

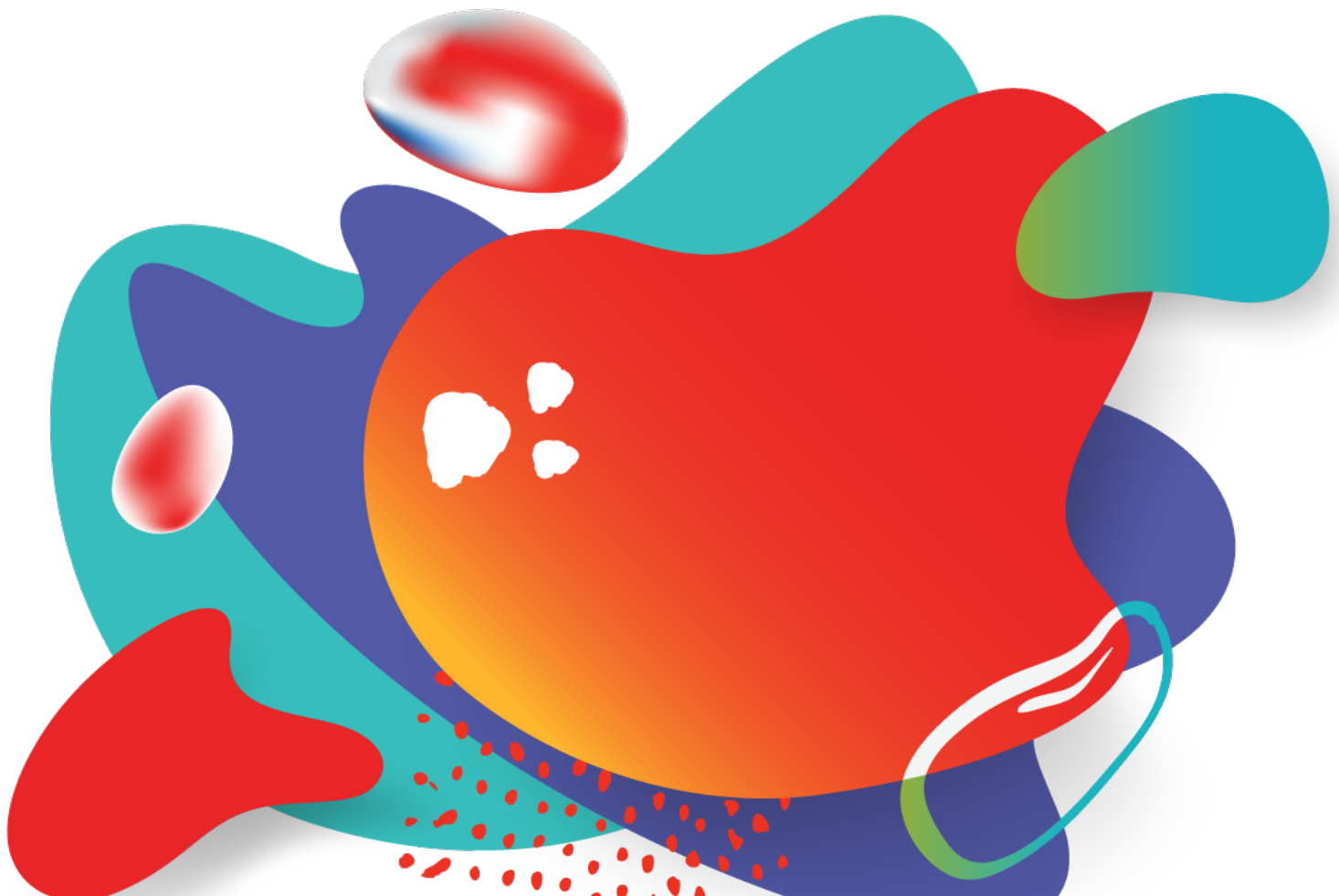
API-first immersive omnichannel experiences

Manage and deliver headless content with Experience Manager



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Executive summary

To keep delighting your customers, you need to deliver exceptional experiences across the increasing number of channels and devices that they want to use. What's more, these same customers have come to expect immersive and responsive app-like interactions on every channel. This is fueling the growth of headless content development and delivery—separating content creation and management from layout, design, and experience.

This paper explores how Adobe Experience Manager addresses your current needs for headless content management while building a foundation for future growth. Experience Manager is a modern, cloud-native content management system (CMS) that gives you a full combination of rich headless capabilities, comprehensive headful modes, and powerful single-page application (SPA) tools to deliver immersive experiences everywhere. With Experience Manager, developers get full flexibility for accessing content headlessly, while marketers can accelerate content velocity, maximize reuse, and ensure tailored experiences.

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The need for exceptional omnichannel experiences

Customers are using a greater variety of digital touchpoints, including web, mobile, IoT, in-app experiences, and more. This has led to an explosion of channels that you need to engage across. In addition, the wide use of smartphones and smart devices has led consumers to expect app-like experiences that are immersive and responsive. To satisfy your customers, you need to deliver exceptional app-like experiences everywhere.

At the same time, an influx of new developer-friendly technologies (like the JavaScript framework's React, Angular, and Vue) provides IT teams with tools to code app-like front-end experiences for the web that meet user expectations.

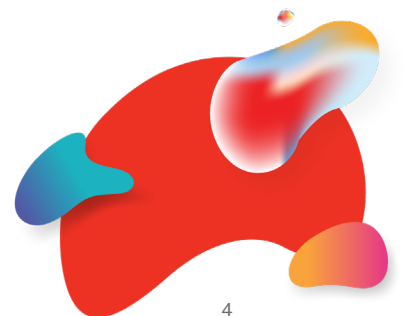
The challenge is how to effectively support exceptional experiences across all of these channels and promote quick time to market while also ensuring marketers have the agility to efficiently manage and launch content across channels.

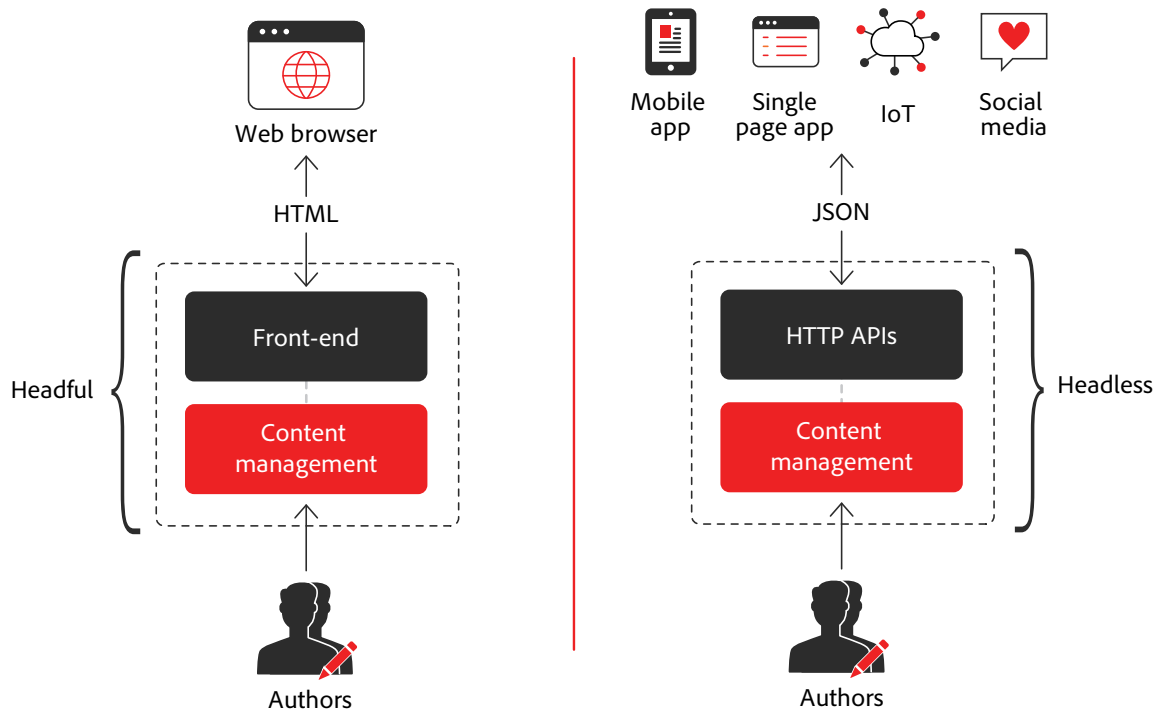
Headless techniques

These trends have led IT teams to consider headless content management as an option for experience management and delivery.

Headless means that content is decoupled from the presentation layer (the head) and is delivered in a channel-neutral format to power any channel or experience. A headless-capable CMS exposes content as JavaScript Object Notation (JSON) through well-defined HTTP APIs. Developers can access content from the CMS using headless APIs and then render it in their customized applications, like a SPA, IoT, or mobile app.

This approach contrasts with the decoupled or *headful* approach in which the CMS manages the content and presentation logic and outputs fully formatted HTML. Headful combines the content with a layout to deliver an HTML-based web front-end experience. While enterprises will continue to have coupled or headful content delivery needs, headless API-first approaches help provide more options for enterprises to fuel content into app-like experiences across devices.





Headful versus headless content delivery

Experience Manager offers complete headless CMS capabilities

Experience Manager is a comprehensive content management system with rich headless capabilities to manage and deliver personalized content. It is built on a central content repository that leverages an application framework based on REST and API access to support the straightforward development of decoupled, content-oriented applications.*

Experience Manager makes it easy for you to structure and author reusable content efficiently for headless use. Developers can then leverage HTTP APIs to deliver JSON content to any experience.

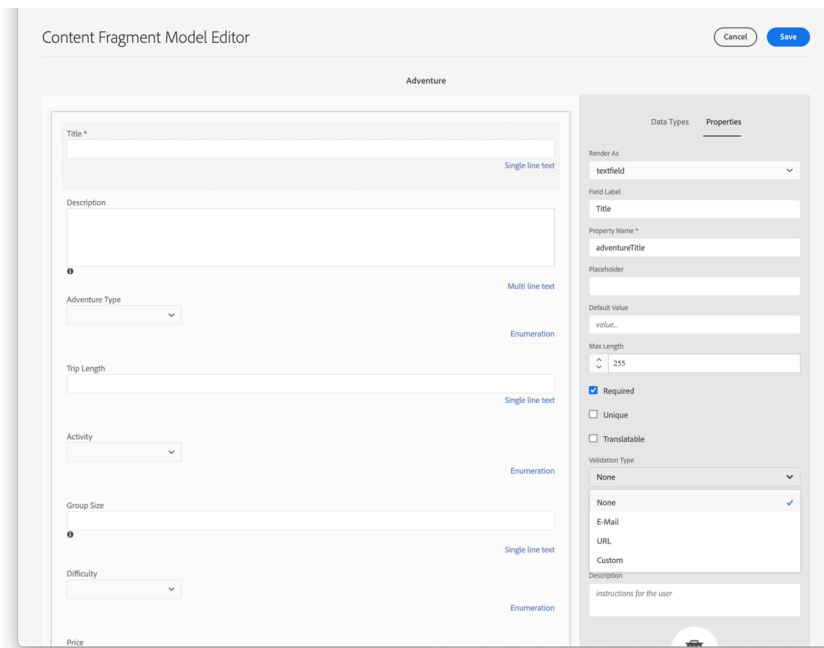
Manage and author headless content

Experience Manager maximizes content reuse with centralized, modular content, called *content fragments*. A content fragment is a design- and presentation-agnostic set of content intended for repeated use across multiple channels and experiences. Content fragments are structured pieces of content that are based on an extensible content model describing the content types and interrelationships. Users can add content fragments defined by their model.

* Experience Manager is based on Apache Jackrabbit Oak, an open source content repository, and Apache Sling, an open source framework for RESTful web-applications

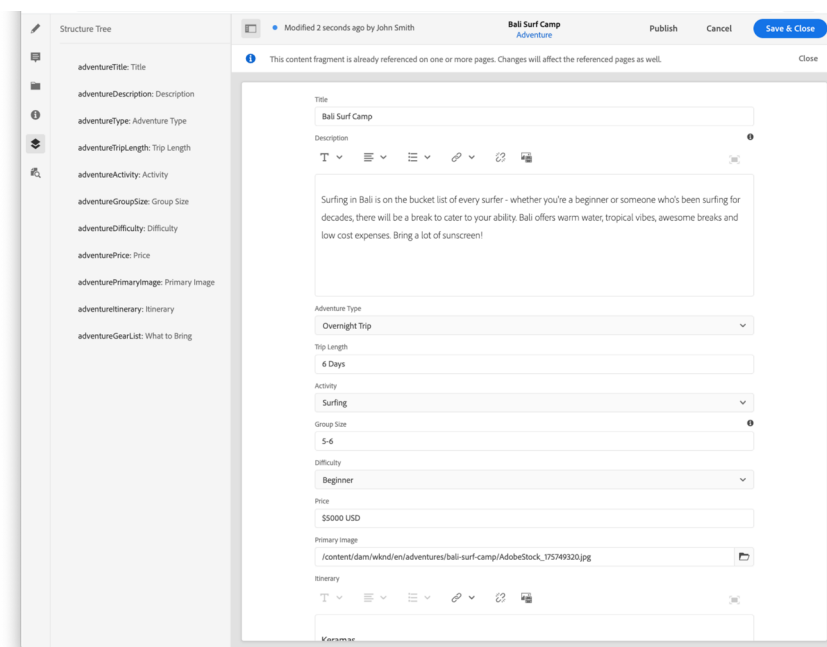


Data fields in a fragment can be required or optional and include data entry and validation rules. Nesting fragments and content references enable authors to create flexible content relationships. The Content Fragment Model Editor is used to define the structure and relationship of reusable content in Experience Manager.



Using the Content Fragment Model Editor to create a fragment

With a content model in place, the Content Fragment Editor makes it simple for authors to create fragments with an easy-to-use user interface. Authors use the editor to add and revise reusable structured content quickly and easily for headless delivery.



Authoring a content fragment in Experience Manager

Translation capabilities in Experience Manager allow fragment localization to deliver content to customers in their preferred language. A text summarization feature enables authors to create variations of content optimized for different downstream channels and varying screen sizes with minimal effort. Authors can easily find the digital assets needed to create new content using services that leverage artificial intelligence to automatically tag content and media, streamlining discovery and content reuse.

Experience Manager automatically creates versions during fragment editing, making it easy to review changes and restore earlier content. In combination with a built-in workflow engine, content governance becomes an integrated part of the process, increasing messaging consistency and reducing the time and cost associated with reviewing, approving, and publishing updated material.

Headless content delivery

Content managed by Experience Manager can be delivered headlessly to fuel modern content experiences like SPAs built with React or Angular, native mobile apps, IoT apps, or in-app experiences. This is done using the GraphQL API, the Assets HTTP API, and Dynamic Media capabilities.

The content fragment library can be queried and retrieved using standard interfaces, such as GraphQL and HTTP REST APIs. With these tools, downstream channels can select the content they want and get an unstyled JSON format complete with element names, values, and data types, ready for local processing.

GraphQL is an industry standard, application-agnostic query language format originally created by Facebook to query and retrieve content. It is designed to be compact and efficient, returning

just the content requested and nothing extra, so that responses match the format and needs of the requesting app. Queries can follow references and nested content and return multiple related items in a single query/response pair, significantly reducing the time and bandwidth required to retrieve the desired information. This is in contrast to HTTP REST APIs, which typically require calls to multiple URLs to get all the nested data they need.

Because apps using GraphQL minimize requests and limit data to just what they need, they can be quick even on slower mobile network connections. Experience Manager also supports caching of GraphQL queries, reducing the number of back-end calls for common queries. An integrated, in-browser user interface is available for developers to easily build, test, and debug their queries. In addition, GraphQL is self-describing, allowing clients to discover the models and properties that are available.



```
1 # Welcome to GraphiQL.
2 #
3 # GraphiQL is an in-browser tool for writing, validating, and testing GraphQL queries.
4 #
5
6 {
7   adventures {
8     items {
9       adventureTitle
10      adventureType
11      adventureActivity
12      adventurePrice
13      adventureDescription {
14        json
15      }
16      adventurePrimaryImage {
17        ... on ImageRef {
18          _path
19          width
20          mimeType
21        }
22      }
23    }
24  }
25 }
26
```

```
{
  "data": {
    "adventureList": [
      {
        "adventureTitle": "Ball Surf Camp",
        "adventureType": "Overnight Trip",
        "adventureActivity": "Surfing",
        "adventurePrice": "$5800 USD",
        "adventureDescription": {
          "json": [
            {
              "nodeType": "paragraph",
              "content": [
                {
                  "nodeType": "text",
                  "value": "Surfing in Ball is on the bucket list of every surfer - whether you're a beginner or someone who's been surfing for decades, there will be a break to cater to your ability. Ball offers warm water, tropical vibes, awesome breaks and low cost expenses."
                }
              ]
            }
          ]
        },
        "adventurePrimaryImage": {
          "_path": "/content/dam/wknd/en/adventures/ball-surf-camp/AdobeStock_175749306.jpg",
          "width": 1600,
          "mimeType": "image/jpeg"
        }
      },
      {
        "adventureTitle": "Beervana in Portland",
        "adventureType": "Day Trip",
        "adventureActivity": "Social",
        "adventurePrice": "$300 USD",
        "adventureDescription": {
          "json": [
            {
              "nodeType": "header",
              "style": "h3",
              "content": [
                {
                  "nodeType": "text",
                  "value": "Experience the best craft breweries in the Pacific Northwest."
                }
              ]
            }
          ]
        }
      }
    ],
    "header": {
      "nodeType": "text",
      "value": "Experience the best craft breweries in the Pacific Northwest."
    }
  }
}
```

Sample GraphQL query and returned JSON in GraphiQL interface in Experience Manager



Experience Manager also includes the Assets HTTP API, which allows downstream channels to perform create, read, update, and delete operations against content managed in Experience Manager. For example, a mobile app with a Q&A section could add a new content fragment for a new user question into Experience Manager via this HTTP REST API.

The partners of structured content fragments are unstructured but equally reusable experience fragments that are also delivered via API. Experience fragments act like reusable snippets of an experience that can have channel-specific layout variations. They can be directly edited using a WYSIWYG editor by marketers and can then be accessed over a HTTP REST API by developers as HTML or JSON.

It's also easy to deliver optimized media headlessly in apps using Experience Manager Dynamic Media capabilities. This allows optimized media delivery for device screen size, cropping and resizing, and intelligent AI based services like Smart Crop to automatically crop images while preserving the focal point of the image or video.

Using powerful headless APIs such as the GraphQL API, it's easy for front-end developers to deliver content from Experience Manager to their apps with only minimal knowledge of Experience Manager itself. The Experience Manager content delivery APIs such as HTTP REST and GraphQL integrate smoothly in client-side development frameworks, for experience creation that does not require specific Experience Manager developer knowledge.

Agility to extend to all channels

With many front-end experiences being deployed as SPAs, marketers are often looking for methods to achieve the same level of content velocity for previewing and in-context editing with SPAs that

they are used to for managing web pages. The Experience Manager SPA Editor helps streamline the authoring of SPA content by business users. It offers a WYSIWYG user interface for authors to make in-context changes to the content, layout, and presentation of SPAs. Editing support can be extended across the entire SPA, or just a specific experience "spot" in the SPA. Marketers then get instant preview and publishing of changes.

SPA Editor supports server-side rendering to improve first-page load time and SEO. Developers continue to use their choice of JavaScript development frameworks and build tools, such as React and Angular, to create the SPA. This means that the SPA Editor allows developers and marketers to work in tandem delivering SPA-based experiences. To help developers create SPAs even faster, Experience Manager also offers React and Angular Core Components purpose-built for Experience Manager, which are ready to use components (such as Progress Bar, Carousel, or Image) for SPAs.

While Experience Manager provides complete headless capabilities, it can also seamlessly extend all content to headful pages when needed. Content fragments, experience fragments, and assets can be seamlessly reused across headless and headful experiences. This means that marketers can fully author headful experiences like landing pages or microsites in the WYSIWYG drag-and-drop editor. Powerful styling and templating accelerate authoring yet maintain governance. Authors can quickly create experiences using Core Components, which are premade, reusable page components, like Teaser and Carousel, that also support JSON output out of the box. Experience Manager can also transform any authored site into a Progressive Web App (PWA) at the click of a button for easy delivery of app-like experiences.

Foundation for enterprise experience management

With complete headless features built on an industry-proven comprehensive CMS, Experience Manager is designed to accelerate and optimize experience delivery and satisfy management needs today and in the future.

Experience Manager is uniquely able to streamline the enterprise content workflows needed to power the delivery of relevant content headlessly or headfully at scale. This starts with a single source of truth for content across the organization, leveraging leading enterprise digital asset management capabilities. Robust permission controls and role-based management ensure governance. Workflows help you move projects through approval processes before publication. Localize and manage content across multiple languages. Advanced artificial Intelligence-based services automate tagging, cropping, and manipulating assets to improve marketer efficiency.

Creatives and marketing teams can also collaborate faster using native connections between Experience Manager and Adobe Creative Cloud. For example, designers in Adobe Photoshop and marketers in Experience Manager can collaborate on creating the multiple creative asset versions needed for a digital campaign, which are then added into content experiences by content authors and flow into headless-powered personalization.

Native integrations with the Adobe Experience Platform make it easy to use content to optimize digital experiences. AI-tailored experiences

are delivered using A/B testing, targeting, and personalization of content through integrations with Adobe Target. Use Adobe Analytics to provide actionable information and cross-channel insights to understand customer behavior. By accelerating content velocity across design, management, and personalization phases, Experience Manager helps ensure marketers can continue to deliver the business results needed, even when headless techniques are used for fueling content to apps.

Built on a cloud-native foundation, Experience Manager supports the agility to start small and grow with your experience management needs. Its container- and service-based architecture scales dynamically, is always current with the latest features, and is secure. As an extensible platform, Experience Manager also offers many integration options, including a wide range of apps available from the Adobe Exchange Marketplace. This includes the ability to power exceptional e-commerce experiences using the Commerce Integration Framework to integrate with Adobe Magento Commerce, or your choice of third-party commerce platforms.

Customers expect app-like experiences on an exploding set of touchpoints. Experience Manager gives you complete API-first capabilities to deliver the omnichannel immersive experiences that your customers want, while accelerating the authoring, development, and optimization of experiences both today and in the future.

For more information.

www.adobe.com/go/aem

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