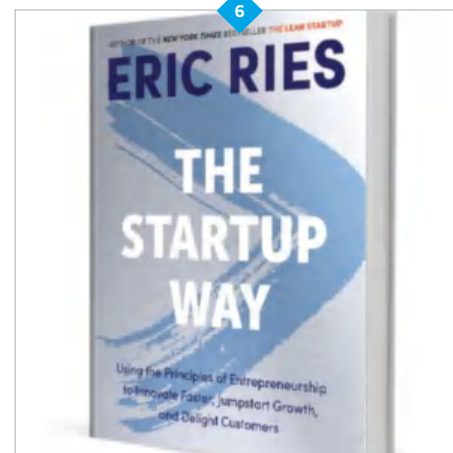
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DATEDROPPER

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6



THE STARTUP WAY

\$21

What we think

- (1) The Opera browser has a new refresh of its UI in the developer stream, complete with a new look and more features. Head to netm.ag/opera-292 for more info. (2) Find out how to learn frontend engineering and what tools you should be investing in (netm.ag/frontend-292). (3) New from Airbnb design is Lottie (netm.ag/lottie-292), an iOS, Android and React library that renders After Effects animations in real time. (4) Ever wanted a quick and free way to create beautiful vector designs? Check out the beta version of Vecteezy Editor (netm.ag/vecteezy-292). (5) Version 3.0 of datedropper (netm.ag/datedropper-292), the award-winning jQuery UI datepicker, gives you completely redesigned scripts. (6) It's not out until October 2017, but that doesn't stop you pre-ordering New York Bestseller Eric Ries' The Startup Way (netm.ag/startup-292).

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MONTH**

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EVENT GUIDE

LONE STAR PHP 2017

DATE: 20-22 April 2017

LOCATION: Dallas, US

Back for its seventh year, Lone Star PHP is once again packed with a great line-up of speakers.

The Training Day returns by popular demand too, offering hands-on help to attendees.

netm.ag/lonestar-292

GENERATE

DATE: 27-28 April 2017

LOCATION: New York, US

Brought to you by this very magazine, Generate heads back to New York for two days of insight, inspiration and practical advice. Get your tickets now.

netm.ag/generate-292

SDD 2017

DATE: 15-19 May 2017

LOCATION: London, UK

SDD 2017 features over 100 in-depth sessions and workshops on a wide range of key software development topics, delivered by 40 world-class speakers.

netm.ag/SDD-292

BEYOND TELLERRAND

DATE: 15-17 May 2017

LOCATION: Dusseldorf, Germany

Design, technology and inspiration will once again be the star of the show at this year's Beyond Tellerrand. Be sure to register for a practical workshop.

netm.ag/tellerrand-292

PIXEL PIONEERS

DATE: 22 June 2017

LOCATION: Bristol, UK

Gone but not forgotten, net's erstwhile editor Oliver Lindberg has launched his own conference, aimed at bringing a concise one-day package at a fair price.

netm.ag/pixel-292



WORLD IA DAY

Bristol's World IA Day expertly raised awareness of the practice of information architecture, writes **Eddie Rich**

★ EVENT REPORT

DATE: 18 FEBRUARY

LOCATION: BRISTOL, UK

URL: 2017.worldiaday.org

➤ Last month I travelled to Bristol for the World Information Architecture event organised by uber consultancy Nomena.


The first talk was by Dan Ramsden and Charlotte Edwards from the BBC. Dan presented a theoretical model he'd been working on to keep projects on track and to hold together the vertical IA work with the horizontal UX that cuts across it. It was really interesting to see how he'd developed it and to hear how it's being used in live projects. Charlotte took us through a project she'd been working on which had proved the model's value.

Next up was Paul Wilson, a 'smart city' advisor. Paul sees IAs as vital to implementing and running smart cities. He painted a picture of the future which, by necessity of function, may move governance away from central control to city governance and global governance. It's hoped that 5G will enable more in coming decades (Paul believes that by 2050, smart cities will be a reality).

The next talk, about voice, by Gordon Plant was closest to my interests. Using the term LUI (linguistic

user interface) to describe vocal interactions with technology, he explained how the interfaces work, understand us and fall short of media predictions.

The talk by Peter Kay was a fascinating walk through his experience with information, from working as an ICU nurse to his experience working as a social media strategist. Carole Court's talk was a fascinating journey from ancient Polynesia to the modern day, exploring how environmental clues and signposting have become second nature and led to interesting opportunities for blended experiences.

The last talk was by Angel Brown who stressed the importance of quantitative and qualitative data in design and decision-making processes. She told us "UX really brought something to the table: qualitative research". The correct use of both research types and data will successfully drive strategy and design. Without both, you greatly decrease the chances of building a successful strategy and project success. 

★ PROFILE



Eddie (@eduardo_rich) is a design strategy and UX consultant for Richly Creative (richlycreative.co.uk), helping business design for their customers

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VOICES

Opinions, thoughts & advice



ESSAY

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Sush Kelly looks at when it's best to adapt and embrace new technologies – a hot topic for any forward-thinking web developer



INTERVIEW

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We talk to information architect, event organiser and author **Abby Covert** about making sense of other people's mess



STORY

35

In his new design of business column, **Christopher Murphy** explores the importance of defining and sharing your business's story

* UX

LEGO LESSONS

Janne Jul Jensen shares 10 tips for how to create a UX department from scratch

> In 2015, I was asked to help establish and mature a new department at Lego focusing on the UX of its enterprise software. Around one and a half years into the process, I've learned the following:

1 GET LEADERS TO COMMIT

A UX department will only be successful if it has commitment from leadership. And not only a 'yeah sure, let's do that' – the commitment should include economy, a willingness to hire, and be long-term. And most importantly: it cannot dwindle when things become hard and painful.

2 CHOOSE ROLES CAREFULLY

A new department is like a blank piece of paper. You can organise it any way you like, and with any roles you prefer. But once it's done it is difficult to change, so choose how you organise it to be sure that it scales. And carefully choose your roles, so you're sure they also cover future needs.

3 ASSESS UX MATURITY

Assess the UX maturity of the organisation, to ensure you run the right activities at the right time. You have to meet the organisation where they are, with regards to level of knowledge, current approach and attitude.

4 CREATE A UNIFIED TEAM

A new team will often include people who come from different backgrounds. To present a unified approach, you have to streamline and unify how UX work is done within the team, making sure you all work the same way, by the same definitions and with the same focus.

5 BE PRESENT IN PROCESS

Many larger organisations are process-heavy, meaning that unless you exist in a process, you do not exist, period. So you will need to identify the processes and documents into which UX should be incorporated, and get those changed.

6 CREATE SHOWCASES

The most effective way to convince an organisation of the potential of UX is through exceptional showcases. Identify good UX showcases, do full UX work on those, and make sure the organisation knows you are behind it.

7 KNOW YOUR USERS

A large organisation means many IT users, so it can be unclear to a project team who they are developing for. Therefore, it is well worth spending time mapping your IT users, and making global personas that all projects have available for reference and can base their projects on.

8 TEACH OTHERS TO FISH

A newly founded UX team is usually not big enough or mature enough to take on all organisational projects right away. On the other hand, if demand exceeds supply this early on, it can be hard to say no. Make projects you can't participate in run effectively by themselves by teaching others to fish when you do not have a fish to give them. This can be done by creating a UX toolbox for them, by teaching them basic UX, and by acting as consultants.



A new department is like a blank piece of paper. You can organise it any way you like – but once it's done, it is difficult to change

9 CONNECT THE ISLANDS

In large organisations there are often several UX departments. These are often organised differently, have different workflows and are at different maturity levels. Connecting them can benefit everyone and help streamline how you work. It means people won't get different answers depending on who they ask.

10 CULTIVATE UX MINDSET

It takes time and effort to truly anchor a UX mindset. But until everyone in an organisation starts putting the user first in everything they do, truly great UX will not happen. This means making sure everyone knows what UX can contribute to a project, why UX is a team effort, how it fits into a development process, the origin of UX, and

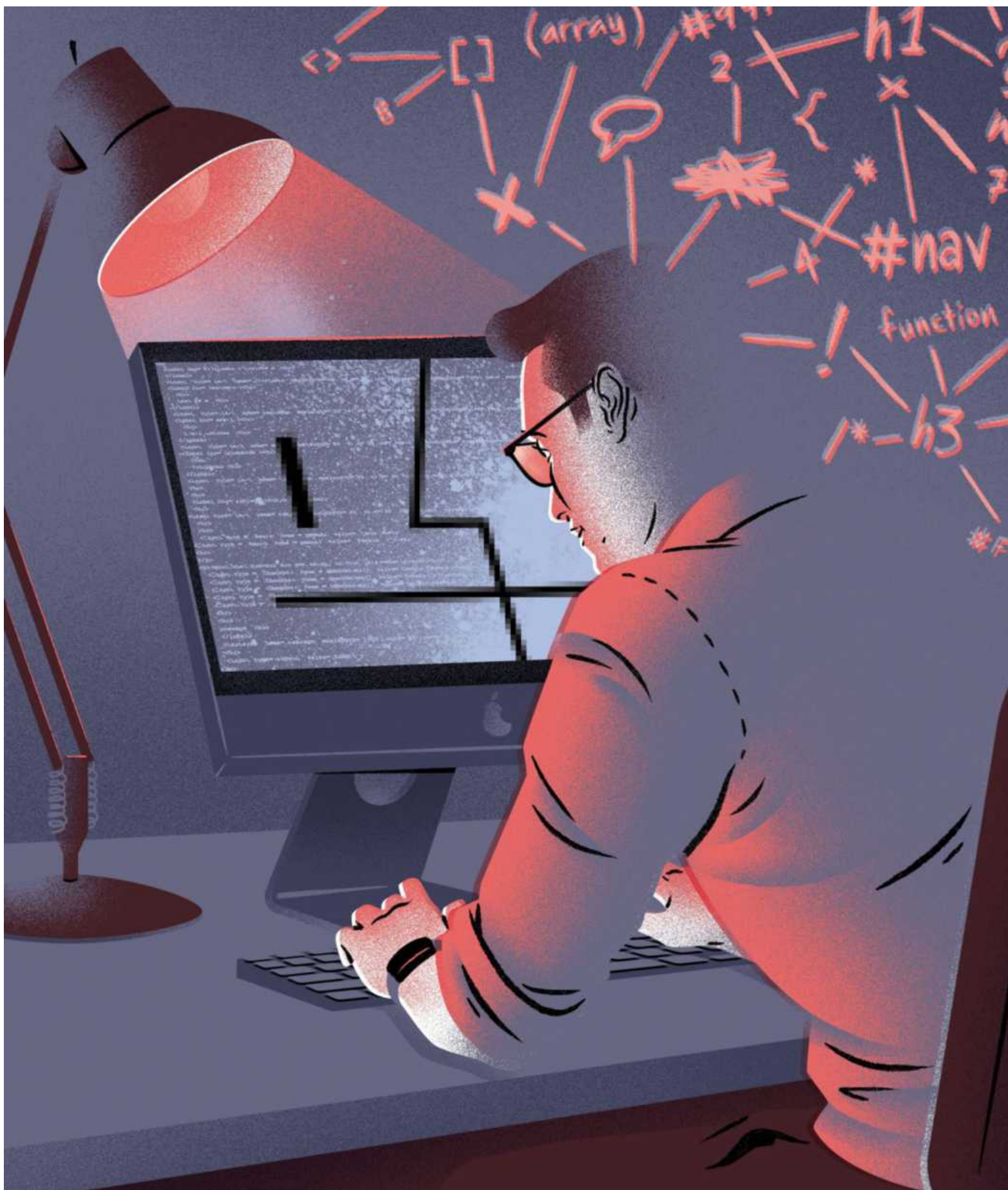
that it's a science, not a matter of opinion or taste. The hardest thing is winning over sceptics. Listen to them, and gently correct any misconceptions they may have.

Finally, ensure people know there is more to UX than delivering wireframes and graphic files by making the UX work that precedes those deliveries visible too. That work is what sets those deliveries' quality, and it makes it easier to grasp why UX takes time.

The exact activities necessary to build a UX department from scratch will vary, but hopefully some of these lessons can inspire or help you in your endeavours. ■

* PROFILE

Janne (@jannejuljensen) is a senior UX architect with the Lego Group. She also enjoys public speaking and always evangelises UX





★ CULTURE

NEW OLD TECH

Illustration by Ben Mounsey

As progress continues to accelerate, **Sush Kelly** warns of the dangers of being seduced by every next big thing

➤ Progress in web design techniques shows no signs of slowing up. As the proponents of the early web are staggering round with 1,000-yard stares, you can't help but feel a little overawed by the plethora of techniques and frameworks available nowadays.

People are championing the new approaches that are about to change the way we work once again, for example Flexbox (already available) and CSS Grid. Rachel Andrew and Jen Simmons have been encouraging developers to look at these technologies now, in readiness for their arrival.

There have been murmurings and posts in recent months from some of the current web industry's founders – such as Andy Clarke and Jeffrey Zeldman – asking if it really needs to be this complicated, and whether web is losing its soul or becoming reliant on a standard output (three-column layouts, hero blocks and the like). Have we all become enslaved to the frameworks and tools available to us?

Although they make a good argument, I don't think there has been a time in my career where there has been more choice (or opinion) about how to build digital projects. We are long past 'HTML, CSS and a little JavaScript' – now there are CSS preprocessors and JS frameworks, and the components that make up a web project encompass a load of new elements – optimisation, CDN delivery and SEO to name a few.

I have been working in websites since the year 2000, which means I cut my teeth on long-forgotten techniques such as tables and shims, all against the backdrop of the

'browser wars' that make the current browser situation seem oh-so-compatible by contrast! As a digital director at a creative agency, it is on my shoulders to make sure we use the right technology on client work and invest our time wisely with regards to what we learn and (in due course) adapt into our processes.

We are a small company of 12, and as such I am not detached from the actual builds, client liaison and the management of the resources we have to deliver. I am right in the middle of the woes the developers, clients and project managers all face in the project life cycle.

NOT LIKE THAT, LIKE THIS

The talks and conferences advocate best practices and cutting-edge tech; why we should be using X, Y and Z. This is 100 per cent necessary. After all, the web industry is relatively young and we are still defining the standards of the industry to an extent.

The problem is, those not using these technologies day-to-day in their work can be left feeling inadequate or somehow lacking. It is a lucky few who get to make their living pushing those boundaries and telling us all about them. Don't get me wrong, it is essential to have these people pushing the bleeding edge, but it can result in an urge to jump into new methods too early, which can be the worst thing to do on live client work.

You want long, productive relationships with clients. Changing how you build sites means having to readjust and remember more skills. As much as good commenting and a README file will help, you need to ►

- make sure what you're delivering will remain effective and usable for as long as possible.

I completely understand how designers and developers want to adopt the next great thing. I feel the same compulsion, and it is actually one of the things that has kept me in the industry so long. The fact is that I also have to think about the longevity of the plugin/library/software as if it won't stand the test of time, or ends up failing or losing support due to a later development, then the responsibility falls on us.

EDUCATING JUNIORS

Many junior developers have a real thirst for knowledge. It is often an inspiration to more senior team members when they arrive in the studio, eager to show a new method or technique that is emerging and explore how it might be used on a project.

You want your staff to grow, develop and be able to work on things together, so again it's important to make

to use Flexbox for a full site at the moment, with iOS and Safari's flaky support, would be a challenge that just may not be financially viable.

EMBRACING THE OLD

Clients, especially within larger companies, likely won't be running the latest browsers. They could also have restrictions on their web access that could affect your build. And if it turns out the main stakeholder is using IE on an old laptop, the site better work on it or the project just won't get signed off.

Sometimes a client will have a good idea of what they want, or specify an incumbent system or technology that you need to work with. A key point for us as an agency is to be adaptive to these needs and work with them, rather than dismissing what the client has and trying to force them down the route we would prefer. Sometimes this may mean having to extend an existing codebase in order to keep within the technology required.

It's important to only take on board advancements that are an improvement on what went before. But when the churn of technology is so quick that we have interns who have never had to use a float, it becomes a real balancing act

sure that you're only taking on board advancements that are an improvement on what went before. But when the churn of technology is so quick that we have interns and junior designers who have never had to use a float and do not know life before Bootstrap, it becomes a real balancing act.

A good example of this is the move from LESS to SCSS and also from Grunt to Gulp. Both these technologies are similar, but different enough to mean returning to a project using LESS/Grunt becomes an exercise in re-learning – or in the case of juniors or interns, learning a new (old) technology from scratch.

LAYOUT GAMBLER

Flex and CSS Grids are the current darlings of frontend talk. CSS Grid has the potential to revolutionise the way we will lay websites out in the future. At the moment it is still hidden in the latest browsers, although you can access it if you enable experimental features on the likes of Chrome. We cannot use it in live work for this reason, though with an imminent launch date, Grid could bring about as big a shift in web development practice as the shift from tables to divs and floats.

We are using Flexbox on live work now, but only in ways that are a benefit – for example for ordering content in responsive layouts or vertically centring items. To try

When embarking on a new project, we now make sure we establish the required sign-off devices as soon as possible. However, over the years have had our fingers burnt on more than one occasion, when we have run with a new way of doing something with good intentions, only for it to cause issues as we tried to get the site signed off. This just serves to remind us that there are so many device/user combos that it just isn't OK if a given method will only work on certain browsers.

Although you can make workarounds and shims, there often isn't budget to do this. And when a client doesn't have the right resources then you need to go with the solution that will please everyone.

When it comes down to it, the main aim of the studio is to produce great, forward-thinking work, which means being fully open to new methods but also picking the right time and project to use them. It is a tricky balancing act, but one that gives me a great feeling of satisfaction, especially when a new process finally becomes 'the standard' on live projects. **n**

★ PROFILE



Sush (@maxray) is digital director for Imagine Creative in Leamington Spa, helping clients create user-focused digital projects



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Abby Covert

Words by Jim McCauley Photography by Eric Tillotson

The web needs information architects. Abby Covert reveals how to become one, what makes it challenging, and why it can ruin your life



job: Information architect
w: abbytheia.com
t: @Abby_the_IA

➤ Websites used to be reasonably straightforward things, but as the web marched forward from niche interest to omnipresence, things got more complicated. Not merely in terms of technology, but also in terms of volume. Back in the Nineties a corporate site could get away with being made out of flat pages and a sidebar navigation. Today, though, it might consist of hundreds of pages, if not thousands.

Organising such massive web presences is an increasing challenge; not merely the nuts and bolts of taxonomy, but also the messier business of implementing it all within organisations where political and technological arguments can hamper the process. People can agree that they need a better website, but no one likes to be told that they've been doing it wrong.

This is where information architecture – or IA – comes into play. It's a discipline that made its name back when the web was finding its feet, and designers and developers were beginning to tackle the challenges of large-scale sites, but as a term it fell out of fashion for a long while. Now, though, it's enjoying a resurgence, and Abby Covert is

one of the practitioners bringing IA back – although it's never really gone away.

DISCOVERING IA

Educated in graphic design, she had her first taste of information architecture at university. "It was mostly focused around distilling complex subject matter into graphics like a poster or an information graphic," she tells us. Then in her first job out of school she worked as an icon designer, which led to her first information architecture job.

"I told the team that I was working on that the icons were not the way to solve this problem," she recalls. "They asked me if I knew what information architecture was and I was like, 'Yes, I'm a print designer, of course I do.' They were the ones that kind of clued me into the fact that this was actually something that was being applied to navigation systems with interfaces as well."

Discovering that there was an entire field of practitioners working on IA for digital systems was a key moment for Covert; she realised that this, not graphic design, was her vocation, and she's been working as an information architect ever since.

So what exactly is information architecture? Covert herself sums it up as making the unclear be clear: taking a whole mess of information and figuring out the most effective structure and language for it, in order to build accessible, navigable and manageable systems, sites and apps.

Covert explains that it's a fundamental skill set within practices such as UX or interaction design. "I would say the closest words that people may have heard of more recently would be content strategy, which is also a very close sister pattern to information architecture in terms of a practice," she says.

MAKING SENSE OF THE WEB

And the reason IA is returning to prominence now? "If you look at the evolution of the web over just the last decade it's incredible how much has changed," she observes. "Even in the early days of websites, you used to be able to rely that people were going to start at your homepage and then they were going to go from there. When search engines came about and started to get very detailed in terms of crawling something more than just your URL then you had to start thinking about people





landing on deep inner pages of your site. Then add to that the persistence of social media sharing content out of context.

"All of a sudden you had to think somebody could end up on some random place on your application or your website, not knowing anything about you or even having intended to go there," she continues. "Having to think about it from a multi-channel and a more complex set of contexts, I think, has really just changed the way that we have to think about it. IA goes along with that."

Explaining the benefits of IA to clients, she finds, is best done through example. "There's usually a pretty recent example for most companies, where the way that they're organising something or the language that they're using to get across their point to a user or to each other is obfuscated by some choice that they've made. If you can key in on that example it's generally an easier sell after that about the importance of thinking about information architecture."

PERSUASION, POLITICS AND FACILITATION

If the science of IA is reasonably straightforward, however, the actual business of

implementing it can be less so. Covert estimates that while 20 per cent of her job is the core business of drawing diagrams and mapping out fresh information structures, the other 80 per cent is what she describes as persuasion, politics and facilitation. "It's hard to go into an organisation and critique something that somebody spent years creating," she notes.

And it's this that can make IA a tremendously difficult discipline to teach, something that Covert does alongside her IA practice. "I was terrible when I first started doing this kind of work," she recalls, "because I just thought that if I came up with something that made sense to me, and I tested it and it made sense to users, that I could then give it to other people in an organisation and that they would believe me."

"In reality it's not that cut and dry. That other part, the persuasion and the understanding of your stakeholders and the understanding of the environment that you're working within, that's something I haven't figured out a way to teach without the element of time. I think that's something that most of my students get theory on, but they really have to get out of their education

"It's hard to go into an organisation and critique something that somebody spent years creating"



and into their working world to discover the realities of practising it."

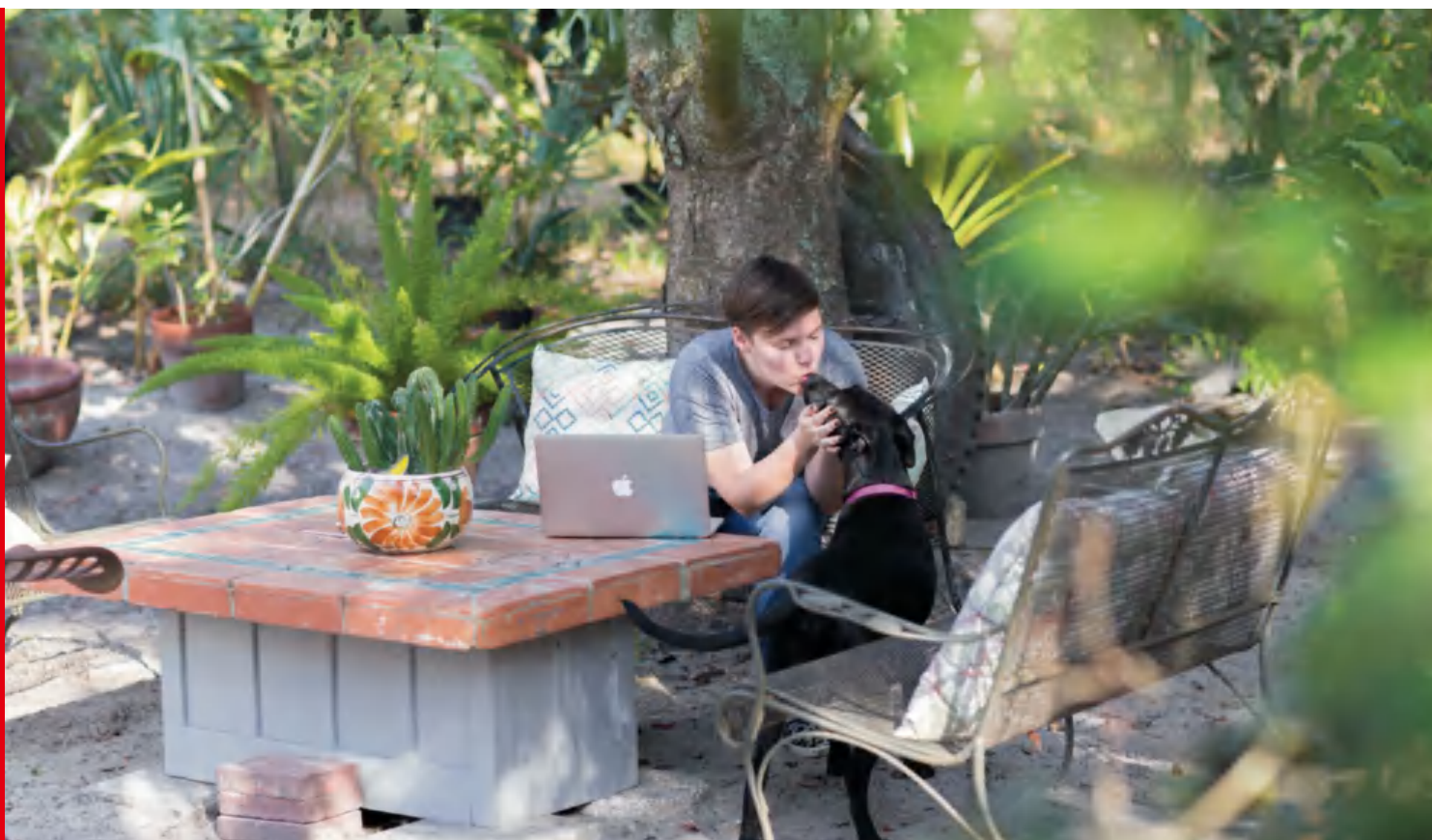
Consequently Covert finds that the people most suited to a career in IA are curious and optimistic in the face of ambivalence. "I think that there's a lot you have to fight, in terms of people not wanting to pay attention to things that are causing misinformation or things to be murky in an organisation," she says.

"To be a person that is not only curious and to make changes to those status-quo realities, but also to be a person who isn't afraid of it and has hope that it can be worked through if given time; I think that makes a good information architect. Somebody who can set aside their own personal bias also helps quite a bit."

EVERYTHING CHANGES

As with web design and development, it's a job in which you never stop learning. "I feel like every time I've got my hands around this thing and I think that it's solid and I can grasp it, it changes."

"I remember when I was three or four years in, I was very focused on software at that point, and I thought, man, this is great. I've



► finally got a grasp on this, I know the patterns, I know how to test things, I know all the questions to ask. Then rich internet applications changed everything and all of a sudden you couldn't rely on a click and a reload for things to happen any more."

Without any set qualifications or career path, information architecture can be a difficult business to learn about and establish yourself in. There are quite a few books on the subject – with Covert's own book, *How to Make Sense of Any Mess* (abbytheia.com/makesense), serving as a great introduction – and Covert will be bringing her experience to Generate New York on 27 and 28 April. This will be an introductory talk that she describes as a vocabulary lesson in understanding information architecture as a concept, combined with actionable tidbits of practical knowledge.

She's also hosting a more in-depth all-day workshop that, she promises, gives you all the conceptual frameworks you need to know about in order to give you confidence in practising IA. And it doesn't mean you need to be set on a career as an information architect;

Covert says that anyone working on larger-scale websites will benefit from it.

THE PAIN WITH NO NAME

"In a lot of cases," she points out, "the divide that we see between designers and developers in the space of the web can be filled with the practice of information architecture. Back in the early dawn of the web they used to call information architecture the pain with no name. I find that web designers and developers are often describing that pain and don't really have the skill set to think through how to get to that next clear place."

If you're feeling the need to incorporate IA into your work right now, Covert suggests writing a controlled vocabulary – a list of words that you say to your customers and to each other – and defining those terms really clearly so that people working on everything from the interfaces to the backend to the

business model all understand them in the same way. "I find that relieves a lot of tension immediately from a team," she tells us. "It's not a fun job to write a list of words, but I do find it to be very valuable."

Beware, though; once you fall down the IA rabbit hole, it will change how you see the world. "It drives me crazy," she says. "When I see things that are inefficient for no reason, or when I see things that are not organised but are expected to be used by other people it drives me nuts. So yes, it definitely changes the way that you see things."

"I did a menu design project years ago, and I can't look at a menu any more without nit-picking it to death"

"I did a menu design project years ago, and I can't look at a menu any more without nit-picking it to death. My husband hates it, 'Can't we just have a meal without you re-IA-ing the menu?'" **n**

Next month: Speaker, author and mobile strategy expert Jonathan Stark



★ THE DESIGN OF BUSINESS

STORY

Christopher Murphy explores the importance of defining and sharing your business's story



INFO

Job: Writer, designer and educator

t: @fehler

w: www.tinybooks.org



In the fourth article in my ongoing series exploring the design of business, I'll explore the importance of sharing your business's story and communicating your values to your customers.

Stories are everywhere. We can learn through stories, we're entertained by stories and our lives are lent meaning when stories lie at their heart. To build a business that lasts and provides value, we need to first look inside ourselves and identify the stories that drive us.

We are all individuals. We all have stories that matter to us. The secret to building a business that matters to others is to identify these stories and build around them. When we do, we find ourselves no longer creating products or services, but stories.

PEOPLE BUY STORIES BY PEOPLE

Spending some time considering your story ensures your customers understand your business's mission and purpose. Your business might offer a product or a service, but it should still have a story.

Benjamin James Edmonds makes kitchen knives by hand in his workshop in Derbyshire. Every knife he makes is lovingly crafted. It's no surprise to see he shares his story prominently (blok-knives.co.uk/story). As Edmonds puts it so succinctly: "There's

something very raw about making a knife. It's back to basics and for this reason I don't like to overcomplicate my production. All of my focus goes into making kitchen knives."

In just a handful of sentences he paints a picture of the business that draws you in. His tone is friendly, "I welcome visits and encourage people to come and have a play. I may even pop the kettle on!" The offer of a nice cup of tea humanises Blok Knives' brand, encouraging you to connect with it.

BEYOND THE MASS MARKET

Regardless of your business's focus, there is likely to be a story behind it. Spend some time teasing it out and share it.

The old, mass manufacture model of business that characterised much of the 20th century is evolving. In its place a new model is emerging, focused around strong beliefs and a desire to change things.

When all that we consume is driven by a race to the bottom we find ourselves missing something. We search for meaning and, for the most part, mass-manufactured commodities lack meaning.

This has led, perhaps unsurprisingly, to a renewed focus on the need for stories behind the everyday things we make a part of our lives. We want to know the provenance of the product. Where did it come from? Who created it? These stories behind the products and services we use in our lives are becoming increasingly important to the consumers of today and the best businesses acknowledge this.

It doesn't matter what you make – it might be physical, it might be digital – regardless, you should spend some time considering your story.

Your business's story is unique to you: it's a product of the people behind it and the purpose that drives it. By spending time defining and sharing your business's story you give your customers something deeper to believe in and build the deep relationships that a business needs to stand the test of time. **■**



Narrative driven Blok Knives shares its story prominently at its website

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* Q&A

JESSICA ROSE

The founder of Open Code talks peer-supported learning and developer relations



INFO

Job: Head of developer relations, Crate.io

w: jessica.tech

t: @jesslynrose

net: Where does your interest in peer-supported code education stem from?

JR: Before moving into technology, I worked in education. I've always been interested in finding ways to encourage learners to rely on each other to support the educational process. When it came time for me to start learning to program myself, leaning heavily on peer support and the local community felt natural.

net: What was the reason behind founding the Open Code study meetups?

JR: I founded the Birmingham Open Code meetups (www.meetup.com/Birmingham-Open-Code) for very selfish reasons. I'm self-taught and a few years ago, I was having a difficult time finding places I could get my questions about programming answered. I started the group and found that there was a great deal of local demand for peer-supported meetups. Other Open Code meetups formed through the community in other cities.

net: You're also the co-founder of Trans*Code with Naomi Ceder, which aims to help draw attention to transgender issues. How are you going about that?

JR: Trans*Code was almost entirely Naomi's doing. I'm always careful to credit her, as she's the brains

behind the operation and does most of the heavy lifting, as well. We've set out to create a space for community building, skills development and creativity that intersects with the technology and transgender communities. I hope we're providing that, through events and online community spaces.

net: You're currently working as head of developer relations for an open source SQL database project, Crate.io. Can you tell us what's different about this database project?

JR: Crate.io is the team of technologists behind CrateDB, an open-source SQL database designed to support working with machine data at scale. The open-source database market is pretty crowded, but we hope that being the only one really built for working with the scale and demands of machine data will earn us a place in the industry that we can continue to contribute and learn from.

net: What excites you about the kind of work that you do?

JR: I love developer relations for so many reasons. Getting to spend my time speaking to users and community members about the great things they're building is so inspiring. I love the variety of tasks that pop up day to day. I love public speaking. I love the travel. I secretly even love the manic pace of it all.

net: Despite all this frantic activity, you say that you're still looking for new projects to get involved in. How do you find the time?

JR: I'm terrible about getting pulled into interesting projects all over the place. I'm afraid there are too many clever people doing amazing things in tech right now. I don't manage to keep up with all of these projects in as much depth as I would hope. But having a house husband who's great with pitching in for admin and scheduling work 100 per cent keeps me afloat when I'm doing too much. Many thanks to Matt Rose for this.

net: If you could go back in time and have a conversation with your younger self, what advice would you give to her?

JR: I've been fantastically lucky. I think the role I have now has let me become the person I always wanted to be when I was younger. I might try and set myself on the path of being kinder and more open to others earlier on in life, but I don't think I would want to give too much direction to younger me. I wouldn't want to ruin the surprise! 📧

Jessica will be speaking at the Pixel Pioneers conference in Bristol (pixelpioneers.co) on 22 June 2017.

* CULTURE

WHAT HAS BEEN YOUR TRICKIEST CLIENT REQUEST?

Client briefs come in a variety of guises; you never know quite to expect. We asked seven designers to describe the biggest curveballs they've been thrown

**AMY PARKER**

Co-owner, Fore Design
foredesign.co

I had a client who wanted a minimal, 'Bauhaus-inspired' website. I've always been a minimalist but this particular client meant what they said: absolutely *nothing* extraneous whatsoever. I really had to push myself to create a unique, interesting design that presented the content as simply and purely as possible, with every single element on every page serving a purpose. Now I try to apply that principle to all of my work.

**MELANIE DAVEID**

Product design lead, Onefootball
melaniedaveid.com

The brief was to create a running app for a leading sports brand, and I didn't have a lot of experience in designing products back then. Plus, the brief was rather vague. A feeling of panic was slowly rising because this product was going to last. I had to get out of my comfort zone and figure out a new process. A team effort was the crucial factor that eventually paved the way for my career in product design – but back then, I made it more difficult for myself than it was.

**DAN PERRERA**

Co-owner, Fore Design
foredesign.co

I had a client approach me with an idea for a sign-up experience for a new part of their business. They wanted to mimic how other companies had solved the problem – but their approach was far more complicated than necessary. With some convincing (and some prototyping), we were able to come up with the right solution for them, reducing a five-step process down to a single step.

During the project, I realised that things that seem obvious to a designer might not be so obvious to clients who don't work in our field. It's always worthwhile to clearly explain your thinking and tie design decisions back to concrete goals.



JULIE ANNE LANE
Multidisciplinary designer
jaldesign.ca

When I have a hard time with clients, it's generally because they have a specific mindset that can't be shifted. Sections of design often do come from one's gut, but there is a proven benefit of using research and data to ensure it's usable and desired. I've had a few clients that stick to 'No need to test with users, I know what they want' or 'I want my target market to be everyone'. It's our job to show the benefits of shifting this understanding, but occasionally there's no budge.



DAVID URRY
Digital project manager, Fingo
www.fingo.co.uk

The most difficult challenge we have is when a client goes against the research and statistical information. When clients disregard best practice, data and user needs, the project can devolve into a discussion over subjective opinions that delay launches and put the website's success at risk. When faced with this, it's important to reiterate the process and, in the case of sticking points, look to a programme of conversion rate optimisation once the site is launched. This helps us take back control of the project and move any murky subjectivity into a test that can be proven either way.



JENNY JOHANNESSON
Senior designer, Ueno
jennyjohannesson.com

A client wanted to save some money, so they asked us to work with a production company in India where only one person could (almost) speak English. In our first meeting we also learned they would not speak to women, which as a team of mostly women made for some really frustrating conference calls.

Even though it was a very simple site, the company managed to mess up the most conventional things. And because of the communication challenge, the feedback never seemed to come through. Eventually, the client fired the production company and we never had to work with them again.



ANNA MARIA HOFFMAN
Freelance graphic and web designer
www.annamariahoffman.com

Early in my career I received a client request to design a website for a nonprofit. She had great ideas and intentions, but it was challenging to ensure all of her needs were being met since she kept on changing her mind. We eventually were able to agree upon a final design, but the experience truly taught me the importance of ironing out your work scope with a potential client first, before starting a new project.

RESOURCES

7 NIGHTMARE CLIENTS

Every designer has met – or will meet – at least one 'client from hell' in their career. In this amusing but also useful Creative Bloq post (netm.ag/hell-292), Bryce Bladon of the Clients from Hell blog describes seven kinds of terrible client, and offers practical tips on how to deal with them.

F**K YOU, PAY ME

All web designers experience problems actually getting paid by clients. In this hugely popular talk (netm.ag/fu-292), Mule Design designer Mike Monteiro runs through all the excuses clients come up with, and how to counter them and make sure you get the money – whatever they throw your way.

HOW TO DEAL WITH SCOPE CREEP

Scope creep occurs in a web design project when clients start demanding you take on extra responsibilities that exceed the original goals and objectives. It's a common cause of client relationship breakdown, and this blog post (netm.ag/creep-292) covers how to identify scope creep, and ways to avoid it.



★ CULTURE

DESIGN ITERATIONS

Lydia Lodovisi discusses the importance of using iteration in your web design workflows

➤ Taking an iterative approach to web design might seem like a time-intensive, laborious process. On the contrary, it can lead to faster, more useful designs and outcomes. Adding iteration to your process can help you create with confidence and make more informed design decisions. Let's talk about how iterating might benefit your next web design project.

First, what is iteration? It is the process of prototyping, testing, reviewing or analysing test results (either formally or informally), and repeating this cycle as much as possible or necessary. This can happen at low fidelity (such as with sketching a website wireframe), high fidelity (with fully articulated design elements) or somewhere in-between. Ideally, the sooner you can get something into the hands of the people you're designing for, the sooner you can start to improve it.

Not convinced? Consider these benefits of incorporating iteration into your workflow.

GET FEEDBACK EARLIER

Waiting until website launch to get audience feedback isn't ideal, nor is it a time when it's easiest to make changes. Knowing how audiences interpret designs early on can give you

critical insight into what's working and not working, and help you shape better solutions based on that feedback.

Getting a design, especially lower-fidelity ideas in the form of wireframes, in front of audiences before getting too far down the process, means that there's greater opportunity for revising and improving. You might get feedback that a key task isn't easy to perform, or that a path to important information isn't intuitive for people as they navigate the site. This kind of discovery may impact large parts of your design system, site architecture or other key elements that would otherwise require a complete rethinking of how all the pieces work together. Being able to change that sooner than later makes it easier, faster and less costly to do so.

DEVELOPER INPUT

Not only is it beneficial to get audience feedback, developer input on design can help make a design even stronger. Having a developer eye on designs sooner usually leads to greater success and efficiency when that design reaches the development stage of the process. Developers can help identify where small revisions in a design would

make big difference in development effort. This kind of collaboration can also save the heartache of realising too late that what you thought was a great solution would actually be a development nightmare and negatively impact the project timeline or budget.

TRYING MULTIPLE IDEAS

Sometimes you might be considering more than one solution to a challenge. This openness may also save you from getting set on your initial ideas, allowing more thoughtful or useful ideas to take shape. Taking an iterative approach allows for the space to see how each solution performs when in the hands of audiences and which might be the most appropriate solution. Design decisions then become more definite, rather than a series of educated guesses and provide clarity for both you and your clients on the approach.

SAVING TIME

Incorporating audience feedback, avoiding development nightmares and getting to the best idea as quickly as possible saves time. Staying in lower-fidelity design at the beginning means you can change things rapidly, without a lot of fuss, before you start to get into detailed design where the stakes for change are higher and often more costly.

One of the biggest intents of iteration is to make design solutions tangible quickly in order to continually refine and make those solutions even more meaningful than their first instance. Bringing an open mind and moving past the expectation of perfection will lead to ideas and solutions that better serve audience needs and goals.

The benefits of continual iteration lead to more positive web experiences that are more likely to be adopted and regularly used, along with better UX outcomes and metrics around those experiences. Which in turn leads to more satisfied audiences, more satisfied clients and more meaningful work for designers. It also sets the stage for how that website is managed and updated going forward, inspiring a mindset of continual improvement that keeps a site alive and well into the future. ■

★ PROFILE

Lydia Lodovisi (@lydiology) is the design director at SmallBox, which is an experience design and consulting agency. SmallBox is located in Indianapolis, Indiana.

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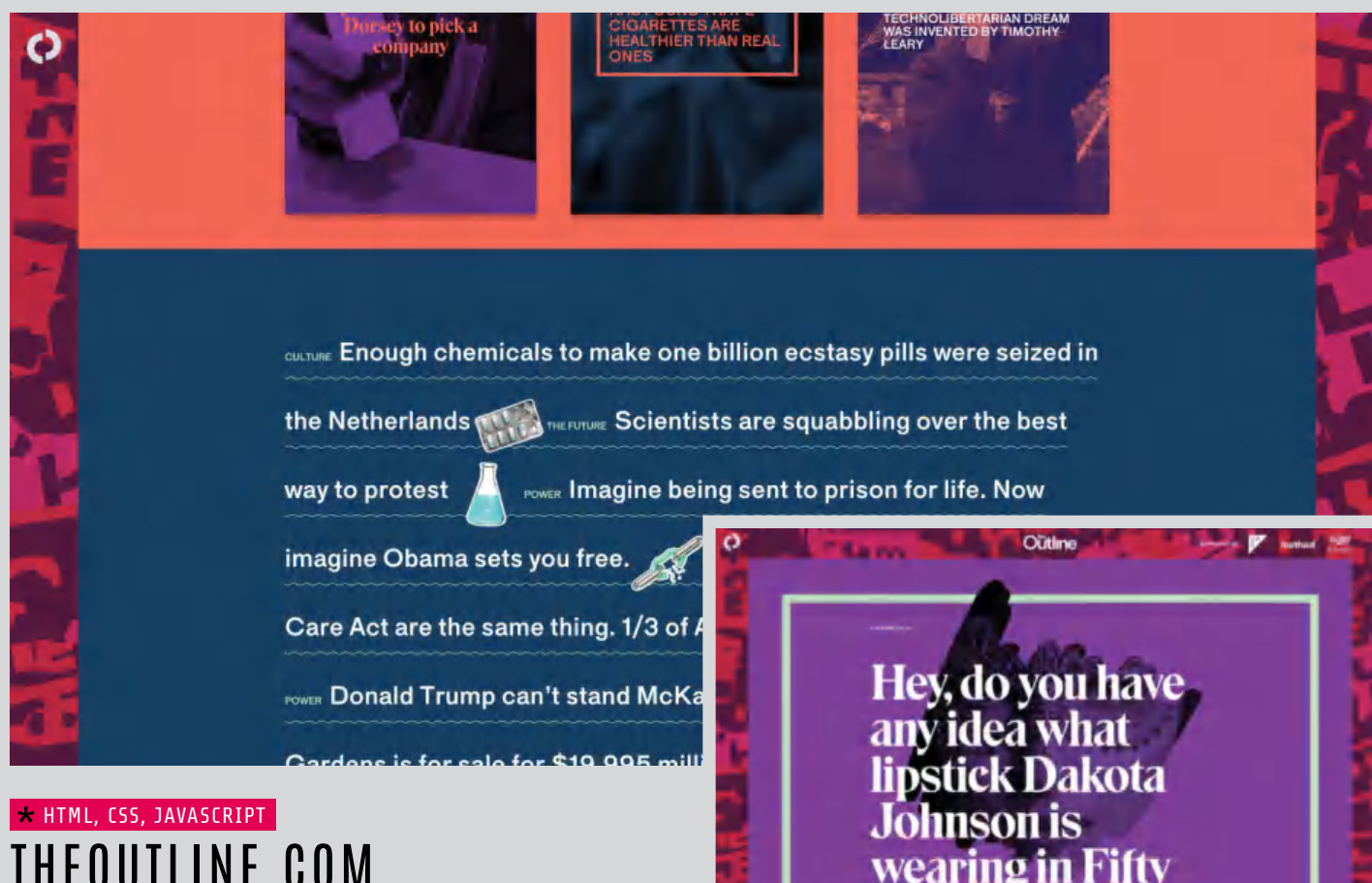
SENONGO AKPEN



Senongo is a New York-based designer, illustrator and art director. He's also the founder of Pixel Fable, a collection of Afrofuturist stories

w: senongo.net

t: [@senongo](https://twitter.com/senongo)



* HTML, CSS, JAVASCRIPT

THEOUTLINE.COM

Code and Theory www.codeandtheory.com

➤ The Outline aims to 'tell the right stories for right now'. An in-house design team worked with New York-based agency Code and Theory to design its striking site.

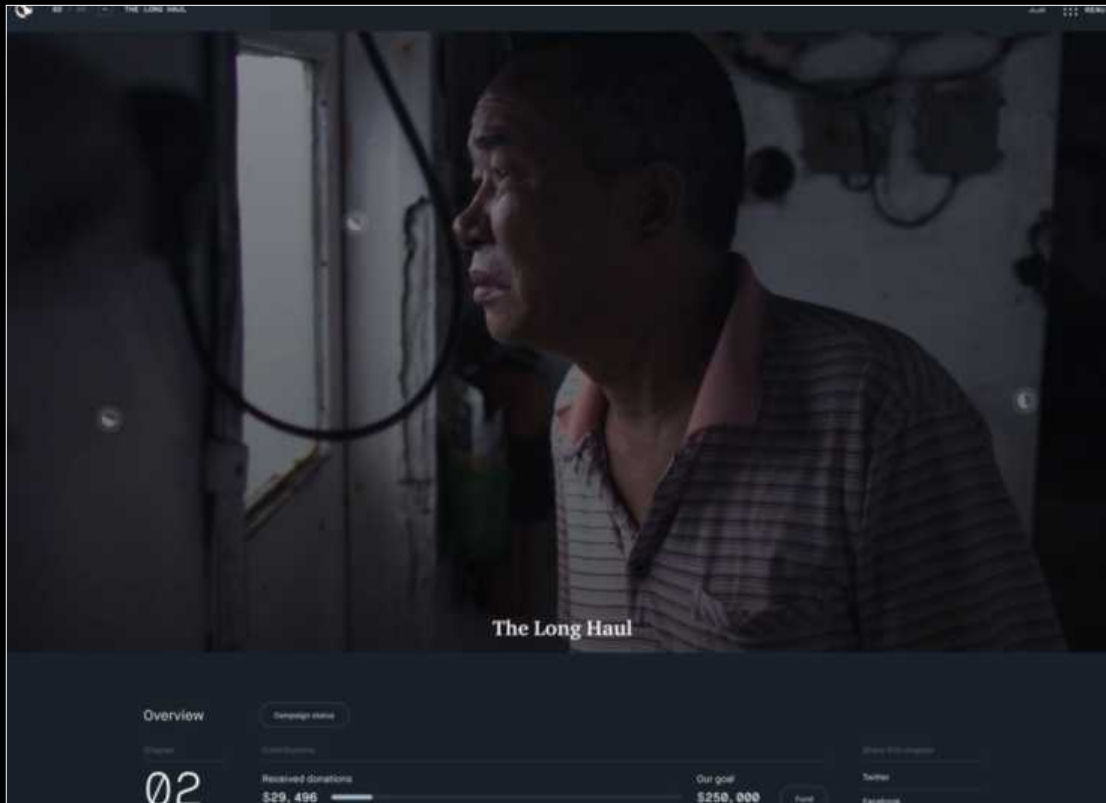
"We built a custom CMS so the 'template-isation' is quite smart and easy to use," says Stephane Elbaz, design director for The Outline. "The system Code and Theory helped us put together gives a lot of options for layouts and colours. It permits diversity

without losing the global consistency of the design aesthetic."

There are a number of repeated, highly visible design elements, and pages with infinite scrolling mean the mix of story and advertising can be incredibly varied. The Outline team calls it "a real-time, highly extensible, extremely modern way of making things on the internet". I hope other media companies give this deconstructed platform approach a try.

"This is a refreshing take on content design – taking the best ideas for mobile and providing a really engaging experience"

SEYI TAYLOR (@SEYITAYLOR)



“Very cool!
I like how
it takes
the time
to simply
present a
story and
help you
understand
the full
impact of
overfishing”
STEPHANIE LAWRENCE
(@SCLAWR)

★ DRUPAL, CSS, HTML

WWW.CONSERVECA.ORG

Hello Monday hellomondays.com

➤ This digital story about tuna overfishing and conservation in the Pacific (netm.ag/tuna-292) is a beautiful, if sobering, read. Created by digital creative agency Hello Monday, the site has numerous small narrative details, with vertical pacing that ensures you have a forward point to focus on. Large, single images and galleries allow you to see life on the tuna boats, to understand the way the fishermen work and live, and the goals of the conservationists.

At the beginning of each chapter there's a Campaign Status ticker showing the amount of money donated to this cause so far. This makes it clear the issue is not someone else's problem, and moves this project from simple storytelling to advocacy.

“The Nature Conservancy needed a dynamic and flexible platform that presented their work through an immersive and story-driven experience. We wanted to trigger an emotional response in people, one that could lead to potential donations,” says Morten Sølvstrøm of Hello Monday.

One of the key challenges was to build a platform that was flexible enough to meet the content requirements, but could still offer an immersive experience with high quality images, video and sound. Naturally, this placed some boundaries on the designers. “The designer/developer alignment was key to the success of the project,” adds Sølvstrøm.





* CSS, HTML, TWEENMAX

SUPER16.DK/FILM/MUKWANO

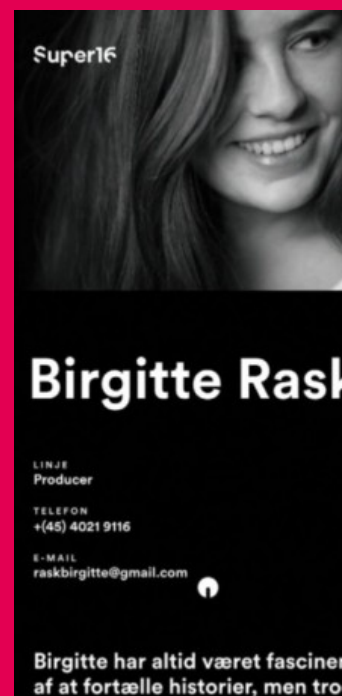
Stupid Studio stupid-studio.com



This site for a film school from Stupid Studio has all the makings of a classic for typophiles. There is large, bold type, a simple grid layout, and a variety of animations that fire on scroll and on tap. The students page, in particular, uses a variety of image glitch effects as you scroll, blurring and shifting the students' portraits in unexpected ways.

Unusually, Stupid Studio has used full-width type on student pages. "It was actually discovered by accident," explains partner Christian Mogensen. "As some pages didn't have any photographic content we quickly came to the conclusion that lists on the site had to be driven by pure typography. At some point we just tried to reuse the big, fluid heading in a looping list and then it simply 'clicked'. The huge repeating titles manifested themselves in a striking expression."

Many of the background images use warping and fade-in animations, creating water-like effects. "It was a no-brainer to combine the big typography with equally large images," Mogensen explains. "The transitions between pages introduce an element of surprise to the otherwise static images."



* WORDPRESS, WebGL, JAVASCRIPT

WWW.ACSL.CO.JP

Studio Details www.details.co.jp

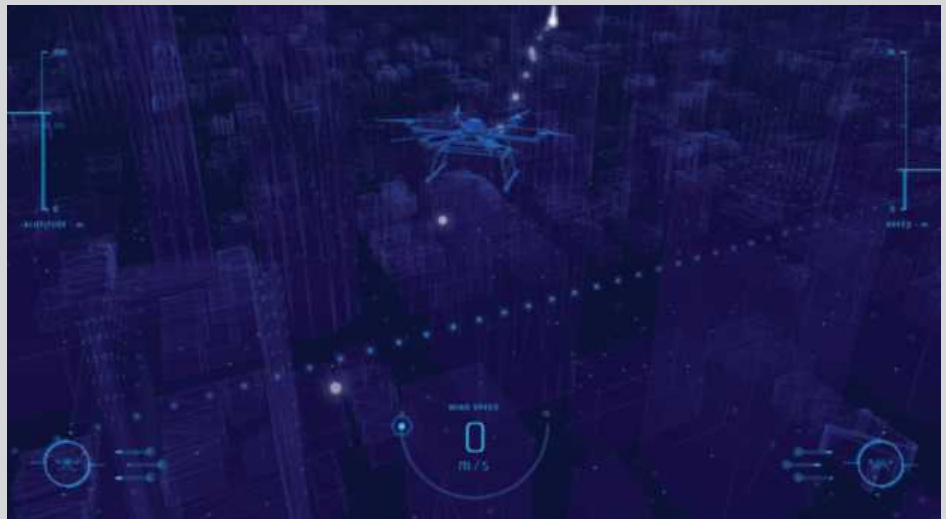
> This site for a drone manufacturer in Japan features some ridiculous WebGL animation and photography. I asked Tomoatsu Hattori from Studio Details – the team behind the site – about the challenges of displaying and rendering all this animation.

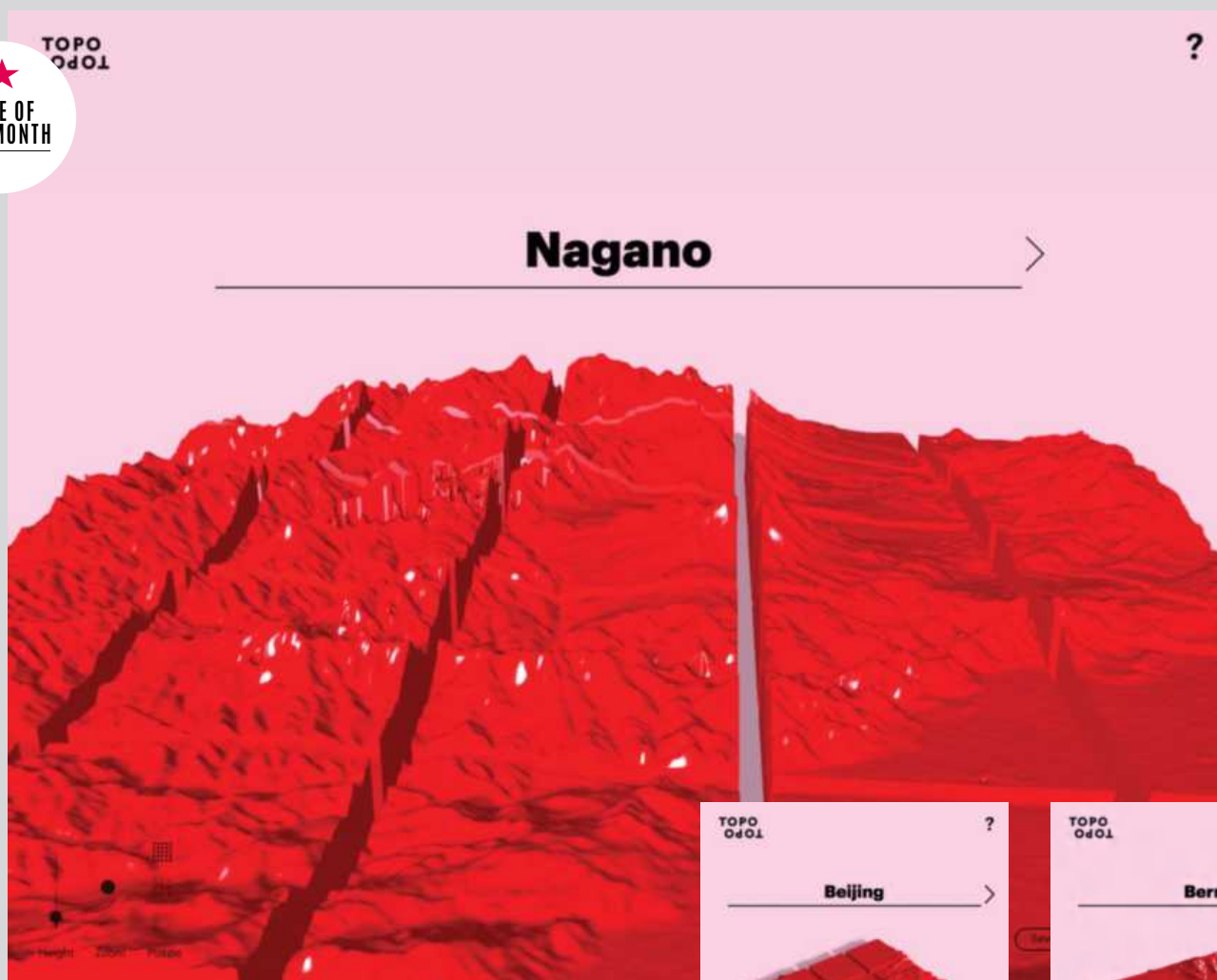
“Changes may occur depending on the environment,” he says. “It was hard to control the cross-browser animation which expresses scroll such as parallax and the axis.” The animation is controlled by JavaScript, with different branches processing the animation for each browser. The result is a series of chained, wonderful effects.

The site offers viewers an almost dizzying array of visual features and even the ability to ‘fly’ a drone through the city of Japan. It’s difficult to pick a favourite page.

So what was Hattori most proud of? “WebGL is often avoided in website production due to high device requirements and load times in Japan,” he says. “We are proud that we were able to successfully balance WebGL and JavaScript.”

Each visit to this site gives you a new angle to explore, just like the experience of flying one of the company’s drones might offer.



★
SITE OF
THE MONTH

* THREE.JS, JAVASCRIPT, HTML

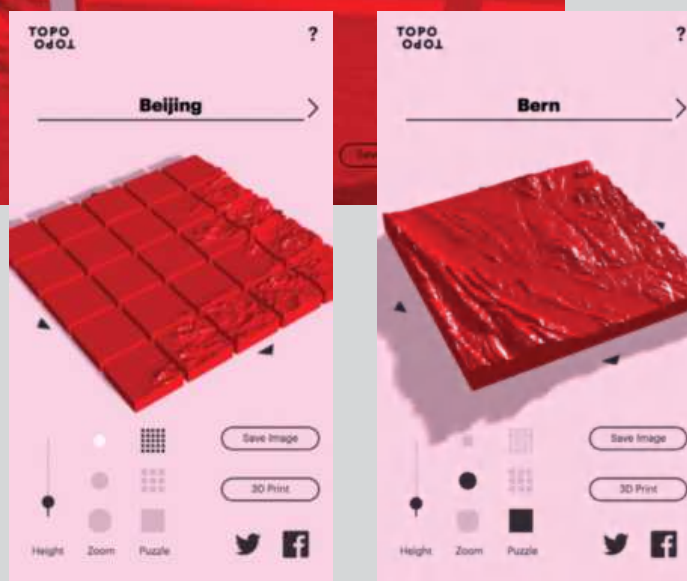
TOPOTOPO.IO

HUSH heyhush.com

➤ TopoTopo is a digital puzzle game that lets you create a 3D topographical model of any location on earth. You can then share it on social media, turn it into a puzzle, or even 3D print it. New York-based agency HUSH were tasked with putting it together.

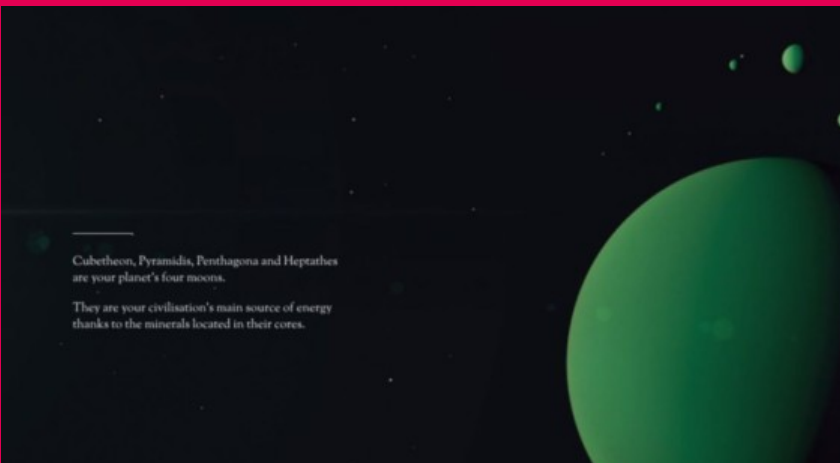
“TopoTopo connects us with our own sense of place, providing us with context for our experiences. We love connecting technology, science and people’s imaginations,” says partner David Schwarz. “It’s a unique and fun way to learn about real-world geography.”

The site runs off open source data from the Shuttle Radar Topography Mission, which is mixed with the Google Maps API to create a topographical database of all places on Earth. With a stripped-down interface and simple animations, this site is a clever way to look at all your favourite places on Earth.



“This introduces kids to open source 3D printing, and adds a layer of authorship to the already active play of puzzles – a great idea!”

BRIAN LAROSSA (@LAROSSA)



★ THREE.JS, JQUERY, HTML

GEMSTONES.ELESPACIO.NET

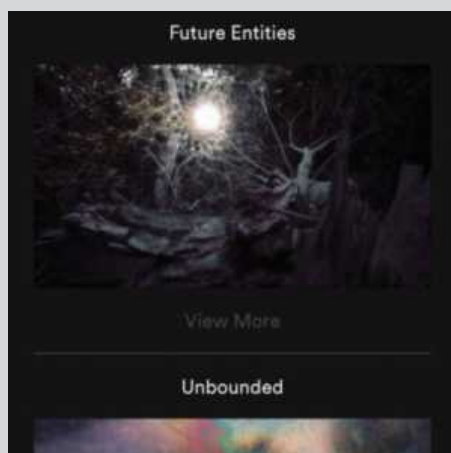
Elespacio www.elespacio.net

> Your planet's four moons are its main source of energy, but they have been destroyed due to excessive mining. The only way to bring them back is to find the four Gemstones hiding amongst the moons' ruins and restore the balance on your planet. The stones are hidden amongst asteroid fields. Find the right point of view to align different asteroids into the indicated geometric shape. The Gemstones will then reveal themselves.

"We were inspired to do a project without the usual creative constraints of day-to-day client work," says Emma Dowuona-Hammond of Elespacio, the agency behind the project. "We wanted to output something different and decided on a puzzle game with a unique twist on the game mechanics." For inspiration, the team looked to the mechanics of Monument Valley, and the striking use of colour and stylisation in No Man's Sky.

"We are used to designing websites or online ads, so designing a game required a completely different process. We also wanted to implement new technologies that were unknown to us before," adds Dowuona-Hammond. "The most challenging aspect ultimately was coding and modifying shaders, and using them along with the library features. Another challenge was to seamlessly combine 2D and 3D worlds."





★ CSS, HTML, VIMEO

EMERGENCE. MAXCOOPER.NET

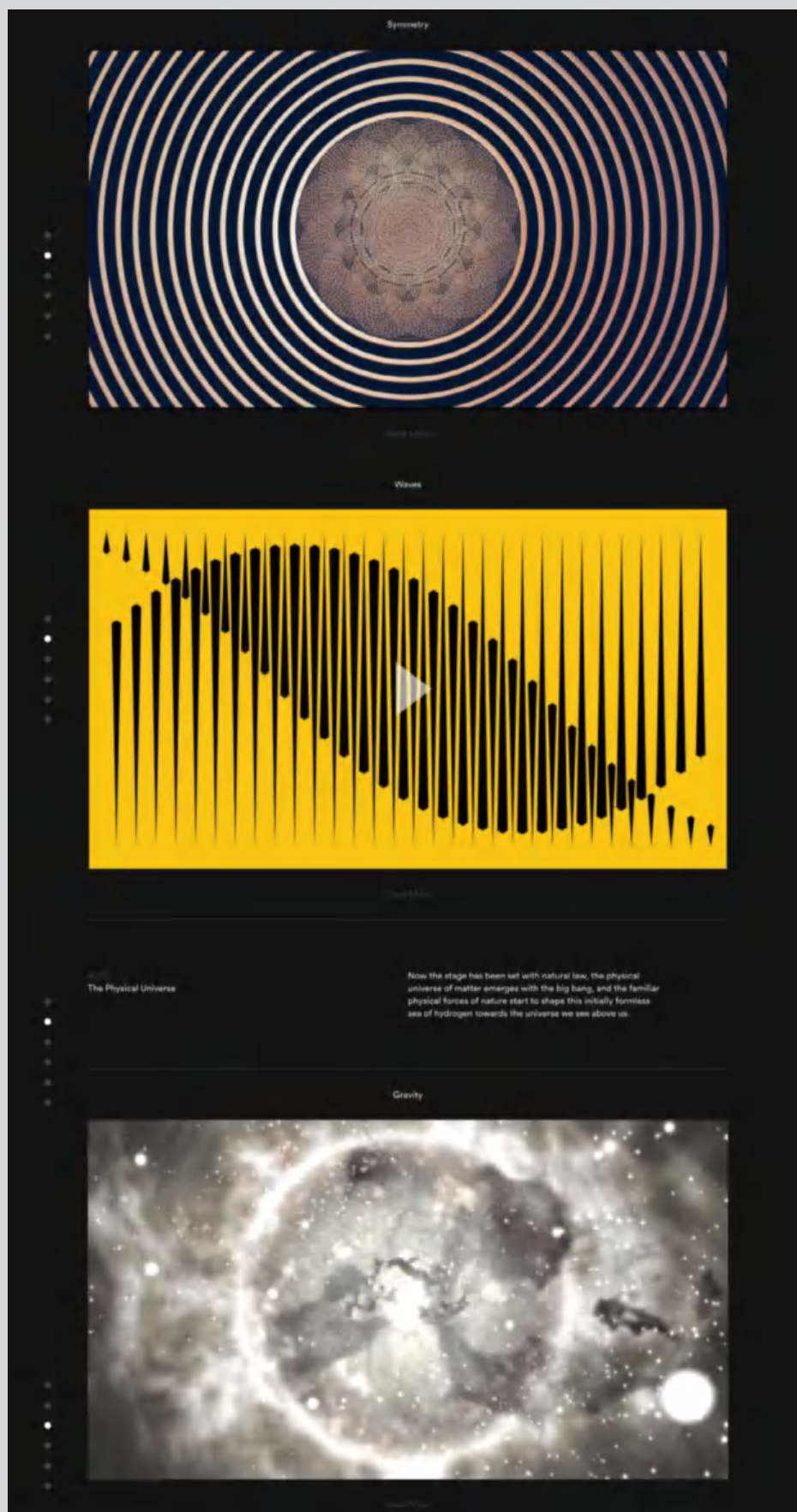
Engine thisismyengine.com

➤ The site for the upcoming Max Cooper album *Emergence* is a joy of minimalism and gorgeous visuals. As not only a musician but a doctor of computational biology, Cooper wanted to create a site that served as a guide and companion to his live shows.

“Max has got such fantastic visual imagery, we let that be the star and kept the interface as clean and minimal as possible,” says Henry Gibson from Somerset studio Engine.

The aim was to cater for both casual visitors who might not know Max Cooper’s work yet, and the artist’s core fans who wanted an in-depth resource. “We also wanted to retain the structure of the show and the flow of the pieces from one to the next,” adds Gibson. “So we tucked away all the content, accessible to those who want it, but easily passed by for those who don’t.” While there will be more videos released in the future, it’s easy for visitors to see what is currently up.

A nice touch is that the site listens for video playback events, and as soon as a clip finishes it scrolls the viewer down to the next video, which automatically starts playing. “This hopefully retains the sense of collection and feel of the album and show,” says Gibson. [M](#)





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SHOWCASE

Sublime design
& creative advice

THIS MONTH FEATURING...



FOCUS ON 57

It's good to revisit your favourite design books and soak up as much information as possible.

Sam Kapila showcases her favourites



PROFILE 58

We talk to UI designer **Jan Losert** about his career to date, and how he is helping shape the future of mobile advertising at Tapdaq



HOW WE BUILT 64

We take an in-depth look at how Brighton-based digital stars **Clearleft** revamped its own web presence from the ground up

DESIGN CHALLENGE

This month ...

BOAT HIRES

* PROFILES



BARBARA MARCANTONIO

Barbara is a freelance UX/UI designer. She works with digital agencies all over the world
w: dribbble.com/grarighe **t:** @grarighe



PETER JAVORKAI

Peter is a UI designer and creative athlete at the Adidas Group
w: peterjavorkai.com **t:** @javpet

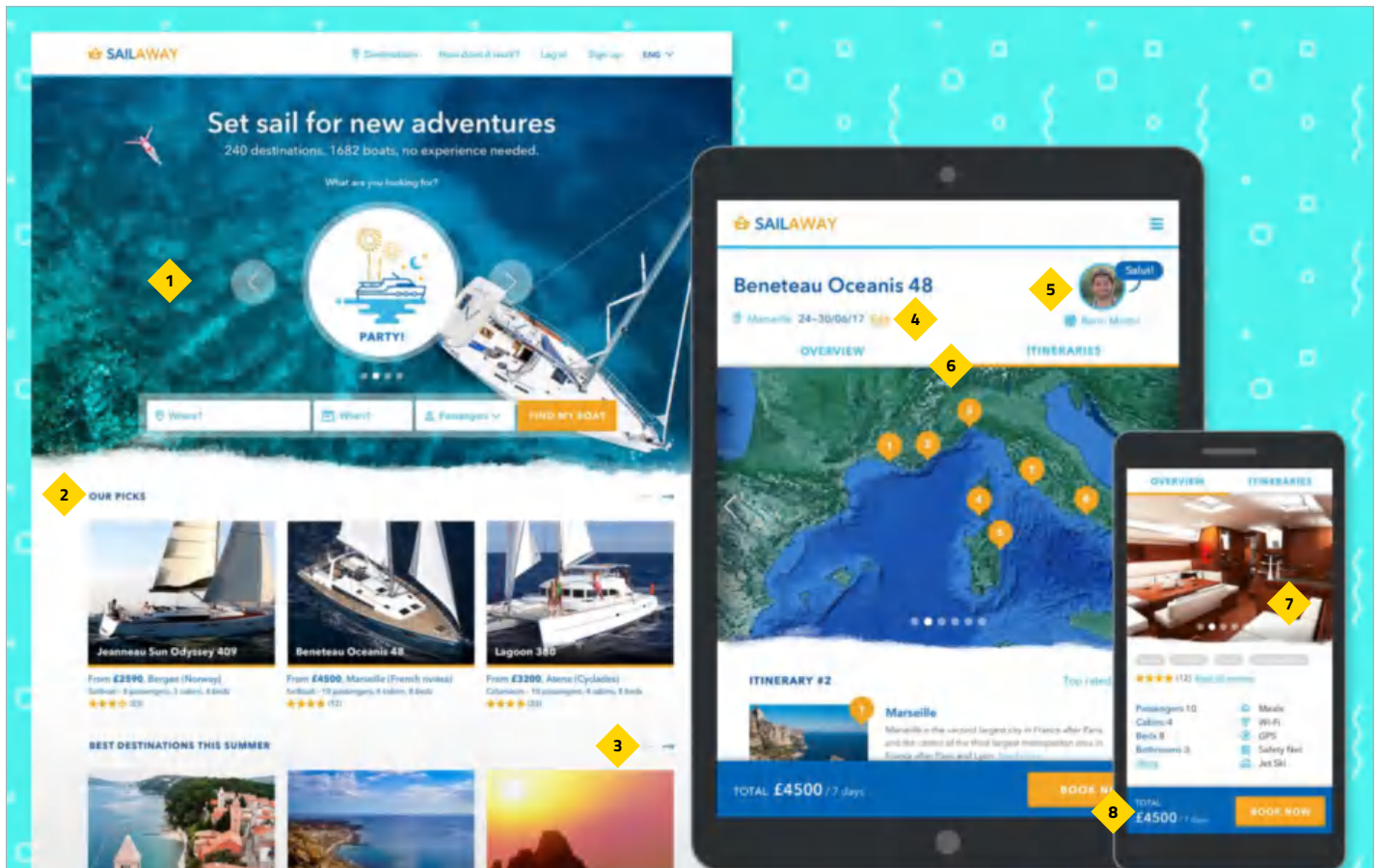


ELLIS ROGERS

Ellis is a graphic/web designer from Milton Keynes, England
w: ellisrogersdesign.com **t:** @EllisDesigner

BRIEF

This month we'd like you to design a website for a boat-hire company. It could be a small company that hires out narrowboats for use on the canal that goes through your village, or a big organisation that lets you charter yachts somewhere fancy; the choice is yours.



★ BARBARA MARCANTONIO

SAILAWAY

SailAway is the hassle-free booking option for people that want to enjoy sailing without having any experience

➤ Many people think that a sailing holiday is too complex to organise. You need a licence, experience, sense of direction and knowledge about boats. So how do you make sailing more accessible for everyone but mostly first-timers?

This company helps you find the right boat for your needs by selecting the purpose of your trip and provides you with all-inclusive packages (skipper, meals, drinks, Wi-Fi and so on) as well as itinerary suggestions around the area of interest. On the boat page you can read about and contact the skipper that will accompany you during the trip. The design is focused around an easy-to-use search and a guided browsing experience through recommendations (including Our Picks, Best Destinations and Reviews). The language is simple and avoids technicalities. Glossy pictures, lovely icons and simple intuitive design with great contrast makes the booking process easy and delightful so that your relaxing holiday can start right away!

🔍 CLOSE UP

(1) The website lets you first pick the purpose of your trip (party/family holiday/romantic getaway/sport and so on), which is represented by a nice illustration, as well as a region, date/duration of the trip and the number of passengers. Search results can be filtered in the next step. (2) Recommendations are based on user reviews on boats and locations. (3) Recommendations can be browsed with left and right arrows. (4) On the Boat page the search criteria is always editable without needing to go back to the previous page. (5) By clicking on the skipper's avatar you can access the full profile and contact him/her for any query. (6) The page is split into two with information about the boat and possible itineraries around that region. (7) This boat overview is a glossy image gallery (swipe left or right to see more) and boat details with only the bare essentials. All boat technicalities can be discovered by clicking on More. (8) The sticky footer has the Total and Book Now call-to-actions always visible while tabbing between the Overview and Itineraries.

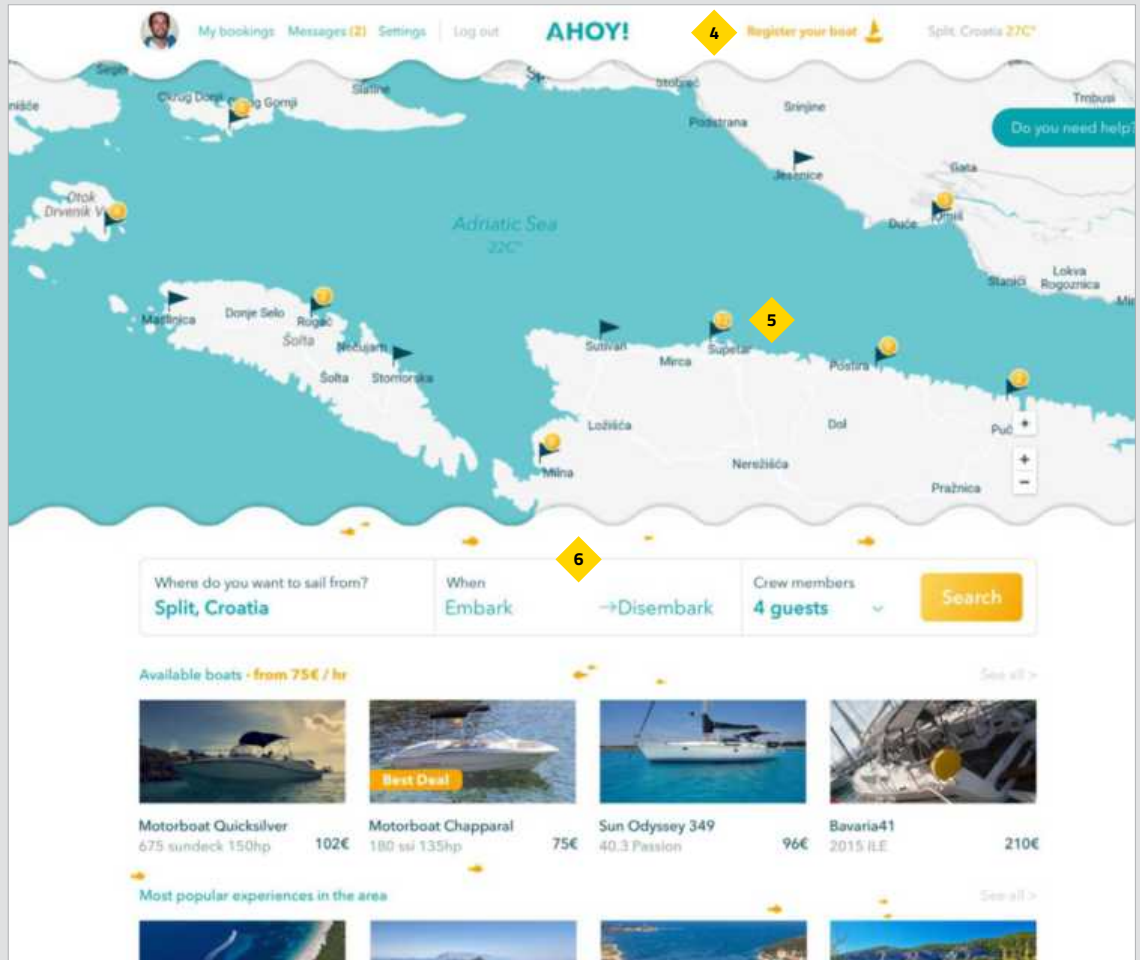
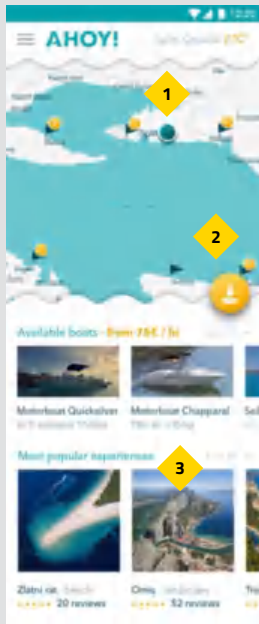
📅 MY MONTH

What have you been doing this month?
I've been travelling around SE Asia, drawing comics, writing and making videos about my journey.

Which sites have you visited for inspiration?
Instagram, Dribbble, Twitter and YouTube.

What have you been watching?
I watched the very disappointing last season of *Sherlock* as well as way too much Japanese anime.

What have you been listening to?
I have just listened to Radwimps' *Kimi No Na Wa* soundtrack pretty much constantly for the last two months.



MY MONTH

What have you been doing this month?
I've created my brutalism design portfolio. Now I'm improving my coding skills and reading about AI for our dating app.

Which sites have you visited for inspiration?
I live in Amsterdam, so all I had to do was go out to the dock for some boat inspiration.

What have you been watching?
Streamed some Twitch and TED videos. Can't wait for the next season of *Silicon Valley*.

What have you been listening to?
Devlin's latest album just came out.

* PETER JAVORKA

AHOY!

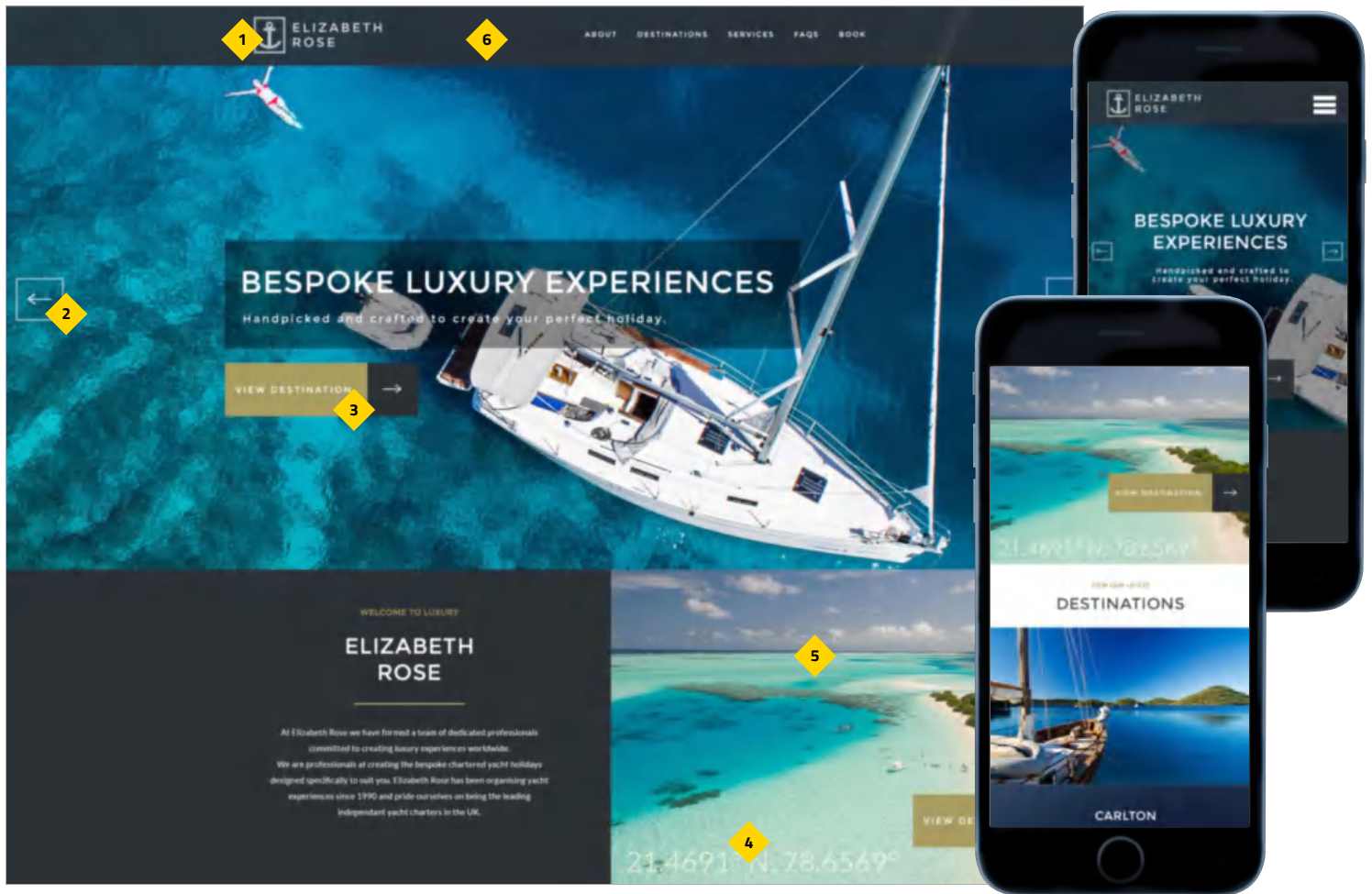
A site that connects private boat-owners with those looking to rent them

Ahoy! is like an Airbnb for short-term boat renting, whether you are an owner of a huge yacht for parties or running a local boat renting business to the closest island, it's open for everyone. The web app is location-based, so the users are always getting the available boat offers from their current surroundings, but they can also search manually of course.

The app provides rich offline experience as well, so for instance a family can download the data for free at the hotel and then they'll be able to find all of the best boat deals right there on the shore without eating up their data plan. Thanks to the service workers the users can also receive some exclusive last-minute notifications, which might help to fill up those empty seats. I chose different hues of aqua blue as the main colour and an orange gradient as an accent, which harmonises well with the uploaded boat content.

CLOSE UP

(1) The users' location is indicated with a pulsing mark, making it easy to follow their current position and the closest docks with available boats. (2) The bright action button holds the primary actions, which gives more space for navigating, and has an overview of the customised Google Map. (3) The greatest experiences by boat are just one tap away! The ratings and categories help future travellers to visit mind-blowing spots in the area with directions. The system smartly filters the sights by reachability and current weather conditions. (4) What about the non-travellers? It's easy to register a boat or yacht with the simple step-by-step signup, and then it's time to set sail and receive passengers from all around the world. (5) The orange bubbles with numbers help users to find a port with all of the available boats and captains nearby. (6) After filling in the details about the dream journey, the system automatically offers the best available options, also highlighting the best deals.



* ELLIS ROGERS

ELIZABETH ROSE

A site that conveys a high-end brand and targets young professionals

Elizabeth Rose is a key player in the sailing industry. Established in 1990, it offers a professional, unique and bespoke sailing experiences worldwide. Elizabeth Rose's website focuses on strong bright photography to showcase their services and destinations. I wanted this site to feel minimal yet high-end to appeal to the target audience of young professionals. This has been achieved by using a very simple colour palette, simple imagery and a heavy focus on responsive layout for those on the go using mobiles and tablets. With this in mind, I wanted to create the feeling of relaxation with a full-screen background video with very minimal movement and a calming sea. Each of the slides would showcase a different destination or service that Elizabeth Rose offers. The website will feature a sticky navigation so that users can quickly navigate throughout the site to avoid scroll fatigue.

Q CLOSE UP

(1) The clean, modern logo defines the company's core values. (2) A minimal, full-screen background video slider showcases the different services and destinations available. The slider contains a marketing message about each service and uses Lato and Montserrat fonts. (3) The homepage contains several call-to-action buttons related to each section. The buttons are dynamic and link directly to the destination in the video. (4) Each different background section has a coordinate of the location to fit into the theme of sailing. Each coordinate is dynamic and displays the correct location of the destination. (5) Under the banner is a full-width 'about us' hero which describes the company's ethos with space for a rolling banner for more destinations. (6) The main navigation is a fixed sticky header, allowing for easy navigation without having to continuously scroll up to get back to the navigation. On mobile, the navigation will become a hamburger menu to accommodate for the smaller mobile or tablet sizes.

MY MONTH

What have you been doing this month? Developing a personal website/blog for freelance work, researching motion graphics to create a simple website and promo animations.

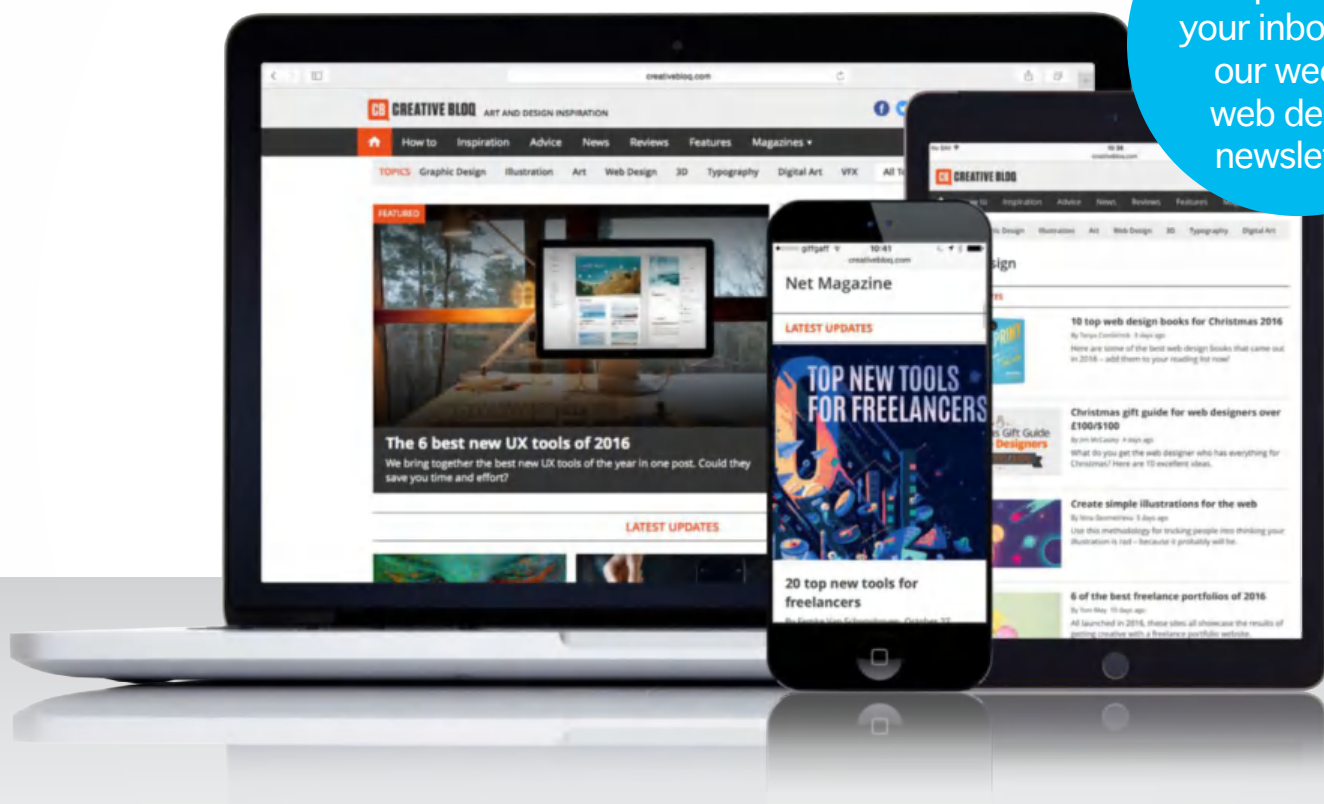
Which sites have you visited for inspiration? Reddit, Apple, Google and Pinterest. Also looking for websites that break boundaries on Awwwards.

What have you been watching? *Taboo*, *Atlanta* and *Game of Thrones*.

What have you been listening to? Chance The Rapper, Childish Gambino and Arctic Monkeys.

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* FOCUS ON

MUST-HAVE BOOKS

Sam Kapila suggests some books to improve your problem-solving

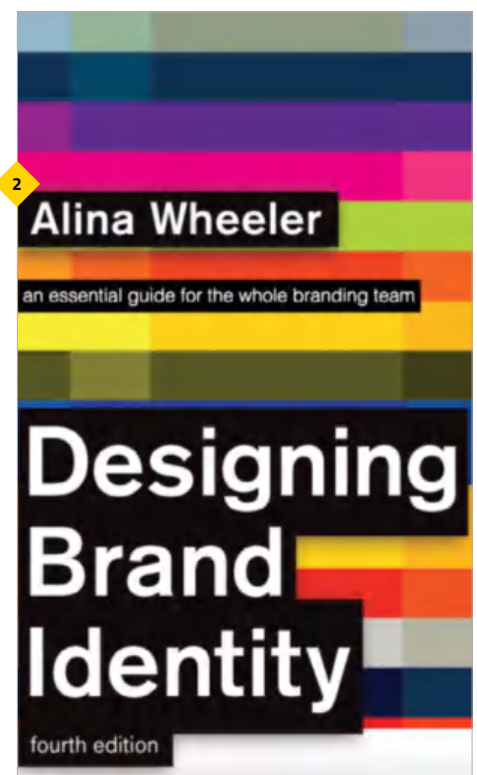
> On a rainy day, when time permits, I try to curl up on the couch with a nice design book. It's a good habit to get into to read or re-read certain design books and soak in the process side of things. It's self-care. Rarely during deadlines do we get to grow ourselves as designers. While we continue to learn, adapt and be agile during a project, we don't always have the luxury, timeline, or support from clients to learn and grow our processes as designers and developers.

When we consider design projects and process, I think a lot about timelines and stages, but mostly I think about problem-solving. That's what we're doing, after all. Here are some books that will help you re-evaluate and improve your problem-solving process.

Sprint (netm.ag/sprint-292) from GV breaks things down into five phases over five days: Map, sketch, decide, prototype, test. The book does a good job of encouraging the reader through such a sprint.

Org Design (netm.ag/org-292) is often recommended as a book about building the right organisational structure, from topics like recruiting and hiring, all the way down to interactions with non-design teams.

One book I come back to often is *Designing Brand Identity* (netm.ag/identity-292). This book has followed me for years since school, with occasional edition updates. It's a must-have guide that goes through every touchpoint of brand identity, and how it carries into messaging, UX, competition, and even favicons. **1**



Sam (samkapila.com) is a designer living in Texas and an instructor at The Iron Yard, an international, immersive coding school

(1) *Sprint: How To Solve Big Problems and Test New Ideas in Just Five Days* provides an insight

into GV's famous Sprint process. (2) Alina Wheeler's *Designing Brand Identity: An Essential*

Guide for the Whole Branding Team covers every branding touchpoint.

(3) *Org Design for Design Orgs* explores how to build the right organisational structure.



INFO

Location: Prague, Czech Republic

Designing since: 2010

Areas of expertise: Dashboard design, web design, visual design, UX, UI kits

Career: Tapdaq, Badoo, Social Bakers





*PROFILE

JAN LOSERT

tapdaq.com

The lead designer at Tapdaq tells us about his digital products and his nomadic lifestyle



The lead designer at Tapdaq (*tapdaq.com*), which is an in-app advertising platform, Jan Losert (*janlosert.com*) has covered a lot of ground since dropping out of university in 2011. That's not solely in terms of his career though, but also in terms of the actual miles that he has travelled whilst working; he's an incorrigible global traveller who works almost entirely remotely.

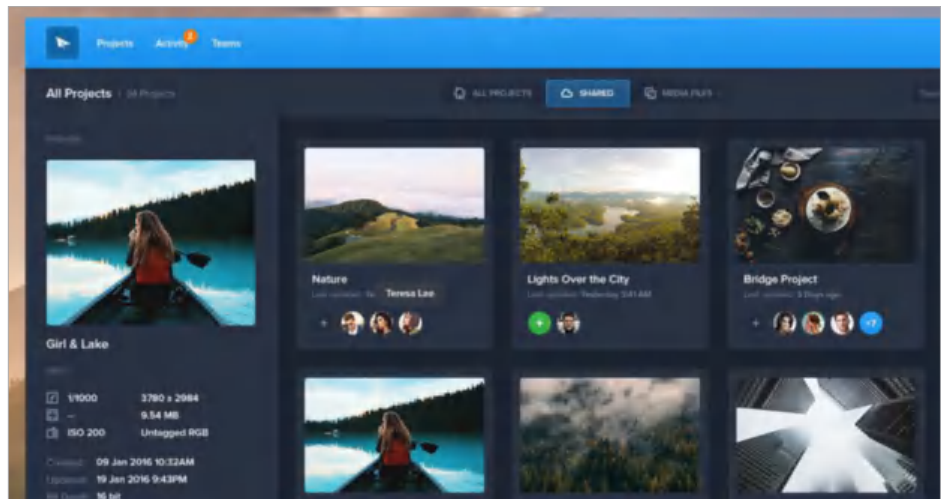
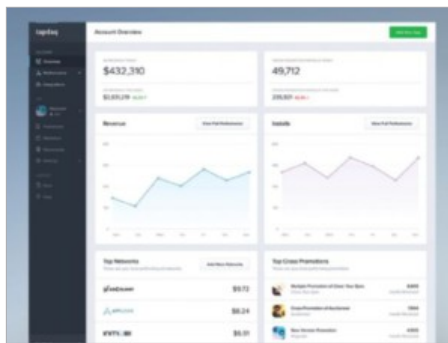
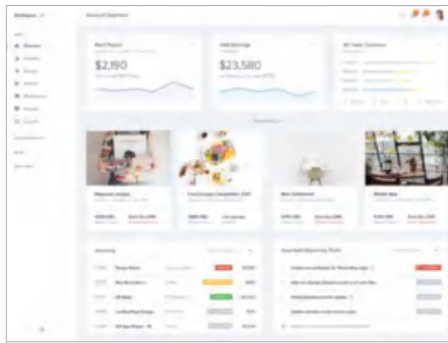
We were lucky enough to pin him down, just days before he set off on a two month round-the-world trip, and ask him about his work, his product-design process, his sideline in digital products and of course his nomadic lifestyle; here's what he had to say.

Can you tell us a bit about your professional background?

I'm originally from Prague, the capital of the Czech Republic, where I'm currently living now. I started working in design at the age of 18 when I used to play with photo manipulation in Photoshop. I dropped out from university after three weeks and I then decided to try my luck in design as a freelancer. Long story short: for the last four years I have been in a constant process of designing dashboards and applications. I have learned a lot about how to deal with different approaches in order to make product designs both better and more efficient.

Tell us a bit about Tapdaq.

About the time when I was thinking about new challenges outside of my previous job ►



Design assets Jan's most successful product – Dashboard UI Kit – is a huge pack focusing on designs for dashboard user interfaces and web applications

What does your day-to-day work at Tapdaq involve?

As the only designer at Tapdaq I'm responsible for everything. What people usually don't realise is that everything really means everything: from the dashboard and landing page over to example ads for our clients, pitch decks or sometimes even social images. We start every day with a team stand-up to keep everyone on track and talk about our wins and changes. Then I usually spend the day working on designing new features (new screens) or by watching user sessions on Inspectlet. This awesome tool helps me to understand where our users are struggling and how I can change the design based on their behaviour.

What are you working on at the moment?

In Tapdaq we've recently launched our new main feature – Mediation. We are currently in the process of understanding the impact, preparing and optimising the onboarding process for all users who are starting to use it. I'm also starting to work on my second-year overview of Tapdaq designs as my next Behance project.

You're very active on Dribbble and Behance; are these useful mediums for you as a designer?

Dribbble has helped me to get where I am now. When you pass the point of, say,

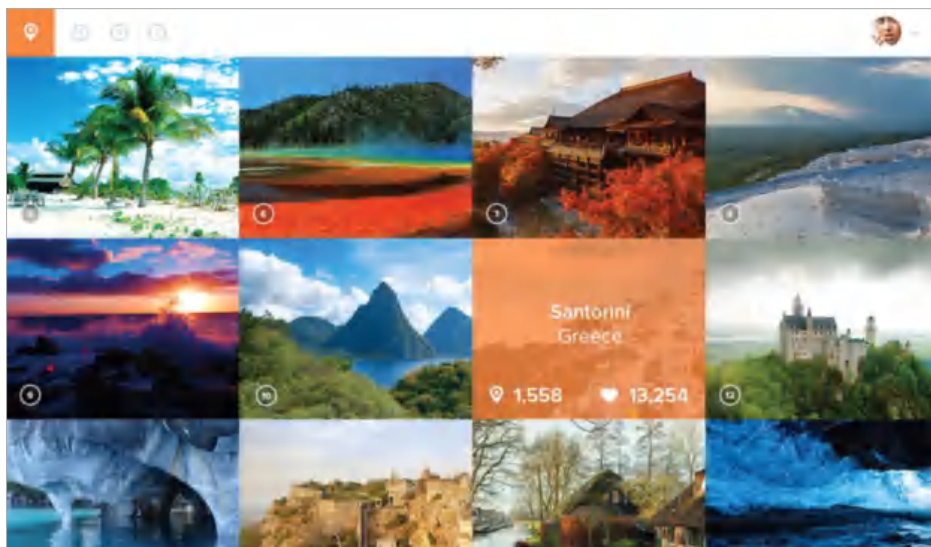
2,000 to 3,000 followers you'll start receiving five or more work offers/project inquiries every week. I wouldn't have had the Badoo offer without Dribbble, I wouldn't have been contacted by Ted (Tapdaq CEO) and I wouldn't have visited Yahoo for an interview with Flickr without the magic Dribbble Hire Me button. I think the most important thing on Dribbble is to really show your areas of specialisation.

I use Behance to show overviews of full projects. So I take ten Dribbble shots and merge them into a Behance project in some way. It always works for me to describe what I've done and why I've done exactly that in these overviews. It's also a great way to show potential clients or companies your way of thinking and exactly how you approach projects.

Your working style is extremely nomadic; how does that work for you?

When I had my first talks with the future team my main requirement was to accept me as fully remote employee. Mainly because I wanted to move back to Prague and start travelling. I fell in love with this lifestyle! For the past two years I've been sitting in different coffee shops in cities around the world pushing rectangles in Sketch. I've visited 25 countries in the past two years and I'm starting to get worried about if I'll ever be able to get back to normal nine-to-five work life.

- at Badoo (*badoo.com*), this guy Ted reached out to me about his startup called Tapdaq. After a few conversations I found out not only about what my position would look like in the company but also who these guys are, what their vision is and how huge this could be. Later that year I ended up in a situation when I had to choose if I wanted to go work at Flickr or to work with three guys and try the start-up life from the company's early days. After considering everything I decided to go with the idea of starting from scratch and design everything in the company, so I started working at Tapdaq. If you asked me to sum up Tapdaq in a single sentence, it would be that we help app developers maximise their revenue with unbiased ad mediation and retain their most valuable users through powerful cross-promotion.



Placing priority Jan's early side project, Placeist, works as a bucket list of places to visit all around the globe. He designed this colourful platform to enhance travel with gamification

Tell us about your 26 Steps of Product & Dashboard Design.

This breakdown (netm.ag/losert-292) is sort of my update to a previous article '14 Ways of Product Design' which I wrote two years ago. I provide all the info about my view of the optimal process to follow in every product team, from the start of the project to the final implementation and to the way to test the results of your work.

It's been one of the top 25 articles per day on Medium for six days in a row. So far it's been viewed over 90,000 times and got over 2,000 recommendations, which I guess is quite amazing.

Your previous job was with Badoo; could you tell us about your work there?

Badoo was my first job in London and actually my second full-time job. I started as a junior designer and worked on all types of various tasks that were required. Since Badoo had five designers for their two products and web, we were all working on various screens/tasks for each of those sectors. I was always chatting with our CTO about the dashboards I was working on for my clients and one day the design team got a request to redesign our internal support interface (customer care). Ideal for me!

Since most of the customer team were in-house I sat down with each member of the team to understand every pain and problem of the existing interface (which at

that point was still developed in HTML tables). We sketched out our ideas, wrote different types of user stories/approaches and then I moved over to Photoshop and prepared some possible solutions. We then discussed and tested this with different members of the team. Later on in the project I managed the whole dev process and I was even able to lead one of my first user sessions and play with the fully working prototype. I'm really glad that I was able to take on this project at that point of my career.

You have a sideline in digital products; tell us about your Dashboard UI Kit.

A year ago I was marking most of my emails as read and just stacking them into a folder with potential future work. Most of these emails were coming from clients who wanted help with their dashboard projects. At that time I came up with my first successful digital product – Dashboard UI Kit. I've made some research and, except for a few packs of three to six screens, there was nothing on the market similar to the idea I had. When I started designing and preparing concepts I went crazy and turned this little idea of a few screens into creating a product full of designs where everybody (not only me) can prepare their own dashboard designs. I came up with over 100 files for dashboard design (including the new 2017 update).



* OFFICE CULTURE



JAN LOSERT

What's on your desktop?

Wacom tablet, chalkboard globe, cinema display and a mug with 'Don't fucking procrastinate' written on it.

Little things that make your life worthwhile

My Crossfit training in the morning, days when I release something new to the world or post something on Dribbble and definitely every day I spend in a different country.

What will you do for lunch?

I've recently started to live healthy so I'd say salad or some decent pasta.

What hours do you work?

I'm in constant process, I think about design all day. But I usually become super productive between 8pm to 3am. All the best projects of mine happened during the night.

What else do you do in the office?

Shoot Nerf guns at my colleagues. I love our *NHL* and *Rocket League* nights in the office. Every two months we also try to solve quests in Escape Rooms.

How often do you hang out with other designers?

From time to time. I recently started to join calls with other designers from around the world and talk about their work or my design problems and hear other's thoughts on design decisions.

Describe your working culture in three words

(Please) Start before sunset.

★ **TIMELINE**

A look at the key dates in Jon Losert's history

APR 2011

Lands first web design project



OCT 2011

Got his Dribbble invite



AUG 2012

First job/first dashboard projects



JAN 2013

Became fully focused on rich web applications/dashboards



SEP 2013

Joined Badoo and moved to London



AUG 2014

Joined Tapdaq as a lead designer



DEC 2014

Leads every design decision in every Tapdaq product



JAN 2015

Became fully remote – spending every month in a different country



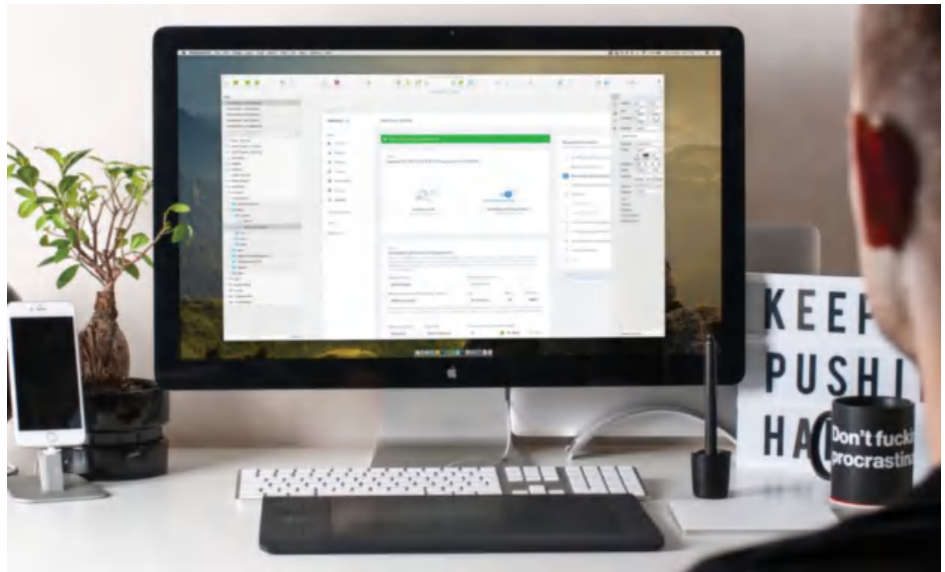
FEB 2015

Created first UI kit – Night & Travel



MAR 2016

Released Dashboard UI Kit (sold over 1,500 licences)



- People are still sending me requests for additional screens and sending thank-you emails after the purchase. This really makes me want to get up every morning.

Tell us about another of your side projects: Placeist.

Placeist was one of my earliest side projects. One day I was browsing the internet at work and I stumbled upon an article called 'The 100 Most Beautiful Places in the World in Pictures' on *escapenormal.com* and I loved it. Ever since I found it I've been eager to visit at least two of these locations per year. The idea behind Placeist was simple: a bucket list of places all around the globe that you can check and mark as visited and share with the world. The whole platform should have gamified travelling to these locations.

Sadly before we were able to finish it, my friend (the developer) and I joined Tapdaq. But at least I'm trying to actually visit those places in real life.

What do you get up to when you're not working for Tapdaq or on your products?

Hah, I always feel I'm in a constant process mode even though for those who know me it's impossible to understand that. So even in my free time I like to take on some side jobs to keep myself busy and keep on working on something new. I recently started going to Crossfit, which is definitely one of my best decisions in 2016. I was always struggling to push myself in

the gym, but when you're surrounded by like-minded people and coach you can't really slack off during your workout. I guess that's the same in everything, even with design.

What advice would you give to anyone starting out in product design?

I think the only advice is to try and test and always share your results, struggles and wins on social media. Don't be afraid to put stuff out and ask for feedback. If you're struggling to find good developers to help you with execution you can always just design your project and share it with the world through Dribbble or Behance. But to get yourself to the next level, work on the full project; design everything from the nice stuff to log-in forms, settings or payment screens. This will help you grow and learn about consistency and style guides, and help you to think about the whole design and development process.

What do you love most about your work?

I truly like the freedom. Being remote with a team that trusts you gives all of us freedom to work and at the same time not be worried about missing on life. I love one quote from the Weebly office in San Francisco which said: 'Work when you want, take days off, just get things done'. I think that really summarises the future.



Next month: Hillary Clinton campaign designer Mina Markham

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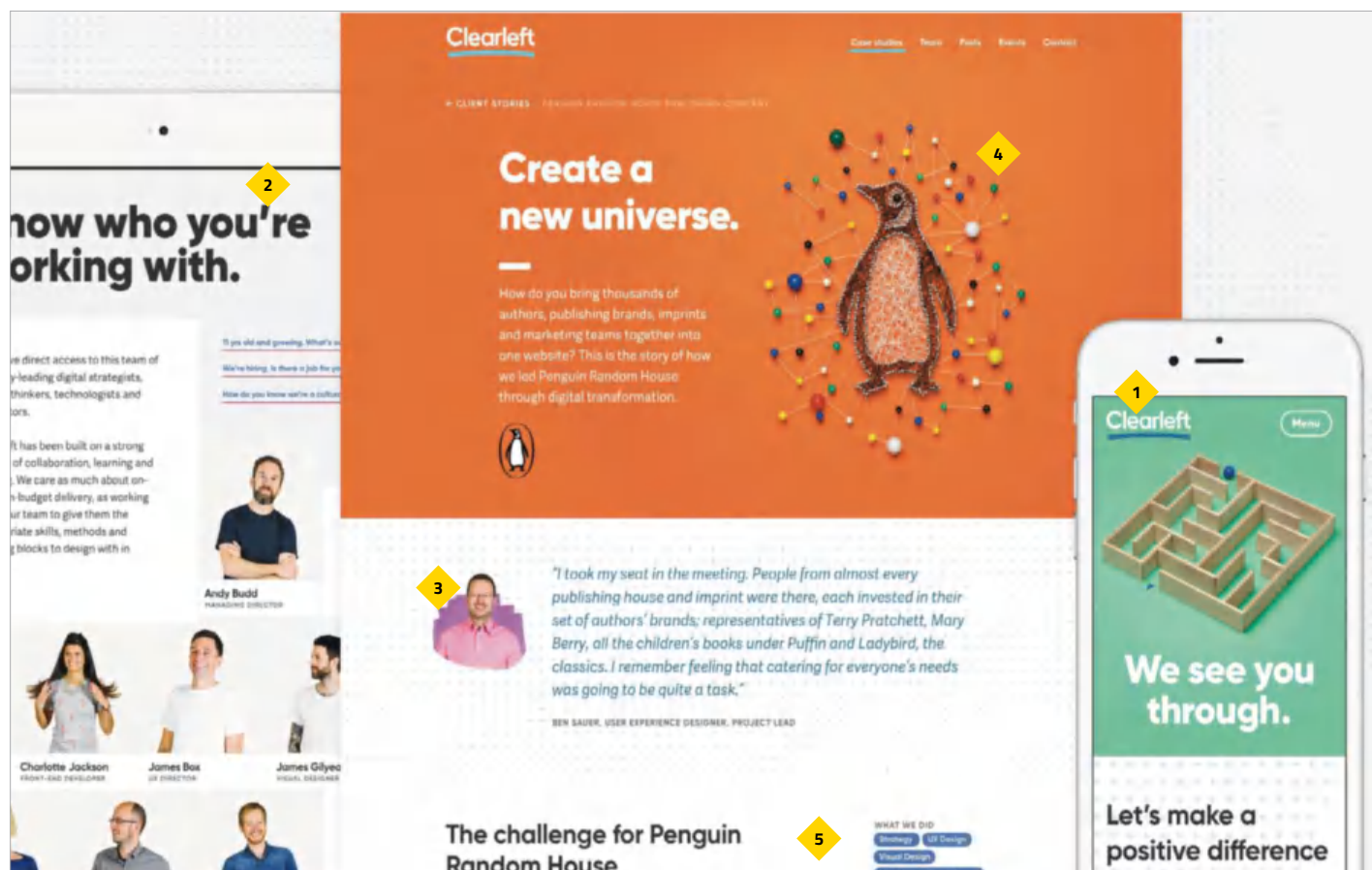
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DESIGN
MATTERS

* HOW WE BUILT

CLEARLEFT.COM.

With an evolved company focus and a rebrand, Clearleft bit the bullet and completely revamped its web presence. We take a look inside



BRIEF

Following a rebrand, Clearleft needed to rework its digital presence. Using a proposition statement, storytelling principles and a collection of user needs as its set of hypotheses, Clearleft built a whole new site reflecting its updated focus.

Q CLOSE UP

(1) Our new logo has a hand-drawn element. We've been exploring this style in visual devices, including shading behind profile pictures and images that lead the eye. (2) We use an assertive tone to communicate key messages with clarity and purpose. (3) This is a new storytelling device that zooms in on the action. Designed on the principles of 'Focus on the lovable details' and 'Show us doing the

things we love'. (4) Working with illustrator Kyle Bean meant interrogating our story to get to the crux of it. His models marry with the language to give abstract concepts new clarity. (5) Beneath the surface, we have an intricate data model. This helps us with searchability and groupability, for example in gathering 'service' or 'sector' content in future iterations.

JON AIZLEWOOD



Jon is senior visual designer at Clearleft and pays special attention to design systems and style guides.

t: @aizlewood

ELLEN DE VRIES



Ellen is Clearleft's content strategist and digital storyteller, she loves making patterns with language.

t: @eldevri

GRAHAM SMITH



Graham works as Clearleft's chief code warrior and he also has a serious gaming addiction to boot.

t: @gabraxian

> In the latter half of 2015 Clearleft (clearleft.com) decided that the time had come for a complete overhaul. Still very much a user-centred design agency that helps clients design and redesign digital products and services, today Clearleft often works in-house (even with clients located in India or the US), looking at the fundamental infrastructure of its clients' digital worlds and offering strategic consultancy. To reflect the change in its focus, Clearleft required a rebrand and, to go with it, a new web presence.

net: Can you tell us how the old Clearleft site was falling short?

EDV: There was a big gap between the nature of the work we were doing with clients and the story that our old website told. We wanted the act of redesigning the site to be an exciting opportunity to take a dose of our own medicine, including building the site using a pattern library tool called Fractal (a product that Mark Perkins has been building at Clearleft). As a result, the website you see today is a testing ground for us, as we experiment and play with it.

net: Was the rebrand a separate project from the site redesign?

EDV: The rebrand project began first; it demanded that we take a long look in the mirror and try to articulate our new proposition, our attributes, our archetypal traits, our purpose and

our differentiators. You can now see elements of the brand story bubbling up across the entire site; from the bold tone of voice for headings on the case studies to the dotted patterns in the page backgrounds. The brand and the website naturally have a kind of symbiotic relationship, where one cannot exist without the other to test it.

net: Did running a rebrand alongside a redesign make things much easier or more difficult?

JA: In many of our clients' cases, we often have to look at new permutations of the visual brand as it translates into digital components. So creating a site at the same time as evolving the brand was nothing new for us. A digital rebrand of this type demands plenty of time for contemplation, as well as face-to-face collaboration. We're a small company with a high concentration of practitioners, so finding that time between client projects to get everyone in a room together was probably our biggest challenge.

net: Part of the process was a hack week; can you tell us about that?

GS: There are two main challenges that a small agency has to overcome when designing its own website. One is to get a fresh perspective and see it from the outside. The other is to resource a team so that they can work together in one room for long enough to get the designs up on their feet. So then we took the team to work off-site in a room at a local



*TIMELINE

Key dates in the Clearleft website revamp

JAN 2016

We research our visual and verbal brand language as part of the rebrand.



FEB 2016

We conduct stakeholder interviews (on ourselves) and collate the findings.



APRIL 2016

We flesh out brand, personas, user journeys, messaging and tone of voice.



SEPT 2016

Hack week: collating discovery findings, creating principles, refining the project canvas, sketching.



OCT 2016

Case studies are pieced together.



NOV 2016

We create the underlying infrastructure for the IA to futureproof the site.



DEC 2016

We put Fractal to use and create the components for our pattern library.



JAN 2017

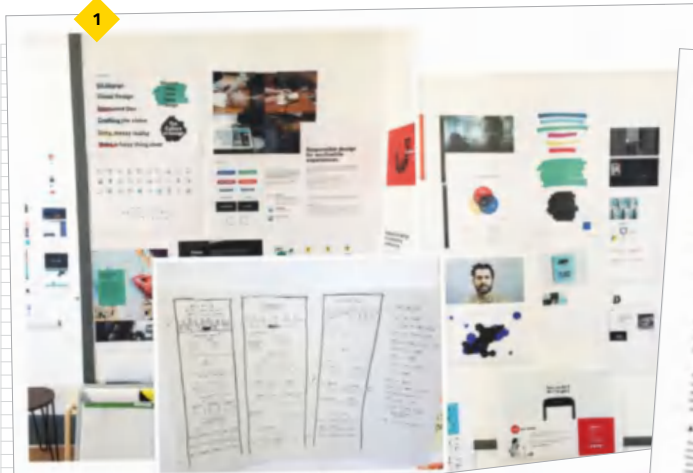
We piece the pages together in Craft CMS.



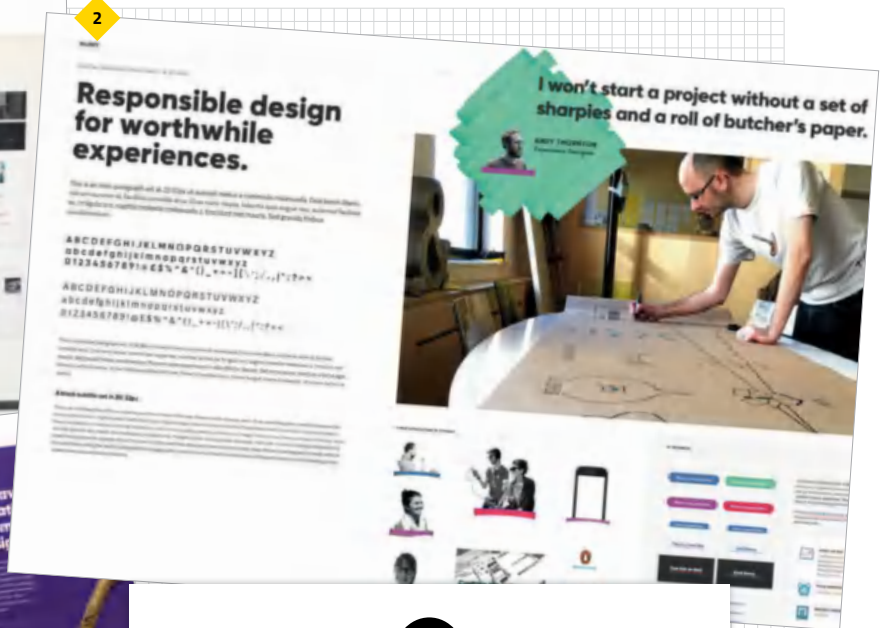
FEB 2017

We open up our work to the wider world, with many more releases to come.

1



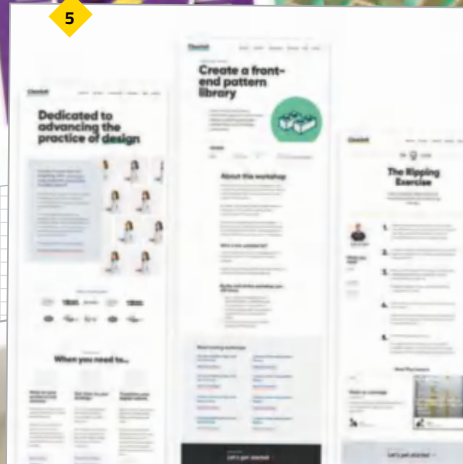
2



3



5

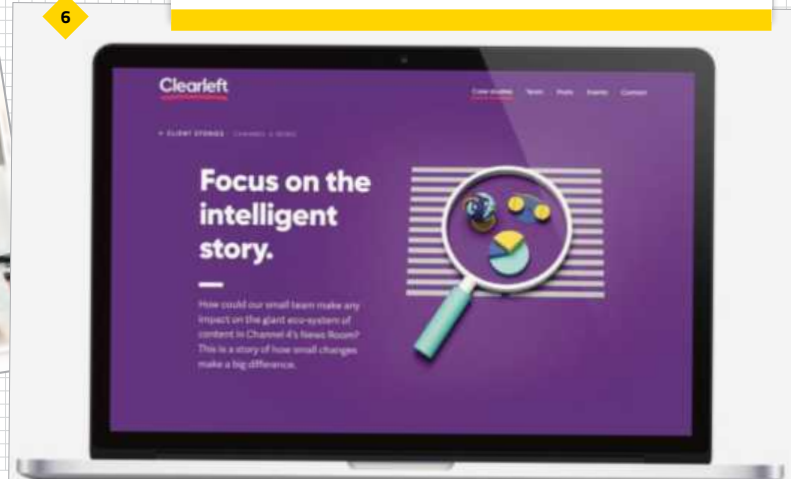


* EVOLUTION

Clearleft shows us the sketches and photography that made the new site possible

(1) During an immersive hack week we looked at inspiration and sketched out various areas for the site. (2) We examined aspects of the visual language including typography, application of the brand and how we represent individuals. (3) We explored our case studies in depth, asking compelling questions that resonated with our personas and matched their needs. (4) We revamped our in-house photography by creating a brief and shooting it all ourselves; a huge upgrade on our existing site. (5) We iterated through loads of designs while maintaining the basic visual language – strong typography, minimalist and confident. (6) Elements of the brand story bubble up across the website, including the bold tone of voice for headings on the case studies.

6



4



► start-up venue. During that time we got everything up on the walls and we nailed down our direction. When you're all sat in the same room, you begin to think differently. It becomes a group effort; everyone is there to remind one another of the needs and requirements that might be overlooked if we were working separately.

net: Can you talk us through one of the site's new design features?

JA: Since the beginning of the work, we'd been playing with this idea of being 'makers' and 'consultants'. We wanted to use strong and bold imagery to give shape to this idea, to keep our work grounded in reality, and easy to grasp. We played with diagrams, double diamonds, sketched pictograms and squiggles. But late in the day we decided we wanted something completely different; so we started working with Kyle Bean, whose amazing real-life models have been used to illustrate complex concepts for various eminent magazines, including this one!

net: What interesting technologies do you have running the site?

GS: Fractal is a tool that most closely aligns with how we work. It was built by Mark Perkins, one of our in-house devs. It's an open source tool which manages one of our primary deliverables; a



Team effort We put a lot of trust in our team, so wanted to reflect their personalities and strengths across the site

pattern library. By using it for our own project we are able to be on the receiving end of this deliverable, allowing us to better understand the problems integrating patterns into a system can bring and, hopefully, improve our process as a result.

net: Did everything launch on schedule and to spec?

EDV: When it's your own project, the schedule becomes elastic. In our case that elastic has been through the wash a few times and is now pretty loose. Because there are no client dependencies, the issue of a launch date was an interesting topic of debate that became almost philosophical at times. When your heritage is 'web' and your practitioners are working on client projects at the top of their game, the pressure to 'shine' is at times the biggest hindrance to getting it live. As Jeremy Keith says, "It's the web. It's built to change. Let's make it live, so everyone can see what we're doing, then

we can play with the other stuff later." So we did.

net: What's the biggest lesson you learned during the project?

JA: We've learned now that building one's own site is hard. We could have hired an agency, or assembled a team of freelancers to 'get it done'. But we would have missed out on the opportunity to dive so deeply into our identity, our sense of purpose and answer fundamental questions about ourselves.

Despite the length of the process, and the time it took to build a visual language for the new brand, we now have a very satisfying starting point. Our next steps on the road map are to refine what we have done, to investigate the choreography of animation and then to add our extensive library of knowledge resources. ■

► **Next month:** Digital innovation agency This Page Amsterdam



Collaboration With availability sometimes an issue, collaboration was key throughout the project, ensuring a shared understanding across the team

MASTER MOBILE DESIGN

Follow **Nick Babich** as he explores solutions that will help you create great mobile experiences

What makes a good mobile app? The answer is simple – design. Good design has a clear focus on key users' goals and removes all obstacles from their way by bringing clarity into user interface. But creating good design isn't an easy task. To help you create really great mobile user experiences we've prepared these design principles.

Make a great first impression

The first-time experience with your mobile app has to be good in order for users to engage further. There is only one chance to sway someone into becoming a user, because if you disappoint them the first time, you can be sure with 80 per cent confidence (goo.gl/EACgBX) they won't be back.



AUTHOR

NICK BABICH

A software developer who is passionate about user experience, Nick's recent projects include user interface redesigns of the iOS apps Notes and Messenger





► Make onboarding beneficial for your users

Onboarding is a process of learning what the product's capabilities are and how to use it. It can include a variety of techniques to keep users engaged during their first time, but it should only be employed if it's really essential for first use. The trick with onboarding is to show just what users need to know to get started – nothing more, nothing less. For instance, Duolingo uses onboarding as building an entry ramp for people to use the app: users are encouraged to jump in and do a quick test in the selected language (even without signing up).

the user interface as 'invisible' as you can. Interestingly, during a redesign phase for the Google Maps app for iOS, Google removed all of the unnecessary panels and buttons and said that the map is now the interface.

Design clear user flow

Whatever you're designing for a mobile device will be used 'on the go'. Users often have to quickly accomplish one core function in a mobile app – make a payment, check for new messages, etc. This critical flow should be crystal clear for the user. Reduce the effort users have to put in to get what they want by

The trick with onboarding is to show just what users need to know to get started – nothing more, nothing less

Don't ask users to rate your app soon after downloading it

Avoid interrupting users by asking them to rate your app if they've only recently downloaded it. Instead, wait until they prove to be repeat users and they'll be more likely to rate your app and provide more informed feedback.

De-clutter your user interface

Cluttering your interface overloads your user with too much information: every added button, image and line of text makes the screen more complicated. Clutter is bad on a desktop app, but on a mobile one it's a hundred times worse. It's important to get rid of anything on a mobile design that isn't absolutely necessary, because reducing the clutter will improve comprehension.

Prioritise content over chrome

Chrome denotes the UI elements that are instrumental in using an app. Whereas on desktop there is enough screen space for both content and chrome to coexist, on mobile designers must downplay the chrome to make space for essential content. As a designer you need to accommodate a high content-to-chrome ratio on the mobile screen: try to keep

using easily recognisable functions that are inherent in other well-known apps in your category and by guiding users seamlessly through task completion.

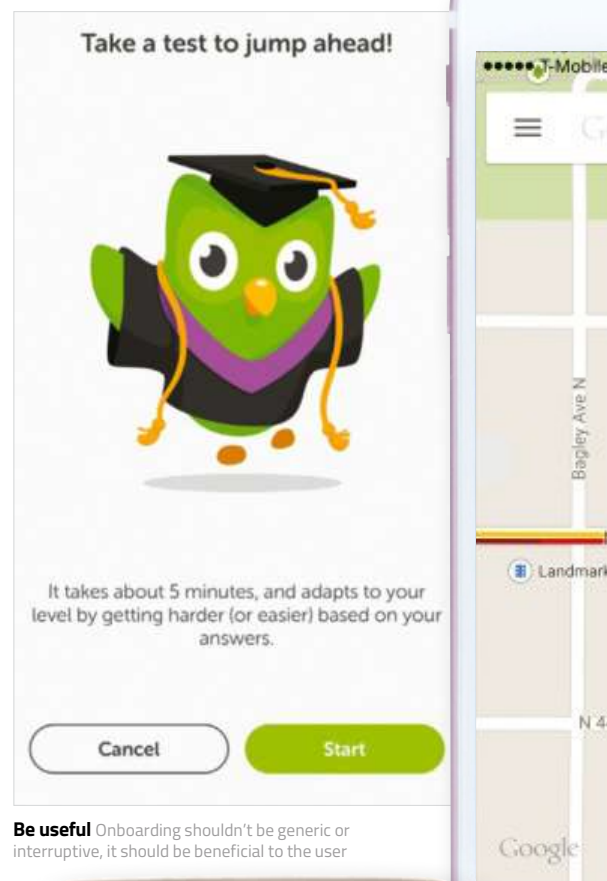
Follow the rule 'one screen, one task'

Design each screen for one thing and one thing only, with no more than one call-to-action. This makes it easier to learn, easier to use and easier to add to or build on when necessary. Take Uber, for instance. Uber knows that the goal of the person who uses the app is to take a cab. The app does not overwhelm the user with too much of information: it automatically detects user location based on geodata and the only thing users have to do is to select a pick-up location.

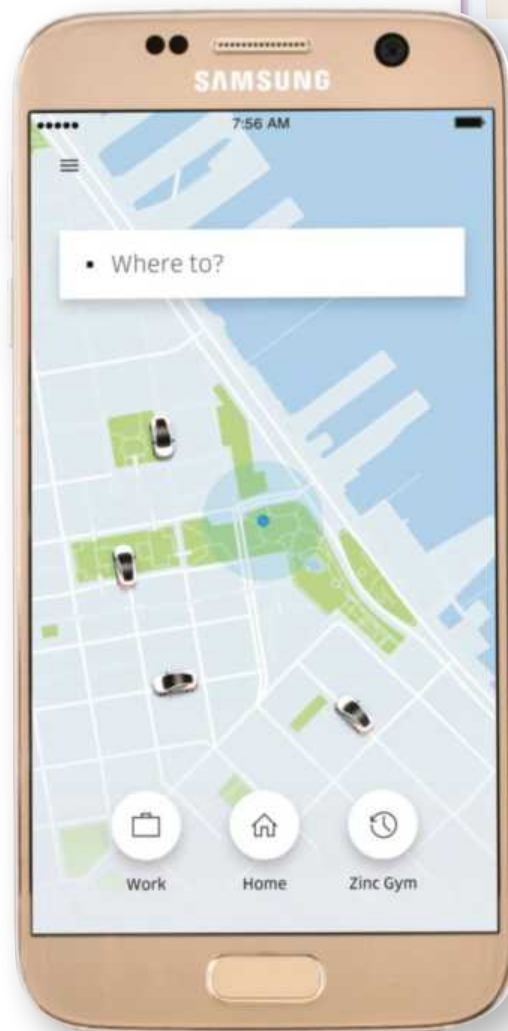
Make navigation self-evident

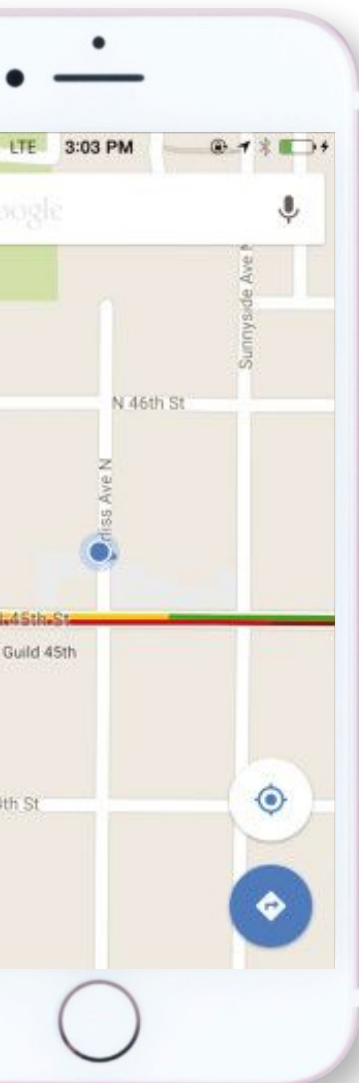
Helping users navigate should be a high priority for every app. Navigation doesn't just provide wayfinding for users, but also communicates to users what features the experience provides. Good navigation should feel like an invisible hand that

Action points Every screen that you design for the app should support a single action of real value to the person using it

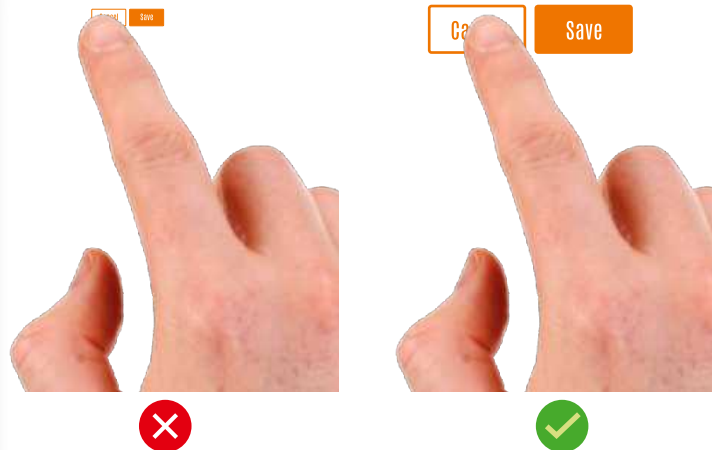


Be useful Onboarding shouldn't be generic or interruptive, it should be beneficial to the user





Tap away The tab bar displays all of the major navigation options and with one simple tap a user can go from one page to another



Target sizes Smaller touch targets are harder for users to hit than larger ones. Aim for controls that are 7-10mm in size

Attention grabbing A user's attention is a precious resource and should be allocated accordingly

guides the user along their journey. Experiments show that exposing menu options in a more visible way increases engagement and user satisfaction.

Design for interruption

Because people use phones in a variety of contexts and situations, they are more likely to be interrupted when using devices. As a result, attention on mobile is often fragmented and sessions on mobile devices are short. The average mobile session duration is a little more than a minute. Short mobile sessions mean that your design should be prepared for such interruptions – save context and make it easy for users to re-engage with an app later (resume an interrupted task).

But designing for interruptions doesn't only mean saving state. It also means simplifying tasks and interactions. A simple task is easier to finish quickly. It's also easier to resume than one with many

steps and alternatives. Thus, break down larger tasks into smaller ones so as not to overload the user.

Avoid dead ends

A dead-end page is a point in user journey that leads nowhere. The most common example of such a page is an empty state containing an error message. You should avoid creating dead-end pages in your apps, because dead-ends create confusion and lead to additional and unnecessary actions. Designing a UX is designing for flow, and flow is, in most cases about moving forward to accomplish a goal. Thus, nothing in your app should be a showstopper for your user.

Don't simply direct users to the browser

Users can get frustrated when an app takes them to the mobile web for more content or to complete a task. If your

Case study: Why hidden navigation is bad for your design

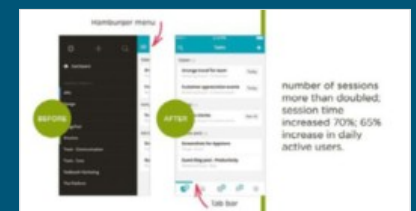
It's tempting to rely on hidden menus (such as hamburger icons) in order to simplify a mobile interface. But hiding critical parts of an application behind these kinds of menus could also negatively impact usage.

In his article *Obvious Always Wins* (goo.gl/138cRm), Luke Wroblewski warns of the dangers of hidden navigation. He provides an example of the Polar app. In an effort to simplify the visual design of the app, they moved from a segmented control menu to a toggle menu. While the toggle menu looked cleaner, engagement fell drastically. This navigation method was less discoverable: people were no longer moving between the major sections of the app as they were all hidden behind the toggle menu.



Forgotten features What's out of sight is out of mind. Any navigation options hidden behind the hamburger will be forgotten or used a lot less

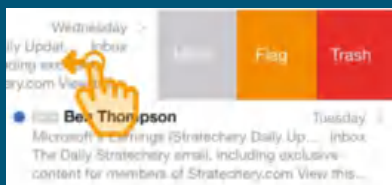
It's challenging to find the room to expose important actions on constrained mobile screen sizes, but it's necessary for designers to do so – when critical parts of an application are made more visible, usage of them can increase.



Visible menu Exposing menu options in a more visible way increases engagement

Design with gestures

Building gestures into the heart of the design saves screen space for valuable content. Touch interfaces provide many opportunities to use natural gestures like tap, pinch and swipe to get things done. But unlike graphical UI controls such as buttons, these interactions are often hidden and users don't know what's possible until they try. For example, how do iPhone users know that by swiping an item, they'll be able to see a list of actions available to carry out on that item?



iOS gestures A swipe-to-left gesture in Apple Mail

Follow these three tips to fill your apps with gestures that enhance the UX:

- It is vital to know your market and the other apps your target audience may be using, so you can employ the same types of gestures in your app. For example, if you design a mail app you can use a swiping-over-an-email gesture because there's a strong possibility that it'll be familiar for many.
- When it comes to teaching users to use your UIs, we would recommend to do so mainly by just-in-time education. The most popular form of such education is contextual hints. Focus each tip on a single, unfamiliar interaction and remember that these hints should appear on the first launch for new users, one at a time, as the user reaches the relevant section of the app. This makes it a lot easier for users to understand and learn instructions.
- Gestures would be nothing without animation. Paired with gestures, animations essentially trick the brain into thinking that it's interacting with something tangible. This reactivity boosts positive user experience.

- ▶ app lacks a specific feature or content, try to use an in-app browser, but do not invoke the smartphone browser or you will cause users to lose their track and not return to the app.

Design for the thumbs

Mobile apps should play nice with the user's thumb. Important content needs to be aimed towards the thumb, to where it is natural for the thumb to be.

Optimise UI for one-hand use

The thumb zone – the most comfortable area for touch with one-handed use – is an important factor in the design and development of mobile interfaces. The image to the right is from article 'How we hold our Gadgets' (goo.gl/VooMEO). It shows the areas of a screen that are easiest to tap when holding a normal size mobile with one hand.

Place top-level destinations and frequently-used controls in the easy-to-reach green zone and place controls that you don't want users to accidentally tap (such as delete or erase) in the hard-to-reach red zone.

Finger-friendly tap-targets

Make your tap targets big enough so that they're easy for users to tap. Create controls that are seven to ten millimetres in size so they can be accurately tapped with a finger. Such button size allows the user's finger to fit snugly inside the target. The edges of the target should be visible when the user taps it.

In each platform's measurements we would suggest the following:

- For iOS: 48px at 1x
- For Android: 48dp is 48px at 1:1 ratio

Ensure that there is good amount of space between tap targets and minimum spacing between elements is 2mm.

Align with platform conventions

If you are designing an app for Android and iOS, it's important to understand the difference between the two platforms early on and the quick ways that you can make the experience feel native to each.

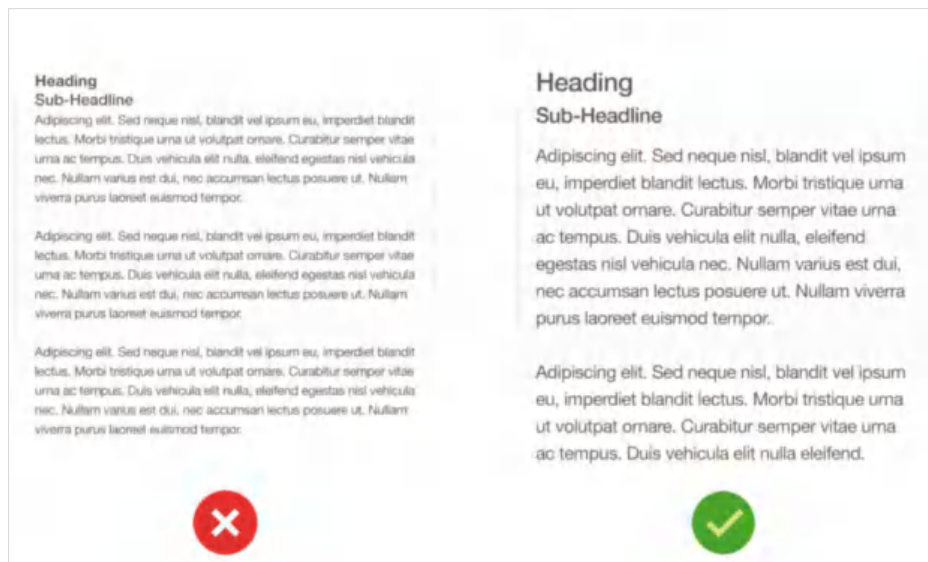
Don't mimic UI and typeface

As you build your app for Android/iOS, don't carry over themed UI elements from other platforms and don't mimic their specific behaviours:

- Input fields, check boxes, switches and other functional components should give a native feel, so that people know how to use them and trust your app with their sensitive data.
- Each platform typically provide sets of icons for common functionality, such as sharing, creating a new document or deleting. As you are migrating your app to another platform, you should remember to swap out platform-specific icons with their counterparts.
- The typeface also needs to comply with the standards of each platform: Android's typeface is Roboto (goo.gl/NU62ok), while iOS uses the San Francisco (goo.gl/T8bDxO) font family.



Colour codes Green indicates the area a user can reach easily; yellow, an area that requires a stretch; and red is an area that requires users to shift the way they're holding a device



Text sizes Reading teeny tiny text is very difficult so make sure it's at least 11 points in size

Design decisions that make perfect sense on one platform will look and feel misplaced on a different platform

Consider different patterns for iOS and Android

It's important to understand the idioms and behaviours of each platform before you start design and development. Design decisions that make perfect sense on one platform will look and feel misplaced on a different platform.

Perhaps the biggest point of difference between iOS and Android platforms is navigation. The difference is clearly visible in the context of tabs.

On iOS, it's common to use a bottom tab bar to switch between top-level destinations in the app.

The primary navigation pattern on Android is a drawer menu. It's also common on Android to use a tab bar at the top of the screen, however this element actually serves a different purpose – it has a name, Action Bar (goo.gl/okQJh9), and should be used to take actions, instead of navigating.

Dig deeper

Find more about design specifics for each platform in the article 'Design from iOS to Android

(and back again)' (goo.gl/6qarLM) and see how the specifics differ between an Android and iPhone UI (goo.gl/cr4AQ3).

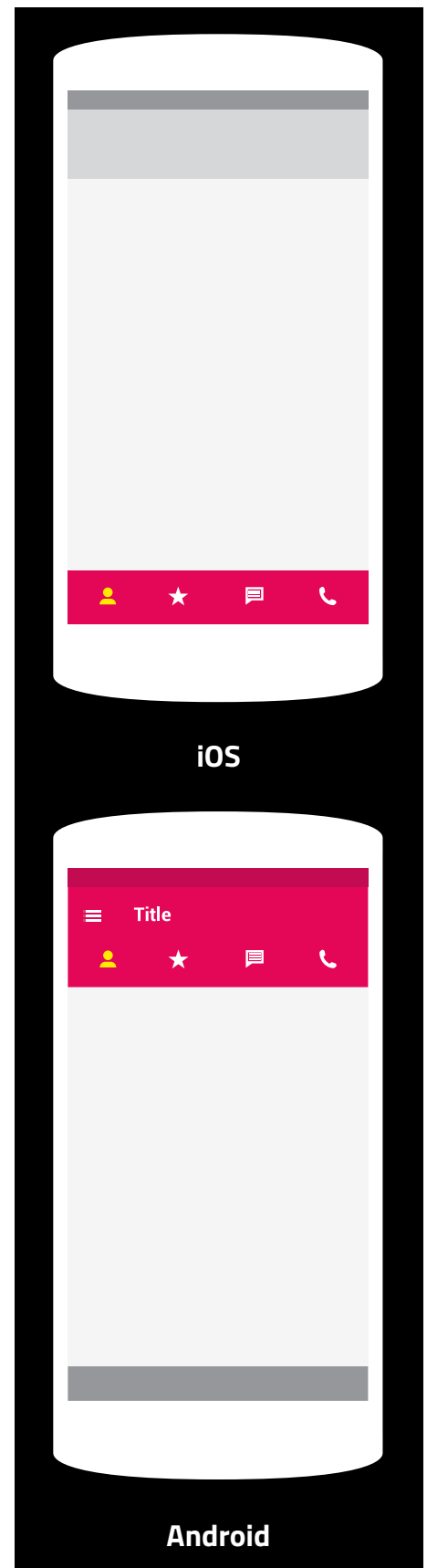
Focus on readability and scannability

When compared with desktops, mobile devices have relatively small screens, which means that one of the challenges of designing for them is to fit a lot of information on a small UI. You might have a temptation to squish everything down in attempt to provide as much information as possible, but you should resist that temptation.

Make sure text is legible

The following techniques should improve text legibility:

- Text should be at least 11 points so it's legible at a typical viewing distance without zooming.
- Good spacing aids readability. By adding a little space to text – both between lines and in the margins – you are helping users better interact with the words.



Android actions Android doesn't have tabs, but an Action Bar and it's used to take actions instead of to navigate

- ▶ ● Don't mix several different fonts in your design, because it can make your app seem fragmented. Consider using one font and just a few styles and sizes.
- Don't use low-contrast text. When the contrast is too low, users experience eye strain as they try to decipher the words. This is especially true on mobile screens, where users are more likely to be outdoors or in bright places that cause screen glare.

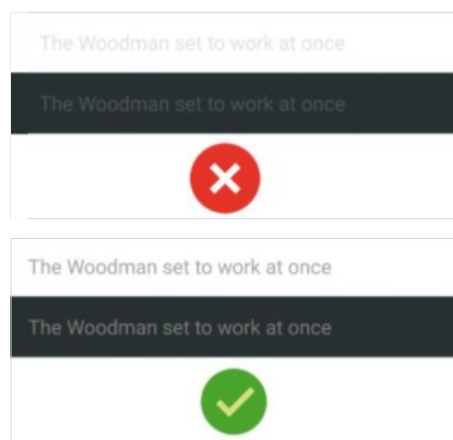
The last moment requires further clarification, because low-contrast text is a very popular choice among many designers. In practice, the right amount of contrast is a tricky thing. WC3's Web Content Accessibility Guidelines (goo.gl/ozX48q) are a good place to start. The W3C recommends the following contrast ratios for body text and image text:

- Small text should have a contrast ratio of at least 4.5:1 against its background.
- Large text (at 14 pt bold/18 pt regular and up) should have a contrast ratio of at least 3:1 against its background.

Use WebAIM Color Contrast Checker (goo.gl/XWlpHa), a browser-based tool, to check your colour contrast.

Use negative space to draw attention to important content

White space is the areas of a design where there is no element placed by a designer. Although many designers may consider it a waste of valuable screen estate, generous white space is an essential



Keep contrast Insufficient contrast between the text colour and the background degrades the user experience

element in mobile design. It creates the spaces around elements in the design to help them stand out or separate from the other elements.

High-resolution assets

Images should be appropriately sized for display purposes. You should display photos and graphics in their original aspect ratio, and don't scale them greater than 100 per cent.

Easily generate the optimal responsive image dimensions

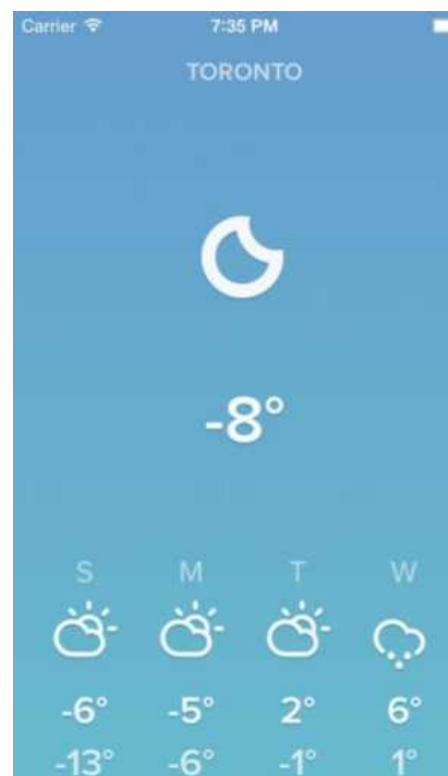
Mobile apps often struggle with selecting image resolutions that best match the various user devices. It's quite clear that one image for all screen resolutions and different devices is not enough. However, an image per pixel is too much – cropping images one at a time can be overwhelming especially if you have a ton of images to work through. Luckily though, there are solutions for this problem and one of them is online tool Responsive Breakpoints (goo.gl/BfynzK) which enables you to interactively generate all required images.

Create a positive experience

Many people seem to think of user experience as a controllable outcome of a design process. But in fact your product doesn't define a user's experience – a user's own emotions do. User experience is a feeling. While you cannot directly design a person's experience of a product, you can take steps to ensure that their experience is a positive one.

Make the app appear fast

Try as much as possible to make the app fast and responsive. Do things in the background to make it look like actions are happening quickly. Actions which are packed into background operations have two benefits – they are invisible to the user and they happen before the user actually asks for them to happen. A good example of this is uploading pictures on Instagram. As soon as the user chooses a picture to share, the app will start uploading the file. The app invites the user to add tags while the picture uploads in the background. By the time users



Efficient spacing Leveraging space helps define different sections of this weather app in a non-obtrusive manner

have added all required tags and are ready to press a share button, the upload will be completed and it'll be possible to share the picture instantly.

Minimise the need for typing

Typing on a mobile is a slow and painful process. If possible, always allow users to tap, rather than type:

- Keep forms as short and simple as possible and remove any unnecessary fields. Learn more about a topic in 'Design Responsive forms' from **net** magazine December 2016 (issue 287).
- Use smart features such as autocomplete and autodetection of location so that users only have to enter the bare minimum of information.

Include functional animation

It is the little things that can make your user experience truly delightful and memorable. By injecting subtle details – like animated microinteractions or in-app sounds – into design, you can make users feel like they are interacting with something that has a personality and not just a stone-cold interface.



Clear picture Images shouldn't be pixelated, so make sure you properly resize them

Apps that allow users to switch channels while completing tasks have a competitive advantage

Never in isolation

Since users often don't complete an activity through a single device, apps that allow users to switch channels while completing tasks have a competitive advantage. A seamless user experience is one of the most important requirements for a usable cross-device experience. You should design for the entire journey, not a single interaction experience.

Test your design

Even the most thought-out UX will ultimately contain some unseen flaw in the real world. That's why it's so important to test your app with real users on a variety of devices. Ask real users to complete regular tasks, in order to see how well the design really performs.

Constantly iterate

Improving the user experience isn't a one-time task, it's an ongoing experience. Treat your app as a continuously evolving entity, use data from analytics and user feedback to constantly refine your design and improve the experience.

Conclusion

People expect a lot from app interfaces today and the standards are just getting higher. You need to work hard to meet these expectations and make your app truly delightful. Just remember that design isn't just for designers – it's for users. Thus, to build a product that people enjoy, your whole product team needs to focus on the user. **■**

Resources

Guidelines for design

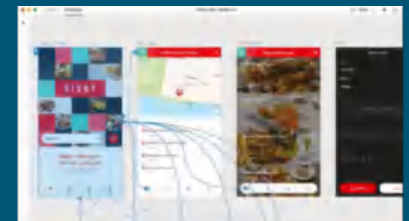
When it comes down to designing for mobile user experiences, you can't go wrong with sticking to best practices for your particular industry. Both the Material Design (goo.gl/BrOMgn) and iOS Human Interface Guidelines (goo.gl/SO6yfs) offer everything you need to design beautiful and engaging apps.

UI Inspirations

Find design inspiration from real live projects on Useronboard (goo.gl/9IYUUI), Little Big Details (goo.gl/AdNyuQ) and Mobile Patterns (goo.gl/ljsKK5).

Prototyping

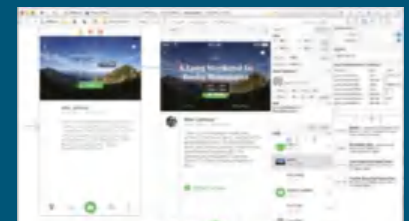
Axure (goo.gl/wwu1Y) and Balsamiq (goo.gl/3DhvdY) are great wireframing tools. Since wireframes require little investment in time and effort, you'll revise your designs more often and also refine them much sooner. And with tools such as Adobe XD Design (goo.gl/8Xyknp) and InvisionApp (goo.gl/hKtrlv) it's now incredibly easy to create an interactive mobile prototype.



Quick stages Adobe XD allows you to go from wireframe to interactive prototype, from desktop to mobile, in seconds

Design hand-off

Sympli (goo.gl/1WJ785) and Zeplin (goo.gl/LaL7Ck) are great timesavers and enable you to generate style guides and resources automatically.



Working together Sympli helps designers and developers collaborate





15 WEB APIs YOU'VE NEVER HEARD OF

Philip Ackermann takes a look at the most interesting Web APIs currently in development that may be supported by browsers in the coming years

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There is a huge number of Web APIs available and sometimes as a web developer it can be hard to keep track of new APIs. So we've helpfully collated a list of Web APIs that are not finalised yet and in very early stages, but are likely to become important in the following months or years. These APIs include handling payments, connecting to sensors and more – make sure you keep tabs on them.

01 Payment Request API

w3.org/TR/payment-request

When you look at payment forms and workflows on websites and web applications they often differ from each other, although in principle the workflow should always be the same: confirm

the shopping cart, add the shipping and billing address, select the payment method, confirm everything, accept the terms and conditions and send the final request form. From a usability point of view this difference can actually have a negative effect. From a developer's point of view, implementing a payment flow every time from scratch can also be a very time-consuming process: different forms need to be implemented, different payment methods like PayPal or credit card integrated and everything has to be secure as well. The Payment Request API currently developed by the W3C wants to facilitate and standardise the process of creating payment workflows and provides several interfaces. It's definitely an API that's worth a look in! ▶

02 Web Share API and Web Share Target API

github.com/WICG/web-share

and github.com/WICG/web-share-target

The goal of the Web Share API is to have a standardised way of sharing resources (including text, images, URLs and so on) from a mobile application to a destination specified by the user, which could be another mobile application, a website or a system service provided by the mobile operating system. The Web Share API extends both the interfaces Navigator and WorkerNavigator with a method `share()`, which takes the shared resource as parameter. While the Web Share API defines how to share resources, the Web Share Target API defines how to receive such shared resources. Applications (either native or web) and other services can use this API to register themselves for the share event to receive shared resources.

03 WebUSB API

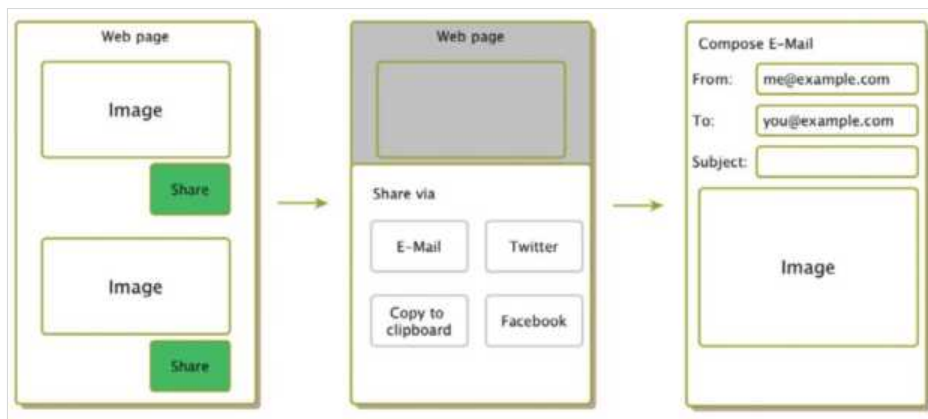
wicg.github.io/webusb

USB (Universal Serial Bus) is one of the standard ways of connecting external devices to a computer. While standard devices like mouse and keyboard are automatically recognised, some devices require you to install native drivers (in other words, native code) to be able to work with them. However, because of this native code these devices cannot then be used by browser in a standard way. This is where the WebUSB API comes into play: the idea is that USB devices expose their services through this API so web applications can access those services. To achieve this the interface Navigator is extended with the property `USB`, which then gives you access to an object of type `USB`, the main entry point for this API. Using the method `getDevices()` you can, for example, retrieve a list of all devices that are currently available and subsequently directly start working with them.

04 Geofencing API

w3.org/TR/geofencing

Today you can already determine the current geographic position of a device through the Geolocation API.



Share together The Web Share and Web Share Target APIs standardise sharing resources from one application to another

The Web Share Target API defines how to receive shared resources

However with the new Geofencing API it will be possible to set up geographic boundaries around specific locations and get notified when a device enters or leaves those locations. The API will be based on Service Workers, so even if the Geofencing API is used in a web application that has been closed it will still receive notifications.

05 Presentation API

w3.org/TR/presentation-api

There are a lot of libraries for creating presentations based on HTML5, CSS and JavaScript. However, there is no standard way to handle the interactions between the controlling part of a presentation and the actual presentation. This is where the Presentation API comes into play. The idea behind it is to be able to have one webpage that contains the presentation and one webpage that runs the code for controlling the presentation. Depending on the capabilities of the presenting device and the connection mechanism (DVI, HDMI, Chromecast, AirPlay and so on), either both webpages run in the same user agent (on the controlling device) or one runs in a user agent on the controlling device while the other one runs in a user agent on the presenting device.

06 Shape Detection API

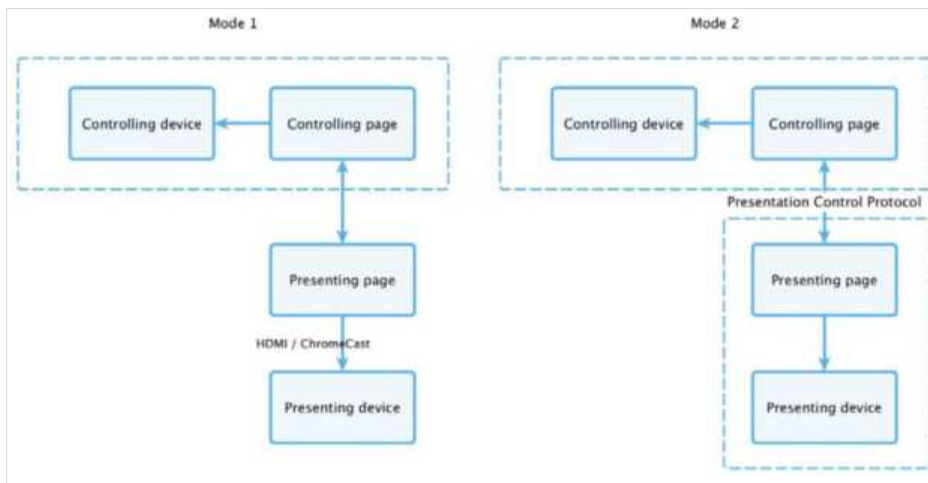
wicg.github.io/shape-detection-api

Detecting shapes in images is something very useful (think of Facebook's face detection features) and there are some libraries available for this, like `tracking.js` (trackingjs.com). The Shape Detection API, which is currently in progress, defines interfaces to detect different shapes in still images or in live image feeds. At the current stage the API has three sub-APIs: one for detecting faces, one for detecting barcodes and one for detecting text. The three interfaces `FaceDetector`, `BarcodeDetector` and `TextDetector` are all used in a similar way: they all provide a method `detect()`, which takes an image source as input and returns a Promise object with a sequence of detected shapes.

07 Async Cookies API

github.com/WICG/async-cookies-api

The current interface to work with cookies (`document.cookie`) is not very comfortable: there are no standard methods for adding, reading or deleting cookies, so all of this has to be done manually via string parsing and string manipulation. Of course there are helper libraries to facilitate all of those operations, but with the Async Cookies API it will be much easier and more performant as well. The idea is to not only store the cookies in `document.cookie`, but also provide a new object named `cookieStore`, which will



Effortless slides The Presentation API can be used to control presentations via JavaScript



Maps boundaries The Geofencing API lets you set up geographic boundaries like you can do with the library gmaps.js

be accessible both in webpages and in service workers. The object has methods like `write()` and `set()` for adding cookies, `delete()` for deleting them and `read()` for reading cookies and they all work asynchronously, so even if some cookie processing takes longer, this will not impact on the overall performance.

08 Input Device Capabilities API

github.com/WICG/InputDeviceCapabilities

Input events like the click event are only abstract representations of the device input and do not contain information about the actual device that has been used to generate the event. Developers need to make assumptions about which actual input device triggered such an

event. When supporting both mouse and touch events this can lead to problems and difficulties: it is hard to find out if some event (eg mousedown) was triggered from the mouse (because a mouse is used) or just because of compatibility reasons (but the actual device is a touch device). The new Input Device Capabilities API wants to solve those problems and introduces a new interface (`InputDeviceCapabilities`), which provides information about the device via a new property `sourceCapabilities` of the `UIEvent` interface.

09 FlyWeb API

github.com/flyweb/spec

With the rise of the Internet of Things, it becomes more and more important how devices and electronics

More interesting APIs in development

There are other APIs worth knowing in addition to what we've discussed here...

Reporting API

Defines an API for generic reporting functionalities (w3.org/TR/reporting).

Web Budget API

Defines an abstract API for retrieving the budget available for resource-consuming background operations (wicg.github.io/budget-api).

Permissions API

Defines an API for querying and changing the status of browser permissions (w3.org/TR/permissions).

Ambient Light API

Defines an API for monitoring the level of ambient light of a device (w3.org/TR/ambient-light).

Remote Playback API

Defines an API for controlling remote playback of media on remote playback devices like TVs, projectors or speakers (w3.org/TR/remote-playback).

Intersection Observer API

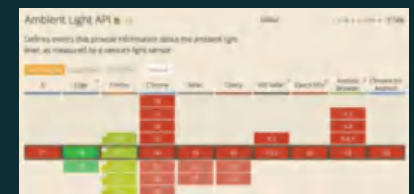
Defines an API for observing changes in the intersection of elements (github.com/WICG/IntersectionObserver).

Worklets API

Defines an API for executing JavaScript code independent of the main JavaScript context (w3.org/TR/worklets-1).

Proximity Sensor API

Defines an API that measures a device proximity (w3.org/TR/proximity).



Resources

Bookmark these really helpful websites to keep up to date with new features and proposals.



Web Incubator Community Group github.com/WICG

The goal of the Web Incubator Community Group is to propose and discuss new features for the web and to migrate them when stable to the W3C Working Group.



Programmable Web programmableweb.com/category/all/apis?keyword=w3c

A website claiming to be the "largest API directory on the web" with APIs for Twitter, Facebook and more.

W3C's JavaScript APIs Current Status Page

w3.org/standards/techs/js#w3c_all
Get an overview of the status of the different Web APIs maintained by the W3C with this website.

The HTML 5 JavaScript API Index html5index.org

This provides documentation of the standard HTML5 Web APIs, automatically generated from the HTML5 specification.

Google Chrome JavaScript APIs developer.chrome.com/extensions/api_index

This website gives you an overview about the Web APIs that are supported by the Google Chrome browser.

connect and interact with each other. The idea of the FlyWeb API, which is being developed by the Mozilla team, is to be able to serve web applications on electronics and to then connect to these applications from other electronics (for example, with smartphones) within the same network. Say that you want to connect a smartphone to a game console, the latter would provide a small FlyWeb server and this would then be visible to the smartphone.

10 Push API w3c.github.io/push-api

In traditional web applications there was no way for a server to actively send messages to a client, for example, to update a news ticker or to update some real-time data stream. Instead developers used techniques like Long Polling, XHR Polling or Hidden Frames to simulate real-time connections. Fortunately thanks to Web Sockets and Server-Sent Events (SSEs) those techniques are not necessary anymore. With Web Sockets you can implement a bidirectional communication between the client and the server and with SSEs an unidirectional communication going from the server to the client, which is perfect for sending updates actively from the server to the client. However both technologies require a browser window/tab to be open to receive those updates. With the new Push API this is not necessary: it is directly connected to the Service Worker API and allows service workers to receive messages from a server. This means that even if a web application has been closed the service

worker can still receive the messages, for example if you want to send notifications via the Notifications API (notifications.spec.whatwg.org) to inform the user about any updates.

11 Generic Sensor API w3.org/TR/generic-sensor

There are already a lot of Web APIs that define interfaces for different kinds of sensors, eg the Device Orientation API or the Geolocation API. Unfortunately those APIs do not have a common interface and are all used differently, so for example by providing callback handlers in one case or by registering event handlers in another. The goal of the Generic Sensor API is to define a set of common generic interfaces for accessing any kind of sensor. Concrete sensor APIs that are based on the Generic Sensor API (such as the Ambient Light API) extend generic interfaces and add functionality as required.

12 Accessibility API github.com/WICG/a11yapi

Accessibility is an important point when developing web applications. There are already standards like ARIA (Accessible Rich Internet Applications, w3.org/TR/wai-aria-1.1), which provides an ontology of roles, states and properties to define accessible user interfaces on the web. It can also enrich HTML elements (on a markup level) with information that can be used by assistive technologies like screen readers. However, the Accessibility API creates a standard Web API for JavaScript, based on ideas from ARIA and other existing accessibility



Messages The Push API allows servers to push messages to the client

The Accessibility API creates a standard Web API for JavaScript

APIs like Web Accessibility and Actions by Microsoft (github.com/cyns/wapa), the Web Accessibility API by Mozilla or other native platform APIs (including the Java Accessibility API). Using the new property `aria` on DOM elements, developers can access semantic information about the element like the role, the state, relations to other elements and many more using JavaScript.

13 Font Loading API

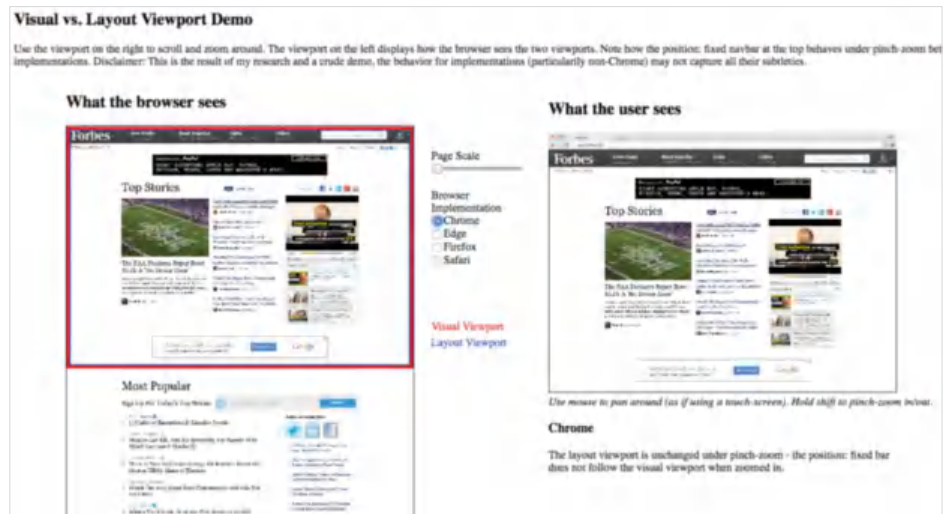
drafts.csswg.org/css-font-loading

When you are using custom fonts on a webpage, downloading the font files can take time, depending on the bandwidth and the size of the font files. This can then lead to display problems like flickering content when the webpage starts rendering without the font face being loaded first. The new Font Loading API addresses this problem and it can define a standardised API for downloading font faces by utilising JavaScript. Developers can choose when to load a font face and what to do when it has been downloaded.

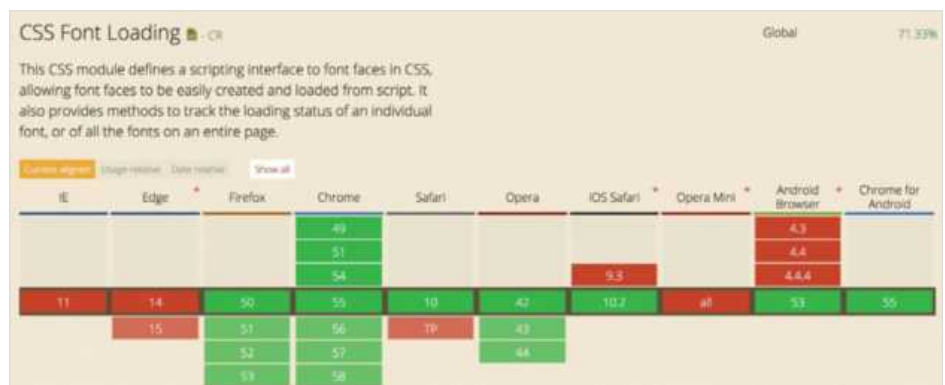
14 Web Bluetooth API

webbluetoothcg.github.io/web-bluetooth

The Bluetooth protocol is a standard that is often used in the field of IoT (Internet of Things), for example to connect a smartphone or tablet to other devices like health trackers to read certain sensor values. For mobile web applications it is already possible to connect via Bluetooth by using PhoneGap and its plugins, but if you want to use Bluetooth inside of a web application on a desktop computer or laptop then you will still need to install an extra browser plugin. The goal of the Web Bluetooth API that is being worked on by the W3C Web Bluetooth Community Group is to provide a standardised API for



Staying timely Moment provides a user-friendly API for working with dates and times



Easy loading With the Font Loading API you can load font faces dynamically with JavaScript

accessing Bluetooth devices through the browser, without any plugins.

15 Visual Viewport API

github.com/WICG/ViewportAPI

As you know, web applications contain two viewports: the layout viewport, which represents the space where a page lays out its elements into, and the visual layout, which represents what is visible on the screen. However, working with those two layouts can be a confusing task: while some properties like `innerWidth` and `innerHeight` are relative to the visual viewport, other properties such as those for accessing event coordinates are relative to the layout viewport. On top of that, the browser behaviour can also differ when you pinch-zoom into an application (an online demo that visualises those problems and the relationship between

these two different layouts in general can be found at bokand.github.io/viewport/index.html). To overcome these problems and disparities, the goal of the Visual Viewport API is to add new properties that are all related to the visual viewport, as well as to introduce a property `visualViewport` on the window object.

Conclusion

So we've put together an interesting collection of Web APIs that are in development. They are not guaranteed to ever be officially published, and the time frames for this are not clear, but they are worth keeping an eye on. To stay up to date with the latest developments you can have a look at the GitHub page of the Web Incubator Community Group, which is available at w3.org/community/wicg or the news page of the W3C, which can be found at w3.org/blog/news. Stay tuned!



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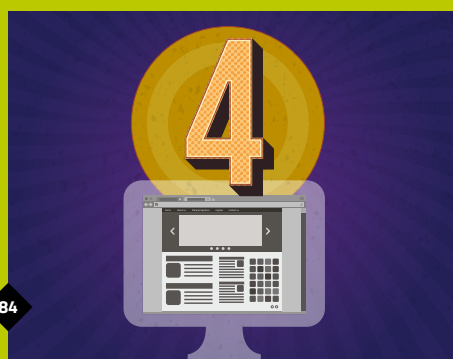
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BROWSER SUPPORT

We feel it's important to inform our readers which browsers the technologies covered in our tutorials work with. Our browser support info is inspired by @andismith's excellent Can I Use web widget (andismith.github.io/caniuse-widget). It explains from which version of each browser the features discussed are supported.



EXCLUSIVE VIDEOS

Getting excited by the 2017 leg of Generate, New York? We've got all the incredible highlights of last year's conference for you to check out free on YouTube. Just head to www.youtube.com/creativebloq where you'll find in-depth sessions from the likes of Meg Lewis, Marcy Sutton and Tim Holman. It's unmissable stuff!



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***BOOTSTRAP**

EXPLORE NEW LAYOUTS WITH BOOTSTRAP 4

Ray Villalobos walks through the new features in Bootstrap 4, including its exciting new Flexbox capabilities

> Layout on the web has been a nightmare so far, because the tools we've had for even the simplest layout tasks have been wholly inadequate. The browsers laughed in the face of your attempts to lay something out consistently as they thwarted your feeble attempts at vertically centering things ... how dare you?

We have worked around it, stressed over it, lost hours of sleep and welcomed anything that made it simpler. Well, all that's about to change for the better with this new version of Bootstrap. If you live on the bleeding edge of frontend development, you

won't mind using the very latest tools like Flexbox, variables and even CSS grids, but there are always problems with compatibility and browser support. For real-world, day-to-day work you need something that is more sensible.

Bootstrap is the web's most popular framework because it gives you a decent system within which to get things done. This battle-tested tool has been popular for years. However, version 3 is starting to show its age, and there are some components that could have been done better (navigation, I'm looking at you).

THE NEW VERSION

The new Bootstrap 4 is different in a number of significant ways, but all the changes feel amazingly practical. However, some of this power comes at a price. The bad news is that it doesn't migrate well ... at all. I can't emphasise this enough. Migration is going to be a major issue.

The grid in the new version, for example, is similar to the old grid, but different enough that you'll have to do some work to fix your old layouts (more on that later). Your forms and navigation are going to break (badly) and even things like the classes for responsive images and carousels will need some love.

GOODBYE IE9

One of the best decisions the developers made in this version of Bootstrap is to let go of Internet

Bootstrap 4 is different in a number of ways, but all the changes feel amazingly practical

Explorer 9 support, which means if you need to support older browsers, you won't be able to use it. However, this is the decision that made using Flexbox possible. The framework CSS will take care of the issues in IE10 Flexbox code, which cause problems when writing CSS for those browsers.

REBOOT

Another big change is the new reset template, which is called Reboot. We use reset templates like `normalize.css` and others to make browsers behave consistently, and to apply things like a reasonable `box-model` or the handy `clearfix` trick.

Bootstrap 4 does this too, but it goes further. Reboot is highly opinionated, but in a good way; it makes sensible decisions about how browsers should work, and incorporates some of the latest thinking in best practices for development. Let's look at some examples.


REMS VS EMS

In the old version of Bootstrap, the fonts were smaller and there was more space above headlines. In the new version, the fonts and breakpoints are bigger, and your content will shift a bit because of new breakpoints in the grid.

The default units for sizing elements in Bootstrap are now rems and ems. Rems are root ems, which

*** FOCUS ON**

WHAT'S MISSING

 There are a lot of exciting changes in this new version of Bootstrap, but there are also a few things you might miss from Bootstrap 3. Here are some of them:

Icons

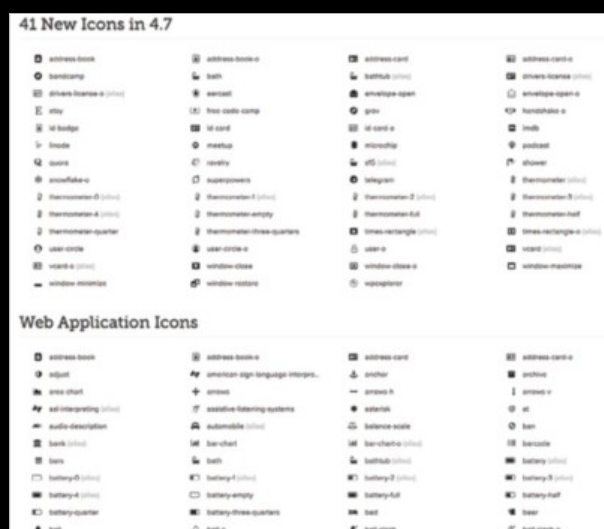
A limited set of glyphs – known as Glyphicon Halflings – were available from the Glyphicon library. These are no longer included with this version of Bootstrap. So if you were already using them, you'll need to either use Bootstrap 3, get a license from the Glyphicon website (0-\$50) or use a different icon set. Some of the obvious alternative options are Octicons from GitHub, Font Awesome or the Noun Project.

The only problem is that the code for the icons is no longer embedded into Bootstrap, so you'll have to add that separately or manually. Several icon sets like Font Awesome include code that is easily compatible with Bootstrap.

Affix

The affix plugin is also gone. Affix allowed you to fix the position of certain elements on the page as you scrolled, and was commonly used with the `scrollspy` component in order to highlight certain navigational elements during a scroll.

The default way around this is to use a class called `position-sticky` which will affix the component to the top of the screen using a CSS property. The problem with using this is that the browser support isn't too great.



Font Awesome One possible replacement for Bootstrap 3's Glyphicon Halflings

- means they are proportional to the root font size. In most browsers that is 16px. The old version of Bootstrap reset the base font size to 14px, but this new version puts it back to 16px on the `<html>` tag and 1 rem on the `<body>`.

This will make it easier to set up component sizing, which will in turn make it easier to change the sizing of the entire page or individual portions and components. Bootstrap 3 is a bit messy when it comes to customisation, so this is a welcome change.

NATIVE FONTS

Some things about Bootstrap 4 seemed strange at first, and native fonts was one of them. Bootstrap 3's default fonts were Helvetica Neue, Helvetica and Arial. This version drops that in favour of a native font stack.

There are more device types around than ever before, and almost every device uses its own custom font. In a responsive world, it makes no sense to try to shove Helvetica down everyone's throat. Even OSX has its own beautiful custom font (San Francisco). So why not use that?

Here's the new setup for the fonts.

```
$font-family-sans-serif:
  // Safari for OS X and iOS (San Francisco)
  -apple-system,
  // Chrome >= 56 for OS X (San Francisco), Windows, Linux
  and Android
  system-ui,
  // Chrome < 56 for OS X (San Francisco)
  BlinkMacSystemFont,
  // Windows
  "Segoe UI",
  // Android
  "Roboto",
  // Basic web fallback
  "Helvetica Neue", Arial, sans-serif !default;
```

MARGIN PROPERTIES

Another thing that will feel weird at first is that all of the `margin-top` properties have been cleared in this new version. When you migrate your existing website it will need some margin love, especially on your site's headlines.

The reason for this change is that browsers make margins collapse, which makes it difficult to know exactly where any spacing above and below is coming from. This change should help make things more consistent: now, spacing is always at the bottom and never at the top.

Thankfully, this new version of Bootstrap includes some new classes that will let you put the space

back. They also feel strange at first, but once you get used to them, they make a lot of sense.

INHERIT

Another change in Reboot is that the `inherit` property is used as much as possible. This makes things easier to update, because font-related properties are kept to a minimum. Previously, it was a bit tough to guess where the properties of elements were coming from. In this version things make a lot more sense.

UTILITY CLASSES

Because of the decision to get rid of spacing, as well as the introduction of Flexbox, this version of Bootstrap has a number of new utility classes to set up the display property. So we can now set up an element like navigation to use the CSS `fixed-top`, `fixed-bottom` and even the very new `sticky-top` properties.

Position classes

`fixed-top` `fixed-bottom` `sticky-top`

You can also set up the display type, so you can make an element display as a `block` element, `inline`, `inline-block` or `flex`.

`.d(-BP)-TYPE`

ALN: `block` `inline` `inline-block` `flex(options)`

`flex` can be set up to change at different breakpoints.

`.d(-BP)(-inline)-flex`

BP: `sm` >576px `md` >768px `lg` >992px `xl` >1200px

FLEXBOX

Flexbox is special because there are so many new classes related to the property. For example, you can set the direction of `flex` elements within a container. What Bootstrap adds to the traditional Flexbox classes is the ability to control these elements on a breakpoint-by-breakpoint basis.

`flex(-BP)(-DIR)(-reverse)`

BP: `sm` >576px `md` >768px `lg` >992px `xl` >1200px

DIR: `row` `column`

Attaching Flexbox to a grid makes it much more powerful and easier to execute. If you've used Flexbox before, you'll know that `row` or `column` makes your items float next to one another or simply appear stacked up on top of one another. But there are a lot more options. `justify-content` controls the spacing of the internal elements and makes it super simple to centre content – something that required a table display or some other crazy tricks before.



justify-content(-BP)-ALG

BP: sm >576px md >768px lg >992px xl >1200px

ALG: start end center around between

`wrap` lets you control whether the elements wrap in relation to the space in their container. There are two options: either wrap the elements or don't wrap the elements. You can also include an extra keyword to reverse the order of the elements.

flex(-BP)-WRP(-reverse)

BP: sm >576px md >768px lg >992px xl >1200px

WRP: wrap nowrap

Vertical alignment does what you'd expect: controls the alignment of elements vertically. As well as the breakpoints, you can either put the elements towards the beginning or the end, centre them vertically, put space in-between or around, or finally stretch the elements to fit the container.

align-content(-BP)-ALG

BP: sm >576px md >768px lg >992px xl >1200px

ALG: start end center between around stretch

One of the traditional ways to control the flow of elements is to float them so they appear side by side. The classes to do that are `float` and then an optional breakpoint, plus either `left`, `right` or `none`, just like in CSS. When you float elements, the container is unable to track the height of an element unless you use a `clearfix` trick, which clears the floats. To do that, Bootstrap provides a `clearfix` class as well.

float(-BP)-SID

BP: sm >576px md >768px lg >992px xl >1200px

SID: left right none

One of the things that feels odd is that there are all sorts of margin and padding classes. You're going to want to resist this, but they're useful because they have breakpoints associated with them, which is super-helpful for responsive design.

PRO(SID)(-BP)-SIZ

PRO: m margin p padding

SID: t r b l x y

BP: sm >576px md >768px lg >992px xl >1200px

SIZ: 0 1 2 3 4 5 auto



Flexbox layout A simple responsive group of elements that are set up by default to stack on top of one another at the medium breakpoint

Let's take a look at an example that uses a lot of these elements in practice.

```
<div class="container bg-danger">
  <div class="bg-warning text-center d-flex flex-column
  justify-content-center flex-md-row">
    <div class="item bg-info px-md-2 py-2 mr-lg-2">Exotic</div>
    <div class="item bg-info px-md-2 py-2 mx-lg-2">Grooming</div>
    <div class="item bg-info px-md-2 py-2 mx-lg-2">Health</div>
    <div class="item bg-info px-md-2 py-2 mx-lg-2">Nutrition</div>
    <div class="item bg-info px-md-2 py-2 mx-lg-2">Pests</div>
    <div class="item bg-info px-md-2 py-2 ml-lg-2">Vaccinations</div>
  </div>
</div><!-- container -->
```

Check out the CodePen at netm.ag/display-292 to play around with these properties. In the images shown above, you can see a responsive group of elements that are set up, by default, to stack on top of one another at the medium breakpoint (768px).

There are also ways to make the Flexbox class to control each item inside a Flexbox container.

align-self(-BP)-ALG

BP: sm >576px md >768px lg >992px xl >1200px

ALG: start end center baseline stretch

This group of tools give you incredible control over just about any property at the different breakpoints,



* IN-DEPTH

MIGRATING

+ The bad news is that migrating from Bootstrap 3 will be pretty challenging. Let's have a look at some key changes.

Navs and navbars

You now have to add `nav-items` to `nav` elements and `nav-link` to links. You can use these with or without list elements. There are many more alignment options now and it's super-simple to control the alignment within `navs`. `nav-fill` will make the links fit the horizontal space, but the space of each link will be different depending on the width of the text. If you want the spacing between the links to be the same, you can use `nav-justified`.

Navbars used to be a real pain to style, but now they're a lot easier to handle with regular background colour classes.

primary	success	info	warning
danger	inverse	faded	

You can simply use a `bg-color` class to change the colour of the background, and if you don't like those colours, you can use CSS to change the `bg-color` attribute yourself. There are two additional classes for controlling the colour of the text. If your background is going to be lighter, you can use the `navbar-light` class and the text will be darker. If your background will be darker, you can use `navbar-inverse` class and your text will be lighter.

Images

Another change that will immediately impact your migration is the slight modifications to image classes. `.img-responsive` is now called `.img-fluid`. `.img-rounded` is now `.rounded` and `.img-circle` is now `.rounded-circle`.

Carousels

The main thing you need to look out for is that the `item` class is now called `carousel-item`. There's also a lot of changes to the left and right arrow controls and buttons.

Forms

There's some key changes to form layouts, especially horizontal forms. It is no longer a requirement to add `form-horizontal` to your forms. However, you now have to add a `row` class, and of course your form should be inside a container. Remember there are different breakpoints now, so the `SM` breakpoint might not be wide enough.

Where forms have changed a lot is in how you work with radio buttons and checkboxes. The format for the control labels is different, with a completely new way to handle those.

- which gives you a new way to control layout. Interestingly, these classes can be injected by something like React or Angular.

THE GRID

Bootstrap's grid has also been upgraded in very significant ways. The new grid has an extra breakpoint at a smaller size of 576px. The smallest breakpoint is no longer called `XS` in the grid, it's simply called `col`.

This means if you have references to an `xs` breakpoint, you'll have to change them all. The distribution of the rest of the breakpoints have changed, with the largest breakpoint now called `XL`, but at the same size as the `lg` breakpoint.

Bootstrap 3 Grid

B3	Extra Small	Small	Medium	Large
Break	<768px	≥768px	≥992px	≥1200px
Width	Auto	750px	970px	1170px
class	.col-xs-	.col-sm-	.col-md-	.col-lg-

Bootstrap 4 Grid

B4	Extra Small	Small	Medium	Large	Extra Large
Break	<576px	≥576px	≥768px	≥992px	≥1200px
Width	Auto	540px	720px	940px	1140px
class	.col-	.col-sm-	.col-md-	.col-lg-	.col-xl-

REORDERING COLUMNS

There's a new class that lets you delete the spacing within the columns called `no-gutters`. Although you can still reorganise columns using push and pull, there's a new way to reorder columns using Flexbox: Include the word `flex`, then optionally a breakpoint as well as a keyword. However, this approach isn't as flexible as push and pull.

flex(-BP)-ORD

BP: `sm` >576px `md` >768px `lg` >992px `xl` >1200px

ORD: `first` `last` `unordered`

CARDS

There aren't a ton of new components in Bootstrap 4, but cards are one of the additions (although they're not totally new, since they replace panels, thumbnails and wells). Cards help you lay out content into card-like containers that look great, and thanks to Flexbox are very easy to set up.

To get started, you create a container with one of three classes. `card-group` gives you cards that flow together with shared margins in-between. `card-deck` is similar, but with margins in-between. Finally, `card-columns` gives you a way to create the type of

layout you see in sites like Pinterest easily. The content itself pretty easy to set up, but a lot more verbose than anything you've done before.

There are classes for just about every type of content that fits inside your cards, with `card-header` and `card-footer` classes providing some additional formatting, and classes for special content like `card-header-tabs` to format tabs inside your cards.

There are also lots of formatting classes you'll need to add to make things look great. The main container class for elements inside cards is called `card-block` and there are classes for titles (`card-title`, `card-subtitle`), text (`card-text`), links (`card-link`) and images (`card-img`, `card-img-top`, `card-img-bottom`).

Here's some code:

```
<div class="container card-deck">

<section class="card" id="drwinthrop">
  
  <div class="card-block">
    <h3 class="card-title">Dr. Stanley Winthrop</h3>
    <h5 class="card-subtitle">Behaviorist</h5>
    <p class="card-text">Dr. Winthrop is the guardian of Missy, a three-year old Llaso mix, who he adopted at the shelter. Dr. Winthrop is passionate about spay and neuter and pet adoption, and works tireless hours outside the clinic, performing free spay and neuter surgeries for the shelter.</p>
    <a class="card-link" href="#">About Me</a>
    <a class="card-link" href="#">My Pets</a>
    <a class="card-link" href="#">Client Slideshow</a>
  </div><!-- card-block -->
</section>

<section class="card" id="drchase">
  <header class="card-header">
    <nav class="nav nav-tabs card-header-tabs">
      <a class="nav-link nav-item active" href="#">About</a>
      <a class="nav-link nav-item" href="#">Pets</a>
      <a class="nav-link nav-item" href="#">Show</a>
    </nav>
  </header>
  <div class="card-block">
    <h3 class="card-title">Dr. Elizabeth Chase</h3>
    <h5 class="card-subtitle">Dentistry</h5>
    <p class="card-text">Dr. Chase spends much of her free time helping the local bunny rescue organization find homes for bunnies, such as Kibbles - a Dalmatian bunny who is part of the large Chase household, including two dogs, three cats, and a turtle.</p>
    <a class="card-link" href="#">About Me</a>
    <a class="card-link" href="#">My Pets</a>
    <a class="card-link" href="#">Client Slideshow</a>
  </div><!-- card-block -->
  

```
</section>
```

```
<section class="card" id="drsanders">
```

```

```

```
<div class="card-block">
```

```
<h3 class="card-title">Dr. Kenneth Sanders</h3>
```

```
<h5 class="card-subtitle">Nutritionist</h5>
```

```
<p class="card-text">Leroy walked into Dr. Sanders front door when she was moving into a new house. After searching for weeks for Leroy's guardians, she decided to make Leroy a part of her pet family, and now has three cats.</p>
```

```
</div><!-- card-block -->
```

```
</section>
```

```
</div><!-- content container -->
```

**New components** Cards are a new addition to add Pinterest-style layouts quickly and easily

Play around with the new card component using this CodePen: [netm.ag/cards-292](https://codepen.io/netm/pen/292).

This is also something that you'll notice in other places throughout the new Bootstrap: Things like list groups and forms follow a newer, more verbose format that requires you to add more classes inside existing components for proper formatting. Cards easily align elements together in a great-looking layout, regardless of the height of the content.

## FINAL THOUGHTS

There's a lot more to this new version of Bootstrap, and because of Flexbox, there are major changes to existing components. Some of your migration efforts will be pretty easy – you'll just end up adding a few classes. Others, like migrating your forms, will be extremely difficult thanks to the changes.

Despite these migration headaches, this new version of Bootstrap is a winner. It gives us a more modern and consistent grid, with Flexbox classes tied to responsive breakpoints, that is easy to learn and fun to implement. **m**

**ABOUT THE AUTHOR**  
**MAX IGNATYEV****w:** [sympli.io](http://sympli.io)**t:** @MaksimIgnatyev**job:** CTO and founder,  
Sympli**areas of expertise:**  
iOS/Android development,  
backend development**\*SYMPLI**

# COLLABORATE ON DESIGNS WITH SYMPLI

**Max Ignatyev** shows you how to use Sympli to collaborate on web and mobile app designs, and streamline sharing with developers

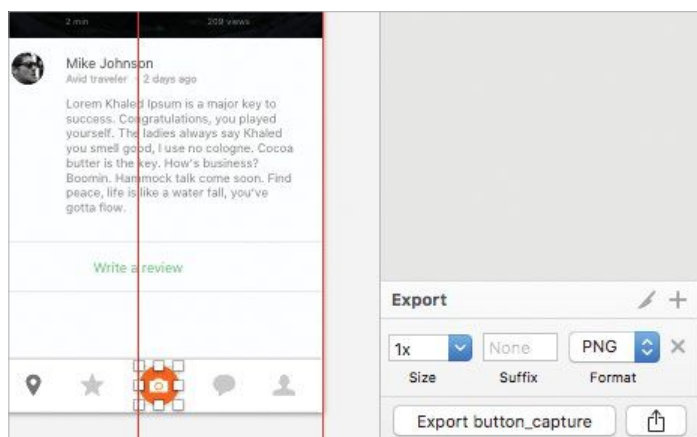
> Anyone who has worked on a web or mobile app development project has experienced it: the seemingly endless back and forth between developer and designer for all things related to the design. Developers asking for fonts, sizes, positioning and colours. Designers sending the latest updates of images and assets. Files sent via email, Dropbox, Google Drive, Slack – you name it. It's a messy and time consuming process and, inevitably, things are lost in the shuffle.

Well, we've seen it too. So we decided to do something about it with Sympli ([app.sympli.io](http://app.sympli.io)). We wanted to offer a simple way to connect designers and developers so that specifications, assets, notes and information could be easily and automatically

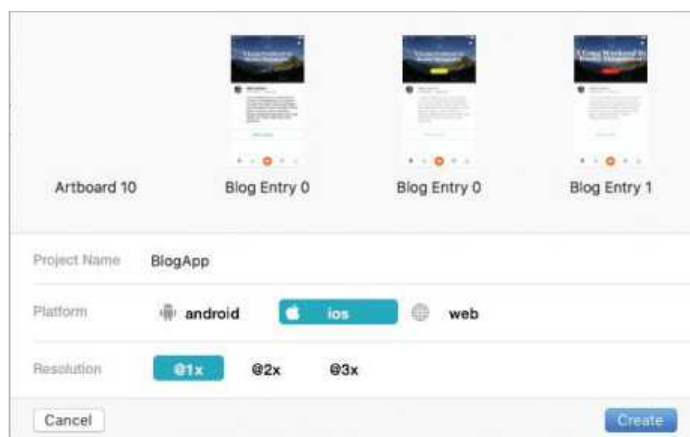
shared, and make collaborating with others on a project much more streamlined.

In this tutorial I'm going to show you how to connect your design and development teams quickly and easily by walking through an example in Sympli, Sketch and Xcode. Starting from the point you finish a design project, I'll explore the next steps from the design team's perspective and then go through what happens after hand-off to the development team.

Note, I don't go into creating an account or setting up the plugins, but you can find information about that at [sympli.io/downloads/web](http://sympli.io/downloads/web). While this example uses Sketch and Xcode, Sympli also works with Photoshop and Android Studio, so no matter what your environment, you're covered.



**Step 2** Select the object you want to export and hit 'Make exportable'



**Step 6** Select your platform and choose your resolution

**01** You've finished your awesome new app design and are ready to hand the baton off to your development team to implement it. Don't worry, you don't need to manually create specification documents, share assets or provide fonts – Sympli automates these tedious manual tasks for you. All you need to do is get your design loaded up in Sketch and make sure you have the Sympli plugin for Sketch installed and working.

**02** Before exporting your design, make sure your visual assets are marked as exportable, and Sympli will automatically generate both vector and bitmap assets at the correct scale for your design. Select the object in your design and

click Make Exportable in the bottom right corner of Sketch.

**03** Now the design assets are all properly configured as exportable, you need to export your design to Sympli. With the Sympli plugin for Sketch installed, go to 'Plugins > Sympli > Export to Sympli' (or hit `cmd+Y`).

Select the specific artboards (or elements) you want to export within the layers tree or on the canvas itself. If you don't select any artboards or elements, all the artboards within the current page will be exported.

**04** When exporting, you will be prompted to log in. Simply enter the email and password for your Sympli account.

**05** Now you need to create a new project in Sympli to which your new design will be uploaded and shared with your development team. Click the Create New Project button.

**06** Enter a name for your project, select your platform, and choose your resolution. If you are using standard artboard templates from Sketch, always select @1x for iOS or web projects, or mdpi for Android projects. Hit Create and Sympli will automatically generate the specifications, as well as the vector and bitmap assets in the design, and upload it all to a secure cloud.

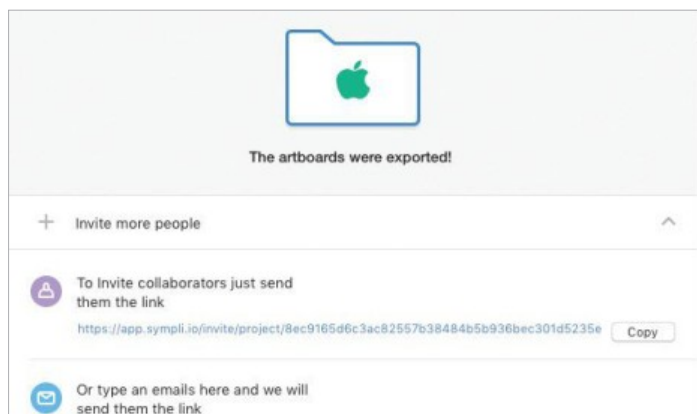
**07** Once you've uploaded your project, share it with the team by typing in their email addresses (including either a comma or space between each email address) and clicking the Share button. Alternatively, you can send the project sharing link to your team through your team's group chat or via email.

**08** Need to update the design? It's simple. Just make the changes in Sketch and export the design again. Sympli automatically creates a new version and stores it in the secure cloud. Not only that, it will track the changes in the

#### \* EXPERT TIP

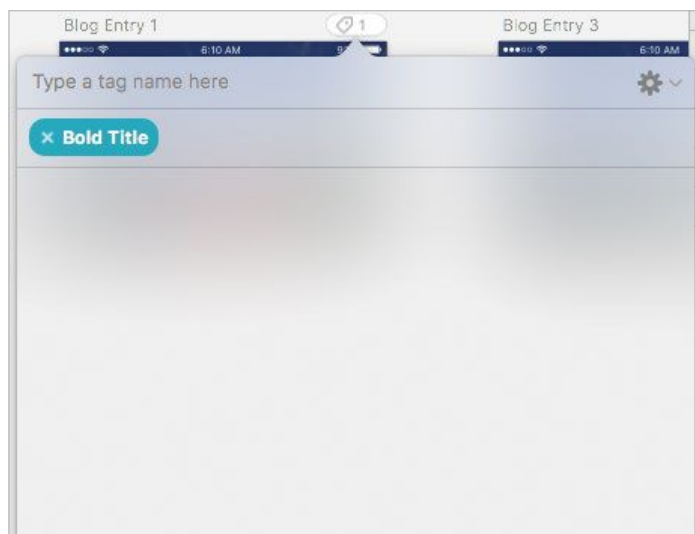
## ADD COMMENTS

Sometimes you need to share additional information about the design with your development team. In Sympli's web interface, click the annotations icon on the left to add information and context for your team. When adding a comment, type '@' and select a team member to notify them directly. This is a great way for developers to quickly ask designers questions and get rapid feedback.

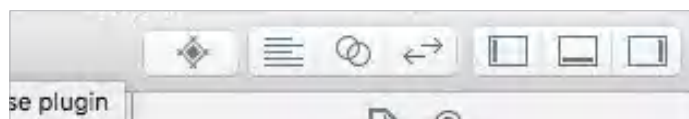


**Step 7** Invite team members to collaborate on the project, or share via the sharing link

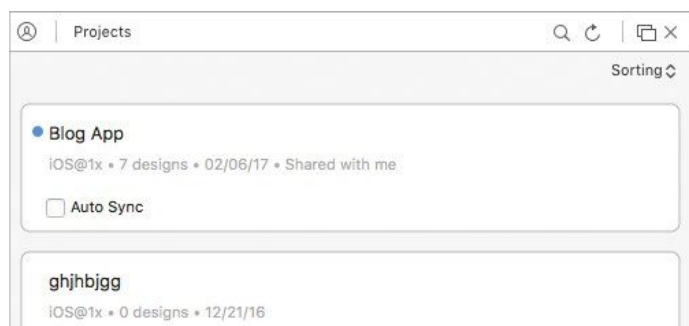




**Step 9** Attach useful information to your designs using tags



**Step 12** Open Sympli from within Xcode



**Step 16** Select your project from the list within Xcode

specifications so you can easily identify what changed and when, and view differences between design versions.

**09** You can organise your designs by tagging screens with any additional information that will help you and your team. To add a tag to a screen through Sketch, first you need to show the tags in Sympli by going to 'Plugins > Sympli > Show Tags' or clicking **ctrl+T**. You can enter anything you'd like as a tag. It's possible to add multiple tags to a screen by separating them with commas.

**10** You can also tag your designs with helpful information through the Sympli web app. Tag multiple designs at once by holding shift and clicking on the design card and then adding the tag.

**11** Need to share information with the team about specific design elements? Add a comment to the design and/or element and let the team know what you are thinking. To add a comment, you must be using the Sympli web app. So log in at [app.sympli.io](http://app.sympli.io), choose your project and design. Then, click the Add Comment button in the left-hand tool bar. Move your mouse to where you want to add your comment on the design and click. Type in your comment and hit enter to send it.

**12** If you have a certain person you want to direct your comment to, you can mention them by typing **@** and their username. As you type, Sympli will auto-show matching team members from which you can select the correct person. When you mention

someone in a comment, Sympli sends a notification email to them indicating the project, design and location of your comment, as well as the text of your comment.

**13** Let's say you're a developer, and you've just been told that your designers have wrapped up the design for your company's new iOS app. You don't need to worry about going through endless design documents, searching for the specifications and assets associated with the design and manually adding them to your Xcode project.

**14** After receiving the invitation email, click the Accept Invitation button to gain access to the project. You must accept the invitation before you can see the project in Xcode.

**15** First, launch Xcode and open the correct app project, or create a new one.

**16** Open Sympli from within Xcode by clicking the Sympli icon in the top right of the main Xcode window. A panel of Sympli projects will open, from which you can select your project. Click the thumbnail image to load the project resources.

**17** Now your project is loaded, you can load project assets by expanding the menu via the Sympli icon in the top right of the main Xcode window and choosing Import Assets.

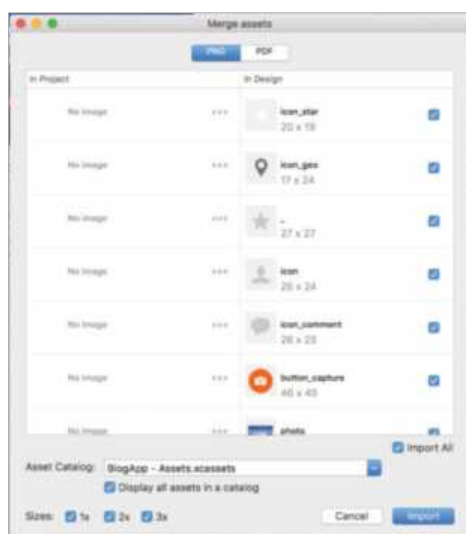
**18** A Merge Assets dialog will appear, through which you can select the assets you'd like to import into the project. Any assets already in the project will be displayed, as well as all assets that were marked as exportable in the design. You can import as PNG or PDF by choosing the appropriate button at the top of the dialog. Then, simply check the assets to import, and click Import.

**19** You can edit asset names by clicking the pencil icon.

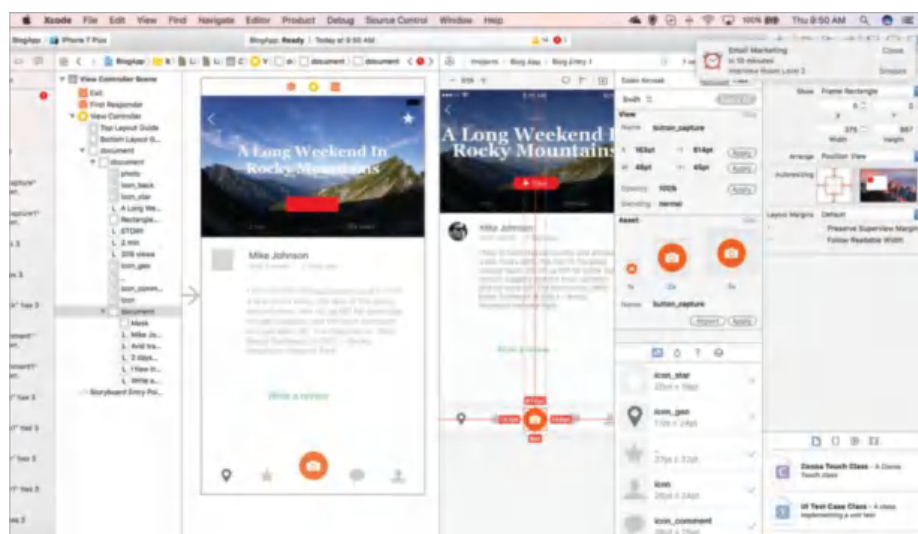
## \* EXPERT TIP

# INSPECT VERSION DIFFERENCES

What changed? How often has a developer asked that question of a designer. Through Sympli's web app, team members can visually compare design versions and immediately see the changes between the versions. Simply select the design in the web app and click the 'Browse Changes' link at the top to see designs side by side with any changes highlighted.



### Step 18 Load project assets via the Sympli icon



**Step 21** Select a component in the layout view of the Sympli plugin to see its properties and styles

Through the import menu you can also import the fonts from the design through the Import Fonts options.

**20** Symplici lets you export multiple assets at a time. To do this, simply select one or more shape layers in the mockup (click on several elements while holding down the Shift key) and then click Export in the details panel on the right. Symplici will then automatically generate vector PDF assets from the selected layers.

**21** In order to see the properties and styles within the design,

you can select the component directly through the layout view in the Symplici plugin. Alternatively, click the layers option in the inspector and expand the layers to select whichever component you wish to focus on.

**22** Now comes the cool part – you can simply drag and drop elements from the design into your Xcode app project and the assets, styles, colours, positioning and other attributes will be added automatically. Click the asset in the Sympli design and drag-and-drop to the Xcode project window – Sympli takes care of the rest.

**23** You can easily apply styles to a view by selecting an element in the mockup and holding the ctrl key down while dragging it to the app's screen.

**24** Did the design team change something? No worries. Symplici's plugin tracks design changes and lets you compare versions to see the differences. If your design has multiple versions, you'll see a button labelled # versions (where the # is the number of versions). Click that button to view and compare the different designs. Use the arrow buttons below the version preview to move between versions.

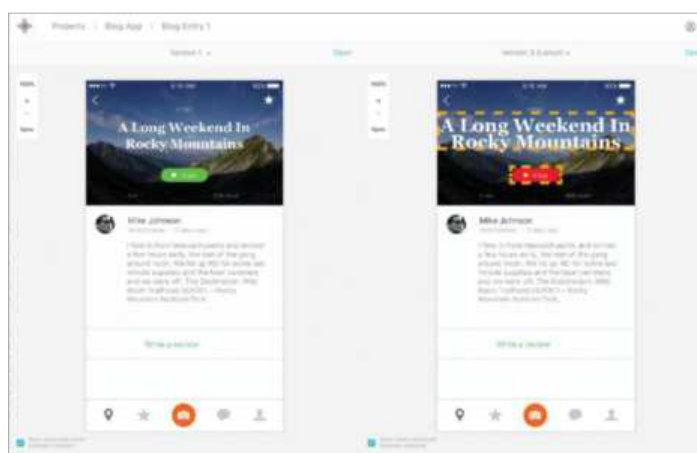
**25** Not enough detail? Open the Symplic web app version diff tool and see versions side by side with the differences highlighted. Clicking the highlighted differences allows you to view the exact changes that were made.

**26** Sharing designs and collaborating with teammates on a project is simple when using Sympli to connect different teams. Try it on your next project by creating a free account at [app.sympli.io/signup](https://app.sympli.io/signup). 

**\* EXPERT TIP**

## TEAM MANAGEMENT

Starting a new project with the same team as a previous project? Quickly add all your previous team members through the project sharing dialog. Simply click the ‘Add Teammates’ tab and click the previous project in the list to automatically select all the team members that had access to that project. Then adjust the permissions/roles for each team member and click ‘Update Access’.



**Step 24** You can compare different versions of the design, side by side



ABOUT THE AUTHOR

**JAMES CHAMBERS**

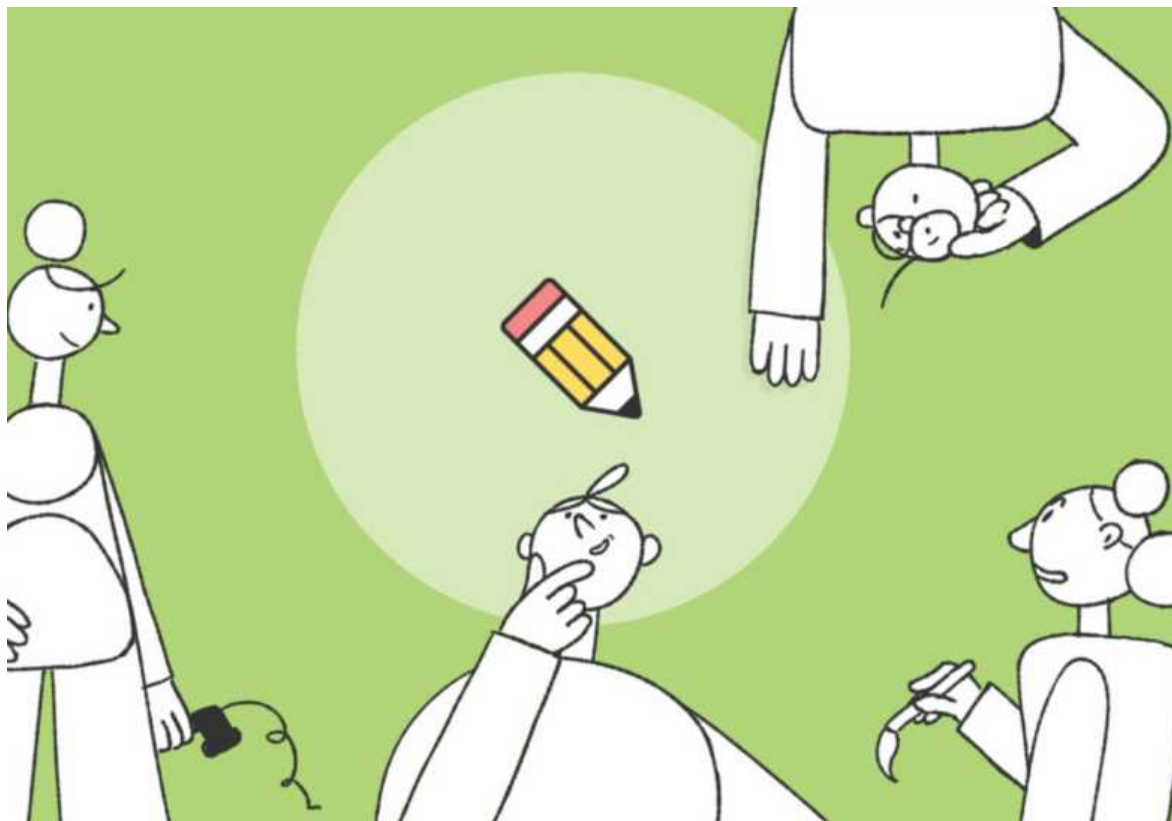
**w:** Boords.com

**t:** @boordsapp

**job:** Co-founder and CTO

**areas of expertise:**

Design, dev, data



\* BOORDS

# CREATE STORYBOARDS EASILY WITH BOORDS

**James Chambers** teaches you how to get started with creating storyboards effortlessly with Boords, the new app on the block

> Boords started as a conversation over a burger. Myself and childhood friend – and fellow founder of animation studio, Animade – Tom Judd, were bemoaning the painstaking process of formatting and editing storyboards, and wondering why on earth there wasn't an easier way. Then the thought struck us – why don't we make one?

Twelve months later, Boords has been helping creatives the world over save time, hassle and the occasional desire to break a computer. Boords is a web-based storyboarding app that makes it easy to create perfect storyboards quickly and easily. For us,

it was the beginning of the end of those familiar old pain points of copying, pasting and renumbering every time an edit was needed, and it's been a pleasure to see how it's becoming a game changer for the wider world of storyboarders too.

And it really is for anyone who needs to make storyboards, in whatever field. Having originally built Boords with animators and filmmakers in mind, we've been blown away by the amazing range of industries who've made it part of their workflow, including advertisers, UX designers, documentary-makers, teachers, writers... even space agencies.



This year, with the latest additions of an in-app drawing tool and support for working in teams, Boords has taken its next big leap forward.

Here's a rundown of how it all works, and what you can get out of it.

## OVERVIEW:

Boords lets you drag and drop images straight into the app, or draw directly into a frame to make a storyboard instantly. You can drag frames around if you need to reorder them or you can insert new ones, and they'll all be renumbered accordingly. Add your notes, like action and VO, then when you're happy with it you can export your storyboard as a PDF ready to send to clients, or share it via a password-protected link. With a Team plan this can all be done collaboratively, too.

## With a Pro or Team plan, the drawing tool lets you sketch directly into frames

### GETTING STARTED:

- To get started, head to [boords.com](https://boords.com) and pop in your email address to get yourself a free account. Then you're in!
- Create a new storyboard, then drop in images from your computer and they'll tumble into place. Or, you can draw directly into a frame (I'll come back to this in a moment).
- Drag and drop to rearrange frames, and add more if you need. You can also insert new frames between existing ones. They'll always fall into place with the correct numbering.
- Add your notes, like titles, action and sound. You can tab through to make it quicker.
- If you need to make new versions of a storyboard, you can do this while keeping all previous versions safely in an archive, which you can go back to any time.

With a Pro or Team plan, the drawing tool lets you sketch directly into frames. We find this is perfect for quick scamps or when you're starting an idea from scratch.

- Click the paintbrush icon in the frame, and the drawing tool will pop up.
- Get drawing! There's a select choice of colours and pencil thicknesses, and the eraser and undo/redo buttons are there if you need them.

When you're ready to share your storyboard with your clients or teammates, you can export the storyboard as a super-slick PDF. This can be made of several pages, including a cover page that's tailor-made to you.

- Click the PDF icon in the toolbar.
- Tweak your settings as you like, then hit 'Create PDF' – and out comes a lovely, perfectly formatted document perfect for impressing your clients with!

You can also share your storyboards via a private link. This is a speedy way to show progress to your clients or teammates, all whilst keeping it confidential. Online sharing makes it easy for others to review, so any amends can be implemented swiftly and without hassle.

- Click the Shareable view button, then change the password if you like. A button in the top-right corner will reveal your private URL, ready to copy and share with whoever you choose.
- Viewing is quick, simple and accessible from any device you choose.

A Team plan lets you collaborate with other people on the same storyboards, making your workflow run like a dream with creative companions, clients, producers and whoever else wants to get involved.

- You can add as many people as you like to your Team. You can always add more people later, too.
- Each new teammate will get an instant invitation, allowing them to get storyboarding with you in a flash.

So that's Boords in a nutshell! As a small team ourselves, we really value our users' opinions and love finding out how we can keep making the app even better for them. Support is available via the Intercom feature on [boords.com](https://boords.com), so you can talk directly to our team of creators and producers who are always ready to listen to feedback and answer all of your queries.

Since the product was born out of our own animation studio, the Animade team has used it every day for their work and helped it grow and evolve. This means our team of developers, who sit side-by-side with our animators, are getting a first-hand understanding of what is really needed in a storyboarding tool – and what works for the people who use it.

Give it a go at [boords.com](https://boords.com) and see how much time you can save on your storyboarding process!



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**job:** Director of engineering, Bustle

**areas of expertise:** Serverless architectures, JavaScript development, product engineering

### \* SOFTWARE

# MAKE YOUR APPS SERVERLESS

Entire applications can now be built without having to deploy code to your own servers. **Steve Faulkner** introduces the serverless revolution

> In 2016, we witnessed the rapid rise of a new buzzword: serverless. At face value, the term makes it sound like servers no longer exist. Of course, this is absurd. Every serverless application is running on a server somewhere. What has really changed is that servers are no longer a primitive exposed to the application developer. Platforms and services have matured to the point that entire applications can be successfully built without deploying code to your own servers.

While the term ‘serverless’ may be misleading, the value of delegating server management to a third party is very real. The dream of spending less time worrying about servers and more time building software can be a reality, and we’ve seen this exact scenario play out at Bustle.

## SERVERLESS IN ACTION

We serve content to over 50 million unique readers a month, which means traffic at our scale is significant but also sudden, as articles can go viral at any moment. Our legacy VM-based infrastructure was having trouble keeping up and our engineers were spending too much time on operations. We

started looking at serverless platforms as a solution and, after a few successful experiments, began moving over our entire stack. It has been a complete success; our projects are more maintainable, easier to operate, and cheaper.

## AMAZON WEB SERVICES

It is difficult to talk about serverless without focusing on Amazon Web Services (AWS). AWS has become synonymous with serverless because it answers one critical question: Where does the custom code go? The concept of using third-party services and platforms is not new. Databases, push notifications, caching, and many other layers of an application have all been available ‘as a service’ for a while, but they sat on the edge of your application. You still needed a place for core application code, which was usually a server (and often many of them) responding to external requests.

This is where AWS came in. Its products AWS Lambda and AWS API Gateway exposed primitives that made it simple to deploy custom application code without the overhead of managing your own servers.

## LAMBDA

Lambda is Amazon's version of functions-as-a-service (FaaS). It is quite simple: you write code and upload it – though currently only Node.js, Java, Python and C# have official support. AWS will then run that code in response to events including HTTP requests, S3 uploads, DynamoDB updates, Kinesis streams, and many others. Scaling happens automatically and you are only charged when your functions are running.

None of these features are strictly a requirement for serverless, but AWS has certainly set the bar high. Any serverless platform will likely have a stateless FaaS offering with very granular billing because of the precedent set by AWS.

## OTHER PLATFORMS

Amazon may have the lead, but other providers are catching up quickly. All the major cloud platforms have recently launched services targeted at serverless applications. Here are a few:

- **Google Cloud Functions:** Still in alpha, this provides similar functionality to AWS Lambda and can also be triggered by HTTP requests.
- **Azure Functions:** This is also similar to Lambda and still relatively new. Azure has a pleasant UI and makes it easy to expose functions over HTTP without needing a separate routing service.
- **IBM OpenWhisk:** The only major serverless platform that is open source. If you are interested in deploying your own serverless platform or just curious how they work under the hood, you will want to investigate this.

## CHALLENGES

Serverless does not come without its challenges. The space is new and as such, the community is still discovering best practices – especially when it comes to operations. I've seen people assume that no servers also means no operations. This could not be further from the truth.

My favourite definition of operations comes from Charity Majors ([charity.wtf](http://charity.wtf)): "Operations is the constellation of your org's technical skills, practices, and cultural values around designing, building and maintaining systems, shipping software, and solving problems with technology." This beautifully captures how integral operations is to any software team, and serverless does not change that. More than ever we are in need of tools for deploying, maintaining and monitoring our applications.

Unfortunately, having no access to the server means we are unable to use many tools that have been battle-tested over the last couple of decades.

I anticipate that 2017 will see many new startups' third-party services targeted at solving these problems for serverless developers. Some companies have already sprouted up or modified existing tools, including IOpipe and Honeycomb.io.

## TOOLS

The open source community has recognised some of these challenges and responded with a wide range of tools and frameworks specifically targeting serverless. Here, the market dominance of Amazon is apparent, as most only currently support AWS.

Of course, it is possible to manually build and deploy serverless applications yourself, but I would not recommend it – with even a few endpoints, building, packaging, zipping, uploading and versioning all become difficult to manage.

Here are just a few of the frameworks out there for you to consider:

- **Serverless Framework ([netm.ag/serverless-292](http://netm.ag/serverless-292)):** This is the oldest and most established framework for building serverless applications. It has a robust plugin system and integrates with many community-developed plugins. Its stated goal is to eventually support deployment to any of the major cloud platforms.
- **Apex ([apex.run](http://netm.ag/apex-run)):** This is written in Go but supports Python, Node.js, Go and Java runtime languages. The creator, TJ Holowaychuk, is a fixture in the open source community and has a great sense of what makes for good developer tools.
- **Chalice ([netm.ag/chalice-292](http://netm.ag/chalice-292)):** The only framework created and maintained by AWS. It currently just supports Python.
- **Shep ([netm.ag/shep-292](http://netm.ag/shep-292)):** Bustle's own open source framework, used for all our production services. It focuses exclusively on the Node.js runtime and strives to be opinionated about how you should structure, build, and deploy applications.

## THE FUTURE

2017 will continue to see the rapid adoption of serverless technologies by everyone from startups to fortune 500 companies. Even in its nascent state, the serverless movement is a significant step forward in enabling teams to build better software. That has been our experience at Bustle, and I've talked to engineers at other companies with similar stories. Capital One, iRobot, and Nordstrom have all talked publicly about their adoption of serverless.

Servers will never fully go away, but it is a joy to build software and let someone else worry about them. If it fits your use case, I highly recommend you consider serverless for your next project. ■





ABOUT THE AUTHOR

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web performance

\* CSS

# 5 ESSENTIAL TIPS FOR SUPERFAST CSS

**Jeremy Wagner** explains how to hasten page rendering by cutting the excess from your site's CSS

> Have you thought about the size of your site's CSS? If your style sheet is ballooning, it could be delaying page rendering. Though CSS isn't the largest asset type you'll serve, it's one of the first that the browser discovers. Because the browser is blocked from rendering the page until CSS is downloaded and parsed, you want to keep it lean as possible. Here's some tips to help you get there.

## 1 USE SHALLOW SELECTORS

Your parents told you that shallowness isn't a virtue, but when it comes to CSS, they're wrong. Used consistently, shallow selectors can trim kilobytes off big style sheets. Take this selector:

```
nav ul li.nav-item
```

This could be expressed more succinctly:

```
.nav-item
```

As well as helping to keep your CSS svelte, the browser will also render the elements targeted

by shallow selectors faster. Browsers read selectors from right to left. The deeper selectors are, the longer it takes for the browser to render and re-render the elements those selectors are applied to. For complex DOMs that reflow often, short selectors can also cut down on jank.

Ideally, you want selectors to be as shallow as possible, but this doesn't mean you should cut everything down to the bone. Sometimes you need additional specificity to extend components. Strike the right balance, but be pragmatic, too.

## 2 USE SHORTHAND PROPERTIES

This seems like common sense, but you'll be surprised at how often I see longhand properties used needlessly. Here's an example of some longhand properties in use:

```
font-size: 1.5rem;
line-height: 1.618;
font-family: "Arial", "Helvetica", sans-serif;
```

That's a lot of CSS! Let's tidy that up:

```
font: 1.5rem/1.618 "Arial", "Helvetica", sans-serif;
```

The `font` shorthand property condenses several declarations into a handy one-liner that takes up much less space.

In the example shown above, the shorthand uses about 40 per cent less space than its longhand equivalent. It's not as readable at first glance, but the syntax becomes second nature after you've spent some time using it.

Of course, `font` isn't the only shorthand available to you. For example, `margin` can be used in place of longer properties such as `margin-top`, `margin-right` and so on.

The `padding` property works the same way. For more ways to clean up your CSS, Mozilla Developer

## Used consistently, shallow selectors can trim kilobytes off big style sheets

Network offers a helpful list of shorthand property references ([netm.ag/shorthand-292](http://netm.ag/shorthand-292)).

What if you need to override a value further down in the cascade? For example, let's say you have a heading element that needs to change its font size for larger displays.

In this case, you should use the more specific `font-size` property instead:

```
h1{
 font: 1.5rem/1.618 "Arial", "Helvetica", sans-serif;
}
@media (min-width: 60rem){
 h1{
 font-size: 2rem;
 }
}
```

This isn't only convenient, it also increases component flexibility. If any other part of the underlying `font` property is modified, those changes will percolate up to larger displays. This works great for component overrides where a new context requires a different treatment.

### 3 USE THE PRELOAD RESOURCE HINT

The `preload` resource hint can give the browser a head start on loading your site's CSS. The `preload` resource hint tells the browser to initiate an early fetch for an asset.

#### ★ FOCUS ON

## SASS/LESS AND NESTED SELECTORS

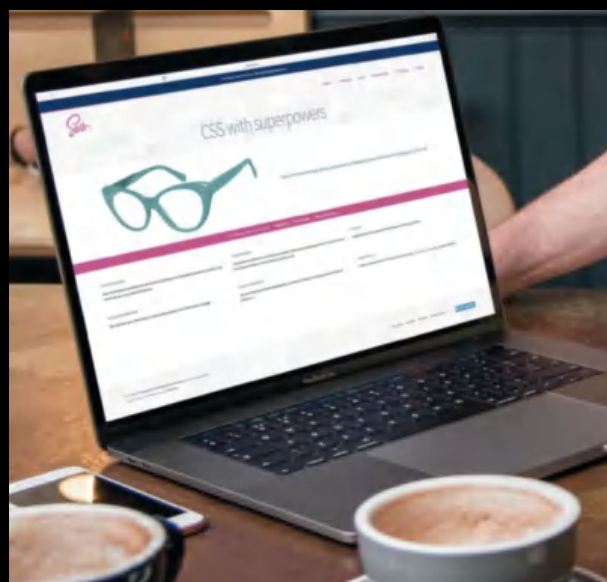
**+** If you use Sass or Less and want to keep selectors short, keep an eye on nesting. While nesting provides a convenient visual representation of selector hierarchy, it makes for longer selectors when compiled to CSS. Consider this snippet:

```
nav{
 ul{
 li.nav-item{
 color: #333;
 }
 }
}
```

This rule compiles like so:

```
nav ul li.nav-item{
 color: #333;
}
```

If nesting gets too deep, you'll be adding a lot of weight to your CSS in no time, so pay attention to it.



**Heavy CSS** Nested selectors in Less or Sass can quickly add weight to your CSS

## \* RESOURCES

## EXPLORE FURTHER



For more ways to slim down your CSS, take a look at the following resources:

**SHORTHAND PROPERTY REFERENCE**

[netm.ag/shorthand-292](http://netm.ag/shorthand-292)

Shorthand properties can go a long way in slimming down your style sheets. Check out this reference on MDN if you want to pick up some new shorthand rules.

**PRELOAD W3C SPECIFICATION**

[www.w3.org/TR/preload](http://www.w3.org/TR/preload)

The `preload` resource hint gives the browser a head-start on loading a specified asset. On HTTP/2 servers, it initiates a server push event, conferring benefits similar to inlining CSS.

**CSSCSS**

[zmoazeni.github.io/csscss](http://zmoazeni.github.io/csscss)

Redundant rules can add a lot of unnecessary bulk to your CSS. Use `csscss` to uncover those rules so you can de-duplicate them!

**CSSNANO**

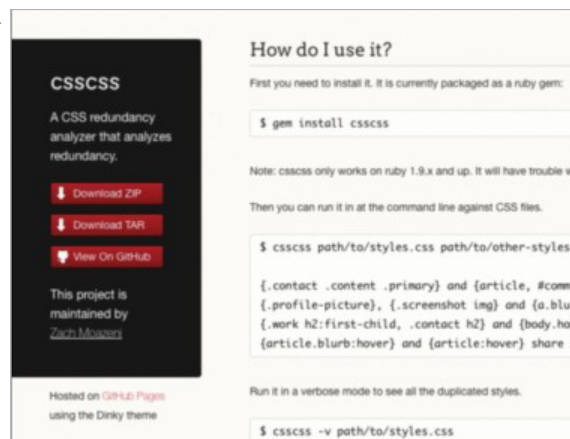
[cssnano.co](http://cssnano.co)

`cssnano` is a PostCSS-based tool that minifies CSS and makes further focused optimisations to ensure your CSS is as small as it can possibly be.

**GULP**

[gulpjs.com](http://gulpjs.com)

`gulp` is a Node-based build system. You can use it to automate `cssnano` optimisations on your CSS (and way, way more than that).



**Remove duplications** `csscss` will analyse any CSS files you give it and let you know which rulesets have duplicated declarations

You can set it as a `<link>` tag in HTML:

```
<link rel="preload" href="/css/styles.css" as="style">
```

Or as an HTTP header in your server configuration:

```
Link: </css/styles.css>; rel=preload; as=style
```

In both of these scenarios, `preload` gives the browser a head-start on loading `/css/styles.css`. Using `preload` in an HTTP header is preferable, since this means the browser will discover the hint earlier in the response headers, instead of later on in the response body.

Another reason to use `preload` in an HTTP header is that it will initiate a server push event on most HTTP/2 implementations. Server push is a mechanism by which assets are preemptively pushed to the client when requests for content are made, and it offers performance benefits similar to inlining CSS.

Server push isn't available on HTTP/1. However, using `preload` in an HTTP/1 environment can still improve performance.

**4 CULL REDUNDANCIES WITH CSSCSS**

It can pay to check your CSS for duplicate rules with a redundancy checker. Take the Ruby-based tool `csscss`, for example.

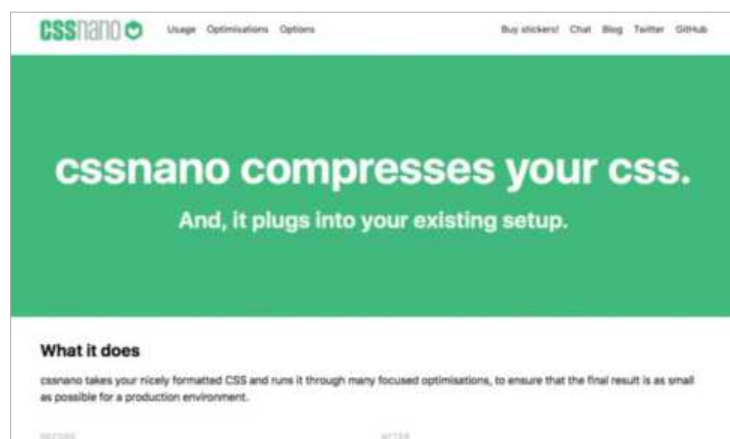
Ruby users can install it with:

```
gem install csscss
```

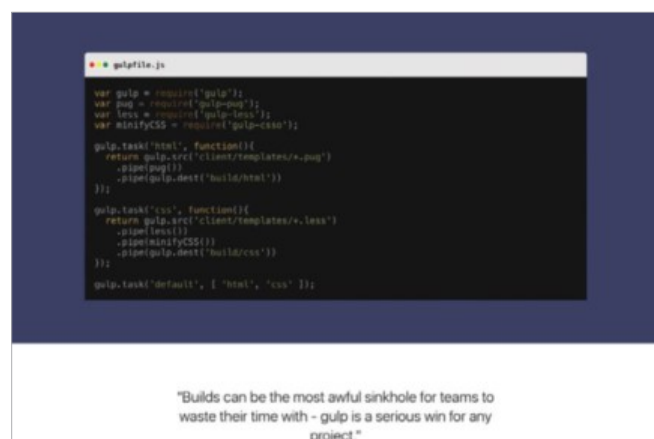
Once installed, you can examine your CSS for redundancies like so:

```
csscss -v styles.css
```





**Fully optimised** cssnano takes your nicely formatted CSS and runs it through many focused optimisations, to ensure that the final result is as small as possible for a production environment



**Workflow enhancement** Use Gulp to automate painful or time-consuming tasks in your development workflow

This command lists which selectors share rules that you can de-duplicate to save space:

```
{h1} AND {p} share 3 declarations
```

```
- color: #000
- line-height: 1.618
- margin: 0 0 1.5rem
```

You can move duplicate rules under one selector:

```
h1, p{
 color: #000;
 line-height: 1.618;
 margin: 0 0 1.5rem;
}
```

You'd be surprised at how much space this process can save in large projects. Use the `--help` option to see more commands you can use to tweak things further.

## 5 GO THE EXTRA MILE WITH CSSNANO

For the cherry on top, you can use cssnano – a node and PostCSS-dependent tool. cssnano not only minifies CSS, it makes many focused optimisations that can reduce your CSS even further. Install it on your system with npm like so:

```
npm i -g cssnano-cli
```

Then use it to optimise your CSS:

```
cssnano styles.css optimized-styles.css
```

If running commands ad hoc isn't your style, you can automate cssnano with a build system. Here's how to use cssnano in a gulpfile:

```
const gulp = require("gulp");
const postcss = require("gulp-postcss");
const cssnano = require("cssnano");

const buildCSS = ()=>{
 return gulp.src("css/styles.css")
 .pipe(postcss([cssnano]))
 .pipe(gulp.dest("css/optimized"));
};

const watch = ()=>{
 gulp.watch("css/styles.css", buildCSS);
};

exports.buildCSS = buildCSS;
exports.watch = watch;
```

The `buildCSS` task reads the CSS you write in `css/styles.css`, and then pipes the optimised output to the `css/optimized` directory. The `watch` task kicks off `buildCSS` whenever changes occur in `css/styles.css`.

The `watch` task can then be invoked in the terminal like so:

```
gulp watch
```

With some tweaking, you can build a workflow that performs this specific optimisation in addition to other CSS-related tasks, such as building Sass/Less files, autoprefixing and more.

## WRAPPING UP

With these techniques at your disposal, you're ready to whip your CSS into fighting shape. If you're having trouble with any of the concepts or tools covered here, check out the Resources boxout on the opposite page for more information. Happy performance tuning! 🍷

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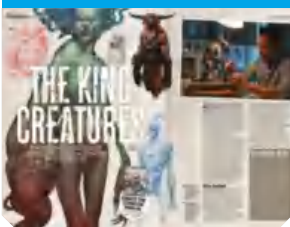
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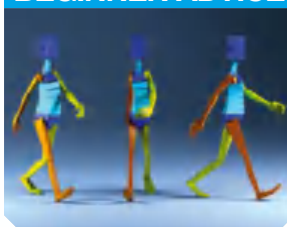
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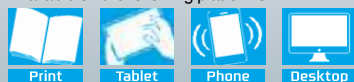


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★ STANDARDS

# USER TIMING API

Aurelio de Rosa introduces an API to help you measure your code's efficiency

➤ Often we need to measure the execution time of our code to find possible bottlenecks. The old way of measuring performance was to introduce a bunch of variables in one or more files, which would store the current time and then calculate the time elapsed. Sometimes it was also necessary to make these variables global, which could lead to clashes with other defined variables. An API that facilitates this task is the User Timing API.

The User Timing API ([netm.ag/timing-292](http://netm.ag/timing-292)) defines interfaces and methods to measure the performance of our code without the need to introduce variables. It deals with two main concepts: Mark and Measure.

A Mark expresses an instant (a timestamp); a Measure expresses the time elapsed between two Marks. These concepts are represented by the `PerformanceMark` and the `PerformanceMeasure` interface respectively. Objects implementing these interfaces expose four read-only properties:

- `name`: Used to identify and retrieve the object
- `entryType`: The object's type (Mark or Measure)
- `startTime`: A `DOMHighResTimeStamp`, which represents a highly accurate timestamp. If the

object is a Mark, `startTime` expresses the time it was created; otherwise it contains the value of the start Mark

- `duration`: If the object is a Mark, the value is always 0; otherwise it contains the time elapsed between the two Marks

The API exposes four methods that belong to the `window.performance` object: `mark(name)` creates a Mark with the associated name; `clearMarks([name])` deletes one or all of the stored Marks; `measure(name[, mark1[, mark2]])` creates a Measure with the specified name that stores the time elapsed between two Marks; and `clearMeasures([name])` deletes one or all of the stored Measures.

To see this API in action, imagine you need to write a function to find all the beers in a list of drinks. You come up with two solutions to this problem, and you want to find which one is faster.

```
performance.mark('start1');
Drinks.findBeers();
performance.mark('end1');
performance.measure('V1', 'start1', 'end1');
```

This code stores the time before and after running `findBeers()` as Marks named `start1` and `end1` respectively. Then, it creates a Measure named `V1` to store the time elapsed between the two Marks. Using the same approach you can store the performance of the other solution.

Once stored, you can employ `getEntriesByType(type)` and `getEntriesByName(name)` to retrieve Marks and Measures. Both belong to the `performance` object and are defined in another specification. The former returns an array of objects of the type specified (i.e. `mark` for Marks). The latter returns an array of the objects with the name specified. This also means the names passed to `mark()` and `measure()` can be reused. The arrays returned are sorted based on the `startTime` property.

So, if we had to retrieve the previously stored Measure, we could write:

```
const measure = performance.getEntriesByName('V1')[0];
```

A demo showing these methods at work can be found on JS Bin ([netm.ag/jsbin-292](http://netm.ag/jsbin-292)). This API is supported by all major browsers, including IE 10+, but not Safari. If you want to polyfill Safari or some older browsers, you can use `UserTiming.js` ([netm.ag/polyfill-292](http://netm.ag/polyfill-292)). ■



ABOUT THE AUTHOR  
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t: @errozero design

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areas of expertise:

JavaScript, HTML5  
apps and audioView source  
files here! All the files you need for this  
tutorial can be found at  
[netm.ag/synth-292](http://netm.ag/synth-292)

## \* JAVASCRIPT

# CREATE A SYNTHESIZER WITH WEB AUDIO

**Mark Hynes** explains how to use the Web Audio API to create a virtual instrument based in your browser

> In this tutorial, we are going to use JavaScript to create a web-based synthesizer instrument that can be played with the computer keyboard or a MIDI device. The Web Audio API will be used for sound generation, jQuery will handle events like button clicks and we'll use a bit of Handlebars.js to help out with the HTML templates. All the files you need can be found in the GitHub repo at [netm.ag/synth-292](http://netm.ag/synth-292).

There are no special build tools required so it's really simple to get up and running: just download the files and place them on your local server. It's a good idea to have the files open whilst reading the article as only the main points will be covered in detail and the code samples will be shortened.

## FILE SETUP

First, let's take a quick look at the structure of the app. There are three main JavaScript files; these work in a similar way to how a class would work in other languages and can all access the properties and methods of the others.

The `app.js` file is where our application begins. The `init()` function in here is called immediately on load, it is used to initialise everything else and create an instance of the synthesizer.

The `ui.js` file handles all the user input, like a knob movement or a key press from the keyboard, and forwards those messages to the `synth` object. It's also responsible for updating the user interface when required (after loading a preset, for example). Keeping the user input completely separate from the `synth` means it will be easy to expand the app and create more instruments in the future, which can be controlled via the same `ui.js` file.

`synth.instrument.js` is the main file we will be looking at and contains the sound generation code. It's different from the other files as it is a prototype object, which means multiple instances can be created. This will be useful if the app is to be extended to support more than one instrument.

You'll notice the `index.html` file is very minimal and contains almost no HTML, just a single `div` element

that our synth will be placed into. The HTML and CSS for the synth is within a Handlebars template called `synth.view.html` and is pulled in via Ajax when an instance of the synth is created. This again makes it easier to add new instruments. Using Handlebars allows us to pass data into the template and use loops for repeating sections of HTML.

## AUDIO CONTEXT

The first step in creating a web audio app is to create an `AudioContext` object. This is used to create building blocks called nodes that allow us to create things like oscillators and filters, which can be connected together in different ways to manipulate the sound passing through them.

It also keeps a precise track of time, which means it can be used to schedule events. For example, a volume fade starting in three seconds and lasting two seconds. Creating an audio context:

```
Var context = new (window.AudioContext || window.
webkitAudioContext)();
```

The audio context is created within the `app.js` file. This is then passed into the synth object on creation:

```
var app = {

 context: new (window.AudioContext || window.
webkitAudioContext)(),
 synth: null,

 init: function(){
 ui.init();
 app.createSynth();
 },

 createSynth: function(){
 app.synth = new synth({context: app.context});
 }
}
```

## GENERATING SOUND

To actually generate some sound, we need to use the `AudioContext` to create some audio nodes and then connect them together. A very basic synth would consist of an `oscillator` node playing a frequency, which would then connect to a `gain` node to amplify that frequency, finally connecting to a `destination` node which would be your computer speakers.

```
var oscillator = context.createOscillator();
var gain = context.createGain();
```

### \* FOCUS ON

## ADSR

**+** ADSR stands for attack, decay, sustain, release. ADSR envelopes are a major part of most synths and are used to control the timbre of the sound over a duration of time. Usually, an ADSR envelope controls the volume and a separate envelope controls the filter cutoff frequency.

Here is how an ADSR envelope is applied to a volume control:

### Attack

The attack value represents the amount of time the sound takes to move from 0 to full volume. Piano-type instruments will reach full volume almost instantaneously, whilst a violin stroke fades gradually from 0 to full volume.

### Decay

This is the amount of time it takes to move from the attack value (full volume) to the sustain value. Most physical instruments start off with a loud sound and then quickly fade in intensity.

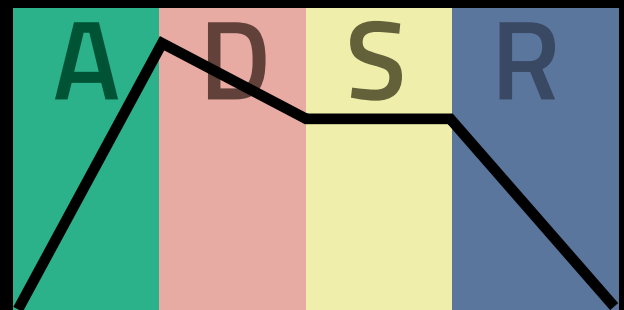
### Sustain

The volume level that the sound will remain at after the decay time (until the note is released). Sustain differs from the other parameters, as it represents a volume level rather than an amount of time.

### Release

After a key is released, the envelope enters the release phase. This is the amount of time it takes for the volume level to return to 0.

ADSR envelopes can be used to automate almost any parameter of a synth to create a more natural or interesting sound.



**Note pattern** The acronym ADSR refers to the timbre of a sound over time

## ★ RESOURCES

FURTHER  
READING

The Web Audio API is still a fairly new and exciting addition to the browser toolkit. Check out some of the resources below for more info. If you are new to synthesis and sound design, the first link will be particularly useful.

**Beginner's guide to the synth**

[netm.ag/guide-292](http://netm.ag/guide-292)

A history of synthesizers and how they work.

**Web Audio Weekly**

[www.webaudioweekly.com](http://www.webaudioweekly.com)

A newsletter full of interesting projects, news and stories related to web audio. Published not quite weekly.

**Tuna**

[github.com/Theodeus/tuna](https://github.com/Theodeus/tuna)

Tuna is an effects library for the Web Audio API, and includes effects like overdrive, delay, bitcrusher and more. The effects can be treated just like any other web audio nodes.

**Web MIDI API**

[webaudio.github.io/web-midi-api](https://webaudio.github.io/web-midi-api)

The Web MIDI API can be used to receive data from a connected MIDI device such as a keyboard or drum machine. This can make a great companion to a Web Audio app.

**Acid Machine 2**

[www.errozero.co.uk/acid-machine](http://www.errozero.co.uk/acid-machine)

A Web Audio app that simulates two classic TB-303 synths and a drum machine.



**Rave material** Errozero has created a Javascript-based Acid Machine that will let you start a rave at work straight from your Chrome browser

```
▶ oscillator.frequency.value = 440;
```

```
oscillator.connect(gain);
gain.connect(context.destination);
oscillator.start();
```

This will play a continuous sine wave tone at 440hz (or the musical note A4).

That's the basics of generating a sound, but it doesn't sound very musical and we can't control the pitch or volume. Let's move on to the main part of this app: the synthesizer module.

**SYNTH**

This synth is polyphonic, meaning that it can play more than one note at a time (it can actually play eight simultaneously). In order to do that we need to create a set of nodes for each voice.

Each voice consists of:

- Two oscillator nodes
- One gain node (for the amplitude ADSR envelope)
- One filter node (for the filter ADSR envelope)

When the synth first plays a note, it will play through voice one; the next note will play through voice two; and so on until it loops back around to voice one again. This way we can make sure the first note has plenty of time to fade out after the key is released. The synth uses two oscillator nodes per voice, which can create a warmer sound, especially when one is detuned slightly against the other.

The nodes are created in a function called

**createNodes :**

```
for(var i=0; i<this.polyphony; i++){

 var voice = [];

 for(var oscNum=0; oscNum<this.oscsPerVoice; oscNum++){
 var osc = this.context.createOscillator();
 osc.type = 'sawtooth';
 voice.push(osc);
 }

 for(var key in voice){
 voice[key].start();
 }

 var amp = this.context.createGain();
 amp.gain.value = 0;

 var filter = this.context.createBiquadFilter();
 filter.frequency.value = this.filterMinFreq;
 filter.Q.value = 10;
```



```
filter.type = 'lowpass';

this.oscNodes.push(voice);
this.ampNodes.push(amp);
this.filterNodes.push(filter);
}
```

These are then connected together in the `connectNodes` function.

## ENVELOPES

The oscillator nodes created in the previous step were set to start playing immediately, but we can't hear them yet as they are running through a gain node set to 0. We'll use an ADSR envelope to modify the value of the gain node when a key is pressed on the keyboard – this will ramp the volume up

## We'll use an ADSR envelope to modify the value of the gain node when a key is pressed

to maximum and then fall back to 0. The amount of time this takes will be set by the positions of the amp envelope knobs on our synth.

Here's a basic example of the attack part of the gain ADSR envelope:

```
ampNode.gain.cancelScheduledValues(currentTime);
ampNode.gain.linearRampToValueAtTime(0, currentTime + 0.01);
ampNode.gain.linearRampToValueAtTime(1, currentTime + attackTime + 0.01);
```

First, `cancelScheduledValues()` is called, which cancels any previously scheduled events. Then we call `linearRampToValueAtTime()`, which very quickly ramps the volume down to 0 ready for the next attack phase. The volume cannot be set to 0 instantly, as there would be an audible click. Finally, `linearRampToValueAtTime()` is called again to ramp the volume up to 1 (the maximum), in the time specified by the `attackTime` variable.

Check out the functions called `ampEnvelopeStart()` and `ampEnvelopeEnd()` in the synth file to see exactly what is going on. There are also similar functions for the envelope filter.

## PLAYING NOTES

Now we have all of the nodes and envelope functions in place, we can look at how to send a message in to

the instrument to trigger a note. This process starts with the `ui.js` file, which is listening for key presses on the keyboard.

Here's what happens once a key press is detected:

```
var midiNote = this.keyCodeToMidiNote(keyCode);

if(midiNote){
 this.keysDown[keyCode] = midiNote;
 app.synth.noteOn(midiNote, 127);
}
```

This keycode is passed into a function called `keyCodeToMidiNote`, which returns a midi note number. This number is then passed into the synth's `noteOn` function, which converts it into a frequency and sets the value of the two oscillators to match the note that was pressed.

Once the frequency has been set, the volume and filter ADSR envelopes are started with the functions `ampEnvelopeStart` and `filterEnvelopeStart`. This should bring the sound up to an audible level and you will hear the note play. The speed at which this happens is determined by the attack value. The sustain value is held until the key is released, triggering the `ampEnvelopeEnd` and `filterEnvelopeEnd` functions.

## TURNING KNOBS


The `ui.js` file handles clicks on the synth's control knobs, it then measures how many pixels the mouse has moved up or down and converts that to a value in the range of 0–127 (127 is the maximum value a midi device can receive). Using midi values like this makes it easy to add in support for real midi controllers later on.

The value is passed into a function within the synth called `setControlValue`. This is a large switch statement, which decides how to process the value it receives.

## PRESETS

The synth has the ability to load preset sounds, a preset is simply a collection of values that sets the position for each knob. You can find all the preset values near the top of `synth.instrument.js`.

There is also a function called `dumpPresetToConsole`, which logs all the current control values to the browser console. With a bit of copy and paste, it can be used to create your own presets, or expanded upon to create a proper preset save feature that uses local storage.

Hopefully this tutorial and the project files that come along with it have given you a good base structure to create your own Web Audio instrument, or transform this one into something unique. 



## ABOUT THE AUTHOR

**RAÚL JIMÉNEZ**

**w:** [www.bytedefault.com](http://www.bytedefault.com)

**t:** @eleccash

**job:** CEO, Byte Default

### areas of expertise:

Angular, video  
streaming, frontend  
architecture



## \* ANGULAR 2

# BUILD A 360-DEGREE VIRTUAL VIDEO TOUR

**Raúl Jiménez** shows you how to combine Angular 2 with A-Frame to create a 360-degree virtual reality video tour

> Video on the web has been gaining relevance ever since Adobe made it available worldwide through the Flash plugin and websites like YouTube became popular. Nowadays, video continues to grow every year – some predictions indicate that by 2019, 80 per cent of traffic on the web will be video streaming ([netm.ag/traffic-292](http://netm.ag/traffic-292)).

The most relevant APIs are Media Source Extensions ([netm.ag/MSE-292](http://netm.ag/MSE-292)), which allows us to stream adaptive video to the users with HTTP Live Streaming (HLS) and dynamic adaptive streaming (DASH), and the combination of WebGL with WebVR. Together these make it possible for us to deliver 360-degree and VR video. In this tutorial, I'm going to walk through an example of a VR video tour.

## ANGULAR BREAKTHROUGH

At Byte Default we've been experimenting with some frameworks to make 360 video scenes as easy

as possible. For us, a mix of Angular and A-Frame was a big deal. Angular 2 was a big breakthrough – it's thanks to this we have powerful tools like the Angular CLI to create a boilerplate and start working faster. We recommend you use always the Angular CLI because it means you can focus on what is important: the code.

## CREATE YOUR PROJECT

To create your project we need to run some terminal commands. First install globally the Angular CLI via `npm install -g angular-cli`, then you can set up a new project using `ng new net-mag-vr`. This will create a boilerplate with some classes ready for you, as well as a lot of useful commands.

Now we can install our dependencies, A-Frame and Videogular 2. A-Frame is a WebGL/WebVR framework by Mozilla. It uses three.js under the hood, and it's incredibly cool because it enables us to create 3D

scenes in a declarative way with custom elements. On the other hand, Videogular 2 is a video framework created by us at Byte Default, and in a similar way, we can create a video player declaratively.

Install these using:

```
npm install videogular2 aframe aframe-animation-component --save
```

Last but not least, we just need to add our fonts and JavaScript files to the `angular-cli.json` file. That will tell the CLI to handle the files for us. It's really handy because we don't need to worry about minification, concatenation or other processes, the CLI will do the magic for us.

## A-Frame allows us to create 3D scenes in a declarative way with custom elements

### ALLOW CUSTOM ELEMENTS

Before we can start creating our declarative 3D scene, we need to let Angular know that some custom elements are going to be used. This is necessary for A-Frame only, since Videogular 2 is an Angular library.

Open `app.module.ts` and add `CUSTOM_ELEMENTS_SCHEMA` to the `@NgModule` decorator and the required dependencies for Videogular 2:

```
imports: [
 // ...
 VgCoreModule,
 VgControlsModule
],
schemas: [CUSTOM_ELEMENTS_SCHEMA]
```

We'll use `VgCoreModule` to create a video player and `VgControlsModule` to add a buffering and progress bar at the bottom of the screen.

### SET THE SCENE

Now everything is set up we can start writing a 3D scene declaratively with HTML. Open `app.component.html` and add the following code:

```
<vg-player>
 <vg-scrub-bar style="bottom: 0;">
 <vg-scrub-bar-current-time>
 </vg-scrub-bar-current-time>
```

## ★ FOCUS ON SELECTING HARDWARE

**+** To play a 360 video first we need an equirectangular video, which is the common format used by most 360 cameras. The range of prices for 360 cameras is pretty big, and obviously the quality will also vary a lot. At Byte Default we bought the Ricoh Theta S camera. This is a very affordable camera option, which comes with two 1920 x 1080 resolution lenses, Wi-Fi and live streaming capability.

You need to understand that when we talk about 360 cameras not only the quality of the image matters, but also how many lenses you have. If you have only two lenses then you're probably going to need to stretch the pixels within the image a lot, resulting in blurry edges most of the time.

The main difference between the affordable cameras, semi-pro cameras and professional cameras usually is the number of lenses each one has. So if you're going to buy one, just remember that when you make your choice.



**All-rounder** An equirectangular video will be added to a 3D sphere to create the 360-degree experience



**360 view** View of the 360 video player on desktop, without the split view for VR goggles



### ★ IN-DEPTH

## RESOURCES

Here you can find the libraries that we used, some helpful links, as well as a couple of 360 cameras that we consider very competitive in terms of price and capabilities.

### Angular

[angular.io](http://angular.io)

Angular is a framework by Google that enables users to develop apps on mobile, desktop, server-side, IoT and more. It's incredibly fast and easy to learn.

### Videogular

[github.com/videogular](https://github.com/videogular)

Videogular is a framework for developing highly interactive apps with Angular (1 and 2). It was created by us at Byte Default.

### A-Frame

[aframe.io](http://aframe.io)

Developed by Mozilla, A-Frame is a framework for creating VR experiences in a declarative way with custom elements.

### A-Frame animation component

[netm.ag/component-292](http://netm.ag/component-292)

An alternative library for creating animations in A-Frame.

### Ricoh Theta S

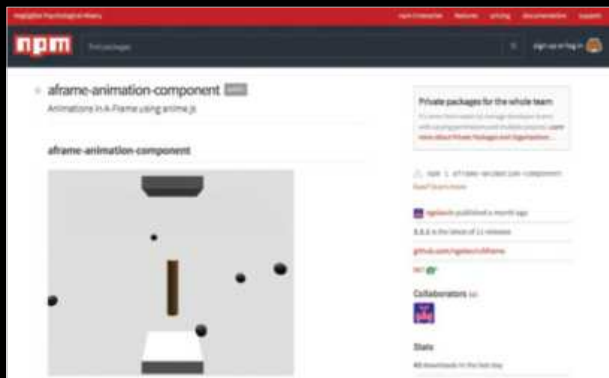
[theta360.com/en](http://theta360.com/en)

This amateur quality camera is pretty impressive.

### 360 Fly

[www.360fly.com](http://www.360fly.com)

The 360 Fly can shoot at 4K. The demo videos on the website look pretty neat – make sure you check them out.



**Component option** This component enables you to create animations in A-Frame using anime.js

```
<vg-scrub-bar-buffering-time></vg-scrub-bar-buffering-time>
</vg-scrub-bar>

<a-scene vr-mode-ui="enabled: true" embedded>
 <a-assets>
 <video [src]="currentRoom.url" vgMedia id="video"
 preload="auto" crossorigin="anonymous" loop autoplay
 muted></video>
 </a-assets>

 <a-videosphere src="#video"></a-videosphere>

 <a-camera>
 <a-cursor color="#FFFFFF"></a-cursor>
 </a-camera>
</a-scene>
</vg-player>
```

That's a lot of new HTML tags, so let's take a look at what each one does. First we have Videogular 2 custom elements and attributes. Wrapping all the code we have `vg-player`, which will basically find all `video` elements with a `vgMedia` attribute to get the data needed that is being used by other components (such as `vg-scrub-bar`, `vg-scrub-bar-current-time` and `vg-scrub-bar-buffering-time`).

As you may imagine, the A-Frame components are all those elements starting with `a-`. The main element is `a-scene`, which contains all the A-Frame elements for our scene. Here is where the mix of Angular and A-Frame becomes so interesting.

For example, we can define our assets inside `a-assets` but also add an Angular binding like we have in the `video` element.

```
<video [src]="currentRoom.url" vgMedia id="video"
 preload="auto" crossorigin="anonymous" loop autoplay
 muted></video>
```

In this particular case, we're binding our variable `currentRoom.url` to the `src` attribute, so if we change that value in Angular, the attribute will be updated. But most importantly, A-Frame will listen to the changes on that video and react accordingly.

Finally we have some other elements like the `a-videosphere` itself (this is in charge of displaying the video in 360-degrees) and the `a-cursor`, which we will use in the next step to move from one video to a new one.

## INTRODUCE DOORS

To finish our virtual tour we obviously need to define several places on the tour, and include a way to navigate between them. So we're going to create

an array of ‘virtual rooms’ inside our `app.component.ts` with as many rooms as we want.

This is what our ‘Room’ looks like:

```
{
 url: 'http://static.videogular.com/assets/videos/vr-route-0.
 mp4',
 doors: [
 { position: '-3 2 -10', rotation: '0 0 0', target: 1 }
]
}
```

Each room will have a video URL and one or more doors that can take us to a new element of the array. Now that we have our doors defined we want to display them in our scene. To do that we’re going to add an alpha image like the ring that appears in the distance in the image on the right. Let’s then add this image to our `a-assets` element.

```

```

## The animation needs to pause a couple of seconds when the viewer enters a door

Now we want to create one or more doors depending on the selected room, and navigate between rooms when we interact with a door.

Let’s add this element to our `a-scene` element.

```
<a-image
 *ngFor="let door of currentRoom.doors; let i=index"
 [attr.depth]="100 + i"
 [attr.position]="door.position"
 [attr.rotation]="door.rotation"
 src="#ringImg"
 scale="1 1 1"
 (mouseenter)="onMouseEnter($event, door)"
 (mouseleave)="onMouseLeave($event)"
 animation__scale="startEvents: vgStartAnimation;
 pauseEvents: vgPauseAnimation; property: scale; dur: 2000;
 from: 1 1 1; to: 2 2 2">
</a-image>
```

Again we have a really interesting combination of Angular and A-Frame. The element `a-image` allows us to create a 3D element from one image defined in our `a-assets` – in this case `#ringImg`. Each door is created thanks to the Angular `*ngFor`



from the `currentRoom` selected. Other attributes such as the `position` and `rotation` are set also by an Angular binding.

**Hidden doorway** The ring in the distance of the scene indicates a ‘door’ the viewer can walk through

### ADJUST THE TRANSITIONS

We added a scale animation via `animation__scale`. This makes the animation pause for a couple of seconds when the viewer enters a door, giving a better impression of what is going to happen – we don’t want the scene to instantly swap over as the viewer goes from one room to another.

Finally, we can add the `onMouseEnter` function to move between rooms and the `onMouseLeave` function to reset the animation in case the user looks out of the door:

```
onMouseEnter($event: any, door: Door) {
 $event.target.dispatchEvent(new CustomEvent('vgStartAn
 imation'));
 this.timeout = TimerObservable.create(2000).subscribe(
 () => {
 this.currentRoom = this.rooms[door.target];
 }
);
}

onMouseLeave($event: any) {
 $event.target.dispatchEvent(new CustomEvent('vgStartAn
 imation'));
 $event.target.dispatchEvent(new CustomEvent('vgPauseA
 nimation'));
 this.timeout.unsubscribe();
}
```

And just like that, we can start our virtual tour. The 360-degree video opens up a new way to consume media. It’s easy to see how this could be useful for museums (we could put our visitors in a 15th century village), or for tourist routes (by displaying information about the place), as well as obviously for epic entertainment in movies and games. **n**

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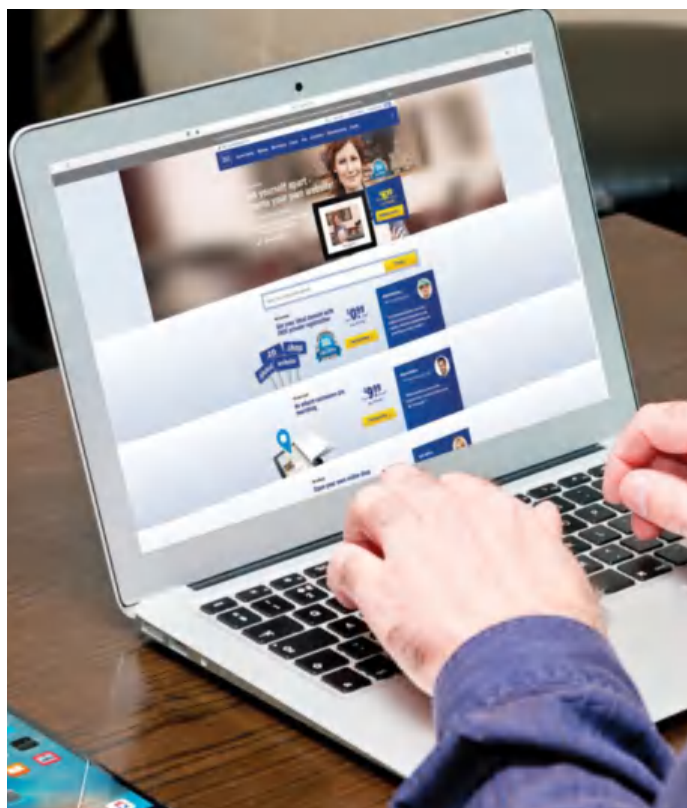
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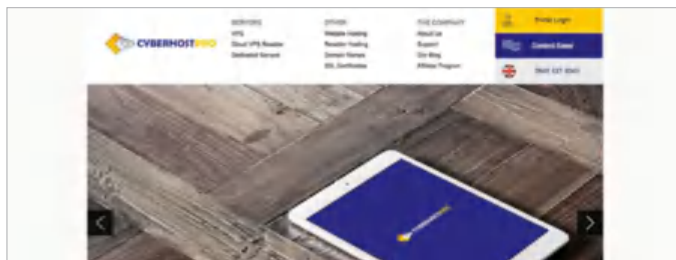


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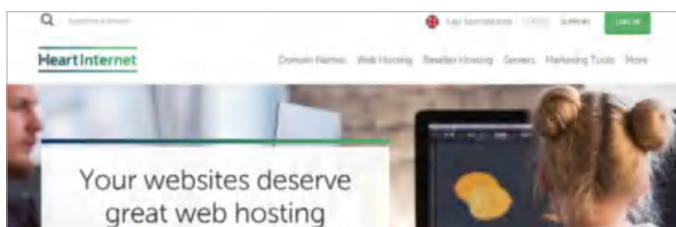


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\* ACCESSIBILITY

# PUTTING PEOPLE FIRST

**Sarah Horton** says that we are hooked on the convenience of technology, but at what cost?

> I was designing websites in the first days of the web and was around for the birth of eCommerce. I remember being incredulous when Amazon launched. Who in their right mind would submit their credit card information on a web form? Over time, I have come to value the convenience of online shopping so much that I happily click the 'Save my credit card information' checkbox.

Over time technology has proven itself as a vehicle for convenience. Tech companies understand that we will tolerate a good deal of bother and intrusion for the sake of convenience. I remember when Gmail launched, feeling invaded by ads that appeared alongside my personal emails. In time, I accepted advertising as the price to pay for free software.

In the last year or so, the implications of our technology addiction have become more visible. After the 2016 US presidential election, Om Malik wrote a *New Yorker* article, 'Silicon Valley Has an Empathy Vacuum'. Reflecting on the influence of technology, he observed within the tech industry a "lack of empathy for those whose lives are disturbed by its technological wizardry".

Given the pressures to succeed, Malik noted in the article, "It's hard to think about the human consequences of technology as a founder of a startup

racing to prove itself or as a chief executive who is worried about achieving the incessant growth that keeps investors happy."

Pair the tech industry's race to succeed with an addicted consumer base, and we pay the price of convenience through dark patterns, edge cases, data exploitation, trolls, doxxing and fake news.

It's time to reset, and make caring for people a first principle in product design.

First principles are the fundamental truths upon which we make decisions. Elon Musk popularised first-principles thinking for creativity and technology innovation. By starting from what we are sure is true and can't be changed, we make better design decisions.

I am fortunate to work in an area of technology that is often considered an 'edge case'. Accessibility is about making technology work for people with disabilities. Through user research, I learn how enabling, disabling or downright painful technology can be, depending on whether it was designed with accessibility in mind. These insights allow me to see a clear path to humane design solutions.

As a designer, one thing I am sure is true: people matter more than profits. Let's put people first, solve for edge cases, keep people safe and stop exploiting. ■

PROFILE \*

Sarah is user experience strategy lead for The Paciello Group and coauthor of *A Web for Everyone* and *Web Style Guide*.



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