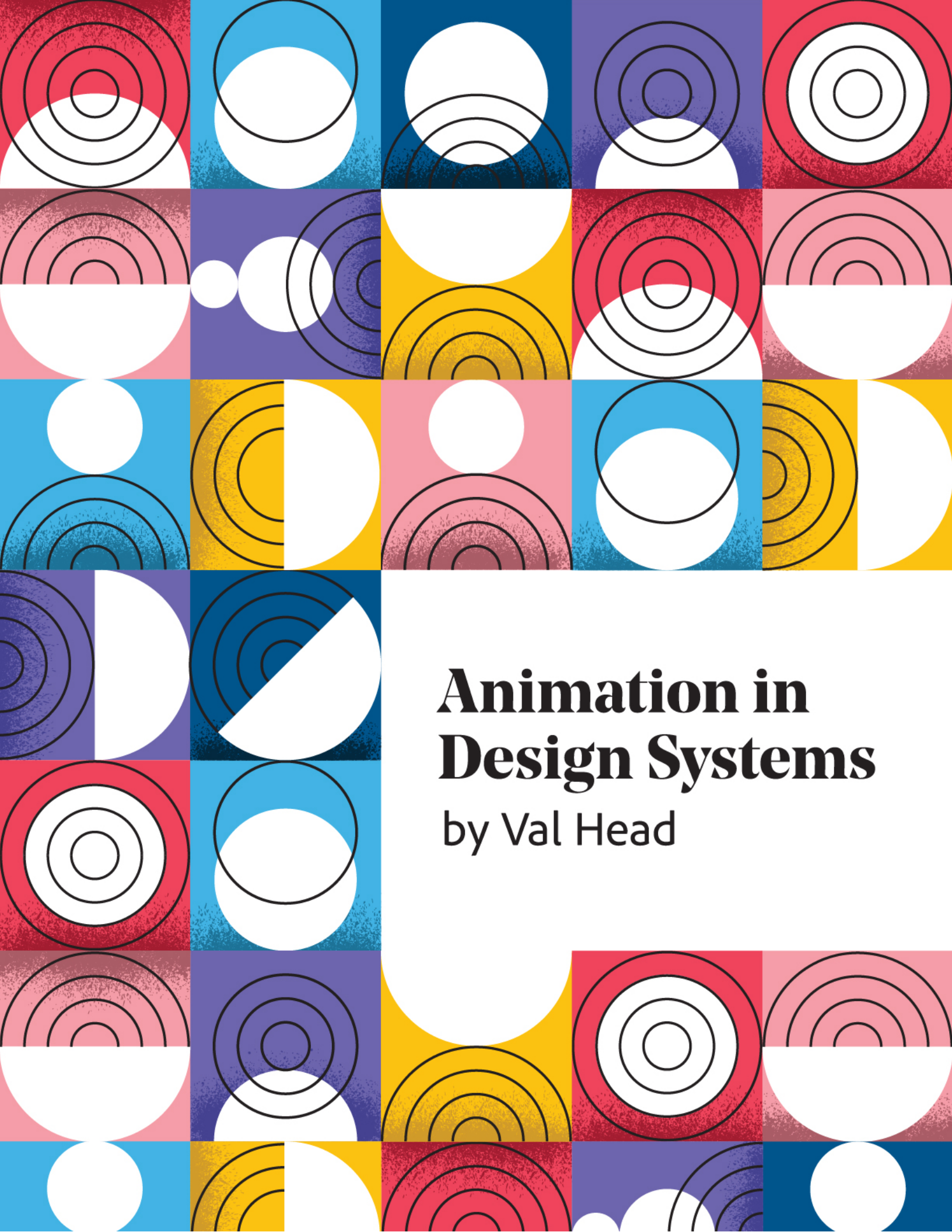

Animation in Design Systems

by Val Head

Animation in Design Systems

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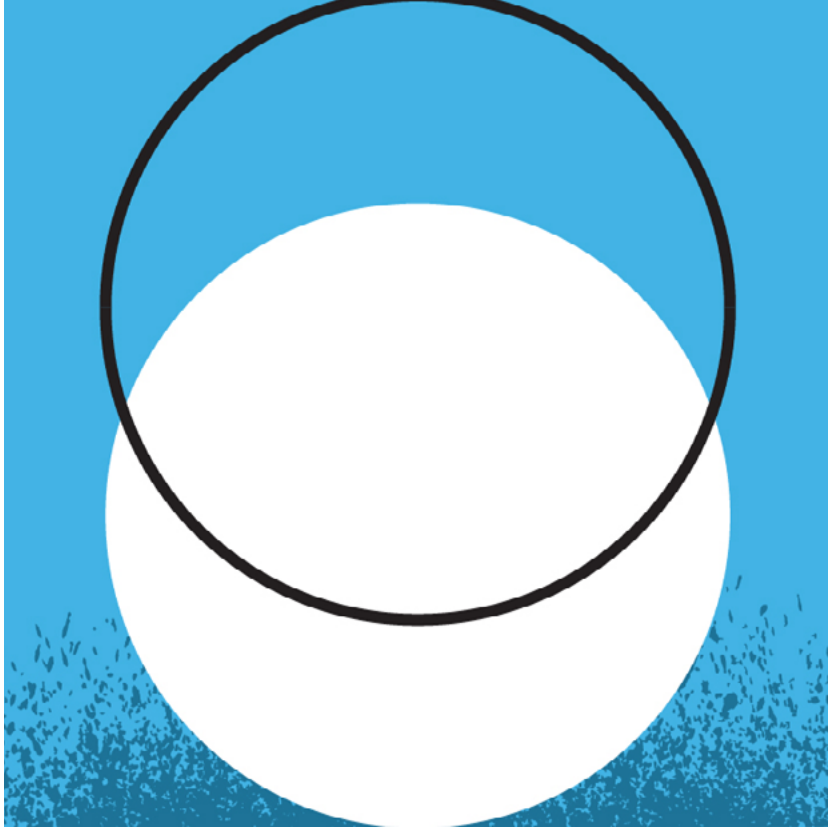


1 The Case for Covering Animation

Design systems come in all shapes and sizes, but not all of them include guidelines for animation. Sure, some teams may have decided that motion wasn't something their product needed guidance on, but I suspect that in many cases motion was left out because they weren't sure what to include. In the past few years, I've talked with many teams and designers who tell me motion is something they want to address, but they just aren't sure how to do it. If you're in that boat, you're in luck. This eBook breaks down everything to include when integrating animation into your design system, and how to successfully pull it off.

So, why animation?

Animation is an important design tool for brand messaging. Just like typography and color, the animation you use says something about your product and its personality. So, when it's not addressed in a design system, that area of UI design tooling is left unaccounted for. When that happens, people following the design system either do whatever they want with animation—which can lead to a strange mish-mash of animation execution across the experience—or, they just don't use animation at all because they don't have time to figure out all the details themselves. Neither case is ideal.

Having a clear stance on how animation is used (or not used) in your design system can help ensure your brand is using animation consistently and effectively while also helping your team work faster.

Your design system's stance on interface animation is part of its point of view; it's part of what makes it unique to your brand or product. There are some common best practices to consider for doing interface animation well, but just like with other areas of design, there is also room to add your brand's unique personality and perspective.

This ebook will walk you through a framework for creating a set of motion guidelines for your design system. It covers best practices, but will also help you develop your system's point of view around motion.

2 Defining What Your Animation Guidelines Should Cover

The groundwork: Defining what you need to cover

As Jina Anne says, "Design systems are for people"(bit.ly/peoplesystems). A key step in creating a successful design system is to talk to the people who will actually be using it—this is crucial to make sure you're building a design system that will be actually useful. This holds true for guidelines around creating animation too. The biggest thing you can gain from talking to the folks who

will be using your guidelines is to find out what those designers need and what you should focus on. This helps you set an appropriate scope for what you need to cover in your animation guidelines; no one wants to spend hours on extensive guidelines that address things your team will never actually need. That wouldn't be any fun.

First, talk to people

Your team may not tell you about their animation pain points unprompted, but that doesn't mean they don't have any. Set up some user interviews and ask them where they're getting stuck when it comes to animation. Ask them how, or if, they use animation, and where animation falls in their design process. Ask them what help they wish they had to better address the pain points they're encountering. Most importantly, listen to how they talk about using animation in their work and what's going well or not so well.

While every team is different, the issues and questions I've heard most often from designers are concerns like: "How do I know an animation is good, or fits with our brand?", "How can I convey the animation details to our engineers effectively?", or "Our developers always say there's no time to implement the animations we design."

You've probably guessed where I'm going with this, but all of these concerns are things you can provide answers for in your motion guidelines. And you can use the questions and pain points that come up most often to guide and focus your motion guideline efforts.

Here are some helpful questions to kick-start your audience research sessions: worksheet: research questions for motion guidelines (bit.ly/motionresearch-questions).

Reference other design systems

Not every design system needs to be public, but it's great that so many of them are. They make for helpful resources when planning your own design system,

and they can be useful research for your design system's motion guidelines too (in fact, I'll be referencing a few of them in this book).

Using the motion sections of other design systems as a reference for your own design system is very helpful, but I don't recommend adopting another brand's motion guidelines wholesale in place of your own.

The most effective design systems contain a branded point of view unique to them—things that make their design system more specific to the products it's for—along with common design best practices. Spend a little time researching and reading through other systems' motion guidelines, and you start to get a feel for which parts are best practices and which parts are customized to that brand or product's point of view. (Or just read this book because we'll do that in Chapter 4 to give you a head start.) Then you can decide which best practices you might also like to include in your guidelines, as well as where to customize the guidelines for your product.

For example, using ease-ins for exits and ease-outs for entrances is a common best practice for UI animation. But the exact ease-in or ease-out curve is usually customized to a brand's intended message and personality.

To quote Dan Mall (bit.ly/systempointofview):

> *"This is the kind of thing a design system should have guidelines for: perspective, point of view, extending creative direction to everyone that decides to build something with the design system. That stuff should be baked in."*

I totally agree. Exploring the motion sections of other design systems can give you a sense of what stance your design system will take on motion and how that might look and feel.

The motion audit

It's not uncommon to be starting a design system for an existing product, or one that's in the works. And in that case, you might already be using motion in your

product; you can use that existing motion as a basis for your motion section. The same goes for adding a motion section or additional clarification on motion to an existing system. If you're already using motion in some capacity, that is a great source that can inform your work in creating guidelines.

A motion audit gives you a chance to look at all your animations as a whole, not just individually. You can use the trends you identify in the audit to establish a strong foundation for your future efforts.

There are a lot of different things you can uncover in a motion audit—everything from gaining an understanding of animation performance and code,to identifying missed opportunities or redundancies in animation—but I'm going to stick to a motion audit's use in identifying trends across a collection of animations used in a given product for this discussion. (I've also written about motion audits in my book Designing Interface Animation (bit.ly/bookDIA), if you're looking to dig into them even more than we cover here.)

Conducting a motion audit to quantify your existing animation efforts

First, establish the scope of where you'll investigating your animations. If you have multiple products, do one at a time as they may each have their own goals and personalities that require separate consideration. Remember that the main goal of the motion audit is to uncover the trends of how you're currently using motion in your product(s). That's what will help you inform your motion guidelines as you create them.

Collect descriptions (and screen recordings or screenshots) of all the animation currently used in your product.

Don't forget any log-in only areas, sign-up sequences, and similar items. Just taking notes is also an option here, but I find that having a visual representation of each animation, like a video clip or .gif, that you can play back is helpful for making sure everyone is on the same page when discussing them in more detail.

The combination of written description and visuals tends to be the best foundation for analysis and discussion in my experience.

You can capture the animations with QuickTime, Screenflow, or other screen recording software, and collect them up as you go. I like using Keynote for my motion audits but Google Docs or spreadsheets, also work well. Pick whichever format is easiest for you to share with your team.

For each animation note the purpose of the animation, the properties it animates, a description of the effect, and the personality it conveys (the feel of the animation).

Group the animations by their primary purpose.

This is the fun—and often most revealing—part. You might end up with groupings like entrances and exits, state changes, content reveals, emphasis, and similar things. Try to really consolidate your animations down to as few purpose-based groups as logically possible. This makes it harder, but also helps to reveal the core patterns in how you use animation. Everyone will have slightly different groupings depending on how their product uses animation. The goal here is to identify trends and patterns.

Evaluate the common traits in each grouping of the animations you've collected. Note durations and easing curves used for the animations. Is there a common easing curve that is used across most of the animations? Is it one that fits the personality of your product? Are you using too many different easing curves arbitrarily? Could they be consolidated or streamlined for specific purpose instead of being arbitrary?

You may find, for example, that the animations used for directing attention employ a more dramatic or eye-catching style of easing than your other animation categories. Or you might find that there are specific sets of properties that are animated in all your state change animations. These are the kinds of patterns you'll want to solidify in your motion guidelines. Here's a starter spreadsheet template you can use to get you started on your motion audit (bit.ly/motionau-

ditsheet).

But what if the results of my motion audit aren't so great?

Sometimes when you take a step back and look at any specific aspect of your product you realize that what's currently there just isn't working. In those cases you absolutely can decide to start defining a whole new, and more fitting, approach to animation for your product. Deciding to start over with a whole new approach to animation might be a tougher sell, but if it's what needs to be done, go for it.

Next up

Now that you've got a good idea of where you're starting from and which issues your guidelines need to address, it's time to start defining the motion principles for your design system. That's coming up in the next chapter!

3 Defining Your Motion Principles

Let's start with the big picture thinking and work on defining your motion principles first. Motion principles are high-level guidelines to measure design decisions around animation, as well as a place to state some specific definitions or values around animation. Principles often focus on the 'why' of using animation within a particular design system and the UX-driven purpose animations serve. In many cases, design systems list these under the heading of Principles in their motion section.

Why create motion principles?

To make your animations work as a system, they all need to have some common ground. Establishing these patterns ensures your

animations share a common message not only with each other, but with the rest of your design efforts. Defining what your design system wants to say with motion gives you the 'why' of your motion guidelines – the higher-level concepts that represent the common traits you want all your animations to share.

These become a design system's motion principles, which will act as a guide for how motion is used within the system as a whole. They should cover, broadly, both the purpose(s) for using animation and what sort of emotion these animations should convey. This is a great starting point for getting animation into your design system because it gives the whole effort direction, and because it requires both conversation and exploration, both of which are useful for getting buy-in and building understanding. Once you define your motion principles, you can use them to focus your animation efforts into a cohesive system and even to evaluate future designs.

How to create your motion principles

Your motion principles can be modeled after your brand's existing global design principles, extrapolated from things like voice and tone guidelines, or even be inferred from finding patterns in your product's existing UI animations in a motion audit (as covered in the previous chapter). You can also use a combination of all of the above if you have strong examples to work from in all those categories.

We've already talked about motion audits, but let's look at some examples of creating motion principles from the other two sources.

Translating global design principles to motion principles

The same principles that you use to guide the overall design of your product can be tailored to apply to motion as well. For example, an overarching design principle of:

> *"We Simplify: Building something simple is anything but. So, we're honest about our impact on people's lives. We respect their time and spend every waking moment of our day making things sim-*

pler."

(Example taken from bit.ly/designprinciples2)

Could be translated to a motion principle of:

> *"Simple: We use motion that is clear and to the point with simple, easy-to-follow actions that do not distract from the primary task."*

Sometimes your existing brand guidelines might already mention motion, in which case you can use these as your motion principles, or as one of your motion principles for consistency. For example, a design principle like the below easily translates to a motion principle:

> *"Conversational: Our use of motion breathes life into our products, and allows us to communicate with users in easily understood ways."*

(From bit.ly/designprinciples1)

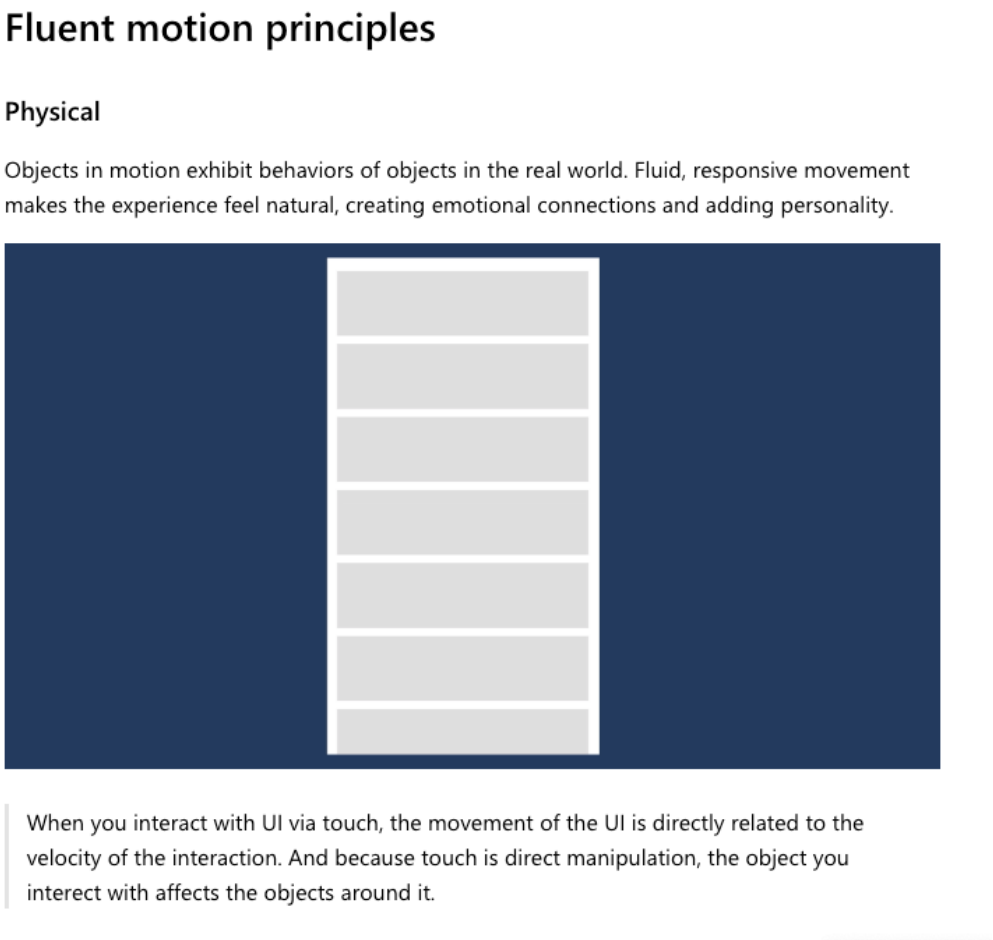
Looking at brand descriptive documents like Voice and Tone guidelines or similar may also help inform your brand's motion principles. The content in those may be a bit more removed from overall design principles, but you can connect some dots between the overall personality and tone you want to convey and the role motion should play in conveying that message.

Examples of motion principles in other design systems

Now that you've got an idea of what your motion principles might be, let's look at some examples of motion principles in other design systems to get a better idea of how these play out. Not every brand handles them the same way. Some call out their motion principles specifically, while others fold them into their design system overall.

Microsoft's Fluent design system (bit.ly/fluentuwp) lists its motion principles as being physical, functional, continuous, and contextual. They include a short

description and illustration of each to explain how it applies to UI animation.



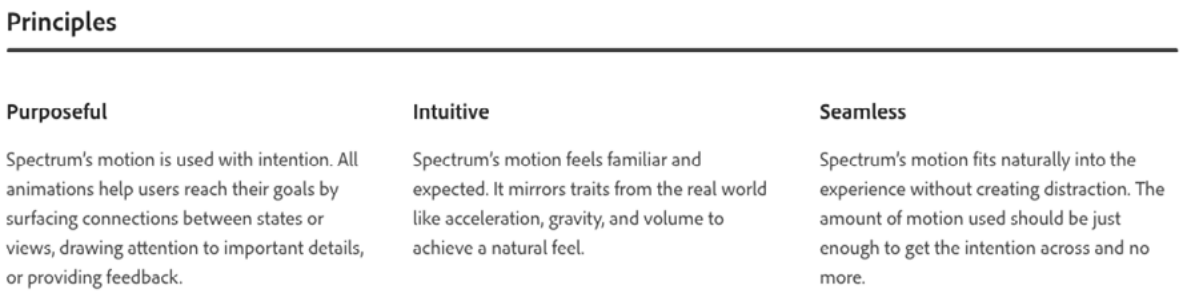
A segment of Fluent's motion principles page.

Audi (bit.ly/audianimation) doesn't have a separate principles section, but they start off their animation section with a declaration of why they use animation. This sets the stage for what sort of motion is to be used in the design system, just like a principle would. Audi states:

> *"We stand for dynamic premium mobility. As such, movements in the Audi look have a typically dynamic character."*

While developing the motion section for Spectrum (adobe.ly/spectrum), Adobe's design system, the motion principles were modeled after the patterns of

the other sections of the system. Within Spectrum, animation aims to be purposeful, intuitive, and seamless.



Spectrum's guiding motion principles for UI animation.

No matter how you decide to present them, your design system's animation principles can be used to establish the system's expectations around animation. They can also be used to evaluate potential future UI animations for the corresponding product(s). For example, if a designer following the Fluent design system wanted to introduce a large bouncing animation into a component, there could be discussion around whether that meets the motion principles (does it fit the principles of functional and continuous?). Then a decision could be made as to whether or not that particular animation warrants breaking from the stated principles, or if the animation should be redesigned to fit the principles.

This helps to steer the design discussions away from the "do you like it?" or personal opinion realm and gives a structure for evaluating animation in a more pragmatic design-oriented way. This is my favorite advantage of establishing declared motion principles; they make discussing meaningful animation so much easier, even for people who don't have a lot of animation experience.

For more motion principles references, check out Photon's motion principles (bit.ly/photonprinciples), Material Design motion principles (bit.ly/materialprinciples), and Carbon's motion principles (bit.ly/carbonmotion). It's interesting to compare and contrast these different design systems and how they present their motion principles in the context of each system.

What makes a good motion principle

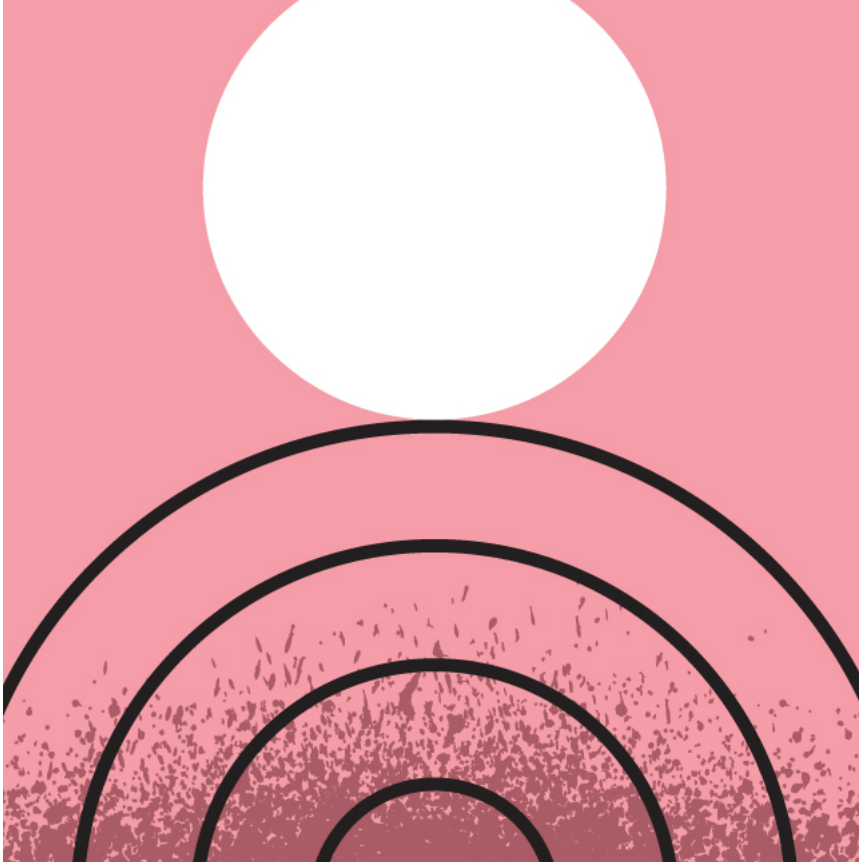
As you can see from the examples above, there's no one single way to do motion principles. The number of principles you have and how you articulate them in your design system can be customized for your team's needs. That said, there are some key things to look out for to make sure you've created solid motion principles.

A strong motion principle should be something that it's easy to say the opposite of. For example, if one of your motion principles is "motion should not be distracting," this principle holds up because it has an opposite: motion that distracts users from their current task.

Strong motion principles should also be objective. You'll be using these to guide what sort of animations your design system will have, and at times you might even be using them to judge if a proposed new animated interaction fits with your system's principles. Having a principle like "all motion used should be good motion" likely isn't objective enough because it's hard to define what "good" means here. On the other hand, a principle that states something like "animations support UX by helping users achieve their goals" is more objective. It would be possible to have a conversation about, and come to a conclusion on, whether or not a particular animated interaction helped users achieve their goals in a particular flow.

Next up

Motion principles take care of the big picture definitions that you need to guide your motion work, but we also need to define some of the more specific implementation details of how to pull those off for a more well-rounded set of guidelines. We'll look at defining your animation building blocks next.



4 Defining Your Animation Building Blocks

Motion principles are great for some high-level guidance, but without some details on exactly how to implement them, you'll be missing the biggest time-saving benefits of including animation in your design system. The implementation section (though rarely actually titled as such) answers many of the 'how' and 'what' questions your team might have around animation.

The objective is to provide smart defaults for anyone following the design system. That way, instead of spending ages playing around with durations and easing for every animation, they can

use the smart defaults you've provided in the guidelines to accomplish tasks faster. It's a huge timesaver that also makes your UI animation much more consistent across the board.

The implementation guidelines are where a lot of design systems diverge in their approach. The amount of detail you include and the topics you cover in these guidelines will depend on how big of a role animation plays in your design efforts and your team's exact needs. For example, Photon's (bit.ly/photoneasing) implementation section includes just one duration and one easing curve, while Material Design's (bit.ly/materialduration) section includes individual sections on duration and easing as well as additional pages full of implementation details.

There's no perfect length for a motion section; it's more about covering the details your team needs, rather than hitting a specific number of pages or rules. Some of the animation building blocks to consider including in your motion guidelines are:

- Animation durations
- Animatable properties
- Easing values used

These are the main ways we customize or style animation. Variations in the properties, durations, and easings used for animation can drastically affect how animations come across.

Let's dig into each set of guidelines in more detail, and for each I'll point out some common best practices and where there's room for your own customized interpretation.

Durations, ranges, and rhythm

Duration describes how long animations should be, and when we're talking about UI animation, these values tend to be very short; it's amazing how much information we can convey in fractions of a second! This is a key aspect of ani-

mation and every design system with motion guidelines covers it, but they do it in a variety of ways.

Common best practices

Some of the best practices around duration that you'll see addressed in most motion guidelines include:

• Shorter durations should be used for simpler effects and relatively small-sized animations (such as fades or color changes);

• Longer durations should be used for more complex effects and larger scale animations (such as page transitions or moving objects on and offscreen);

• Optimal timing can change based on viewport size.

While the specifics of each set of guidelines vary—sometimes even greatly—you'll see these common best practices in almost all of them. Different systems have different definitions of exactly what 'short' or 'long' durations are, and go into varying amounts of detail on the difference between the two. Also, while it's more of a design system thing than an animation best practice, providing design tokens for your specified duration values is a useful thing to consider here as well.

Implementation examples

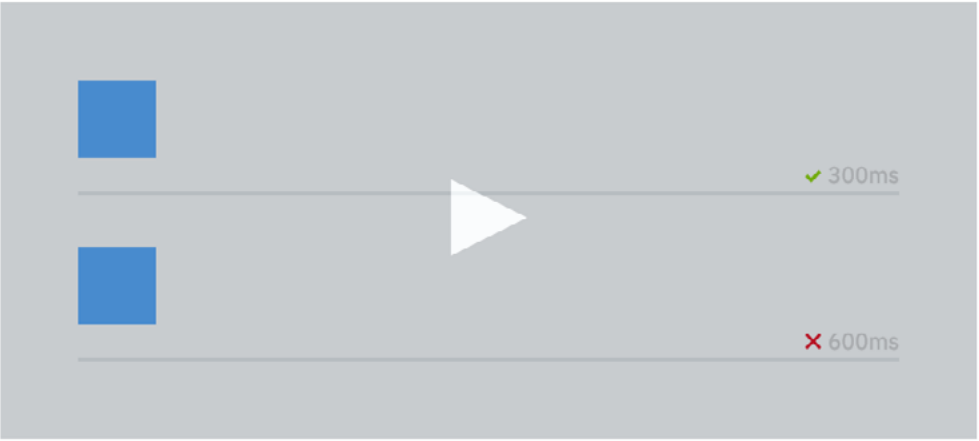
Carbon (bit.ly/carbonmotion) provides a short table of ranges of duration values based on the type of animation in question. Contrast that with Material Design (bit.ly/materialduration), which breaks down recommendations on duration speed in categories based on the complexity of the animation, as well as by the relative area covered by the animation. Pluralsight (bit.ly/pluralsightmotion) takes a different approach altogether and provides a set of keywords for different durations paired with cute animals.

Speed

Motion speed should most often occur at the following standard increments.

EXTRA SLOW	SLOW	NORMAL	FAST	EXTRA FAST
500ms	**400ms**	**300ms**	**200ms**	**100ms**
psMotionSpeedXSlow	psMotionSpeedSlow	psMotionSpeedNormal	psMotionSpeedFast	psMotionSpeedXFast

Pluralsight's design system lists durations, animals, and design tokens for each of its duration options.



Type	Duration
Buttons/small components	100-200ms
Alerts/table reorder	250-300ms
Panels/modals	300-400ms
Page transitions	500-700ms

Carbon's illustration and table sorted by interaction type give guidance on what durations to use for UI animation within the system.

Easing values

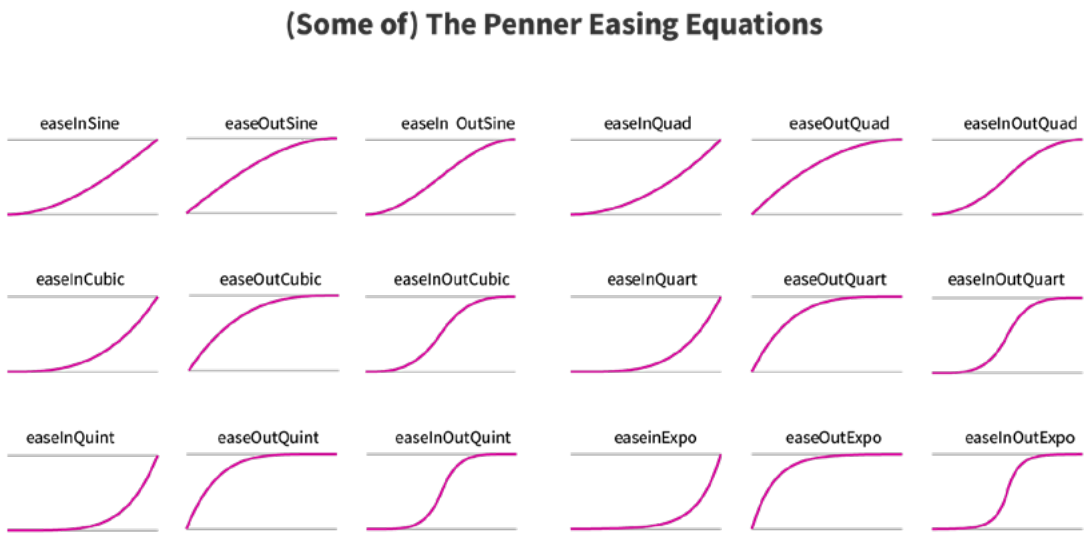
Common best practices

My top advice for easing guidelines is to create your own customized curves and not just use the CSS defaults for your animations. This is the most effective way to build some consistent motion association for your brand and, as Sarah Drasner puts it, build "motion equity." (bit.ly/motionequity) You'll be on solid ground with just three curves: a custom ease-out, ease-in, and ease-in-out. And there's always the option to add more if needed.

Of course, there are times when it's best to follow native operating system standards or defaults for certain OS specific components that are animated. But there are also many cases where you're creating custom components or interactions, and that's where your custom easing choices can shine.

Quick Tip: Penner easing equations as a starting point

If you're totally stumped on where to start on easing curves, check out the Penner Easing equations on easings.net. These are designed to give you some nice looking motion and are grouped in threes for easy use. They're much more expressive and flexible than the CSS defaults. Using a set of these in your motion guidelines can be a great place to start.



A few of the Penner Easing Equations illustrated as cubic-bezier curves.

Essential easing functions

I recommend defining the three core easing curves because that will cover all your main easing needs for various animations:

Ease-in

This curve is the one that accelerates as it begins any movement. It reads well for moving an object out of view.

Ease-out

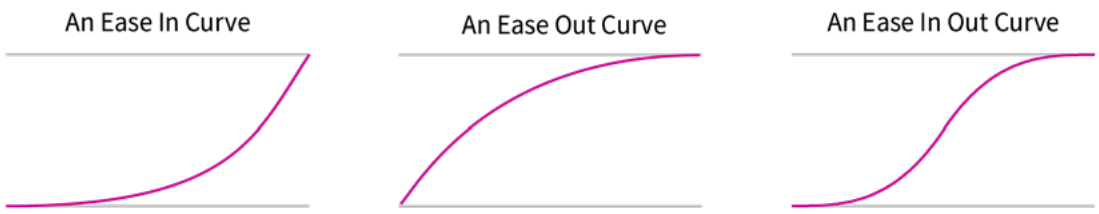
This curve causes objects to decelerate before stopping, which makes for a more natural way to bring objects into view.

Ease-in-out

As the name suggests, this curve combines the features of the first two and is

best for moving elements from point to point.

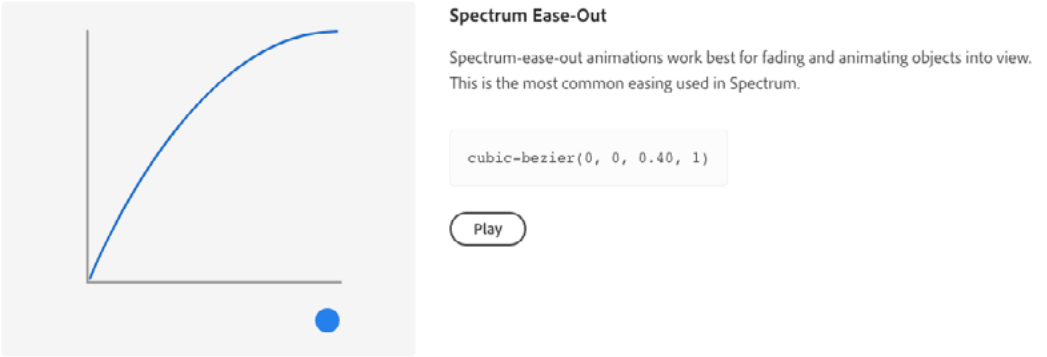
With these three custom curves, you'll have almost all your animation needs covered.



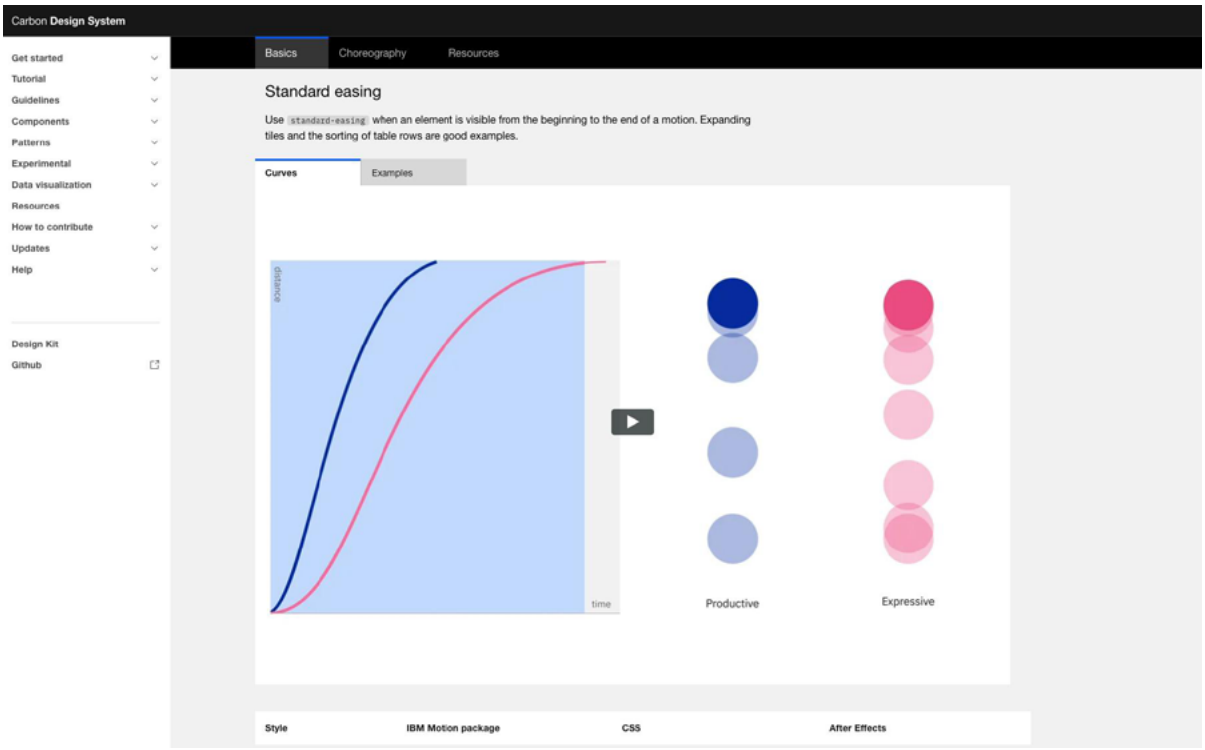
Most motion guidelines include these three main types of curves.

Implementation examples

For Spectrum, three custom easing curves were created, along with recommendations on which kinds of animation to use for each (these curves were developed by looking at existing animation and experimenting with some motion studies). Carbon (bit.ly/carbonmotion) and Pluralsight (bit.ly/pluralsightmotion) take a similar approach, designating three curves with suggested uses, as well as designating one as the default curve to use when in doubt. In some cases, you might only feel the need to have one custom easing curve, like Photon (bit.ly/photoneasing) does, defining one curve for use across all animations.



One of Spectrum's three custom easing curves.



Carbon's standard easing curve details.

Along with the easing curves, it's helpful to provide some supporting information like associated design tokens, language-specific code (for CSS, JS, iOS, and/or Android), or After Effects keyframe velocities depending on which tools your team uses. This adds to the ease of use and helps make following smart defaults in your motion guidelines the path of least resistance.

It's also a big plus to include a visual illustration of the curve and interactive examples. This helps you quickly demonstrate how the easing curves work and what they look like. Never underestimate the power of showing instead of telling (or, better yet, showing along with telling!)

Easing hierarchy

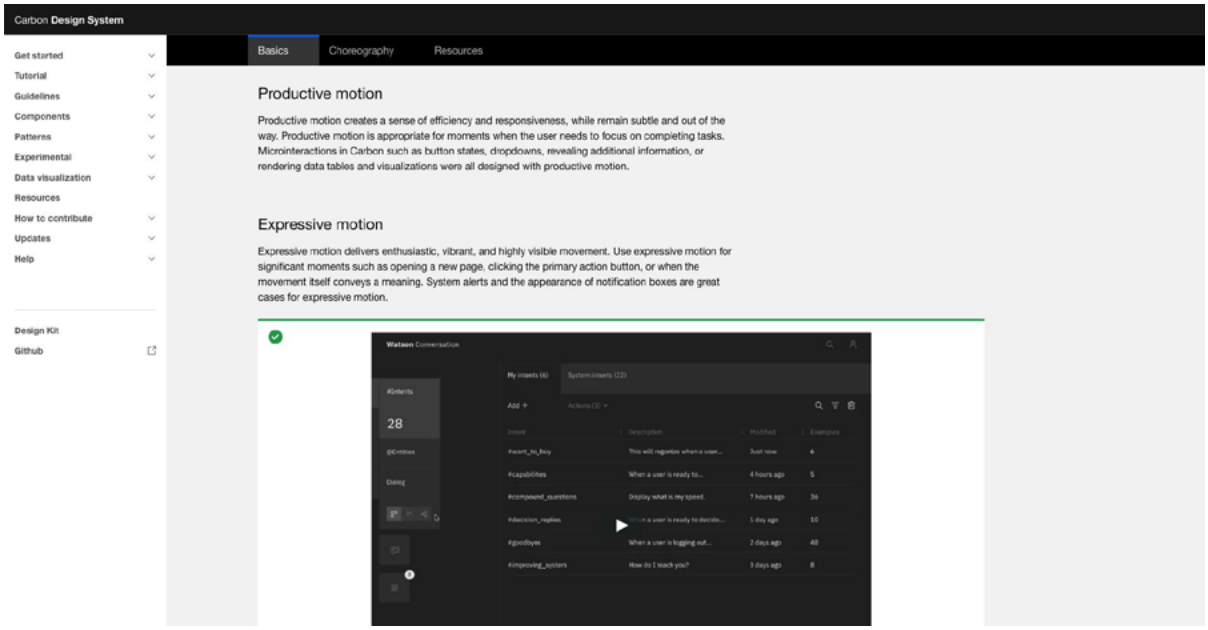
Including a hierarchy of easing is one way you can take things a little further than the three core custom curves. This can be especially useful for brands that use motion as a core method for conveying their design message. Just like with type, you may want to determine a way to make certain animations stand out

more than others. Animations that stand out more strongly can be used to emphasize a particular point or interaction. In these cases, structuring your easing curves so that you have one that is more dramatic than others can be a useful technique.

Different easings for different types of motion

When looking where you're using UI animation, or where you plan to use UI animation, you might notice that you have distinct contexts for your products that require a different approach to animation. For example, your product itself might be for productivity tasks like tracking financial transactions, but you also use animation in your onboarding and marketing communications. Animation that works well for the onboarding and marketing contexts, may not fit well with the productivity context. In cases like this, it can be helpful to delineate different motion guidelines for each of these main contexts.

IBM's Carbon design system is a great example of this. In it, a distinction is made between productive motion and expressive motion. Each category has its own recommended easings and durations and Carbon also provides descriptions of each context to be clear on when each applies.



Carbon's description of the productive and expressive easing categories.

Defining your brand's custom easing curves with motion studies

Using the default easing curves for your platform or animation library is certainly an option. But if you're going to the trouble of setting up a design system, having custom easing curve definitions that fit your brand personality will make your system much more unique and impactful. Easing curves are a part of design systems that have a lot of room for expressing your brand's point of view. It's a best practice to use them, but the exact curves are up to you.

Setting up a motion study

The way I recommend doing this is to create a small collection of motion studies to narrow down which types of easing seem to best emulate your brand personality in a simplified motion case. A motion study can be done in almost any tool—CSS, JavaScript, After Effects, etc. All you need to get started are some simple shapes (I like to use circles) and a short list of brand attributes you want to convey with your easing choices. Add some simple animations to your shapes—I usually go with a fade, a scale, and some point-to-point movement. Then, ex-

periment with the easings on those simple animations to find a custom set of easing curves (ease-in, ease-out, ease-in-out) that have a vibe that matches your brand attributes. Here's a starter CodePen example (bit.ly/motionstudystarter) you can use to make your own motion study.

Narrowing down your brand attributes

Every brand has words or traits it uses to describe itself, or a specific sort of personality it wishes to project. You can use these as a starting point to inform your design system's point of view on motion. You might find these in your branding guidelines, experience pillars, design principles, or other similar materials. By defining these brand attributes, your animations will say something, and your work will be stronger since you'll be planning intentionally.

Voice and tone guidelines can be an especially useful place to start for defining your brand's personality. The same traits your brand is trying to convey with written words can also be conveyed with animation. When both your content and your design align, your messaging becomes that much stronger and clearer.

I find that a group of three attribute words is a good number to work with. This is just the right amount to help focus your efforts without becoming overwhelmed with possible options.

Let's look at an example: Intuit has a nice and concise voice and tone documentation (bit.ly/harmonyvoicetone) as part of their Harmony design system that I'll use as an example. In it, they outline three main traits for their voice and tone, along with a list of supporting characteristics for each. That list of supporting characteristics make a great basis for some brand-specific motion exploration.

Three of their supporting characteristics are "friendly, charming, and clear." To embody concepts like friendly and charming in motion, you could use easing that employs some follow-through or overshoots to convey a heightened sense of energy and friendly appearance. Even when this is applied to a simple circle, you can start to see the friendly feel with just a touch of extra bounce, while the straight line of the action keeps the motion clearly defined. This kind of motion

can fit well with a moment when you want to say something like “Good for you! You’ve balanced all of today’s transactions!”.

Motion studies are a great way to focus in on designing animation details in a relatively short amount of time. Once you have some easing and animation styles that work well in your motion study, you can apply them to prototypes for further exploration to see how they look in context.

While some additional prototyping and exploring would still be necessary for resting and refining the exact easing and timing standards, rooting your motion guidelines in your brand’s personality and goals gives those guidelines context and meaning. Instead of just using default easing keywords from CSS or an animation library, you’ll be using easing that gives your design system a point of view that will differentiate it from other projects.

Just like other design elements, like type and color, the meaning derived from motion is somewhat contextual and subjective. There isn’t going to be one true, correct answer for exactly how your brand should exist in motion, but there will be many possible answers. You get to choose which combination of attributes is right for your brand.

Bring the team in early

Don’t forget to include other key team members or colleagues in your animation exploration along the way. You can show them prototypes based on your motion studies during design critiques or design discussions to gather feedback and iterate further. The more you involve others in the process, the more likely they will buy-in to the final results; everyone likes to be heard, and your colleagues have valuable insights into your brand and its personality too. Sharing your work along the way is a win-win.

You’re off to a good start

At this point, you’re armed with animation principles plus your durations and easing sections, and you have a solid set of motion guidelines in hand. That

might be all you need for a version one of your motion guidelines, or if you're designing for a brand that doesn't rely heavily on motion in its design. If you're pressed for time, establishing smart defaults for durations and easing will get you far enough to see the benefits (and time savings) of establishing motion guidelines and save your team time.

Quick Tip: Finding more examples

If you're looking for additional motion guidelines for research, Adele (bit.ly/adelelist) is a design system collection that lets you filter by topics like motion, and styleguides.io is always a great resource for finding public design systems too.

Next up

If you're looking to add a little more to your animation guidelines, or thinking ahead to what you might want to include in the next iteration, the next chapter covers some other possible topics to address in your motion guidelines.

5 Taking It Further

If your design system uses motion extensively in your design style, it can be useful to include some more detailed direction on how to use motion in your guidelines. Not all design systems need to have all of these additional motion guidelines, and you might even find that there are other things specific to your product and your design system that you want to include. It all goes back to making guidelines that will help your team in their work. Here are a few options to start with.

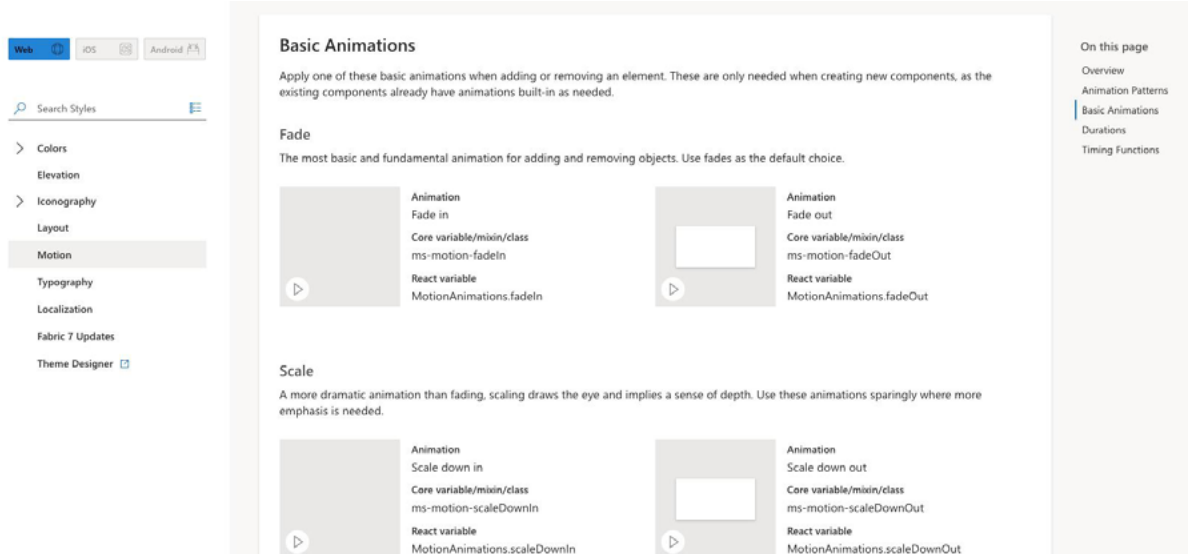
Named effects

Providing a list of named effects or a library of animations to use can be a useful thing to have in your motion guidelines. Not all design systems' motion guidelines have these; some opt to bake the animation guidelines into their components instead (or as

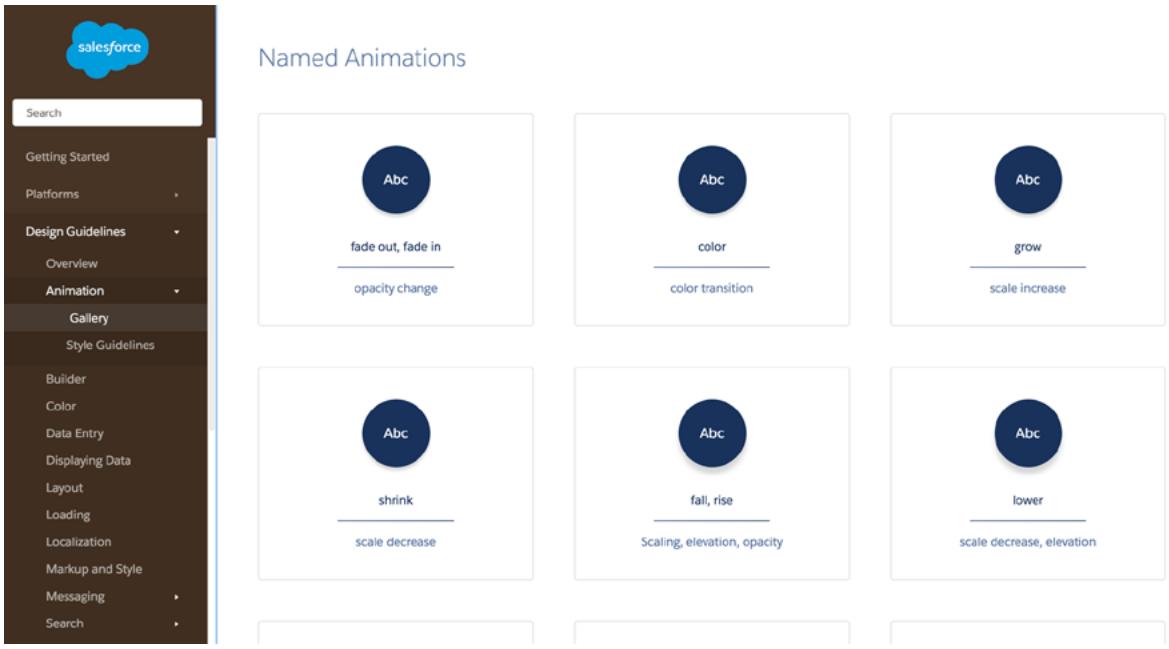
well), and some just don't need this level of detail. This is one of those areas where you can decide if including these will be useful for the folks using your design system. And this is also something that you might decide to add in a version two or beyond while iterating on your motion guidelines over time.

One word of caution on these though: more isn't always better. It might look cool to have a huge library of animations as part of your design system, but the more effects you list, the more time and effort it will take to maintain those effects. To avoid creating a huge time-sink for you and your team, I'd suggest making any collection of named effects as small as you possibly can.

There tend to be two approaches to providing a library of effects in motion guidelines. One approach is the way that Fluent (web) (bit.ly/fluentweb) does it, providing a library of small animation effects (molecules of animation, if you will) that can be used individually or composed together to build up more complex animations. Each animation is named and variables are listed to invoke each of them, along with a preview of what each looks like for easy recognition and implementation (previous iterations of Lightning design system took a similar approach as well).

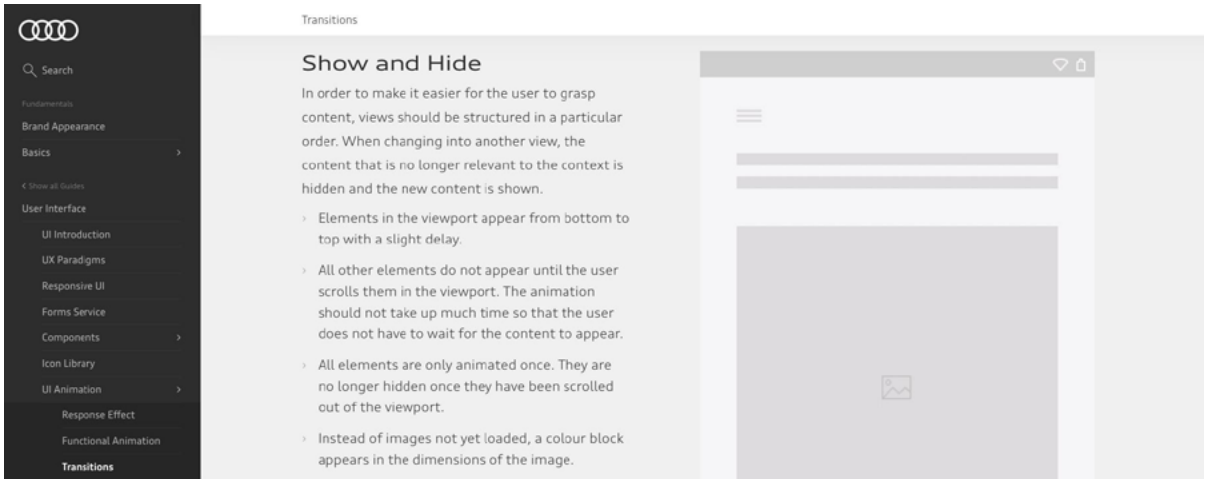


Fluent's basic animations for their web implementation serve as a library of named effects that can be easily accessed and implemented.



The Lightning design system's previous named animation library.

The other approach is to provide more comprehensive and purpose-driven effects, like Audi does for its [show and hide, transform, shift, and superimposing effects](bit.ly/auditransitions) (bit.ly/auditransitions), and Fluent (Windows) does for its [page transition effects](bit.ly/uwppagetransitions) (bit.ly/uwppagetransitions). For either approach, providing the design rationale and specific code implementations for each is useful.



One of Audi's specified animation effects.

Choreography of multiple animations

If you use a significant amount of complex animation, or have multiple instances where multiple elements are in motion together, establishing guidelines around choreography will be helpful. Choreography comes into play any time more than one element or property is animating because that requires making decisions around how those properties or elements will animate relative to each other.

Common best practices for choreography

Choreography guidelines can vary drastically from one product to the next depending on how each brand is expressing its message in motion, but there are also some good general best practices.

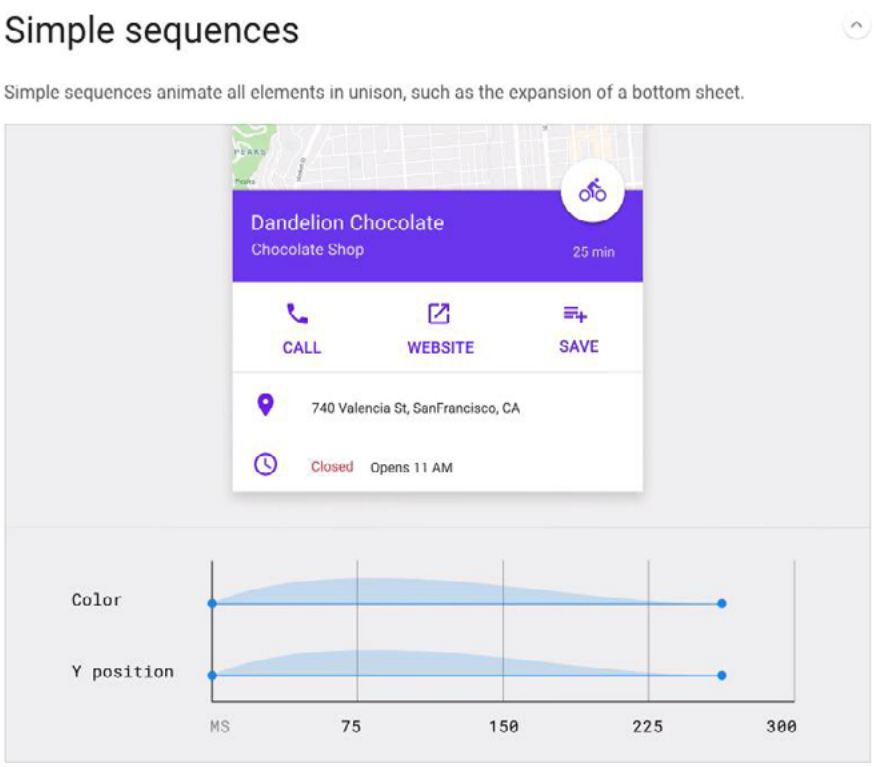
Entrances should inform exits

While there's no rule saying all elements must leave the screen the same way they came on, having a logical plan in place for how elements enter and exit provides a solid foundation for your choreography. For example, if an element appears into view by animating from the bottom, and then returns to the bottom of the screen when it exits the view, that reinforces the spatial idea that the element 'lives' just out of view below the screen. Using entrance and exits to establish spatial orientation like that can make the overall experience feel more consistent. Whatever your entrance and exit animations might be, having consistent logic to how they work will go far in creating a UI that feels easy to navigate around.

Sequencing

If you often have multiple elements moving at the same time in your effects or components, having some guidelines on how these should be sequenced can be helpful. For simple sequences it often makes sense for all the animating properties to start and end together. But for more complex sequences—especially ones where some elements are leaving the view and others are entering—it might be easier to follow the action if some animations happen before others

start. Also, including some points around how to handle the continuity of elements that persist on screen throughout a transition can be very useful. The way elements move in and out of view during times of transition can make the difference between a transition that's confusing and one that leads the user's eye through in a logical way. Material Design's motion section provides some good examples of how to present sequencing guidelines and Carbon's guidelines on continuity provide a good reference as well.



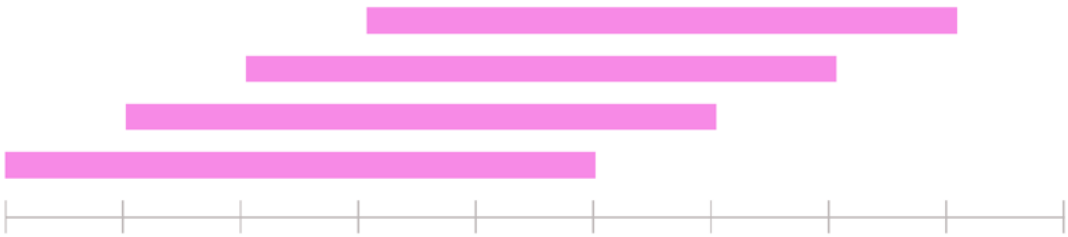
A segment of Material Design's sequencing guidelines.

Overlapping action looks more organic

Overlapping action (or staggers) is very much related to sequencing,and honestly could fall under that same heading, but I wanted to call it out specifically. It's a great way to add more organic feel when you're animating multiple objects at once and can also help to reinforce the elements' relationship to each other.

Achieving overlapping action is pretty easy too. All you need to do is add a bit of delay to each subsequent item in a group of animating items to offset their action by a small amount. Instead of having a group of objects all wait for the one before it to finish before it starts its motion, have each start slightly after the other to overlap the action.

Including guidelines around when to use overlapping action and what amounts of delay to use between items can help ensure the technique is used consistently throughout your product.



A figurative timeline showing four objects' motion offset slightly in time to create some overlapping action.

Consider the path of motion

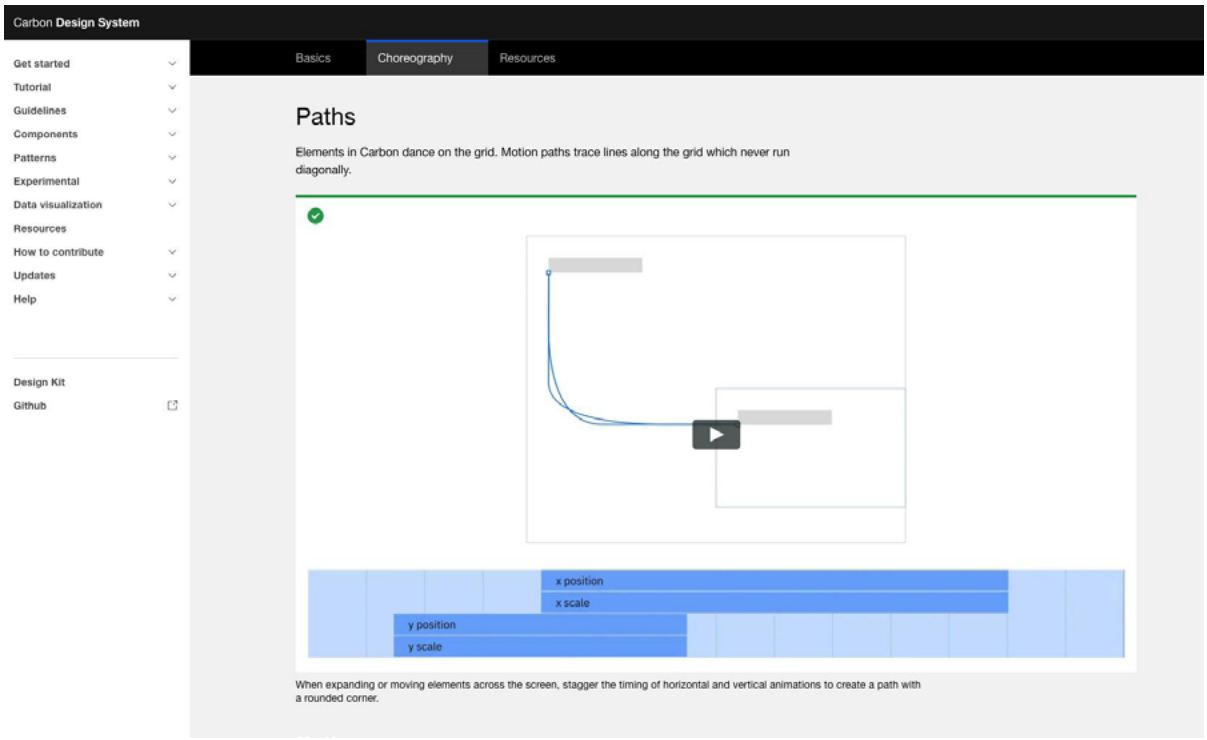
Elements moving from one place to another on screen can take a variety of ways to get there. By default, most of our tools will move the object in a straight line, but it is also possible to animate objects on curved or arched motion paths.

If you often have elements moving from place to place, defining guidelines for these motion paths—if they should be straight lines, what shape of curve they should follow, if motion paths may intersect, etc.—will have a significant impact on how cohesive the overall experience feels.

In general, curved paths of motion tend to feel more organic and are visually softer, while straight lines of motion tend to feel more efficient or urgent and are visually more harsh. You'll want to pick an approach that fits best with your

content and messaging.

IBM's Carbon design system does a good job of noting this in the Paths section of their motion guidelines where they say, *"Elements in Carbon dance on the grid. Motion paths trace lines along the grid which never run diagonally."*



Carbon's guidelines on motion paths in their motion choreography section.

As I mentioned above, choreography isn't something that all design systems cover, but it can be very useful for design systems that use a good bit of animation. Currently the best public design systems to use for reference on choreography are Carbon and Material Design. Both address choreography differently for their different needs, but you can learn a lot from reading each to help guide you in creating your own custom choreography guidelines.

Motion and design tokens

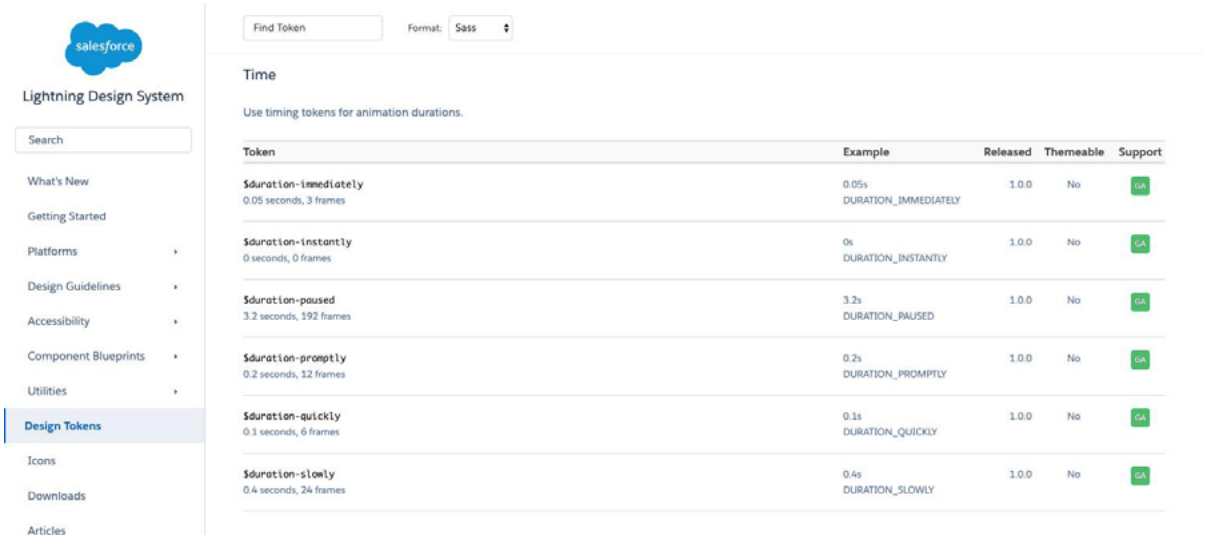
Design tokens are a way to denote common design variables across platforms in a central way. While not every design system uses them, if yours does, you'll

want to include motion-related tokens as well. As Jina Anne describes them:

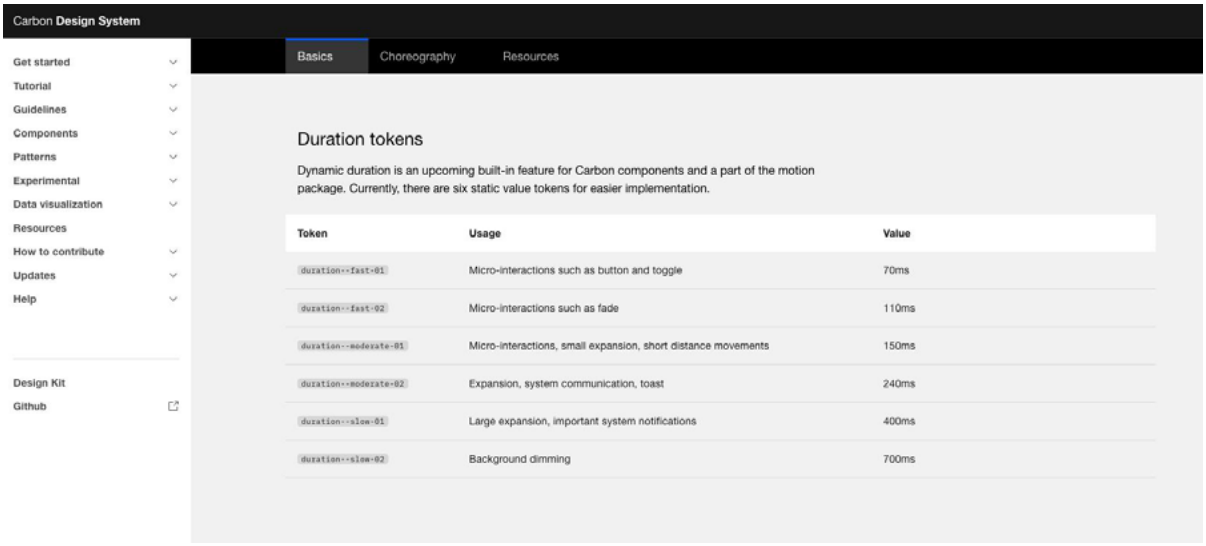
> *"With design tokens, you can capture low-level values and then use them to create the styles for your product or app. You can maintain a scalable and consistent visual system for UI development."*

This makes design tokens very useful for large or complex systems; they can be used as a single source of truth for your animation building blocks.

The building blocks discussed in the last chapter are types of animation details that lend themselves to being tokenized. For example, creating design tokens for your durations and easing curve definitions would be very useful indeed. You can find some examples of how motion details have been translated to design tokens in the Carbon design system, as well as Lightning design system, and others.



Lightning design system's timing tokens.



Carbon's duration tokens for animation timing.

To learn more about design tokens and their role in design systems, check out this course (bit.ly/jinadesigntokens) from Jina Anne. It's a great starting point.

Wrapping up

I hope this book has helped show how including motion guidelines in your design system can be incredibly useful, and I hope the chapters above have helped to demystify the process of creating one as well. Addressing animation in your design system can have a positive impact on the overall consistency of your product's design, and it doesn't have to be overly time-consuming.

As you're working on your motion guidelines, I encourage you to work in stages instead of waiting for your motion guidelines to be perfect. Shipping a version one with the intention of adding to and updating is much easier on you, the person or people authoring the guidelines, and can help you make sure you're creating guidelines that are useful.

As hard as it can be to share something that you know is missing some detail, it can be very useful to ship a version one of your motion guidelines and then talk to your team about them. This helps you see how the first version of the

guidelines has helped them and which pain points are still a factor. This iterative approach can go far towards making your guidelines cover the most relevant topics, and lets you adapt them to your team's needs. Both are good for having a system that's useful, while also avoiding unnecessary extra effort.

Good luck with all your motion guideline efforts. I'm excited to see how you incorporate motion into your design system and I'd love to see what you come up with. Find me on Twitter (twitter.com/vlh) and show me what you've created!