

ADDY OSMANI Q&A

SERVICE WORKERS

How to build a web app that
caches resources for offline use

OPTIMISE IMAGES

Four essential tips & tricks to
reduce the bulk of your websites

The voice of **web design**

net

Issue 301 : January 2018 : net.creativebloq.com

*IN-DEPTH

MASTER THE SCIENCE OF CRO

Understand the best way to convert
visitors to customers in 2018

NEXT-GEN

UX

REVEALED: HOW TO DESIGN FOR THE **INVISIBLE INTERFACE REVOLUTION**



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★ WELCOME

EDITOR'S NOTE

> The world of UX changes at such a pace it's hard to keep track of where we're at. The paradigm-shifting touchscreen has been the de facto product user interface for over a decade now, but we're moving at full throttle towards a future of 'invisible interfaces'.

The popularity of Siri, Alexa and Google Home point to a more natural way of connecting with our devices, and with that brings a host of UX problems. How we design for the invisible interface revolution will be vastly different. We tasked Hilary Stephenson, managing director of digital UX agency Sigma, to reveal how we should approach UX design with voice-controlled products in mind.

Elsewhere, we dive into the science behind CRO and make sure you're armed with everything you need to know about converting visitors to customers. There's money to be made and a loyal following to gain. This issue our Projects section is packed with practical advice on exciting new technologies, too.

Hopefully this will be old news by the time you read this, but we're also delighted to announce that Generate, *the conference for web design and development*, is coming back to New York on 25–27, April 2018. It promises to be yet another amazing few days, and one headlined by a star-studded lineup. You can get tickets now from www.generateconf.com.

Enjoy the issue!

FEATURED AUTHORS

HILARY STEPHENSON



Hilary, the managing director of digital UX agency Sigma, reveals how to design for invisible interfaces in this issue's cover feature. Head to page 60 to find out more.

w: www.wearesigma.com
t: @Hilaryonline

JAMIE MURPHY



Want to convert visitors to customers? You need to read Jamie's brilliant guide to CRO on page 68 and understand the science behind the processes involved.

w: www.budaffect.com
t: @jjmu15

ELLEN DE VRIES



Clearleft's content strategist shares the secrets to successful group projects. Turn to page 20 to discover her three techniques for fruitful collaboration.

w: collaboratebook.com
t: @eldevri

BRAM STEIN



Selecting a beautiful typeface is one thing, but making sure it renders correctly is a different matter. Bram, from Adobe Typekit, shows you how on page 88.

w: <https://bramstein.com>
t: @bram_stein



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★ REGULAR
GALLERY 40

► **Jane Austin** runs down her favourite websites of the month, including a brilliant film website that whets the appetite



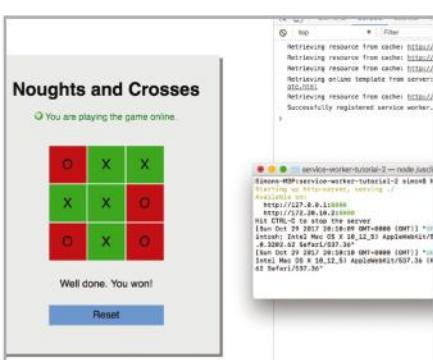
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EXCHANGE

Send your questions to netmag@futurenet.com

Practical
advice from
industry experts

THIS MONTH FEATURING...

IAN DEVLIN



Ian is an Irish web developer based near Düsseldorf, Germany, where he currently works as a lead developer for trivago. His main focus is on web standards, good semantics & accessibility.
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t: @iandevlin

MARK ROBBINS



Mark is an email developer, CSS hacker and speaker based in Brighton. He's worked with a number of large brands to produce complex templates that fall back cleanly in all email clients.
w: www.gorebel.com
t: @m_j_robbins

★ QUESTION OF THE MONTH

What's the best way to include automated accessibility testing in a CI environment?

Paul Coupe, Sheffield, UK

The screenshot shows the Tenon.io homepage with a blue header and a white main content area. The header includes the Tenon logo, navigation links for BLOG, PRICING, DOCS, SERVICES, GET CODE, REGISTER, and LOGIN, and a user icon. The main title 'Simplify Your Accessibility' is centered above a search bar containing the placeholder 'ex. <p>Code</p>, or http://some-domain.com'. Below the search bar are 'Show Options' and a green 'Analyze Your Webpage' button. The main content area features a quote: 'We believe... in a web accessible to everyone. Tenon.io exists because universal design is hard. We create software to help you reach beyond compliance and build superior experiences for everyone.' At the bottom right is a yellow 'Join us' button and a blue speech bubble icon.

Testing Building automated tools such as Tenon into your workflow can identify potential accessibility issues

ID: Automated tools can certainly go a long way towards helping ensure that your site's code is accessible, although of course, they cannot test for everything. You can help improve the quality of your code by integrating automated tools such as Tenon (<https://tenon.io>) and Pa11y (<http://pa11y.org>) into your build workflow, which can help identify potential accessibility issues before something goes live. Ideally, any errors that are reported by these tools should block any build from going live. Additionally, developers can run these tools locally before they push any code to help identify any problems at an earlier stage.

EMAIL

HOW LONG FOR TABLES?

When do you think there will be a more universal and up-to-date method of coding emails than tables?

Paul McKay, Leicester, UK

MR: Outlook on Windows and Windows 10 Mail, both use Microsoft Word in

place of an HTML rendering engine; this is what forces us into using tables for layout. Microsoft is making an effort to push people to the online version of Office, which has slightly better support, but have also announced it is releasing Outlook 2019 next year. Considering we still see people using



Side project Get Off The Table is a project by Mark Robbins that uses divs in the HTML, which magically convert into tables when opened on Outlook

Outlook 2003, it might take quite a while to die out.

However I do have a little project I'm working on that uses divs in the HTML, which magically convert into tables when opened on Outlook. If you're interested it's up on GitHub at github.com/M-J-Robbins/get-off-the-table.

ACCESSIBILITY

IMPROVE ACCESSIBILITY

What does writing 'accessible' HTML and JS actually mean? If it's valid HTML and works in all modern browsers, shouldn't it be all good?

Scott Vinkle, Kingston, Ontario, Canada

ID: Working in the browser is too low a bar to set for whether something is accessible to all. A browser generally doesn't care if you use a <div> instead of a <button>, and as long as a click handler does something with it, all is good. But for things to be keyboard accessible, or easier for tools like screen readers to interpret your HTML correctly and present the interface to users as it should be, you have to use the right elements for the job. Because these tools already know how to interpret these elements and how to handle them, and operating systems know how to deal with them via the keyboard.

EMAIL

FOR THE LOVE OF EMAIL

Can you share any advice on how you manage to do your job (in email coding) without ripping your hair out?

Shane Hudson, West Sussex, UK

MR: I get asked that a lot, but I actually prefer working with email over web.

If you want to do something on a website, you can Google it and find pages of articles telling you how to do it. With email, you're lucky if you find one. It feels like there is still so much to discover with email. Email is also fleeting in its nature. You can be experimenting with something new for every send if you want; you don't have to maintain code you wrote two years ago, you don't have old CSS styles interfering with your new code.

ACCESSIBILITY

AVOID COMMON MISTAKES

What are some accessibility 'gotchas' we should be looking out for when developing single-page applications?

Zoë Bryant, London, UK

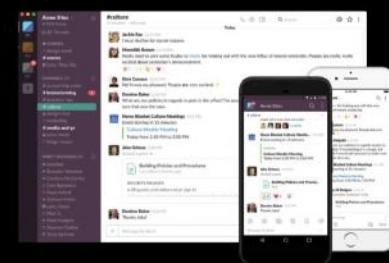
ID: Given the nature of single-page applications, things can be updating dynamically all the time, and you need to ensure accessibility tools are made aware of the changes so they can present them to the user. This is where WAI-ARIA can help a lot, as it provides methods such as live regions, which developers can take advantage of to alert tools to any onscreen changes. You may also have to rethink the UI of a single-page application and ask yourself questions like: 'Do we really need to update the results list every time a new filter is selected, or should we let the user decide when to apply them?' Asking yourself questions like this can improve the experience for everyone.



3 SIMPLE STEPS

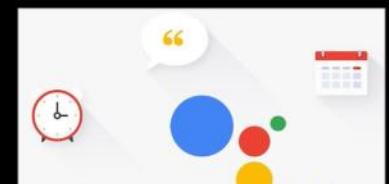
Where do you think email will be in another 10 years? All mobile? JavaScript? Decent CSS support? Or will it even be here at all?

Steven Mansfield, Manchester, UK



Slack to the future?

+ A lot of people say email will be gone in 10 years, but there is a lot to indicate that it will survive. Things like Slack and WhatsApp have taken a big chunk out of email usage but they won't replace it. Email is an open technology – nobody owns it and nobody will suddenly start charging you to use it. It's also great for archiving things like receipts, and there are no compatibility restrictions.



JavaScript

+ I don't think JavaScript will ever come to email, apart from things like Google Actions. Opening up JavaScript just leaves too many vulnerabilities.

CSS support

+ Decent CSS support is definitely on the cards. Some clients already have it, so others could follow. It would be good to see more collaboration between email clients, perhaps on a shared preprocessor, then we could more accurately predict what code is supported and what isn't.

COOL STUFF WE LEARNED THIS MONTH

HOW TO USE SCROLLING TO DEAL WITH LOW ATTENTION SPANS

+ Studies show that the majority of web users skim text, and miss a lot of information. This article explains how to design your site so that people are more likely to read and retain the information you present. netmag/301-scrolling

DESIGNING GLUE

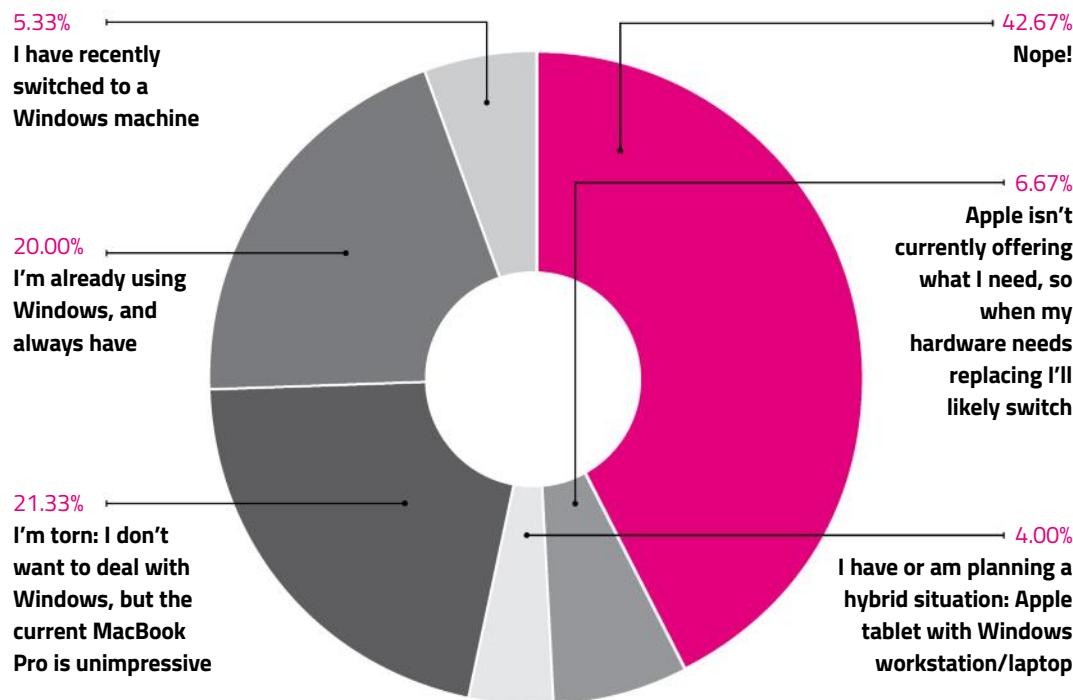
+ In this article, "glue is the connective tissue that exists between your product and everything else". Does your product fit seamlessly into people's lives, or is there friction? Are your users posting about hacks and tricks to achieve common tasks? Ste Grainer explains how to find and fill the gaps to make your app or site more usable. netmag/301-glue

DISTILLING HOW WE THINK ABOUT DESIGN SYSTEMS

+ "Design systems have a marketing problem," says Sarah Federman. The vocabulary around design systems is confusing and creates a big learning curve for new people joining your team; in this post Sarah lays out her model of how to think about them in a clearly defined way. netmag/301-systems

*THE POLL

WOULD YOU EVER SWITCH FROM MAC TO WINDOWS?



From our timeline

What's the best web design book you've read this year?



The Little Black Book by
@womenwho
@_tashhockey



Design Systems by
Alla Kholmatova.
@Dan10GC



Sass for Web Designers
by @simplebits was
crucial in helping get up
to speed on Sass when joining a
new team this year! Highly
recommended!!

@pixelflips



I've read *HTML & CSS: Design and Build Websites* by Jon Duckett. I'm a beginner and I think it's a must have for learning HTML & CSS.

@dhubuzon



ResilientWebDesign.com by @adactio. When you fully understand the nature of the web, you can make sure your users can get their tasks done.

@RealAlanDalton



Not read, but buying for my niece *Girls Who Code: Learn to Code and Change the World* by Reshma Saujani.

@weirdgroup



Designing Interface Animation: Meaningful Motion for User Experience by @vlh
@rachaelgrocott



Design is a Job by
@monteiro... just changed me. I will never communicate with clients the way I did before.

@darishead

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FEED

People, projects & paraphernalia

THIS MONTH FEATURING...



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One client changes his mind pretty quickly when presented with a simple cost estimation

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MANGOMOJI

Elina Åberg explains how a weekend Spotify hackathon led to the creation of this cool tool

* SIDE PROJECT OF THE MONTH



ELINA ÅBERG

job: Full stack developer
at Humblebee

w: www.humblebee.se



Tell us a little about Mangomoji...

It's an emoji based Spotify-connected search where you can find a song based on your emotions. Simply combine a maximum of three emojis and a song will start playing.

What's the inspiration behind Mangomoji?

We all love emojis and we see them being used more frequently than ever. Sometimes you might not know exactly what you want to listen to, but you know how you feel! That's our inspiration – feelings! As well as knowing that one emoji can say more than a thousand words.

Who is this aimed at?

A person who doesn't care too much about the artist or specific lyrics. A person who's more likely to be looking for a specific mood to satisfy. This person is a frequent app user and likes to try new stuff and explore the www!

What sort of feedback have you had from users?

We've gotten great feedback! People love to be



interactive, especially when it comes to music. And we love how passionate they get when they try the app. They come up with new features and really like the idea and want us to develop it further!

Have you experienced any difficulties so far?

It could be difficult to expand our emoji base and create even better accuracy. Our goal is that every single combination should be SPOT ON.

How did Mangomoji come about?

We are a group of four people who created this app at the Spotify weekend hackathon in Gothenburg, Sweden. We are all creative and have decent technical experience. We have a data student, a technical designer, a business designer and a full-stack developer in the group. We met randomly at the hack and put our heads together and created something we think is brilliant... in 48 hours. ■



★ HOW TO

IMPROVE DESIGNER & DEV COLLABORATION

We asked the @netmag followers for their tips on breaking down those barriers

COMMUNICATION

Make sure communication is really tight: "Designers, go show your sketches to the developers," says @netrunnerIT. "Developers, tell them what is easy and what is hard. It's easier on the budget."

There should be an ongoing discussion throughout the project.

PROCESS

"An integrated process is necessary for best results," says

@anotheruguy. "Produce collaborative assets that can be discussed and have team value." Avoid including features that aren't necessary, advises @_LeonBrown: "Conflict never occurs on features that don't exist". @AshConnolly recommends that you make use of a style guide: "Designers and developers both working with a consistent UI reference leads to a better product, better UX and cleaner code".

TOOLS

"As a developer, getting designs through @zeplin_io makes things a lot easier than getting the raw Sketch files," says @billtechspring.

@RicusMaximus recommends @webflowapp: "It can export semantically correct code and you can edit it visually". @Dan10GC likes Notion.so.

[PLEASE SELECT YOUR ARTIST]



LOVE TO HATE

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

★ CLIENTS FROM HELL



Client: Hi! I'm blown away by your pixel art. I have a small project I'd like you to help me with. Are you interested?

Me: Thanks for reaching out! Can you be more specific about the scope?

Client: Well it's one project. I'm sure you'll find it very simple! Basically I want a pixel art portrait of me with some speaking animation.

Me: Well, hold on. I'll draft up an estimate and send you a contract that includes timeframe etc.

Client: Wow, you think it will take a couple of hours, huh? I didn't think it would take that long.

Me: This is my initial estimate, and I always put in a buffer. I'll only charge you for time worked, but I find it's useful to estimate high.

Client: I understand you're over-estimating but I can assure you it won't take that long. So why don't you change the contract to reflect that?

Me: My estimations come from experience with similar projects and this is my professional

opinion. If my estimation is over the budget, then I suggest finding another artist.

Client: It's not that I CAN'T pay you. That's not the case AT ALL. Why are you assuming stuff? But I honestly do think it's a bit UNFAIR that you would charge that much for such a small project.

Me: Again, while I appreciate your continued interest, I think it best you find another artist.

Client: Already found one, buddy. All you do is PIXEL ART. There are millions of people who can do what you do. Don't think you're special. Bye.

For the record, I actually do a ton of different design work. I have no idea why they thought I just did pixel art. I don't think I've had someone flip their opinion of my work so quickly.

CLIENTS FROM HELL
clientsfromhell.net

GAALEIC FOOTBALL

Kevin Devine on how sprint drills in the freezing Irish winter are a great way to clear a creative mind

* BEYOND PIXELS

> Gaelic Football is a team sport played throughout the island of Ireland and beyond. It is played on a large rectangular field where teams of 15 players compete against each other. The game is a bit of a cross between soccer and Australian rules football, played with a round ball and with two ways to achieve scores: points and goals.

The sport is strictly amateur and participants play for clubs based on where they live. There is a real sense of community around the game, with strong family connections within each club. Those who are good enough will go on to represent their county and compete in national competitions.

I've been involved with the game from a young age and started playing with my local club, Clontarf, from the age of six. Based on Dublin's northside, my grandfather helped start the club in the sixties and I grew up playing with my siblings and friends against different teams throughout the county.

As a teenager, I was lucky enough to be picked for the Dublin underage teams and I got to play in Croke Park a few times, which is Gaelic Football's main stadium. Holding over 80,000, the stadium is the jewel in the crown for Gaelic games and hosts the national finals every September.

There's a close connection with Australian rules football and I got selected to spend a year in Melbourne playing professionally, which was a fantastic experience as a young 18 year old. On my return, I continued to play Gaelic Football at University and for my club.

The game itself can be physical and it requires aerobic ability, strength and skill. Training can be tough, particularly in the winter months, but there is always a great camaraderie with teammates. I find it has been a great way to keep fit and see it as another creative outlet. It's also a great way to clear the head after a day at the desk. When you're doing sprints in the freezing cold, the last thing on your mind is the design critique you had earlier that day.

Now in my mid-30s, I'm approaching the end of my playing days and I'll probably look to get involved in the coaching side of things. It's a nice way to remain involved in the game and help bring along the next generation of players. ■



* PROFILE

Kevin is a senior product designer at nearForm in Ireland. He helps build and shape digital products for clients throughout the world.



STUFF I LIKE



PETER BARR

**Head of Web & UX
at Murray Creative**

www.petebarr.com

BEAR

This is a great little app for writing notes, to-dos and lists, which syncs between your devices. It utilises advanced markup options for quick input without the need for a formatting GUI. The hashtag categorisation and export options are great.

www.bear-writer.com

FRANZ

Combine all your chat and messaging services into one app to declutter your desktop with a multi-tabbed interface.

Especially useful when you are subscribed to multiple Slack groups, you have far less need for Cmd/Ctrl-tab flicking between apps.

<https://meetfranz.com>

GSAP

It would be remiss of me not to mention this animation platform by Greensock. Be it for animating the DOM, SVG, threejs, canvas, or whatever, it has you more than covered.

Simple, powerful, stable. I love it! The support forum is very approachable, too.

<https://greensock.com>



CREATEFUL

Toby Pestridge takes us on a whistle-stop tour of Createful's bright and friendly offices in Bournemouth

* WORKSPACE

> Createful as an agency was born from opportunity. Back in 2010, founder and managing director Kriss Bennett spotted an opportunity to form a new digital creative agency focussed on the burgeoning mobile app industry. Our first project captured another opportunity – a wedding planner iPad app where none previously existed. Our light and airy Bournemouth town centre office was yet another opportunity not to be missed, and in 2014 we jumped at the chance to upscale from our previous office, which was based in a startup incubator on the campus of the local Arts University.

Keeping with the theme of opportunity, our comfy sofa (1) provides a central breakout area, decked out with custom cushions

(2) picked out by the whole team from their favourite themes. We're big fans of classic and modern video game consoles (3), but often a good old-fashioned game of chess is the most effective way of clearing your head over lunch (4).

Our standing desk (5) is an opportunity to help promote a healthier working environment, and there are also gym balls for those who prefer to bounce around while they work!

We love our ceiling-height windows that stretch the full width of the office (6). They give us great visibility locally, and are perfect for a spot of people watching. Bournemouth's seven miles of blue flag beaches are only a short walk away, so many of us go for a stroll or a run during the day.

We're passionate about marrying elegant and attractive user experience with heavyweight technical solutions, and we love working closely with our clients at every point of our mobile and web projects. For this reason, we've covered many of our walls with whiteboards (7) and are constantly doodling, sketching, wireframing and evolving. We've also got a colouring wall, decked out with black-and-white wallpaper that we invite all our visitors to contribute to.

We're not just about seizing opportunity, though – we also offer opportunities to students and young people looking to begin a career in digital.

Our internship and placement programmes focus on the realistic day-to-day skills required in our industry, and some of our students' work has ended up being used in live client projects. ■

*** PROFILE**
Toby (@TobyPestridge) is the Creative Director at Createful (@Createful). He's passionate about encouraging the next generation of digital creatives.



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* COLLABORATION

3 TECHNIQUES FOR FRUITFUL COLLABORATION

Ellen de Vries shares the secrets to guarantee successful group projects



Many of us love the idea of being part of a strong collaborative group who pull together to create new and exciting things. As the web grows and changes, as tools and systems become more complex to negotiate, and as project participants are busy people who work further and further away from one another, you might be feeling like it's a challenging feat to keep the team together and feel a sense of collaboration.

In my ideal world, a digital project should act like a campfire; a central point of interest that draws together experts, practitioners and stakeholders. But when you're trying to achieve this across an ever-shifting team, how might you

maintain that shared sense of focus? Here are three techniques that I've written about in my eBook on collaboration at collaboratebook.com.

CREATE A SHARED VOCABULARY

Every project participant comes to the table (even if it is a virtual one) with a different lens; a different perspective on a subject, which means they have a different language from you. If you've ever sat at a boardroom table listening to a conversation and thought "I don't understand what these people are talking about" then you've experienced one of the main blockers to creating a fruitful collaboration, which is not having a shared language.

The more diverse your group members are, both culturally, physically, mentally, and in terms of their domains of expertise, the more potential you have to innovate and create something no-one has ever seen before. But it requires acknowledging that time and effort need to go into the language you're using.

As part of my work at Clearleft, I recently facilitated a workshop with 16 Artificial Intelligence experts from all over the world. In order to create divergence in the conversation and reflect the diversity in the group, I ran a "vocabulary dump". Every individual took 15 minutes to write out all the words they could think of from their domain on sticky notes. We stuck them together randomly in a cloud, covering several metres of window space.

We then used our huge vocabulary cloud to act as a starting point for discussion; allowing people to question what one another's phrases meant, and also pick up on nuances in meaning. It was a wonderfully collaborative way to spark helpful discussion and identify where there was convergence and divergence in our vocabularies.

ESTABLISH A NORTH STAR

A few organisations we work with are now using the evocative term "North Star". It's a short central organising statement



in the form of a proposition or an elevator pitch. The act of composing this short North Star statement with everyone on your project is a surprisingly challenging exercise in collaboration, but the major benefit of the work is that it draws the team together in order to iron out inconsistencies in everyone's perception of what they're doing. It's not copywriting or marketing language, it's just a plain language statement that shows the team have consensus around what it is they are creating together.

Try working with your team (whether they are near or far) to answer these questions about your project:

- What does this thing do? For example, it's a thing to write with.
- Who is it for? For example, it's for people who want to write things down.
- How does it help them? For example, it helps them to collect all their thoughts on paper.
- What were they dissatisfied with before? For example, cave paintings were not portable enough.

MAKE A SET OF CULTURAL PRINCIPLES

Some organisations like to create sets of values, others have rule books, some even have manifestos. One set of guidelines we've enjoyed using is the "It's ok to..." list, inspired by a system used by the .gov.uk team (<https://gds.blog.gov.uk/2016/05/25/its-ok-to-say-whats-ok/>). Examples from that list include:

- It's ok to say 'I don't know'
- It's ok to have a messy desk
- It's ok to make mistakes

One way to gather these guidelines is by asking your team members to contribute stories that begin "I liked it when..." or "I like the way..." about other brands, work experiences, or about your working culture. The act of doing this is in itself a positive experience that focuses the team on the act of collaboration. ■

* PROFILE

Ellen is the author of *Collaborate: Bring People Together Around Digital Projects* published by Gather Content (collaboratebook.com).



★ BURNOUT

MANAGING BURNOUT & GETTING BACK TO WORK

Illustration by Kym Winters

Jessica Rose offers practical advice on how to prevent, diagnose and manage burnout at work

> It's crunchtime. You're coming in early. Staying late. But it's just until this last deadline. Until we deliver this last thing. But looking back, it's been crunchtime for as long as you can remember. There's always one more big project between you and finally being able to relax again. What is this high stress, always-on way of working doing to you?

Burnout can happen when stress and overwork outpace your ability to heal and recuperate. Sufferers report difficulty sleeping, emotional and physical exhaustion, emotional changes and decreased ability to function in both their professional and personal lives. Physical symptoms may also include stomach issues, eyestrain and persistent headaches. Those impacted often report taking months or even years to fully recover. While the focus on burnout and its impact on our lives may seem new, the concept of occupational burnout dates back to the 1970s.

Unfortunately, the always-on and high demand nature of many workplaces in technology places us at a higher risk of burning out. So how can we best avoid burning out, recover when we are impacted and create healthier ways of working overall?

PREVENT BURNOUT

The best way to cope with burnout is to avoid burning out in the first place. As the pressures of sustained stress and overwork bring burnout, our first line of defence is creating a clear separation between work and personal lives. Although creating this division can be challenging in an industry where email, social media and comms tools aim to keep us continually connected to our work.

For freelancers, this is a matter of pure willpower. Begin setting limits on where you work, limiting your working activities to your workspace or home office. Creating a clear physical space where you work enables you to physically leave when you're done. This should help you leave work stresses behind you when you leave your workspace.

Clearly define what counts as work to you. Activities like answering emails or chasing invoices are work, but often creep into personal time for freelancers. As work activities spill into your personal time they bring work stress and an increased risk of burnout with them. Once you've managed to limit all (or more realistically, most) of your work activities into a single space, you can work to set limits on the amount of time spent on work. Remember that longer days don't result in more or better output, with research suggesting that somewhere between six and eight hours a day is best for productivity and lets you minimise burnout risks.

If you're not freelance, your ability to create healthy working patterns depends on your employer supporting and encouraging a non-toxic culture. Your employer's offices can provide a workspace more clearly separate from your personal life than a home office, but your ability to unplug from work can very much depend on employer expectations.

Setting boundaries like ignoring your emails or snoozing Slack can be dangerous in a setting where you're expected to remain connected to your work. Employers expecting mandatory overtime or enforcing crunch conditions can place you further at risk of burnout. If you can't push back against these expectations to set ways



- of working that keep you healthy and productive, looking for employers who can help you take care of yourself can be a valuable long-term priority. Developing and defending healthy working patterns are the key to preventing burnout; if your employer isn't an ally in this effort, you may need a better job.

RECOVER FROM BURNOUT

If you can't prevent burnout, catching it early can help you reduce your recovery time. Katie McLaughlin, SRE, talks about the ability to "self-identify that I'm feeling slightly burnt out, more of a 'medium rare'" and working to adapt her work and life into healthier patterns in response. The early stages of burnout can feel like jetlag or gentle exhaustion. Many in the 'medium-rare' stage

stressful period that he was unable to engage in any work that required creativity.

He talks about finding himself "only capable of performing what I'd call 'reactive duties': I would show up in meetings, reply to questions and emails, and I could even deliver conference talks when I was familiar enough with the content. But my creative process was completely stopped." He's been carefully working to reduce the pressures and may take a long break from work in an effort to fully recover.

To heal from the more advanced stages of burnout you'll need the same time away from the daily pressures that less severe burnout requires, just more of it. Taking time off work is a critical recovery step for many in the critical stages of burnout who are able to afford it. Many

"Symptoms of more extreme burnout will be more intense. Memory issues, insomnia and attention challenges can exacerbate the more subtle symptoms of early stage burnout"

report being quicker to anger, less patient and having trouble getting to sleep at night.

In the same way that prolonged pressure brings on burnout, recovering from early stage burnout requires a reduction of pressure and time. Aim to spend less time at work, on high pressure tasks and attempt to avoid professional conflict while you recover. Look critically at your side projects to see which of them may be draining you further. As a rule of thumb, try not to jump back into the pressures of your life too quickly after taking some time out to recover. Taking too little time could leave you vulnerable to cooking back up to medium-rare quickly, while taking extra time to recover is unlikely to cause damage.

Catching burnout early is quite difficult, especially for those who haven't been impacted by burnout before. Symptoms of more extreme burnout will be more intense. Memory issues, insomnia and attention challenges can all join and exacerbate the more subtle symptoms of early stage burnout.

People unaware of burnout or too busy to heed the warning signs may try to work through burnout, stopping only when the symptoms overcome their ability to continue. Those suffering from early stage burnout can recover by doing less for relatively short restorative periods. Recovering from more advanced burnout requires stripping your life down to as few stressors as possible for stretches that can seem impossibly long.

Docker's Jérôme Petazzoni took almost two years to recognise the increasing impact that burnout was having on his work and life. He noticed after a particularly

technologists take months or years off work, some returning gradually or in a part-time capacity.

For those of us unable to take long breaks from work, cutting down on hours worked, eliminating side projects and reducing the intensity of work duties can be a route to relieving some pressure to begin to heal. Dramatically cutting down on the hours you work and the pressures connected to your workday are vital.

Trying to work through burnout requires an understanding and accommodating working environment where your health is being actively supported. The idea of switching roles while fried may seem daunting, but removing yourself from a toxic workplace or workload is an investment in your recovery. Redirecting energy away from work and stressors and into calming hobbies or activities may help you refocus.

Burnout has been widely studied across the fields of psychology, occupational studies and medicine but doesn't exist as a dedicated medical diagnosis. Many burnout symptoms overlap with symptoms of depression, anxiety disorders or other serious mental or physical health concerns. If you have recently been impacted by symptoms that sound like those described in this article or have had other significant changes to your health or mood, please seek advice from a medical professional. ■



PROFILE
*

Jessica works to foster more equal access to technical education and meaningful work in technology. Projects include Open Code meetups, Trans*Code and Pursuit Podcast.

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Margot Bloomstein

Words by Oliver Lindberg Photography by Sharona Jacobs

Before you even begin to think about generating content, you need a clear idea of your brand. Welcome to the world of brand and content strategy



INFO

job: Brand and content strategist & Principal of Appropriate, Inc
w: <http://appropriateinc.com>
t: @mbloomstein

For a long time companies forgot to think about the needs of their users. Companies only focused on their priorities and what they wanted to express. That changed with user-centred design – people started digging into the needs of different audiences. But there's a risk that an organisation can lose itself in exclusively paying attention to users. Brand and content strategist, Margot Bloomstein, is on a mission to bring the pendulum back to the middle.

"If companies within a particular industry that speak to the same audience only focus on the needs of that audience, it would be a very bland experience," she argues. "Airlines that sell the same product would all look and sound the same, and that's just not right because we know that they differ as brands, even if they fly the same routes, sometimes at the same price point. We know that the experiences that JetBlue, Virgin and United offer differ wildly, and people have different loyalties, proclivities and interests that correspond to those brands. I like to work with my clients to help them best express those differences. If they know who they are,

then they can better decide what they want to communicate and what kind of language, content types and platforms are best to engage their audiences."

Bloomstein, who has worked with clients like Timberland, Lindt, and Al Jazeera America, helps brands ensure the choices they make are not just right for their audience but also right for them as a company; an approach she calls brand-appropriate user experience. Should a brand be communicating in short, truncated sentences, long-form copy or in bullet lists, for example? Should they be conducting video interviews with their stakeholders, or would it be better to hear directly from their biggest customers?

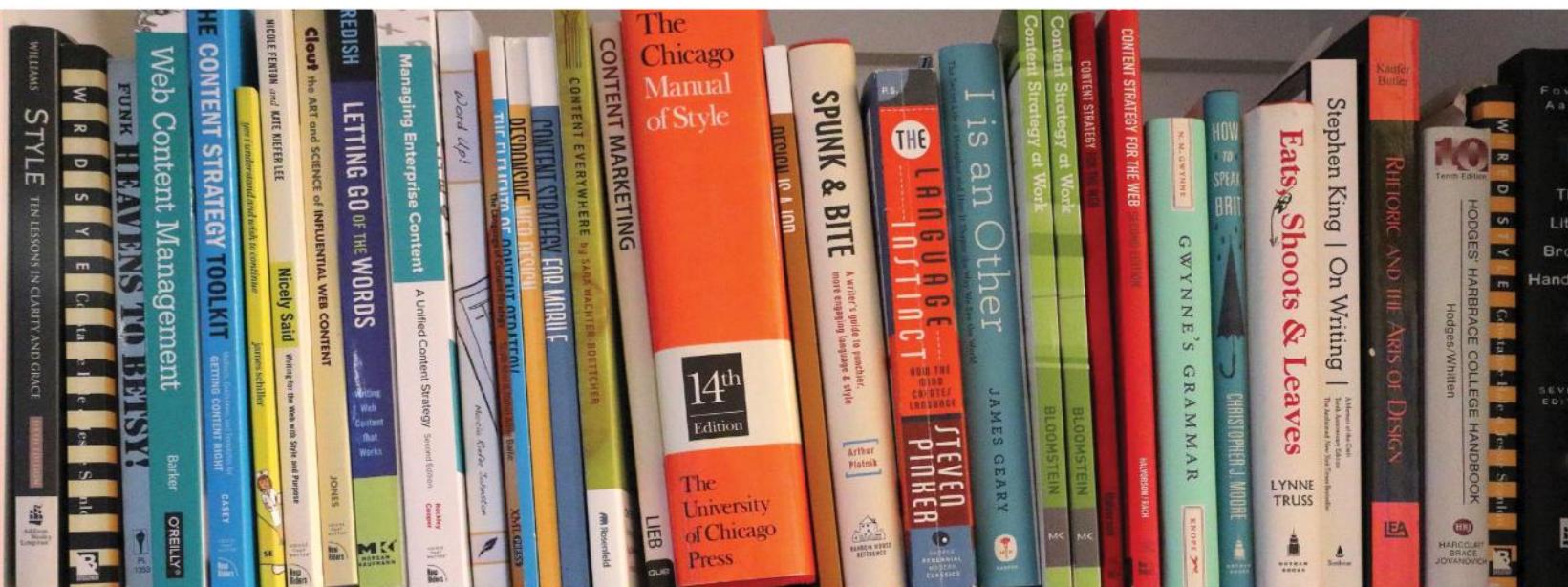
The first step, regardless of the client's industry, size or problem they are trying to solve, is always to help them create a message architecture. Bloomstein defines this as a hierarchy of the communication goals that can be used to guide the copy creation as well as the visual design. For this purpose she tends to facilitate an exercise around BrandSort (<http://cards.appropriateinc.com>), a deck of cards that she's created to help the

client prioritise and clarify all of those important communication goals.

Bloomstein guides the client through a three-step process (first introduced in her book, *Content Strategy at Work*) of sorting attribute cards describing who they are, who they'd like to be and who they're not. She then analyses which terms are so core and important to the brand that they want to make sure they hold onto them, while others are discarded.

"Maybe you've always been thought of as traditional and you realise that's stodgy and boring, but you still want to be seen as established, responsible and reliable," she explains. "Finally, we figure out the natural patterns in those terms and rank them. We find out what's most important to communicate – for example, your sense of innovation and being a ground-breaking, thought leadership-orientated organisation."

Once the message architecture has been established, Bloomstein moves into the more tactical work. This could be conducting a content audit and establishing editorial style guidelines. The message architecture is used





Photography: Erik Westra www.wiestra.com

to measure the brand's existing content to test it. "I can't tell you how many times I've worked with a team that might start out by saying they want to be seen as modern," Bloomstein laughs, "but when I ask them what that means and how it differs from how they've always done things, oftentimes people pause and shrug, because who doesn't want to think of their work as modern? We have to unpack those terms and go from abstract to concrete. The BrandSort tool is a way to do that. By the time you get to the actual content, whether it's specing out photography, developing infographics or writing copy, it's real and concrete, and you can see how it all goes back to the original message architecture. I firmly believe that you cannot conduct a content audit that is effectively qualitative as well as quantitative unless you first understand the message architecture of an organisation."

Bloomstein, who has a background in design, first got into the profession when she

joined a content strategy team at global marketing and consulting company, Sapient, in 2000.

Her first client was Lotus, the software company that acquired the technology behind the first buddy list and instant messenger. Bloomstein collaborated on the team to help figure out how to unite two software products into a single software as a service, which included coming up with the right tone for the branding, major calls to action, and taglines on the homepage for the new product. Content strategy, Bloomstein says, gave her the milieu to address some of the biggest problems that organisations face. In some ways her experience as a content strategist has not changed but it has substantially evolved.

At the moment Bloomstein works with brands to explore how they can establish credibility through choices in content and design. She's also writing a book on how organisations and brands establish trust, drawing inspiration from the political developments in both the US and UK.

"It's important for our audiences to understand more about how we make choices"

"When we think about how we choose to include or exclude information, edit content or call attention to certain parts of the page, whether that's online or in print, we operate like political strategists," Bloomstein argues. "It's important for our audiences to understand more about how we make choices as content strategists, copywriters, designers, or creative directors to elevate certain parts of our argument, call attention to certain products and maybe pull attention ►



► away or distract from unfavourable reviews. We make those choices all the time, whether it's around the density of the information on the page, our use of photography or overwhelming our reader with lots of details."

When asked for examples of brands that just get it right, Bloomstein highlights clothing companies Patagonia and Icebreaker, and motorcycle-gear retailer RevZilla. "They use a lot of different content types to engage their audience," she enthuses, "and they choose content types that align with their communication goals. Patagonia commissions a lot of its own content, both photography and longform content from outdoor enthusiasts and athletes who use their products sometimes every day, whether it's to scale a mountain or work on a particular bouldering problem. RevZilla, meanwhile, has an excellent customer service through live chat as well as more proactive content types such as video reviews of all their new products, and the depth that goes into their content aligns with their brand and communication goals."

Bloomstein stresses that longform content allows for a slower pace and a slower read, which may be a surprising technique to recommend at first. After all, online experiences these days seem to be mostly fast, efficient, easy and orderly. Not all experiences need to be fast to be functional, however, which is the topic of Bloomstein's talk at Generate New York in April. Longform content can afford readers and customers

the opportunity to slow down, explore and learn on the website in the same way as they would in the real world.

There are two major areas of research, as Bloomstein points out, that support slow content strategy and slower, well-paced user experiences: psychology and brick and mortar commerce.

"Empiricism teaches us that when people have the opportunity to cultivate their knowledge of the world through first-hand experience, they gain a greater sense of confidence and courage in their convictions," she argues. "We believe what we see. When designers give people the time to slow down, dig into the details, and collect more information about a camera lens they want to buy or candidate they want to support, for example, it turns out they feel more confident in their decisions. We can measure that success, especially on purchases, when we see a lower rate of returns."

If somebody had a product in their shopping cart, we used to hurry them up and get them out of there, but that's never been the thinking in brick and mortar experiences. "When people are considering a higher priced purchase or just want to spend more time browsing, shopkeepers don't rush them out of the store," Bloomstein laughs. "Instead we like to move people around the store to help them consider other items and purchases. Those are slower experiences that pay out in dividends, sometimes literally, for the brands that encourage them offline, so naturally that works pretty well online too. It's not

right for every brand and purchase, and if someone is interested in a low-price purchase, we shouldn't be putting up roadblocks to that. We need to let them hurry through. But in other cases, it's right to help people slow down to help support them where they are on their customer journey."

According to Bloomstein we can learn a lot from adjacent industries like journalism, media, and politics. "When we look and see how they associate text and imagery to allow for slower experiences by offering speed bumps through either the design, the information on the page or the actual content of that information, then we can see opportunities to help consumers find greater courage in their convictions. Sometimes that translates to readers having greater faith and trust in a particular news outlet, or to people returning again and again and again to the same retailer, or to people just feeling smarter about their choices. When I feel that I can see consistency in the content that a brand is creating and some transparency and insight into their communication goals, then I can feel more confident in my relationship with them as well."

And that's the essence of a brand-appropriate user experience. Content strategy can help identify and support whether the user experience that most fits your brand should be fast or slow, and ensure that you communicate with your customers with consistency and clarity. User needs are still important but the brand controls the experience, not the other way round. ■



“Longform content can afford readers and customers the opportunity to slow down, explore and learn”

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★ Q&A

ADDY OSMANI

Currently working with the Chrome team on Polymer, the Google engineer talks web fonts, open source tools and his dev YouTube show



job: Engineering manager, Google
w: addyosmani.com
t: @addyosmani

net: What are the main ways Chrome is trying to make developers' lives easier right now?

AO: We want to help developers ship delightful user experiences on desktop and mobile. Sometimes this means bringing new capabilities to the browser that it hasn't had before. For example, developers like web fonts, but want to avoid the dreaded Flash-of-unstyled-text (FOUT) we often see on the web. In recent versions of Chrome, we've given them this via the CSS font-display property. font-display:optional instructs the browser to say "If this Web Font can't be loaded fast, don't load it at all. Only show it the next time the page is loaded, if it's cached". It can vastly help improve a user's experience loading up an article page. We've had many requests for the mobile web to support the same powerful features native applications do, too. Over the years, we added Push notifications, offline caching and background-sync to Chrome. New versions support streamlined authentication (Credential Management API), photo capture controls like zoom (Image Capture API), and access to the native share dialog so sites don't need to rely on share buttons (`navigator.share()`). Developer

experience matters, too. We recently shipped JavaScript Modules support and continue to work on improving JS performance so framework code runs as fast as it can.

net: Has Chrome released any cool new open-source tools recently?

AO: Sure! I'm excited about three open-source tooling projects we recently shipped. There's Lighthouse: a web performance and best practice auditing tool. It's useful for learning where you can improve your site. Lighthouse powers the new 'Audits' panel in Chrome DevTools and **net's** readers can try it out in Chrome stable. Next, there's Workbox (workboxjs.org), our library for offline caching resources. If you have files a site needs on repeat visits (eg JavaScript), caching improves load performance. Workbox can generate Service Workers for you, taking some of the pain away from writing them. Companies like Starbucks are using Workbox in production.

Finally, we released Puppeteer (github.com/GoogleChrome/puppeteer), which lets you automate headless Chrome: a command-line version of Chrome without the overhead of the full browser. Puppeteer is useful for generating screenshots of webpages, automated testing (eg keyboard input) and for pre-rendering content. We're excited to see how these projects help developers in practice.

net: When is your YouTube show, *Totally Tooling Tips* (g.co/TotallyToolingTips) returning?

AO: Season 4 just started! *Totally Tooling Tips* is for web developers who build sites and want to get more productive. We'll often hear how hard it is to configure Webpack or audit your site for web performance issues. Matt Gaunt and I deal with these problems every day and share tips on the show to save you going through the same pain. I'm surprised the show hasn't been cancelled yet (we're awful), but it's had over a million views so far. We're just happy to not be writing unit tests with the time, I mean, helping. We're happy to be helping.

net: How do you keep up with all the latest web design techniques, tools etc?

AO: I used to carefully curate the RSS feeds I followed to stay up to date. That worked a few years ago, but I'd miss articles from a lot of great new writers who hadn't gone mainstream yet. I now rely on Nuzzel, an app that provides personalised top stories, as well as the recommendation engines in Pocket and Medium.

Occasionally, I'll also read Reddit or Hacker News on the odd day when I'm feeling brave. Oh, and I read **net** magazine of course. I get to be on the cover for saying that, right? ■

* TESTING

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**ANDY THOMAS**

UI/web designer and developer,
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www.andythomas.ca

 I always test as I go with Chrome. If I come across a function or feature I feel could be troublesome, I'll test it with other browsers: IE, Firefox, then on some mobile devices as well. I try to sort out any issues as soon as I find them, to save time later on. Over time you'll get a good idea of what works in a browser, but it helps to keep caniuse.com handy for reference. This information is useful when deciding what elements to introduce when building a page. Also having another set of eyes look over everything will help catch things.

**JOE CASABONA**

Web developer
casabona.org

 A few things to consider include device, screen size, browser and connection speed. What I generally do is test screen size first (resizing browser). Then I test on the native devices I can (iPhone, two sizes, one Android phone, various desktop browsers). I'll use BrowserStack for the rest. For other testing, I'll often send the site to friends, and I've also gone to a local retail store to bring up websites on their devices.

**ANA TRAVAS**

Designer/
front-end developer
animista.net, wearec2.com

 One of the tools I use extensively throughout the development process is Chrome's Web Inspector. It helps me troubleshoot and debug on-the-fly. This saves me a lot of time. I also do a lot of functional tests. Cross-browser testing is the most time-consuming part. I try to ensure that a website looks and performs consistently. For this, I use as many real devices as possible; otherwise I test in virtual environments. I run each website through Google's Lighthouse, which provides me with all sorts of useful information about the site's performance. The final stage is beta testing, where users get to report back with their feedback. This is where I get the chance to perform some final tweaks.



JAMIE HUSKISSON

Managing director and founder, JH
wearejh.com

 Testing is vital to our work at JH, as we have a thorough internal sign-off process. A client's priority should be to focus on the customer's experience, and not to test. We're a little biased because we created it, but Browsersync is vital. One thing we're known for is great mobile experiences, so you'll often see someone connecting multiple devices using Browsersync to test. Because the only time added with each device is the movement of our eyeballs between the devices on our desks, we can test our front-end code much more effectively.



TOM JEPSON

Lead designer, Buying Butler
www.tomjepsoncreative.work

 For me, testing is something that should happen at every stage of the design and development process. Sharing work as early and often as possible is a great way to ensure you achieve your product goals. I'll look to gather feedback and iterate on content, wireframes, visuals, prototypes and the final ready-for-release product to make sure what's being made is accessible, effective and fit for purpose. The feedback can come from people close to the design, key stakeholders and SMEs, and external parties too, if it can be shared.

TESTING INTRODUCTION

netm.ag/301-testing

 With front-end development becoming more complex and with developers responsible for stability and consistency like never before, Alicia Sedlock breaks down your different testing options and explains what situations they are best used for.

12 MUST-HAVE TESTING TOOLS

netm.ag/301-tools

 New code and user testing tools pop up every day, so it's easy to miss something that could help. This list of quality code tools will help you in a variety of testing scenarios. Each should be investigated to make sure it fits with your tech stack and technical needs.

VIKTORIANA KOSTOV

Visual communication designer
komiska.com



 My work involves small businesses or individual clients and WordPress. While coding, I repeatedly check code through code validators and Nibbler. I also use packages like Autoprefixer for the Atom code editor. Soon I plan to switch to workflow automation including the Autoprefixer and Browsersync for Grunt. I test my layouts on Apple and Android devices and Windows PCs in the office, as well as using ScreenQueries, Responsinator, BrowserStack and Browsershots. I love the Microsoft Edge platform and also have VirtualBox installed. A reliable theme testing method is Morten Rand-Hendriksen's Theme Unit Test install, and the Developer plugin by Automattic.



ANGELA P RICCI
Web designer/
front-end developer
gericci.me

 I believe the only reliable test is in real conditions. Perceived performance, accessibility and general usability can only be tested in that way. Today, the respect for web standards and the progressive enhancing approach leave less room for bad surprises, so I prefer to focus most of my testing efforts on mobile, where the diversity of environments is greater. If I'm applying new features or standards, I test them right away in as many browsers and devices I can.

RESOURCES

7 GREAT RESPONSIVE TOOLS

netm.ag/301-responsive

 To ensure your site is fully responsive, you need to test it on different devices. Most of us, though, don't have the budget to get hold of hundreds of physical devices. But fear not! These tools provide a halfway house by letting you test your designs in a virtual environment.



*HOSTING

CLOUD HOSTING VS SHARED HOSTING

Neal Thoms examines what the difference is between the two and which will work best for you

We're used to seeing the word 'cloud' stuck in front of basically every technological term out there. And while tech-savvy individuals have a decent grasp of what 'the cloud' is, the same can't be said for all its potential applications.

Cloud hosting, for example, is not simply shared hosting with a cloud badge stuck on the front of it. Cloud hosting is in a league of its own when compared to more traditional forms of shared hosting, and offers many unique advantages that qualify its existence. This article will explore these differences.

The critical differentiator of cloud hosting is that it draws computing power from a pool of dynamically allocated resources across a large network of physical components, not a fixed set of hardware. Shared hosting, on the other hand, is a web hosting solution where each customer receives a portion of server hardware to run their website or application. Shared

hosting is often the most economical way to get online, because the service provider houses multiple customers on a single web server, resulting in lower costs overall.

While shared hosting can be perfect as a cost-effective platform for less demanding projects, it has its limits. With several customers sharing one set of physical hardware, individual users can't rely on a guaranteed level of server performance.

This might not be an issue for sites and applications with minimal requirements or low visitor numbers, but when it comes to running intensive, business-critical processes, many users find that shared hosting isn't up to snuff.

The reason shared hosting isn't suitable for intensive applications? In a word: contention. The full power of the hardware will always be pulled in several directions at once, with different websites and applications in constant competition for processing power.

Imagine one customer on a shared platform gets a sudden spike in traffic. Luckily, other websites on the same server are quiet, so some resources can be allocated to cope with the extra visitors. But what happens when several websites are popular at once? The server only has a finite amount of resources to parcel out, so intensive applications will regularly struggle to get what they need. The end result is inconsistent performance, slow loading times and a shoddy experience for the end-user. If your website is a major source of leads or sales, this presents a serious shortcoming.

Even with high contention, shared hosting can still use sophisticated tech to provide decent performance, at least for sites with low or medium requirements. But the fact remains: demanding sites will never get predictable, consistently high performance on anything other than a dedicated platform.

One major misconception of cloud hosting is that it doesn't offer any significant performance boost. This couldn't be further from the truth. With cloud hosting, every single resource you configure is dedicated to you alone. Processors, RAM and SSD storage provide guaranteed performance on cloud hosting, exactly the same way they do on complete servers.

Like a shared platform, everything can be managed from one central control panel, but with the flexibility to also manage files via SFTP, install and update apps, manage databases and DNS, and manipulate source code.

But of course, as mentioned before, the biggest difference is that unlike shared hosting, cloud hosting offers fully dedicated resources that can be scaled on demand for guaranteed performance. A kind of 'dedicated hosting' option for users who want the increased power of their own server, but don't want to deal with server management. Hopefully this exploration of 'cloud hosting vs shared hosting' has cleared up some misconceptions! ■

*PROFILE

Neal is a content editor at Fasthosts (www.fasthosts.co.uk), a UK provider of dedicated and cloud hosting services including CloudNX, the next-generation cloud platform.



★ THE DESIGN OF BUSINESS

PARTNERS

Christopher Murphy explores how partnerships can deliver more than the sum of their parts



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

Running a business can be a lonely affair, especially if you're in a team of one. In this month's article I'll explore the role that partnerships can play, helping you to deliver added brand value and, as a result, maximise awareness and drive sales.

Working with other like-minded businesses has the potential to widen your reach and, even better, deliver a win-win for both parties. The key lies in finding partners that share your brand values.

Look closely and you'll see strategic partnerships in play throughout business. Partnerships are an incredibly effective strategy when it comes to marketing and storytelling. Why? Because the partners add up to more than the sum of the parts. When Apple launched the Apple Watch, for example, it positioned it not just as a wearable computer, but also as a luxury fashion item and a sports accessory. Partnering with Hermès (tapping into the storied world of luxury goods) and Nike (tapping into the focused world of fitness) was an inspired decision.

These partnerships ensured that the Apple Watch enjoyed the benefits of three companies, not just one, helping to promote the product when it launched. Hermès, a business with a long history, benefited by aligning with a business at the bleeding edge of technology. Nike, a business with a loyal

audience passionate about sport, benefitted by aligning with a new device that was perfect for tracking fitness.

You don't need to be a multinational business to build a successful partnership, however. With a little imagination even the smallest of businesses can develop a partnership that pays dividends.

CREATIVE PARTNERSHIPS

Partnerships can be an opportunity to tell a captivating story, where both partners win. When Andy McMillan launched Build – a design festival for web designers that ran for five years in Belfast – he considered his partnerships as opportunities to create something memorable. Sponsors can make or break a conference, but sponsors can offer more than just money and McMillan seized the opportunity to explore his partnership's potential.

At the second edition of Build, McMillan partnered with Campaign Monitor, an email marketing company, to create Caffeine Monitor (<http://gofreerange.com/building-caffeine-monitor>), "an application built to track and display a real time visualisation of caffeine consumption during the conference." It was a lovely idea and proved far more effective than simply acknowledging Campaign Monitor's support with a brand liberally applied to the conference materials. The application, featuring data visualisations by Nicholas Felton and designed and built by Jason Cale, was a hit. Attendees loved the idea and coffee consumption, naturally, became the focus of attention. Build won, Campaign Monitor won, and everyone was happy.

The key to building a successful partnership is to identify businesses that echo your vision. Building something together affords an opportunity to reach a larger audience by aligning two, or more, brands. You'll give your business a welcome boost by establishing partnerships and, especially if you're in a team of one, you'll enjoy working with other, like-minded individuals. ■



Caffeine Monitor A perfect partnership between Build and Campaign Monitor

NEVER MISS AN ISSUE!



#300 DECEMBER

Web visionaries investigate what's next for design & the internet in our special 300th edition, plus 30 greatest web moments

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SEE PAGE 18



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#294 JULY 2017

The 10 Rules for Better Web Typography, why you should be using a Service Design approach and how to use CSS Grid Layouts

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#298 OCTOBER 2017

Rachel Andrew guides us through the features of CSS Grid Layout we're not making the most of in a bumper CSS Grid Secrets special



#297 SEPT 2017

Our first-ever Accessibility cover looks at how we can design a better web for all, delving into the inclusive design principles



#296 SUMMER 2017

The Money Issue. How to survive – and thrive – in an increasingly uncertain world, plus eCommerce, finances & project management



#295 AUGUST 2017

Explore the changing world of SEO, why inclusive design is so important and the ultimate guide to Sketch's latest update



#293 JUNE 2017

The new CSS trends, tools and techniques you should be using right now, plus how to design the perfect UX for offline use



#292 MAY 2017

Discover how to master mobile design through the golden rules of great mobile UX, plus 15 web APIs set to revolutionise the web



#291 APRIL 2017

Take an in-depth look at the six main trends changing the face of UX and introduce five steps to great image management



#290 MARCH 2017

We explore the design secrets driving major brands, share tips for futureproofing code and dive into Adobe XD's latest features

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GALLERY

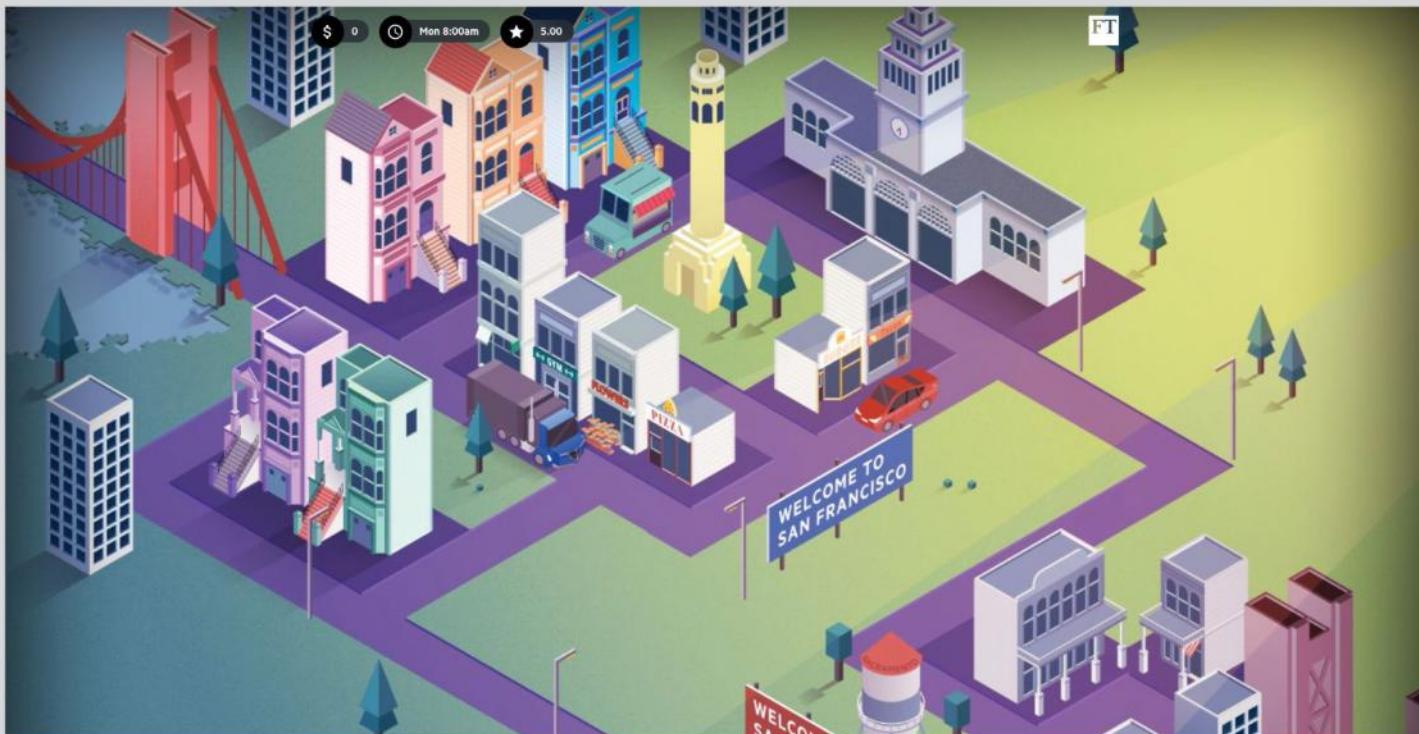
Sensational design and superb development

JANE AUSTIN



Jane is currently Director of UX and Design at MOO, an online print and design company that is passionate about great design and the difference it can make.

t: @msjaneaustin



* INK, CSS, JSON

FINANCIAL TIMES

<https://ig.ft.com/uber-game>

> Uber has been in the news for a variety of reasons this year, but I love this site by the Financial Times as it focuses on one aspect of Uber that I don't think has been discussed enough. The reality of so many of the big digital success stories is that they are built on the back of cheap labour. While digital companies are valued in the billions and their pampered employees have stunning offices and always-on food, the reality of the life of the people delivering the services are very different.

The deceptively simple gameplay and abstract graphic style doesn't prevent this game from packing a real emotional punch. It shows the difficult choices faced by drivers and the knife-edge they need to walk every day. The game is based on hundreds of hours of interviews with real Uber drivers and is a companion piece to an FT article on the gig economy. It's a fresh way of telling a story and a very exciting direction from the FT, who designed and produced the game in-house.



Sorry! You only earned + \$406!

You weren't able to make enough money to pay your \$1000 mortgage bill. But you did earn more money than 10% of other players on HARD mode.



HOW IT WORKS ▾ WHY FOR WOMEN PRICING TEAM INSIGHTS NEW: 401(K) ROLLOVERS GET STARTED LOG IN

EV ELLEVEST

Invest Like a Woman. Because Money is Power.

GET YOURS

FROM THE PRESS

THE CUT

"[Ellevest] aims to serve women's needs better than any other existing system by using an algorithm tailored specifically to women's incomes and life cycles. (*Yes, no one else has thought to do this before.*)"

READ MORE

* JSON, CSS, HTML

ELLEVEST

<https://www.ellevest.com>

Ellevest is an investment platform set up by Sallie Krawcheck, described by *Fortune Magazine* as the "last honest analyst". At its heart is an algorithm designed for women's needs – longer lifespans, career breaks for family, and different investing style. Surprisingly, nobody had done this before.

Using a simple mint colour palette and a sophisticated yet readable selection of fonts, Ellevest brings clarity to the confusing business of investing with a step-by-step guide, focusing on the aim of the investment. The initial screen sets the tone, then the process is chunked into an easily digested sequence – it's like having an experienced advisor next to you. It's possible to get up and running in about 15 minutes, but there are also many customisation options to explore that help you narrow your choices to a detailed and personalised plan.

The graphic treatment of the graphs and investment targets brings a refreshing clarity to the often overwhelming layout and clutter of financial graphs. This clarity carries through to the copy – it's well written and simple, without being patronising, with a light human touch. I have to make a confession here – as it's an American site, I saw all this by sitting with a friend as she got set up – I'm not a customer myself but if Ellevest comes here (and if I have enough spare cash to invest) then sign me up!

Fund Your Goals, Power Your Future

Watch: How We Ellevest

THE ELLEVEST EXPERIENCE

BE A WOMAN WITH A PLAN

Start Investing in 15 Minutes

- Tell us about yourself (including family, if you choose) and your goals in 5 short steps.
- We'll suggest tailored contributions, timelines, and [diversified investment portfolios](#) for each of your goals.
- No funny stuff. We're a [fiduciary](#), which means by law we act in our clients' best interests, always.

Make it Yours

FOUR CUSTOMIZABLE VARIABLES

Change the timeline, recurring contribution, initial

shehzilmalik

Home The Print Shop Illustration Blog Press About Contact

I'm a designer/ illustrator passionate about design for social change, storytelling with heart- and understanding the role technology can play in both.

All

Sort Portfolio: All Branding Interactive Social Impact

* WOOCOMMERCE, CSS, JAVASCRIPT

SHEHZIL

<http://www.shehzil.com>

 I was honoured to be invited to speak recently at the first-ever Pakistan national Design Conference. I had a fantastic time and was blown away by the quality of the work and the speakers, but one person stood out to me – Shehzil Malik.

Shehzil is an unstoppable creative force. She has worked in advertising, was an art director, a designer, illustrator, street artist and her first fashion collection is about to be launched. Her work has a strongly feminist angle and she focuses on working for social change.

The culture of Pakistan is a clear influence on her work, using traditional script and imagery based on the plants and flowers she saw when spending a month among the women of the Hunza Valley, and this helps her capture the reality of being a young woman in Pakistan.

Her work is incredibly detailed and on close viewing more messages and images distinguish themselves from the riot of colour and expression. Her most moving works are a series called *It's Not OK*, inspired by the renewed security crisis in Pakistan, where simply going out and listening to music becomes seen as "an act of defiance".

shehzilmalik

Home The Print Shop Illustration Blog Press About Contact

Shehzil Malik is a designer and illustrator with a practice based on design for social change. Her passions of design and social responsibility result in collaborative projects with a focus on societal issues like women's rights, feminism and identity constructs. She is a Fulbright scholar with an MFA in Visual Communication Design from the Rochester Institute of Technology and is also part of the International Development Innovation Network (IDIN). She has previously taught at Beaconhouse National University, and worked as art director at Ogilvy & Mather, been part of the Arcade Creative Group at Sony Music in New York City as well served as the art director of a socially conscious startup, Uth Oye! in Lahore.

"Shehzil Malik's illustrations depict very emotive and contentious subjects. If you read the story behind each piece, you can't help but feel moved by her experiences" LEAH RYZ, UX RESEARCH & DESIGN CONSULTANT



The Print Shop

shehzaikmatik

Home The Print Shop Musician Blog

Showing 1-12 of 14 results

Image	Title	Price
	"Noor Jehan"	Rs 5,950
	"Desi Wonder Woman"	Rs 5,950
	Adils Album Art	Rs 4,500
	"Ultimate Woman"	Rs 3,500
	"Babushka"	Rs 3,500
	"Walk I"	Rs 3,500
	"Botanical Anatomy"	Rs 5,950
	"Juice Box"	Rs 3,500
	"Hunza"	Rs 3,500
	"Breaking News"	Rs 3,500
	"Walk III"	Rs 3,500
	"Fearless"	Rs 5,950
	"Walk II"	Rs 3,500

* REACT, TYPEKIT, JQUERY

DROPBOX PAPER

www.dropbox.com/en_GB/paper

> I know Paper has been out for a wee while but I love it and believe it deserves some acclaim. A while back my team at The Telegraph worked on an interface for a CMS and we did a lot of research and iterations that ended in an amazing product (I didn't work on it so I'm allowed to say that!)

I can see so many things we learned that are in play here. The minimal editing interface that gives a real sense of calm, the way the document handles anything you can throw at it – code snippets, images emojis etc – intuitively and elegantly, the ability to embed whatever you need and the great sharing tools.

Dropbox Paper tops that off with loads of great integrations and smart features that should see it become a serious rival to Google Docs – but I suspect it won't. Google has scale and is so embedded in so many organisations I'm not sure even something as great as Dropbox Paper will pry the company out.

Nevertheless, Paper has a really stylish, clean user interface and has clearly done a lot of work to make the product extremely easy to use. You can tell this is the result of a great team working together well, and I'm looking forward to seeing what features they roll out in their next update.

Dropbox Paper

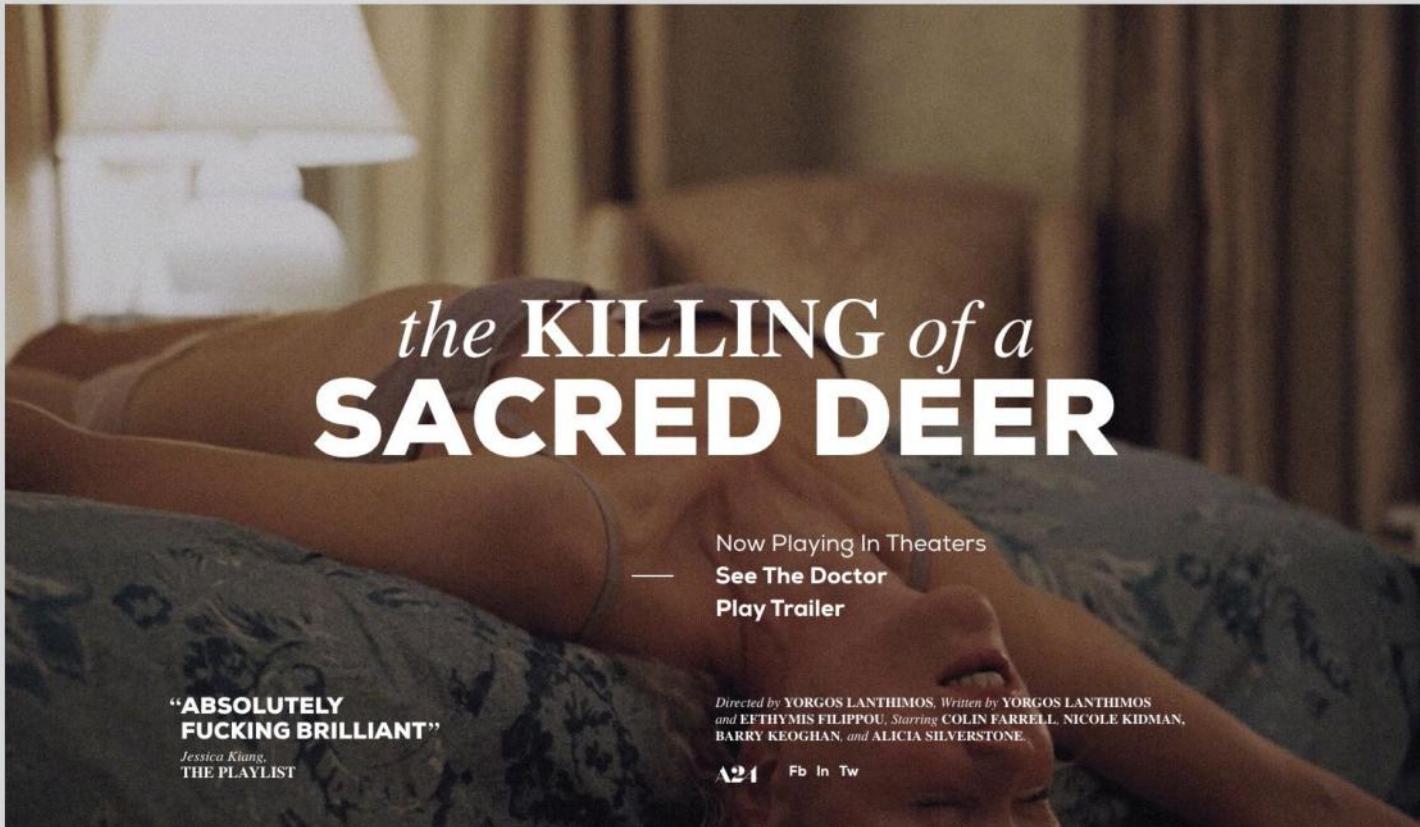
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A connected space to create and ideate together

Review and revise work in a single, shared space

Look and Feel

Spring Product Line



* HTML, JAVASCRIPT, CSS

KILLING OF A SACRED DEER

<http://killingofasacreddeer.movie>

I've been a huge fan of film websites like this since I saw two early pieces of work by Hi-ReS – one a site for *Requiem for a Dream* that managed to evoke the queasy, hallucinatory dread of the film while giving away nothing of the plot, and its piece for *Donnie Darko* that was just mind-blowing at the time. Both are still on the Hi-ReS archive at <http://archive.hi-res.net> if you want to check them out...

This is another film website classic. I hate film trailers as they give too much away, but by spending time on a site like this you get a sense of the aesthetic and the atmosphere of a film, and often the experience of a film website enhances the film in a way a trailer simply doesn't.

I love the style of this site. It looks like a beautiful old medical text book, and this is reflected in the choices of fonts and colours. The illustrations are stunning, incredibly detailed, and render superbly. The site is fully responsive and works brilliantly on a mobile. It has beautiful and subtle interactions, such as the flayed man looking down at your thumb as you choose where the pain is. A small, subtle site that has whetted my appetite for the film.

A mobile screenshot of the movie website. The top half features a large, stylized illustration of a human eye with red blood vessels, set against a dark background. The text 'ARE YOU BLIND TO YOUR FAULTS?' is overlaid in bold, white, sans-serif capital letters. Below the eye, a smaller text says 'Let's get in there and take a look.' At the bottom, there are links for 'the KILLING of a SACRED DEER', 'Now Playing In Theaters Get Tickets', social media icons for Facebook, Instagram, and Twitter, and an A24 logo.

A desktop screenshot of the movie website. It features a similar layout to the mobile version, with a large, detailed illustration of a human heart in the center. The text 'IS YOUR HEART IN THE RIGHT PLACE?' is overlaid in bold, white, sans-serif capital letters. Below the heart, a smaller text says 'Don't worry, you won't feel a thing.' At the bottom, there are links for 'the KILLING of a SACRED DEER', 'Now Playing In Theaters Get Tickets', social media icons for Facebook, Instagram, and Twitter, and an A24 logo.

OUR DESIGN PRINCIPLES

DESIGN EVERYWHERE

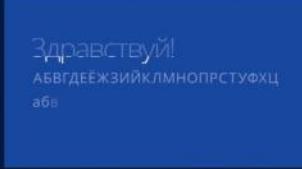
When we set out to create a new design system, our goal was to unify our products and services. The system had to be many things to many people. It had to be **fast, smart and reliable**. It also had to be **authentic and iconic** to resonate with our global consumer and enterprise audiences, across any device or platform. No small task.

After much anticipation, we've launched our innovative design platform—an archetype for the digital payment world. By creating a truly global-centric user experience that's built for speed and security, we continue to help realize virtually every possibility across regions, cultures and devices.

TYPGRAPHY

MAKING A STATEMENT

Typography is the messenger of content, delivering information, knowledge and soul. Our humanist sans serif typeface adds friendliness to both consumer and enterprise facing audiences. It's legible and functional across print, web and mobile interfaces, making it the perfect workhorse typeface.



ICONOGRAPHY

BE BOLD. BE ICONIC.

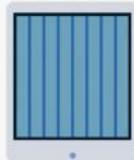
It's no coincidence that powerful digital payment solutions require powerful communication tools. Whether Visa iconography dives into metaphorical or abstract styles, it provides immediate, meaningful visual messages to users.



THE GRID SYSTEM

FLEXIBLE FOUNDATION

The Visa experience is an intuitive journey for all. To accommodate screen sizes and configurations across the world, our platform harnesses the utility of a dynamic grid system. This system re-sizes, re-configures and re-images per user interface. It's structured. It's scalable. It's the future of digital payments.



JQUERY, BOOTSTRAP, TYPEKIT

VISA DESIGN SYSTEM

<https://design.visa.com/design-systems.html>

At MOO (along with many other companies) we have a design system and associated ways of working that we are continually building on. We have been discussing about how, and when, we might make this work public so I was really excited to see this website from Visa.

I'm excited because even a few years ago nobody would have expected a financial services firm to be leading the way like this, and to be doing it partially in the open. I know it's mostly a recruitment site, but it's a statement of intent, too.

On this website Visa says: "When we set out to create a new design system, our goal was to unify our products and services. The system had to be many things to many people. It had to be fast, smart and reliable. It also had to be authentic and iconic to resonate with our global consumer and enterprise audiences, across any device or platform. No small task."

No small task indeed. I know when I've worked on vastly smaller projects the design inconsistencies reflect the internal structure of a company, and much of the design work is done behind the scenes in reconciling different aspects of a business, different processes and systems.

I'm awestruck at what Visa has achieved. A cohesive, global design system that the company has supported and is now publicly shouting about – having design supported inside Visa like this is going to have a great effect on the business, not just on brand perceptions but in streamlining how the business works. It's a game changer. I hope this will make more people realise that design is not about pretty pictures but about creating change. 

ANIMATION PRINCIPLES

MOVING YOUR CAPTIVE AUDIENCE

When we include movement on a page we immediately change a user's perception. These motions humanize the brand and offer moments of celebration, delight and even symbolize an approachable, friendly face to Visa.



INTERVIEW

LEVERAGING OUR DESIGN SYSTEMS

"In order to create and build the next generation of VISA digital products, we are focused on developing a key set of tools, processes and workflows that not only bridge the gap between design and development, but unlock our full potential as creative problem-solvers. At the heart of that strategy is our design system."

ABOUT KERRY HEBERT, DESIGN LEAD →



LET'S CONNECT

SHOWCASE

Sublime design & creative advice

THIS MONTH FEATURING...



PROFILE

50

We chat to **George Hastings**, the New York 'devsignloper' about cryptocurrency and using artificial intelligence to create colour palettes



HOW WE BUILT

56

The team from **Kota Creative** explain how they built a good old-fashioned whodunit for a venerable performer

DESIGN CHALLENGE

This month...

COWORKING SPACE

* PROFILES



LORISSA SHEPSTONE

Co-founder at Being Wicked, a design studio specialising in the publishing industry.

W: lorissashepstone.com **t:** @lorissa



GARETH EVANS

Gareth is the designer and founder of HypeBound, a design studio in Port Talbot.

W: hypebound.com **t:** @GarethEvz



CLAIRE KIRSCHHOFFER

Claire is a junior designer at Candorem, which specialises in UX and marketing strategy.

W: www.candorem.com **t:** @OhClaire



BRIEF

This month we'd like you to design a website for a coworking space. Visitors to the site should be able to see what the space looks like and get a sense of the culture of the place. Information about prices and facilities should also be readily accessible.

* LORISSA SHEPSTONE

THE CAPITAL

Fun photography and a script font are used to convey the casual atmosphere at this space

> The Capital is an inviting coworking space for creatives who want to get work done in a casual environment. The design reflects the sleek interior via photography throughout the page but is offset by a 'no stodginess' atmosphere with the use of a handwritten typeface, personable photos, artistic textures, and a bit of tongue-in-cheek copy.

The use of colour is kept to a minimum with a bold blue, so the visitor is drawn to the photography rather than any design aesthetics – it's all about the space! Overall, I wanted the tone of The Capital to feel authentic, and hopefully that comes across.

In doing so, the goal of The Capital is to attract other like-minded creatives who are also looking for a casual work environment where they can bring their pet dog, display their favourite classic comic book figurines with pride, and work within a community of inspired business owners.

CLOSE UP

(1) A clean, simple navigation to the main sections of the website alongside standard social media links. The contact link is highlighted to garner better attention from every visitor. **(2)** An artistic 'paint' effect is used on the interior shots to give them a little more depth and interest, and to create an atmosphere of being a little 'rough around the edges'. This is a casual creative space and that element needs to come across. **(3)** Amenities are highlighted visually with simple icons and the use of the bold blue colouring, enabling visitors to quickly and effortlessly scan those crucial features. **(4)** Although most of the photography on the page highlights the interior space available, the content is broken up here with a personable image alongside a little dose of humour. The idea is to give a sense of the space, but also of the community within it. **(5)** The available membership plans are laid out clearly with the price and immediate sign-up option. **(6)** Additional photography is brought in via Instagram.

MY MONTH

What have you been doing this month?

Launching a restaurant rebrand and starting a large project for a publisher. Also trying my hand at creating a line of sarcastic greeting cards for obscure occasions.

Which sites have you visited for inspiration? Dribbble and Admire The Web.

What have you been watching? Various TED talks and also *The Daily Show* (the only way to get the news nowadays).

What have you been listening to? *The Guilty Feminist* podcasts. Deborah Frances-White is absolutely hilarious.

SHOWCASE

Design challenge

The screenshot shows the homepage of Rabble Studio. At the top, there's a navigation bar with links for 'Workspace', 'Community', 'Room Hire', 'What's on', 'Contact', and social media icons. A large yellow diamond-shaped callout labeled '1' is positioned above the top navigation. Below the navigation, there's a main heading 'Your New Work Home' with a subtitle 'An Awesome Co-Working Space in Cardiff Bay'. The background features a photograph of several people working at desks in a bright, open-plan office. On the left, a person is seen from behind, working on a computer; a yellow diamond-shaped callout labeled '3' is next to them. In the center, another person is working on a laptop; a yellow diamond-shaped callout labeled '4' is next to them. On the right, more people are working at their desks. A yellow diamond-shaped callout labeled '2' is in the top right corner of the image. At the bottom, there's a section for an event: 'SEP 20 10am WORKSHOP Money Management for Creative People and Businesses'. To the right of this, a yellow diamond-shaped callout labeled '5' has arrows pointing up and down. On the far right, a yellow diamond-shaped callout labeled '6' also has arrows pointing up and down. A sidebar on the right is titled 'Community Inspired Environment' and contains a photo of two people working at a desk, a price of '£200 pcm', and a button 'Apply for a Desk'. Below this, a section says 'Not sure which plan to choose?' with a 'Get in Touch' button.

Modern Creative Workspace

MY MONTH

What have you been doing this month?
Working on various web and print projects, organising a design showcase event in Swansea and spending quality time with my wife and daughter.

Which sites have you been visiting for inspiration?
It's always great to see awarded sites on csswinner.com and cssdesignawards.com. Lots of super creative, eye-catching designs.

What have you been watching?
Game of Thrones, *Sneaky Pete* and anything on Netflix.

What have you been listening to?
Really enjoying new music by Pond, Rat Boy and Glass Animals.

GARETH EVANS

RABBLE STUDIO

A bold, black-and-white design for a Cardiff-based space

Rabble Studio is a coworking space located within the thriving creative community of Cardiff Bay. It is a working base for a mix of creative professionals enabling them to work, collaborate and hang out.

It was important to implement a modern, on-trend design and make full use of the studio photography to give a feel of the space and its environment. I selected the sturdy and legible sans serif typeface, Museo Sans, using its thick bold weight for impactful headings.

I chose a black-and-white colour scheme to complement the brand logo and enable the photography to stand out, giving a colourful vision into the workspace. The design layout brings together squared panels, which creatively overlap and extend beyond the grid. The panels are also designed to appear from various sides of the screen as the user scrolls down, which is achieved using animate.css effects.

CLOSE UP

(1) The overlapping menu is designed to follow the user as they scroll through the website, enabling them to click onto other pages easily. (2) As the space is located in the capital of Wales, the website can be switched to read in Welsh. (3) The top section of the website 'above the fold' instantly gives users a sense of the studio culture, with a collection of transitioning background photography. (4) This panel shows a featured blog post highlighting the benefits of joining a coworking space. Staff are able to change what article is displayed here using the CMS. (5) This second feature panel shows the next event or workshop being held. By clicking the up/down arrows, visitors can click through the list of upcoming events without the page reloading. (6) Prices are displayed card style, which means the user can easily compare the different types of memberships available. On mobile, the left/right arrows enable the user to click through the cards.

The homepage features a large hero image of a modern office space with people working. Overlaid text reads 'big ideas begin here'. A navigation bar at the top includes 'home', 'workspaces', 'membership', 'community', 'sign in', and 'apply'. Yellow numbered callouts point to specific design elements: 1 points to the 'big ideas begin here' text; 2 points to the hero image; 3 points to the lowercase lettering in the main text; 4 points to the underline symbol on the 'learn more about us' button; 5 points to the 'membership', 'culture', and 'perks' sections; 6 points to the 'tour our spaces' button.

A mobile phone displaying a form titled 'drop in request'. It asks for 'only need a couple hours to work? fill out the form below so we can save you a spot!'. Fields include 'first name', 'last name', 'phone', 'email', 'occupation', 'workspace type' (with a dropdown menu), 'begin time' (8:00 AM), and 'end time' (10:00 AM). A 'submit' button is at the bottom. A yellow numbered callout 6 points to the 'submit' button.

* CLAIRE KIRSCHHOFFER

GROUND FLOOR

A logo that reflects the steps of the development of a creative idea

Ground Floor is a hub for entrepreneurs that provides a community and collaborative environment for individuals or small groups looking for a place to work. The name 'Ground Floor' alludes to the concept that someone can come and build their idea from the ground up. Located in Madison, Wisconsin, on the historical capital square, Ground Floor provides a central site for creatives located in South Central Wisconsin. With ample nearby parking, countless eateries and shops, members can take breaks for inspiration just by stepping out the door. The interior itself features warm textures and colour schemes, and a variety of seating areas appealing to all ages. Taking advantage of the repurposed architecture, large windows and high ceilings keep an open environment physically and psychologically. The website plays off these features, with white space and imagery to match.

CLOSE UP

(1) The block motif is reflecting the stacked form of the Ground Floor logo mark. The logo itself is relying on the user's imagination to visualise steps, taking them from the beginning of their idea to the next level and bringing it to reality. (2) A large hero image places the user directly in the space, helping them picture themselves working there. The design of the space is the main thing that will sell it to potential members, so it is important that this is placed front and centre on the site. (3) The site design only uses lowercase letterforms to give an inviting and friendly appearance. The conversational tone also helps put the user at ease about joining the collaborative community. (4) The underline symbol used on the button links is a playful suggestion of the actual ground. (5) The main points of interest are easily recognised on the homepage, and help to quickly direct the user exactly to where they may need to go.

MY MONTH

What have you been doing this month?
Running, helping coach soccer, freelancing and some bartending.

Which sites have you visited for inspiration?
Awwwards, Behance, Fast Co Design, CreativeBloq and Designspiration.

What have you been watching?
Game of Thrones and *The Vietnam War*, a PBS film by Ken Burns and Lynn Novick.

What have you been listening to?
The Avett Brothers, Blink 182, Sublime, and Branches.

INFO

Location: New York,
United States

Designing since: 2011

Areas of expertise: UX/UI
design, front-end design/
development, prototyping

Clients: ESPN, Quartz, US
State Dept, Google

Awards: Webby Awards
People's Voice, Fast Co
Innovation by Design





★ PROFILE

GEORGE HASTINGS

georgehastings.com

We chat to the New York-based 'devsignloper' about cryptocurrency and using artificial intelligence to create colour palettes

> New York-based designer and developer, George Hastings, came to our attention recently as the creator of Khroma (*khroma.co*), a cool online AI tool built to help designers find the perfect colour combinations to use in their work. He's currently employed as a senior interaction designer by IDEO (*www.ideo.com*), where he recently worked on a platform enabling New Yorkers to understand the risks of flooding and to be prepared to deal with it in future. We caught up with George to find out more about his work, his career and his life away from the desktop, and, of course, to learn more about his amazing machine-learning colour tool. Here's what he had to say...

Hi George, tell us a bit about yourself...
I'm 30 years old and live in Brooklyn, New York, where I've been in the design industry for six years. I've worked across over a dozen industries, shipped dozens of websites, and designed and launched a few products myself. I saw on Twitter someone use the word 'devsignloper' and I think I identify with that.

How did you get into the web business?
As a young child I attended a Montessori school in the suburbs of Philadelphia, which I believe taught me initiative, collaboration, and independence. That's pretty much how I'd describe my creative style today. I got my degree in marketing

► and studio art in the States but discovered UX design at Hyper Island in Stockholm, Sweden. There was something very satisfying to me about the combination of business logic, rationale, and user centeredness in the UX field. I also fell in love with the web. To me it was the ultimate creative medium – the perfect confluence of art, design, entrepreneurship, and technology. Something definitely clicked, and I think this came across during my internship with AREA 17, where I got my first job in the business.

You're currently working at IDEO; what do you do there?

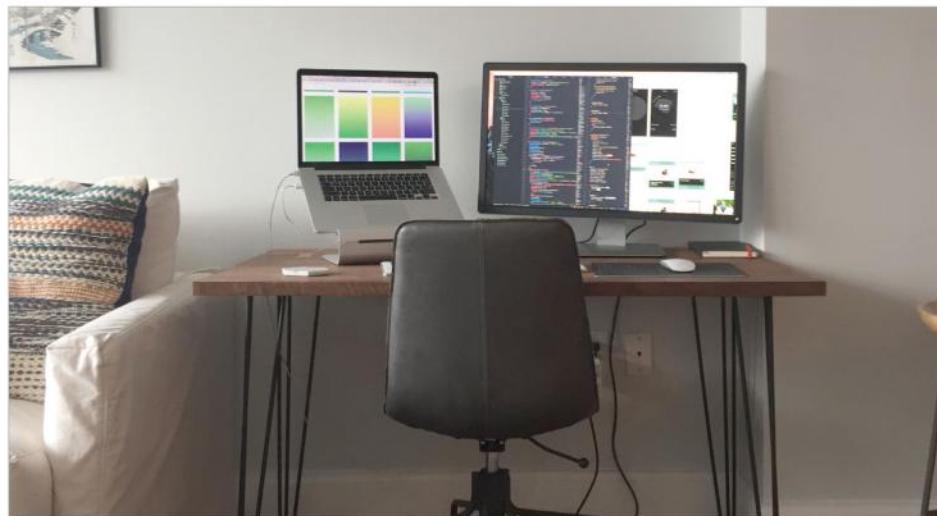
I'm a senior interaction designer at IDEO. My work here ranges from infusing Design Thinking practices into organisations, to envisioning new ventures, to creating detailed, responsive style guides for to-market website builds. The diversity of briefs and industries is exciting and really stretches me as a designer. One thing that doesn't change is starting the process with people, users, and customers – something that definitely resonates with me as a UX designer at heart.

Can you tell us what you're working on at the moment?

I just finished up a project in the 401k space. I can't say much else!

You built an AI colour tool for designers, how did that come about?

Khroma was a classic case of taking a pain-point and combining it with a new technology. We did this exercise a lot at Hyper Island: Take a problem you



It's not all about building websites; George built this striking desk himself using 100-year-old salvaged black walnut

encountered yesterday, pick a new technology (AR/VR, AI, Internet of things, etc...), and come up with solutions around those constraints. That's sort of the case with Khroma.

For some reason, I'm drawn to creating things that surprise me. A year and a half ago I was creating a lot of little experiments, one of which was a poker 'AI'. The problem was that it wasn't really an AI, I hard coded all of the behavioural logic. It still acted unexpectedly due to some built-in randomness, but I wasn't satisfied. That's when I discovered machine learning – specifically a JavaScript library called synaptic.js by Juan Cazala. Once I understood it I thought, "What should I make with this?" As a designer, I thought pretty quickly of something that uses a lot of numbers, but is more theory than maths – colours.

Finding colour palettes for my designs always felt slow and unintuitive for me. It was hard to bring a certain rigor to it. So I wondered: why painstakingly craft colour palettes by hand when I can train an AI to do it for me?

I probably spent 100 plus hours of my free time over the span of nine months building Khroma. The very first prototype was in code and that's primarily how I designed it. By designing in the browser I could immediately test, click and use it, which I think helped me make better

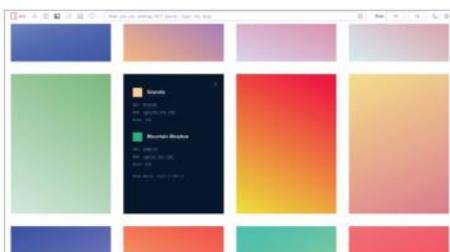
decisions quicker. I could also get fast feedback by trying it out with co-workers and friends (some of whom generously voted on 800 colours in the early days). I was simultaneously iterating on the product features, design, build, and machine-learning algorithms. At times it was pretty tough to manage everything, but every little bit of progress I made felt like a big accomplishment.

After a while, my friends started to think I would never launch it. "When is Khroma coming out?" they would ask. "Next week," I would say. Then it wouldn't. I didn't realise how much work it takes to go from a tool that works for me to a product that works for everyone. So, I was very pleased when I could finally release it. I've been so pleased by its reception and had a lot of fun making it.

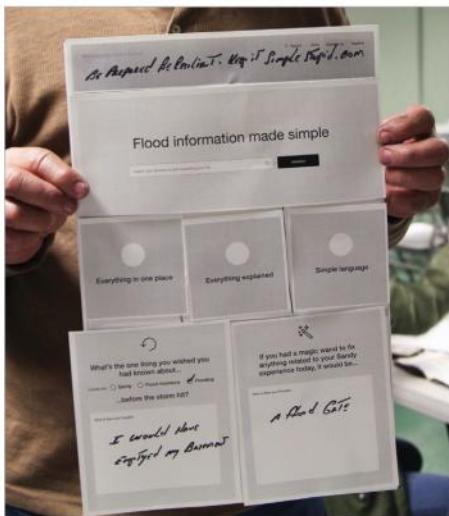
What tools do you prefer to work with?

For design, I use Sketch. It seems to be the standard these days. I haven't yet felt the need for collaborative features like those offered in Figma, but I like the concept. For development, I use Atom – primarily because it's the most aesthetically pleasing. That seems trivial to development but hey, I'm a designer.

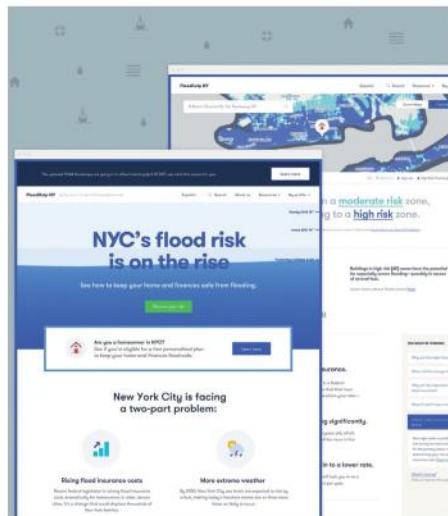
I also use a tool called CodeKit, which takes the pain out of terminal compilers for Sass and ES6 JS, JSX, and so on. It has a lot of other handy features as well – I think



Like most of George's projects, the idea to build Khroma came from a desire to learn a skill and also fix a problem he encountered



A Gerritsen Beach resident helps George prototype the FloodHelpNY platform



Here are some of the final designs for the FloodHelpNY scheme

of it as being like a Swiss Army Knife for the lone developer.

I've also made some of my own tools in the form of small JS libraries. Using code to solve my own problems is very satisfying. I'm working on cleaning some of them up to open source.

Can you talk us through your work on FloodHelpNY?

FloodHelpNY is a platform we designed with the Center for New York City Neighborhoods, with funding from the Governor's Office of Storm Recovery, which helps New Yorkers understand their flood risk and take action to protect their homes and finances. The brief was to co-design the evolution of the platform together, making it the most openly defined to-market project I've worked on.

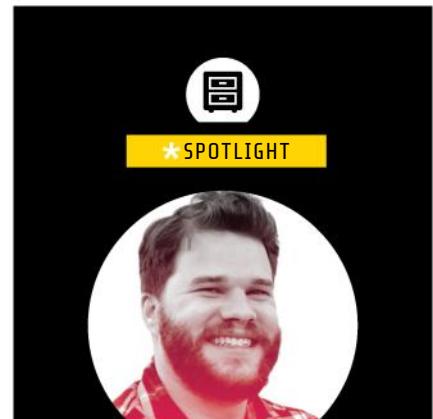
The site needed to serve a diverse audience of people – those who already felt the devastating effects of Superstorm Sandy, others who were confused about the flood insurance programme, and still others who were unaware their homes were affected by shifting flood zone policy. Making sure everyone got the right message and relevant information to whichever situation they were in was tough. Our solution centred around using clear language to demystify the complex minutia of flood preparedness and help people find the most relevant and

actionable information as quickly as possible. Flooding is scary, but we wanted to make people feel empowered to be resilient, not frightened. We also had the opportunity to funnel people in eligible neighbourhoods into a programme that gave them a free home audit, which has been quite successful.

Whose work do you find inspiring?

I've always been a huge fan of the Codrops team. They're always coming out with cutting edge UI demos that are super polished (and have great colour palettes). I also love their collective newsletter, in which I've been lucky enough to be featured a couple of times. I'm also blown away by some of the advancements going on in machine learning, specifically the generative work at OpenAI and the generative models by Mario Klingemann.

You made your own app, Rome, to help you quit smoking. How does it work?
Rome works as a support tool for people who want to change or pick up a new behaviour. If there's a strong will, Rome can reinforce it. The object is to build a city by collecting and spending coins, which can be earned in two ways. By visiting the site, you are given coins for the amount of days since you started or abstained from the behaviour. As well as being given coins, you can also reward yourself with a



GEORGE HASTINGS

What's on your desktop today?

Like most days it's a cosy pile of windows from Atom, CodeKit, Hyper, Sketch, Chrome, and Spotify.

Little things that make your life worthwhile...

Websites:

CodePen is the front-end playground for my tinkering.

Twitter/Designer News/Hacker News is where all my news and inspiration comes from.

I don't know what I'd do without Wikipedia.

Apps:

The New York Times Crossword app helps to take the edge off my subway commute.

I've also been really hooked on a new live gameshow app called HQ.

I check on my cryptocurrencies, too, often in Coinbase.

Audio:

My music taste is very eclectic. I'm big on 80's, jazz, bossa nova, Nu-disco and house, and lately classical. I listened to almost exclusively classical while building Khroma.

As far as podcasts, I'm a huge *Stuff you Should Know* fan. It's like the audio version of Wikipedia but with two great personalities. I also dig *Planet Money*, *Startup*, and *How I Built This*.

Reading:

Right now I'm working on *The Windows of the World Wine Course* by Kevin Zraly and *The Big Oyster* by Mark Kurlansky.



Khroma NETIA

The AI color tool for designers

Discover, search, & save color combinations you'll love.

Personalize Generate

Khroma came about because George needed something to apply machine learning to. He always found manually creating colour palettes a pain, so Khroma was born

- coin if you feel like you've done something to deserve one.

As of this writing, I had my last cigarette 180 days ago. Using Rome helped me get through the first week – which was by far the most difficult one. It became something I could fixate on; a tangible representation of a good thing I was (actually) building. Due to the reward mechanism, the city was slow going in the beginning. Eager to see it grow, I was using it every day and giving myself rewards for getting through tough withdrawal periods. I think the day count is something that sticks with me the most, it's a number I want to see keep going up!



George's reward-based Rome app helped him quit smoking – this shows him 80 days in

games), and think of something you want to build. The next and last step is to figure it out. Once you learn how to ask the right questions, you can find all the answers.

What do you do in your spare time?

If I'm not working on something (which I often am), I'm probably having drinks with friends, playing Hearthstone, or spending quality time with my fiancé.

What advice would you give to people just starting out on the web?

Be fiercely curious, and feed that curiosity religiously. All of the answers are already out there, you just have to find them.

What's the best thing about your job?

I get to use my passion to help solve problems that make a difference in people's lives. I think that's pretty cool. ■

PUT A PAUSE IN YOUR DAY

With so many demands from work, home and family, there never seem to be enough hours in the day for you. Why not press pause once in a while, curl up with your favourite magazine and put a little oasis of 'you' in your day?



PRESS PAUSE
ENJOY A MAGAZINE MOMENT

To find out more about Press Pause visit:

pauseyourday.co.uk

★ HOW WE BUILT

PENHALIGON'S MYSTERY MANSION

Where is William Truthsbury? The team from Kota Creative explain how they built a good old-fashioned whodunit for a venerable perfumer



BRIEF

London perfumer, Penhaligon's, needed a shareable, cross-platform interactive marketing tool that would advertise the company's new Portraits product range, while introducing the new characters created to promote it.

CLOSE UP

(1) The splash screen to the experience. The brand had to be instantly recognisable here as well as entice the user to play.

(2) The intro. It was important to explain the sequence of events that lead up to William's disappearance, so the team created a vintage-book styled intro. The user can also interact to read more about each suspect.

(3) The main interactive scene. Here the user

is prompted with riddles, which act as clues to know where to click within the mansion.

(4) Clue and promo screen. When the user clicks on the right object, they find a clue card hinting at the culprit along with a special offer allowing for data capture.

(5) Experience completed screen. Appears once you have successfully found all the clues and the whereabouts of William.

PEDRO TAVARES



Brought into the project early on to work as lead developer specialising in CSS, three.js, as well as animation.
[w: www.pedrotavares.com](http://www.pedrotavares.com)

JAMES PIPER



Artist and creative director at Kota with over 15 years digital experience under his belt.
[w: www.mrpiper.co.uk](http://www.mrpiper.co.uk)
[w: www.kotacreative.co.uk](http://www.kotacreative.co.uk)

KRISTJANA WILLIAMS



Icelandic born artist and illustrator who was commissioned by Penhaligon's.
[w: www.kristjanawilliams.com](http://www.kristjanawilliams.com)

> Established in London back in the days of Queen Victoria, Penhaligon's (www.penhaligons.com) is a perfumer with a long and proud heritage, not to mention two coveted Royal Warrants. It creates unique fragrances, blending the highest quality natural ingredients and using the latest technologies in fragrance chemistry, all the while remaining true to its roots – the company still consults its founder's original recipe books, and retains the original bottle design used when it was supplying perfume to Queen Victoria.

Penhaligon's 147-year heritage continues to inspire its marketing and branding, and a strong vintage look was key to its latest campaign – a fun murder mystery making full use of the brand's roster of quirky characters. To create Penhaligon's Mystery Mansion (mysterymansion.penhaligons.com), the company brought in regular collaborators, Kota Creative (www.kotacreative.co.uk). We spoke to them to get the story behind the site.

Tell us a bit about Penhaligon's...

JP: Penhaligon's is a British perfume house. It was founded in the late 1860s by William Henry Penhaligon, a Cornish barber who moved to London and who became court barber and perfumer to Queen Victoria.

What's the thinking behind the Mystery Mansion?

JP: We needed to come up with an interactive marketing tool that engaged

the users while promoting Penhaligon's new characters, which represent their Portraits product range. It needed to be fun, to be shareable, and to work across all platforms.

As Kristjana had already created the mansion illustration for Penhaligon's packaging, the murder mystery concept came pretty easily. We then adapted it to just be a kidnapping so we could use William again in the future.

How did Kota get involved with the project?

JP: We've been working with Penhaligon's alongside their marketing team for the past three years, providing them with fun, immersive digital experiences. Last Valentine's we created 'Language of Flowers' – a microsite where users would send loved ones secret messages by selecting different flowers to create a digital bouquet. You can see that here – <https://flowers.penhaligons.com>

There's a fantastic mix of visual assets; how did you manage them all?

JP: We worked closely with Kristjana (Penhaligon's illustrator) to create all the woodland scenes as well as adapt the mansion for the web. We then set about creating the rest of the assets with a mixture of hand drawings and Victorian engraving book scans.

Could you tell us about the technologies running the site?

PT: The Mansion and its environment



*TIMELINE

Significant dates in the Penhaligon's Mystery Mansion

EARLY MAY 2017

Initial client kick-off to brainstorm ideas based around the Penhaligon's Mansion

Developing the Mystery Mansion concept and assessing interactive component functionality

Organising project resources, writing technical specifications and also client sign-off

JUNE 2017

User experience design and wireframing each stage of the journey

Set up of content management system and site admin

Artworking, animation demos, user interface design and prototyping across platforms and devices

JULY 2017

Front-end development, including responsive page builds and custom components

MID-AUGUST 2017

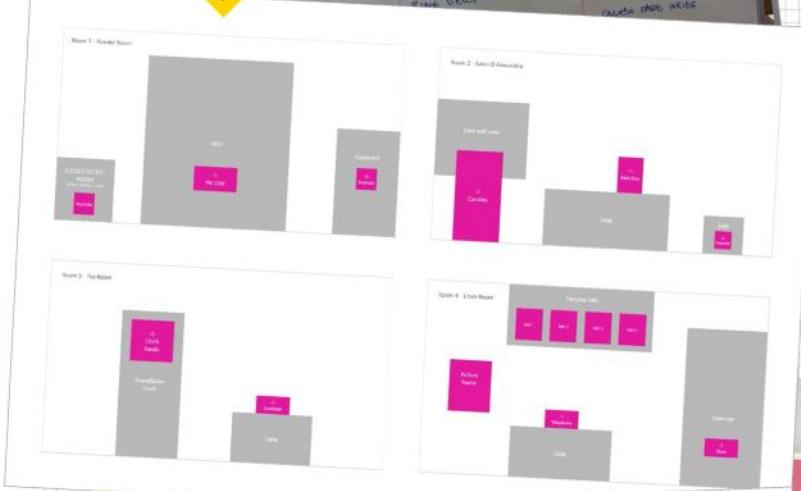
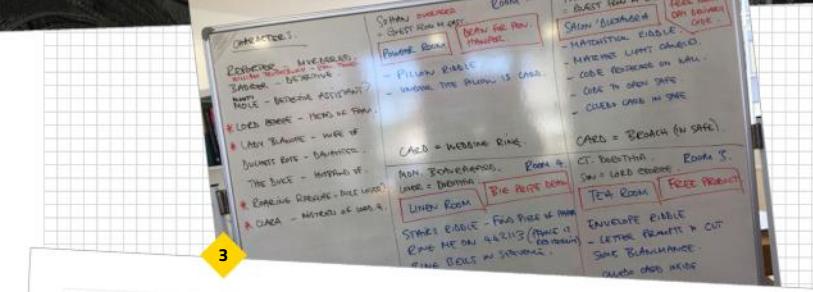
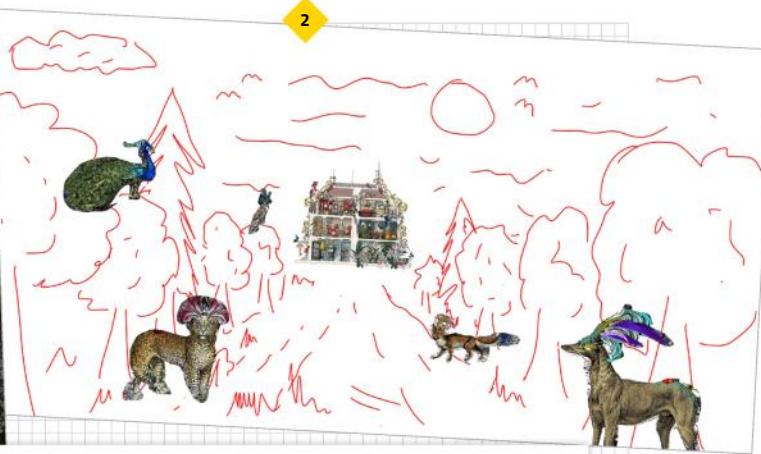
Beta site sent to client for feedback and user testing. Website refined where it was necessary

SEPTEMBER 2017

Penhaligon's Mystery Mansion is live!

SHOWCASE

How we built



★ EVOLUTION

(1) The first design concepts were very dark until we developed it further with Kristjana's artwork. We found a light colour scheme worked better. (2) This was the template we provided to Kristjana to create the forest scene around. The file was over 17,000 pixels wide! (3) Extensive whiteboarding and multiple wireframes were made before we started this project. One of the original ideas was to have an RPG inventory system where you could choose which items you used on the objects in the rooms, but we decided the experience would have taken too long. (4) When developing the story we had to make a character that would fit into the Penhaligon's world and William Truthsbury went through many iterations before we got him spot on. (5) One of the preliminary designs for a room before we used Kristjana's illustrations.

- ▶ was created with WebGL using three.js; SVG was used to create some of the flat images (the logo, textures and masks); and the animation was handled by GSAP.

The content is pretty static so nearly all of it is just written in the HTML document, with the exception being the riddle answers – they live in a JavaScript array of objects. All in all, it is a bunch of very simple techniques overlaid on top of each other that ended up giving a complex feel to the end result.

What feature of the site are you proudest of?

PT: One of GSAP's plugins is Draggable, which as the name implies, allows you to drag any DOM element. It also lets you define the limiting bounds and even gives you the option to use momentum-based movement.

We created a dummy DOM element on top of the WebGL canvas that the user can drag around. As the user is moving this dummy, we read the direction and speed of it and pass those into the camera in three.js. When the user releases the dummy, it snaps back into its original position but the three.js camera continues its movement until it comes to a rest or the user starts dragging the dummy again.

How did you ensure cross-platform performance?

PT: We were in a very quick turnaround schedule so there wasn't actually much time for testing any bleeding edge technology. To make sure the site worked in as many devices as possible with the minimal use of polyfills, we focused on older, more established techniques. Sometimes, using yesterday's technologies is the safe route.

Talk us through your testing process; did it uncover any major problems that needed changing?

PT: We do incremental testing – each significant stage of development is completed with a round of tests using the browser's development tools... Chrome, Firefox, Safari... then at milestones, we do a round with as many different physical devices as we have available.



Gather evidence Work through each screen, paying attention to the suspects and solving the riddles to access clues that – if you have your Sherlock hat on – will lead you to the kidnapper

When we get to the final stage, we do informal user sessions with one another at the agency, as well as with friends and relatives, then finally we use an external testing service.

Did you learn any useful lessons during this build?

PT: Oh yes. A browser in a particular operating system might not behave in the same manner in another operating system. We were tasked to build this experience with offline capabilities because the client was going to make the experience available in their stores, but connectivity was not guaranteed. We were super excited with that and started

development with the whole PWA idea behind it.

Everything was working great in Chrome. We were aware that Safari isn't supporting most of the PWAs championed by Google but what we did not know was that Chrome in iOS is as limited as Safari in that aspect. That caused a last-minute scramble to make sure it would also work offline in Safari.

What's the response been like?

JP: The response has been overwhelming on social media with over 20,000 unique hits and 6,000 new signups over three months. We also have a happy client and a great piece of work for our portfolio. ■

NEXT-GEN

UX

REVEALED: HOW TO DESIGN FOR THE
INVISIBLE INTERFACE REVOLUTION





Hilary Stephenson, founder and managing director of digital user experience (UX) agency Sigma, explores the areas in which invisible interfaces are revolutionising the field of user experience design



P

roduct user interfaces have changed dramatically over the years, to the point where interaction with our various devices is completely unrecognisable from that of even 20 years ago. We have moved from the first iterations of the classic WIMP interface, on to increasingly advanced GUI solutions, right through to the paradigm-shifting touchscreen interface popularised a decade ago by the first ever iPhone.

As our technology continues to become more advanced, new user interfaces seem to be appearing absolutely everywhere. From our vehicles, to our thermostats, to even our fridges, we're reaching the point where everything in our lives can be controlled at the touch of a button or the swipe of a finger.

However, no matter how advanced these interfaces get, they still represent a barrier between us and our technology – a barrier which is swiftly beginning to look ever more obsolete in our interconnected world.



AUTHOR

HILARY STEPHENSON
Having begun her career as a technical author, Hilary (@Hilaryonline) is the founder and MD of north west digital user experience (UX) design agency, Sigma.



► Celebrated design guru Donald Norman put it best in 1990 when he said: "The real problem with the interface is that it is an interface. Interfaces get in the way. I don't want to focus my energies on an interface. I want to focus on the job... I don't want to think of myself as using a computer, I want to think of myself as doing my job."

That's the key. We are moving towards a future without any traditional interface, where we move away from the touchscreen – or any screen at all, in fact.

As our world fills with more and more interconnected devices, so too will our day-to-day lives. Because of this, the interfaces we use will naturally need to develop along with this – interfaces which are not fragmented and distracting, but rather those that are designed to be effective, seamless and most importantly of all... invisible.

The question is how do we make interfaces invisible and also begin to

these disparate elements converge, in order to provide a more intuitive experience for the end user.

Zero UI introduces us to a new world where our natural gestures, voice, glances and even our thoughts can be used to communicate with our devices in a seamless, non-intrusive way – leading us towards a user experience that makes us feel like we're communicating not with a machine, but rather with another person.

The aim of invisible interfaces is to help facilitate a world wherein our devices find the balance between presence and discretion; always being peripherally present and ready to accept user input, while never distracting or demanding our attention.

The key change to designing for this will be in anticipatory design, the process in which a designer – with the help of artificial intelligence – anticipates the needs and tasks of the user by making pre-emptive decisions on their behalf,

"We are moving towards a future without any traditional interface, where we move away from the touchscreen – or any screen at all"

move beyond the screen? There is no doubt that the smartphone is a wondrous invention, which has revolutionised the way we socialise, work, and live.

However, we can also agree that this 24/7 tether to the outside world can also occasionally be a distraction at best, and downright intrusive at worst. The perennial beeps, buzzes, red dots and blue ticks serve as – ironically – a constant barrier between the world around us, taking us away from the tasks we're trying to accomplish.

This is why the natural next phase in UX design will be about moving beyond the screen and interfacing with the devices around us in more natural ways, such as computer vision, artificial intelligence (AI), and also voice control. The concept behind these invisible interfaces – also known as Zero UI – is essentially designing for where all of

in order to simplify the user journey and reduce cognitive load.

Here, we'll take a look at the main areas that invisible interfaces are poised to revolutionise the way we interact with our devices, as well as where the transition to invisible interfaces could take the field of UX design in future.

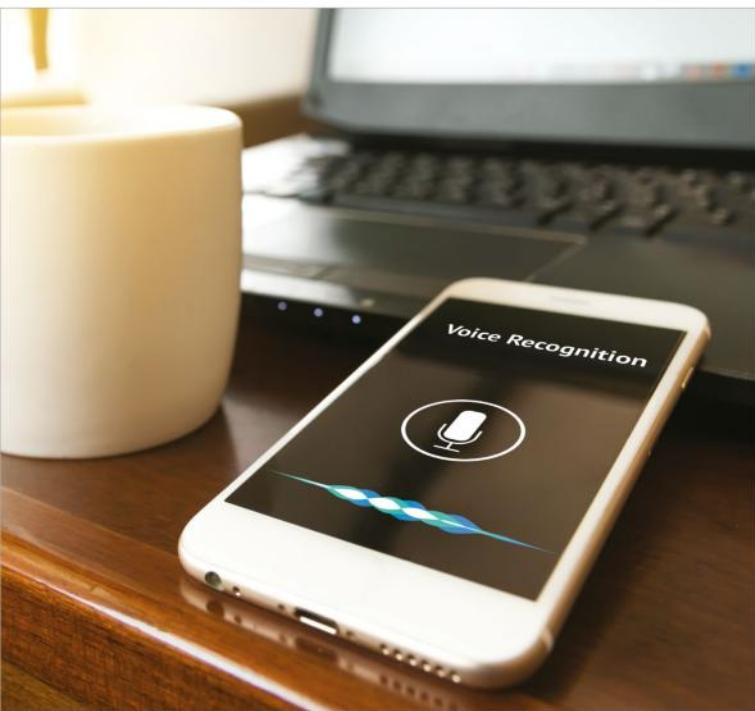
Conversational interfaces – designing for voice

The most popular invisible interface by far is that of voice, with recent investment in this area from tech titans Apple, Amazon and Google having thrust this technology firmly into the mainstream. This burgeoning market for voice control creates an intriguing new challenge for UX designers everywhere. In fact, some are already hailing the sector as the natural next step forward in UX design.



The reason so many have adopted voice as the de facto standard for invisible design is simple. As we've moved through the different ways of interacting with our devices, the common goal has been to increase speed and usability while reducing user friction. We started with complicated strings of keystroke commands, then moved on to incorporate the mouse, and more recently the rise of the smartphone has led to touchscreens taking over. As natural as the touchscreen is, though, it's still a screen, so the obvious next step is something that continues to evolve the user journey, being quicker and easier to use while further reducing friction. And what could be quicker or easier than voice?

In terms of how we implement voice in a mainstream capacity, we should first cast our minds back. In the 90s,



Above The screen's days may be numbered as we see invisible interfaces take off

Left An example of how we might have used voice assistants up until now

Case study

Capital One: Designing an invisible interface for Alexa

Banking giant Capital One was looking to design an Alexa skill, which enabled its customers to manage their finances with nothing but their voice and by speaking to their Amazon Echo devices. This would let customers quickly and conveniently access the bank's services wherever they went.

This presented a major design challenge for the team working on this project, who had never taken on anything like this before. To begin with, they studied call centre data and researched related key search terms from Google in order to better understand their customers' transactional needs, as well as the natural flow of human conversation.

Following this, extensive user testing was carried out, which exposed the challenges the project would pose. One particularly tricky example was if a customer wanted to hear their balance. What if they held multiple accounts? What if they also had credit cards with the bank? On the traditional online interface the customer would be able to call this information up in a few clicks, however voice is an entirely different scenario.

As a result of this user testing, Capital One was able to overcome these obstacles and create one of the first working use-cases in the financial sector. The company also overcame the barrier of the initially rudimentary voice recognition technology by creating a four-digit personal key, an extra layer of security beyond the traditional username/password that users were asked for every time they tried to talk to Alexa about money.



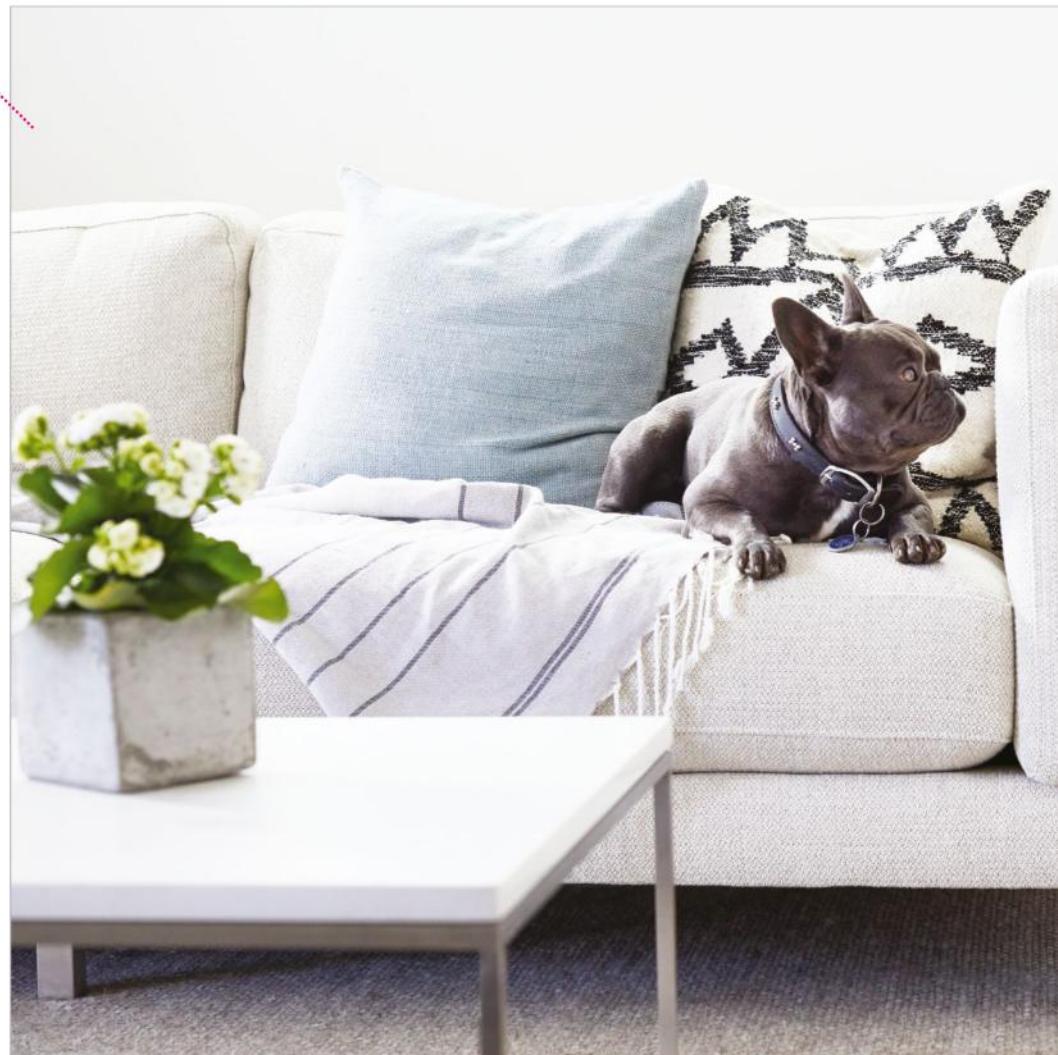
How invisible interfaces are set to transform the way we shop

A specific sector set to be revolutionised by Zero UI is the field of online retail. Forward thinking companies (such as Ocado) have already begun to design for this by offering a voice-only search function, and this will become the norm as consumers and retailers get more accustomed to the technology.

However, it is crucial that consumers are able to intuitively search for and purchase products by brand if the technology is to be a success. For example, imagine a situation in which you ask Alexa to order more tea bags, and she has to sift through the 15 million results on Google – it would be both time-consuming and ineffective.

Retailers must also consider how invisible interfaces will work from an advertising perspective. As devices such as smart speakers become integrated into consumers' lives, it may be seen as intrusive to advertise to consumers in this format. Take Burger King's recent disaster with Google Home, in which the brand's TV advertising was designed to activate a separate advertisement on the smart device – a move that was universally criticised as being "creepy" and "invasive".

While it's likely that many eCommerce interfaces will remain screen-based for the foreseeable future, the introduction and mainstream adoption of invisible interface devices points to a future where we become more comfortable with screen-less interactions. This means that retail brands, designers and consumers alike must begin preparing for this future now if they are to avoid being left behind.



► what drove people to embrace online? The availability of internet access on our home computers; unified devices we could all get behind.

A decade ago, what drove us to embrace touchscreen UI? The iPhone; another unified device we could all get behind.

So, what invention is going to be the driving force for the mainstream adoption of talking to your devices?

If you were caught talking to your computer even a few years ago, you'd likely attract more than a few funny looks. Now, the explosion in popularity of voice-controlled devices such as the Amazon Echo and Google Home, suggests a future wherein this becomes the normal process, and menus, screens, pointers and commands are replaced by simple spoken language.

Controlling our devices with nothing but the spoken word might seem far-fetched – a pipe dream reserved for fanciful sci-fi films. However, this may be a reality far sooner than you think.

The reason this has been a pipe dream up until now is because the computing power required to process, break down and interpret human speech is huge, requiring more resources than were previously available in a mainstream capacity. However, numerous breakthroughs were made in this field in 2016, and we are now at the point where there's enough computational power available to us to make speech recognition and interaction a viable alternative to visual interfaces.

On top of this, we're lucky enough to be living in a time when around one in three

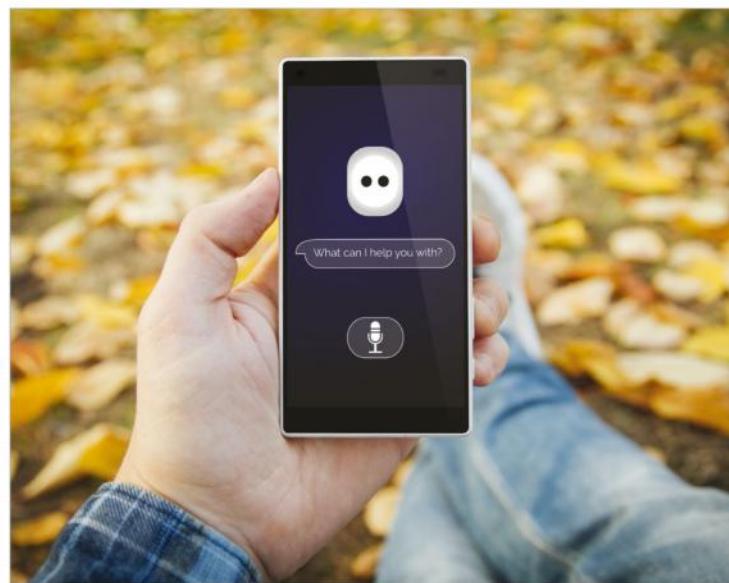


people carries a smartphone – essentially a mini computer with a microphone attached – around in their pockets; a figure that will continue to rise in the years to come.

Designing from a technical standpoint

In terms of how we go about designing for this, the most fundamental element to consider is that because voice-controlled interfaces are invisible, users will not have the benefit of images, buttons or clickable links to guide them. Because of this, developers and designers must ensure the voice assistant is providing users with constant feedback and support so they are not left in the dark.

Simplified, brief interactions need to be weighed up against people feeling lost



Far left Devices like the Echo could become a permanent fixture in the living room

Left Searching for products by voice could well be the future in online retail

"Users will need voice patterns they are familiar with every time they operate a new app or program, in order to acclimatise them to the new software"

or not in control. In a traditional screen interaction, visual cues such as buttons, tick boxes, links, or error messages provide a virtual breadcrumb trail for users, letting them know exactly where they are in a given process.

Similar to screen-based design patterns, it's important to consider that users will need voice patterns they are familiar with every time they operate a new app or program, in order to acclimatise them to the new software. Above all, this process must be simple and intuitive, using universal conversation patterns as a method for executing commands.

It is also important to bear in mind that users have to use their short-term memory to remember key phrases to interact with the device. Therefore conversational exchanges need to be kept short and sweet to lessen the cognitive load and avoid confusing users.

Overall, while voice UIs may be simpler on the surface, they require reassurance and pacing to be built into the interaction

if they are to provide the best possible user experience, particularly for those with cognitive impairments or lower levels of confidence.

Designing for language

Considering the range of functions that voice devices will need to be able to accomplish in order to effectively take over from the tech we currently use, as well as the fact that the end user will be working entirely without visual cues, language is crucially important.

Natural language, tone of voice, accent and tone are all vital. Currently, home assistants feel a little pre-programmed and artificial (it's still obvious you're speaking to a robot), so to alleviate that we need to look at the language people feel comfortable with.

Overly assertive, imperative language can be off-putting, particularly to less tech-savvy users. Colloquial terms can be more reassuring, however, overly quirky communication can be seen as condescending. Therefore, there is still



- ▶ considerable user research and usability testing required in this area.

Another critical design point to consider is avoiding bias. In traditional UI, and when you come to think of it, any software design, there can often be a disconnect where the designers are not necessarily representative of who will use the software.

This is especially important in voice UIs because people tend to be sensitive to language. For example, the language of a white male, graduate software developer could be quite different to the conversational tone between young girls or older adults. Of course, that's not intended as a generalisation about developers, but a reminder that as with any software, we aren't always the users of our products. Bringing a whole new meaning to 'tone of voice'.

This technology can also be leveraged in a positive way, and there is actually a fantastic opportunity here for forward-



thinking designers to build specifically for greater personalisation and also customer engagement.

We hear the phrase 'tone of voice' – in relation to both a brand's personality and how they communicate with their audience and clients – a lot when we're talking about a brand's communications strategy, and this is another area that is set to be completely turned on its head with the mainstream adoption of invisible interfaces.

Whereas previously a brand's tone of voice may have largely been restricted to



written communications, conversational interfaces provide an entirely new way to communicate and shape the overall experience a customer has with a brand.

This, of course, presents a brand new set of considerations for UX designers – namely the literal tone of voice brands choose to employ in these devices, including gender, dialect, and expression – but also a wealth of new opportunities. Imagine a world where each of the companies with which you communicate daily (perhaps the businesses you shop with, or those that deliver your news),

had their own distinct personality and voice – perhaps even one which you, the user, could control? Such a thing would be truly a tone of voice for the digital age we live in.

Which areas of business will be most affected?

The early success that Amazon, Apple and Google have enjoyed in this area has helped to raise consumer awareness of just how useful these devices could be in everyday life. It looks as though this technology could be set to explode in popularity in 2018, with a host of innovative new software and hardware products coming to the market.

This technology can also be incredibly useful from an accessibility standpoint. By negating our current reliance on screens and creating the ability to control devices with nothing but your voice, users with visual or physical impairments will be able to access and use devices completely independently, with no need for external assistance – some for the first time ever.

In terms of where we'll see the tech take-off, a sector that could benefit hugely is digital health products, particularly fitness trackers and related health monitoring devices.

Our health sector is currently feeling the pressure from rising numbers of patients, in addition to an ageing population presenting more complex cases. Because of this, a greater focus has naturally been put on convincing

retail. Voice search in particular could be a game-changer; indeed, we're already beginning to see significant pickup in this area. A recent study from Google revealed that more than half of teens (55%) now use voice search on a daily basis – a strong statistic that goes some way to showcase the current penetration of invisible interfaces in everyday life.

This tech looks set to really take off in retail as more brands make the leap and begin proactively

making use of it to engage customers in new and exciting ways. A great example here is Ocado, who recently made the headlines by

becoming one of the first retailers to offer a dedicated app enabling customers to shop using voice commands.

While this is a tremendously exciting time for UX design, we as designers must adapt accordingly. Voice interaction represents an exhilarating new challenge to UX designers, one that we must acknowledge and learn quickly from if – as a community – we are to take full advantage of the opportunities this new, seamless technology presents. ■

"By negating our current reliance on screens... users with visual or physical impairments will be able to access and use devices completely independently"

people to take a more proactive stance in managing their own health.

Invisible interface devices such as personal fitness wristbands could be key to this, providing people with an unobtrusive way to measure their vitals, as well as other health related statistics such as steps, calorie intake and their heart rate.

Another sector that could be transformed by invisible interface devices such as the Amazon Echo is

Resources



Capital One's Alexa Project: Designing UX Without UI

A fascinating exploration of one company's unique challenge of designing UX without utilising a traditional user interface.

netmag.ag/301-capitalone-alexa



Invisible UI: a hidden opportunity for great UX

Jennifer Winter discusses the evolution of invisible user interfaces, highlighting several real-life applications of the technology in order to accentuate her points.

netmag.ag/301-invisible-UI



How Invisible interfaces are going to change the way we interact with computers

A future gazing piece on Mark Weiser's Ubiquitous Computing, and how it will lead into invisible interfaces

netmag.ag/301-interaction



The UX of Voice: The Invisible Interface

Got a bit of time to spare? Settle down and have a read of this interesting longform piece that focuses on how voice will be used to shape the future of invisible interfaces.

netmag.ag/301-interface



MASTER THE SCIENCE OF CRO

Jamie Murphy introduces CRO and identifies the key steps to follow to successfully complete your first A/B tests and improve conversions

Illustration by Neo Phoenix

What is CRO?

Conversion Rate Optimisation (CRO) is the process of maximising conversions from existing traffic. For example, if you get 1,000 visitors per day on average, and have a 1% conversion rate, that means 10 of those visitors will convert. CRO is the process of trying to optimise your site, to improve that rate of conversion to 20 users (2%) for every 1,000 visitors on average, for example.

CRO also has the added benefit of affecting future traffic conversions from all sources, such as organic visits, paid ads and social media campaigns. If you can increase the average conversion from 1% to 2%, that means all investments of campaigns will on average return double the results, leading to more efficient marketing. A win/win scenario if there ever was one.

At its core, CRO is fairly simple. You assign a level of baseline performance (current conversion rate) and then do



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► an A/B test to see if you can improve that. An A/B test can actually consist of more than just two outcomes, but essentially it means that you split percentages of traffic between a couple of variations to see which performs best. For example, you could send 50% of your website's users to the current version of a product page and then split the remaining 50% between two test variations.

From this point you need to monitor the conversion rates for each version to see which one performs best. Don't worry if the existing version performs best; CRO is a learning experience and you'll likely not get it right first time.

Try another variation and keep experimenting until you find what works for your website. Remember that what works best now might not necessarily be best in six months, as trends and UX change over time – don't assume that once you have completed a successful CRO project on one page, that it will continue to perform at that level for months and months. Keep reviewing performance on a monthly basis to identify dips early and keep your website a well oiled, converting machine!

Real world example

Imagine that you're the owner of your town's first supermarket and you notice that your large store is selling less impulse products (think chocolate and soft drinks) per customer than your smaller corner shop competitors. This is despite your supermarket offering a much larger and higher quality selection. Why would this be the case?

After examining your competitors, you realise that the majority of their impulse sales come from displaying their impulse products within eyesight of the checkout while waiting to pay. As such, you trial placing the chocolate near to the cashier and notice a major boost in sales.

Following your first success, you then take your improvements one step further and trial different chocolate brands, sizes of package and flavours at each checkout. You monitor which three products sell the most so that you eventually place the most successful products across all cashiers to further increase sales.

New Experiment

Experiment Key

Use this to uniquely identify the experiment.

Description (Optional)

What is your experiment? State your hypothesis and notes here.

Experiment Traffic Allocation

Add this experiment to the following exclusion group:

None

Fraction of total traffic to include in your experiment:

100 %

Variations

Create variations (i.e. treatments) you want to include in this experiment.

Variation Key	Description	Traffic Distribution	Action
(optional)		50 %	Delete
(optional)		50 %	Delete
Add Variation			

Audiences (Optional)

Choose the audiences you'd like to include in the experiment.

Browse for Audiences

+ Create New Audience

Audiences



Left Creating an experiment with Optimizely is quick, powerful and easy

This is a real world equivalent of Conversion Rate Optimisation and supermarkets across the world are still trialing new layouts and approaches to increase sales of key products all year round to maximise profits from their existing footfall. You should get in the habit of applying the same logic and mindset to improving your website and attempt to convert more visitors into customers. CRO doesn't just apply to eCommerce sites and product sales, but

every year or two. Consider assigning a percentage of your CRO budget to keep the website looking modern and working well from a UX point of view.

Working in this manner leads to more consistent conversion rates over time rather than the traditional model of a full redesign every 12–24 months, which boosts conversion performance initially but then tails off over time as the site becomes dated to the point where a full redesign yields big results.

Identify dips early and keep your website a well oiled, converting machine

also increasing user signups, newsletter signups or any other KPI that increases revenue, user experience or engagement.

CRO is the future

If you have an existing website, we strongly recommend that you consider making CRO your main form of website development moving forward, rather than forking out for a major redesign

The costs of such monthly updates alongside your CRO will likely work out comparatively to a major overhaul in the same period of time but can deliver more conversion results, leading to more profit.

As mentioned previously, trends and UX change more than you'd think over time because the web is a constantly evolving and improving place. If you have a successful site and the budget to do

Master the science of CRO

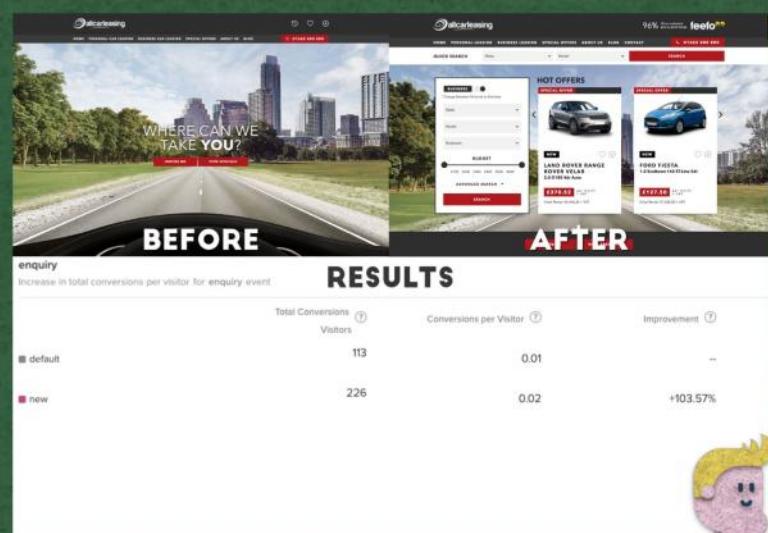


Right Targeting specific users and audiences based on many factors is easy with A/B Testing tools. Here is an example in Google Optimize

The screenshot shows the 'Create rule' interface in Google Optimize. It includes sections for 'Who' (targeting 45.7% of visitors) and 'When' (evaluates on page load). The right sidebar lists various variables for targeting.

CRO IN ACTION

After reviewing the homepage of allcarleasing.co.uk and comparing to competitors, this author realised the current landing page looked great but didn't show many products or give an easy way to begin searching above the fold. The first round of changes focussed on this, introducing key offers directly below the menu, making the large image a background image and adding a quick search below the main navigation, while adding some trust reassurance of a high score from Feefo reviews. The second month focussed on the product detail page and drew focus to the enquiry section through some simple but effective amendments like adding a border around the CTA section and adding an informative piece of text above the lease configurator to explain how to use it. As you can see in the image, the before and after above the fold look starkly different, with the amended version focussing on offers and best deals alongside making searching for specific vehicles more accessible. This A/B experiment was conducted using Optimizely Full Stack to integrate changes within the application code and get detailed feedback on performance.



Using the methodology explained in this article, the homepage of allcarleasing.co.uk was optimised to increase enquiries for cars over 100% over the course of two months

so, you should consider CRO as a never-ending project. Once you have your site converting well, your goal is to try and keep them at that level by identifying the areas that start to dip and improving them as soon as possible.

How to do CRO effectively

There are a large selection of tools to choose from to achieve your CRO goals. Depending on your technical ability and complexity of A/B tests required, a simple visual editor to change some content, visual styles or CTA (Call To Action) elements may be all that is required. On the other hand, if you need more comprehensive A/B tests that justify an integrated service within your application, enabling you to A/B test the back-end logic or serve totally different experiences to your users, then a more advanced tool will be needed.

Identify your KPIs

Before you get caught up in deciding which CRO tool to use you should clearly define the KPIs that you wish to improve. For an eCommerce site, these are likely to be as simple as more clicks on the Add to Cart button, fewer exits from checkout pages and more newsletter signups. For a SaaS website, the KPIs might be more signups or more upgrades to higher



► membership types, for example. For a blog these may be as simple as more page views per visit or more clicks on the external ads.

Set up analytics tracking and identify your baseline

The next step is vital to be able to quantify your results. Just checking the number of orders or signups over a period of time and comparing it to the past can give an okay indication, but is not a reliable method because traffic and active users can fluctuate day by day.

The easiest way to do this is to set up goals and events within Google Analytics. Once you have completed this step, you will have a firm and reliable baseline to evaluate your first round of A/B tests

Evaluate the page, try to find the cause of the poor performance and plan your A/B tests

against. Another benefit is that it is very motivating to know (and brag about) an actual percentage increase, thanks to your hard work.

Now for the frustrating part. Before you start your first round of A/B tests, you need to collect enough data from analytics to be able to identify if your improvements are actually working. If you have a busy site you can have this data within a day or two but be prepared

to wait a week or two if you have a new website with lower traffic levels. Try to wait until you have data from 1,000 visits before making any major changes.

Identify weaknesses and plan A/B tests

Now that you have reliable baselines set up for your KPIs, you have much more useful data available to you within analytics and may even be able to spot major weak points in your site. Is there a specific point during the checkout that users leave? Are less than 0.2% of people viewing the product page clicking the Add to Basket button? Is a very low percentage of first-time visitors to your site failing to click the Register button in the top-right corner?

Once you've identified your biggest and most urgent weak points, evaluate the page, try to find the cause of the poor performance and plan your A/B tests.

Is the Add to Basket button the same colour as all the other buttons on the page and therefore hard to spot? Is it below the fold and users have to scroll further down to see it?

Think of A/B testing like a science experiment back in school. First you need

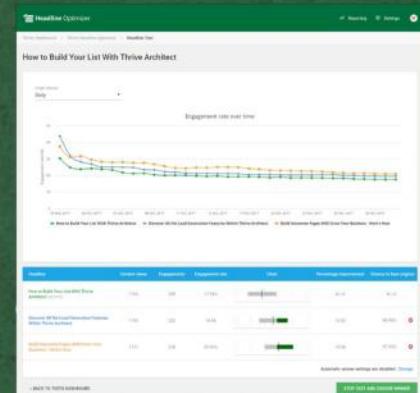
CRO TOOLS

Thrive Themes – Headline Optimizer (for bloggers)

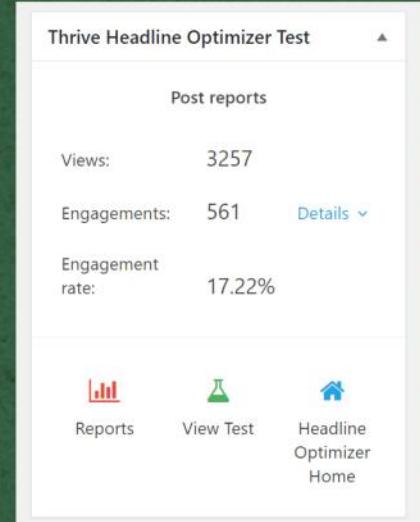
<https://thrivethemes.com/headlineoptimizer>

One for the bloggers out there. Thrive Themes is a WordPress plugin creation company that provide plugins with a focus on CRO. The simple Headline Optimizer plugin enables you to test multiple blog post headlines to see which content leads to more clicks to your blog post.

It's the ultimate tool to test out linkbait headlines or find the right writing style for your audience. With this plugin there is no need to integrate with a third-party service and is as simple to use as any other WordPress plugin.



The fairly comprehensive analytics also enables you to identify time on page, click through rate and more so you can identify not only the titles leading to the most clicks, but the titles leading to the most engagement, too.



Also check out Thrive Themes' other plugins.

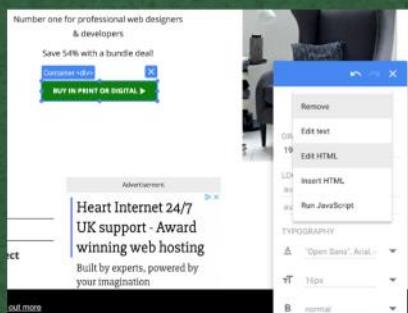


Google Optimize

A free and easy-to-use visual editor giving you the power to make visual changes to your website or webpage. As Google Optimize has direct access to your analytics account, you have one less step to get ready for your tests.

Using your newly created Google Analytics events and goals as the experiment objective, you can get detailed reports about the changes you make and how they affect conversions.

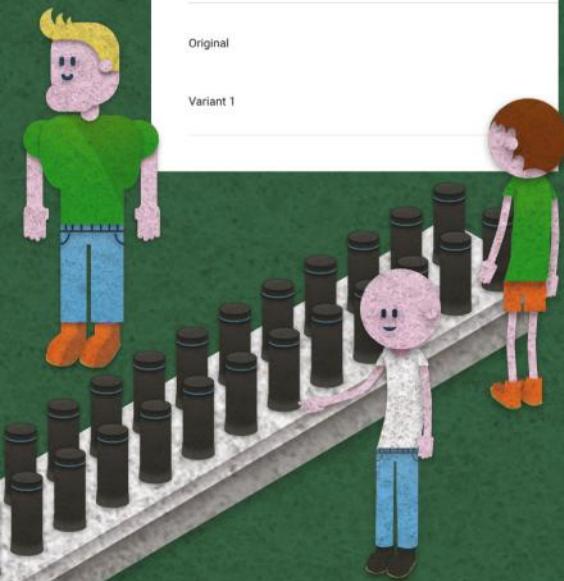
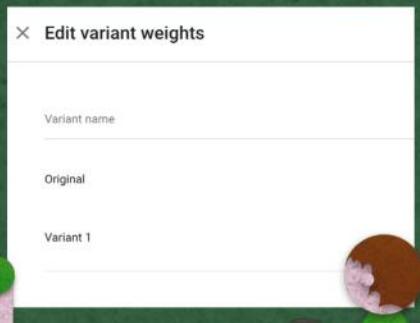
With the visual editor, you can change text, positioning and even directly edit the HTML of an element (adding custom CSS styles etc) to make your variations.



Using the UI Editor to create new variations is easy with Google Optimize

Create multiple variations, edit the variant weights (percentage of traffic sent to each variation) and go live. It is that simple.

The reporting is also super detailed and easy to understand, making reviewing your experiments both easy and interesting.



Optimizely

One of the industry leaders in CRO offering multiple services based on your needs. It provides a similar UI editor to Google Optimize if you wish to experiment, but the company's offering is not different enough to warrant a paid service over the free Google Optimize.

However, it comes into its own when you need application/website level logic changing for your A/B tests. If you wish to fundamentally change the experience for your users then you will need code changes also.

For example, with the Optimizely Full Stack service you can deliver a completely different checkout (logic, layout and style) all within your website's code. You create the experiment and variations within your Optimizely account and then use its SDKs (PHP, JavaScript and more) to integrate these experiments into your code.

As Optimizely is a complete CRO solution and does not integrate with Google Analytics like Google Optimize, you will need to track your events with Optimizely events as well as Google Analytics events, so that Optimizely can track performance. Using the SDKs the code is very simple, as seen below...

```
$optimizelyClientInstance.track('enquiry', $sessionId);
```



Once you have the events tracking and your experiments live, the results update regularly so you can check in on your progress whenever you like

Integrating Optimizely directly into your application in this way can afford you total control over the user experience and create really unique and powerful A/B tests to really learn all about your website and make some major improvements.



to create yourself a hypothesis and then get to work proving it wrong or right.

For example: "I propose that if I make my 'Add to Basket' button stand out more by making it a different colour with slightly bigger text and padding, then more users will notice it and be persuaded to begin their checkout journey".

Experiment

Now that you have your baseline performance established and a hypothesis to prove, you're ready to create some A/B tests and put them in the wild. We introduce some CRO tools in the box on the left if you'd like a starting point for available tools.

Just remember to be patient until you have enough data to make an informed decision. Around 1,000 visits should be enough to clearly see the difference in performance between them.

Evaluate and repeat

Finally, your first A/B tests are complete! Compare your results from the 1,000 (or more) visitors to your baseline conversion rates and identify the variation with the highest conversion rate. Put that version permanently live on your website and reap the rewards of your hard work.

Now go back through the process, find the next biggest problem within your website, ensure your baseline data is collected, evaluate the page to see what may be the problem, create a hypothesis that you anticipate will solve it and then experiment with options!

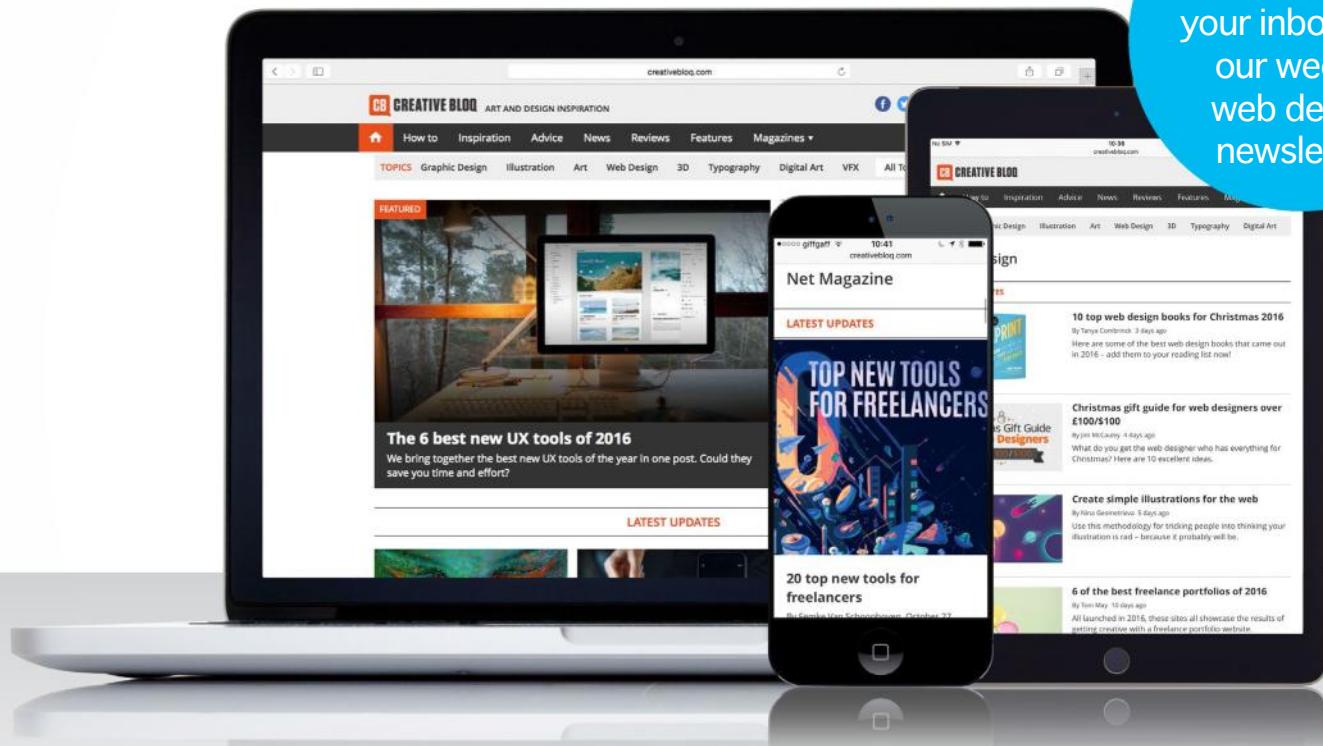
Conclusion

In a world where the internet is growing exponentially and competition is everywhere, CRO will become vital. Optimising your site to reduce cart abandonment, increase cross sales and improve engagement could make all the difference and lead to not only more sales, but more loyal customers.

CRO tools are available for every level of website, expertise and skillset. Whether a blogger, business owner, designer or full stack developer, there is a CRO service that will enable you to start delving into CRO and improving your offering, experiment by experiment. ■

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PROJECTS

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THIS MONTH FEATURING...

The screenshot shows a web browser window for a Noughts and Crosses game at 127.0.0.1:8000. The game board has three rows and three columns. The top row contains 'X', 'X', 'X'. The middle row contains 'X', 'X', 'O'. The bottom row contains 'O', 'X', 'O'. A message at the bottom says 'Well done. You won!' and a 'Reset' button is visible. To the right of the browser window is a screenshot of a browser's developer tools Network tab. It lists several requests: 'Retrieving resource from cache: http://127.0.0.1:8000/game.css', 'Retrieving resource from cache: http://127.0.0.1:8000/game.js', 'Retrieving resource from cache: http://127.0.0.1:8000/site.js', 'Retrieving online template from server: http://127.0.0.1:8000/temp1.html', 'Retrieving resource from cache: http://127.0.0.1:8000/tick.png', and 'Successfully registered service worker.' The status for each request is 'sw.js:1:57' or 'site.js:1:57'.

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BUILDING WEB APPS THAT WORK OFFLINE

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ESSENTIAL IMAGE OPTIMISATION TIPS

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HOW TO MAKE TEXT RENDER PERFECTLY 88

PROTOTYPE AND HANDOFF DESIGNS WITH MARVEL 92

ACCESSIBILITY: A11Y DOT AI 98



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t: @j_a_nomis

job: Software engineering director

areas of expertise:

JavaScript, front-end frameworks, and emerging technology

The screenshot shows a Noughts and Crosses game interface. The browser title bar says "Noughts and Crosses" and the address bar shows "127.0.0.1:8000". The game board has the following state:

O	X	X
X	X	O
O	X	O

A green message at the top says "You are playing the game online." Below the board, a message says "Well done. You won!" and a blue "Reset" button is visible.

To the right of the browser window, the developer tools Network tab shows several requests:

- Retrieving resource from cache: <http://127.0.0.1:8000/game.css> sw.js:57
- Retrieving resource from cache: <http://127.0.0.1:8000/game.js> sw.js:57
- Retrieving resource from cache: <http://127.0.0.1:8000/site.js> sw.js:57
- Retrieving online template from server: <http://127.0.0.1:8000/template.html> sw.js:43
- Retrieving resource from cache: <http://127.0.0.1:8000/tick.png> sw.js:57
- Successfully registered service worker. site.js:5

Below the Network tab, the Terminal tab shows the command used to run the server and some log output:

```
Simons-MBP:service-worker-tutorial-2 simon$ http-server -p 8000 -c-1 — 80...
Starting up http-server, serving ..
Available on:
  http://127.0.0.1:8000
  http://127.20.18.2:8000
Hit CTRL-C to stop the server
[Sun Oct 29 2017 20:10:09 GMT+0000 (GMT)] "GET /template.html" "Mozilla/5.0 (Macintosh; Intel Mac OS X 10_12_5) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/62.0.3202.62 Safari/537.36"
[Sun Oct 29 2017 20:10:18 GMT+0000 (GMT)] "GET /sw.js" "Mozilla/5.0 (Macintosh; Intel Mac OS X 10_12_5) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/62.0.3202.62 Safari/537.36"
```

★ SERVICE WORKERS

BUILDING WEB APPS THAT WORK OFFLINE

Simon Jones looks at how service workers, an experimental technology, means you may not need to go native to build apps that work offline

For many years, there's been a notable distinction between the functionality available on the web and in 'native' apps, whether on mobile or desktop. A native build has always had the upper hand in terms of user experience, offering a host of advantages: swifter load times and navigation responses; closer integration with device functions such as touch sensitivity, vibration and push notifications; but perhaps most importantly, the ability to build software that works both with and without an internet connection.

There are problems with native development, however. Your code won't be cross-platform, so you may have to code independently for iOS and Android, or Windows, Mac and Linux. It's also harder

to deliver your software to users, since they have to download a package or visit an app store. It's not surprising, therefore, that there's been a strong focus in recent years both from web standards bodies and browser makers to bridge the gap by delivering more and more functionality to the web that you might normally associate with native apps.

Examples of web APIs that have been introduced to support this objective are plentiful: there's the Notifications API to generate push-style notifications on a device; Web Bluetooth, which enables sites to establish Bluetooth connections; and the Vibration API, the purpose of which you can probably guess. One of the most interesting technologies, however, is service workers.

The concept of service workers is very simple. Installed by a website, they are stored by the browser, and run in the background even when the website no longer has focus or has been closed. The core function of a service worker is to intercept network requests made to a page and decide how to handle them. This enables you to choose between routing the request to the server, or serving up content from a cache, which you control.

In this tutorial, we'll walk through the development of a simple app – a game of Noughts and Crosses – which uses a service worker in order to cache its resources for offline use, and renders different content depending on whether it is being used online or offline.

Before we get started, there are a few basics to establish. Service worker support isn't universal at this stage, so we'll assume you'll use Chrome during development. You'll also need an HTTP server. If you don't typically use one for development – and you generally should – then it's straightforward to set up using npm (Node Package Manager), which is available at <https://www.npmjs.com>. After you've installed npm, from the console you can run:

```
npm install -g http-server
```

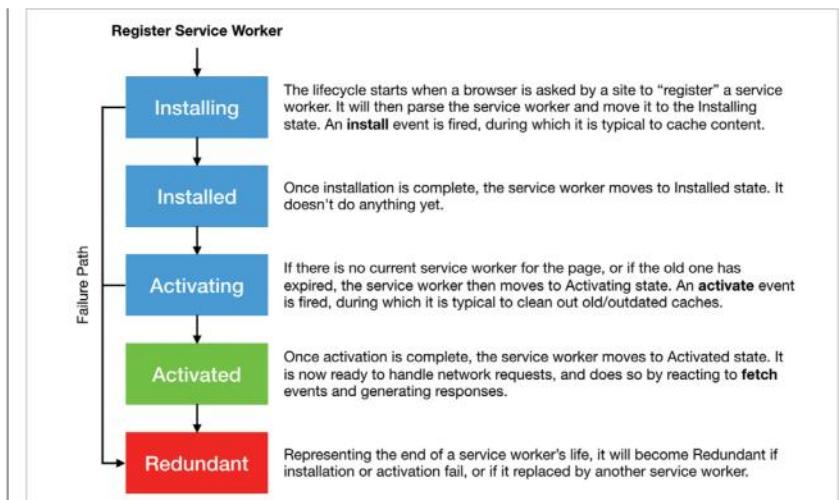
This will install the `http-server` package globally. Once done, you can run it from your project folder:

```
http-server -p 8000 -c-1
```

This will serve your content at (<http://127.0.0.1:8000/>). We've used the `-c-1` parameter to disable HTTP caching (that is, stop the browser automatically trying to cache content), because this can override the behaviour we build into our service worker.

If you were to put your page live at a later stage, you'd need to switch from HTTP to HTTPS. Since service workers can intercept, modify and even fabricate network requests, they are immensely powerful and could be open to exploitation. Consequently, if you're using them anywhere other than your local machine, HTTPS is mandated to ensure that the service worker being installed is a genuine one.

Let's begin by setting up the basics of our site. Obviously we need some markup (`index.html`), and we'll add some styling too (`game.css`). We'll split our JavaScript into several files: `game.js` will contain all the logic associated with the game itself, and should not need to worry about service workers; `site.js` will be our entry point and handle scripts execution when the page is loaded; and `sw.js` will be the code for our



Lifecycle Each service worker has a lifecycle which it progresses through a number of states. You'll find that you generally perform particular actions at each stage of its lifecycle

service worker, which we'll come back to later. We won't be going into the detail of implementing `game.js` within this tutorial, but you can obtain it online (<https://github.com/simon-a-j/net-magazine>).

We're now ready to start implementing our service worker. Before we do so, it's important to take a moment to consider the lifecycle of a service worker. A service worker can exist in a number of states, and different events are triggered depending on its state. You'll typically want to perform specific actions at each state in the lifecycle – this is most easily visualised through a diagram (see above).

`site.js` is where we begin to add our service worker. We need to start by checking the browser supports them, and if so, registering ours.

We'll also include some logging, as the standard console feedback from service workers can be a little cryptic. The `scope` parameter refers to the path on the site for which the service worker will intercept requests; we'll go for the current directory (root) to cover everything.

```

if ('serviceWorker' in navigator) {
  window.addEventListener('load', function() {
    navigator.serviceWorker.register('sw.js', {scope: '/'})
      .then(registration => {
        console.log("Successfully registered service worker.");
      }, function(error) {
        console.log("Error registering service worker: " + error);
      });
  });
}

```

The syntax above, as with other features of service workers, makes use of a JavaScript Promise. Promises represent the outcome of an asynchronous operation (in this case, registering the service worker), and the use of `.then()` enables us to assign



ServiceWorker

Open DevTools window and pause JavaScript execution on Service Worker startup for debugging.

Registrations in: /Users/simon/Library/Application Support/Google/Chrome/Default (1)

Scope: http://127.0.0.1:8000/
Registration ID: 168
Active worker:
Installation Status: ACTIVATED
Running Status: RUNNING
Fetch handler existence: EXISTS
Script: http://127.0.0.1:8000/sw.js
Version ID: 680
Renderer process ID: 3172
Renderer thread ID: 43027
DevTools agent route ID: 21
Log:

```
Console: {"lineNumber":57,"message":"Retrieving resource from cache:  
http://127.0.0.1:8000/","message_level":1,"sourceIdentifier":3,"sourceURL":"http://127.0.0.1:8000/sw.js"}  
Console: {"lineNumber":46,"message":"Retrieving offline template from cache:
```

Internals It is possible to inspect any currently-registered service workers by using Chrome's Service Worker Internals tab.

- ▶ a function to use this outcome once it is available. If you aren't familiar with Promises, they're worth brushing up on as an increasing number of JavaScript APIs rely heavily on them.

If you create a blank `sw.js` file and load the site in Chrome now, you should find that the registration of your worker has been logged. You can also visit a couple of pages built into Chrome to inspect the service worker and see its lifecycle status:

`chrome://inspect/#service-workers`

And:

`chrome://serviceworker-internals/`

Next, we can begin implementing the service worker's functionality. This goes in `sw.js`, which must always be placed in the root directory of your site (not the JavaScript folder), because a service worker is only able to access content in its current directory or sub-folders.

The first thing that we do is to define some variables identifying the name of the cache we want to use and stipulating the content to be cached. This content list should always include `'/'` in order to ensure that the base URL is handled correctly as well as individual resources.

```
var CACHE = 'game-cache-v1';
var CONTENT_TO_CACHE = [
  '/',
  './index.html',
  './template.html',
  './template_offline.html',
```

```
./game.css',
'./site.js',
'./game.js',
'./sw.js',
'./cross.png',
'./tick.png');
```

We can now use these to tell the service worker to actually cache the content by hooking in to its `'install'` event. The use of `event.waitUntil()` here tells the service worker to remain in `'installing'` status until a successful Promise is returned from the addition of all content to the cache.

```
self.addEventListener('install', event => {
  event.waitUntil(
    caches.open(CACHE).then(cache => {
      console.log("Adding content to cache...");
      return cache.addAll(CONTENT_TO_CACHE);
    })
  );
});
```

You'll notice that the name of our cache includes a version number. This enables us to manage updates to cached content and to purge previous caches containing out-of-date content when we make changes. We do this by listening for an `'activate'` event from the service worker, upon which we will review all offline caches and delete any that do not match the current version number of our cache.

```
self.addEventListener('activate', event => {
  console.log("Activated service worker. Checking cache is up-to-date...");
  event.waitUntil(
    caches.keys().then(keyList => {
      return Promise.all(keyList.map(key => {
        if ([CACHE].indexOf(key) === -1) {
          console.log("Deleting old cache: " + key);
          return caches.delete(key);
        }
      }));
    })
  );
});
```

The nature of service workers and caches can lead to confusion when making changes to either the service worker itself or the content it's caching. You may frequently find yourself wondering why changes aren't taking effect, or why old content is being served. Generally as you make changes, you will want to ensure you have done the following:

There are multiple approaches you could take to handling these fetch requests

- 1 Updated the cache version in your code if any of the content changed
- 2 Unloaded the prior instance of the service worker which was running using the Service Worker Internals page
- 3 Double-checked that your HTTP server is running to install the new service worker

Now that we have content being cached and the cache refreshed when appropriate, we're ready to implement functionality to intercept network requests and handle appropriately. An active service worker will receive 'fetch' requests when the browser tries to send a request to the server within its scope. We can listen for these, and then have the service worker determine how to respond to them.

There are multiple approaches you could take to handling these fetch requests. You could default to the network, then fall back to the cache if unavailable. Alternatively, and more commonly for static content, you could default to the cache then fall back to the network, which relies on your cache versioning to ensure you aren't serving outdated content. We'll begin with the latter approach, in which we use `caches.match()` to determine whether the requested resource is available in the cache.

```
self.addEventListener('fetch', event => {
  event.respondWith(
    caches.match(event.request).then(response => {
      if (response) {
        console.log("Retrieving resource from cache: " + event.request.url);
        return response;
      }
      console.log("Retrieving resource from server: " + event.request.url);
      return fetch(event.request);
    })
  );
});
```

You should now find that if you load your page, then terminate the web server and reload the URL, the site will work offline. You'll also note that if

★ PROGRESSIVE WEB APPS THE FUTURE IS PROGRESSIVE

 The concept of installable web apps that offer equivalent functionality and user experience to their native counterparts has been a goal for some time, but in 2015 the term 'Progressive Web Apps' was coined to refer to it. Google is a leading champion of this concept and term, and there's an emerging specification that captures what attributes they should have, which extends beyond just working offline. Essentially, advocates of PWAs express that they should at a minimum:

- 1 Offer equivalent speed of rendering and user interaction to native apps
- 2 Integrate with the device through the use of native APIs and functionality, and present as if native rather than being accessed through the browser
- 3 Work both online and offline, or work with an unreliable network connection

Google's developer site, (<https://developers.google.com/web/fundamentals>), has some great coverage of how to think about these areas, and design patterns to solve them.

Arguably the maturity and widespread adoption of PWAs and their underlying technologies (which include service workers and a range of other web APIs) will be good news for both app developers and consumers. They'll enable a much wider range of functionality on the web to be exposed in a manner that results in a faster, slicker user experience, while reducing the complexity and cost of managing native functionality across multiple platforms.

There's still a way to go, both in terms of browser support, app maker adoption, and maturity of the specifications themselves. You can see many examples of early PWAs at <https://pwa.rocks>, and no doubt this list will continue to grow in the future.



Early adoption <https://pwa.rocks> has collated a list of some of the first Progressive Web Apps out there, and there are some big names already building them

★ COMPATIBILITY

HOW WIDELY SUPPORTED?

+ The web is a constantly evolving landscape, and new technologies like service workers are being introduced all the time. The process by which this happens isn't straightforward. Usually there will be a standards body such as W3C, which defines a specification for a new technology. However, it is then down to browser makers (primarily Google, Mozilla, Apple and Microsoft) to implement the specification in their respective browsers. Only then will a technology really be ready for production use. This typically happens over a period of time, with Google and Mozilla tending to lead the way. Where features are supported by some browsers but not others, often JavaScript 'polyfills' will be published by third-party developers to bridge the gap.

At the time of publication, service workers are supported in Firefox, Chrome and Opera. You might argue that this means they aren't quite ready for live use. However, since service workers shouldn't affect the core online functionality of a page, there's really no harm implementing them to enable an offline experience for users of compatible browsers – the site will still work fine online for others. This is referred to as 'progressive enhancement'.

As you experiment with newer web technologies, an invaluable resource is <http://caniuse.com>, which documents the latest state of browser support for all the latest technologies. In this tutorial, we've also used the Fetch API, Cache API, Promises, HTML Imports and HTML Templates, all of which you can check on there.

Another question you might be asking is how well supported service workers are by popular front-end frameworks. Angular 5 will introduce an @angular/service-worker package to replace and simplify earlier approaches, and for React you can either use vanilla service worker code, or integrate one of a number of packages designed for offline support, such as sw-precache, into your build pipeline.



Browser support <http://caniuse.com> lets you check on browser support for the latest HTML, CSS and JavaScript features

- ▶ you refresh while the server is still running, it still retrieves from the cache (which you can check using the console logging), since we have it set up to default to cached content.

This is a good start, but what if you want to serve up different content depending on whether we are online or using the cache? We can do this by modifying our response to the `fetch` event. One approach is to cache a completely separate offline page and then serve it up as the response when we detect a navigation request. We can test for navigation using:

```
if (event.request.mode === 'navigate') {  
}
```

However, this limits the functionality we can provide and could lead to a lot of code duplication. There's an alternative approach we can use, which takes advantage of two other new browser features: HTML templates and HTML imports. These are part of the Web Components specifications, but essentially enable us to build modular HTML code that we can dynamically load into our page when required. Experimental in nature, currently this will only work with Chrome.

Let's create some separate markup in `template.html`, which will be our first piece of template code:

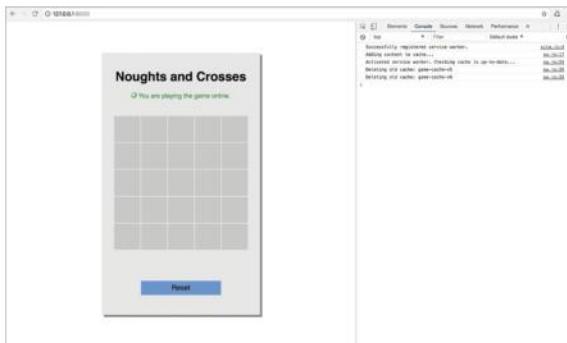
```
<template id="status-template">  
  <p id="status" class="online"><img src='tick.png'>You are playing the game online.</p>  
</template>
```

Using an `import` statement, we can now load this into our page from `site.js` and dynamically add its content to the DOM:

```
var template_import = document.getElementById('template-import').import;  
var template = template_import.getElementById('status-template');  
document.getElementById("connection-status").  
appendChild(template.content.cloneNode(true));
```

You'll now find that when you load the page, the content from your HTML template is injected. So how do we modify this when the content is being loaded offline? Let's create a separate `template_offline.html` file for the alternative markup:

```
<template id="status-template">  
  <p id="status" class="offline"><img src='cross.png'>You are playing the game
```



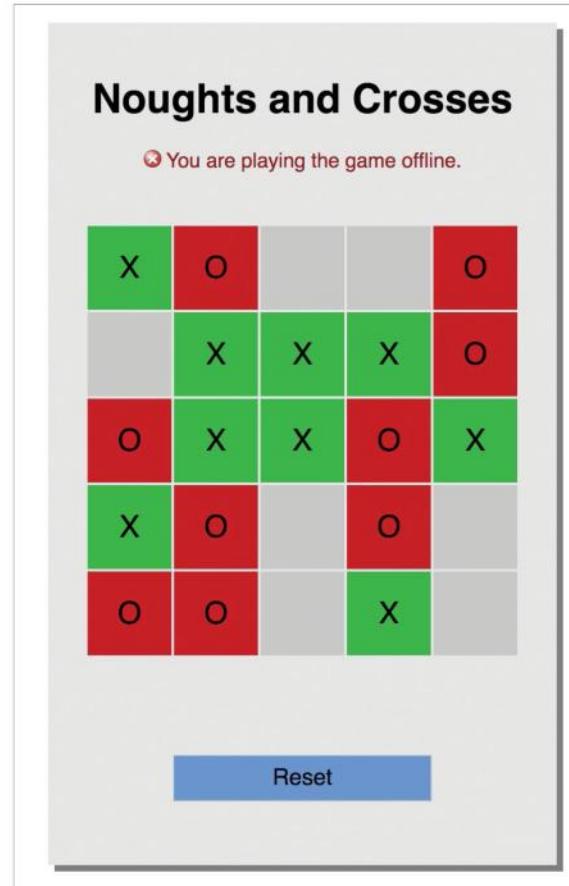
```
offline.</p>
</template>
```

Now we have two different template files to use depending on whether the content is being retrieved from the server or the cache. This enables us to modify the fetch response in our service worker to return two different files when `template.html` is requested. In this case, we'll apply logic to default to the server first, and only fall back to the cache if it's unavailable – but most crucially, if we fall back to the cache, rather than `template.html` we'll respond with `template_offline.html`.

```
self.addEventListener('fetch', event => {
  if (event.request.url.includes("template.html")) {
    event.respondWith(
      fetch(event.request).then(function() {
        console.log("Retrieving online template from server: " +
          event.request.url);
        return caches.match(event.request);
      }).catch(function() {
        console.log("Retrieving offline template from cache: " +
          event.request.url);
        return caches.match('template_offline.html');
      })
    );
  }
  else {
    // Previous logic to serve remaining content from cache by
    // default
  }
});
```

You also need to remember to add these new template files (along with the .png files we are using) to the `CONTENT_TO_CACHE` variable in `sw.js` and increment your cache version so they are stored when the page is loaded from the server.

You should now find that your page works both online and offline, and will display a different templated message depending on which.



Far left The app injects templated content onto the page when loaded, and looking at the console shows the service worker being registered and also updating the cache

Left The finished app works without a network connection and will display different content to the user depending on whether it is online or offline

Congratulations on taking your first step into the world of service workers.

One thing you might observe is that when you reload your page offline, the current state of your game is lost. We haven't implemented any data storage to retain this, which would be a useful feature for most offline apps. To extend this example further, you could consider doing this using IndexedDB, another new API that enables client-side storage of structured data.

As you look to implement more complex apps offline, you may begin to find caching troublesome and the API a little too low-level. Fortunately, like many such scenarios on the web, there are wrappers and libraries that exist to make your life easier. Google Workbox, available at <https://workboxjs.org>, is one such project. Workbox is a set of libraries and tools to make building offline apps easier, and will solve problems such as cache versioning, which we encountered while building our game: it will automatically update the cache with new or modified resources, rather than requiring you to delete and rebuild the cache completely. Frameworks such as this likely represent the future of service workers, and will help bring them into the mainstream. ■

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Frontend development,
web performance*** IMAGE OPTIMISATION**

ESSENTIAL IMAGE OPTIMISATION TIPS

Images are typically the bulk of any site, so keep them trim with these four serviceable image optimisation tips, presented by **Jeremy Wagner**

> A few lucky developers and this author had the opportunity to tech edit Addy Osmani's new image optimisation eBook, *Essential Image Optimization*, which you can (and absolutely should) read at <https://images.guide>. In this article, you'll learn a few tips from Addy's book that will help make your site's images leaner and faster.

BE SELECTIVE AND PRELOAD CRITICAL IMAGES

Take a look at your site and identify a critical image asset. For most, this would be a logo or hero image that you want to have render as soon as possible.

This is where the preload resource hint comes in. preload is a way of hinting to the client that an asset should be retrieved before the browser parser would otherwise discover it. You can use it for pretty much anything, but it works splendidly for preloading

critical imagery. Here's an example of it in use in the HTML `<head>` element on order to preload a hero banner image:

html

```
<link rel="preload" href="/img/logo.svg" as="image">
```

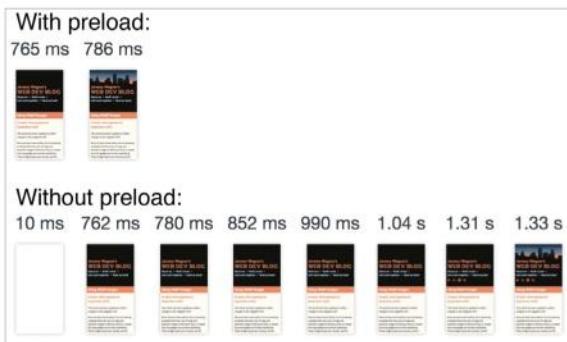
You can also use preload in an HTTP header:

http

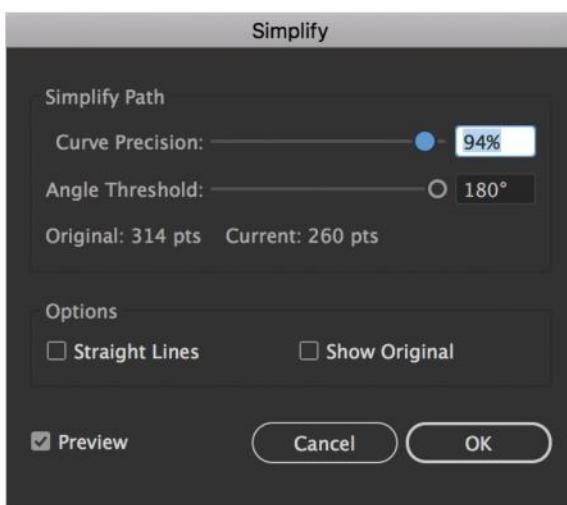
```
Link: </img/logo.svg>; rel=preload; as=image
```

On the next page, you can see two screenshot rolls of the same page loading in Chrome. One scenario uses preload to load a hero banner image, while the other doesn't.

In the example with preload, the banner image appears in the browser window half a second faster.



Go faster The effect of `-o` on the loading of a hero banner



Simplify tool Illustrator's Simplify tool, showing the number of anchor points before and after as Curve Precision is lowered

All because of a quick one-liner that gave the browser a head start.

AUTOMATICALLY SIMPLIFY YOUR SVG ARTWORK

Optimising SVGs is different than with other image types, because unlike JPEGs or PNGs, SVGs are comprised of text, specifically XML markup. This means that typical optimisations you would apply to text-based assets (for example, minification, gzip/Brotli compression) can and should also be applied to SVGs. Beyond that, you can use an optimiser such as SVGO to tamp down the size of SVGs.

But what if you're not merely consuming vector artwork, but creating it? If you're an Illustrator user, you can automatically simplify your artwork to reduce the amount of anchor points in paths via the Simplify dialog window.

This dialog can be found in Illustrator's menu by going to Object>Path>Simplify. By reducing Curve Precision (and optionally adjusting Angle Threshold), it is possible to remove extra path points in your artwork. In this instance, you'll note that a reduction

IN-DEPTH

PRELOAD CAVEATS

+ `preload` is powerful stuff, and can be used to preemptively load more than just images. That said, you need to be aware of its potential pitfalls:

1 Don't forget to signal the asset's content type in the `as` attribute, or the browser may download the asset twice. For images, `as` should have a value of `image`. To learn how to signal content types for other assets (such as CSS or JavaScript), check out <https://w3c.github.io/preload/#as-attribute>.

2 Not all browsers support `preload`. In cases like these, `preload` will confer no performance benefit. Support for `preload` is growing, however, so keep an eye out at <http://caniuse.com/#feat=link-rel-preload> so that you always know which browsers eventually pick it up!

3 Finally, if you specify `preload` as an HTTP header, know that it can trigger a server push in some HTTP/2 implementations (such as Apache). If you know what you're getting into, this may even confer a performance benefit, but the way server push interacts with the browser cache can be rather odd in some browsers. If you want to `preload` something without causing an HTTP/2 implementation to push it, add `hopush` at the end of the resource hint. To learn more about the idiosyncrasies of server push, check out Jake Archibald's excellent article at <https://jakearchibald.com/2017/h2-push-tougher-than-i-thought/>.

Jake Archibald wrote... 

HTTP/2 push is tougher than I thought

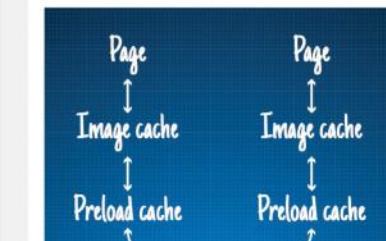
Posted 30 May 2017

"HTTP/2 push will solve that" is something I've heard a lot when it comes to page load performance problems, but I didn't know much about it, so I decided to dig in. HTTP/2 push is more complicated and low-level than I initially thought, but what really caught me off-guard is how inconsistent it is between browsers – I'd assumed it was a done deal & totally ready for production.

This isn't an "HTTP/2 push is a douchebag" hatchet job – I think HTTP/2 push is really powerful and will improve over time, but I no longer think it's a silver bullet from a golden gun.

Map of fetching

Between your page and the destination server there's a series of caches & things that can intercept the request:



★ RESOURCES

MASTER OPTIMISATION

If you want to go further than the tips given here, you're in luck! Here are a few resources that should satiate your hunger for image optimisation knowledge:

The tl;dr
We should all be automating our image compression.
In 2017, image optimization should be automated. It's easy to forget, best practices change, and content that doesn't go through a build pipeline can easily slip. To automate: Use [Imagemin](#) or [libvips](#) for your build process. Many alternatives exist.

Essential Image Optimization

<https://images.guide>

Addy Osmani's image optimisation eBook is a comprehensive guide on the topic, spanning everything from basic image handling and exporting, image optimisation binaries, and tons of novel ideas and practical advice!

Web Performance: Video Optimization

<http://www.standardista.com/web-performance-video-optimization>
Impressed by the mileage you got out of converting animated GIFs to videos? Then check out this post from Estelle Weyl with more video optimisation tips.

Web Performance in Action
Building Fast Web Pages
Jeremy L. Wagner
Foreword by Ethan Marcotte
December 2016 • ISBN 9781317293771 • 376 pages • printed in black & white
An invaluable, accessible reference for the modern web developer
From the foreword by Ethan Marcotte, author of Responsive Web Design
Web Performance in Action is your companion guide to making websites faster. You'll learn techniques that speed the delivery of your site's assets to the user, increase rendering speed, decrease the overall footprint of your site, as well as how to build a workflow that automates common optimization techniques.

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our returns/exchange policy	

An excellent and practical guide through the forest of

Web Performance in Action

<https://www.manning.com/wagner>

If you're interested in web performance tips beyond image optimisation, check out this author's book from Manning Publications. Use the code **sswagner** to get 42% off!

► in Curve Precision of as little as 6% removes 54 path points. Used judiciously, it could even improve the appearance of your artwork.

Word to the wise – be careful with just how aggressive you get with this tool. Lower Curve Precision too much, and your once carefully crafted artwork will devolve into a blob. Strike the right balance, though, and you'll reap the rewards.

CONVERT ANIMATED GIFS TO VIDEO

We all love a good animated GIF. They effectively convey nearly any sentiment, but they can be really huge. Image optimisers such as gifsicle can help shave off excess kilobytes, but the ticket is to convert those GIFs into videos and embed them in the HTML5 `<video>` tag. The `ffmpeg` command line utility is well suited for this task:

shell

```
ffmpeg -i animated.gif -b:v 512K animated.webm
ffmpeg -i animated.gif -b:v 512K animated.ogv
ffmpeg -i animated.gif -b:v 512K animated.mp4
```

The commands above take a source GIF (`animated.gif`) as input in the `-i` argument, and output videos with a variable bitrate maximum of 512Kbps. In a test of our own, we were able to take a 989Kb animated GIF and reduce it to a 155Kb MP4, a 109Kb OGV, and a 85Kb WebM. All video files were comparable in quality to the source GIF. Because of the ubiquity of `<video>` tag support in browsers, these three video formats can be used like so:

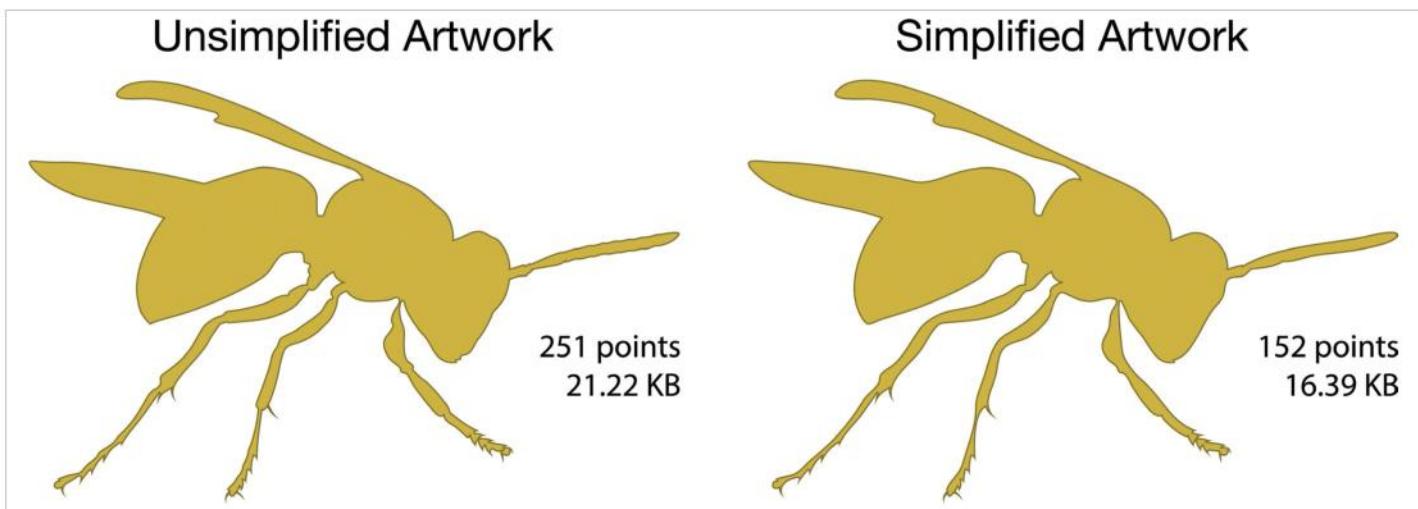
```
<video preload="none">
<source src="/videos/animated.webm" type="video/webm">
<source src="/videos/animated.ogv" type="video/ogg">
<source src="/videos/animated.mp4" type="video/mp4">
</video>
```

If you decide to go this route, be sure to order your `<source>` tags so that the most optimal format is specified first, and the least optimal is specified last. In most cases, this means you'll start with WebM videos first, but check the output file size of each video and go with whatever is smallest first, and end with whatever is largest.

If you don't have FFmpeg or don't know what it is, check it out at <https://www.ffmpeg.org>. It's easy to install through most operating system package managers, such as Homebrew or Chocolatey.

LAZY LOAD WITH INTERSECTIONOBSERVER

Lazy loading images is something you might already be doing, but many lazy loading scripts use CPU-



intensive scroll event handlers. Such methods contribute to sluggish interactions on a page. Older hardware with less processing power is even more prone to the ill effects of this type of code. Execution throttling does help to a degree, but it's still a messy and rather inefficient workaround for determining when elements are in the viewport.

Thankfully, the Intersection Observer API gives us a simpler and far more efficient way to determine when elements are in the viewport. Here's an example of some basic lazy loading image markup:

```

```

Here, we load a placeholder image in the `src` attribute, and then store the URL for the image we want to lazily load in the `data-src` attribute. To top it all off, we give the `` element a class of `lazy` for easy access with `querySelectorAll`. From there, we simply use this code:

```
document.addEventListener("DOMContentLoaded", function(){
  if("IntersectionObserver" in window &&
    "IntersectionObserverEntry" in window &&
    "intersectionRatio" in window.IntersectionObserverEntry.prototype){
    elements = document.querySelectorAll("img.lazy");
    var imageObserver = new IntersectionObserver(function(entries, observer){
      entries.forEach(function(entry){
        if(entry.isIntersecting){
          entry.target.setAttribute("src", entry.target.getAttribute("data-src"));
        }
      });
    });
    imageObserver.observe(elements);
  }
});
```

```
entry.target.classList.remove("lazy");
imageObserver.unobserve(entry.target);
}
});
});

elements.forEach(function(image){
  imageObserver.observe(image);
});
}
});
```

Here, we bind code to the `document` object's `DOMContentLoaded` event. This code checks to see if `IntersectionObserver` is supported by the current browser. If it turns out that it is, we grab all `img` elements with a class of `lazy` with `querySelectorAll` and then attach observers to them.

The observer contains references to the elements we're observing (`entries`) and the observer itself (`observer`). This code hinges on each observer entry's `isIntersecting` value. While the observed element is out of the viewport, `isIntersecting` returns 0. As the element enters the viewport, though, it will return a value greater than 0. It's at this point that we swap the content of the image's `data-src` attribute into the `src` attribute, and remove its `lazy` class. After a given image lazy loads, the observer is removed from it with the observer's `unobserve` method.

This process is much easier than mucking around with scroll handlers, but since `IntersectionObserver` doesn't enjoy universal support, you may have to fall back on them. If you're the sort to grab a script and go, we've written a lazy loader that uses `IntersectionObserver`, but also falls back to the methods of yesteryear. You can grab it from <https://github.com/malchata/yall.js>. ■

Simplified artwork
The savings that path simplification can afford

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* STANDARDS

GOOGLE AMP VS WEB STANDARDS

Adrian Roselli questions the controversial role of Google's AMP

Google released AMP (Accelerated Mobile Pages) just over two years ago with a promise of making the web faster. Instead of trying to draw a comparison to Apple News or Facebook Instant Articles, as many do, it is perhaps more appropriate to compare it to the HTML/CSS/JS stack.

The web platform is made of technologies that are defined by teams of people who are not beholden to one company. The W3C has patent policies and experts, not to mention broad industry participation. Sometimes browser makers introduce a technology that becomes part of a standards document, and sometimes those technologies die a slow death in the outskirts of the land of zombie browsers.

Google AMP is different. It is not produced by a standards body. It is a Google product. Google AMP has Google resources and Google employees. Employees who are not encoding what standards bodies have learned from past mistakes. Mistakes such as allowing zoom to be disabled, or taking the XHTML approach and failing to render pages with

code errors, or allowing page sources to be obfuscated under the Google.com domain.

These are just three examples. People who have been extolling the value of web standards since the early days of Internet Explorer (and earlier) have been raising alarms and flagging issues since AMP first appeared. People without that history, but with an eye to the future, have done it as well.

For the most part, they continue to remind us that AMP is not a sub-set of HTML, nor is it a set of guidelines to use HTML for the fastest possible rendering. AMP isn't even a tool that evaluates a page and flags issues. AMP is essentially a fork of HTML.

Even when we look at custom elements, as allowed by HTML, we still have to consider the needless re-creation of existing elements for what is supposed to be a simpler, faster output.

Those who work in standards already spend a good deal of time working to keep HTML current with needs and resisting hip trends, while following an open process, working toward cross-browser support, and encoding accessibility. Many of these people are supported by their employers, many are not.

We can't ignore that the only reason AMP is even on our radar is because Google has such strong influence of search engine traffic. If websites weren't so reliant on Google's search traffic, they would not have taken up AMP. Getting to the top of the search engine results page (SERP) is the SEO marketer's dream. It's also an easy pitch for an SEO marketer – make AMP pages and you'll see your listing at the top.

Google may downplay the role of SERP position, even at the AMP Conf in March a panel agreed that the carousel placement was the biggest reason for AMP uptake, not performance. The Guardian's own pages outperformed the AMP version, but that alone was not enough to get those pages into the coveted carousel.

AMP as a project is run by Google. Significant changes require sign-off from one core committer and the project's technical lead. Those are Google employees. In contrast, consider all the people who contribute to the W3C process. They are already committing time to an open standard. They already have their focus. They may struggle to be motivated to commit yet more time to yet another standard that is not open and is retreading issues that have been solved elsewhere.

Putting a project on GitHub, asking for contributors, and using your own syntax for your own opaque platform is not open. It's a barrier to entry hiding under the signals of open source software. ■

PROFILE
Adrian (@aardrian) does stuff with the W3C, has written some books, founded and ran a software development company for 20 years, and even co-founded evolt.org. Avoid him at AdrianRoselli.com.

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areas of expertise:

Webfonts, front-end development, performance, procrastination



* TEXT RENDERING

HOW TO MAKE TEXT RENDER PERFECTLY

Learn how text rendering works and make sure your fonts render beautifully with **Bram Stein**, the author of *Webfont Handbook*

> Selecting a beautiful typeface is useless if it looks ugly on your screen. To avoid hideous, or worse, illegible text, you should always test if the font works well on the devices your visitors are using. You might be surprised; most of your visitors are probably not using the same device you use to design and develop. In fact, the vast majority of people surfing the internet are using Android and Windows machines (Fig 1).

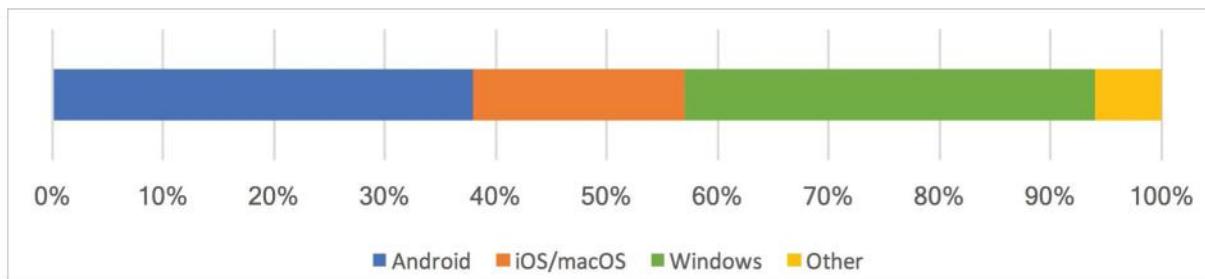
The best way to test how a font behaves is to set a sample text in the font and try it out on all devices that you target. Bad rendering is especially noticeable on thin weights.

For example, a font that renders well on macOS may appear fragile on Windows (Fig 2). It's important to use real devices, because online browser-testing tools and virtual machines are often inaccurate (more on that later).

If you don't have your site's content yet (tsk!), give Tim Brown's Web Font Specimen (<http://webfontspecimen.com>) a spin. It sets content at several text sizes and with different background colours. It's no replacement for real content, but it'll do in a pinch.

Sometimes you get lucky, and the font you have chosen is designed explicitly for screens: Hoefler & Co's ScreenSmart, Monotype's eText, and Font Bureau's Reading Edge are examples of collections specifically designed with screens in mind and should look beautiful everywhere. Of course, it pays to double-check the text rendering, regardless of the origins of the font.

But exactly why does text look different from one browser to the next? To answer that question, we're going to have to take a quick detour into the nitty gritty details of text rendering.



Top left Fig 1: Worldwide operating system usage, according to StatCounter Global Stats (April 2017). Apple's devices represent a small fraction of global usage, while Android and Windows dominate

Bottom left Fig 2: Jubilat Thin on Windows 7 (left) and macOS (right). Note that on macOS the text looks 'heavier' than on Windows 7



“To test how a font behaves, set sample text and try it out on all devices that you target”

RASTERIZING AND ANTIALIASING

The process of transforming font outlines into pixels is called rasterization. The operating system's text-rendering engine places the outline (ie the shape) of each character at the desired font size on a pixel grid. Next, it colours all the pixels whose centre is inside the outline (Fig 3).

In this example, a pixel is either on or off, no matter how much of the outline is present in the pixel. This approximation of mathematically perfect outlines is called aliasing; antialiasing attempts to mitigate the coarse staircase-like appearances caused by the limited resolution of screens.

The idea behind antialiasing is to figure out how much of the outline is present in each pixel and represent that with a greyscale value. In other words, if the outline covers 50% of a pixel, it uses 50% of black to colour that pixel. If the pixel is entirely within the outline, 100% black is used, and so on. This leads to an antialiased rendering that reduces the aliasing (Fig 4). You'll often see the term 'greyscale antialiasing' used to describe this effect.

While antialiasing improves the quality of text rendering, it's possible to improve the result further using subpixel antialiasing. Subpixel antialiasing

* FURTHER READING

PROGRESSIVE ENHANCEMENT

+ There's more to choosing a webfont than aesthetics – rendering, language support, hosting, and licensing are equally crucial to communicating your message. Think of webfonts as progressive enhancement, and learn how to harness CSS and browser features to improve performance.

From selection to optimisation, the *Webfont Handbook* (<https://abookapart.com/products/webfont-handbook>) shows you how webfonts can make the web a more visually diverse, efficient, and readable environment.



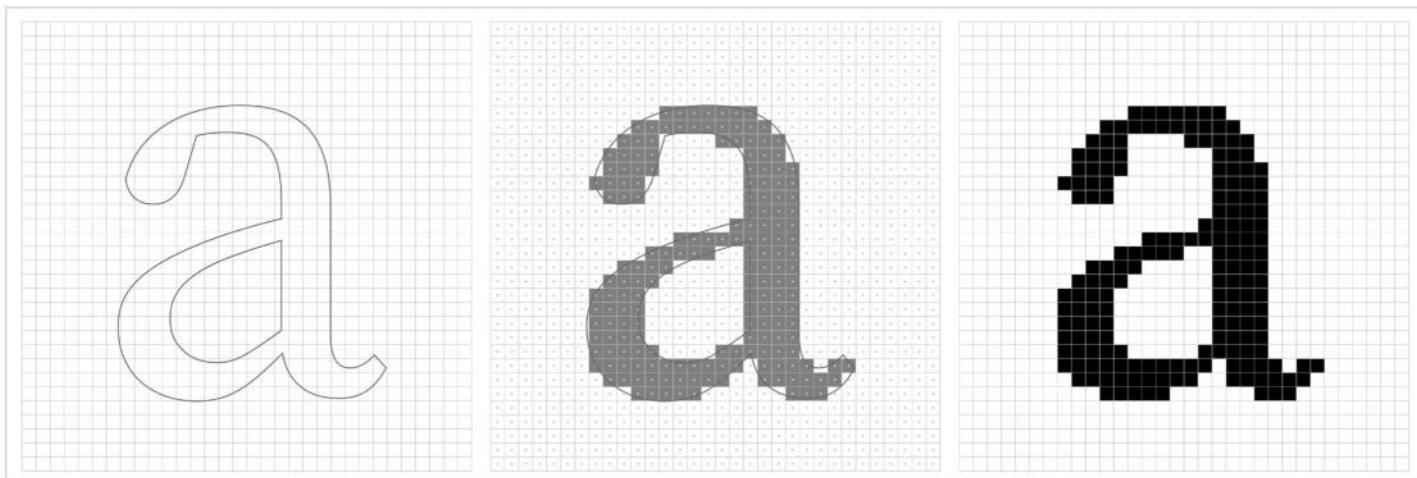


Fig 3: From Bézier curve to pixels. On the left is the outline of the character 'a'. In the middle that outline is superimposed on a pixel grid; any pixel whose centre is inside the outline is turned on. On the right is the resulting rasterization

► makes use of the characteristics of screens to increase the resolution of rasterized text. Each pixel in a display is made up of three oblong subpixels: red, green, and blue (other configurations exist, but the same principles apply). The operating system can control these subpixels individually; subpixel antialiasing exploits that by applying the coverage calculation to each subpixel (Fig 5).

The difference between these text-rendering options becomes evident when you start working at smaller text sizes. Without antialiasing, characters quickly lose their distinctive outlines. Greyscale antialiasing makes characters blurry but maintains their shape. Subpixel antialiasing renders sharp characters but also introduces some colour fringing around the character's edges.

TEXT-RENDERING ENGINES

Most operating systems use their own proprietary text-rendering engine, while others use the same open-source engine (though not necessarily with the same configuration). However, all of them support antialiasing and subpixel antialiasing but differ slightly in their implementation. In many operating systems, the choice of antialiasing method is user-selectable. On Windows, for example, subpixel antialiasing is called ClearType; on macOS, it is called LCD Font Smoothing.

There are currently four major text-rendering engines: the Graphics Device Interface (also known as GDI) and DirectWrite on Windows; Core Graphics on macOS and iOS; and the open-source FreeType on Linux, Chrome OS, and Android.

Generally speaking, a browser will use the text-rendering engine that's native to the operating system it is running on. Chrome, for example, uses DirectWrite on Windows, Core Graphics on macOS, and FreeType on Android. Windows is unique in that it offers two text rendering engines: GDI and the newer DirectWrite. All modern browsers use DirectWrite, so you don't need to worry about GDI save for one exception: some browsers fall back on the inferior GDI rendering if the machine has no dedicated graphics hardware. Online browser-testing tools and virtual machines often do not have dedicated graphics hardware, so text-rendering on these tools is not accurate.

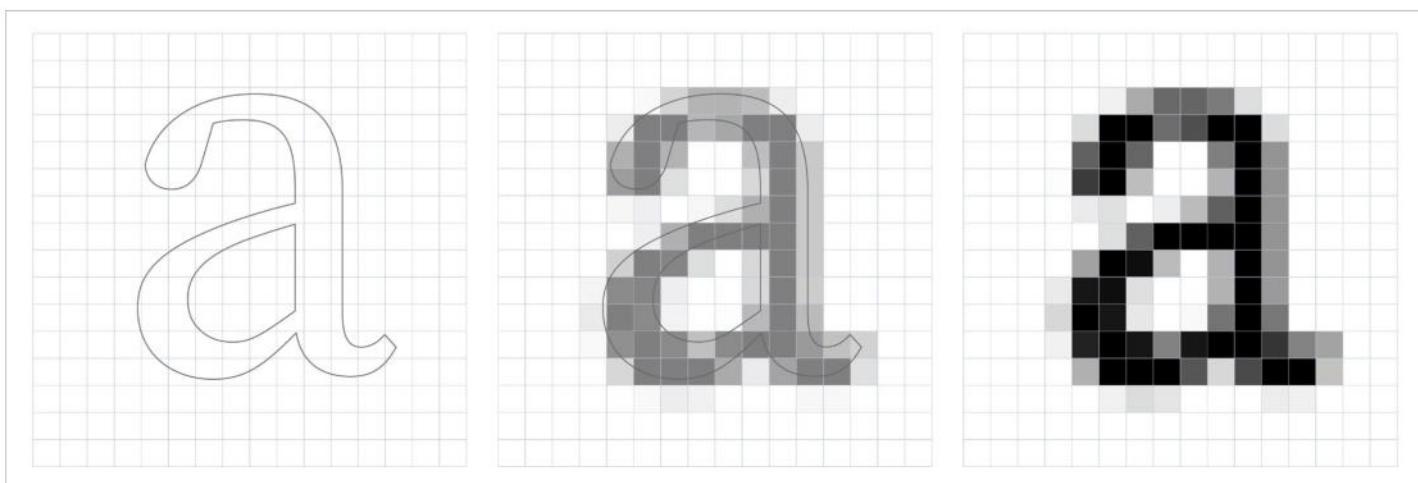
Ideally, all text is rendered using subpixel antialiasing because it creates the most legible text. Unfortunately, that is not always possible – for example, subpixel antialiasing is often disabled on devices that can be rotated, such as tablets and phones. When you turn the screen of these devices,

IN-DEPTH

ANTIALIASING

+ You can change antialiasing settings through the non-standard `-webkit-font-smoothing` and `-moz-osx-font-smoothing` CSS properties. Unfortunately, many CSS frameworks and libraries use the `antialiased` and `grayscale` values to make the text appear lighter on macOS. However, most developers and designers don't realise this disables subpixel antialiasing and makes text appear blurrier, thereby hurting legibility.

Changing someone else's preferred text rendering to be less legible is very inconsiderate. If you *must* have lighter text, use a lighter weight instead of disabling subpixel rendering.



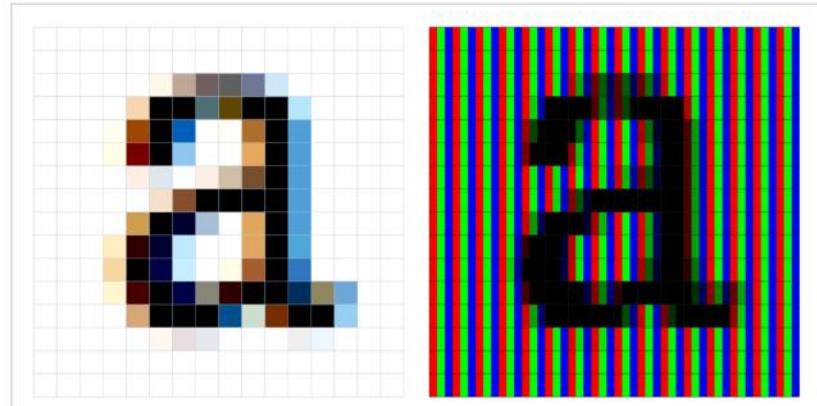
"The rules browsers use to select the antialiasing method are constantly being updated"

the subpixels are no longer arranged in the pattern expected by the rasterizer and will cause subpixel antialiasing to look ugly.

Browsers also disable subpixel antialiasing in similar situations, for example when text is rotated or animated. In this case, the rasterized text no longer matches the subpixel layout of the text's original position and would need to be rasterized again. This is expensive, especially for animations, so most browsers fall back on greyscale antialiasing, which doesn't suffer from the same problem and works in any orientation.

Some browsers – Chrome on macOS, for instance – also disable subpixel antialiasing on high-resolution screens to provide a more consistent user experience. Other browsers only enable subpixel antialiasing on small text, because minor changes in text rendering are less visible at larger sizes.

There are several other cases where browsers disable subpixel antialiasing. The rules browsers use to select the antialiasing method are constantly updated as new corner cases, and problems, are found (<https://www.html5rocks.com/en/tutorials/internals/antialiasing-101/>). These frequent changes make it very hard to keep track of what is going on with your text rendering. What once used subpixel antialiasing may fall back to greyscale with the next browser update. The only way to know for sure how your text renders is to test on actual devices.



You're probably used to testing your site in several browsers. Testing text rendering increases the amount of testing you need to do manifold. Not only do you need to check all combinations of operating systems and browsers, but also all common text rendering settings. Some devices may be preconfigured to use greyscale antialiasing while others use a mix of greyscale and subpixel antialiasing. To make it even harder, it is not possible to use online-browser testing tools or virtual machines, because the text rendering often differs from that of real devices.

When testing, always use a representative sample of your content. A pattern library is ideally suited for testing type rendering because it includes a broad sample of your content: headers, body text, labels, background colours, and animation. Having examples of your content on a single page enables you to check all combinations of styles and background colours quickly. Be on the lookout for text that is not legible or appears thin on some operating systems. If you find an issue, change to a different weight in the same font family, make the text darker, or pick a different typeface. Good luck! ■

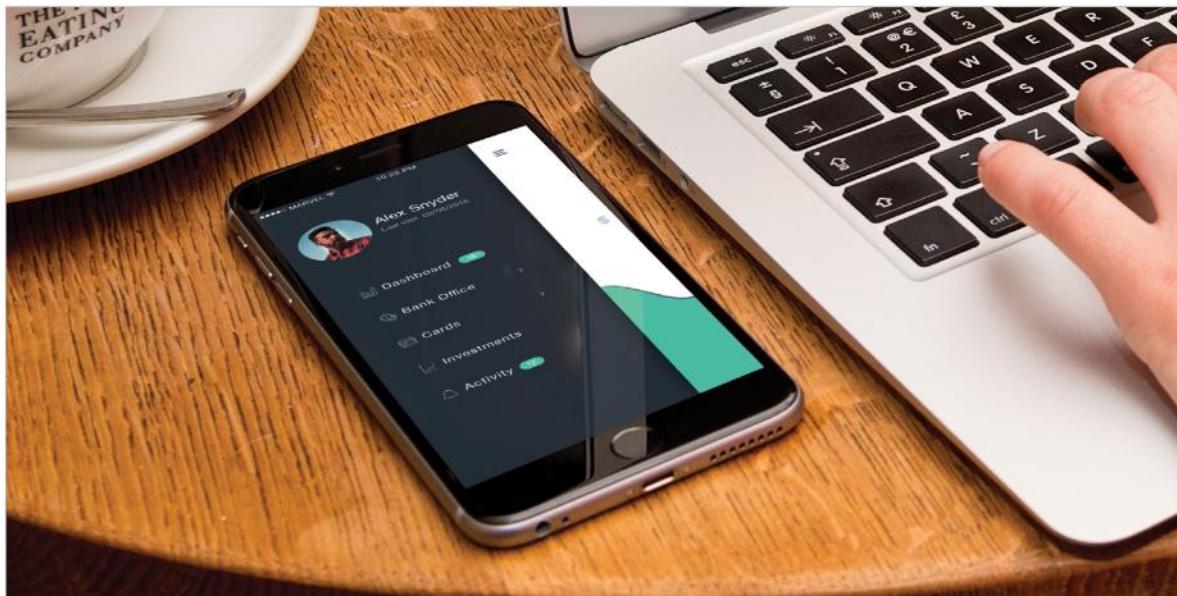
Top Fig 4: Antialiasing using greyscale values to represent the outline coverage of each pixel produces better results

Above Fig 5: By targeting individual subpixels, subpixel antialiasing effectively increases the resolution of rendered text. The colours the naked eye perceives (left) are the result of setting individual coverage values for each subpixel (right); the subpixels for red, green, and blue combine to form a single perceptible colour



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* MARVEL

PROTOTYPE & HANDOFF DESIGNS WITH MARVEL

Daniel Schwarz explores how to prototype apps with Marvel, then introduces us to the software's new design handoff tools

> With a shorter learning curve than InVision App, and brand new design handoff tools for enterprise teams, there's no better time to explore how Marvel can be a swift and effortless solution for prototyping web and mobile applications in teams.

Marvel helps teams take their designs (made either in Sketch or Marvel itself) from sketched idea to initial concept to tested concept. Its collaborative tools encourage stakeholders not only to have their say, but to be a part of the design workflow.

In-between design sprints, bouts of feedback and multiple reiterations, facilitated by commenting and annotating features that help even the largest of teams communicate productively, there's also an iOS app that does a lot more than live preview.

With the iOS app, teams can convert static designs to dynamic prototypes as easily on mobile as they can on desktop, so nobody is ever left out of a design sprint when they're without their desktop computer. But what's even better is that it can help

non-designers convert their sketched ideas to digital prototypes with ease.

In this tutorial we'll learn how Marvel helps to establish a collaborative team culture where design is a democracy; where absolutely everyone has a say regardless of their proficiency with a design application like Sketch.

We'll explore a workflow that involves easy-to-use prototyping features, and then, to wrap up, we'll learn about the design handoff features that help savvy developers turn interactive prototypes into real apps. Brace yourselves!

CREATE YOUR FIRST MARVEL PROJECT

Sign up at Marvel to begin, where only your name and email address are required. It's really nice that you're encouraged to create your first design project right off the bat (although you can still click the Skip Tour button in the top-right corner if you're not ready to do that yet).

If not, start with step one and choose either Design Project or Prototype Project. A Prototype Project is when you upload screens that you've already designed (usually in Sketch), and a Design Project is when you're starting from scratch, and you'd like to use Marvel's own design tools to create a low-fidelity mockup (this is an amazing option for rapid iteration and brainstorming).

Choose Design Project, then give it a name, then choose iPhone X and click the Create Project button. From here (we'll call this the project dashboard from here on out), click the Design button on the left-hand side, or the Start designing button in the middle of the window.

DESIGN LOW-FIDELITY PROTOTYPES

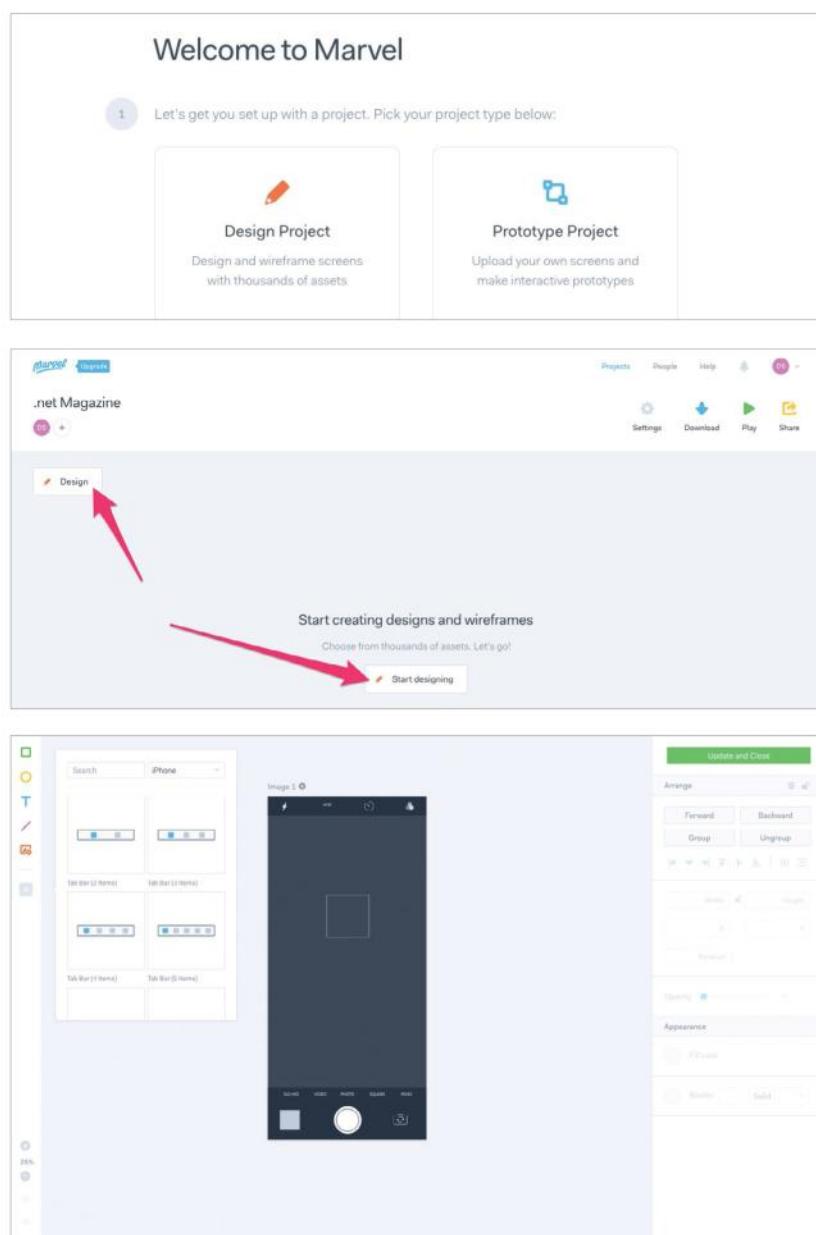
Our core aim here is to visualise our ideas quickly without wasting too much time worrying about what the final outcome will look like. From here we're able to create shapes, images, text, ready-made components like tab bars, and even entire full-screen components like this camera screen (which was selected from the left-hand sidebar and restyled using the right-hand sidebar).

Drawing shapes, creating text layers and making simple visual changes is fairly easy even for a non-designer, although seasoned designers will love how quickly they're able to throw an idea together and click the Add to Project button.

Although you can't expect vector drawing, masking and other complex design tools, this interface will nonetheless feel quite familiar if you're a Sketch, Adobe XD or Figma user (in fact, we'll discuss importing higher-fidelity designs from Sketch in a moment). What you can expect is zooming, aligning, grouping, basic visual design tools, mouse controls such as dragging, resizing and rotating, and a few handy keyboard shortcuts.

However, Marvel isn't only for designers. While it may require a designer to create the final design in an industry-standard design app, ideas should (and do) come from all kinds of stakeholders (managers, clients, developers, and so on).

No matter what your primary role is in a team, it should be super-easy to say: "Hey, could this be an idea?", and then demonstrate that visually. Marvel's POP (<https://marvelapp.com/pop/>) mobile app reduces the barrier of entry even further by bringing these simplified design tools to mobile devices, because let's face it, ideas can come to us at the strangest of times. Ideas sketched on paper can be converted to an interactive Marvel screen using the device camera. Design needs to be a democratised, where anybody can have a say without being restricted to using complex design applications.



Top Choose your project from the Start screen

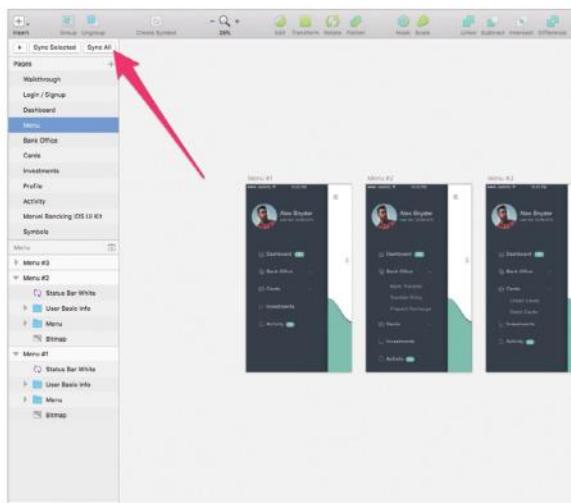
Middle Once you've picked your project, click one of two buttons to start the design process

Above You can use and adapt ready-made components, like this camera screen

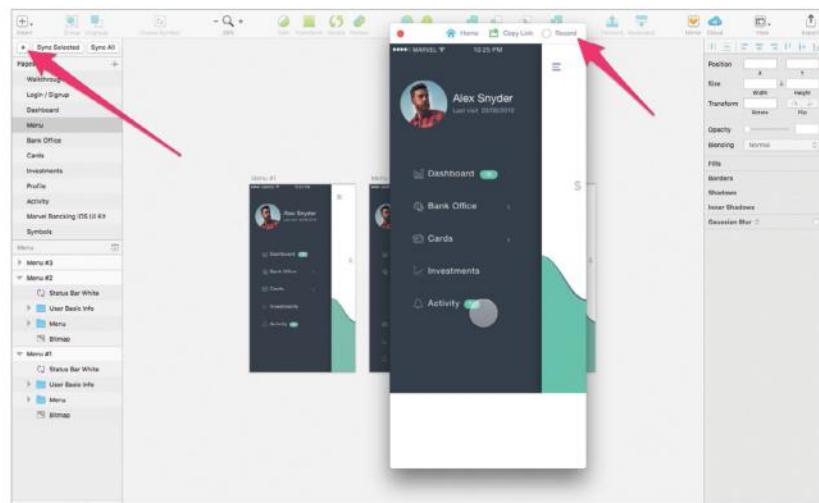
INTEGRATE MARVEL WITH SKETCH

After productively brainstorming low-fidelity ideas with your team, you'll want to mock up the first iteration in your design app of choice. While you can totally upload exported PNG screens from any design app, Sketch is the recommended app because there's a dedicated Sketch Plugin that automates the process (and even readies the design so that it can be inspected by developers later on). Photoshop support for design handoff will come later, however Adobe isn't touting Photoshop for user interface design anymore, since it created Adobe XD.

From the dashboard, click Settings>Integrations>Sketch Plugin, then Download Plugin. Once you have ►



Above It is easy to sync designs between Sketch and Marvel



Above When your prototype becomes interactive, hit the Play icon to test it in Sketch

► it installed, and your design file open, hit the Sync Selected or Sync All buttons in the Marvel bar (this appears above the layer list) to begin choosing a Marvel Project to sync the screens into.

You can hit those sync buttons whenever you make a change to the design in Sketch and want to sync them into Marvel and, when you start to make your prototype interactive in Marvel, you can hit the Play icon to test your prototype directly in Sketch!

Note: in the examples shown here, we're using a sample Sketch file (<https://marvelapp.com/sketch/>) that comes from Marvel.

PROTOTYPING INTERACTIONS

But of course we can't test prototypes if we haven't added any interactions to them, so let's do that now. Moving back to the Marvel dashboard, where you'll see the screens that we synced, click View on any one of the screens to enter screen mode.

From here we can still navigate through the screens using the left and right arrows on either side of the window, click Timer to have Marvel cycle through the screens after [x] amount of seconds (useful for presentations!), or click No Comments to add your first comment or annotation on the screen.

Just FYI: it's highly-recommended that teams use this comment system (especially during the low-fidelity brainstorming stage) to discuss ideas and offer feedback, as this will improve the user experience of the final outcome exponentially. Making a comment in Marvel is as easy as making a comment on Facebook, enabling designers to collect feedback from virtually anyone.

Probably the first thing you'll notice is the Fixed Header and Fixed Footer buttons that appear near the top-left and bottom-left corners of the screen

respectively. These buttons are draggable, and they can also be moved to mark the cutoff region of a header section that is to stay fixed to the top of a scrollable viewport. You can also use the text fields in the top-right and bottom-right corner to specify this value manually.

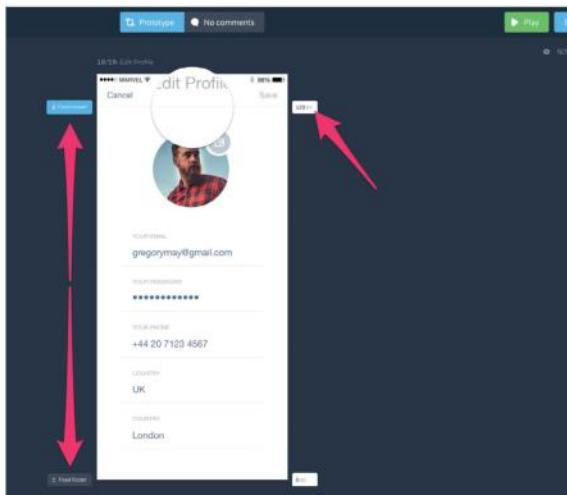
But how do we actually link one screen to another? Simple; with the mouse, drag-select a region on the screen that is to link to another screen (this is called a 'hotspot'). Once you've done that, an interface will appear at the bottom of the window that enables you to customise where the user is taken to, any transition that happens during the interaction, and what gesture is required to activate that interaction (tap, swipe etc).

And of course, we can use these prototyping tools even on low-fidelity mockups. In fact, it's recommended that you do, all the while using the commenting features to discuss and reiterate.

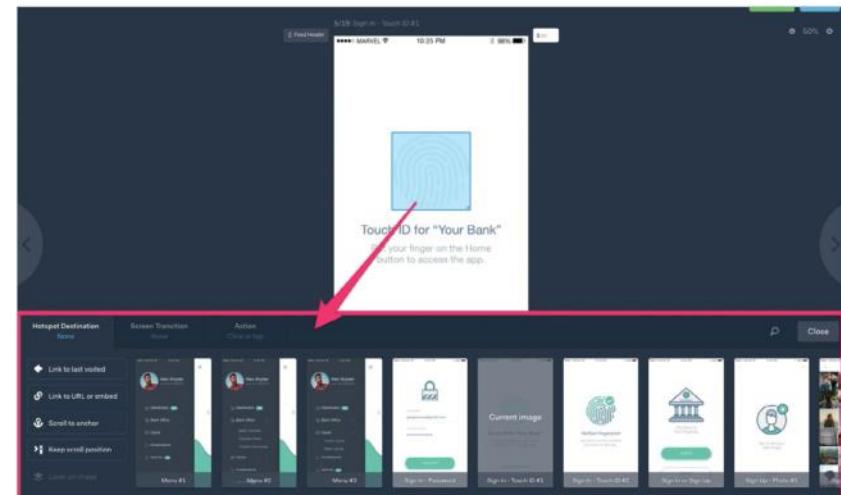
HANDING OFF DESIGNS TO DEVELOPERS

When your team retains full confidence in the final design, validated using the commenting and user testing tools, it's time to hand it over to the developers who can then inspect and code. It's important to remember that a designer isn't 'done' once the design is handed over, and that designers and developers should always communicate in harmony to oversee the development until its completion. The developer may also have some questions, so those commenting features should still be very much active.

Hit the Play button, then click Handoff in the bottom-left corner to open the design handoff interface. From here, developers will be able to click on the design elements and inspect the individual



Above Use the fixed header and footer buttons to mark a cutoff region



Above Drag-select regions to create hotspots for linking from one screen to another

styles that make them what they are, using the sidebar on the right-hand side (much like the inspector interface in Sketch, Figma or Adobe XD). The only difference here is that developers are able to click on the Copy button to copy the styles as code to the clipboard!

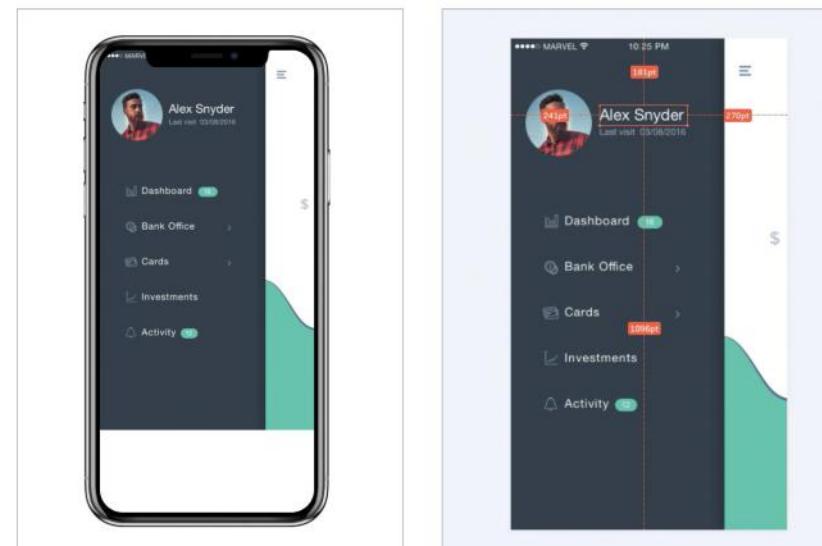
When not focused on any specific element, the developer is able to clearly see an overview of all colours and assets used in the design; assets that can be exported and used in the codebase of the website or app that's being designed, without developers having to open up a design application like Sketch, and without designers needing to send over these assets old-school style.

Design handoff bridges the gap between designer and developer, where the styles can be extracted as CSS code (for web), Swift code (for iOS), and Android code (for, well, Android!). Better yet, developers can measure the distance between two objects to eliminate the need for guesswork. With handoff, absolutely everything is implemented right down to the very last detail. Design handoff is a feature awarded to enterprise teams, along with unlimited users, advanced security, Single Sign-On (SSO), priority support and a dedicated account manager.

If you're ever offline and you want to test your prototype (or send it to a stakeholder who is neither a Sketch or Marvel user), click the Download button in the Marvel dashboard to install it on iOS, Android, desktop computers, or even as a PDF.

If you want to make the app design even more realistic, click the App icon screen in the dashboard to upload an icon that will be viewable on the home screen of the tester's device.

Even though you can test interactions in Sketch, you'll find it far more convenient to test them



Above left Hit Play to view the design in a 'mockup' frame device

where you make them. You just have to hit the Play button anytime and anywhere to open up the app in a 'mockup' device frame, although you might find that the Marvel iOS application is better for testing because you'll be able to navigate the screens using thumbs and gestures. This essentially makes it possible for you to test the user experience in a more realistic environment.

You'll want to request feedback every step of the way. Click Share from the dashboard to invite others to comment on designs (even if they don't have a Marvel account), or click People from the menu to invite stakeholders to collaborate.

From the Share interface you can share via email/SMS, create a sharelink, or embed the prototype in a website as an iframe, or you can even connect Marvel to Lookback (<https://lookback.io/>) to set up a rather elaborate user testing workflow. ■

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FEATURED HOST



"We have several servers from Netcetera and the network connectivity is top-notch – great uptime and speed is never an issue. We would highly recommend Netcetera"

Suzy Bean

*EXPERT TIP

CLOUD TECH TIP...

If you're going to fully utilise cloud technology, before deciding on a service provider, ask whether monitoring comes as standard and whether management is included in the price. A fully managed cloud can make your business fly; an underutilised cloud will be a waste of money.



Netcetera provides hosting from one of the most energy-efficient datacentres in Europe, all powered by green energy. It offers everything from reliable low-cost hosting for a single site right through to complex cloud racks and managed IT solutions. One of its most popular products is its Managed Cloud, designed to help SMBs get the most from their website, on their own cloud server. Server monitoring comes as standard for Netcetera's Cloud and Dedicated server clients – something it believes should be included in the price of the hosting it provides.

Offering reliable website hosting, dedicated servers, colocation and cloud solutions, Netcetera has a large portfolio of green, zero-carbon solutions for businesses of all sizes. Customers can choose from its fully managed cloud servers, Linux and Windows for SMBs and a fully managed cloud solution for WordPress websites, to help them fully utilise cloud technology without any hassle. And with server monitoring as standard and a full migration service available, Netcetera has made the switch to better hosting really easy.

CONTACT

03330 439780 / SALES@NETCETERA.CO.UK

WWW.NETCETERA.CO.UK

WHAT NETCETERA OFFERS

- **Managed hosting:** A full range of solutions for a cost-effective, reliable, secure host
- **Dedicated servers:** Single server through to a full rack, with free set up and a generous bandwidth
- **Cloud hosting:** Linux, Windows, hybrid and private cloud solutions with support and scalability features
- **Data centre co-location:** From quad-core up to smart servers with quick set up, and all fully customisable

1&1 INTERNET

1&1 Internet is a leading hosting provider that enables businesses, developers and IT professionals to succeed online. With a comprehensive range of high-performance and affordable internet products, 1&1 offers everything from simple domain registration to advanced eCommerce packages.

0333 336 5509

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TIDYHOSTS

Tidyhosts boasts a feature-rich selection of services from shared web hosting, WordPress hosting, hosted exchange, virtual servers and streaming. Tidyhosts' passion and drive has gained it a highly reliable and trusted reputation from its customers, making it the number one choice for hosting services.

0560 367 4610

WWW.TIDYHOSTS.COM

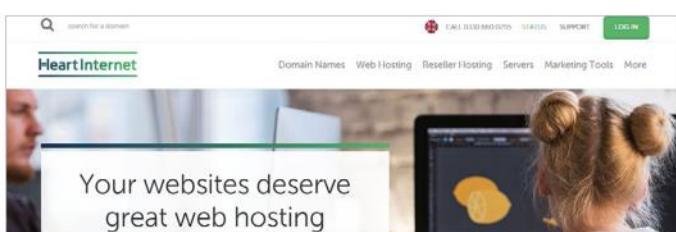


HEART INTERNET

As one of the UK's leading web hosting authorities, Heart Internet focuses on designers, developers and technically adept businesses. It builds on its four tenets – speed, reliability, support and security – to create award-winning solutions for over 500,000 customers.

+44 (0) 330 660 0255

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TheNames.co.uk offers great value cPanel web hosting, SSL certificates, business email, WordPress hosting, Cloud, VPS and dedicated servers. Part of a hosting brand that started in 1999, it is well established, UK based, independent and its mission is simple: ensure your web presence "just works".

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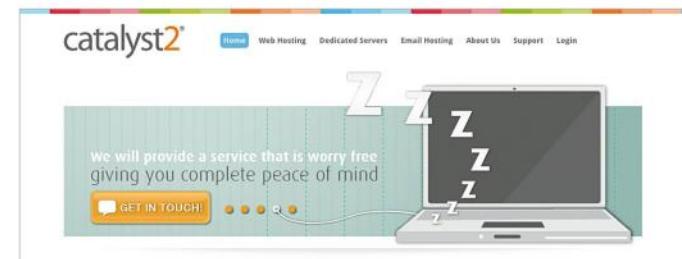


CATALYST2

As one of the UK's most experienced hosting companies, Catalyst2 has built a stable, reliable and well-supported hosting platform for organisations across the UK. Catalyst2 specialises in very high-availability hosting and exceptional customer support. Contact the team today for a quote.

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Would you like to promote your hosting business and services to our audience of professional web designers and developers? If so, please call or email Chris as below.

REASONS TO ADVERTISE

- **Reach professionals:** 75 per cent of readers are working in or seeking work in the web industry
- **Variety of projects:** Future projects include mobile apps, web apps and CMS-driven sites
- **Home workers:** 51 per cent have a personal website under development

CONTACT

+44 01225 687832 / CHRIS.MITCHELL@FUTURENET.COM



* ACCESSIBILITY

A11Y DOT AI

Denis Boudreau considers how AI can make building accessible products easier for developers

> Building blocks of artificial intelligence, powered by machine learning and neural networks, are changing the way people with disabilities go about their lives. It changes how they communicate and interact with the world around them. Because we integrate these bricks, we have the power to improve the experience people have, using our sites and applications.

As we're jumping on the AI bandwagon, how can we leverage the technology to ease the development of the next generation of products? And in doing so, how can we ensure no prejudice is caused to those who use the web differently? Visual information not described in text is perhaps the most commonly reported type of issue a blind person can run into on the web. But what if we no longer needed to bother? What if the technology handled it on its own?

Consider Facebook's implementation of DeepMask, for instance. These building blocks of artificial intelligence are trained to be able to recognise composition of images. They generate alt text attributes that read "image may contain", along with a series of keywords based on what the AI recognises in the images. Facebook has been using it for over 18 months now, and with good results. Facebook's AI

research division open sourced its image recognition software soon after, so that others could contribute to advancing the technology as well. All the time the accuracy of the AI improves, we can imagine the need of planning for alt text to become less of a concern over time.

Likewise, OpenFace is a joint effort to provide open-source facial recognition with deep neural networks. Designed to address the challenge of password recollection, this technology relies on pictures of a person's face to recognise the same face in a variety of contexts, settings and lighting conditions. Of all the implementations that were recently advertised, the two most popular probably are Apple's Face ID and Windows' Hello. As AI-powered facial recognition begins to weed out bots, another notorious barrier to accessibility will disappear from your products. Facial recognition might be the CAPTCHA killer we've been waiting for.

These examples are the tip of the AI iceberg. Artificial intelligence will never fully replace the need to care about accessibility, but it will handle some of the work. It will make our jobs building accessible products easier. It will help move the web towards more digital inclusion. ■

Denis is a principal web accessibility trainer and inclusive design advocate, working for Deque. He has a passion for interfaces that are engaging and delightfully accessible.

PROFILE
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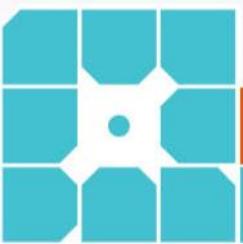


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