

The Sustainable Product Development Manifesto

A Guide to Building Sustainable Software

Presented by the team at Mightybytes



Introduction

Mightybytes recently completed an 11-week development cycle building our website sustainability tool, [Ecograder](https://www.ecograder.com). Our goal was to build a product that helps website owners better understand their site's environmental impact and provide a general roadmap for making improvements and decreasing site greenhouse gas (GHG) emissions.



www.ecograder.com

Not only did we want to build a product that can help evolve web sustainability, we wanted to develop it with a process that is green in and of itself. From this project **The Sustainable Product Development Manifesto** was born. The goal of this document is to ensure minimal environmental impact of your product concepting, design, and development, as well as eliminate waste from building products people don't want. It pools resources and strategies collected from Lean Startup principles, agile methodologies, and life cycle assessment frameworks for sustainability.

We're proud of what we accomplished with EcoGrader and what we learned during the process, and hope you will find the resources contained herein valuable. Here are the main principles to consider when creating sustainable web products.

Sustainable Planning

It's easy to get caught up in the planning process, devising solution after solution to solve what we think are our customers' problems. But if they don't need what you build, what's the point? Here are some thoughts on making your planning process a sustainable one.

The Opportunity Assessment

Ask yourself and your team: why are you considering this endeavor? Is it worth using resources to test the idea? Why right now? If you're having issues with this, check out Marty Cagan's [opportunity assessment](#) template, or [Lean Canvas](#) for business planning.



The Lean Canvas

Impact Analysis

Take full account of the effects of building this product or feature, from the efficiency of its code to the resources needed to support it for the long haul. Ensure that the planned life of the product and its impact are fair trade-offs for the value the product delivers to customers.

Validation

Learning can and should be [validated scientifically](#) by running experiments and testing each element of your vision before using resources to build something unwanted. Start by conducting customer interviews to find out if they are actually interested in this idea, and, more importantly, if they would pay for it. Look for people already solving the problem you're working on with homebrew solutions.

Clean Design

Pragmatic Design

Your product design should be ethical, purposeful, and pragmatic. Consider the [Bauhaus minimal approach](#) by stripping its design of any extraneous or unnecessary elements, reducing your product to the core components that convey its purpose. This method, called Economy of Form, provides that the “economy” refers to a limited “budget” of elements usable to complete a design. In software parlance: avoid bells, whistles, unnecessary images, carousels, share widgets, Flash, and externally loaded maps unless there is no other way to serve a specific need.



Mobile First

One billion people across the world browse the internet using smartphones so it makes good business sense to optimize websites and applications to be viewed on those devices. It also reduces server side energy by loading less large rich media, images, and helps the user find what they're looking for more quickly. To learn more, pick up this book by [Luke Wroblewski](#).



Reduce Share Greed

Sure, social sharing widgets are convenient, but adding them to a site can [balloon page size](#) significantly, not to mention increase HTTP requests. Oliver Reichenstein, in the article “[Sweep the Sleaze](#)”, writes that “If readers are too lazy to copy and paste the URL, and write a few words about your content, then it is not because you lack magical ‘share’ buttons.”

If you must include options to share your site content, include simple links so that a multitude of buttons aren't added to your pages on load.



Efficient Development

The software equivalent to lean manufacturing, creating a design and development process that is efficient and minimizes waste will play a critical role in the success of your product endeavors. Here are some notions to consider as you iterate ideas.

Minimum Viable Products

It cannot be stressed enough to minimize resource input as much as possible during the initial pre-validation, or validation period. In [green engineering](#), this is known as “meeting needs and minimizing the excess”. You can use methodologies such as customer interviews, and the [MoSCoW method](#) (must, should, could and would) of prioritization to ensure that when it is time to build you’re only delivering the greatest and most immediate business benefits.

Working Software Over Comprehensive Documentation

Taken from the [Agile Manifesto](#), this basically means that while vision is mandatory, a 15-page product requirements document is not. Don’t waste pixel power or print paper on something no one will read. Instead consider a functional prototype to get your vision out. Avoid entropy and complexity within your requirements. If you can’t put it on an [index card](#), it’s probably too complex of a task for development.

Efficient Work Environments

Minimize [vampire power](#). There are surge protectors you can get that will actually turn off power flow to things plugged into them, such as computers, lights, etc. Even though something is turned off it still can draw power if plugged into the wall. Also turn off unnecessary lights, machines, devices, when not in use.



Efficient Development cont.

Responding to Change (Over Following a Plan)

Sustainable product design means welcoming changing requirements, even late in development. Harnessing change can create opportunities to improve the product, or reduce its impact at any stage in development. Read more about this concept in the Agile Manifesto.

Output-Pulled Versus Input-Pushed

In the article “[Design through the Twelve Principles of Green Engineering](#)”, the authors P.T. Anastas and J.B. Zimmerman writes that “Products, processes and systems should be ‘output pulled’ rather than ‘input pushed’ through the use of energy and materials. In other words, don’t make your product run when it doesn’t need to. Give users control over functions when possible.

Green Materials

What goes into your project is just as important as what comes out. In standard life cycle assessments, this is often building materials and other ingredients. For software products, one must consider the virtual life cycle of your components.

Use Green Ingredients

Roughly 50 million servers contribute to an internet carbon footprint equivalent to about 5% of total global greenhouse gas emissions. Since servers require power 24 hours a day, it is important to consider a green hosting provider that uses 100% renewable energy. This is key to reducing the long-term server-side impact caused by use of your product. Our goal is reward the progress and momentum of society, and the easiest way to make an impact through reducing server-side energy consumption.



Catch & Store Energy

Mightybytes enabled ‘caching’ to store information and reduce user energy consumption with Ecograder. Consider all possible ways you can use data already captured to reduce energy consumption in your product. Content Delivery Networks (CDN’s) provide a great way to reduce energy when delivering content. A CDN is the virtual equivalent to ‘buying local’.



Green Materials cont.

Produce No Waste

At every design stage, an opportunity will present itself to prevent waste rather than create it and deal with consequences later. Make sure your team is prepared to face this decision, and has the power to make important decisions during design and development to ensure the product remains low-impact.



Share and Recycle

[Code](#) and [pattern libraries](#), [boilerplates](#), [bootstraps](#), API's, and open source code can help you cut back on “reinventing the wheel”. Less hours coding features and writing custom CSS will result in less energy and consumption used during the build of your product.



Working & Living Green



It's worth mentioning that sustainability is an all-in philosophy. It's not just about your website or mobile app, it's about the big picture, which means also greening up your business and maybe even your personal life as well. Much of the content herein applies standard life cycle assessment thinking and processes to virtual properties, such as websites or mobile applications. If you truly want to bring your sustainability efforts full-circle, think about how you can reduce the impact of your physical space as well. Better yet, think about the impact your entire business has on a sustainable future. Sure, recycling bins are great, but how about the wages and benefits you offer employees? Or perhaps how your work (directly or indirectly) impacts access to resources or quality-of-life for people in challenged economies?

We may be a bit biased, but [B Lab's B Impact Assessment](#) is our favorite tool for assessing business impact, not just the recycling bins in the kitchen. It's free and to date over 15,000 of the world's leading businesses have used it to assess, compare and improve their social and environmental impact. It's not the only resource out there attempting to do this, but it's the one Mightybytes uses.

What makes us a better company?

B Impact Report

Certified since: July 2011

Summary:	Company Score	Median Score*
Governance	19	10
Workers	28	22
Community	38	32
Environment	14	9
Overall B Score	98	80

80 out of 200 is eligible for certification

*Of all businesses that have completed the **B Impact Assessment**

*Median scores will not add up to overall

Resources

Here are some resources that Mightybytes found useful during our exploration of sustainable product development.

- [Google Apps](#)
- [HTML/CSS Icons](#)
- [Twitter Bootstrap](#)
- [SVN version control](#)
- [Google Web Fonts](#)
- [Basecamp](#)
- [Sifter](#)
- [Trello](#)

We would also like to note that Pete Markiewicz's [Green Boilerplate](#) is a work-in-progress with the intent of streamlining sustainable app and website development for the following:

- **Design/Team Level** - minimize development energy, maximize sustainable development
- **Web Hosting Level** - minimize energy and other resource (water) use on the server, and during download
- **Client Level** - minimize energy and resource use on the client computer
- **UX** - minimize effort and maximize sustainable use of a web design through UX.



Blogs & Articles

- Pete Markiewicz, “[Save the Planet Through Sustainable Web Design](#),” *.net Magazine*
- James Christie “[Hack the Planet poster](#)”
- [Mightybytes Blog](#)
- Greg O’Toole, [Sustainable Web Ecosystem Design](#) (Springer, 2013), eBook
- James Glanz, “[Power, Pollution, and The Internet](#),” *The New York Times*
- [W3C Sustainable Web Forum](#)
- [Sustainable Virtual Design Blog](#)
- James Christie, “[Sustainable Web Design](#),” *A List Apart*
- Dorian Peters, “[The Web Runs on Electricity and We are Running Out](#),” *A List Apart*



Website Launch Checklist

Design

- ☐ Process graphics and other media for maximum compression using tools such as [Yahoo Smush.it](http://Yahoo.Smush.it) or [ImageOptim](http://ImageOptim.com).
- ☐ Don't feed all devices the same images. Use responsive images. Don't send desktop-sized large in kb/mb images to mobile phones, because it wastes energy.
- ☐ Use fewer share buttons and social plugins (each share button means more requests).
- ☐ Use HTML/CSS icons over image based icons.
(see <http://copypastecharacter.com/>)
- ☐ Avoid image carousels. A typical carousel of 5 images at 600x400px adds 750 kB ~ 1 MB per pages. Lots of savings.
- ☐ Design for mobile first. Not having to load the styles for a desktop first means not having to overwrite them with mobile styles later, using less browser computation power and loading site quicker.
- ☐ Use Flash sparingly (can increase CPU usage by 33%) and when possible replace with HTML5 elements. Use CSS Sprites to reduce HTTP requests.
- ☐ Apply standards-based design principles to create fully validating pages in HTML4 or 5 and CSS 3.

Website Launch Checklist cont.

Code

- ☐ Static content is set with six-month expiration (via HTTP Expires headers) to prevent redundant downloads.
- ☐ Run site through validators: W3C, Google PageSpeed Insights, etc.
- ☐ Educate clients and stakeholders on sustainable alternatives throughout the design process, to make sure medium matches message.
- ☐ Cache downloads.
- ☐ Create background graphics with CSS Sprites, experiment with CSSEmbed to load background images directly into stylesheets, which reduces HTTP requests.
- ☐ Replace large standard JavaScript libraries with micro-libraries (e.g. Sizzle) when possible.
- ☐ Write CSS as fluid and flexible as possible, accounting for the fact that mobile devices are changing rapidly.
- ☐ Use Google Closure Compiler to optimize original JavaScript developed in-house.
- ☐ Use HTML5 type attribute values, and smart form defaults on forms.
- ☐ Use Google Libraries and Microsoft Ajax Content Delivery Network for downloading standard libraries, enabling one download to be used by several of our web apps without re-requesting the code.
- ☐ Minimize the number of external assets used to create a layout. Use Combine to dynamically combine separate CSS and JavaScript files during downloads, which reduces HTTP requests.
- ☐ Using HTML5 type attribute values, and smart form defaults on forms.

Website Launch Checklist cont.

Overall Site Efficiency

- ☐ Run site through validators: W3C, Google PageSpeed Insights, etc.
- ☐ Use a Green Hosting provider.
- ☐ Apply Yahoo Exceptional Performance Guidelines to improve page speed and efficiency.
- ☐ Enable caching. Enabling browsers to cache your site reduces page load time, reduces bandwidth and hosting costs and saves energy.

Conclusion

This document is meant to be a conversation starter. It's far from a comprehensive resource. Becoming a sustainable business building sustainable products with a sustainable process is a long-term, ongoing commitment, but we hope the resources included herein are helpful.

We welcome all feedback and suggestions. Please send us some via the [Mightybytes contact page](#).



Mightybytes is a full-service creative firm for conscious companies.

Our broad range of service offerings from branding and content strategy to web and product development are guided by our unique commitment to a triple bottom line of people, planet and prosperity.

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