Enterprise Content Management (ECM): Functions, Adoption Drivers and Trends

Would you start a business today without having access to the Internet, email services or a cellular phone? How slow, how expensive would it be to go back to doing things the old way, using paper-mail, telephone booths, rotary dials and Yellow Pages? Would it even be possible to consider?

Ponder now if you will, on the amount of processes your company, your organization, your government still depends on, which rely on paper documents. Think of the costs associated with these, over and above the price of paper. Examples are:
- Sorting, indexing and storage
- Security and retrieval
- Preservation, access and purging

The questions above are not new. Paper has been around for a long time. Filing cabinets, hanging folders and banker's boxes are still part of the document landscape. Their role however, is shrinking.

Three factors are changing the way we create, transfer, store and access documents.
1) The majority of new business documents no longer come to life on paper. Word processors, web-based forms, social media and IoT (Internet of Things) transactions are now the first source of document creation.
2) Affordable digital storage, both on-premise and on-Cloud is accessible anywhere, via the Internet.
3) Increasingly sophisticated Enterprise Content Management (ECM) software systems are making inroads into paper-based storage and manual workflows.

In this article, I will focus on ECM systems as a disruptive technology and describe the following elements:
- Functions
- Adoption drivers
- ECM as a disruptive technology
- Emerging trends

Functions
Wikipedia describes Enterprise Content Management, ECM, as follows:

ECM extends the concept of content management by adding a time line for each content item and possibly enforcing processes for the creation, approval and distribution of them. Systems that implement ECM generally provide a secure repository for managed items, be they analog or digital, that indexes them. They also include one or more methods for importing content to bring new items under management and several presentation methods to make items available for use. […]
The key feature of ECM that distinguishes it from "simple" content management is that an ECM is at least cognizant of the processes and procedures of the enterprise it is created for, and as such is particular to it.

Before starting, let's describe ECM functional components. There are five basic functions:
1) Capture and index
2) Store and secure
3) Search and retrieve
4) Workflow automation, collaboration and audit
5) Preservation and purge

In most cases, these components come as a package. They are typically well integrated. Not all components need to be implemented at once, or for all the records in a given organization. The following tables provide a summary of functions, benefits and adoption drivers.

Functions and Benefits

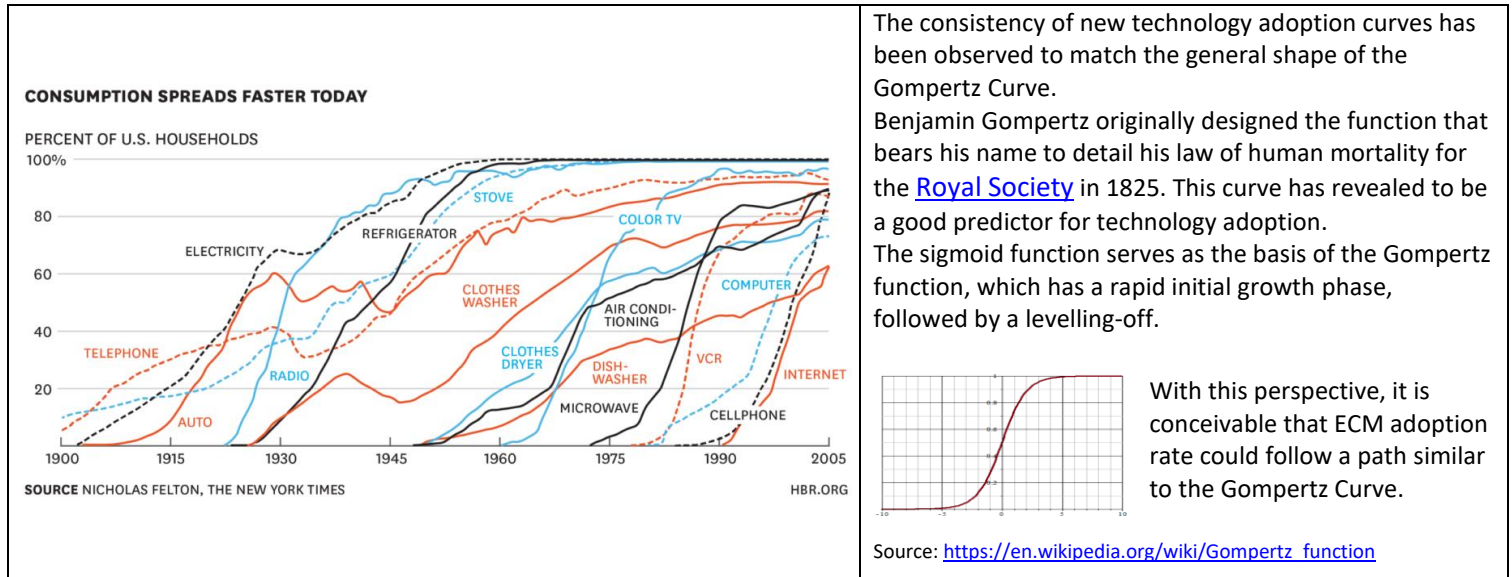| Function	Description	Benefits

Capture and index	• OCR (Optical Character Recognition), and Zone OCR, to retrieve specific document data for index, metadata and workflow purposes
	• Barcode Recognition
	• Document indexing, metadata and classification
	• Capture from
	  o Physical sources such as scanners and MFP's
	  o Electronic sources such as subdirectories, email and Cloud sources
		• Make documents searchable by word or index value
		• Trigger automated documents workflows
		• Enable automatic document filing
		• Enable document capture from a variety of sources

Store and secure	• Store and backup
	• Secure and encrypt
	• Compress and hash to enable tamper monitoring
	• Secure access by
	  o Document and/or document category,
	  o Users or groups,
	  o Function (read/write/modify)
		• Reduce physical storage space cost
		• Enhance security
		• Prevent loss
		• Ensure controlled access

Search and retrieve	• Enable instant retrievability with
	  o Index values or full-text document search (the Google effect)
	  o Access to documents and workflows via either local or mobile devices
		• Increased search speed with indexing
		• Secured access to documents and workflows anywhere, via Intranet or Internet

Workflow automation, collaboration And audit	• Enable scripting of existing workflow with functions such as
	  o The ability to recognize documents by harvesting key data elements and use these to guide documents through standardized workflow processes e.g. an invoice amount over $10M may need a different approval process than one worth $1K
	• Enable collaboration with document workflow automation
	  o Record time-stamped event history for each document as it makes its way through each assigned workflow process in a database that can be subsequently queried and/or analyzed
		• Increase workflows execution consistency
		• Track document versions and work only with the latest, most up-to-date version
		• Speed up customer service, ability to respond to document related inquiries
		• Built-in document audit trail
		• Enhance cooperation

Preservation and purge	• Backup and recovery • Retention and Purge Rules	• Provide recoverability in case of disaster • Ensure regulatory compliance • Enable rule-based document purge • Reduce cost of keeping obsolete data

Adoption Drivers

ROI Term	Adoption Drivers	Descriptions	Benefits
Immediate benefits	Cost control	• Prevent document loss • Reduce retrieval time	• Improve operational efficiency • Reduce physical storage and associated costs

	Collaboration and customer service	• Make documents searchable with index values or full-text search
		• Optimize and automate business processes, eliminate manual and/or repetitive tasks with scripted, automated workflows
		• Apply BI (Business Intelligence) to workflow timeline data, enable use of visualization tools, to better understand trends, e.g. what specific steps are causing bottlenecks and slowing down a workflow?
		• Integrate with desktop applications, such as MS Office and Outlook
		• Integrate with Cloud data services, enabling intercompany data exchange.
			• Optimize business processes
			• Enable
			  o Process automation
			  o Process monitoring
			  o Workflow automation and efficiency analysis
			• Increase agility, responsiveness

Medium- and long-term benefits	Compliance	• HIPPA, Sarbanes-Oxley, GDPR and others, depending on jurisdiction • Ensure data integrity is protected, reduce fraud risk	• Maintain compliance • Ensure business continuity
	Security and continuity	• Set granular access privilege per category of user, and/or document, to read, write, modify or delete • Provide auditability and modification history for each document • Backup and recovery in case of disaster	• Reduce risk • Increase customer confidence • Have an audit trail for each document and workflow

With such compelling functions and benefits, one may wonder why ECM market penetration appears to be low, when compared with the email or cellular telephone disruptive technology examples mentioned earlier. The answer to this question may lie in taking a step back, zooming out and looking at the bigger picture.

ECM as a Disruptive Technology

The ECM value proposition is to automate, accelerate workflows and reduce document handling costs. With a vast potential market and well-established functional benefits, we have the markers of what may be an emerging disruptive technology.

A noticeable property of past disruptive innovations is the consistency of their adoption rate curves, which typically have an S-shape. These curves are often modeled using the Gompertz Function as a predictor – see explanation below.

CONSUMPTION SPREADS FASTER TODAY

PERCENT OF U.S. HOUSEHOLDS

SOURCE NICHOLAS FELTON, THE NEW YORK TIMES

HBR.ORG

The consistency of new technology adoption curves has been observed to match the general shape of the Gompertz Curve.

Benjamin Gompertz originally designed the function that bears his name to detail his law of human mortality for the Royal Society in 1825. This curve has revealed to be a good predictor for technology adoption.

The sigmoid function serves as the basis of the Gompertz function, which has a rapid initial growth phase, followed by a levelling-off.

With this perspective, it is conceivable that ECM adoption rate could follow a path similar to the Gompertz Curve.

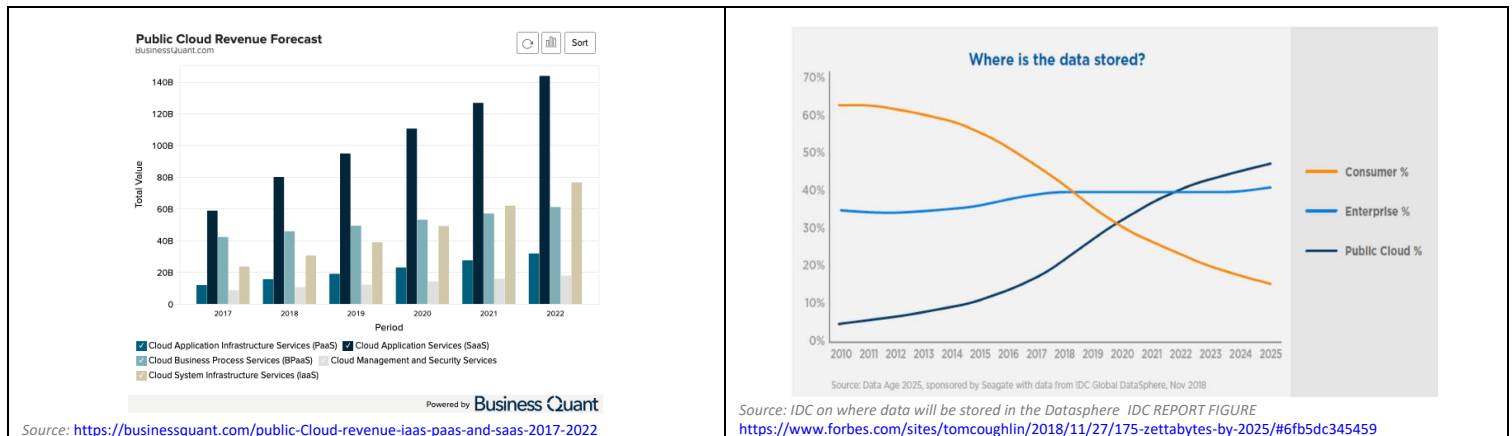Source: https://en.wikipedia.org/wiki/Gompertz_function

Emerging Trends

Based on current growth rate, industry forecasters estimate ECM software sales will grow between 14% to 18% over the next 5 years. As for any software category, it is difficult to estimate precisely where we are in the ECM growth curve. Using past disruptive technology adoption curves and the Gompertz model as a guide, one may infer that we are at the early stages of adoption. Furthermore, the ECM market is not uniform. The number of implementations vary by region and by company size e.g. enterprise vs. small-and-medium businesses (SMB).

Early ECM adopters have typically been larger companies, based in developed countries. Assuming the adoption curve is driven by the value proposition, one may also ask: are the ECM software products currently on the market compelling enough to spur demand across a wider range of geography and business sizes?

As many other categories of software, ECM is affected by a much larger, global shift: data and IT delivery services moving to the Cloud. The charts below clearly illustrate this progression.

Source: https://businessquant.com/public-Cloud-revenue-iaas-paas-and-saas-2017-2022

Source: IDC on where data will be stored in the Datasphere IDC REPORT FIGURE
https://www.forbes.com/sites/tomcoughlin/2018/11/27/175-zettabytes-by-2025/#6fb5dc345459

The global shift from local to Cloud-based computing is, all by itself, accelerating the rate of creation for new transaction. Contracts, agreements and documents of all types generated by social-media, e-commerce, IoT and mobile apps all contribute to this volume increase. In effect, most new documents are born in digital form. Paper is almost never involved.

On the ECM "demand side", this means companies and organizations now typically process
- Less paper, more electronic documents.
- A larger proportion of electronic documents originating from Cloud sources.

On the ECM "Supply Side", software providers have already adapted to this trend in three ways:

1) Enabling ECM systems to directly process documents in electronic form and/or originating from Cloud based platforms.
2) Designing products able to handle large document volumes with access to [almost unlimited] storage and computing Cloud resources. Workflow automation, in particular is specifically aimed at improving document handling speed and efficiency. Secured electronic signature exchange integration also reduces the need for printing, signing [by hand] scanning and sending.
3) Leveraging [Cloud-based] Software as a Service (SaaS) delivery to reduce cost of implementation and maintenance, while keeping scalability as part of the offer.

Software market research firms Gartner and Forrester, respectively produce yearly ECM "Magic Quadrant" and "Wave" charts **. These can be described as a representative sample of solution leaders in this field and they provide a good insight on the leading trends in this category of software.

- The Gartner and Forrester charts show roughly 20 distinct ECM suppliers, with some overlap (same suppliers in both lists)
  - All the suppliers listed have Cloud-based ECM service offerings.
  - Some suppliers offer only Cloud-based solutions (no on-premise software at all).
  - Hybrid solutions, bridging the gap between on-premise and Cloud-base deployments, are also offered.
- Relating to the Cloud trend described above, a number of observations can be made on the ECM solutions themselves:
  - With Cloud based SaaS delivery offerings, ECM clients now have the option to purchase services based on their requirements, without large up-front investment in software or infrastructure. ECM software solutions, delivered as SaaS are now more immediately affordable for smaller organizations while preserving the scalability required for enterprise clients. This is opening opportunities that would not have been cost effective with the traditional on-premise computing model.
  - A number of these solutions and services are hosted on very few, very large, global public Cloud suppliers.
    Note that until now, no significant disaster has hit any of these giant Cloud providers. Their integrity, reliability and strength has been, since inception, unparalleled. With this, a bigger question emerges: what if a significant disaster did happen? What would be the impact of so much data hosted by so few Cloud storage and computing providers?

Conclusions
Cloud-born data, as feedstock for Cloud-based ECM solutions appears to be the emerging direction. Over time, barring unforeseen events, on-premise hosting will likely become the exception rather than the rule for ECM software solutions. Concentration of ECM data in the hands of few large Cloud providers may bring concerns related to risk, privacy, trust and security. So far, these elements have not impacted the trend.

Past disruptive technologies show that initial adoption was often limited by the higher cost for a new product or service. With SaaS Cloud-based delivery, ECM providers can now offer scalable products, charged per usage, with no local infrastructure requirements. These SaaS software solutions are lowering the entry price, opening new, untapped markets; conceivably setting the stage for the accelerated, steeper phase of the adoption curve. Are we heading towards the mythical paperless society? Not quite yet. In the foreseeable future, the mass of managed documents will likely increase. The proportion of paper documents in the overall set will decrease but not disappear.

At the beginning of this article, I asked:
Would you consider starting a business without having access to the Internet, email services or a cellular phone?
In only a few short years, we may ask ourselves if any modern business or organization could function at top speed without using some form of Cloud-based ECM service.

References & Abbreviations:
** The Gartner Magic Quadrant and Forrester Wave charts can be found by entering the following arguments in a search engine:
- [Gartner Magic Quadrant for Content Management Service Platforms](#)
- [Forrester Wave, Enterprise Content Management (ECM) Content Platforms](#)
- ECM: Enterprise Content Management
- GPDR: General Data Protection Regulation, adopted by the European Parliament in March 2014

- OCR: Optical Character Recognition
- SaaS: Software as a Service
- SMB: Small and Medium Business
- IPPA: Health Insurance Portability and Accountability Act adopted by US Congress in 1996
- IoT: Internet of Things

Thibault Dambrine is a software professional based in Calgary, Alberta; currently working for Canon Canada, a digital imaging company. His IBM i experience shaped his interest for data aggregates, SQL, and networking topics. His articles and presentations are rooted in lived-in experience. He can be reached at dambrine@gmail.com. This article was originally published on the Toronto User Group for Power Systems website at www.tug.ca. The author thanks Kris Shahi, Luis Oliveros and Rob Bendig, who provided knowledge and perspective on this topic as well as the proofreaders, who helped with both form and substance.