

The Rise Of The Headless Content Management System

Content Microservices And APIs Point Toward The Future Architecture Of Digital Experiences

by Ted Schadler and Mark Grannan

March 14, 2016 | Updated: March 17, 2016

Why Read This Report

Compelled by the need to deliver content-rich digital interactions on mobile, Web, and everywhere, application development and delivery (AD&D) professionals supporting content management technologies are taking an API-first approach. They are adopting new headless content management systems (CMSes) from vendors like Built.io, Cloud CMS, Contentful, and Prismic.io. Or, they are tapping into new API sets from web content management stalwarts like Hippo and SDL to unlock content. This microservices approach is the future of digital experience architectures.

Key Takeaways

Headless Content Management Systems Offer A Different Approach Over Existing Strategies

Today's full-stack web CMSes offer robust features, tightly coupling content management to delivery. A headless CMS stores content in pure format, ready for any purpose. It provides access through stateless APIs for authoring, delivery, and analytics. And it takes full advantage of the cloud.

Warning: Headless Content Management Is For Do-It-Yourself Shops

If you decide not to buy a packaged solution, you can compose one by adding content authoring and workflow tools, using different delivery tiers for different touchpoints, and implementing new kinds of content analytics. You may also have to push the pause button on WYSIWYG.

Get Ready For Microservice Architecture

New "Millennial architects" are already using headless CMS tools alongside multiple other sets of API-first microservices to build out new digital products. These digital natives take a product engineering approach to digital experience architectures.

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In developing this report, Forrester drew from a wealth of analyst experience, insight, and research through review of existing frameworks as well as advisory and inquiry discussions with end users and vendors across industry sectors.

Related Research Documents

[Digital Experience Technology Integration: Go Beyond Just A Basket Of Solutions](#)

[The Forrester Wave™: Digital Experience Platforms, Q4 2015](#)

[Market Overview: Web Content Management For Digital Experiences](#)

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Content Is A Cornerstone Of Digital Experiences

Imagine a digital screen without content. We can't, because every moment we spend on a smartphone, PC, tablet, kiosk, or smartwatch is enriched and made vital with digital content: images, text, video, product reviews, and much more. Even when we ask Siri for the nearest tapas carryout, she gives it to us via words, links, pictures, maps, ratings, and reviews — all content. And that content must be highly relevant: It's the way customers experience their digital interactions. That makes content a cornerstone:

- › **At the core of digital experiences.** In a global study of software decision-makers, we found that 71% of North American enterprise respondents are expanding or implementing web CMSes — more than any other customer-facing application that we asked about.¹ The head of digital operations at a global bank told us that his team of 12 people manages 3,500 content changes to the web experience every single day.
- › **Relevant on every device and in every channel.** Mobile apps and mobile Web continue to displace and augment the desktop Web as the primary touchpoint. In 2015, Americans spent more than 2 hours a day on their smartphones and over 1.5 hours on their tablets.² That means the content has to work brilliantly: rapidly rendered, gorgeously displayed, and deeply personalized on any device and in any channel — yours or a partner's. Content is the centerpiece of the digital experience architecture (see Figure 1).
- › **That you must personalize with metadata.** You can't personalize content unless you've tagged it to find the highest relevance. And that means continuously updating the attributes and metadata to match content to a person's full context, including history, preferences, and intent. As part of its content recommendation strategy, The Washington Post analyzes tens of millions of events every night to improve content and ad relevance. You can't update the underlying content repository that frequently. So AD&D pros need a new layer of tag data management: a new content repository designed for dynamic changes.

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FIGURE 1 Content Is A Cornerstone Of The Digital Experience Architecture



Many Content Repositories Fail To Meet Today's Digital Everywhere Requirements

When the world was just web and email, a web CMS could handle dynamic content delivery just fine. These systems, which date back to the 1990s from vendors like Adobe, HP, IBM, Oracle, SDL, Sitecore, and others, grew by solving tough problems like unique designs, WYSIWYG authoring, workflow for approvals and translation, marketing support, and Internet-scale delivery. This resulted in:

- › **Content cluttered with markup and metadata.** The content you need on a mobile app, printed statement, or Facebook post may not use HTML. When you store content for a specific delivery use case, it's hard to use it elsewhere. In addition, different business practitioners, partners, and customers create content outside core systems or processes, and the explosion of mobile and digital customer interactions stress these old content architectures to the breaking point.

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- › **Tightly coupled authoring and delivery environments.** This link between authoring/storage and delivery offers tremendous benefits in performance, practitioner ease of use, and agile content updates. This is how many web CMS architectures work. But if you optimize your content repository for HTML templates, you have to undo all that optimization to use the content anywhere else in a non-HTML format.
- › **APIs as an afterthought.** The flip side of tight coupling is that those products didn't require APIs linking the repository to the delivery tier or the content authoring and workflow tools. So any new APIs vendors like Adobe and Sitecore have built are best-effort interfaces built on old-style Java or .NET call interfaces. That doesn't make them bad or a bad idea, but they reflect the existing, tightly coupled approach.
- › **Product packaging that made it hard to buy just the content repository.** Selling the content repository and delivery environment together makes perfect sense for web-only scenarios. But if you want to reuse the content on the mobile app or in email marketing, you still have to run the entire web CMS stack. And you will also invariably have to replicate or synchronize content rather than pull it natively and dynamically at runtime.

Headless Content Management Systems Offer A Different Approach

If we knew then what we know today, we'd take a different approach — one built on Internet standards and cloud hosting and taking advantage of huge advances in storage, bandwidth, and computing power. That's what a new breed of solutions we call headless content management systems is doing. A headless CMS uses modern storage, stateless interfaces, and cloud infrastructure to efficiently deliver Internet-scale content experiences on any device.³

A headless content management system is the content component in a digital experience architecture. It interacts with other components, including authoring, delivery front ends, and analytics tools, via loosely coupled APIs. A headless content management system may offer native content authoring and experience previewing but may also be integrated with other authoring environments like Adobe's Creative Cloud. These next-generation content building blocks:

- › **Store content in pure format, ready for any purpose.** The CTO of a European omnichannel retailer told us that Contentful solved his company's multi-markup problem by separating content storage from content delivery. To achieve this, headless CMS products use formats like JavaScript Object Notation (JSON) due to its simplicity and strengths around data analysis. These repositories typically use NoSQL databases (like Apache Cassandra and MongoDB) for performance and scalability.
- › **Provide access through stateless APIs for authoring, delivery, and analytics.** Increasingly RESTful APIs are the only choice when you don't know the "what" or "when" of digital experience content. Headless CMS distills the commonplace complexity down to a select few, yet very robust, web service APIs, which are superior to older Java APIs because they are stateless,

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discoverable, and event-driven; on the authoring side, APIs drive flexible consumption of content workflows, enabling a bring-your-own-authoring-environment strategy. For delivery, APIs allow for heterogeneous delivery to any front end at runtime.

- › **Allow any application — Web, mobile, IoT, marketing — to pull and render content.** RESTful APIs and a collection of software development kits let front-end development teams use any programming language (e.g., Ruby, PHP, Java, or Swift) to pull content — without running app updates through Apple, for example. The front-end code controls the look, feel, and functionality of the experience, but the content comes from a headless CMS. As a testament to this flexible focus, JavaScript client-side web frameworks such as Angular, Ember, and React flared in popularity in 2015 for Web and mobile Web.⁴
- › **Take full advantage of the cloud.** Because of their content storage purity, stateless APIs, and scale-out architectures, headless CMSes run well on cloud platforms like Amazon Web Services or Microsoft Azure. Running in the cloud, these content building blocks are readily available for new applications, allowing teams to rapidly iterate on new ideas with little upfront cost. And if an application takes off, cloud scalability will rise to the occasion.
- › **Deliver a new content microservice.** The sum total of pure content storage, stateless APIs, delivery-tier agnosticism, and cloud hosting adds up to a new architectural pattern called a microservice. Headless content management systems are the right approach to building a content microservice because they aren't bogged down by Java interfaces and heavyweight software packaging. Playboy Enterprises' playboy.com is built on a headless CMS and 10 other microservices.

Veteran And Emerging Vendors Follow Headless Principles

The need for open content access accelerated with the mobile mind shift. And now new headless content management pure plays are putting even more pressure on traditional web CMS vendors to open up their repositories. We see some veterans and a growing number of startups offering headless CMS capabilities (see Figure 2):

1. **Content repository pure plays lead with APIs on modern infrastructure.** Contentful is the vendor we hear about the most. This Berlin-based startup is setting the pace for features, functions, and pricing for headless content. But other startups like Built.io, Cloud CMS, and Prismic.io benefit from a fresh start, taking advantage of RESTful integration approaches, JSON and NoSQL stores, cloud-hosted scale-out architectures, and content-only pricing models.
2. **Full-stack solution vendors expose the repository through new APIs.** A few web content management vendors are rebuilding for microservices architectures already, and we expect most others to follow suit. CoreMedia, eZ Systems, and Hippo are ready with repositories and APIs, even if their architectures aren't as slim and trim as the headless pure plays. Unfortunately, most of these vendors still package their products in bundles, so it's hard to buy just the repository.

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FIGURE 2 Examples Of Headless Content Management Systems Today

Cloud-centric pure plays (Not a complete list because more pop up every day)	
Built.io Contentstack	San Francisco-based Built.io, founded in 2007, has productized its content repository, Built.io Contentstack, to its portfolio to handle content management across web, mobile, and other digital scenarios.
Cloud CMS	Six-year-old, Waltham, Mass.-based Cloud CMS uses JSON to store content. It has more true content management features, including analytics and search, but it's headless because of the loosely coupled architecture.
Contentful	Founded in 2011, this Berlin-based startup takes an API-first approach to authoring and delivery. Contentful is attracting firms like Jack in the Box and Specialized, which are building a microservices architecture.
Prismic.io	Paris-based Prismic.io uses principles like infinite versioning, stateless APIs, and content slices to take a blank-page approach to rebuild CMS for the Internet era. This has attracted large firms in insurance and media.
Re-architected web content management or digital experience portal vendors (Not a complete list because vendors are rapidly re-architecting and re-packaging their software)	
CoreMedia	This Hamburg, Germany-based vendor is competing and winning as a content add-on to commerce products like IBM Commerce Server and SAP Hybris.
eZ Systems	Based in Porsgrunn, Norway, this open source provider is exploiting its loosely coupled approach to expose content for multiple channels and scenarios.
Hippo	This Amsterdam-based open source vendor has exposed its content capabilities as microservices with native APIs readily available to developers.
Progress Software (Telerik Sitefinity)	Based in Bedford, Mass., this product has a cloud-first approach with a clean API approach and a new architecture that supports both traditional web CMS and third-party needs.
SDL	This Maidenhead, UK-based vendor is re-factoring its platform to expose content in more native, scalable ways to serve global web scenarios.

Warning: Headless Content Management Is For Do-It-Yourself Shops

That means it's not for every organization. As Rob Frieman, director of eCommerce at Urban Outfitters, told us, "If you have a large engineering team building APIs, and you're doing native mobile development, then you'll 'get' headless CMS solutions like Contentful." These firms compose a complete solution using headless content management systems by:

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- › **Adding content authoring and workflow tools.** Depending on the solution you choose, you may need a separate authoring and workflow tool and lose some WYSIWYG simplicity. For example, you might bring authoring to Contentful with a collaborative toolkit like Adobe Creative Cloud or Atlassian Confluence, an open source CMS for its authoring capabilities, or a standalone authoring tool like Acquia's Drupal Lightning.
- › **Using a different delivery tier for web, mobile, or marketing touchpoints.** With a headless content management system, you gain flexibility in your delivery tier. For example, you can pull the content from a separate web delivery tier like Drupal or WordPress, integrate content into a mobile infrastructure platform from Kony or Red Hat, or ingest content into a commerce server from Demandware or marketing automation tool from Adobe.
- › **Implementing new kinds of content analytics.** Modern web content management systems offer engagement analytics, with content analytics largely as an afterthought. Personalization or test-and-target solutions feature some content analytics as well. But with content APIs at the center, headless CMSes are the right place to capture full content analytics to feed insights back into the creative teams. Today, you'll have to link full content and engagement analytics using a cloud business intelligence tool from a vendor like Birst or GoodData.⁵
- › **Pushing the pause button on WYSIWYG or learning to do without.** "What-you-see-is-what-you-get" authoring is one of the big successes of the web CMS products. But as the number and variety of touchpoints expand, this direct link is lost. After all, if you don't know the destination of content, it's hard to picture how it will look. We believe this will be the biggest pain point for mainstream web shops. However, we expect vendors like Prismic.io to mitigate this pain by adding viewpoints into the authoring tools. Alternatively, if your content editors know the template structure well enough, the transition to headless may be easier.
- › **Working with a partner to gain agility over pricey, bloated, packaged solutions.** In-house teams are not the only ones that will find a headless CMS attractive. Agencies and development shops are constantly refining their tool sets to meet client needs. As John Cunningham, global chief technology officer at Possible, a digital agency, told us:

"[With large, packaged solutions], it's millions of dollars before the client sees any value. Instead, we can use Contentful to manage content, Angular on the front end, and then re-use content in the mobile app and in-store experience. It's all about low-cost, fast time-to-market and delivering what most clients need . . . simple content use cases."

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What It Means

Get Ready For Millennial Architects And Microservices Architecture

Application development and delivery teams at publishing organizations, media companies, and branded manufacturers already use headless CMS tools alongside multiple other sets of API-first microservices to build out new digital products.⁶ These digital natives are taking a do-it-yourself approach to digital experience architectures and dragging their firms into the digital-first age. Here's what AD&D pros supporting CMS initiatives should keep an eye out for:

- 1. Millennial architects and others like them will challenge the status quo.** Most websites are built on 10-year-old software architectures. It's why firms have stood up entirely parallel stacks to support their mobile apps. Application developers or architects raised in an Internet-first, API-centric world are asking why they need all that bulky software and are pushing for an architecture built on loosely coupled application and insights web services instead. We expect Millennial architects to rise in importance as they move into positions of influence and power.
- 2. Advanced digital businesses will build microservice architectures.** When digital is the product, the architecture must be flexible and readily extensible. That means building on these loosely coupled microservices. Dr. Robert Zores of REWE Digital told Forrester his team is using headless components like Commercetools and Contentful to build an architecture of microservices to serve a scalable digital commerce platform.
- 3. Content will find a strong home in the commerce experience.** Luxury brands and commodity retailers share a plight: Customers have many choices, and prices are readily available. To compete, these firms are using branded and user-generated content to improve the experience and conversions. Headless content management solutions are a good building block alongside a headless commerce engine from Commercetools, Elastic Path, or Mozu, and they can also be content engines in a full-blown commerce solution from IBM, Oracle, or SAP.
- 4. Full-stack web content management system vendors will rethink their architectures.** Even if web CMS or eCommerce vendors are not going to relinquish control of the presentation layer to a dynamic JavaScript framework like Angular, they will be forced to publish new stateless APIs to deliver content everywhere. Doing this properly will take the vendors years and cost millions or tens of millions of development dollars. We expect Acquia and Adobe to ramp up their API stories in 2016.

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Supplemental Material

Companies Interviewed For This Report

Acquia

Built.io

Cloud CMS

Contentful

CoreMedia

eZ Systems

Hippo

Prismic.io

Progress Software (Telerik Sitefinity)

SDL

Urban Outfitters

Endnotes

¹ Source: Forrester's Global Business Technographics® Software Survey, 2015.

² Some 70 million Americans spend more time online on their smartphones than on any other device. It's been hard to know how your customers find their way to and from your mobile moments. Until now. Our US Consumer Technographics Behavioral Study helps you understand your customers' — and your competitors' customers' — direct engagement with your mobile app or site. We know where they stop and where they go next. CI pros can use this knowledge to improve marketing tactics, find mobile brand friends or foes, and optimize direct mobile engagement. See the "[Master Your Customers' Mobile Pathways](#)" Forrester report.

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- ³ Mobile is pushing aging web architectures to the brink. The three-tier architecture built for a browser-led PC world can't flex, scale, or respond to the needs of a good mobile experience or the emerging requirements for connected products. Mobile's volatility and velocity of change requires a distributed four-tier architecture that we call an "engagement platform." The engagement platform separates technical capabilities into four parts: client, delivery, aggregation, and services. The new requirements of modern apps will force content distribution networks, application server vendors, mobile middleware vendors, platform-as-a-service suppliers, a myriad of startups, and their enterprise customers to coalesce around this four-tier architecture. App development teams need to start planning immediately for the migration from three tiers to four. See the "[Mobile Needs A Four-Tier Engagement Platform](#)" Forrester report.
- ⁴ Consumer giants Facebook and Netflix face complex challenges in delivering innovative experiences to millions of users. How do they manage this growing volume of continuous streams for enormous volumes of concurrent consumers? The innovative solutions such giants build are powering the future of web and mobile app development. This brief explores the tools and techniques from Facebook that application development and delivery (AD&D) pros should adopt to address similar near- and long-term challenges. See the "[Brief: How Facebook Will Change The Digital Development Landscape](#)" Forrester report.
- ⁵ In Forrester's 16-criteria evaluation of cloud business intelligence (BI) platform vendors, we identified the 15 most significant vendors — 1010data, Adaptive Insights, Bime Analytics, Birst, GoodData, IBM, Microsoft, MicroStrategy, Oracle, Rosslyn Analytics, Salesforce, SAP, SAS, Tableau Software, and TIBCO Software — in the category and researched, analyzed, and scored them. This report details our findings to help application development and delivery (AD&D) professionals select the right solution for their cloud BI strategy. See the "[The Forrester Wave™: Cloud Business Intelligence Platforms, Q4 2015](#)" Forrester report.
- ⁶ We first heard this term from Malcolm Teasdale of Cloud CMS, and it brilliantly captures the new mindset of the digital-first architects and developers.

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