



Executive's Guide to Composable Architecture

M

MICROSERVICES



A

API-FIRST



C

CLOUD-NATIVE



H

HEADLESS





Introduction

One of the most impactful recent developments in the digital experience space is the formulation of a composable microservices-based, API-first, Cloud-native SaaS and headless architecture (MACH) and the subsequent MACH Alliance.

The creation of MACH as a business strategy could not have arrived at a better time. The need to deliver the right information, at the right time, throughout the entire customer journey, and at every touchpoint, along with the speed of digital innovation has created an environment in which the digital experience must adapt at the same pace as customer expectations and behavior.

Balancing the demands of the marketplace and consumer expectations while adapting the latest and greatest technological innovations in order to stay competitive is no easy feat. Just as difficult is transitioning off aging monoliths with their massive codebases.

This ebook is an attempt to address the issue of MACH adoption from both directions; as a net-new approach to building an agile, composable structure or bringing your digital experiences into the present and future-proofing them at the same time.

Cloudinary is proud to be a member of the MACH Alliance and continues to develop microservices-based, API-first, headless architecture that furthers our mission to integrate with thousands of other platforms and services and is unleashing the potential of the visual economy.

I hope you find this ebook informative and useful.

Best,

Tal Lev-Ami
Cloudinary Cofounder & CTO

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CHAPTER 1

Composable Architecture: Everything you need to know but didn't think to ask



Written by Gary Ballabio

Gary Ballabio serves as Cloudeinary's VP of Technology Partnerships where he helps manage the company's integrations and go to market strategies. Gary has over 20 years of experience in the digital media industry focusing on solutions for the high-tech, media & entertainment and e-commerce verticals.

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Preparing rich media assets for the web requires a lot of time and effort mainly because every asset needs to be adapted and manipulated to fit all modes in which that media will be delivered and consumed. When working at scale, the amount of time invested into visual media manipulation is significant, consuming a considerable chunk of your limited development time.

Generally, when establishing a technology ecosystem, organizations either lean on digital suites or develop a digital infrastructure in-house, meaning their architecture will be tailored to — and created in response to — their challenges.

The problem with digital suites and in-house digital ecosystems is they are expensive and the time associated with developing architectures from the ground up is significant.

The larger your organization, the more time and money it takes to develop an architecture. To get around creating an architecture and rich media manipulation solution, some organizations outsource the work to multiple vendors.

Outsourcing may seem like a good idea until you consider:

- What products are currently in your development stack?
- What products are you hoping to use?
- Do they integrate with your current stack?
- Do the new vendors you hope to work with integrate with the other new vendors you're working with and are they compatible?

Enter composable architecture.

A composable architecture puts an end to vendor lock-in by using APIs and other flexible tooling that enables you to scale your entire development stack more easily and avoids complex integration issues. And, when working with all media delivery, a composable architecture you can work with all kinds of tools, reducing the amount of tedious, complicated, or time-sensitive media tasks that presently saddle your team.

Let's explore what composable architecture is, its benefits, and how it can make media creation and sharing easier.

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Why Composable Architecture Matters

Before diving into what composable architecture entails, let's discuss why it's important.

Let's say you want to automate your image and video delivery process. To do this you use a workflow automation tool from Vendor A. You've been working with Vendor A for a while, so you're comfortable and familiar with the tool. But as your organization's goals expand, you'd like to introduce additional functionality into your workflow, for example, using AI to transcribe your video content.

You want this to occur automatically within your current workflow, so you look for tools that are compatible and complement the automation tool you have from Vendor A. Finding a transcription tool from Vendor B is challenging, as vendor lock-in with Vendor A limits the number of tools you could potentially integrate.

You're stuck.

Managing dependencies among several vendors is not easy. Especially as your organization expands, making integration challenges more complex. By the time you have discovered that your vendors' products don't speak a common language and are not compatible in other foundational, functional ways – making them hard (or impossible) to integrate – you could find yourself introducing new tools altogether, which translates to more cost, greater time to market, lost revenue.

“The reason it is called a modern, composable architecture is because it helps you support the future. Monolithic solutions have lived their lives and everyone is moving away from them. They've had their 5-10 years. A composable architecture will give you 10, 15, 20 years down the road, creating the ability to help you evolve to support VR, AR and 3D which brands need to be successful in the future.”

Jon Panella
Group Vice President
Global Commerce Alliances & Strategy
Publicis Sapient

The Composable Architecture Difference

Composable architecture to the rescue! With composable architecture, each component used during your development process is pluggable and can be replaced, scaled, and consistently improved to help you meet your business needs. When establishing composable architecture, each component of your development stack and microservices should be able to communicate regardless of differences in language or code.

Composable architectures eliminate managing dependencies and enable you to avoid vendor lock-ins, freeing you up from costly investments in time and effort in integrating multiple services.

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Composable architectures are based on the foundational principle of **API-first**. APIs ensure applications work and pair well with microservices and other APIs, which might operate on different code or with a different language. They provide open pathways and open communication lines between each application in the stack.

Benefits of Composable Architecture

Composable architecture offers developers significant benefits, including:

- **Bring products and experiences to market faster.** A microservices-based approach enables developers to use agile development methodologies.
- **Speed up creation and delivery times.** Composable architectures support automation and orchestration so that massive visual media collections can be managed and optimized using AI and SaaS automatization solutions.
- **Encourage reusability.** In the early days of the web, app-to-app communication could only be done with custom direct TCP connections. There were no standards for app-to-app integrations which meant you had to customize build for each app you wanted your app to talk to. Composable architectures' components are reusable.

- **Reduce costs.** Reusability of components built for composable architectures significantly lowers initial development costs.
- **Boost flexibility and avoid vendor lock-in.** Composable architectures are language agnostic. New tools can be easily integrated into your existing technology stack and can evolve using widgets, APIs, SDKs, and pre-built integrations.
- **Scale up fast to capitalize on growth opportunities.** Composable architectures are extremely flexible, allowing developers to expand services quickly and be more responsive to market changes. Because composable architectures are language agnostic, new APIs and tools to support growth can be added as needed.

When it comes to managing rich media formats, development velocity slows when developers don't have a single tool or a cohesive, integrative suite of tools that offers all the media preparation, modification, and sharing capabilities needed for imagery, video, and emerging formats like 3D, AR, and VR.

Companies need flexibility and efficiency to keep up with the competition and offer their customers the best content possible. Composable architectures enable companies to seek out the tools that best suit their use cases, publishing avenues, and aesthetic objectives without having to worry whether or not those tools play nicely with one another.

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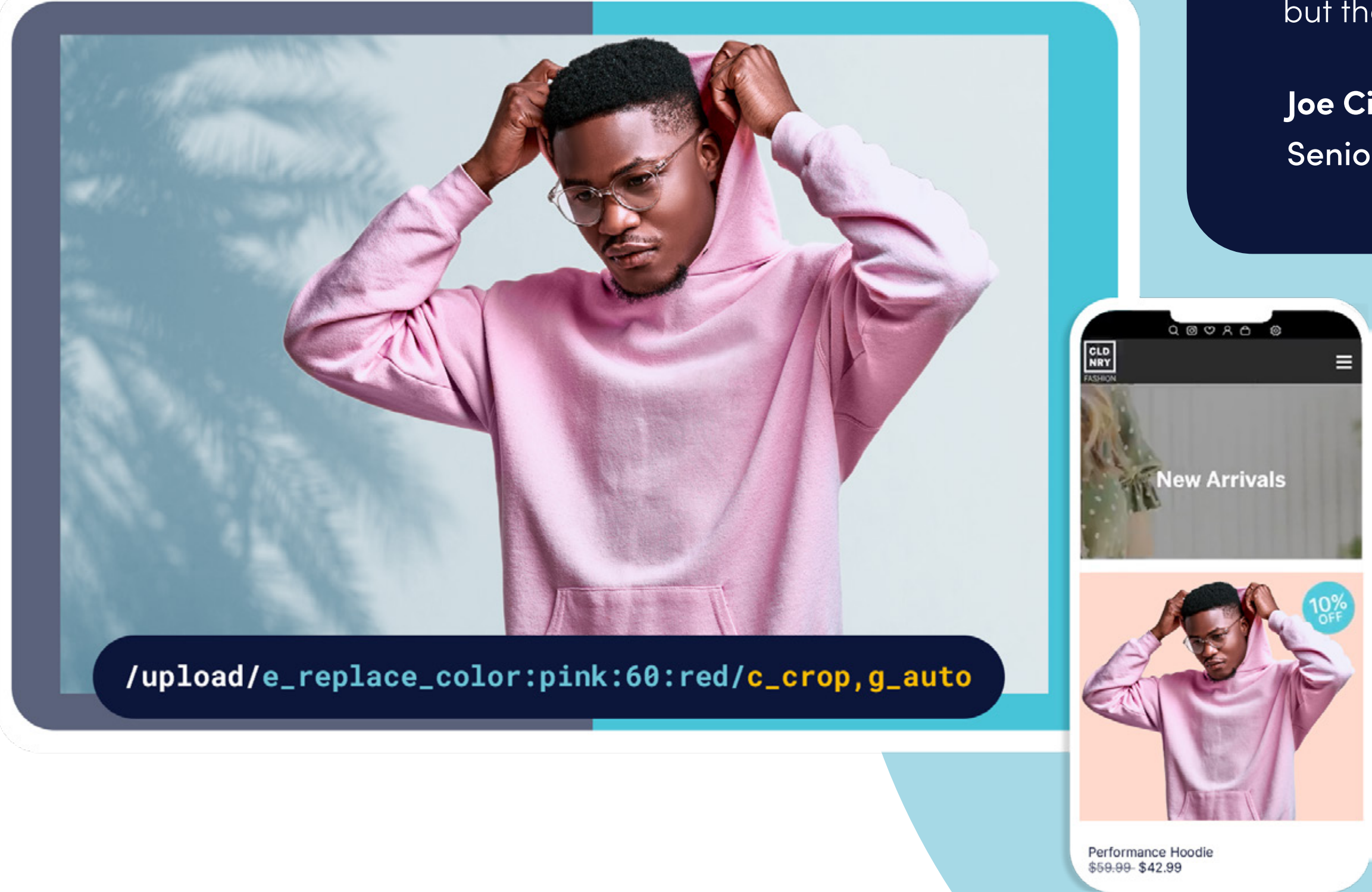
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Forrester analyst Joe Cicman shared his thoughts during opening remarks at MACH One in June 2022 on why MACH vendors are poised to overtake the market.

“Technology should enable brands to bring innovative digital experiences to life. It should not be what hinders companies from acting on great ideas...the monoliths still provide value, but they cannot keep pace.”

Joe Cicman
Senior Analyst, Forrester

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About The MACH Alliance

Founded in June 2020, The MACH Alliance is a not-for-profit industry body that advocates for open and best-of-breed enterprise technology ecosystems.

The Alliance aims to educate and support the industry as a whole on what to look out for when (planning to) moving from legacy infrastructure and going composable, including when, where and how to start and select partners.

MACH is an industry tech standard describing modern technology. The prerequisites to achieve this standard are: Microservices based, API-first, Cloud-native SaaS and Headless. MACH Certification gives enterprises confidence they are choosing best-in-class vendors that can deliver future-proof technology.



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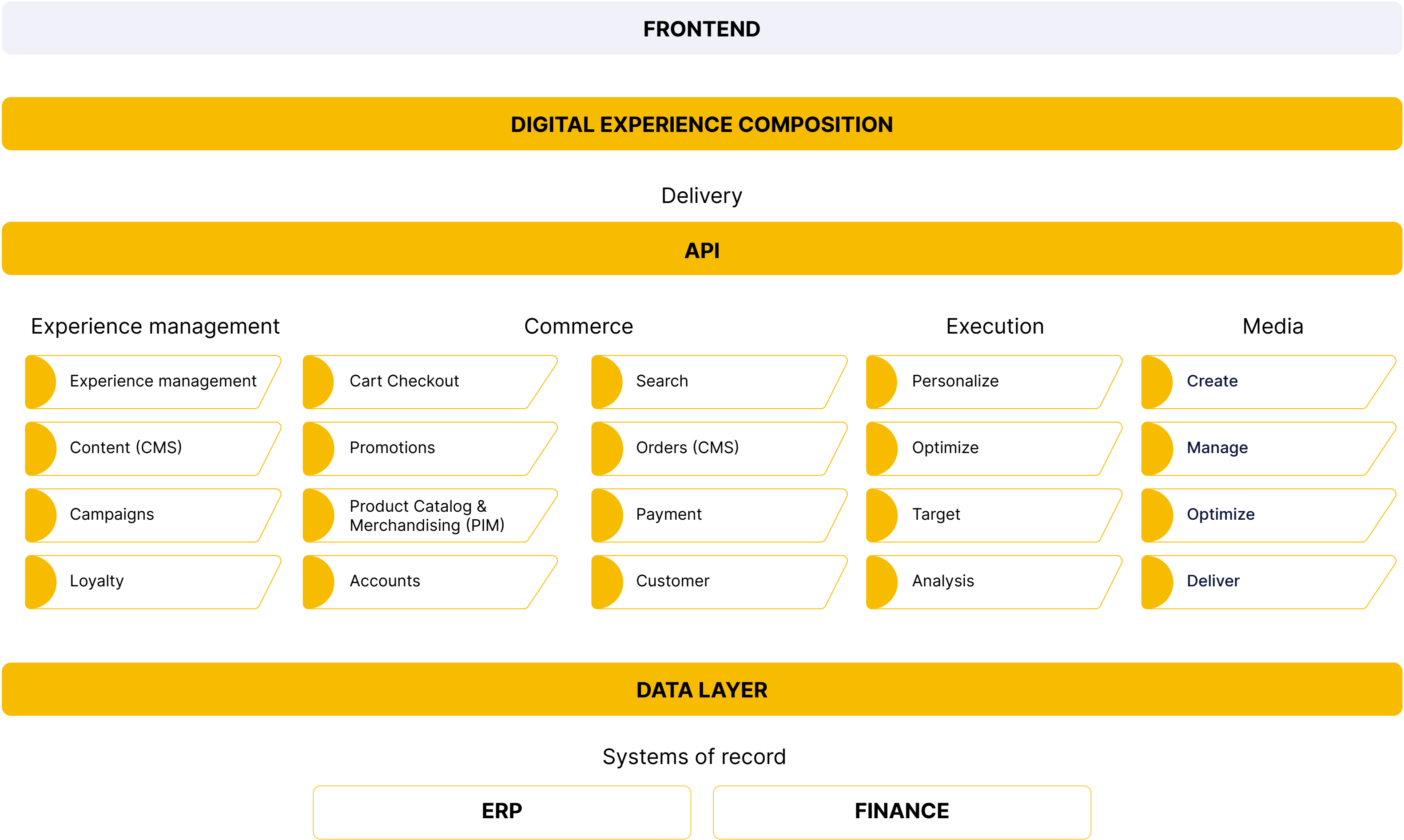
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Below are the composable elements that go into a typical commerce environment:

Microservices **A**PIs **C**loud Native SaaS **H**eadless



CHAPTER 2

The Media Layer: An essential component of the composable tech stack



Written by Shelby Britton

Shelby Britton is Sr Director of Product Marketing at Clouddinary. She has been in tech marketing since 2004 and hails most recently from Adobe where, for the previous 13 years, she held GTM and product marketing leadership roles for the Adobe Experience Manager Sites and Adobe Connect products. Previously she led the marketing departments for channel partners of IBM and Adobe.

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The act of delivering fast-loading, high-quality, visually rich experiences to an ever-multiplying number of devices, anywhere, anytime, on brand, to all touchpoints, at scale, sounds impossible. If not impossible then incredibly labor intensive and expensive. To deliver the rich visual experiences that engage and convert, brands, companies and organizations of all sizes need an intelligent, automated, purpose-built solution that integrates with their existing and evolving composable tech stack and allows them to create and deliver engaging visual experiences at scale.

The Media Layer: An essential component of composable architecture

Media-rich digital, mobile, and e-commerce environments call for a new direction: a powerful media layer delivered through an approach called MACH. MACH stands for:

- **Microservices-based**
- **Application programming interfaces (API)-first**
- **Cloud-native software-as-a-service (SaaS)**
- **Headless**

The media layer is a an essential part of an evolving and composable, MACH-based digital experience tech stack.

The right media layer will support dynamic real-time image and video transformations, which are then delivered automatically in the right format, size, and weight to all devices with intelligent content

awareness. The ability to upload, optimize, transform, personalize, and deliver all types of rich media assets helps teams intelligently automate workflows, fosters deeper collaboration between IT and business teams, and allows for asset enrichment through AI and other key features. The right media layer helps brands create a flexible, scalable strategy for delivering visual experiences everywhere.

Modern Architecture for a Modern Martech Stack

As opposed to a traditional Martech stack, a MACH-based tech stack that includes a media layer is well positioned to deliver visual experiences at scale. Adoption of modern composable architecture allows ease of fit and scale in two ways:

1. It's easier to connect composable technologies with legacy systems and services. That means companies can quickly and effectively integrate the media layer into their existing workflow.
2. It streamlines the process of building, delivering, and managing visual experiences, allowing marketers and developers to work together seamlessly to create captivating visual experiences.

Today's media layer has moved beyond being part of the data layer; it has become an essential tool(s) that will grow and expand with any composable architecture. As the diagram on page 14 shows, it's now easier than ever to have a single media source that connects to PIM, CMS, e-commerce platforms, search, personalization, analytics components, and more.

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An API-First Media Layer for Greater Flexibility

Solutions that use APIs for app and IT development have become indispensable components of enterprise IT architectures. APIs can be built to serve all applications, and developed and maintained efficiently for all devices, platforms, and operating systems.

When it comes to web and digital experience performance, media APIs provide functionality around media enrichment and automation of creative tasks with media-centric intelligence. The media layer includes APIs for all stages of the rich media asset lifecycle. This gives users greater creative freedom and accelerates time to market across all channels. The API-first approach also allows brands to incorporate visual media management into a best-of-breed composable stack.

The Media Layer Advantage: Innovate, Pivot, and Scale

Because your media layer is intelligently automated, and built on flexible architecture, a composable, microservices-based media layer can better equip brands to:

- **Innovate faster.** With support in place to manage all media formats across any technology and every touchpoint, composable media layers empower organizations to embrace cutting-edge

and emerging media quickly and easily to keep up with customer demands for highly engaging content.

- **Pivot when disruption occurs.** Because of the increased collaborative capabilities provided by a composable media layer, marketers and developers can work together to quickly spin out new and different app and site experiences. Additionally, because brands are not tied to particular vendors housing their media, they gain greater flexibility to change parts of their stack as necessary.
- **Scale when opportunities arise.** A composable media layer makes it easier and more efficient for brands to create compelling visual experiences at scale and keep up the relentless pace demanded by today’s digital marketplace.

A composable media layer powered by intelligence and automation can be easily added to traditional and MACH tech stacks to ensure companies can deliver visual experiences everywhere.

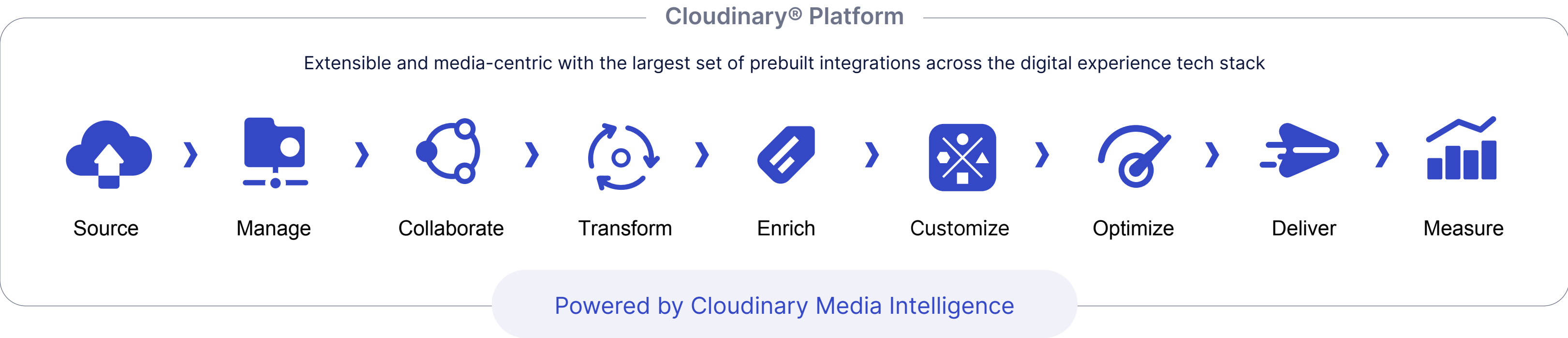
“The entire idea of composability is that you can change quickly. If you have an easy way to keep APIs consistent, you can plug in a new system that you like better. You can substitute technologies in and out.”

Jon Panella
Group Vice President
Global Commerce Alliances & Strategy
Publicis Sapient

Cloudinary Composable Architecture

Cloudinary offers a media-centric **composable architecture** that enables customers to create, modify, and refine visual content more easily. It's a headless, AI-powered platform that enables brands to easily create and deliver rich media content that's ready to use and share across different channels and in different forms. And, since it uses a MACH approach to media development and production, many of the world's largest and most successful brands, like Puma, River Island and Mattel, rely on Cloudinary to easily manage and optimize their media at scale within their composable tech stacks.

Cloudinary offers AI-powered automation for the entire media asset lifecycle in its purpose-built and future-proof **Media Experience Cloud (MXC)**, enabling seamless integrations and promoting continuous innovation.



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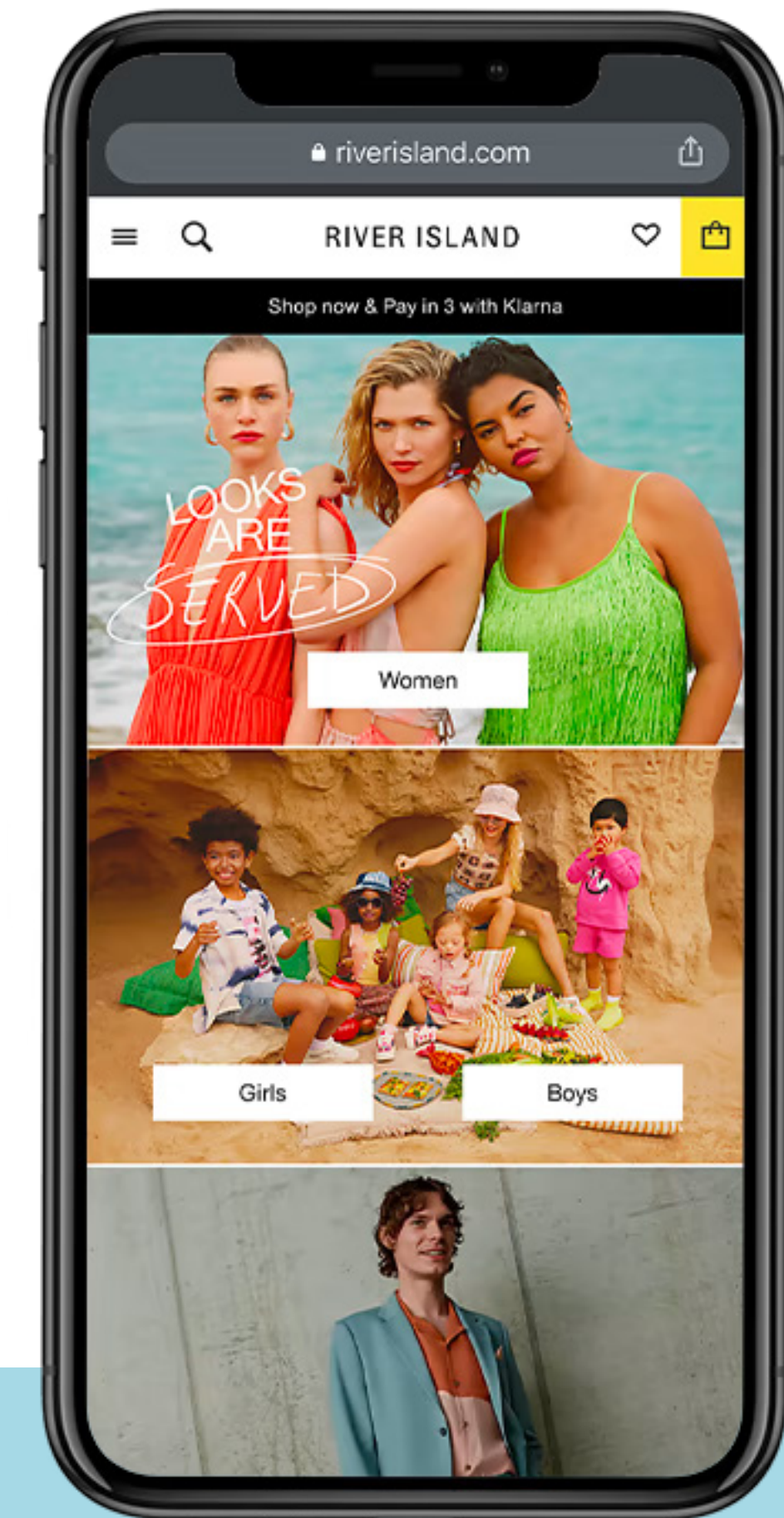
Cloudinary Features

Let's explore some of the features Cloudinary offers that make the media creation process more efficient and enjoyable.

Programmable Media Powered by Intelligence and Automation

Cloudinary **Programmable Media**, an offering within the Media Experience Cloud, provides several tools that are backed by AI and automation, including background removal with the **Background Removal add-on** and **object-aware cropping**, and **automatic image tagging** using their **Content Analysis add-on**. With these tools, images can be prepared and exported in all necessary variants for any delivery channel, whether it's for a thumbnail, social media, or email campaign.

Furthermore, Cloudinary's AI-powered add-ons also work with Google to perform **video transcription** and **video moderation** and provide **AI-based video preview features**.



“We’re really excited to apply Cloudinary’s advanced, AI driven capabilities, which will speed up our capacity to bring new products online and elevate the customer experience.”

– River Island head of architecture

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“Cloudinary has been at the core of our Enterprise DAM strategy and has since become a key requirement for us to ensure any related products we pursue have out of the box support for Cloudinary.”
– Sr. Director, Omni Personalization & Engagement Engineering, Neiman Marcus Group

Headless DAM

Cloudinary brings digital asset management capabilities to your fingertips. Our SaaS model and media APIs for search, administration, organization, collaboration, and more allow you to easily build your own UI or media programming into your workflows, whether they’re customer-facing or internal.

Third-Party Integrations

Cloudinary’s Media Experience Cloud’s open architecture and API support make its digital ecosystem highly pluggable and friendly with other MACH members. This introduces agility and flexibility to digital media content operations.

Cloudinary also provides **prebuilt widgets**, including the **Upload widget**, **Media Library widget**, and the Cloudinary **Media Editor**, among others, to help with various parts of the visual media creation and delivery process all in one place. However, you can also quickly leverage **certified integrations** to extend the already powerful Cloudinary Media Experience Cloud, enabling efficient collaboration among existing content operations tools and services.

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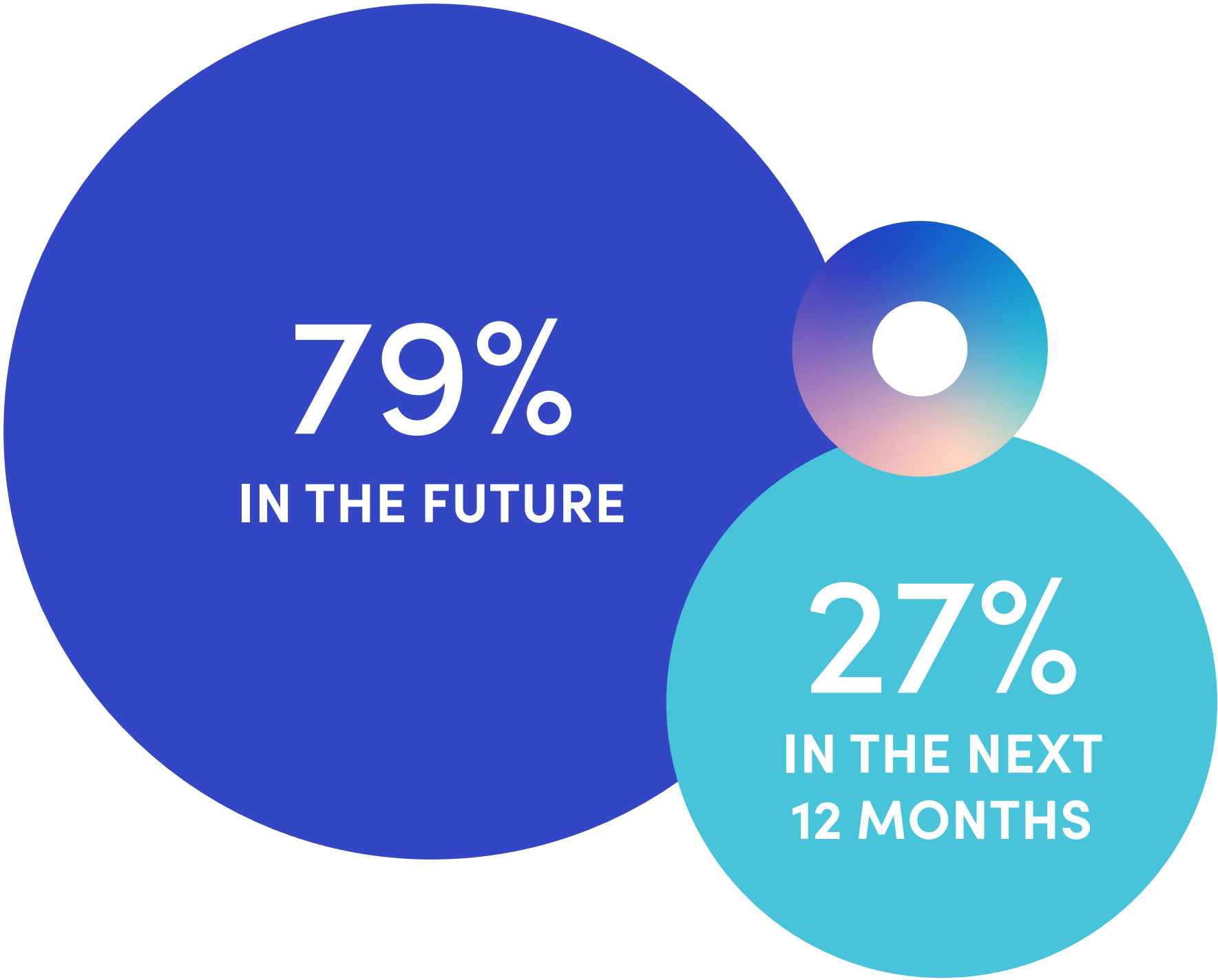
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Developer First

Cloudinary’s AI-powered solutions use a developer-first approach, meaning you have everything you need to manage and deliver all kinds of media—from images and videos to AR, VR, and 3D — quickly without a significant lift. Additionally, the developer-first approach helps brands avoid spending too much on developing solutions, ensures they scale easily, and allows developers to work in their language of choice, reducing the learning curve and increasing productivity.

MACH-Certified

As a member of the [MACH Alliance](#), Cloudinary’s base technology is certified as adhering to the cutting edge and future-proof approach of MACH technology. Cloudinary’s media APIs are flexible, expandable, and encourage cross-platform collaboration, making it easy to prepare your media for multi-channel publication.



79% of tech leaders expressed strong intention to increase MACH elements in their architecture in the future; 27% in the next 12 months.

Source: Enterprise MACHified 2022 study, conducted by Mel Research and commissioned by the MACH Alliance

CHAPTER 3

Composable CMS: Consistent, content-backed experiences everywhere



Written by Shelby Britton

Shelby Britton is Sr Director of Product Marketing at Cloudinary. She has been in tech marketing since 2004 and hails most recently from Adobe where, for the previous 13 years, she held GTM and product marketing leadership roles for the Adobe Experience Manager Sites and Adobe Connect products. Previously she led the marketing departments for channel partners of IBM and Adobe.

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The momentum behind composable (or, if you prefer, agile or headless) Content Management Systems (CMS) continues gaining steam as brands realize improvements in efficiency, innovation, and digital experience performance. At the same time, customer demand for visual-first experiences seems insatiable. Brands now find themselves trying to juggle creating numerous media-rich experiences for every possible digital channel, while ensuring everything performs at lightning speed. With the right technology in place — in this case, a composable CMS combined with a visual media solution — brands need never sacrifice volume and immersiveness for performance when it comes to creating unique visual experiences.

Combining a visual media solution with a composable CMS improves a brand's ability to deliver visual experiences across channels quickly, whether that channel is a website or mobile app or a Single Page Application (SPA) or Progressive Web App (PWA). Content experiences created for these different touchpoints must be highly optimized. Pairing a composable CMS with a visual media solution that's designed to automatically transform and optimize imagery, video, and other cutting-edge formats; enable brands to create high-performing and visual experiences everywhere, which improves customer engagement and conversions.

Fast, Visual and Everywhere – Without Compromise

'Yesterday, please.' How often is that the answer to the question, "How soon do you need this?"? As consumer demand for more visual experiences increases, so too does the pressure to deliver projects and experiences faster. The pace? Unrelenting. The expectations? High. Deliver more visual experiences, in more places, faster — and make them beautiful and consistent across channels.

"We view the role of the content management system as the "chief of consistency". You need to be able to have a consistent, content-backed experience that goes throughout all of the different channels you're interacting with your customers on. These channels are varied but are more and more in the digital world."

– **Nick Borth**
Chief of Staff to the CEO
Contentstack

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“It’s more important than ever to both house and manage your content centrally and also serve the growing number of stakeholders who manage marketing channels within your organization.”

– **Jon Panella**
Group Vice President
Global Commerce Alliances & Strategy
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A modern, composable tech stack with a Headless CMS and visual media layer ensures that all teams working on customer experiences can do so in tandem using the tool of their choice without slowing each other down. For example:

- **Developers** can create mobile apps or SPAs in their preferred language without learning marketing tools or having to go back to designers for every possible variation of an image or video
- **Marketers and designers** can create the asset once (increasing their efficiency) without having to rely on developers to dynamically adjust the asset’s shape, size and frame for each unique channel

While brands are eager to reduce time-to-market, they must also monitor another speed factor: experience performance. Even a

one-second lag in experience or asset load time can trigger customer churn out of the experience. Creating lightning-fast content experiences via SPA or PWA in languages like React is a moot point if the media drags down performance speed.

A visual media solution automatically optimizes all rich media formats, including video, 3D, 360-degree spin sets and more, for any browser or device. Cloudinary also employs a multi-CDN approach for higher regional speed performance. For web developers, these tactics meet Core Web Vitals standards for optimum SEO placement.

Innovation in a Competitive Environment

Competition for eyeballs has turned our digital world into a visual-first world. Staying ahead of the competition means continually innovating on customer experiences and finding new ways to deliver immersive moments that capture consumer attention and loyalty. Unfortunately, innovation quickly grinds to a halt when content creators find themselves bogged down with the manual repetitive tasks of managing media variations—which happens often.

If an ambitious brand wants to add new media formats to experiences (say, video or 3D) or new channels (perhaps digital signage) to the customer journey, these innovations prompt a whole slew of new and necessary rich media manipulations. By adding a visual media solution to a CMS, content and experience creators can focus on experience creation for their customers and know that any

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media asset inserted into the experience will automatically transform as needed for each device, browser, and channel. They can feel confident in making experiences as visually appealing and rich media-heavy as they desire to increase user engagement or commerce conversions without compromising performance.

Visual Media Solutions + Composable CMS Empowers Brands To Win

Adding dynamic media to a composable CMS ensures that rich media assets appear flawless within each experience delivered to any channel powered by the CMS.

“Customers get started with a CMS because they have specific properties or experiences they want to build and the lack of the right CMS is holding them back. Once the proper CMS is in place and a visual media solution is easily plugged in, those desired experiences can be created.”

– **Nick Borth**
Chief of Staff to the CEO
Contentstack

CHAPTER 4

Immersive Commerce Experiences: Fast and easy with composable architecture



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Modular Media Experience Cloud Powers Highly Visual Digital Commerce

Online shoppers’ demand for visual-first experiences has risen at a pace that some e-commerce brands have struggled to keep up with. When a shopper doesn’t find a compelling reason to stay on a site, they leave. As early as 2020 Nike recognized this trend and pivoted to a visual-first, direct-to-consumer model. That move **resulted in 30% of the company’s revenue to come from e-commerce** by the end of 2020 – a goal they thought would not be achievable until 2023.

As the Nike example reveals, retailers that deliver online customer experiences that rival — or surpass — in-store shopping see an increase in revenue. Unfortunately, the amount of effort, the complexity, and the scale of creating highly visual digital commerce across all channels is beyond human capabilities. An intelligently automated rich media solution connected to a composable commerce platform is a surefire way to deliver the experiences consumers expect and gives brands the competitive edge they need.

Creating Highly Immersive Commerce Experiences is Fast and Easy with Composable Architecture

Forward-thinking retailers are creating highly visual digital customer experiences that rival the in-store experience. These rich visual experiences lead to higher engagement and give shoppers a deeper



understanding of products before they purchase. Accomplishing this across all digital channels during the buying journey takes a massive volume of rich media variations adjusted for every possible digital scenario.

Brands with monolithic stacks will struggle. Many monolithic or best-in-suite technologies have not kept pace with innovations in the specific areas that impact visual commerce. Aging tech can’t operate at the scale required to manage the exponentially growing amount of visual media or accommodate the ever-growing number of formats. Brands on traditional platforms can’t:

- Adopt new engaging and immersive visual formats like 3D, 360, AR, or VR.
- Scale with the volume of rich media required for visual-first everywhere
- Meet the high-performance demands of customers
- Pass the to Core Web Vitals tests that score a user’s experience loading a webpage

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To deliver rich media assets, e-commerce brands need a modular **Media Experience Cloud (MXC)** in a tech stack built with composable **MACH architecture** for supplying fast, high-quality, and consistent visual assets at ever-multiplying touchpoints.

Best-of-breed solutions ensure brands are always supported with the latest innovations for both visual media and commerce – allowing them to stay ahead of competitive pressure.

Achieving Ambitious Commerce Goals Takes an Intelligent, Automated and Agile Approach

Combine savvy and demanding consumers with sudden and unexpected market shifts and brands must be prepared at all times to respond and pivot. Retailers caught in moments of shifting consumer or market sentiments without the next generation of technology at their disposable will be surpassed by those that future-proofed their tech stack. Composability, automation and intelligence are keys to the ability to innovate and do so quickly.

Transitioning to a composable technology stack with an intelligently automated **media layer** combined with MACH-based CMS, commerce and PIM solutions, provides three key benefits.

Time to Market

The right technology accelerates brands' timelines for delivering visual commerce experiences and adding new products.

- **Intelligent automation**

Automated workflows and intelligent automation reduce the time spent on repetitive tasks. For example, Smart Tagging ensures all media assets are automatically tagged upon upload and ready for personalized delivery. Pre-designed and automated media lifecycle workflows get assets production ready faster. An automated **Product Gallery widget** makes creating new Product Detail Pages simple.

River Island, a Cloudinary and ContentStack customer, selected Cloudinary solutions to help “future-proof its digital media tech stack, boost the user experience, and shorten time to market.”

“We’ve cut the creative team’s time in half because of the mix of the presets and all of the automated tagging, collections and sophisticated metadata they get with Cloudinary. And as the URL names finally make sense too, all their search and workflow is so much better, too.”

– John Kilpatrick
Principal Engineer
Rapha Racing Limited



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Global fashion company, Paul Smith, tailors a bright headless future.

- Cloudinary was key in the move to modern, headless ecommerce tech stack
- 40%+ reduction in asset management costs
- 45% boost in video-enabled sales
- Major efficiency gains thanks to first-time B2B partner workflows



- **Collaboration**

MXC in the stack ensures ecommerce brands are working in tandem with creatives, marketers, and developers using the same rich media assets while remaining in their tool of choice. For example, product marketers can enrich product data from within the MXC which updates the Product Information Management (PIM) system commerce practitioners are comfortable with.

- **Composability**

The nature of modular architectures lends itself to connecting composable solutions when new functionality is required. Prebuilt integrations, APIs, SDKs, widgets, and plugins typically available with these technologies contribute to the ease of adding innovations to a tech stack. Access to the right tools when needed makes creating commerce experiences quickly feasible.

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Commerce Conversions

Highly visual and immersive experiences drive better conversions.

- **Captivating media**
Incorporating engaging and emerging formats like video, 360, and 3D will captivate audiences and convert shoppers into buyers more often. Support for these formats at scale as well as overall commitment to all future media formats gives brands confidence future experience innovations will always be possible.

Cloudinary and Commercetools customer, Minted, a design marketplace for independent artists, puts a very high value on life-like imagery. They were able to remove heavy bottlenecks and replace insufficient home-grown 2D/3D image tools, to reliably launch new art products in hours versus weeks.

minted.



- **Performance**
High-quality and life-like rich media is important to online shoppers. If that media does not load quickly and show up in high definition, buyers will typically take their business elsewhere. The most valuable tech solutions will optimize imagery and video on-the-fly for any device, browser, or channel – enabling create once and deliver everywhere capabilities. Brands that add an intelligent media layer to the tech stack can expect up to **58% faster image load times** without doing manual work.

Omnichannel Commerce

- **Consistency**
Delivering high-quality and high-performing experiences on any device, browser, or channel is critical as shoppers device-hop before purchase. Consumers do not have patience for experiences in a microbrowser that do not perform as well as their desktop browser. A media optimization solution in a composable commerce stack ensures customers get what they want and brands realize better conversions.

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- **Scale**
Creating variants of every image, video, or other media asset to guarantee every visual looks right in every digital scenario with the right shape and size while staying focused on the subject matter and loading quickly is not manually possible. Dynamic media solutions solve for scale across channels with intelligent and automated resizing, reframing, and cropping of images and video at the moment the asset is requested.

Nieman Marcus implemented interactive product galleries with detailed 360-degree images and videos to showcase the products, making the experience as close to real as possible while effortlessly scaling to manage seasonal spikes and rapidly deploying all new innovative experiences across channels.

Take Control of Your Stack With MXC and MACH

To bring order to the chaos of rich-media content scattered throughout applications in your technology stack and to accelerate the creation and delivery of a compelling visual experience, be sure to adopt a Media Experience Cloud during your composable transformation. It's the only solution that can truly unlock the innovation required to win and keep customers now and in the future.

Talk to Cloudinary to learn more about the Cloudinary Media Experience Cloud.

“Cloudinary has been at the core of our Enterprise DAM strategy and has since become a key requirement for us to ensure any related products we pursue have out-of-the-box support for Cloudinary.”

-Sr. Director, Omni Personalization & Engagement Engineering, Neiman Marcus Group



CHAPTER 5

Personalization: It's a journey, not a destination



Written by Emma Furlong
Director of Product Marketing, Dynamic Yield by Mastercard

Emma is the Director of Product Marketing at Dynamic Yield, overseeing GTM strategy, Partner Marketing, and Customer Marketing. Emma is passionate about helping marketers bridge the gap between technology and methodology to build high-performing, personalized experiences that drive customer loyalty and growth.

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While personalizing and scaling e-commerce content, namely visual media, can be a challenge, the rewards are worth it. Personalization increases online sales by an average of 20%. In an inflationary economy where consumers may be reluctant to spend, personalized marketing can be the X factor that leads a person to a purchase decision they would have otherwise been reluctant to make.

To get more bang for your visual media buck means that brands need to find ways that make personalization easier, more efficient, and cost-effective. The solution is composable technology.

Using composable technologies brands can automate time-consuming tasks like resizing and reformatting because a single e-commerce channel may require dozens of visual variations. Multiply this across many different channels, and it becomes impossible to manage manually. Automating and optimizing rich media enables teams to focus on fine-tuning the personalization experience.

The path to personalization doesn't necessarily arrive at a destination, it's the journey that matters. To make the personalization journey as short and manageable as possible, brands should keep the following in mind.

Pack Light and Get Others Involved

The luggage you bring on your personalization voyage should be light and fit in the metaphorical overhead bin that is your brand. Composable and flexible architectures, like MACH, are flexible and integrable enough to streamline and accelerate the launch of personalization initiatives.

Getting others involved in this journey is key. Organizations should involve key stakeholders early and often to avoid roadblocks and technological incompatibilities. A good starting point is to establish a personalization center of excellence with the following teams:

- The team running the website and/or app (typically a marketing team)
- Dev/QA
- Analytics
- Design

All stakeholders should have a touchpoint within other channels to ensure users receive a consistent experience across touchpoints. Staying connected also reduces the likelihood of merchandising mistakes and enables marketers across departments to support one another's objectives. For example, if the web personalization team knows what paid media campaigns are currently running, that same creative can be tested and optimized on the brand's owned channels to provide a seamless experience.



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Once companies have achieved stakeholder buy-in and have established their center of excellence, the next recommended step is to identify quick wins. Scoring the easy win(s) with personalization demonstrates success to company leadership and builds momentum for the project’s future.

Email personalization is a great starting place to develop a broader personalization strategy. Unlike other channels, email is hyper-targeted and takes into account customer behavior across a brand’s website, mobile app, and even physical store, to serve experiences that address the entirety of the customer journey. Additionally, a visual media layer in a composable tech stack can enable brands to serve the most relevant image or video to each customer, optimized for device, OS, and bandwidth. This ensures every experience will be timely, relevant, and personalized, regardless of when, where, or on which device a user views it.

Another area brands can score quick hits is product recommendations. They are easy to implement and typically show immediate value.

A final personalization recommendation is localization. More than just serving up content in the local language, knowing the climate a customer lives in and serving images and videos of products that map to that location can have a huge impact on performance.

Once companies see initial success here, they can then layer in dynamic and personalized content (both images and videos) based on affinity, intent, and browsing behavior on web, mobile, and email and then follow up with more sophisticated triggered campaigns across channels.

Predicting the unpredictable

As is typical when on a journey, being prepared for unforeseen circumstances is crucial to any personalization program. Additionally, personalization strategies may require adjustments to be made on the fly, whether it’s building new stacks or identifying new vendors. Two ways to prepare for unexpected the include:

Manage expectations: From the outset, establish the personalization plan’s goals. Keep all lines of communication open and, whether it’s with agency partners or internal stakeholders, be transparent.

The answers are in the data. Even if a campaign doesn’t perform as expected it’s important to remember that even down lift numbers are valuable as they can be used to inform and optimize future campaigns. Perhaps the image and videos that were personalized weren’t the right combinations of item, color, or size, or the promotional messaging didn’t resonate with a certain audience. Digging into the data will help brands continually optimize experiences and better understand their customers.

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Don't forget your map: Personalization relies on, and generates, different types of data. The key is honing in on the data that matters. This can include past purchase behavior, intent, and product affinity. This information tailors the visual media, content, and product recommendations to match those preferences while helping maintain consistency and context across various channels.

Two examples of brands that have excelled in personalization with Dynamic Yield are:

SKIMS

SKIMS is an American shapewear and clothing company focused on body positivity and inclusivity. The team at SKIMS has understood the importance and potential of personalization from the jump, launching a comprehensive program in under 6 months which has already resulted in 10-12% of direct revenue from product recommendations per month, and a campaign personalization rate that is 26% higher than the industry average.

home24

home24 is a leading e-commerce platform with a product catalog of over 200K furniture items for all styles and budgets. To make the shopping experience relevant to each customer the home24 team captured interaction data from its site, including past purchases and affinities to certain brands, styles, and colors. The team used this data to tailor its content and product recommendations across the web and via email maintaining consistency and context across

channels. Through the consistent fine-tuning of its product feed and experimentation with different strategies and use cases, home24 now receives 25% of its revenue from product recommendations.

Enjoy the ride but, keep your eyes on the road

Getting personalization right requires the orchestration of many moving parts. When everything operates smoothly, the results speak for themselves. Organizations with advanced personalization maturity, who realize the most ROI from personalization, are equipped with teams that collaborate to identify and use the right data as well as incorporate the most flexible technologies. Using an AI-based composable solution for the media layer allows brands to streamline and automate various media transformations to ensure media renders correctly no matter the device, file size, format, or internet speed.

Personalization is a journey that involves planning, preparation, and constant refinement. By keeping their eyes on the road, brands and marketers can continually gather new input, refine their strategies, and think about new destinations to explore in their continued personalization journey.



About Dynamic Yield by Mastercard

Dynamic Yield, a Mastercard company, helps businesses across industries deliver digital customer experiences that are personalized, optimized, and synchronized. With Dynamic Yield by Mastercard, marketers, product managers, developers, and digital teams can algorithmically match content, products, and offers to each individual customer for the acceleration of revenue and customer loyalty.

Redefining personalization technology, Dynamic Yield by Mastercard's Experience OS unifies business silos to deliver ongoing, personalized engagement from a single, fully customizable platform. With it, companies can build their own mix of powerful personalization capabilities, which can include a wide array of experience types, support any digital channel, adjust according to industry and KPIs, and improve time-to-market efficiency.

Today, Marketing, Product, Development, and e-commerce teams from more than 400 global brands are using Dynamic Yield's Experience OS alongside CMS, Commerce, and ESP solutions to iterate faster and accelerate long-term business value.

Dynamic Yield operates as a standalone SaaS business under Mastercard's Data & Services division. **[Click here to read further.](#)**

CHAPTER 6

How to Build a Composable Stack: Five tips to get you there



Written by Jon Panella
Group Vice President, Commerce, Publicis Sapient

Jon has over 25 years of technical, consulting and leadership experience in enterprise architecture planning, commerce strategy, product evaluation/selection, software development and technology implementation/support. Jon is currently responsible for Publicis Sapient's Global Customer Engagement Platform Practice which includes sales, strategy, oversight, planning and reviews for numerous commerce strategy and implementation engagements. Jon is also an Executive Board Member of the MACH Alliance. Most importantly, Jon has a passion for Commerce and his tenure at Publicis Sapient has enabled him to do what he loves and help customers be successful.

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Digital transformations describe large technology changes over time. Any given technology stack usually experiences these seismic shifts every ten or so years, when new technology enables an inflection point. This is exactly where we are today with composable stacks.

In the case of e-commerce, the best examples were monolithic solutions — “one-size-fits-most” stacks that helped accelerate e-commerce strategies. However, consumers are rapidly changing the ways they shop, how they engage with content, and what they value in commerce experiences. Monolithic technology can’t keep up with modern requirements.

The good news is that the next digital transformation is already underway, and it elevates the omnichannel experience: the MACH stack. The MACH stack is a composable stack based on the following technologies:

- M**icroservices-based
- A**pplication programming interfaces (API)-first
- C**loud-native software-as-a-service (SaaS)
- H**eadless

As brands embrace omnichannel strategies, they find themselves at a tipping point where composable stacks are becoming essential. Companies can approach this as either an evolution or a revolution: they can move bits and pieces away from a monolithic solution (evolution), or be revolutionaries and replace the entire stack all at once. Either way, there’s a real sense of urgency in making the shift.

What should companies keep in mind when building a composable stack? Here are five essential guidelines.

TIP
#1

Omnichannel must move at the speed of today’s consumers

Keeping up with today’s consumers requires omnichannel capabilities to deliver a consistent brand experience at every step along the shopper journey.



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The key problem for retailers is that monolithic solutions aren't agile enough to keep up with the demand for seamless omnichannel experiences. Monolithic solutions were once attractive because they offered retailers a one-stop solution for e-commerce. However, there was a tradeoff: while they may be capable of doing a few aspects of e-commerce extremely well, monolithic solutions can't do everything. Furthermore, they may require entire teams of people to manage them. Other aspects that hold back monolithic stacks include:

- **Product life cycle.** Monolithic stacks take longer to update and upgrade because vendors have long product cycles. They're also complex, which means IT is typically in charge of them and business users can't respond quickly enough to consumer needs (more on this later).
- **Customizations.** Ongoing maintenance and customization are expensive, too; retailers typically must hire consultants or additional staff, increasing the total cost of ownership and reducing ROI.

Given the speed of omnichannel change, monolithic stacks are a barrier to innovation and digital transformation. They're slow, inflexible, and expensive. Retail and e-commerce teams must directly control their commerce stacks to respond quickly to customers, market changes, and other variables that ultimately impact the balance sheet.

Time is of the essence, too. Managing monolithic solutions is a manual effort since most of them lack automation and AI-based capabilities. Without composable, MACHtechnologies, these solutions slow down the speed and scale required to innovate for today's shoppers.

TIP
#2

Use composable architectures to differentiate and hyper personalize

- **Mix and match components.** This allows companies to combine solutions from different vendors, based on what's best for each component of the stack. Brands can use best-of-breed solutions that require little customization and are easily replaced if business requirements change.
- **Avoid vendor lock-in.** A composable stack also prevents vendor lock-in by offering the ability to swap parts of the stack when needed (e.g., to improve scalability or meet the preferences of a new stakeholder).

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Customers today expect an engrossing and compelling experience – and this is where businesses can differentiate by using headless technology to create hyper-personalized experiences.

Many brands today are going headless because it's what everyone is doing. This is a normal phenomenon in digital transformation shifts – as soon as a new technology reaches an inflection point, everyone wants it. However, brands can't simply follow the herd; selecting technology for technology's sake won't solve your problem specifically, let alone allow you to be competitive. The right reason to want to go headless is that you realize that you need to create that differentiated experience.

One way to illustrate this is to look at how companies create and manage content versus visual experiences. Generally speaking, content is static and can refer to PDFs of user guides and other such documentation – these are things buyers need. It's unlikely factored in their decision-making.

Visual media, specifically images, and videos, is how companies can make their products shine, and would-be buyers take note. However, these buyers may not even exist if the brand doesn't have the right technology to create experiences to make products shine.

Going headless allows brands to hyper-personalize and lets the business (not IT) take control of the customer experience. The components of a composable stack allow you to pick the ones that will most easily enable you to create hyper-personalized experiences rapidly.

TIP
#3

Get your organization ready for the future

When a retailer is ready to start its MACH revolution, a team of internal stakeholders is tasked to manage the project.

One mistake these task forces typically make is ignoring the needs of smaller stakeholders who lead revenue-generation departments. For instance, take an ecommerce brand whose revenue is split 90/10 between B2C and B2B, with B2C taking the larger share. Ignoring the needs of the B2B department due to their smaller revenue overlooks the possibility that the B2B sales team may also help them grow their business with a new technology stack.

Another consideration is whether to take a centralized or federated approach to governance. This decision can impact revenue growth. A centralized approach means a single team is responsible for the entire stack and completing any requests users may have. In a federated model, users are allowed to modify certain parts of the stack independently from a central team. This is a common approach for multinational brands that need to give regional teams the ability to tailor content for their area.

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There technically isn't a right or wrong approach here, but as content and visual experiences become more hyper-personalized to individual shoppers, it's likely a centralized approach means the business won't be as nimble.

TIP
#4

Go after low-hanging fruit first

One of the best ways to get started with a composable stack is to reach for low-hanging fruit first. This means starting with components that are the easiest to implement with little to no downtime, that bring end-users immediate value, and improve experiences where a brand has needed to differentiate and catch up to competitors.

For instance, adding an AI-based visual media layer simplifies the work of developers by reducing the amount of manual labor required to create, optimize and deliver rich media content. With relatively low effort on your part, customers will immediately notice the brand's site loads faster because of the now-optimized images and videos and experiences are customized to every device, screen, and operating system.

Optimized media also improves Google Core Web Vitals (CWV), one of the factors used by Google to calculate site ranking that is largely based on how fast visual portions of a site take to load. Better Google rankings means more site traffic and more conversions.

TIP
#5

Keep it Simple

When it comes to composable, don't bite off more than you can chew. This is the beauty of modern architecture: it allows brands to carefully plan and evaluate how many components they can switch at a time before selecting the pieces they need, and deploying those pieces is also much quicker.

Composable doesn't force brands into making rash decisions under the pressure of sales pitches or accommodating every single internal use case.

Brands *do* need to move fast to modernize their architecture, but they can now do it at their own pace. If a composable solution doesn't initially work out, brands' feet aren't as close to the fire as they would be if they had previously purchased an expensive monolithic stack.

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As the **MACH Alliance** continues growing, more MACH-based solutions will be available for brands as they move to composable stacks.

Join the Composable Revolution

At **Publicis Sapient** today, we estimate that:

- 75% of companies who come to us want to learn more about modern and composable stacks and how to move away from monolithic solutions.
- 50% of existing clients have some components of modern architecture, and may be at that evolutionary stage where they're moving things that way.
- 20% of existing clients are fully modern.

With so many businesses approaching us to inquire about moving away from monolithic solutions, it's clear MACH is the path forward.

We want to see the MACH revolution continue building on its momentum and will continue educating the community on the benefits of a composable stack and why they're essential for continued business growth and success.



CHAPTER 7

Composable + Monolithic? Yes, you can do both



Written by Raj Khandelwal

21+ years of Strategy, Product Management, Business and Technology Consulting experience in Digital Commerce, Marketing and MACH Strategy

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No matter how out-of-date your digital system may seem, it contains a significant amount of innovation, technological debt, and business data. This is why transitioning from a legacy system to a new, sustainable system demands a thoughtful and, above all, economical approach, to preserve and reuse system components that may still be viable.

To make the transition from monolithic to composable architecture, you must first decide where your business will start. For certain brands, this may mean a full replacement strategy that involves a total commerce re-platform and relaunch. Some brands may opt to spilt the difference and take a more progressive approach to fully transforming to composable platform while maintaining some legacy technologies. When charting your composable digital transformation, it makes sense to weigh the advantages and disadvantages of each.

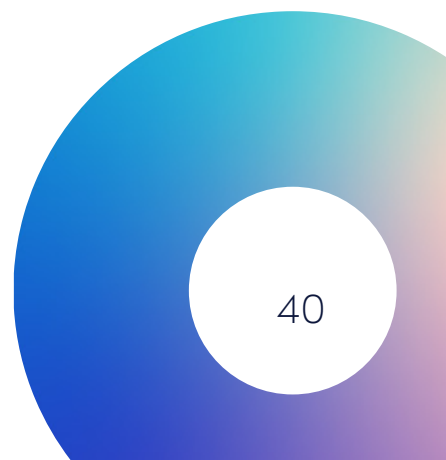
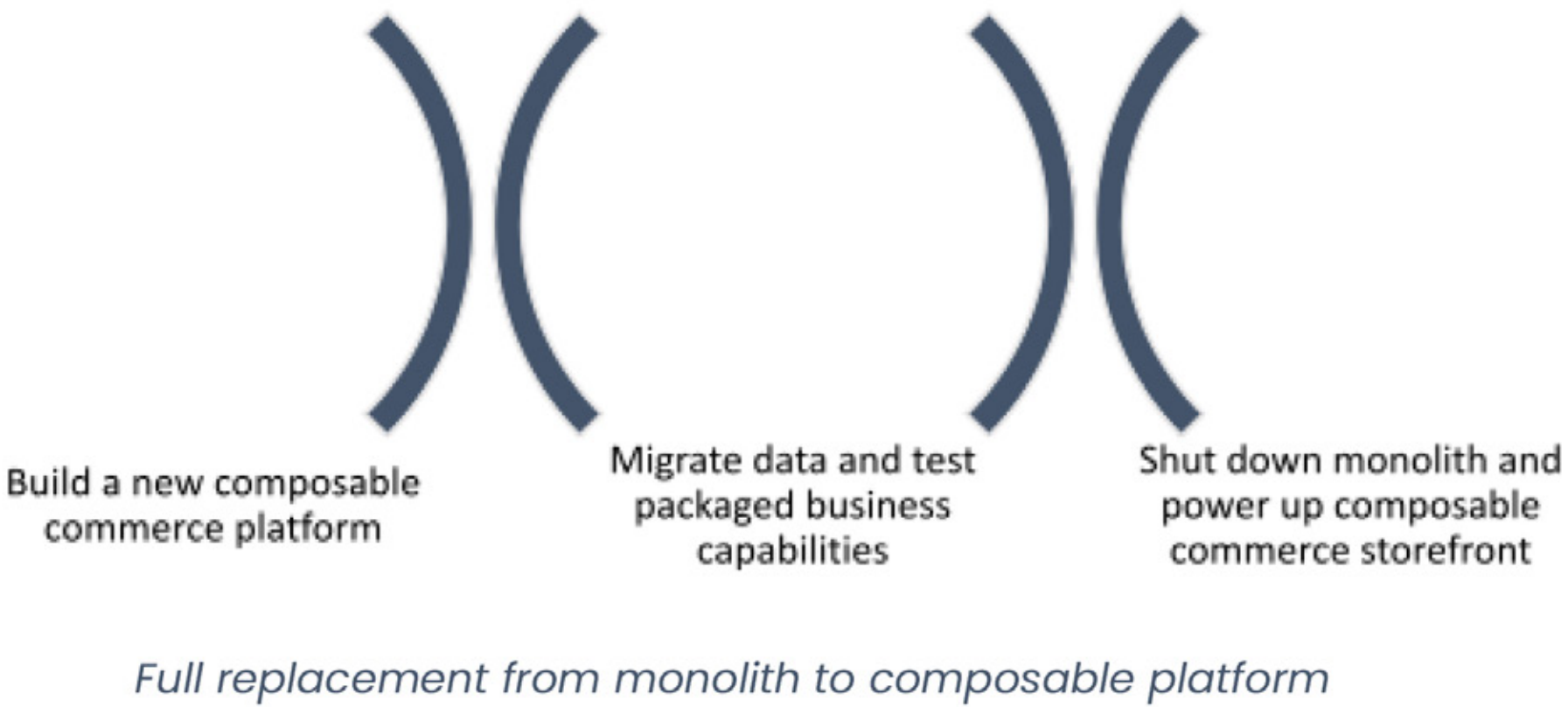
“The days of the big bang, full replacement are past. Don’t try to replace everything at once. This gets you to market with composable technologies more quickly, generates new revenue and allows you to fund the next steps in the transformation process.”

– **Jon Panella**
Group Vice President
Global Commerce Alliances & Strategy
Publicis Sapient

The “Full Replacement” approach

Replace legacy system and rebuild composable platform from scratch.

Choosing to disassemble your entire system and start over from scratch makes sense if the suffering and harm brought on by the aged, rigid, intricate, and unstable system have reached a point where fixing ongoing issues requires spending a significant amount of time and money.



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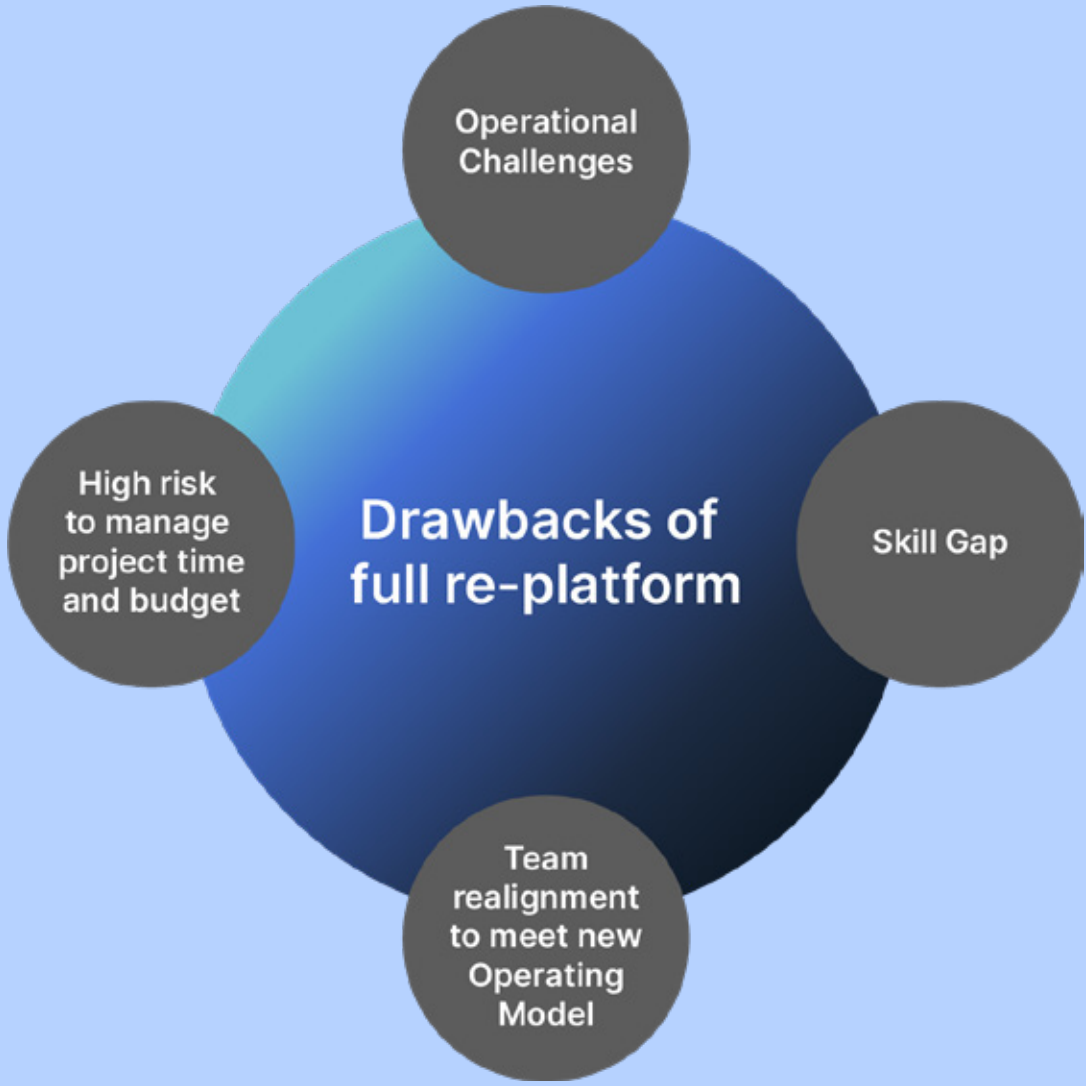
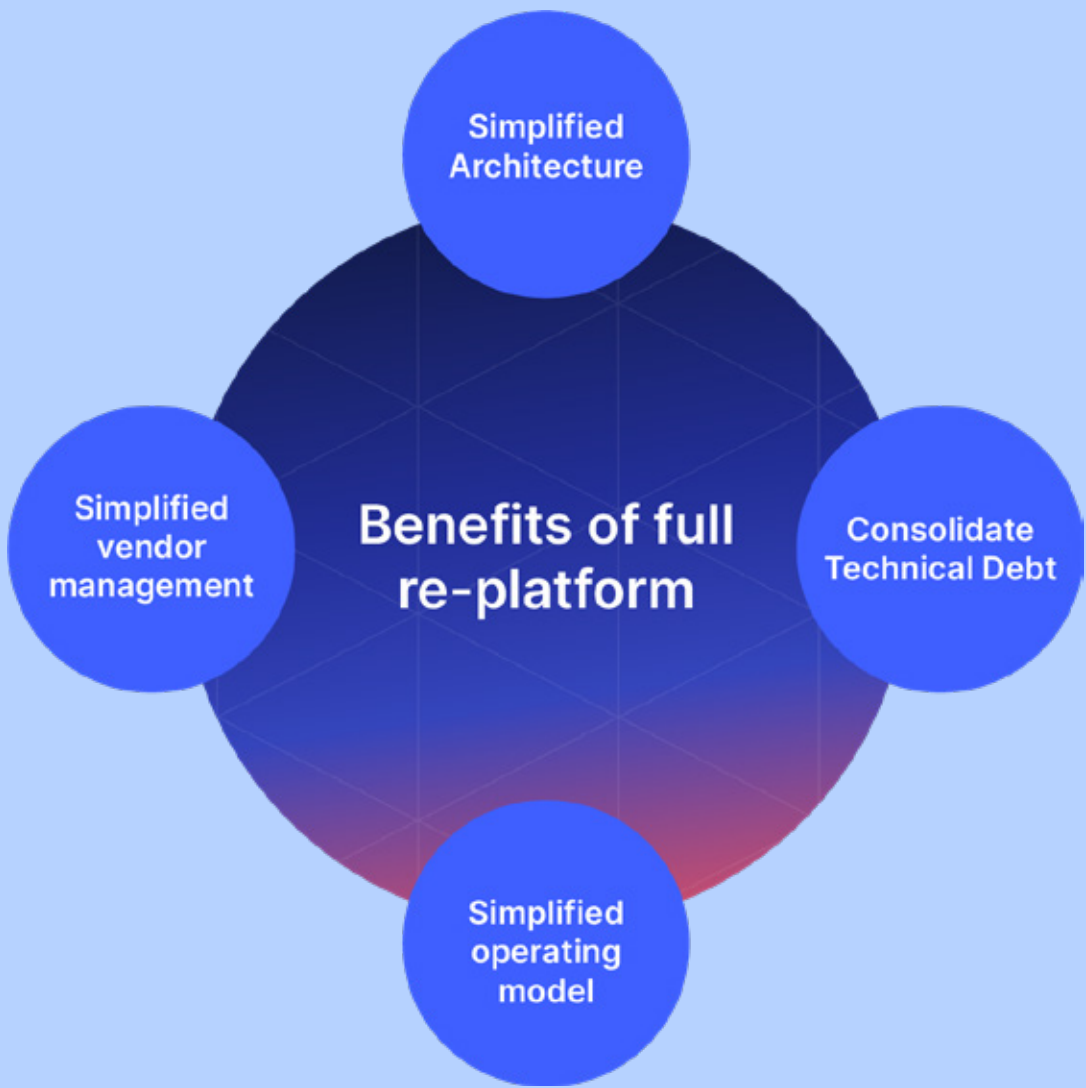
Composable + Monolith (A Progressive strategy)

The progressive strategy is an iterative, gradual replatforming that enables companies to perform a step-by-step migration in a prioritized capability level. This strategy has lower upfront costs and risks and lets you control the capability rollout of composable commerce platform at your own pace by keeping monolith alive for the core features and bringing composability for the capabilities where they are needed. For example, you may decide to keep core commerce features like account management, catalog, cart, and checkout in the monolith but may bring composable solutions for loyalty, subscription, search, personalization, etc.

This strategy allows the monolith to co-exist with composable architecture while moving toward value maturity.

There is a third, more popular approach to moving out of monolith (fully or partially) to known as the “Strangler” strategy.

Pros and Cons of rebuilding composable platform from scratch



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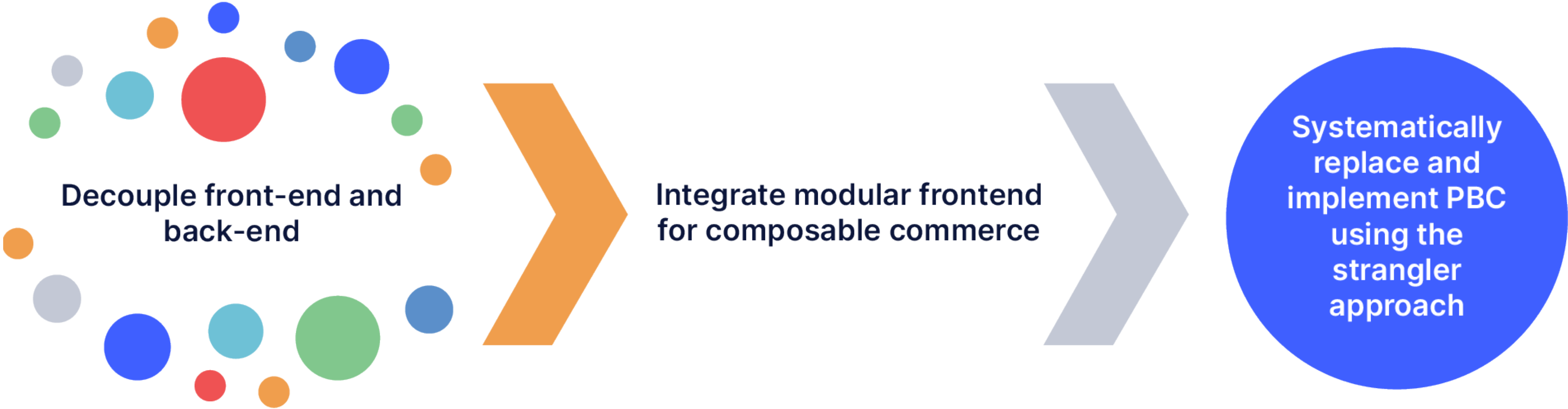
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Progressive strategy to move to composable platform (Strangler)

“Parts of our site are still on that legacy stack which is literally one big box that does everything, but not very well. There wasn’t really any workflow, so we’re moving off it as quickly as we can, starting with anything that’s sessionless, because composable and Cloudinary for images is so much better.”

– **John Kilpatrick**
Principle Engineer
Rapha Racing Limited



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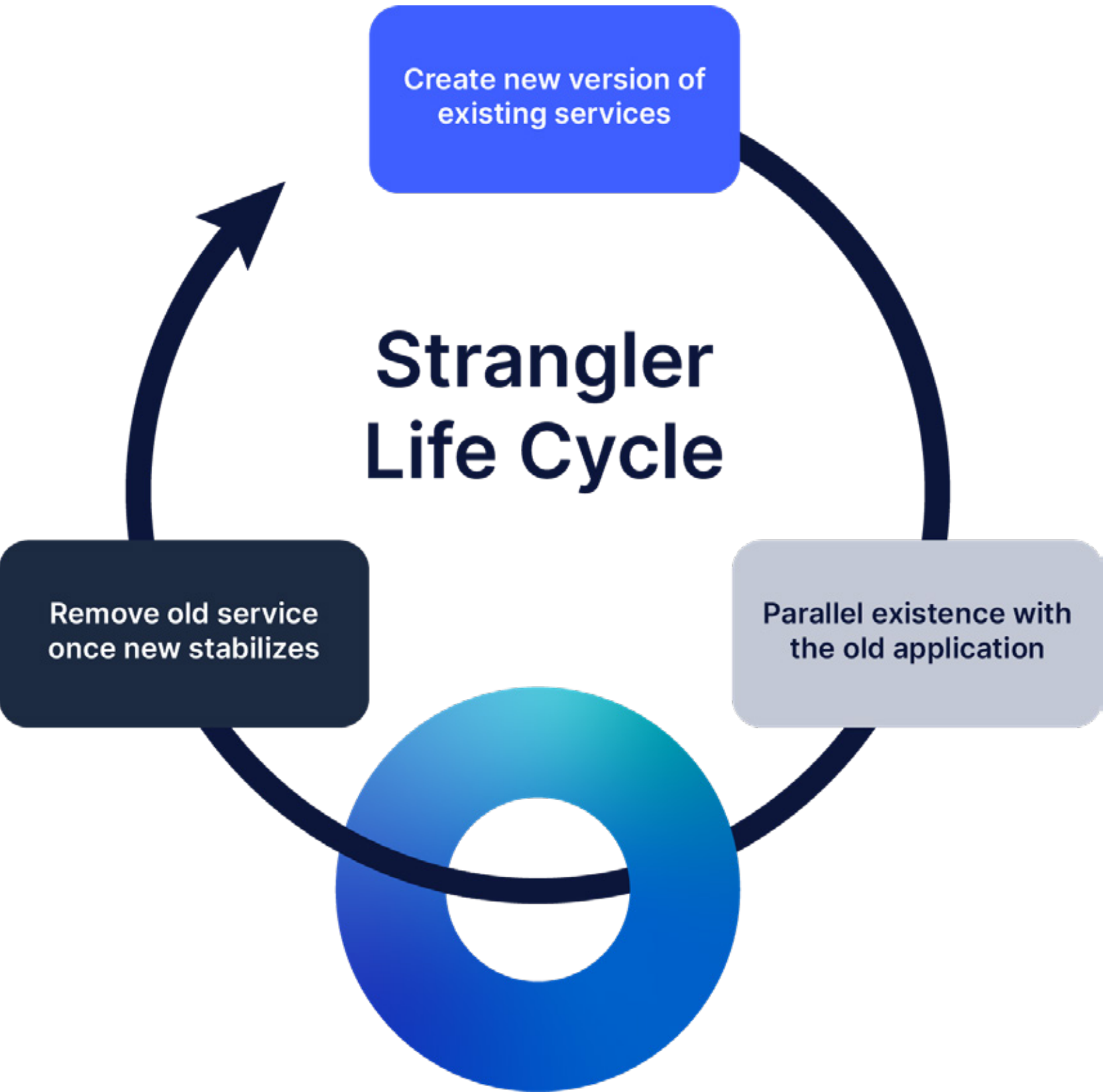
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Strangler Approach

If your brand’s main objective is to enhance the customer experience and quickly increase performance, then migrating crucial elements of your old system is a good place to start. The frontend (UI) is where you’ll gain the most since KPIs for SEO and customer experience will almost immediately improve. While enhancing and customizing your presentation layer, you can keep using your current eCommerce platform (UI).

By utilizing composable content management system, experience management, and other 3rd party tools, you can use the Strangler to concentrate on optimizing all metrics in a single component while starting to deconstruct the rest of your stack.

The Strangler application is built on top of existing services which are parts of the monolith and new functionality. With this approach, the monolith is gradually shrunk by replacing it with a new microservice built to support a packaged business capability.



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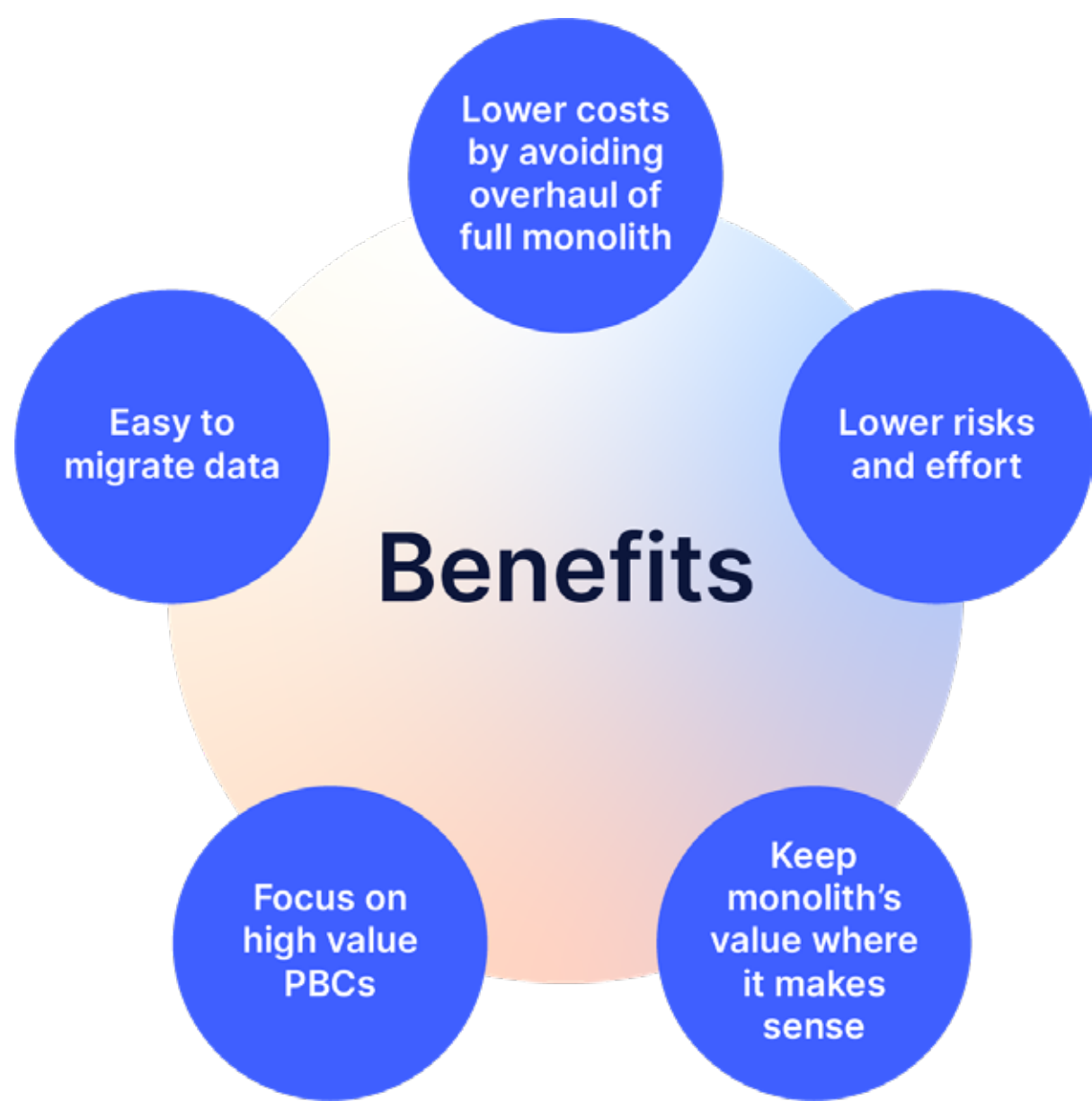
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Benefits of Strangler



“We were very happy with our decision to adopt Cloudinary and it’s been a big part of our evolution to look deeper at updating our overall tech stack. With Cloudinary we know we can work quite easily with other MACH vendors now that we’re fully headless.”

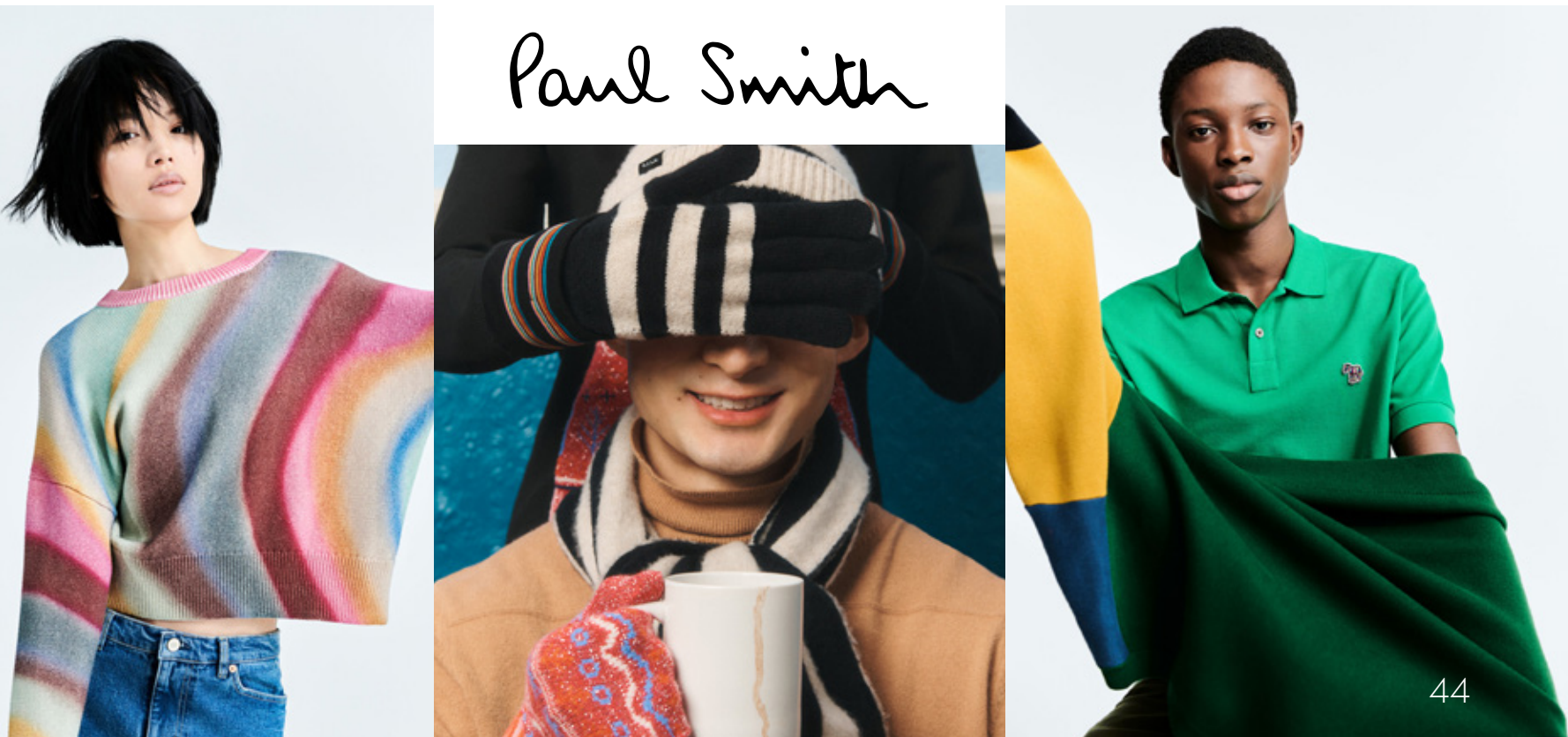
– **Hannah Bennett**
Head of Digital
Paul Smith

Strategy Considerations

- **Optimized operating model:** Ensure the right team with the adequate skillsets are available as change will impact monolith and new PBC migrating to composable commerce platform.
- **Cutover and data migration strategy:** Plan the cutover from monolith services to new services with adequate data and functional testing

Conclusion

Composable architectures are set up for flexible and sustainable digital commerce without creating a technological roadblock. The rewards of moving to composable commerce technology while maintaining some of the monolith’s value, outweigh the effort when the transformation is straightforward.





Conclusion

Composable architecture is the foundation on which modular, scalable, and testable applications rest. Additionally, you're able to build complex applications and systems that are flexible and adaptable to change.

The ability to rapidly respond to changes in the market and to easily integrate new technologies and services will give brands a competitive advantage.

Including Cloudinary as the media layer in your composable architecture provides you with a flexible visual media asset delivery platform. Cloudinary helps brands experiment with and deliver quality visual experiences without the many hours spent on manual tasks related to managing rich media.

About Cloudinary

Today, visual media determines the user experience of your website or app and can lead to high engagement and conversions, whether that's a retail sale, a download, a click to learn more, or a social-media follow. Whatever you define as a successful outcome of a digital experience, hyperautomation can make that happen more quickly and consistently. So, stop spending time manually creating asset versions and start building an engaging media experience. With Cloudinary, you can store, transform, optimize, and deliver all your media assets—images, videos, and the like— with easy-to-use APIs, widgets, or user interface.

For more information, visit [**www.cloudinary.com**](https://www.cloudinary.com).



About Publicis Sapient

Publicis Sapient is a digital transformation partner helping established organizations get to their future, digitally-enabled state, both in the way they work and the way they serve their customers. We help unlock value through a start-up mindset and modern methods, fusing strategy, consulting and customer experience with agile engineering and problem-solving creativity. As digital pioneers with 20,000 people and 53 offices around the globe, our experience spanning technology, data sciences, consulting and customer obsession — combined with our culture of curiosity and relentlessness — enables us to accelerate our clients’ businesses.

We have 25+ years experience developing digital commerce solutions

