

dotCMS Integration Guide

Building a Flexible and Scalable
Digital Experience



Contents

dotCMS has an open integration philosophy. We believe integration should be lightweight at all levels, making digital experience integrations fast and efficient. This also means less risk to core business applications as well as creating a solution architecture that remains flexible enough to cater to continuous change with an overall lower total cost of ownership.

Best of Breed versus Marketing Suite	3
The Nature of Digital Experience Integrations has Changed	4
Content Integrations	5
Data Integrations	7
Front-End Integrations	8
Edit Mode Anywhere	9
Anything-as-a-Service	10
Option 1: Full Site Delivery	11
Option 3: Layout-as-a-Service	11
Option 2: Content-as-a-Service	11
APIs & API Tooling	12
About dotCMS	13

Best of Breed versus Marketing Suite

Content Management System vendors follow one of two distinct philosophies for Digital Experience Solutions: Best of Breed or Marketing Suite. dotCMS is a Best of Breed solution.

Marketing Suite players, such as Sitecore, Adobe and SDL, believe in creating one unified software stack to cover all aspects of the digital experience ecosystem. Depending on the strategy, they either build (i.e. Sitecore) or acquire (i.e. Adobe / SDL).

The vendors who focus on building complementary solutions internally face the challenge of keeping up with developments of this adjacent functionality compared to the respective best of breed players in that space. It is virtually impossible to build new competitive solutions in the areas of analytics, campaign management and marketing automation which been domains in their own right for over a decade.

Thus it is not surprising, that analysts shun this approach, as former Forrester Reach analyst David Aponovich wrote on the case of Sitecore:

“Sitecore is betting big on a suite approach. [...] The flip side of this is that some pieces of the Sitecore platform, such as analytics, aren't as mature as those offered by its peers. Sitecore needs more third-party integrations, particularly in analytics and eCommerce. Few of the Sitecore customers we've spoken with are using the vendor's entire offering; instead, they've implemented core content management and delivery — making it especially important for anyone considering this product to check customer references.”¹

Vendors trying to cover the entire digital experience landscape through acquisition find themselves in years-long integration projects of their acquisitions. In some cases, acquired solutions follow fundamentally different product architectures with the result that much R&D effort flows into making the siloed solutions appear to be working as one. As Tony Byrne from the Real Story Group writes,

“Adobe's suites are mostly mythical. Some enterprises get lured by Adobe's long-term vision of aligning creative and marketing digital life-cycles. Note, however, that Adobe's acquisitions in the digital marketing space have been thin and disconnected.”

Similarly, Mick MacComascaigh from Gartner Research said about Oracle:

“Oracle WebCenter Sites has seen significant development investment since the FatWire acquisition, but Oracle's broad approach to innovation depends largely on acquisition, rather than organic R&D. Much of its development effort is devoted to rationalizing and integrating numerous software products and services, which may hamper progress in some areas.”

Vendors following the best of breed philosophy like dotCMS, have concentrated their R&D efforts on creating an open product architecture that allows for more lightweight, faster and more flexible integration with other solutions in the digital experience landscape.

¹ Stephen Powers & David Aponovich, The Forrester Wave™: Web Content Management For Digital Customer Experience, Q2 2013, Forrester Inc.

² Mick MacComascaigh, Magic Quadrant for Web Content Management, Jul 2013, Gartner Inc

“WCM isn’t a suite story, it’s an integration story”³

- Forrester’s Stephen Powers and David Aponovich

The focus of suite players on building or bringing together technologies and locking their customer base into that offering, means they are losing valuable resources on advancing the individual products. In the meantime, best of breed vendors overtake on core competencies, leaving suite solutions with an outdated functionality set, complex and often disjointed integrations.

In summary, the disruptive nature of today’s digital experience landscape requires solutions that are easily and quickly integrated with other best of breed solutions. Moving forward, this approach is the only way in which organizations can benefit from the latest digital experience innovation and secure short time to market as well as consistently low TCO.

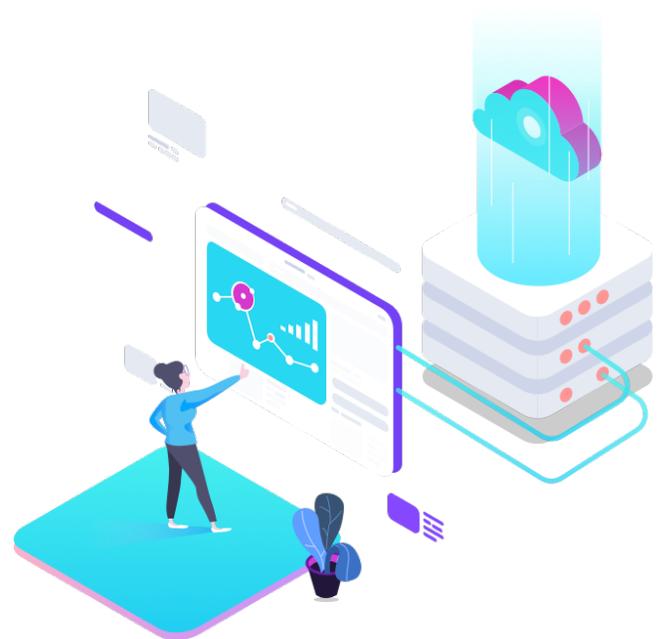
The Nature of Digital Experience Integrations has changed

No other domain of IT has undergone as radical a change in philosophy over the past decade, as the digital experience space. Traditional back end technology undergoes slow, deliberate change cycles and is by nature risk-averse. Contrary to this, next generation digital experience technology demands fast, agile delivery cycles and continuous innovation capabilities. This fundamentally changes the approaches in which Application Development and Delivery (AD&D) teams tackle digital experience integrations.

“Enterprises deliver digital customer experiences through the design, development, and delivery of applications using information technology and people skilled in software development and delivery. Today, most AD&D pros do their work within an application life cycle oriented toward core business systems; this life cycle doesn’t take into account what customers experience as a result of these processes. Projects that

support digital customer experiences require a different life cycle (see Figure 3). The two life cycles have fundamental differences in the information they manage, the speed at which they evolve, and the pace at which they must embrace new technologies.”

Web Content Management solutions play a core role in this new integration landscape and to succeed, vendors must support a diverse range of integration levels, in particular the integration of content, data and front-end functionality.



¹ Stephen Powers & David Aponovich, The Forrester Wave™: Web Content Management For Digital Customer Experience, Q2 2013, Forrester Inc.

² Mick MacComascaigh, Magic Quadrant for Web Content Management, Jul 2013, Gartner Inc

Content Integrations

Today, content typically resides in multiple repositories. This can be due to organizational silos, legacy technology or the different natures of content, such as structured content, product data, documents, multimedia assets etc. Modern Content Management Systems must be able to span across these repositories to provide digital experience team with one ubiquitous view on organizational content. In addition to that,

WCM solutions have to allow the enrichment of content and metadata to facilitate the harmonized delivery of content to all digital properties and allowing leveraging technologies such as targeting and personalization.

From an integration perspective, it is our belief that synchronizing all content / data from external content sources into the dotCMS repository is not the way to



go. A smarter way to leverage external content with dotCMS-enabled content and applications, is to use an external index (for example ElasticSearch which is part of the standard stack of dotCMS) and point to the external sources. The authoring environment is built to support the content-creation process seamlessly with external content sources to maximize the User Experience for marketing teams and avoid the toggling between different applications and therefore drive content velocity, time-to-market and Return-on-Investment.

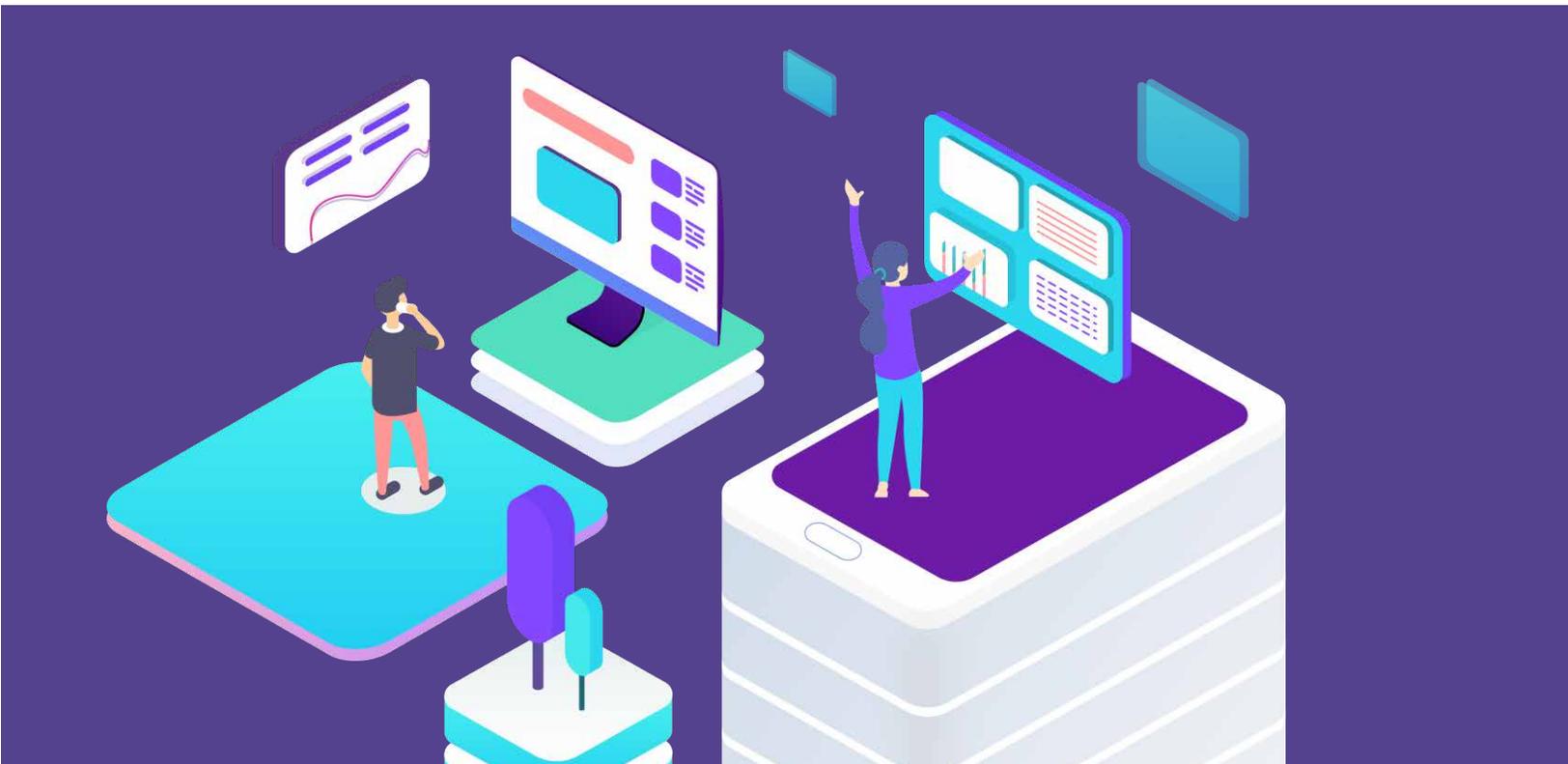
dotCMS has been traditionally very strong in the area of Content Integrations. The foundation of dotCMS is a scalable java based content repository that is overlaid with tools and capabilities to delivery and extend the content in digitally creative ways. All content and CMS functionality is exposed through a standard set of API interfaces. This allows any application or process to integrate with the CMS for automatic creation, import, export and publication of content, next to the web based CMS User Interface.

Other CMS platforms like Sitecore, Drupal and Adobe are historically more web-page oriented and don't allow external systems to operate on the raw, structured content in their repositories. They may have their content stored as web pages or parts of web pages including presentation, whereas dotCMS stores content in a structured way with no presentation applied. dotCMS Repository allows for the creation of domain-specific content types, enforcing data integrity when external systems push content into the repository.

The dotCMS delivery tier delivery framework has built-in support to search and serve content via REST³ endpoints. Using REST, content in dotCMS can

dynamically queried and be delivered either rendered through a server side template or delivered raw - via REST endpoints. Domain specific content can be exposed using these REST APIs to external applications that are web connected. Examples are external eCommerce platforms pulling content from dotCMS Repository, or a native mobile app getting the latest content from it over the web.

Next to providing a storage layer, the Repository is also responsible for the base CMS services such as metadata and workflow driven content management, content searching, versioning, processing, scheduling, transformation and aggregation.



dotCMS's OSGI⁴ driven plug-in architecture in the Content Management System allows customers to create plugins to access 3rd party systems from within the context of the dotCMS User Interface. This plug-in architecture defines clear extension points to the CMS layer. Programming against these well-defined end-points makes future upgrades of dotCMS easier to control and execute.

³ <https://dotcms.com/docs/latest/rest-api>

⁴ <https://dotcms.com/docs/latest/osgi-plugins>

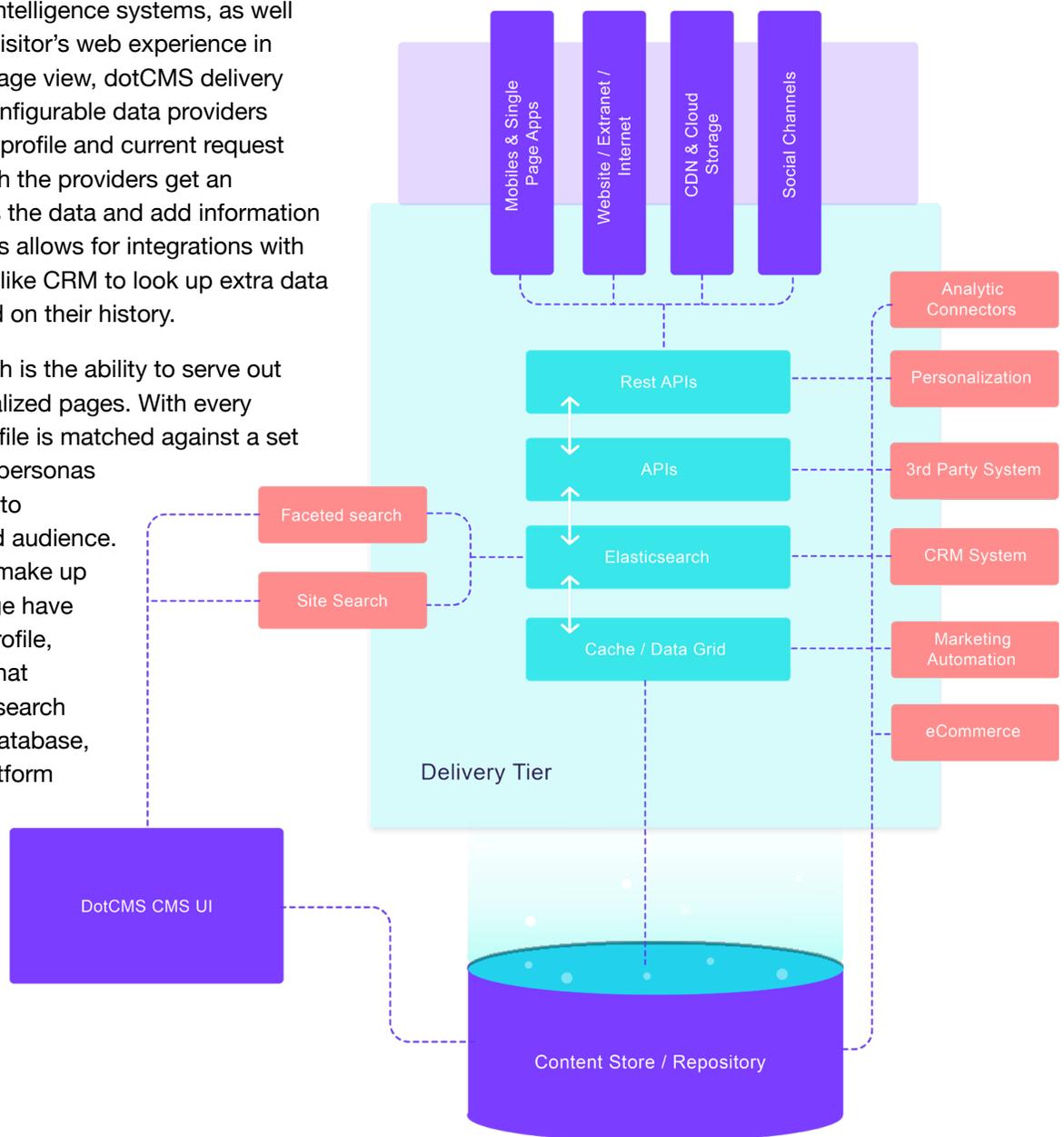
Data Integrations

Being flooded with content and information, online visitors expect interactions with a brand to be relevant and to the point of solving the very problem they have. The need for more dynamic and tailored information is the driver for the new rise of targeting and personalization functionality. For digital marketing teams, data on and around the customer has never been more important and connecting the data dots between different customer data stores inside and outside the organization has become crucial.

dotCMS maintains a live visitor profile for every unique visitor on an online property. The visitor's profile is initially stored in-memory but persisted into a back end NoSQL database. Whenever the visitor returns and is recognized, their previous profile is picked up and progressively enriched with new data points.

The visitor profile data can be used offline for data analysis by Business Intelligence systems, as well as online to tailor the visitor's web experience in real time. With every page view, dotCMS delivery tier triggers a set of configurable data providers that receive the visitor profile and current request information, after which the providers get an opportunity to process the data and add information back to the profile. This allows for integrations with external data systems like CRM to look up extra data about the visitor based on their history.

dotCMS's core strength is the ability to serve out truly dynamic, personalized pages. With every request, the visitor profile is matched against a set of characteristics and personas configured in dotCMS to represent a segmented audience. The components that make up the portions of the page have access to the visitor profile, allowing them to use that information as part of search queries and external database, Data Management Platform (DMP) or Customer Data Platforms (CDP) lookups.



Front-End Integrations

Many of the integrations that contribute to digital experience properties and modern online business applications do not necessarily require an integration with the back-end CMS. Rather, they require a contextual integration depending on the visitor situation, thus needing an integration on data level and the ability to mash-up content and applications in real-time.

dotCMS's strength in front-end integrations can be brought back to a core concept: The strict separation of content, layout and logic.

dotCMS stands out through the strict separation of content and content management from the context of its usage and its presentation. dotCMS does not maintain content in a page oriented way, rather content is stored in a generic structured format, allowing it to be reused and enriched. The content can be reused across multiple pages, but more importantly, the content can be shared across multiple application and devices obviously.

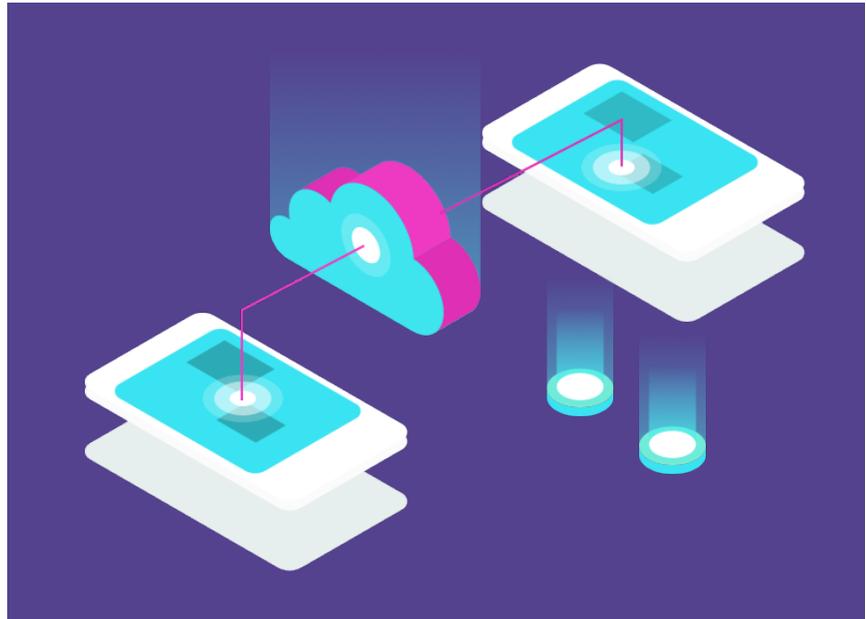
This allows business users to create a multiple digital outlets (website, mobile site, apps etc.) and repurpose all existing content for that new channel, saving time setting up additional channels, and reducing maintenance overhead in subsequent changes. This

content velocity as it should be. CMS Users can further enrich the content by adding metadata, which is used to further personalize the experience of site visitors based on their context. Needless to say, this drives business outcomes such as time-to-market, Total-Cost-of-Ownership and in the end Return On Investment of digital.

Dynamic digital estates and online business applications can access and manipulate the content stored in the CMS repository. Equally, CMS users can access this and 3rd party information from within the CMS user interface. (See: Content Integrations)

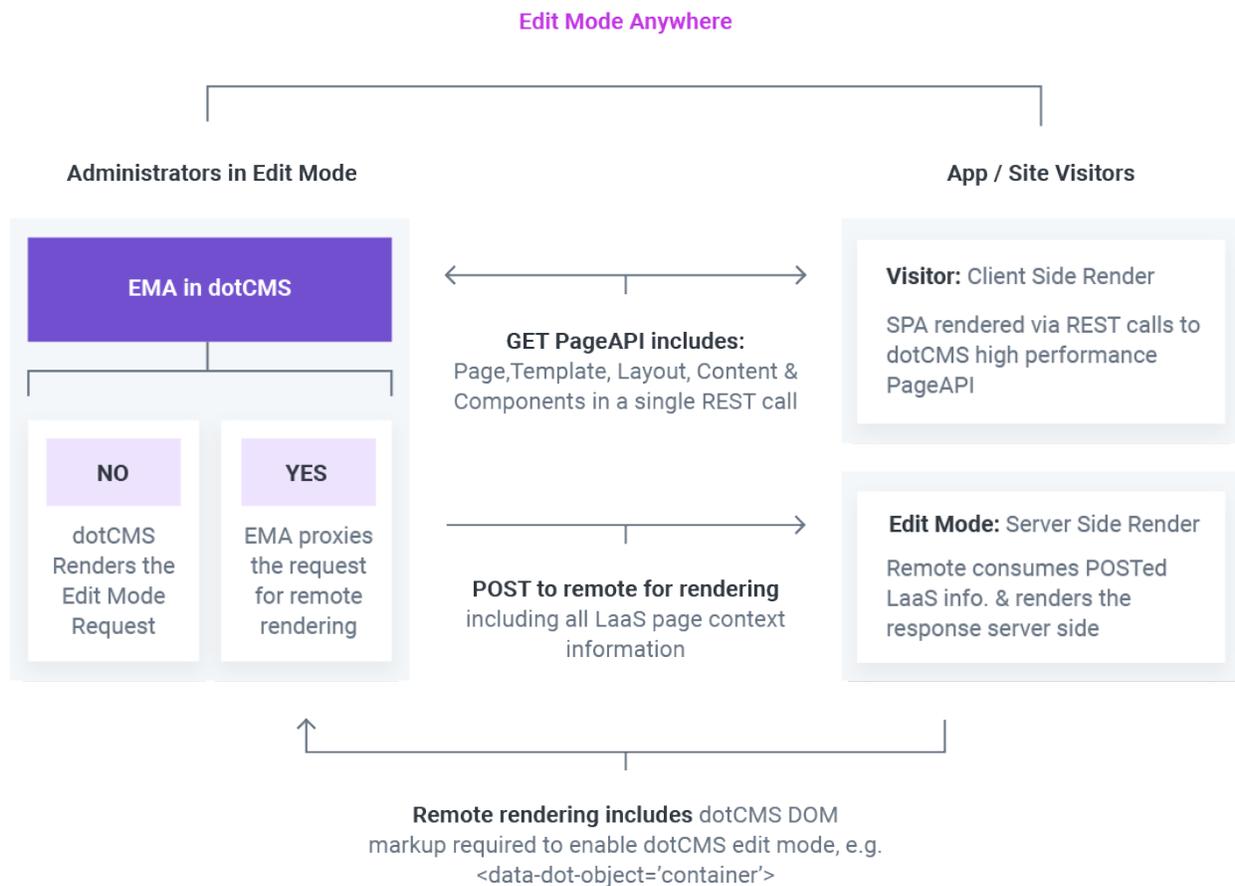
All content and CMS functionality are exposed through a standard set of REST APIs. This provides full control over content and means any external application can – with the appropriate permissions – create, import, export, search, manage, structure, manipulate and publish content just by using dotCMS's open APIs.

The REST interface opens up content also to non-Java applications as well as partner applications and affiliates. Furthermore, it allows customers to choose a custom delivery tier that does not make use of the dotCMS dotCMS delivery tier. It is this level of flexibility of dotCMS that helps enterprises to drive innovation and leverage agile frameworks, such as AngularJS, React and Node, to build content and data-driven applications that help to drive customer experiences as never before.



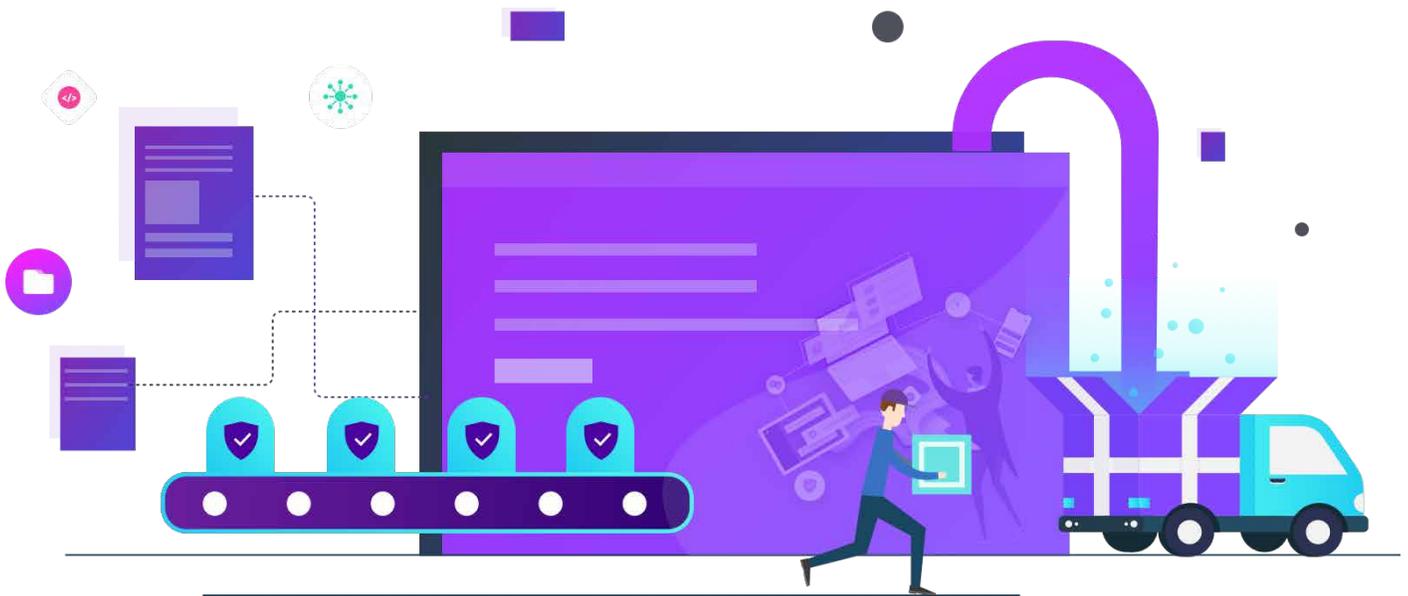
Edit Mode Anywhere

With dotCMS 5.1 (March 2019), dotCMS introduced [Edit Mode Anywhere](#). This critical capability allows for uninterrupted editor experience in dotCMS, when operating in a headless mode, meaning editors have full access to critical tools like preview, drag and drop, inline editing, personalization, and page composition and page template editing. This makes dotCMS even more compelling from an integration point of view and a true [Hybrid CMS](#): development teams can innovate with modern and agile JavaScript frameworks, while marketing teams have the tools needed to build and manage digital experiences faster and at a lower Total Cost of Ownership.



Anything-as-a-Service

In the early 2000s, portals played an important role for authenticated business applications. Some CMS vendors had a separate portal product next to their CMS. dotCMS never went that route and has always believed that portals would become obsolete at some point. This turned out to be true. Portals and portal technology was not the right stack to adopt new functionality in an agile and high-speed fashion. Particularly in relevant areas for digital marketing teams, portals were too cumbersome to support agile digital marketing (requiring continuous customer experience optimization). In addition, the portal stack was too top-heavy from an infrastructure perspective and far from lightweight. It always has been dotCMS's belief that managing customer experiences should be done with a lightweight business application that is flexible and open for enterprise application integration.



The dotCMS delivery framework offers both the mash-up technology that a portal offers and puts business users in the driver's seat when it comes to managing look & feel of digital experiences combined with content targeting & personalization capabilities. This way, dotCMS offers a single business application ('customer experience orchestration hub') to deliver hyper-personalized customer experiences to both anonymous and known (logged-in) users from a single solution. This allows dotCMS customers to build and deliver both authenticated and unauthenticated customer experiences.

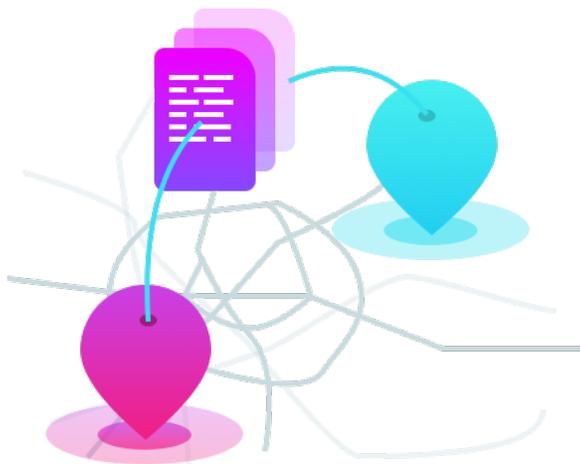
dotCMS has always leveraged the latest technologies, which compared to the competition leaves dotCMS with a much fresher and cleaner overall architecture. Concretely, the dotCMS delivery tier leverages Spring technologies like Spring MVC, Spring Security and Spring Integrations to integrate Spring-based applications into content-driven websites. Furthermore, the solution supports both server-side solutions (Edge Side Includes, Container Level Integration, Spring Bridge) as well as client side solutions (AJAX, Widgets, Gadgets) to facilitate visual integrations.

Because of its decoupled architecture from the very beginning, dotCMS was engineered to support Content-As-A-Service deployments. However, this scenario brings limitations for business users and technology teams and there is a need for multiple and flexible content delivery scenarios, which can be mixed and matched as requirements dictate.

All these scenarios make the dotCMS platform extremely well suited to be integrated into any (existing) ecosystem, as flexibility is crucial in today's day and age, especially when you are facing challenges around delivering a consistent, meaningful customer experience. Integrating new technology or new digital touchpoints is as easy as leveraging the existing APIs in both dotCMS and the adjacent business application that make up your digital experience platform.

Option 1: Full Site Delivery

This is the traditional and most straightforward approach where the full site rendering is handled by the platform and still a very common scenario. In this scenario marketing teams can profit from all the agile marketing capabilities dotCMS has to offer, including drag & drop for editing pages and templates as well as preview and content targeting & personalization. The technology teams can build the front-end applications from scratch with no limitations.

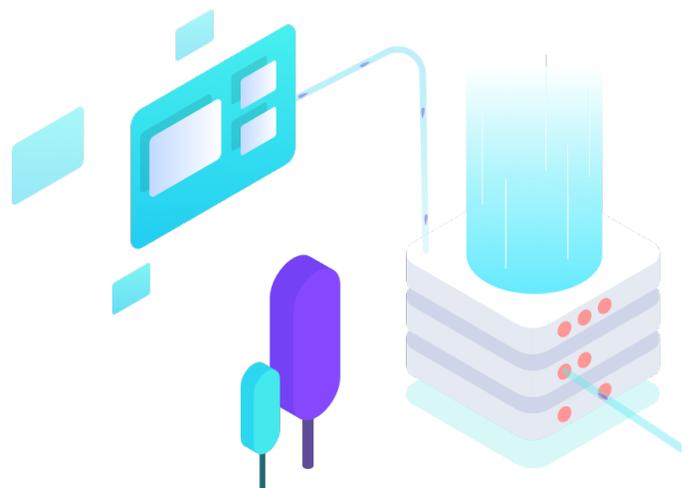


Option 2: Content-as-a-Service

The content as a service model allows the retrieval of content from the database in a easily consumable JSON or XML format. Content-as-a-Service scenarios fits well for mobile applications or external sites where content is mashed / aggregated and layout is not subject to change that often.

Option 3: Layout-as-a-Service

This scenario allows the page to be built in a full WYSIWYG approach, but the delivery can be done in both a structured format, for mobile applications or a Single Page Application, or in HTML fragments for inclusion in existing applications. dotCMS offers preview capabilities while the delivery is taken care of by a Third Party and we call this concept Layout-As-A-Service. Digital marketing teams have the full advantage as if the content delivery was done by dotCMS and the technology team can drive innovation with agile frameworks (Angular, Node, React) without being locked in a specific delivery framework.



⁵ <https://dotcms.com/docs/latest/page-rest-api-layout-as-a-service-laas>

⁶ <https://dotcms.com/blog/post/beyond-headless-content-layout-as-a-service-in-dotcms>

APIs and API Tooling

As an open source CMS platform, dotCMS offers a variety of APIs to cater to make best-of-breed scenarios as easy as possible. While we support traditional **Java APIs** as well, the majority of our clients work with our extensive and well-defined set of **RESTful APIs**. Since dotCMS 5.1, we also added **GraphQL API** and query support to the mix in order to enhance integration scenarios even further.

dotCMS [GraphQL support](#) exposes the dotCMS content repository as GraphQL and provides an API that allows developers to query and return specific properties of content and shape the API response at call time. Coupled with our new content relationships, this makes delivering custom views into the content repository simple and allows developers to traverse the content graph based on content relationships and other properties.

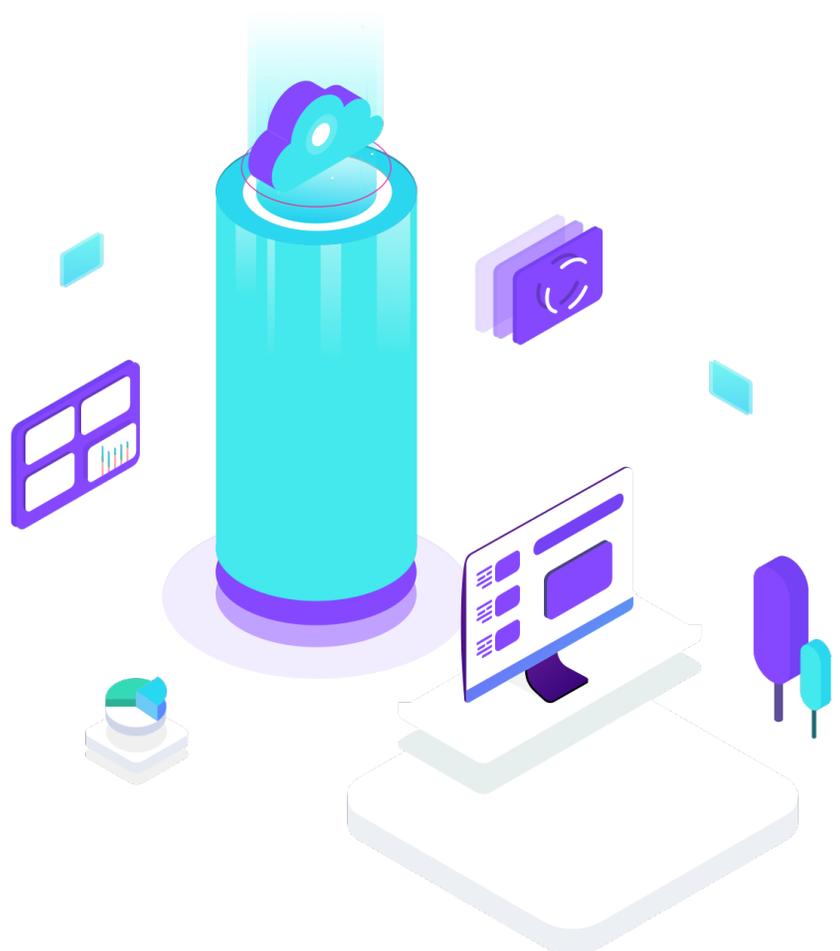
API Tooling

Building REST endpoints in dotCMS was already easy, but with the addition of two new tools in dotCMS 5.1, it will reduce the level of effort for web developers to build REST endpoints even further.

Scriptable API endpoints: In this release it is possible to define and deliver scriptable REST endpoints, which is a more solid and scalable pattern

Scripting-as-a-Service: In addition, permissioned users can control responses by using PUTting and GETting Velocity script in the requests.

This has a direct impact on the integrations (of any kind) with adjacent system and technology. No Java coding is required to build REST endpoints using this tool⁷.



⁷ <https://dotcms.com/blog/post/lightweight-endpoints-writing-custom-rest-endpoints-without-java>

About dotCMS

dotCMS is a leading, open source content and customer experience management platform for companies that want innovation and performance driving their websites and other content-driven applications. Extensible and massively scalable, both small and large organizations can rapidly deliver personalized and engaging content across browsers, mobile devices, channels, second screens and endpoints -- all from a single system.

Founded in 2003, dotCMS is a privately owned US company with offices in Miami, Florida; Boston, Massachusetts and San Jose, Costa Rica. With a global network of certified development partners and an active open source community, dotCMS has generated more than a half-million downloads and thousands of implementations and integration projects worldwide. Notable dotCMS customers include: Telus, Standard & Poors, Hospital Corporation of America, Royal Bank of Canada, DirecTV, Thomson Reuters Foundation, China Mobile, Aon, and DriveTest Ontario.

Web: dotcms.com

Phone: +1-305-900-2001

Email: info@dotcms.com

Miami

3059 Grand Avenue
Miami, FL, 33133
U.S.A

Boston

200 Portland St
Boston, MA, 02114
U.S.A

Heredia, Costa Rico

Eurocenter
Primera Etapa, Piso 2
106 Heredia, Costa Rica