FASOO

The Future of Content Management:

Virtual Content Infrastructure (VCI)

WHITE PAPER

Content management, why it matters

Content management is one of the oldest areas in information management, which deals with efficient management of various content used in business. Most organizations have deployed multiple content management solutions (CMSs) over the years, from simple shared storage to an enterprise-level CMS. Is content management not an issue anymore at your place?

Checking the reality, it might be the case that the CMS carries a lot of files, but it is still uneasy to find what you want. Or your CMS has just a limited portion and does not have what you want. This incomplete content management will deteriorate the overall productivity of your organization. Innovating your current content management should be the starting point of your digital transformation journey since the content is at the core of business operation and the most valuable digital asset in any modern organization. Recently remote working has become an inevitable option for most companies, and a trustworthy CMS is necessary more than ever to support remote workers.

Unresolved problems in content management: insufficiency and redundancy

Here is a simple but practical health check to find out whether your organization succeeds in content management or not.

- What is the probability of finding what you want from your CMS?
- How fast can you locate what you want on your CMS?

The probability of finding depends on the coverage of your CMS. If it holds most of your content, the chance is high. Otherwise, the likelihood is low, unfortunately. This is the insufficiency problem of CMS which means that your CMS is not sufficient to serve all your content. You have non-trivial files somewhere out of CMS like PCs, email servers, and other application systems.

How fast can you locate what you want on CMS? Fast enough, for example, in a minute? You may browse the folders of your CMS here and there. You may do a keyword search and spend extra time pinning down the right one among similar files. Your CMS must have many redundant copies if you feel uncomfortable locating the wanted file within the CSM. This is the redundancy problem of CMS.

If you do not have a clear strategy to alleviate the problems, it worsens day by day, and you will eventually end up in information chaos. You are not alone in this ditch. Why do the problems remain unsolved, even though CMS has made numerous advances for several decades? The truth is that you and your co-workers should have done some manual jobs faithfully along with the CMS for successful content management. One of the jobs is to check all non-trivial content in CMS. The other is to delete the redundant content. Otherwise, your CMS becomes insufficient and redundant sooner or later.

Content management and well-disciplined users

It does not seem challenging to check content in CMS properly and delete redundant content regularly. But it does. Let's enumerate the rules of a well-disciplined user to follow along the entire content lifecycle.

- **Rule 1 (Create):** Create one from scratch or a copy. Check it in the proper folder of CMS.

- **Rule 2 (Edit):** Find a file from CMS and check out, edit, and check it back in CMS. Do not use one on your PC, a localized, unless you are sure that no one else is editing it and it is the latest version. After editing, check it in the proper place of CMS.

- **Rule 3 (Share):** Find a file in CMS share its URL. Do not attach the file itself.

- **Rule 4 (Instant clean-up):** Delete the copies on your PC whenever you have done with them.

- **Rule 5 (Regular clean-up):** Clean up the similar but obsolete copies regularly on your CMS.

Rules 1 – 4 are straightforward, even though they are not easy to follow. Rule 5 is somewhat ambiguous. Different people may judge the identical copy differently, obsolete vs. necessary.

Believing that people will comply with these rules is naive or too optimistic. Users' habits are far from these rules, and even a mindful user cannot comply with these easily. It is not well-accepted to enforce these as a corporate policy. Consequently, many localized and unmanaged files sprawl up, you encounter them often out of CMS, and your mint CMS will soon become insufficient and redundant. To succeed in content management, we should have had a proper CMS and disciplined users observing the above rules voluntarily to improve the sufficiency and reduce the redundancy of CMS.

The industry could not find solutions to the problems, and analysts were obliged to declare in 2017, "Enterprise Content Management(ECM) is dead," until then, ECM was considered the most advanced CMS. The problems still linger around unsolved. The Association of Intelligent Information Management (AIIM) says that "Organizations are losing the battle against information chaos and need to rethink outdated manual approaches to information management" in their report, the "AIIM 2021 State of the Intelligent Information Management Industry".

The future of ECM

The industry agrees that automation is required, not relying on users, and new technologies must be adopted. Gartner suggests "Content Services Platform(CSP)" for the future of ECM, while AIIM recommends "Intelligent Information Management (IIM)." Both are ECM fortified with Cloud, Web editing, APIs, and AI tools. Many vendors are introducing new products branded as CSP or IIM with new features. Here are the new features claiming that they could reduce or delay the insufficiency and redundancy problems.

Some vendors developed an add-on feature on the existing CMS, called automatic centralization, that automatically blocks saving files on PCs or moves PC files onto CMS. This solution seems to solve the insufficiency problem, but sooner or later, redundant files pile up on CMS.

Some solutions allow only web-editing, which means users can create or edit files on CMS only through the web. You don't need to download a file, which helps reduce redundancy. You don't need to check it in after saving, which solves the insufficiency problem. But you have to download some anyhow, and it will be the revival of the old problems. It could be a temporary solution for an organization with just a small number of files for a short period. You will encounter the same redundancy problem as with automatic centralization. The speed of redundant files' piling up might be slower than that of the automatic centralization.

Both automatic centralization and web-editing recommend users send a file link for sharing. But they may send the file itself carelessly or inevitably, and it will increase the redundancy. Both seem to succeed in enhancing sufficiency but fail in reducing redundancy. Their usability is not good either since users always connect to the CMS server and cannot enjoy the familiar local-editing. There are approaches to automate users' mundane jobs through AI technologies. They help users classify content and find what they want among similar files. But their efficacy is very much limited, considering its high computing cost and output accuracy. We need an innovative approach to address the root causes of the CMS problem, insufficiency and redundancy.

File virtualization (FV)

We need to pay attention to the fact that we generate too many copies every day through routine actions like copy-paste, download, upload, attach, check-out, and even check-in. We also create a lot of derivatives, which are different from the original but similar. These copies and derivatives are the root cause of the redundancy problem. Handling the redundancy problem requires us to identify the copies and derivatives at a minimal cost. Within the current file systems, a file sticks to its location. The unique identifier of a file is the combination of its name and location. It means if you make a copy of a file to another place, then the copy becomes another independent file even though its name and content are the same. Thus identifying the copies become a nonnegligible job. For file identification, you have to compare at least the hash of each file, analyze them with AI tools, or rely on the user's discretion.

Fasoo has developed FV technology to overcome this limitation of existing file systems. Like other virtualization technologies, FV makes files independent of their physical location. A virtualized, simply virtual, file has a unique identifier and a version number. It will be identified only by the pair attributes, which means it does not matter where it is stored and what the file name is. You can copy a virtual file anywhere, not changing the identifier and the version number.

Thus all the copies can be treated as the same at ease. The version number goes up when you edit and save the file. FV automates version control without relying on users and controls the update priority when users simultaneously compete to update a file. Each virtual content has a unique URL. You can attach a virtual file itself or send its URL for sharing. Either way, the recipients can access the latest version or a specific version. You don't need to resend the new copy or replace the old one. There is no chance of either generating unmanaged copies or missing versions not being checked in.

You make a lot of derivatives from existing files. A derivative could be a new version of the old or a brand new one driven from the old. FV clarifies whether you get a new version or a derivative with a new identifier. FV also keeps the information about which one is the parent of a derivative, enabling you to trace back to the origin of a file.

FV guarantees that you can get complete actual usage of a file, while the usage information you can get so far is just the log from CMS. You don't know any file usage outside of CMS, even though files move around anywhere out of CMS. FV informs the entire lifecycle of a file, where it originates, how it has changed, and who has accessed it. FV makes the Rules, 1 through 3, unnecessary and helps users comply with Rule 4 and 5 easily.

Virtual Content Infrastructure (VCI): sufficient CMS with minimum redundancy

FV helps users reduce redundant copies dramatically and delete redundant copies with confidence. You can delete all your local redundant copies anytime since every version of virtual files resides in a virtual space. FV provides users with the necessary information to sort out the redundant files among similar files.

You can build a system with FV technology that virtualizes content automatically when saving, makes the virtualized content available from anywhere, anytime, and guides users to delete redundant files regularly at ease. We call it the Virtual Content Infrastructure(VCI) of an organization.

VCI will serve as your sufficient CMS that holds all your content without missing or duplication. Due to the FV technology, users can use any local files or links without worrying about the duties of well-disciplined users in old CMS. VCI assists users in determining which ones are redundant among similar files through the accurate usage information whation and the entire lifecycle of a file. The redundancy will drop significantly compared to the conventional CMS. VCI is an innovative CMS with minimal redundancy, overcoming CMS's insufficiency and redundancy problems, not relying on disciplined users.

VCI: content management platform

VCI serves as a virtual content management platform and boosts all your application systems' capabilities. Most of today's application systems allow attaching files. It is nice but complicates content management. The files attached are no longer at the reach of CMS. For instance, your email system might have more files than your CMS, but you cannot manage the files in your email system like those in your CMS. Your email system is the biggest obstacle to successful content management unless you force users to insert a link instead of a file itself. With VCI, your email system will remain an excellent collaboration tool since VCI still manages all the attached files as a content management platform. Likewise, your team's bulletin board or ERP could be an excellent collaboration tool with VCI. Your application systems help users locate the relevant files quickly with appropriate context, while VCI takes care of other content management from behind.

Since the breakout of the pandemic, organizations have deployed a new set of collaboration tools as needed. As you add another, information is getting more fragmented and duplicated. Thus you have to look around here and there to find something and the overall redundancy goes up. With VCI, all the content can be integrated and shared in all application systems, as you expect from a content platform. You can enjoy various collaboration tools without worrying about the ultimate information chaos.

Virtual Content Infrastructure (VCI)

| ECM | E-mail | Collaboration Tool | Cloud Storage | File Server |
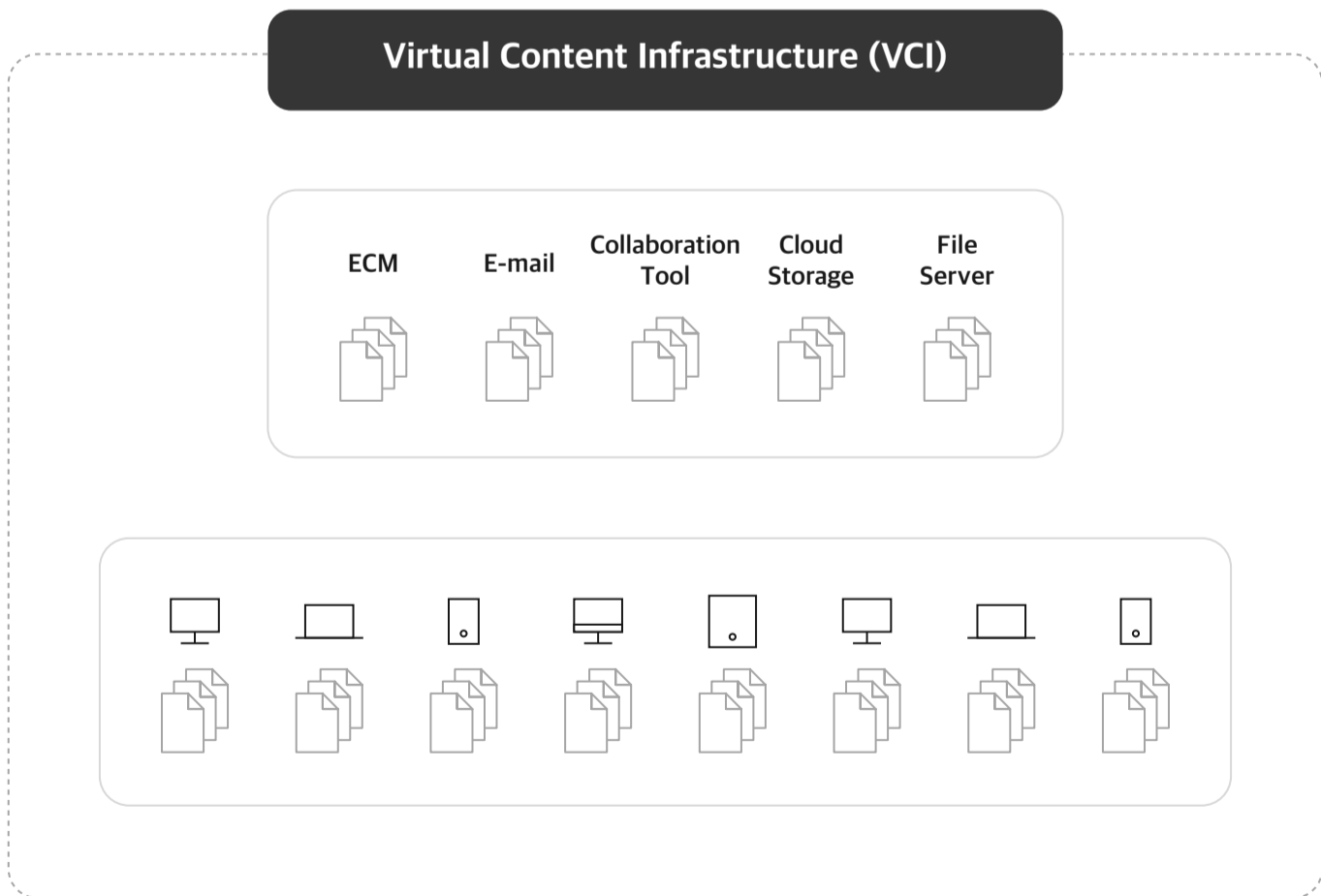
VCI: data security platform

VCI provides essential security features on content, unstructured data. VCI keeps all content encrypted at rest and in transit and controls who can access each file or not. VCI needs to be the base solution when deploying other data security solutions like DLP, EDRM, SIEM, and UEBA. If you deploy other security solutions on top of VCI, you can enjoy several benefits such as:

- VCI reduces the threat surface significantly by minimizing the redundant files.

- VCI alleviates the burden of setting a security policy over a file. Policy setting on virtual files is more straightforward than on physical files considering a virtual file can have many physical instances. Otherwise, you have to repeatedly define a policy per each physical file, even worse, resulting in a different policy on the same content.

- VCI provides accurate content usage with rich context, which is critical to SIEM and UEBA.

VCI backs up all your content in real-time without duplication. VCI is the most efficient content backup method since it guarantees no missing content but requires minimum storage.

Content availability is crucial to a large enterprise with many regional offices globally. VCI knows which content has been and will be used by whom and where. VCI can suggest an optimal content delivery strategy to reduce the latency problem, which worsens in a large deployment. VCI enables you to enjoy the benefits of cloud computing without worrying about performance, offline use, and complete control over your data.

VCI: reinventing content management

VCI reinvents CMS and opens up a new horizon for intelligent information management. VCI is the next-gen CMS that serves as a content platform for management and security. VCI will put your organization to lead the digital transformation race most efficiently and safely.

| Data Management | Collaboration | Security | ○ ○ ○ |

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