

MEASURABLE SUCCESS



10 Checkpoints for Future-Proof Enterprise CMS

Scrivito CMS White Paper
New Enterprise SaaS CMS

DOES YOUR CMS HAVE IT ALL?

YOUR CONTENT MANAGEMENT SYSTEM CHECKLIST

- ☐ 100 % full-stack, cloud-native
- ☐ > 99.95 % availability of service
- ☐ > 160 CDN locations to scale content globally
- ☐ < 10 minutes of training to become an editor
- ☐ > 10k audited React frameworks and 0 insecure plug-ins
- ☐ 0 attack vectors and possible hacks by being serverless
- ☐ < 2 seconds page loading time globally
- ☐ 100 % headless APIs to access content from anywhere
- ☐ 0 maintenance cost
- ☐ < 60 seconds needed for first deployment

CMS IMPACT ON BUSINESS

CONTENT MANAGEMENT SYSTEMS CONTRIBUTE TO THE BUSINESS

Revenue

Revenue is based on demand, a business plan, the brand, and the business logic. However, if the CMS does not provide a secure technical foundation, measurable by some of the points mentioned in this paper, then the best business plan, a well-known brand, and smart business logic will fail in their effect. The CMS also has a clear revenue-relevant impact on the time to market. Fast project results and the possibility of agile adjustments determine a successful market entry nowadays. Finally, the performance of content delivery has a significant impact on the conversion rate and thus on sales.

Quality

Serving customers or employees poorly doesn't pay off. The CMS directly influences the quality of the user experience, the availability of service, brand reach, consistency, and compliance. A satisfactory CMS service level determines how defined quality is ensured.

Cost

Costs are directly influenced by the CMS. Operating costs, project costs, content creation, and content distribution costs all depend directly on the efficiency of the CMS. Many of the points mentioned in this article affect costs significantly.

Risk

The CMS has a clear impact on business risks, too. These can be normal business risks, such as rising costs or falling revenues. But there can also be technical risks, such as availability issues and hacking due to data security issues. Ultimately, legal risks such as data protection violations or compliance problems are also affected. The CMS influences these risks, especially in highly digital business processes.

STATUS QUO

THE ROLE OF THE CMS IS CHANGING

Limitations of current CMSs

The web has constantly changed and improved since Sir Tim Berners-Lee invented it in 1989¹. Unfortunately, the technology behind it has not. Web pages still load too slowly, responsiveness sometimes is just a promise, and weak security remains an ongoing issue. Content contributors still find themselves filling out complex forms in content management systems and clicking preview buttons to see the results, which is often far from how it looks to actual users.

Some reasons for this are that most popular CMSs are known for poor usability, lack of flexibility, ancient technologies, high maintenance costs – and they constantly face security threats. Enterprises use unscalable and inflexible tools, unsuitable for

omnichannel use. Many commercial enterprise CMSs are simply too complex, diminishing the intended benefits through expensive, time-consuming projects that deliver inflexible, static results at a breathtaking TCO (total cost of ownership).

This situation has serious consequences – organizations annoy customers or employees, conversion rates are unsatisfactory, content isn't regularly updated, SEO rankings decrease, the efficiency of content and IT teams decreases while the time and cost of delivering new digital projects skyrockets. New requirements derived from the organization's digital transformation uncover limitations in the CMS infrastructure.

Get ready for an omnichannel experience

Enterprises need better solutions to face these challenges. In the future, organizations will need headless, decoupled CMSs to manage all kinds of digital assets, to edit and distribute them to customers, employees, and stakeholders in a compliant way on multiple channels. Today, content is much more than just the web. It

is also the growing omnichannel experience with e-commerce, smart-edge devices, in-car information systems, voice search, machine learning automatons, and AR & VR development. Forecasts see worldwide technology spending on the Internet of Things surpassing \$1 trillion in 2022² and many of those devices will need content.

¹ Source: CERN, The Birth of the Web, <https://home.cern/science/computing/birth-web>

² Source: International Data Corporation (IDC), Worldwide Spending on the Internet of Things, January 2019

Accelerate digital transformation

Currently, the role of the website is changing from static publishing to interactive applications, from transferring a hierarchy of HTML files to web applications that provide content dynamically through a session as a browser-driven GUI. It's more a software application than a publication. The content base needs to be established in the heart of the organization. This content hub should serve all the connected systems, not just a few of them. Updates not only need to be published at a defined point in time, on all related channels, but

changes also need to be audited and documented in a compliant way.

A great central content hub serves editors, developers and the operations side of the business. The non-stop availability, scalability and consistency of content reduces operational and project costs and ensures quality with significantly better data protection and security. The CMS is no longer a delimiter, it becomes an accelerator for digital transformation and business.

The solution – next-gen enterprise SaaS CMS

The solution is actually simpler than ever and – more importantly – its success is measurable. As H. James Harrington pointed out: “If you can't measure it, you can't improve it.”³

So far, success measurement as a basis of productivity in the area of CMSs has not been given much attention. With the increasing importance of content for organizations and thus the mission-critical importance of CMSs, this will change. The questions of availability, security, scalability, compliance and performance can no longer be

answered with “good enough”, because these parameters make the competitive difference in the digital age. A slow website simply does not sell. The importance of compliance will also increase for organizations that work internationally. The answer is the next generation enterprise SaaS CMS, which addresses measurable success factors such as scalability, flexibility, speed and intuitiveness, and is based on modern, innovative, proven and reliable technology.

³ Source: H. James Harrington, Business Process Improvement: The Breakthrough Strategy for Total Quality, Productivity, and Competitiveness; McGraw-Hill Education, 1991.

100 % CLOUD

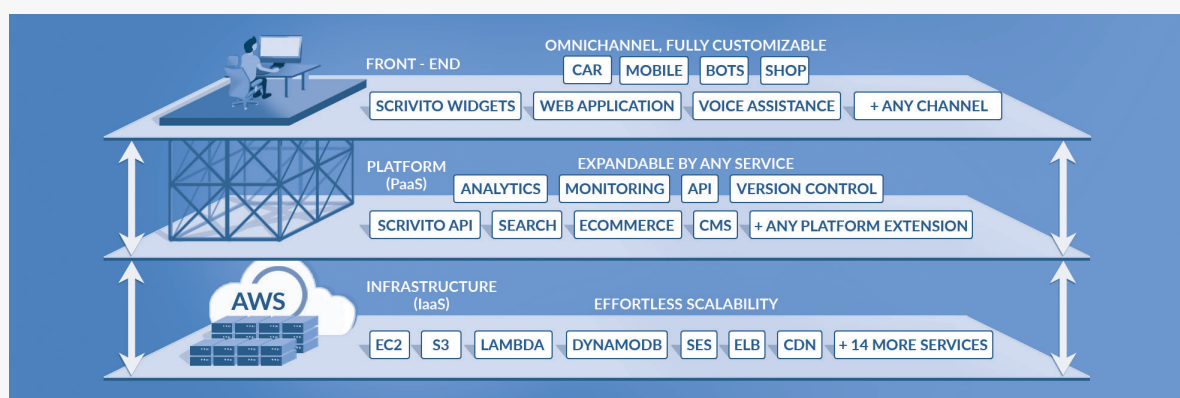
ONLY THE TRUE CLOUD OFFERS REAL BENEFITS

Current CMS setups require a lot of IT infrastructure. In addition to the CMS and the operating system itself, databases, servers, load balancers, monitoring/backup systems, and search engines are needed. The production environment includes development and test environments with precisely matched components. Custom integrations, deployment tools, frameworks and libraries complete the CMS zoo. A team of specially

trained sysadmins and webmasters have to administer it around the clock.

Naturally, today's CMSs additionally require an adequate, service-oriented IT infrastructure. But very few companies have a global IT infrastructure available in house, or the associated costs and infrastructure investments will have a significant time and financial impact on the business case.

Today, the best infrastructure for this purpose



is operated globally by experienced cloud providers like Amazon Web Services (AWS), which dominates the cloud market according to The Wall Street Journal⁴. But many legacy CMSs are just hosted on these platforms without really taking advantage of them. Their claim to be cloud-ready is, in fact, at least misleading. It's like hosting a mail server and claiming you've created Gmail

Running a legacy CMS in the cloud solves only a fraction of the problems. Remote hosting and cloud-native computing are two different approaches requiring very different software architectures, while only true cloud computing

offers all the benefits. SaaS CMSs are built for the cloud. They make use of the full stack of available web services and benefit accordingly. Only a system developed 100 % for the cloud offers real benefits.

The cloud gives users not only full availability and flexibility, but also provides a modern, stable and robust environment by means of which enterprises access resources available in the cloud: Big Data, next-gen technologies like voice search, machine learning, and AI. It also allows them to take full advantage of services like Lambda, Amazon S3, Amazon EC2, DynamoDB, CloudFront, or the Amazon API Gateway.

⁴ Source: Angus Loten, The Wall Street Journal, CIO Journal, "Amazon Reigns Over Cloud Market", July 2019

SaaS CMS Scrivito is built specifically for the cloud and is powered by one of the top cloud-computing suppliers – Amazon Web Services (AWS), with solutions that take full advantage of the potential offered by this modern environment.

Thanks to Scrivito's native cloud approach, organizations can expect a significant, measurable decrease in the total cost of ownership (TCO) as well as a significantly shorter time to market with projects.

99.95 % + UPTIME

NO BREAKS IN CONTENT DELIVERY

Non-stop availability

Running a traditional content management system comes with the burden of system administration jobs that directly affect the availability of service: Installing CMS patches and avoiding to break plug-in dependencies while doing so, updating staging and production systems as well as CMS components and the operating system, relaunching, expanding tables in the database, monitoring system integrations, fixing failed integrations, invalidating caches, re-deploying the website. All these tasks and many others lead to planned or unexpected downtimes. Since the availability of the content to be delivered is vital for customers and employees, the unavailability of a server can cause serious damage. It is not about a single shopping transaction that fails or a small piece of important information that can't be provided to the customer. It is worse: The customers' trust or the employees' motivation may be damaged in a way that has expensive long-term effects.

Therefore, planned or unplanned CMS downtimes are no longer acceptable. The Internet operates 24/7/365. Hence, the CMS as

a content hub must be permanently available, and a corresponding service level agreement (SLA) is established.

The software architecture of the SaaS CMS Scrivito is fully based on distributed, fault-tolerant web services using the Amazon Web Services (AWS) infrastructure. Scrivito's modern architecture includes monitoring, self-healing and a scaling shared-nothing architecture distributed over several redundant data centers, also known as availability zones. Websites powered by the enterprise SaaS CMS Scrivito are available at the highest possible standard: Both guaranteed by AWS and included in the SLA. There are no outages in content delivery, even during blackouts and natural disasters. The SaaS CMS Scrivito is even used in critical infrastructure like in aviation and medical environments.

Long-term Scrivito customers have been running the system for 5+ years without experiencing a single minute of downtime. Thanks to the architecture of the cloud-native SaaS CMS Scrivito, organizations can expect to measure a service availability of over 99.95 % per month.

160+ CDN EDGE LOCATIONS

THE AMOUNT OF CONTENT WILL GROW ENORMOUSLY

Importance of scalability underestimated

The scalability of content management systems is a topic not often initially evaluated in depth, as it is very technical and therefore invisible – at least until the first service interruption. Especially in unexpected situations of popularity or crisis, when smooth communication with customers and employees is vital, the additional load of the system could potentially increase so much that it breaks down – comparable to a DDoS attack.

This might be a painful lesson to learn because scalability is more than just asking “how many visitors and assets can our CMS and our servers handle?” In fact, the load patterns of web applications are subject to great fluctuation. Therefore, it is not surprising that the scalability of CMSs is rarely questioned in detail, hardly tested and even less frequently measured. In many cases scalability remains an untested assumption.

With legacy, on-premise CMSs, the most important parameters of scalability are predefined and static: The CPU and I/O throughput capacity on the CMS servers, databases and load-balancers, combined with the complexity of the customizations, defines the time it takes to render a single page. Even rare changes of these parameters show the necessity of either modifying the scope of the contract or modernizing

and expanding hardware, not to mention the involvement of IT specialists to adjust the software. This takes time.

Also, the capacity of this legacy environment has its limits. Every sudden peak in web traffic affects performance and availability. The traditional approach also needs a much longer reaction time for scaling. That explains why so many brands face service overload problems during moments of great success, or – even worse – emergency.

In addition to traffic growing unpredictably, so does the content volume. As a rule of thumb, content volume follows Moore's Law and doubles every 18 months. If there is a requirement to archive the content history, then this increases even more. In addition, content is becoming increasingly personalized. This means that the CMS must be designed to handle a multiple of the initial content. Unfortunately, nobody initially knows exactly how much will be needed in practice. The only way to handle this unpredictability is to achieve linear scalability or even better.

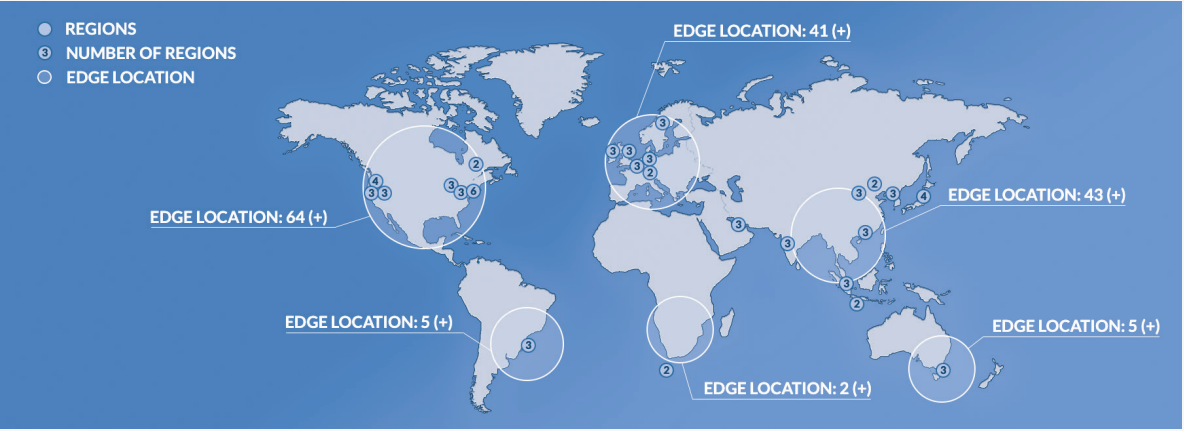
Also, the ability to dynamically adapt commercial conditions in a pay-per-use model is one of the factors that scales the business plan. Why overpay for a service you do not use, or wait hours for the support department's response to a sudden traffic peak?

Automatic scaling in a pay-per-use model

Enterprise SaaS CMS Scrivito offers instant, almost infinite and automatic scaling in a pay-per-use model. Scrivito grows with your demands; no hard limit for content objects or editors, for

example, exists. And the enterprise pays only for the exact amount of content in use. In addition to true scalability, there is no money wasted on unused and therefore overpaid capacity.

160+ edge locations ensure global content delivery



All digital assets in Scrivito are automatically transferred through a built-in Content Delivery Network (CDN). Scrivito's true cloud nature takes advantage of the AWS infrastructure. AWS has the largest global infrastructure footprint of any cloud provider to deliver Scrivito's content through a worldwide network of Points of Presence (PoP) locations, which consists of Edge Locations and Regional Edge Cache servers. Amazon CloudFront

is a fast content delivery network (CDN) service securely delivering data, videos, applications and APIs to users globally with low latency, high transfer speeds, within a developer-friendly environment.

AWS's 69 Availability Zones (AZ) are spread over 22 regions⁵. The content is highly available and distributed to the 160+ edge locations worldwide, keeping a copy of the content geographically as close to the users as possible.

⁵ Source: Amazon Web Services (AWS), "Global Infrastructure", August 2019

Handling multiple web applications and sites (multi-tenancy)

Managing content with the legacy approach, whether by means of open-source or commercial enterprise CMSs, is confined to pre-defined templates and limited structures in terms of multi-tenancy. Changes are slow and expensive to implement. Some popular web CMSs cannot even run more than one website efficiently.

Typically, this results in multiple CMS installations. At best, these are varying releases and versions only. At worst, there are many different CMS platforms. In reality it has been observed that some organizations use more than 10 different CMSs. Time-critical projects require quick results, so in addition to the organization's official standard system, many

small solution "islands" are established. Not using the central system as a shared service is often justified since many CMSs can only be extended with considerable effort and are soon perceived as functionally incomplete or difficult to use.

Enterprises today regularly get requests for new web applications, websites, landing pages, shops and other content consuming channels. The number of voice assistants, IoT, smart watches and other modern devices requiring support for specific formats is increasing. When this kind of business demand arises, the enterprise faces obstacles. Excessive time, money and IT resources are required to create new websites.

Multi-tenancy provides flexibility

With Scrivito's built-in multi-tenancy, these limitations are eliminated. The enterprise SaaS CMS Scrivito can handle an unlimited number of websites or web applications, within one tenant or across multiple tenants. Content assets can be shared within one tenant or more strictly separated. Whatever decision is made, the number of possible tenants is virtually infinite. Thanks to multi-tenancy, new projects can be created quickly and easily by pressing a single button.

For new requirements coming from business units, multi-tenancy provides the flexibility and speed to

instantly start and run individual web projects. Even external agencies can be involved easily and securely. There is no waste of valuable resources setting up a new website, all technical obstacles are excluded. SaaS CMS Scrivito gives the enterprise full freedom without compromising control.

With the SaaS CMS Scrivito, the enterprise can expect a decline in isolated web solutions, a steep decline in the number of CMSs in use, a significant reduction in related costs, and measurable quality improvements through more consistency in a shared service.

< 10 MINUTES OF TRAINING

ONLY BY PROVIDING USERS WITH A GREAT WAY TO UTILIZE THE CMS, WILL PROJECTS SUCCEED

User experience is key to success

The usability of many traditional CMSs is poor. Some systems are even inoperable from the user's point of view. This starts a downward spiral: The more difficult it is to use the CMS, the less it is actually used, quickly leading to outdated content on the websites. Intermittent use lets users get out of practice. Time-consuming and cost-intensive training is unhelpful if the user only occasionally works with the CMS or if its complexity requires insider knowledge that is often poorly documented, if at all.

Why is this so? The idea of a hierarchical site structure borrowed from the file system, together with data storage in relational databases means that content is edited using form fields with magic mark-up acronyms at hidden places in a deep content hierarchy. Once done, it often requires a separate step of previewing to get an idea of how the content will look on a staging server, often with no possibility to understand how the content will be displayed on other channels such as mobile devices. When more than one editor is working on the content or a relaunch is planned, error-prone coordination often has to be done using traditional means, i.e. by sending emails with attached Word documents and notifications, or by declaring complete sections as "frozen" for other editors. Sometimes, it requires separate staging servers for larger relaunched. This way

of working with a CMS often hinders more than it helps.

To exaggerate only slightly, classic CMSs seem to be in two basic categories: Systems loved by developers and systems loved by users. While developers focus on the options to create and enhance internal integrations and the back end, users want the front end to be intuitive and versatile. The ease-of-use requirements of the editors, who are actually using the system and creating value by creating content, often fall short and are addressed very late in the project, if at all.

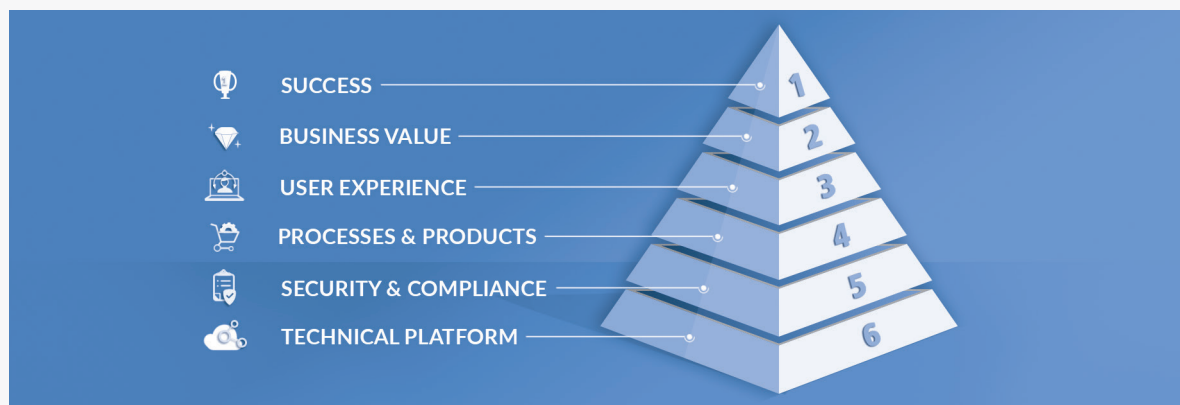
But focusing on just one of these categories creates alignment issues and communication trouble between the business side and the technical staff. Both are of equal value because both are success factors. To show how technology and users contribute to project success, a hierarchy of demands can be applied to a web application as well.

The pyramid illustrates that the technical aspect is the foundation. But only by providing users with a way to utilize the CMS as efficiently as possible will this lead to business results.

This is why Scrivito puts a lot of effort into creating a great user experience. It has new capabilities to improve the user's productivity and reduce training time. To make using Scrivito as intuitive as possible, numerous functions

are available: From WYSIWYG editing with drag-and-drop to autosaving changes, everything is

implemented in a way the user is familiar with from modern web platforms.



Enterprise IT-integrated user management with customizable permissions, roles and approval workflows controls access to Scrivito, and multiple

levels of validations ensure the completeness and quality of the content.

Introducing three new ways to work with a CMS as an editor

CMS Scrivito offers three new concepts for CMS usability, which, above all, simplify its use. The emphasis is on WYSIWYG editing, real-

time collaboration within a team, and the smart organization of digital assets.

WYSIWYG in-place editing saves time

Scrivito offers a modular way for developers to create content using building blocks called widgets. They are available to editors in the front end and can be modified in WYSIWYG mode, allowing the user to view the final result while working with the CMS. With Scrivito, WYSIWYG refers to the ability to directly edit the layout and content of a page without using commands, specific markup or navigating to a node

within a hierarchy. This also works across devices, including previews for mobile devices.

Widgets can not only contain simple content like text, headlines and images but also complete interactive application components such as configurators, dealer searches and more, which can be placed easily on existing or new pages – without any interaction of IT required.

Real-time collaboration – working copies save time

Scrivito simplifies teamwork. The unique working copies feature enables multiple editors

to work on website content simultaneously, either collaboratively or independently – no staging

servers are needed. It's like a version control system for content, combined with the ease of use of parallel live editing like in Google Docs.

Potential conflicts are detected by Scrivito and resolved automatically. Live content is always consistent. Users can invite each other to working copies and can edit content in real time, distributed and collaboratively. This awesome feature

increases productivity, saves time, and does not require collaborators to work at the same time at the same location. All content can be changed but can only be published by an authorized person. Changes are tracked within a working copy and can be undone through the version history even after publication.

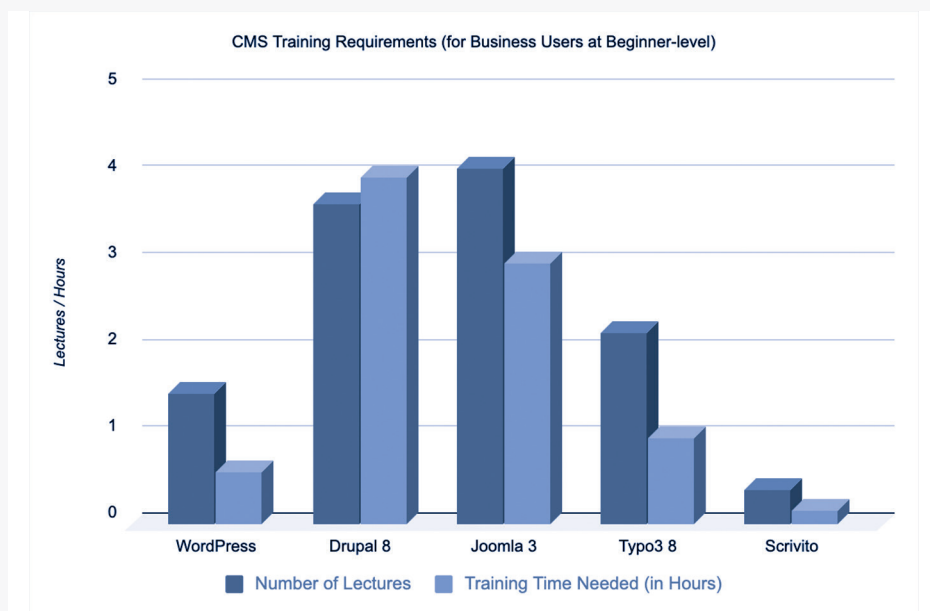
Smart digital asset management – quick content selection and automatic processing saves time

With Scrivito, logos, images, videos, PDFs, and all other types of digital assets are managed using the Content Browser. It allows users to drag and drop digital assets into the CMS, and access and manage existing assets. Users can organize, search, filter, edit, and tag resources.

The Content Browser can be extended by custom filters such as products, semantic tags or other criteria. All content loaded into the Content Browser is immediately distributed by Scrivito's

built-in Content Delivery Network, and images are automatically scaled to various sizes for cross-device use in order to minimize page loading times. The Content Browser is comfortable to use and saves a lot of time.

Training time is a measurable success criterion for the usability of a CMS. E-learning platforms⁶ make it clear how time-consuming it can be to introduce a beginner-level user to a CMS:



Scrivito users need less than 10 minutes and only 4 lectures in total as they do not need to remember cryptic commands and already know how to work

with Scrivito because it relies on common usage paradigms already familiar to web users.

⁶ Source: www.udemy.com, 2019

10K+ AUDITED FRAMEWORKS

LOW CODE: AVOIDING REINVENTING THE WHEEL

Security is a challenge

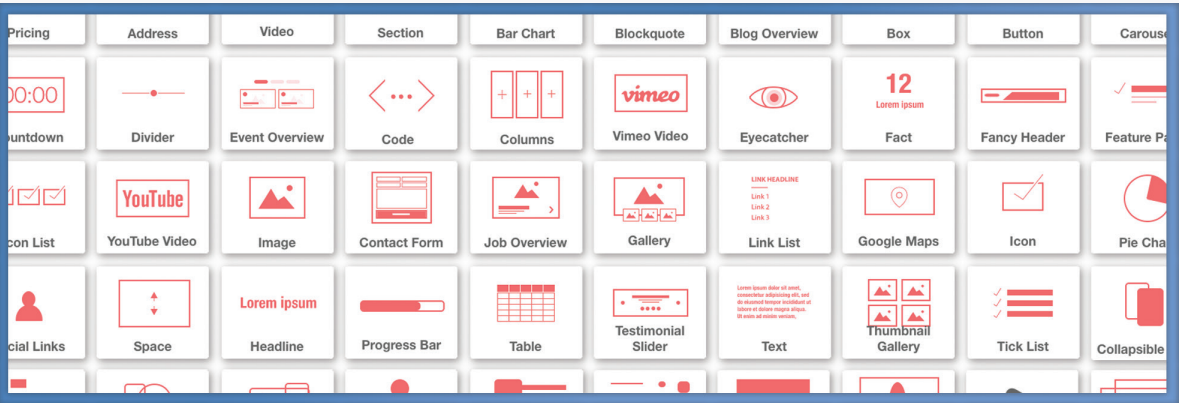
Many CMSs, mainly open source, offer hundreds of plug-ins to enhance the functionality of the websites and the CMS. Some are useful, many are not. A certain degree of redundancy exists. They are often created by the community or anonymous third-party companies, which makes it almost impossible to track their compliance with security standards. Especially in the PHP world, where thorough testing and coding standards are not a priority. Those plug-ins are potential back doors to the company's data on the servers as they usually have full access to all data.

According to Imperva, “98 % of WordPress vulnerabilities are related to plug-ins, which extend the functionality and features of a website

or a blog”⁷. Security breaches caused by using insecure plug-ins might compromise enterprises in a completely different way allowing hackers to change content on websites, exploit personal data or even install malware. In the age of GDPR, this can lead not just to bad PR but also to significant fines by the data protection authorities.

Other plug-ins, especially those available for commercial CMSs, are difficult to adjust or enhance. At best, the support of a developer is needed. At worst, those plug-ins don't work and cause code to break, requiring PHP or Java specialists to locate and fix errors.

Open source but curated



SaaS CMS Scrivito offers 70+ useful, customizable widgets out of the box. These are

tested and curated by Scrivito, even if they are 3rd party. You can use them as they come, drag and

⁷ Source: Nadav Avital, Imperva, Blog, “The State of Web Application Vulnerabilities in 2018”, 2019

drop them on the page, and see the results of your changes in an advanced WYSIWYG editor with live preview. If our widgets don't cover your use cases, you can either modify the standard widgets or simply create and deploy your own using JavaScript

and React – no special Scrivito know-how required.

And the best thing is, as those widgets all run in the browser, they're safe by default. They can't compromise any servers, because there aren't any.

10+k JavaScript / React libraries

Since Scrivito can be extended with JavaScript /React, the related libraries and frameworks from sources like npm or Github can be used. These libraries are numerous and cover a broad range of additional functionality to develop any web application. Adding those libraries to a Scrivito project is very easy. This reduces your project efforts significantly.

Unlike existing CMSs, Scrivito does not limit the implementation of the project in any way. Since Scrivito can be part of any JavaScript / React project, there are few restrictions on how the web application is designed and developed. Scrivito embeds itself as a lightweight service in the project, not the other way around. This keeps training for

developers low: If you know React and JavaScript, you already know Scrivito.

Scrivito also comes with comprehensive documentation on how to integrate common services such as Salesforce, Auth0, Google Analytics, Mailchimp, Slack, eCommerce tools and others.

Measurable success refers to the fact that Scrivito's 70+ curated widgets cover a broad range of functionality at the highest security standard. 10k+ ready-to-use libraries allow you to use existing tools if customization is needed. The result is a significantly shorter time to market, lower project costs, professional support, and incomparable security.

0 HACKS, 100 % JAMSTACK

WIN THE UPDATE RACE AGAINST THE HACKERS

As seen in many reports⁸, vulnerabilities in web-based CMSs are a constant factor. Common CMS security issues originate from running default installations, which are not security-hardened and not regularly updated (often hard to do, given the 542 security exploits WordPress suffered from in 2018⁹) as well as unstable deployment procedures, improper security configurations, outdated databases/os/web servers, known default

passwords, lack of data security knowledge, broken authentication or hijacked session management.

While some security issues are related to high complexity and the human factor on the server, it is worth mentioning that the server is not the sole component to monitor: Many threats come from vulnerabilities introduced by add-on software like modules, plug-ins, themes, and extensions. They open backdoors to the system.

Using open-source CMSs invites security issues

Using an open-source CMS significantly increases the probability of getting hacked. Given the widespread use of these systems, they represent a very lucrative target vector for attacks. The number of additional, often poorly maintained plug-ins increases the risk and therefore the system administrators' workload by having to update software all the time. Since resources are unavailable to test every software module, it is often only a matter of time before some door to the system is left wide open. Such an incident does not necessarily disable the site. In most cases, the system is misused for other purposes. The number of undetected hacks in WordPress is much higher than the number of outages. Many cases of misuse are not noticed. A true 24/7/365 service

has to be established to avoid these risks. Very few organizations do this.

Reports¹⁰ show numerous weaknesses and hacks of websites due to the underlying CMSs. A typical on-premise CMS installation, whether commercial or open-source, comes with servers, a database, and additional modules such as search engines or plug-ins for editing. These servers are the main target of attacks.

Unfortunately, the nature of these attacks is inherent to the systems running a traditional server-bound legacy CMS. There is simply no way to fix this as software is written by humans – and humans are prone to making errors. It is impossible to run a feature-rich, on-premise CMS securely. Period.

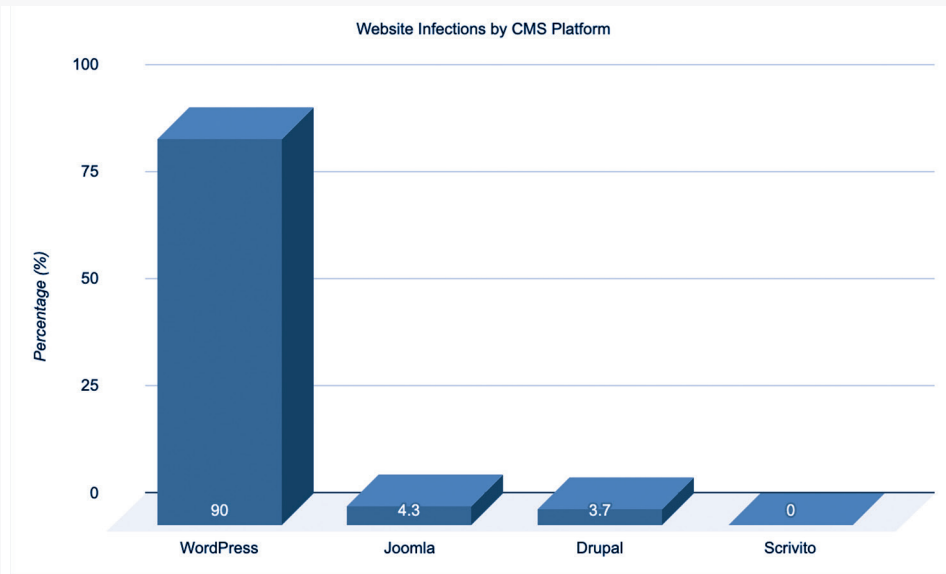
⁸ Source: CISA, formerly Computer Emergency Readiness Team (US-CERT) <https://www.us-cert.gov/report>

⁹ Source: Nadav Avital, Imperva, Blog, "The State of Web Application Vulnerabilities in 2018", January 2019

¹⁰ Source: Sucuri, Whitepaper, "Hacked Website Report 2018", 2019

The only solution to this problem is to rethink the whole CMS architecture radically by minimizing the number of server components, exposing as little data as possible through well-secured,

firewalled APIs, move most of the former server logic to the browser and use serverless functions for the remaining components. And this is exactly what the JAMstack architecture does.

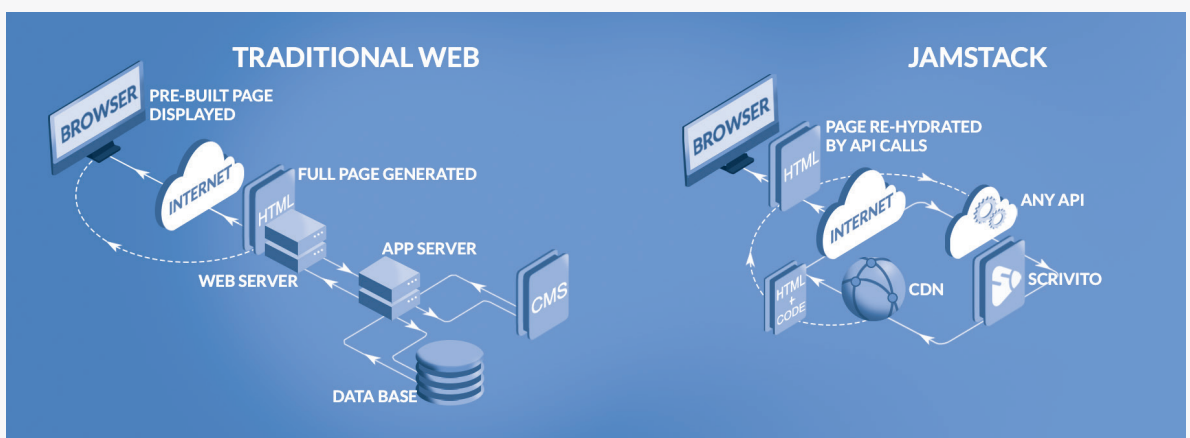


The JAMstack architecture improves security

Using a fully maintained virtual service instead of traditional servers reduces the risk of being hacked. With no databases, plug-ins or dynamic

software running on a server, the potential for code injection and hacks is reduced dramatically.

Websites running in the browser, with all dynamic



functions handled by APIs and client-side JavaScript, eliminate the need for a dedicated CMS server. The browser becomes the new integration platform with the Scrivito CMS as a secure, reliable data source.

Eliminating the CMS server removes almost all potential points of failure and attack vectors.

How does a browser-based web application work? SaaS CMS Scrivito provides a serverless

environment combined with the most modern JAMstack (JavaScript, API, Markup) approach¹¹.

Serverless computing is a cloud computing model where the cloud provider runs the server and dynamically manages the isolated allocation of machine resources – the developer just provides the backend code as functions (FaaS – Function As A Service)¹². Serverless computing can dramatically simplify the process of deploying code into production, scaling it and keeping it available.

All front-end and integration logic is executed in the browser: Scrivito's architecture is based on the JAMstack principle: JavaScript, API, and prebuilt markup. This JAMstack approach can dramatically improve your app's security as this architecture generally has a small attack vector by design.

This means that the site is an application, distributed via a CDN and executed in the user's browser to display the web pages. This approach means that it is almost impossible to break into the system, which significantly reduces risks. Projects can focus less on security, updating, patching, and other maintenance tasks and more on the business results.

These are the two crucial technical concepts behind SaaS CMS Scrivito that prevent hacker attacks by a well designed, modern system architecture rather than through daily updates. That there were over 20k confirmed Wordpress-based websites hacked in 2018¹³ and zero hacks of Scrivito-powered sites further underlines the advantages of the JAMstack architecture.

¹¹ Source: Matt Biilmann speech at JAMstack Conf 2018 in San Francisco

¹² Source: Miller, Ron (24 Nov 2015). "AWS Lambda Makes Serverless Applications A Reality". TechCrunch

¹³ Source: Sucuri, Whitepaper, "Hacked Website Report 2018", 2019

< 2 SECONDS LOADING TIME

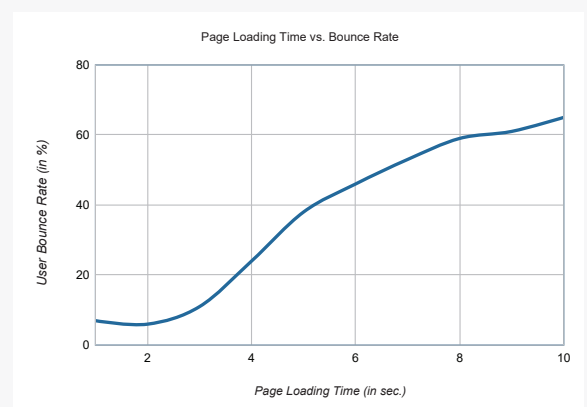
NOT STRAINING THE PATIENCE OF CUSTOMERS AND EMPLOYEES

Every user has experienced a slow-loading website and its impact. It may be due to limited network bandwidth, an overloaded server or simply a lot of superfluous data having to be delivered to the user's browser. A large volume of unoptimized images is one common reason behind website slowness.

Today, "page load time" refers to the "first meaningful paint", the time it takes for the content of a page to become available to the user. The first meaningful paint has become the most important metric for Google's SEO rankings next to the quality and relevance of the content. It is the most relevant technical factor for SEO: How fast does your site display content?

Since modern user interfaces are mostly browser based, they essentially consist of a set of pages delivered to the user's browser. The speed the pages are delivered to customers, employees and other stakeholders is a key success factor. The perceived responsiveness of this software is crucial to good user experience and therefore a competitive advantage. Customers having to use a slow website do not want to wait. Employees using a slow digital workplace become frustrated and unmotivated. It is not only the user who needs an optimal user experience. Supplying content to other systems or meeting content quality requirements in search engines depends on page delivery speed, too. Google has indicated speed as one of the key signals used to rank pages¹⁴.

To improve website performance, many companies not only engage internal teams but also external agencies, paying to improve something that should be available from the start. But since users may be located anywhere on the globe, latency can become an issue even if the network's bandwidth and computational power are available at the highest level and the page is highly optimized. Optimization becomes even compulsory if large



amounts of data need to be transferred.

Statistics show a clear correlation between page load time and the percentage of users you lose with each second of extra load time¹⁵.

Bounced users affect the conversion rate. Knowing the changing conversion rate, it is possible to calculate the vanishing revenue of a slow website or the additional revenue of a fast website.

The speed of a site depends on many factors, starting with the backend systems, continuing through the network, the cache and the code, up to

¹⁴ Source: Google, Webmaster Central Blog, "Using site speed in web search ranking", 2010

the optimization of content. That's why the first score to be objectively measured is the first impression: The first meaningful paint, i.e. the time it takes for the first useful content of the page to appear in the user's browser. The average result for optimized pages is

a maximum of three to four seconds. However, the more binary content like images and multimedia data gets delivered, and the less efficient the network, the worse the resulting load times will be, amounting to five seconds or more.

Super fast pages thanks to JAMstack – JavaScript, APIs, and markup

Scrivito's JAMstack approach to the first meaningful paint is to initially deliver the pages without their JavaScript code, i.e. as static HTML files, to the browser – through a CDN, which is the fastest way to deliver web pages. After that, the JavaScript code is restored to the pages to make them dynamic again, while the user can already browse through the site.

For these pages and all content assets, SaaS CMS Scrivito makes use of a seamlessly integrated Content Distribution Network (CDN) based on AWS CloudFront, which distributes content across 160+ CDN edge locations worldwide. Copies of pages are stored in these multiple, geographically diverse data centers to enable users to access the site faster and more reliably. SaaS CMS Scrivito keeps a copy of the content geographically as close to the users as possible.

In addition, SaaS CMS Scrivito ensures that no served images are larger than necessary by resizing

uploaded images to many typical device screen sizes. As all other content assets, these image collections are automatically distributed to the CDN. Scrivito does a lot of additional work behind the scenes to make the content available faster: For example, it uses a sophisticated technology to render low-resolution versions of large images first and to replace them with high-res versions after the page is displayed. This all works out of the box – editors just upload any image, and Scrivito takes care of the rest. We call it SEO out of the box.

The measurable success for sites run by SaaS CMS Scrivito is that it usually takes less than 2 seconds to complete the first meaningful paint in the user's browser. It's great for user experience, has a proven impact on sales and brand reputation and is crucial to SEO. The page loading speed has a significant impact on the conversion rate and thus on sales.

¹⁵ Source: Solarwinds Pingdom, Blog, "Does Page Load Time Really Affect Bounce Rate?", 2018

100 % HEADLESS

AWESOME USABILITY AND A FIRST-CLASS API ARE NO CONTRADICTION

API-first for the CMS

A traditional CMS platform comes with a front-end presentation layer (the head), tightly coupled to the back end, which stores all the content in a database. The presentation layer typically dictates how the content should be put together, and is usually part of a web application.

With a headless CMS, all functionality is available through an API. A headless CMS,

therefore, acts as a hub for content delivery. Thanks to an API-first approach, a headless CMS supports a real omnichannel experience: It works not only as a management system but is also capable of providing content not only to web applications but to different devices like smartwatches, digital boards, tablets, smartphones, TV screens, voice assistants, cars and VR devices too.

RESTful CMS interface

A headless CMS typically offers two levels, an API and a library for accessing the API from the development platform. A RESTful API is an application programming interface that uses HTTP requests to GET, POST, PUT, and DELETE content and related data. A RESTful web service

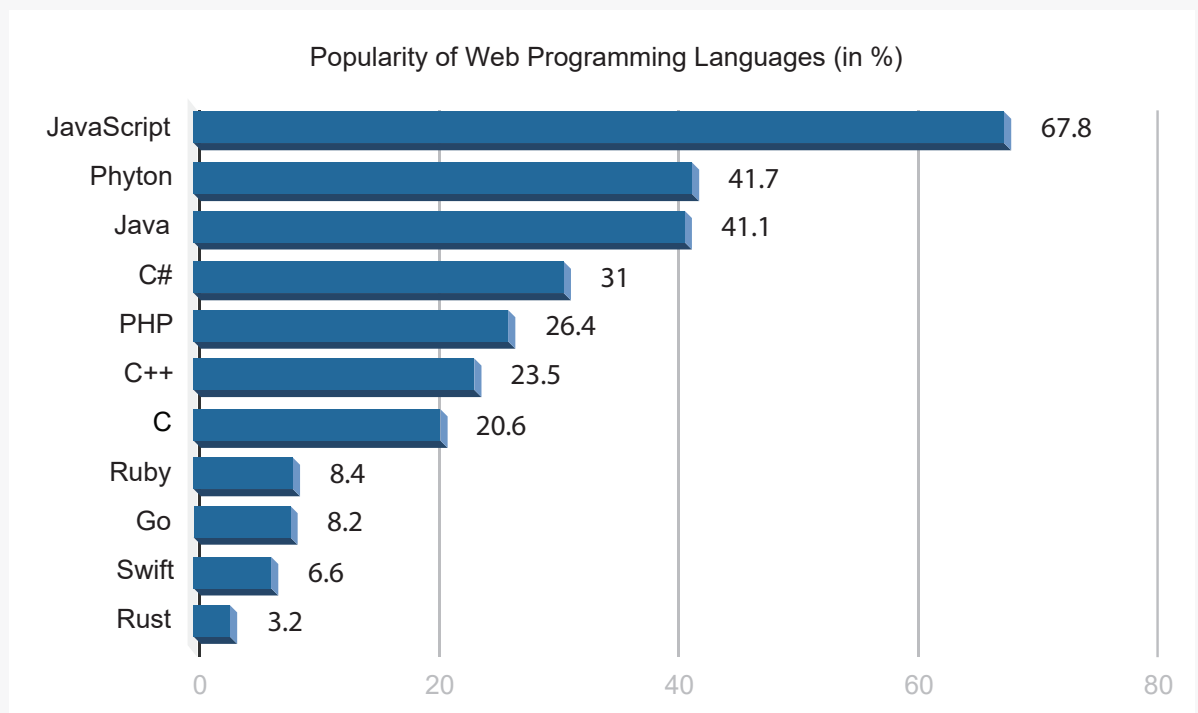
is based on representational state transfer (REST) technology, which is an architecture and approach to communicating between different services¹⁶. A REST API in a headless CMS allows developers to trigger, write and read content through the library.

JavaScript / React library

On top of the low-level RESTful API, a library for the development platform should be available. It can be a challenge to find experienced developers for programming environments that are rarely used. That's one reason why Scrivito uses the most popular development environment available: JavaScript. Scrivito can be extended by using the

JavaScript library React, an open-source project backed by Facebook and used extensively to make facebook.com a user-friendly website. React dramatically eases the creation of interactive UIs. Due to its popularity, many developers are available around the globe, and it is the most popular as well as the fastest-growing JavaScript framework today.

¹⁶ Source: Roy Fielding, "Architectural Styles and the Design of Network-based Software Architectures", 2000



The survey¹⁷ shows the popularity of programming languages among software developers worldwide.

SaaS CMS Scrivito gives developers full freedom

in creating new applications and enables them to connect and deliver content to any edge device. Adding SaaS CMS Scrivito to an existing JAMstack / React project requires less than 15 lines of code.

Widget building blocks in Scrivito are the key to great usability

SaaS CMS Scrivito goes even further. It is not only a headless CMS but also offers decoupled CMS functionality that provides everything to create a great front-end. With typical headless CMSs, editors fill out form fields without getting an idea of how the content will look when published. Scrivito comes with a new kind of WYSIWYG user interface. Editors love to work with Scrivito because it is intuitive and offers powerful features to business users. Widgets are building blocks for the website. A page is a collection of different widgets arranged freely in a grid. Users with editing permission can rearrange the layout and modify the content in

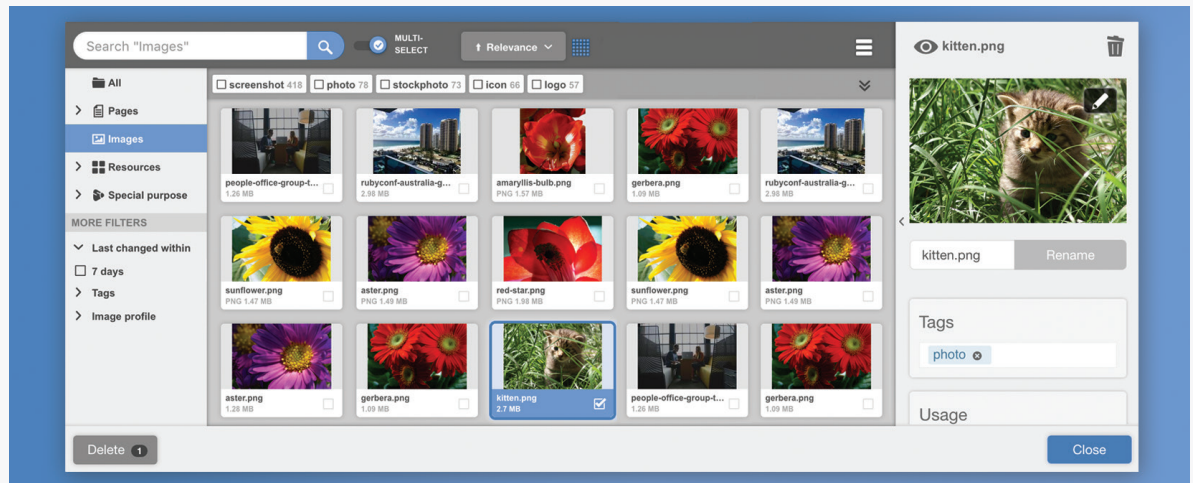
place. The widgets' behavior can be influenced by parameters provided by users, code or external events. Besides providing content, they can be interactive and include complex business logic such as CRM integrations, forms, product configurators, dealer searches, interactive quizzes, etc. Widgets can be reused across multiple website tenants.

Widgets are so easy to use that non-technical business people can simply set up a website including landing pages, etc. This empowerment of the business side shortens the time to market and reduces project costs. That's why we call Scrivito a headless CMS with a head.

¹⁷ Source: Compilation of Data from Stack Overflow and Amazon, March 2019

All of Scrivito's content retrieval functionality is made available through an API. Additionally, a great GUI provides an awesome user experience. Enterprise SaaS CMS Scrivito satisfies such

requirements, overcomes the classic categories, and offers a perfect symbiosis for developers as well as editors.



0 MAINTENANCE

ADMINISTRATION CAUSES THE TRUE COST OF A CMS

Traditional CMSs cause high total cost of ownership

System administrators and webmasters know that managing a traditional CMS can be very time consuming. The maintenance costs behind a legacy system are the major cost driver. Whether it is an open-source CMS or a commercial content management system: The initial costs are often just a fraction of what needs to be invested over the life cycle of the CMS. The total cost of ownership (TCO) to keep the CMS up and running is the main burden over time.

A traditional CMS and its software components such as databases and operating systems needs to be managed 24/7/365, keeping the IT department busy with ensuring that the basic foundations are safe and secure. No visible value is created, it's just something you have to do to keep your website alive. Parallel projects change and enhance the system, a defined, tested production environment status becomes a moving target. Additionally, forced freeze periods stall the business. For security reasons, a sloppy implementation of the required system administration processes is not an option.

System administration costs are added to the costs of providing the IT infrastructure. Operating

a classic CMS makes a professional data center mandatory. These require redundant servers for the CMS, databases, etc. and are kept running in development, test and production environments. Due to the 24/7/365 nature of the system, backups, network management, monitoring, power supply and all other jobs associated with the data center must be maintained. Even if the systems are hosted remotely, these jobs have to be performed. The level of redundancy of a 100 % true-cloud SaaS CMS running on a professional cloud provider like AWS can simply never be achieved with an on-premise installation, neither in your own data center nor if hosted remotely.

If the system malfunctions, the impact is visible to all employees, customers, and partners. Often, a CMS only gains the attention of the C-level when a problem occurs. Many IT managers try to master this challenge by choosing an on-premise CMS from a major vendor. IT managers thus hope there are clear responsibilities for troubleshooting and support. This doesn't become real because the software just gets more complex, not more manageable. The only difference is the cost.

A SaaS CMS reduces maintenance cost to zero

SaaS CMS Scrivito reduces maintenance costs to zero. The serverless revolution is all about getting rid of the IT burden and focusing on what's essential for the enterprise's digital existence: The business logic. No more payments for backups,

updates, patches, and security breaches. No software update race against hackers. SaaS CMS Scrivito is always available and up to date because the system is provided as a web service. No data center operations are required.

60 SECONDS TO START

MAKING A PROJECT VIABLE AS FAST AS POSSIBLE

The dashboard allows an instant start

After logging in to Scrivito, the user is presented with a dashboard for setting up one or more tenants to start projects – it's as simple as creating

a GMail account. All required parameters are preset with default values down to a complete example application. So it's really easy to get started.

Replacing an existing system

Introducing a new Content Management System to an enterprise used to be somewhat nerve racking. Decommissioning a legacy CMS usually cannot be done in one step. This is due to the strong vendor lock-in underlying traditional CMSs: The means by which content is delivered to the front-end and the website or web application are deeply integrated. Replacing them means having to reinvent the front-end and often the complete

application. A CMS also hosts content for many systems all of which require reconnection to a new system. Migrating the content is not easy in practice due to hidden database structures. Sometimes, the only way to transfer content from system A to system B is to copy/paste it.

Decommissioning a legacy CMS is often a step-by-step project over a long period of time, requiring the old CMS to be held active and maintained.

Pre-configured deployment and pre-fabricated widgets

While starting is really easy with Scrivito, one objection to replacing a CMS might be that starting is just a small proportion of the project. This is true. Other aspects are the deployment process, the development of the application or website, setting up integrations or the migration of data from other systems. Scrivito provides a complete pre-configured deployment process with well-known providers like

AWS, GitHub and Netlify. It can be adapted, if required, but it runs out of the box. And because of its headless approach, transferring content can be automated with batch scripts. Scrivito also comes pre-configured and with great usage examples and documentation. Of course, it is supported by professionally trained and knowledgeable support staff.

Extendable with JavaScript / React.js

In case the provided widgets are not enough or need to be adapted, you can build and deploy your own ones using JavaScript and React. The measurable result: Less time spent in projects and

lower costs of delivering new digital products using a SaaS enterprise CMS that can be customized using JavaScript / React.

WHY

MEASURE TO IMPROVE

Measure your CMS success

Some of our 10 points to measure the success of a CMS might be already on the CMS manager's radar. Of course, our list is not complete, and specific points may need to be adapted to specific environments, requirements and use cases.

But only measuring can indicate what can be improved. Behind every aspect mentioned in this paper, there are years of development, practice,

acquiring and sharing of experience in the CMS world. There are also strong technical skills and a strong belief that it is important to build a future-proof SaaS CMS that radically changes the approach to what a CMS needs to offer in order to meet the requirements of the next generation in the digitalization era.

We designed enterprise SaaS CMS Scrivito to be:

- Simple and intuitive with robust features and powerful widgets,
- Secure, powerful and flexible for enterprises requiring a customized and advanced CMS,
- Built with JavaScript, based on the state-of-the-art JAMstack architecture,
- Highly and automatically scalable, because this is a priority for CTO,
- Modern, serverless and headless to give freedom and capabilities to developers to easily grow and improve their digital products in a world full of IoT, AI, VR, and machine learning.

We believe that Scrivito is the best next-gen enterprise SaaS CMS on the market. We don't just want to convince you with words, so we offer a free trial with access to Scrivito's full functionality – without limitations. Visit scrivito.com/signup, set up your account and start your new project instantly.

We also offer a free live demo for those who prefer to be quickly informed, talk to experts and ask questions. Just visit scrivito.com and talk to us using our chat to schedule your session.



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