Information Revolution

Lean practices and new technologies are reinventing information management and governance

Organizations of all types are under pressure to improve how they manage and police their information. This urgency is driven in part by the unprecedented volume of information businesses now manage. (The world's data volume is expected to grow from 33 zettabytes[1] in 2018 to 175 zettabytes by 2025.[2]) This mountain of physical and electronic information creates enormous problems for organizations and institutions slow to implement new data governance and management practices:

- *Operations:* Outdated information storage and workstreams impair effectiveness across the organization, from preventing sales staff from identifying new customers; R&D engineers accessing product-development knowledge; and managers and employees recognizing and applying best practices to the processes they touch on a daily basis.

- *Market consequences:* Information is constantly required from entities along an end-to-end supply chain, regardless of sector — customers demand information about a product or service; suppliers need production forecasts; students seek course descriptions; patients need summaries of their medical histories. Responsive information management and governance enhances customer satisfaction and supplier support; weak supply-chain information processes erode those relationships.

- *Compliance consequences:* Governments at every level are adopting regulations that define how organizations must handle information, with severe penalties for those that don't comply. For example, the California Consumer Privacy Act (CCPA) takes effect on Jan. 1, 2020. Enacted in 2018, the legislation "creates new consumer rights relating to the access to, deletion of, and sharing of personal information that is collected by businesses." The intent of the law is similar to that of the General Data Protection Regulation (GDPR), but businesses may have additional obligations under CCPA.[3] GDPR set data privacy laws for EU member states, assigned control of personal data to individuals in the EU, and incorporated new rights for EU data subjects. GDPR applies to any organization holding information on EU data subjects — even those outside of the EU — and fines for GDPR non-compliance can reach €20 million or up to 4 percent of an organization's annual worldwide revenue of the preceding financial year.[4]

- *Security consequences:* Virtually every organization, in virtually every industry — healthcare, manufacturing, financial services, higher education, legal services, etc. — holds large quantities of sensitive information, including financial statements, credit card data, intellectual property, user IDs and passwords. Yet since 2013, there have been approximately 15 billion data records lost or stolen, and only 4 percent of those were "secure breaches," in which encryption was deployed and the stolen data was useless to those who took it.[5] Assessing and improving information workstreams also can improve the security of information within an organization.

With so much at stake, it's no wonder many organizations have begun to apply best practices to information management — especially lean strategies they've used for years to improve other workstreams and processes.

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Lean Thinking and Information Management

Over that last 30 years, lean thinking has become a widely accepted methodology for improving processes — including information-centric ones.
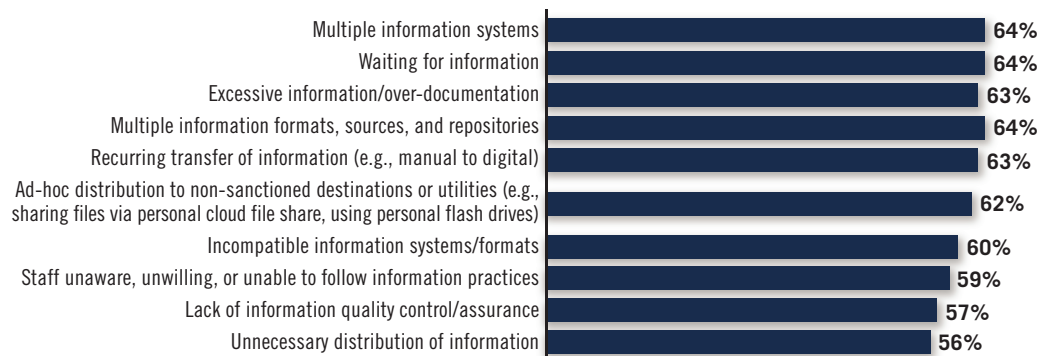
Over that last 30 years, lean thinking has become a widely accepted methodology for improving processes — including information-centric ones. Lean thinking evolved from Japanese manufacturing practices, spreading from manufacturing into industries ranging from retail (e.g., Starbucks) to healthcare. Originally applied to visible processes (e.g., production or service environments), lean is now applied to less visible processes, such as product development/R&D, accounting, and information management and governance.

Why? Because lean thinking can help leaders in quickly assessing and improving information management workstreams. In fact, information has always been at the heart of lean, in the form of value-stream mapping — originally referred to as "material and *information* flow mapping." By tracking the movement of information, employees can identify information problems and waste. This work, combined with a comprehensive information-security-and-compliance gap analysis, helps organizations to determine root causes of information problems and eliminate them by redesign-

ing workstreams. Not only can this dramatically impact operations, it also enhances the competitive posture of organizations, promoting them as best-in-class at managing and securing sensitive information.

A lean approach works because information workstreams are subject to the same categories of waste found in physical workstreams: overproduction, waiting, conveyance, processing, inventory, motion, and correction.[6] Not surprisingly, the *Canon Lean Information Management and Governance Study* found that many organizations are fraught with information wastes *(Figure 1)*. For example, 64 percent of executives report that their organizations have problems with "waiting" for information; "overproduction" comes in the form of excessive information/overdocumentation, reported by 63 percent of executives.[7] Information overload is often an indicator of lagging investment in information infrastructure, but it's far from the worst outcome: the cost of slow data access is dwarfed by the potential financial impact of fines, lost revenue, and diminished shareholder value if information is compromised.

Figure 1. Information Problems/Wastes
(% of manufacturers with some or significant problems)

Multiple information systems	64%
Waiting for information	64%
Excessive information/over-documentation	63%
Multiple information formats, sources, and repositories	64%
Recurring transfer of information (e.g., manual to digital)	63%
Ad-hoc distribution to non-sanctioned destinations or utilities (e.g., sharing files via personal cloud file share, using personal flash drives)	62%
Incompatible information systems/formats	60%
Staff unaware, unwilling, or unable to follow information practices	59%
Lack of information quality control/assurance	57%
Unnecessary distribution of information	56%

Source: Canon Lean Information Management and Governance Study

The use of lean principles in the redesign of information workstreams — including practices such as standardization, mistake-proofing, and pull signals for information (i.e., rather than "pushing" information to employees, they request or "pull" the data they want) — along with new technologies can help to minimize or remove problems entirely, resulting in:

- *Improved operations capabilities:* By addressing information problems related to delays, quality, and incompatible information systems and formats, users (employees, customers, suppliers) access up-to-date, accurate information *when* they need it, from *where* they need it (mobility), and *how* they need it (in formats that enhance collaboration and productivity).

- *Automated information workstreams:* Many organizations struggle with mixtures of paper and digital information, forcing back-and-forth conversions to accomplish even simple tasks (e.g., filing a document). Improved information management and governance requires a digitally formatted platform that allows for rapid, accurate, one-time conversions of paper documents. For example,

automation solutions with optical character recognition software can speed the transition to all-digital documents, reducing the volume of duplicate and lost documents; enabling digital access for authorized users; and improving process efficiency (e.g., invoicing, ordering, receipt of goods).

- *Improved analytics:* Decisions are only as good as the information upon which they're based. With lean principles improving information quality and access, executives receive the *right* data for analytics applications. Data is visualized in real-time in formats customized for end users.

- *Improved security:* Value-stream mapping also identifies gaps in security, which can help to mitigate security risks. This allows organizations to implement new information processes with security controls, automated tracking mechanisms, and integrated data protection technologies that incorporate protected or sensitive content into regulated workflows on receipt; limit unauthorized access to office devices; and leverage classification tools to accurately catalog, store, and secure information.

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Information-Management Best Practices and Technologies

The *Canon Lean Information Management and Governance Study* finds that some organizations are improving information workstreams with lean practices and automated solutions. Yet many others struggle: only 50 percent of organizations have a "strategy defined, and policies and tactics that align with the strategy disseminated across the *entire* organization"; another 23 percent report dissemination across *most* of the organization.

C-level executive teams are most commonly responsible for an organization's information management and governance strategy *(Figure 2)*. Because these leaders can make decisions to impact information manage-
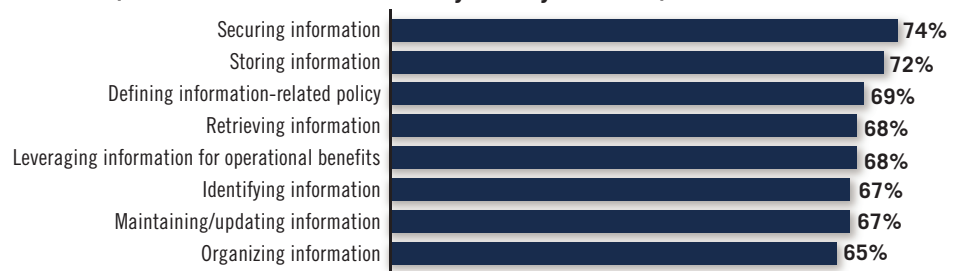
ment and governance (e.g., invest in talent, resources, tools), their involvement is critical — especially at organizations that have yet to define and execute a strategy.

Organizations are most successful at executing their information management and governance strategies for securing information (74 percent extremely or very effective) — which means 26 percent or more are getting lesser results for key information activities (securing, storing, identifying information, etc.) *(Figure 3)*. Organizations have been least successful (slightly effective or not effective) at leveraging information for operational benefits (11 percent).

Figure 2. Group responsible for executing information management and governance strategy

C-level executive team	46%
Information Technology department	42%
Cross-functional department management team	37%
Human Resources department	18%
Legal department	17%
Operations	13%
External consultants	9%
Hardware and software suppliers	7%
Research and development	5%
Other	1%
Don't know	1%

Figure 3. Successful execution of company strategy in the following areas (% of manufacturers extremely or very effective)

Securing information	74%
Storing information	72%
Defining information-related policy	69%
Retrieving information	68%
Leveraging information for operational benefits	68%
Identifying information	67%
Maintaining/updating information	67%
Organizing information	65%

Source: Canon Lean Information Management and Governance Study

The *Canon Lean Information Management and Governance Study* examined three categories of best practices related to information management and governance *(Figure 4)*:

- *Information-management practices:* The most-used practice was breach-awareness and -response policies and procedures (in use at 58 percent of organizations). The least-used practice was organization-wide taxonomy for information types (in use at just 13 percent).
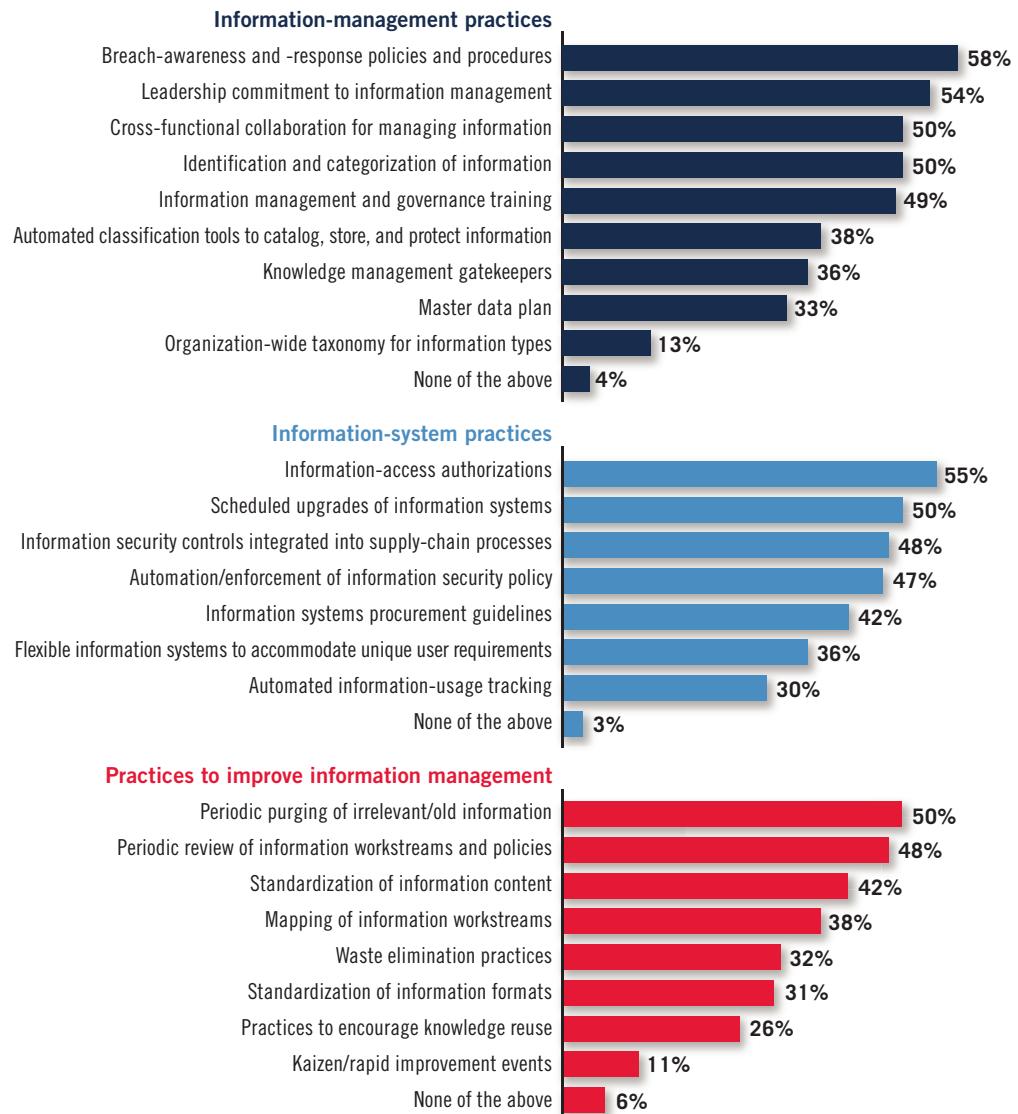
- *Information-system practices:* The most-used practice was information-access authorizations (in use at 55 percent of organizations). The least-used practice was automated information-usage tracking (in use at 30 percent).

- *Practices to improve information management:* The most-used practice was periodic purging of irrelevant/old information (in use at 50 percent of organizations). The least-used practice was kaizen/rapid improvement events (in use at just 11 percent).

Figure 4. Best practices in use

Information-management practices

Practice	%
Breach-awareness and -response policies and procedures	58%
Leadership commitment to information management	54%
Cross-functional collaboration for managing information	50%
Identification and categorization of information	50%
Information management and governance training	49%
Automated classification tools to catalog, store, and protect information	38%
Knowledge management gatekeepers	36%
Master data plan	33%
Organization-wide taxonomy for information types	13%
None of the above	4%

Information-system practices

Practice	%
Information-access authorizations	55%
Scheduled upgrades of information systems	50%
Information security controls integrated into supply-chain processes	48%
Automation/enforcement of information security policy	47%
Information systems procurement guidelines	42%
Flexible information systems to accommodate unique user requirements	36%
Automated information-usage tracking	30%
None of the above	3%

Practices to improve information management

Practice	%
Periodic purging of irrelevant/old information	50%
Periodic review of information workstreams and policies	48%
Standardization of information content	42%
Mapping of information workstreams	38%
Waste elimination practices	32%
Standardization of information formats	31%
Practices to encourage knowledge reuse	26%
Kaizen/rapid improvement events	11%
None of the above	6%

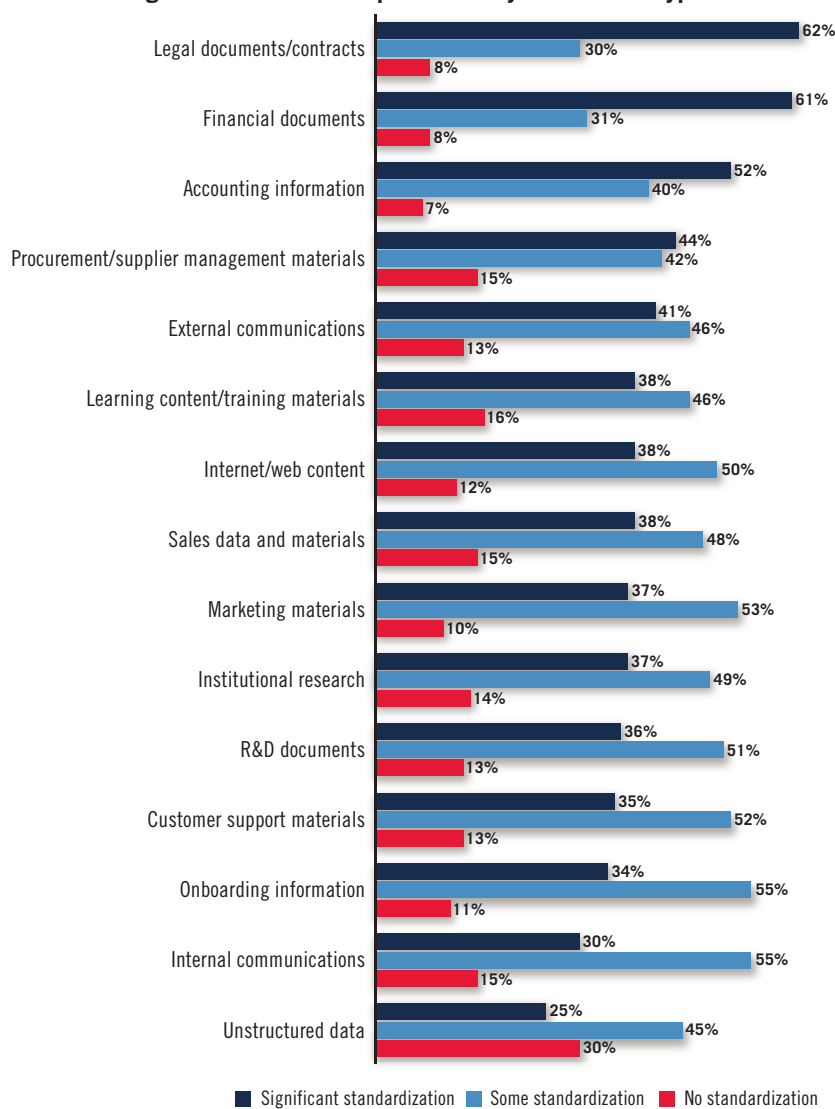Source: Canon Lean Information Management and Governance Study

Most organizations enjoy at least some collaboration among departments and functions in defining, executing, and managing information governance; 24 percent extensive collaboration, 54 percent moderate collaboration, and 19 percent some collaboration. Yet levels of standardization vary widely by the type of information *(Figure 5)*. Legal documents/contracts and financial documents are the most standardized forms of information, while internal communications and unstructured data are the least.

Organizations without standardized information management and governance processes for critical information (legal documents, financial documents, accounting information, etc.) are at risk for errors, duplication, and waste, and should consider implementing data audit and standardization initiatives.

Figure 5. Standardized processes by information type[8]

	Significant standardization	Some standardization	No standardization
Legal documents/contracts	62%	30%	8%
Financial documents	61%	31%	8%
Accounting information	52%	40%	7%
Procurement/supplier management materials	44%	42%	15%
External communications	41%	46%	13%
Learning content/training materials	38%	46%	16%
Internet/web content	38%	50%	12%
Sales data and materials	38%	48%	15%
Marketing materials	37%	53%	10%
Institutional research	37%	49%	14%
R&D documents	36%	51%	13%
Customer support materials	35%	52%	13%
Onboarding information	34%	55%	11%
Internal communications	30%	55%	15%
Unstructured data	25%	45%	30%

Source: Canon Lean Information Management and Governance Study

Best practices and standardization address many information problems but may not overcome difficulties caused by legacy or unreliable hardware and software. The Canon study found that many pieces of hardware and software are more than five years old *(Figure 6)*.

A majority of executives describe their hardware as having high reliability (40 percent) or good reliability (52 percent). Similarly, most describe their software as having high reliability (35 percent) or good reliability (56 percent). Not surprisingly, organizations with newer equipment and software are more likely to have hardware and software with high reliability. For example, 48 percent of organizations with copiers less than three years old have hardware with high reliability vs. only 37 percent of those with older copiers. Some 46 percent of organizations with content management systems less than three years old have software with high reliability vs. just 32 percent of those with older content management systems.

Figure 6. Age of hardware and software

	Less than 3 years old	3-5 years old	5-10 years old	More than 10 years old	Not applicable
Hardware					
Computers	46%	38%	9%	4%	3%
Servers and network equipment	44%	38%	11%	5%	2%
Multifunction printers	38%	35%	19%	3%	5%
Printers	36%	42%	12%	5%	5%
Scanners	36%	40%	15%	4%	5%
Copiers	34%	36%	23%	4%	3%
Software					
Customer relationship management (CRM)	36%	34%	13%	5%	13%
Document management system (DMS)	36%	36%	13%	6%	10%
Content management system (CMS)	34%	43%	11%	4%	7%
Industry-specific applications (e.g., LMS, SIS)	29%	36%	15%	7%	13%
Enterprise content management (ECM)	32%	34%	15%	7%	13%
Enterprise resource planning (ERP)	26%	42%	15%	7%	10%

Source: Canon Lean Information Management and Governance Study

Not surprisingly, organizations with newer equipment and software are more likely to have hardware and software with high reliability.

Information Performances and Metrics

Most executives report that their information management and governance practices have positively impacted a range of performances *(Figure 7)*. But many organizations have had trouble turning practice into better performance. For example, 21 percent report that their practices have had no impact or negative impact on the security of information.

Most organizations have substantial opportunities to improve performance measures such as security. For example, the Canon study found that 70 percent of organizations have had at least one security breach (i.e., unauthorized access of data, systems, applications, or networks) in the past two years; 42 percent of organizations have had more than two breaches; and 8 percent of executive report they "don't know" how many breaches have occurred.

Despite the high percentage of organizations with breaches, only 28 percent have evaluated the value of their content vs. a risk management matrix. Risk matrices help organizations prioritize preventive actions by estimating the likelihood of an adverse event occurring and the consequences from the event.

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Figure 7. Business impact from information management and governance practices

|	Negative impact	No impact	Some positive impact	Significant positive impact
Regulatory compliance	5%	18%	41%	36%
Financial reporting	3%	25%	37%	35%
Security of information	5%	16%	44%	35%
Customer satisfaction	6%	21%	43%	30%
Updating of information	5%	23%	44%	29%
Ability to leverage information within the IoT (e.g., extract and use information from smart devices)	4%	28%	44%	25%
Teaching/Training/Professional development	5%	30%	40%	25%
Reuse of information	5%	28%	42%	25%
Organization productivity	7%	21%	48%	24%
Revenue/Sales	6%	28%	43%	23%
Access to information (e.g., speed, insights)	7%	30%	42%	21%
Ability to leverage information with business analytics	6%	24%	49%	21%
Supplier performances and supplier relations	5%	32%	42%	21%
Profitability	6%	26%	47%	21%
Personalized learning	6%	34%	43%	17%

Source: Canon Lean Information Management and Governance Study

Many organizations also have issues with data quality: 42 percent of executives report that more than 10 percent of their organization's information is out-of-date, and only 7 percent report no outdated information.

Most organizations are investing in data improvement initiatives. In the past year, a majority spent 5 percent or more of their revenues on equipment, hardware, and software for information management and governance *(Figure 8)*. Sixty-five percent of organizations will increase spending on information management and governance this year vs. last.

Figure 8. Information management and governance investments (% of revenue) in past year (% of organizations)

0%	1-2%	3-4%	5-6%	6-7%	7-8%	8-9%	9-10%	More than 10%
6%	15%	17%	20%	9%	14%	5%	7%	8%
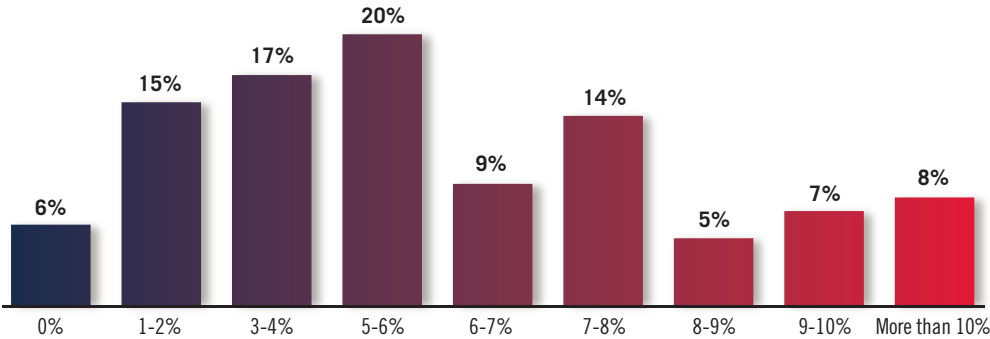
Source: Canon Lean Information Management and Governance Study

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Turn Information Management and Governance into a Competitive Advantage

Every organization has information challenges, but lean organizations manage them more efficiently. They've made information management and governance a strategic priority, and implemented visualization systems, regular reviews, and communication protocols that allow frontline personnel to rapidly identify problems, prioritize actions, and implement solutions — or escalate issues to higher levels for support and resources.

Every organization can improve information management and governance, starting with a comprehensive assessment of information processes and workflows. By working with trusted partners, organizations can efficiently and effectively:

- Evaluate their security posture,

- Perform gap assessments that establish or contribute to a risk register,

- Build real-time dashboards that alert management of current and emerging problems,

- Analyze issues for risks and costs the organization may incur (by action or inaction), and

- Create action plans for remediation that include redesign of information workflows, standardized practices, training employees in best practices, and investing in technologies to automate and digitize manual information processes.

How will your organization improve its information management and governance?

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[1] A zettabyte is one sextillion (10^{21}) bytes.

[2] Andy Patrizio, "IDC: Expect 175 zettabytes of data worldwide by 2025, *Network World,* Dec. 3, 2018.

[3] "California Consumer Privacy Act," State of California Department of Justice.

[4] Regulations, REGULATION (EU) 2016/679 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 27 April 2016, Official Journal of the European Union.

[5] "Data Breach Statistics," Breach Level Index, October 2019.

[6] *Lean Lexicon,* Lean Enterprise Institute.

[7] Canon Lean Information Management and Governance Study, October 2019. All subsequent data in this report are from the Canon study.

[8] Due to rounding, some data in the report will not sum to 100%.

Canon U.S.A. does not provide legal counsel or regulatory compliance consultancy, including without limitation, Sarbanes-Oxley, HIPAA, GLBA, Check 21 or the USA Patriot Act. Each customer must have its own qualified counsel determine the advisability of a particular solution as it relates to regulatory and statutory compliance.

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Some security features may impact functionality/performance; you may want to test these settings in your environment.

Canon Believes in Lean Document Processes and Protecting Confidential Information

In the 21st century, protecting intellectual property and document security has become more paramount than ever with the rise of office and online data breaches that have impacted the competiveness and credibility of organizations. A lack of proper oversight for document management can potentially cause irreparable harm to your bottom line while putting your company, employees, and clients all at risk. Help protect sensitive information at your MFP devices by monitoring and logging document activity through the use of enterprise authentication and document tracking systems. Have the ability to record each typical daily document activity, such as copying, scanning, printing and faxing, and log that information by user, documents, and time stamping for compliance purposes. Enhance the monitoring of key confidential words or phrases to identify confidential word breaches when they occur and alert IT to prevent the possibility of your documents ending in the wrong hands.

Canon U.S.A Inc. is helping businesses understand the advantages of adopting lean best practices combined with leveraging today's imaging and document technologies to optimize business processes and to help protect document information. Canon offers a portfolio of scalable hardware, software, and services aimed at safeguarding documents, automating manual steps, and reducing waste that can help improve document turnaround time and connect resources for information sharing.

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