



Topic: Digital Workplace

Issues: What are the technologies and architectures that enterprises should leverage in the workplace?

What are the macro trends impacting the evolution of work?

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# Aragon Research Technology Arc™ for the Digital Workplace, 2016

Aragon Research introduces its 2016 Technology Arc for the Digital Workplace. This fourth edition features 58 technology profiles that are split between the emerging, adopting, and mature arcs.

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## Introduction

Workplace technologies have undergone tremendous convergence as they have become cloud and mobile enabled. The push towards platforms has also allowed new categories of applications to emerge, via open APIs, to support specific business processes. This fourth edition of the Aragon Research Technology Arc™ for the Digital Workplace will help you to identify important technologies, choose which technologies to monitor, and determine the potential benefits of each. Additionally, this report adds extra dimensions that will help you decide when, why, and how you should adopt these technologies.

Following in the same vein as last year's report, the 2016 Technology Arcs feature emerging classes of applications that either extend or replace an existing category due to enterprise needs, or focus on specific tasks or processes, with the goal of producing specific business outcomes. Sales Communications, Predictive Lead Scoring, and Predictive Hiring are emerging areas where communications and analytics are combining to power insightful business decisions in Sales and HR, respectively.

In 2016, technology will continue to focus on business outcomes. Business planners have to understand user needs and the potential impact of emerging technologies and applications. Planning will have to include the applicability of any technology to the business outcome where its impact can be measured accurately. Business leaders responsible for planning have to be clear on the potential transformative power of even the newest technology categories, as it could mean a powerful competitive advantage or misstep in strategy.

## About The 2016 Technology Arc

The Technology Arc for the Digital Workplace highlights and reviews the key technologies and products that enable work to get done and deliver business value. It encompasses three sequential maturity arcs: *Emerge*, *Adopt*, and *Mature*.

### Emergence Arc

The Emergence Arc starts when the technology first appears outside of a pure research environment. Commercial pilots and first-generation products appear in the early part of this cycle, followed by the growth of the market that includes the technology. Generally, this phase lasts 1-3 years.

### Adopt Arc

In the Adopt Arc, a technology starts to be accepted as a product category and included in a general marketplace of similar products. The first 30 to 50 percent of this arc is considered an early adoption phase.

Typically, many enterprises wait to see what others are doing with a technology before they try it. Social networks are a good example. While many companies have not adopted social networks enterprise-wide, enough have tried them to give the technology a track record and a reputation. As market activity increases, more users start pilots so they can learn to leverage the same technology as their peers have. The demand attracts multiple vendors with a variety of approaches, price points and feature sets, which in turn drives further adoption. As a result of this activity, video content management advanced from about 10% to about 40% on the Adopt Arc between the 2014 and 2016 Workplace Technology Arcs. We're also seeing the adoption of other technologies increase, such as Sales Communications, as the transformative potential gets realized.

### Mature Arc

As technologies mature, the pace of change generally slows and progress becomes incremental. Often, the most significant opportunity in this phase is to gain efficiency through lower cost, while the dramatic functional gains of the Emerge phase become infrequent.

Some enterprises wait for maturation before attempting to deploy. These late adopters are often holding back for cost reasons. The trade-off is that by waiting, transformative opportunities that could have been captured sooner are delayed, along with the potential ROI. However, enterprises with conservative adoption cultures often wait for technologies to mature before implementing, which can save costs. Another trade-off in using this late adopter approach is that some competitors may not wait.

### Classifying a Technology's Potential Impact

Technologies have a wide range of different types and levels of impact on buyers. Aragon has called out two for special attention: 1) *transformative potential* (identified by pyramid icons) and 2) *cost-saving potential* (identified by green diamond icons).

▲ **Transformative Potential:** If a technology can transform a market, it is labeled with a *pyramid* icon instead of a bullet. Examples range from cognitive computing to enterprise social networks.

◆ **Cost-Saving Potential:** Some technologies bring new, more efficient ways to do things, and lower the cost of doing them. A *green diamond* identifies these entries. For example, the shift from on-premise to cloud-based email can offer significant savings over time, which is one reason many enterprises are evaluating it.

Not every technology or product category will lower your costs, but some may do so significantly. Aragon can help you find the ones with the greatest savings potential.

## Maturity Timing

Sometimes technologies can get stuck in the middle of a cycle. For example, when instant messaging was introduced, many enterprises would not deploy it because of archiving and records management requirements. As a result, enterprises delayed implementations until they were comfortable with the instant messaging products' archiving capabilities.

- ▲ An entry with a *black* icon generally has a 4-5 year maturity cycle.
- ▲ An entry with a *red* icon has a longer maturity cycle, generally 5 to 10 years.

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Aragon Research Technology Arc™ for the Digital Workplace, 2016

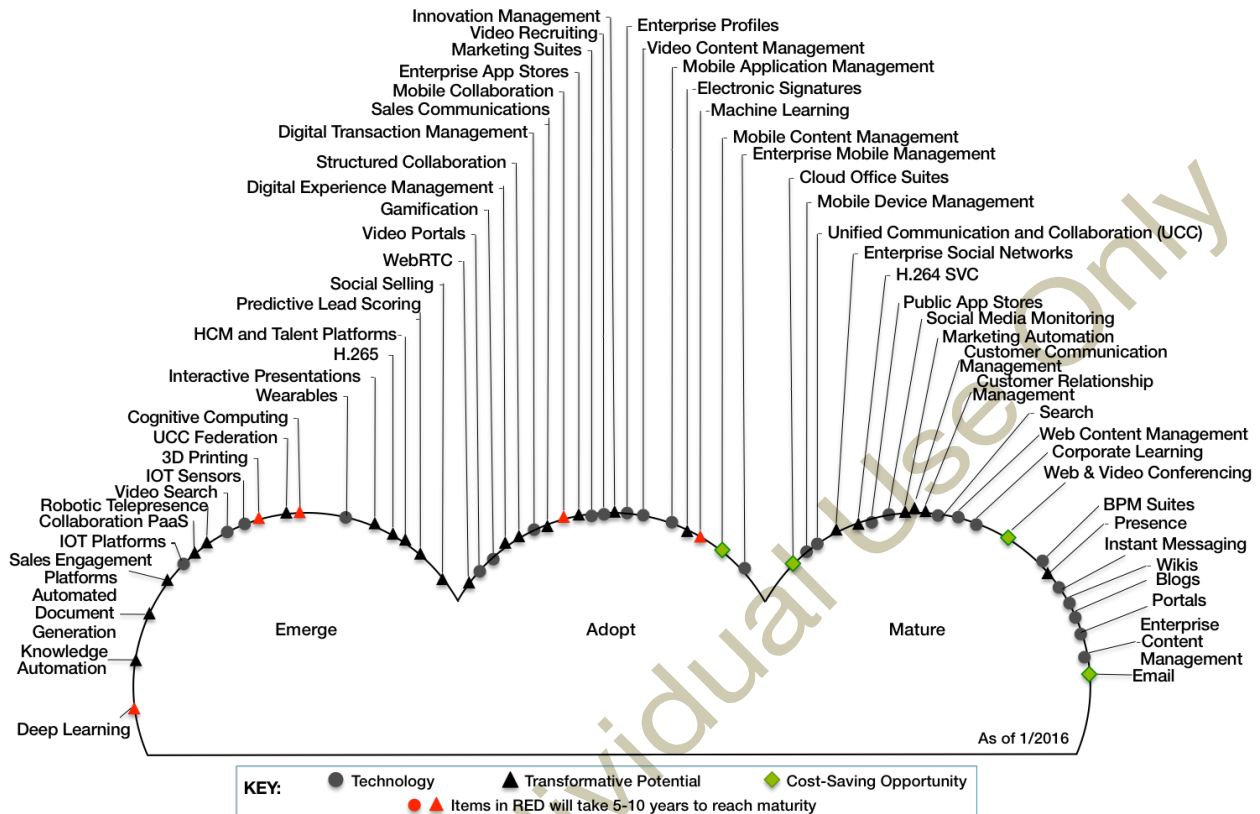


Figure 1: Aragon Research Technology Arc™ for the Digital Workplace, 2016

The workplace is undergoing fundamental changes, with people persistently connected by digital collaboration technologies and an evolving work environment. Due to the changing nature of work in a geographically distributed workplace, collaboration is no longer limited to desktops, landline phones, or videoconferencing rooms. Wherever people are, mobile devices, cloud services, social networks and video give them access to each other and help to nullify distance and time barriers. These, together with more open workspaces and predictive business applications, are leading to a new collaborative workplace.

Information is traveling at the speed of need, via cloud and mobile access. Technologies have to enable better collaboration and access to information in context to support business processes. Technology investments are being made by business leaders to enable specific outcomes.

## Phase 1: Emerge

Emerging concepts and technologies are those that are just beginning to be identified and understood outside of narrow R&D communities. While they may not be as widely adopted as other more mature technologies, some of them are so attractive that they may not stay in the emerging phase for very long.

These efforts often address large-scale issues and carry significant upside potential. However, few enterprises implement new technologies during the Emerge phase, and those that do generally confine them to pilots and tightly controlled deployments.

### ▲ Deep Learning

Deep Learning is a form of machine learning that uses a structured approach and specific computing models to solve complex problems, such as image recognition or semantic analysis. Deep Learning uses models, with the most popular being a Neural Network, to process complex problems. As such they need lots of computing power, of which GPU processors are becoming the de facto way to process large amounts of data very fast.

To date, Google has made news when it open sourced its TensorFlow Deep Learning algorithm. TensorFlow powers its Machine Vision Platform and other new innovations, such as Google Smart Reply, which is part of Google for Work.

**Representative Vendors:** *Caffe (via Berkeley Vision and Learning Center), Google, and IBM.*

### ▲ Knowledge Automation

Knowledge automation is poised for higher demand as information can be found faster due to increased use of deep learning. Knowledge Automation is all about its ability to tailor the selection and delivery of information and content to a specific audience in the context of specific circumstances. We would note that there is a link between KA applications and the rise of Digital Assistants.

The combination of machine learning with constant measurement of what people are doing in context of a particular task or job, allows knowledge automation systems to constantly

deliver the right information at the right time. Enterprises that deploy KA will gain a competitive advantage over traditional methods of training and information delivery.

**Representative Vendors:** *Digital Reasoning, Exsys, Kaybus, RightAnswers, and Vanguard Software.*

### ▲ Automated Document Generation

Automated Document Generation is the ability to process input or commands from computers or humans to automatically construct a new document. ADG goes beyond document generation/CCM capabilities of today that are basically rule based. The ability to auto construct documents bases on business situations or the needs of people will help to automate business processes even more than they are today.

The use cases for AGN are tied to any document oriented business process, particularly for sales people and others such as loan origination officers.

**Representative Vendors:** *Nintex and OpenText Thunderhead.*

### ▲ Sales Engagement Platforms

In addition to the core CRM System, Sales Engagement platforms will be the key software platform for sales professionals. During the steps of a sales process, salespeople need many tools and procedures to prepare for and engage in a sale. Sales Engagement platforms tackle the lifecycle of the selling process, including key internal and customer engagement processes.

Being able to onboard sales reps, communicate with customers, and share the right content at the right time are some of what sales engagement platforms can do to enhance the sales process.

▲ **Transformative potential:** Sales automation is turning from a process focus on the internals of sales management toward more substantive elements of sales communications and engagement that will improve closing rates and business outcomes.

**Representative Vendors:** *Brainshark, Callidus Cloud, Clearslide, Fileboard, Highspot, Qvidian, and Savo.*

## ▲ IoT Management Platforms

IoT Machine Platforms provide a cloud-based approach to interfacing with and managing IoT Machines. Historically, device management was done on a proprietary basis. Emerging standards for devices and interfaces and the entire IoT movement has led to the need for a management platform.

There will be many different approaches to device management, based on industry and device type.

**Representative Vendors:** Alicloud, Axeda, Carriots, Bosch, Cisco, Evrything, Google, IBM, Konekt, Microsoft, Mode, and thethings.io,

## ▲ Collaboration PaaS

The collaboration market is expanding to include Platform as a Service (PaaS) as the new way to deliver collaboration capabilities. Collaboration capabilities become services in the form of APIs and can be embedded into business applications to perform specific tasks. The platforms themselves can then be extended with additional functionality. PaaS has merged with Infrastructure as a Service (IaaS) in the cloud, democratizing the building and deployment of applications.

Cloud, mobile, and the growing API economy are taking communication and collaboration out of proprietary stacks and embedding them into the business applications, processes and services that people do their work in. This revolution has caused the ongoing emergence of business-led API architectures with measureable business outcomes as the driving requirement. This is the catalyst for Collaboration PaaS.

Many new Collaboration PaaS players are emerging to collaboration-enable business applications. Service providers are partnering with these vendors to build developer ecosystems around their services. Traditional collaboration providers are also emerging with their own PaaS offerings.

**Representative Vendors:** Cisco, Genband, Twilio, and Unify.



## ▲ Robotic Telepresence

Robotic telepresence blends robotics and video into one category. Robots are intelligent machines that can move around and act upon objects in the real world, either autonomously or under remote control. Devices now can move autonomously and have embedded video system (screen, camera, microphone and speakers) and allow people in other locations to participate in remote office activities, perform industrial inspections, and go into hazardous areas.

Use cases include general knowledge workers, manufacturing, military and other areas, especially healthcare. Increasingly, in scenarios involving physical security, cameras themselves are remotely controlled to provide robotic surveillance capabilities.

▲ **Transformative Potential:** Systems that can be "driven" offer obvious benefits for workers who need to operate in remote, dangerous, or inaccessible places. Systems with autonomous mobility open up a vast range of use cases, some completely unanticipated.

**Representative Vendors:** *Double, Fellow, InTouch Health, iRobot, Revolve Robotics, Suitable Technologies, and VGo.*

## ● Video Search

Video search is the ability to search a video file for "looks like" pictorial content, rather than for tags or other text metadata, using math-intensive image processing algorithms. It may incorporate audio search, either for spoken key words or for the voice of a particular speaker, as well as the ability to resolve text information within a video image, such as an auto license plate. A video timeline also allows users to search for and find specific clips or sections in a video file.

Machine learning and Deep Learning are playing an increased role as computers get better at matching existing images with ones it "sees." In fact, Google's Machine Vision, which allows robots and computers to recognize images and scenery uses deep learning algorithms to do this. Object recognition will be the first part of video search. Later, computers will be able to understand specific movements and behaviors.

Video search is still in its infancy, but some firms are making investments for the future. Existing technology vendors like Cisco, Google, and IBM are teaming up with new vendors such as Blinkx. The need for video search is being driven by the explosion of video as a category of enterprise content, as video becomes a widespread document type. Video content management products can tag video files with metadata to make them searchable in a video portal for on-demand replay.

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**Representative Vendors:** *Blinkx, Cisco, Fooooo, Google, IBM, InfoSpace, KZO Innovation, Lockheed Martin, LTU, Microsoft, Munax, SAIC and Valossa, and VeVe.*

## ● IoT Sensors

IoT Sensors are embedded computing platforms that serve as the basis for connecting devices to applications that allow them to be accessed and managed remotely. Most offer remote accessibility via Wi-Fi or onboard network connectivity. Their computing capabilities vary by manufacturer and use case.

IoT Sensors come from a variety of providers and various form factors, including chipsets, boards. The growing demand to connect devices, homes, buildings and cars will fuel the growth of this segment. Cost will be a key factor and we expect multiple classes of devices to emerge from basic chipsets and sensors to full compute platforms.

**Representative Vendors:** *Apollo Electronics, ARM, Arduino, Atmel, Bosch, Espressif, General Electric, IBM, and Raspberry Pi.*

## ▲ 3D Printing

3D printing is not a new technology, but it is one in which many capabilities are merging. 3D printing is not for industrial uses alone, but has now found its way into engineering and design centers, and in 2016, is poised for home and consumer uses, such as “printing” plastic toys. There are new entrants in this space, such as toolmaker Dremel, which recently introduced its 3D Idea Builder Printer.

There are three main use cases to focus on for 3D printing: Industrial Part Printing, Design Prototyping, and Consumer. These should be looked at seriously for Industrial uses that today are centralized. For Industrial, Certain types of parts can be printed, but the cost can be high. We are seeing new 3D Printer models being used much more frequently for design and prototyping. A best practice is using 3D Printing to engage customers. For the consumer space, we see more models being used in homes to print toys.

As the demand for 3D printing grows, imaging and printing vendors like HP will make acquisitions. Given their understanding of supplies that are needed to ‘print’, we are surprised many of them have waited this long.

▲ **Transformative potential:** Manufacturing is a foundation element not just of our economy but also of all human civilization. A transformation of this scope will have effects

comparable to those of the industrial revolution itself, including economic, demographic, logistical, cultural, medical and political disruptions. A corollary of this is:

▲ **Long maturation cycle:** It will take decades to play out. Expect major headlines through 2050, with consequential reverberations throughout this century.

**Representative Vendors:** *3D Systems, Dremel, ExOne, Formlabs, M3D, MakerBot, Proto Labs, Stratasys Ultimaker, VoxelJet, and Zortrax.*

## ▲ UCC Federation

Cross-platform IM, presence, and overall UCC interoperability has been an ongoing problem that has yet to be dealt with by technology providers. It is the proverbial elephant in the room. While open standards such as XMPP and SIP exist, UCC vendors have not embraced them all in the same way. Instead, they have created proprietary extensions to open standards that then cease to be open when implemented.

We define UCC federation as connecting two or more disparate UCC platforms for multi-modal communication among users. At the heart of this connection is *presence federation*, which lets users share presence information from different platforms.

UCC federation is one of the best ways to bridge disparate presence-based UCC platforms so that users in separate organizations can interact and communicate with each other. As enterprises invest in business-class IM and presence systems from providers such as Cisco, IBM, and Microsoft, the issue of interoperability still exists between enterprise IM and presence platforms. Vendors have been reacting to this and in early 2015, AT&T announced that it was offering a new UC Federation service.

▲ **Transformative potential:** Federation allows companies and users on disparate UCC systems to connect as if they were on the same system. Presence federation lets users see presence information from others on different UCC or IM systems and interact via chat, voice, video, web conferencing, app sharing and text or data collaboration.

**Representative Vendors:** *Actiance, AT&T, Intellepeer, and NextPlane.*

## ▲ Cognitive Computing

Cognitive Computing has become a race to develop expert Knowledge Systems. Cognitive Computing goes beyond basic machine learning to a state where a computer learns a body of information that it can later access and recall. Based on that, it can analyze a situation,

compare it to known facts and then make recommendations, all in split seconds. Cognitive Systems are being deployed in multiple industries and we expect to see more providers emerge in 2016, since IBM has been the main provider of commercial applications to date.

IBM has developed a large ecosystem of Watson Partners and specific Watson applications. Emerging players will focus on leveraging unassisted learning algorithms to allow for faster deployments. At the end of the day, Cognitive systems will evolve into intelligent digital assistants.

▲ **Transformative potential:** In this case, the phrase “quantum leap” is not hyperbole. The increase in real-world functionality that full-scale cognitive computing can achieve is almost incalculable. From autonomous vehicles to near-human virtual assistants, the world will look very different after this paradigm shift.

▲ **Long maturation cycle:** A lot of this is still laboratory science. Even with steady advances year after year, Cognitive Computing will take a decade to approach commodity status. Even after 2025, it will remain high-end in cost, complexity, and the computing resources it consumes.

**Representative Vendors** working in this and related areas (see “Machine Learning” below): Google, IBM, Loop AI Labs, Microsoft, and Saffron (Intel).

## ● Wearables

Wearable computers are a fast-growing category of devices that a person can wear on their bodies or in their clothing. Many early models are peripherals for smartphones, but a growing number are standalone devices comparable in power to early smartphones. The Apple Watch, which shipped in Q2 2015, joined Fitbit as one of the mass-produced wearables and helped to make the category legitimate.

Besides the wearable devices, digital clothing also became a category in 2015. Wearables have many potential uses, and much of the innovation in this area will focus on the apps that run on these devices. Candidates for wearables include doctors, soldiers, truck drivers, technicians, and knowledge workers on the go.

**Representative Vendors:** Analog Devices, Apple, Athos, Fitbit, Garmin, Google, Jabra, Jawbone, Motorola Solutions, Pebble, Plantronics, Samsung, and Sony.

## ▲ Interactive Presentations

Interactive Presentations come in many forms and leverage different technologies to make them interactive. These platforms keep getting easier to use and allow average knowledge workers to create compelling presentations.

Interactive Presentations can already be delivered to mobile devices such as tablets, and tools are now emerging that allow a user to create them on tablets as well. The limited attention span and overload of traditional content will attract people to interactive presentations. Besides basic info sharing, product demos and entertainment will be popular use cases.

▲ **Transformative potential:** Compared to static text documents, interactive and dynamic media hugely increases the transfer, comprehension, and retention of information, improving outcomes for all classes of communicators.

**Representative Vendors:** Adobe, Apple, Brainshark, GoAnimate, iPresent, KnowledgeVision, Prezi, Swipe, Vasmoo, Visme and Zoho Show.

## ▲ H.265 (HEVC)

H.265 is a new video compression standard that supports the creation and playback of very high quality video such as 4K. Also called *high efficiency video coding* (HEVC), it provides 30-50% better compression performance than H.264 AVC (see below). Since it supports 4K video resolution, it is essentially more than 4 times better video quality than 1080P. Aragon believes this codec will further help to make video communication pervasive, in part because of its improved compression and auto-scaling.

H.265 is now supported on the iPhone 6 and Android Lollipop, and is being supported on Windows 10 and on 4K Blu-Ray disks. Conferencing providers will follow rapidly as new encoders go into place.

▲ **Transformative potential:** Bandwidth limitations continue to plague enterprise video as streaming and conferencing traffic soars, especially where consistent quality is essential for business engagements. Any technology that improves video throughput will reduce costs and the need for new infrastructure. It also helps planners meet two important goals: deliver video to ever-larger numbers of people, and improve performance for mobile users.

**Likely representative vendors:** Adobe, Apple, Avaya, Cisco, Fuze, Imagination Technologies, Microsoft, Polycom, Real Networks, and Sony.

## ▲ HCM and Talent Platforms

Over the next two years, human capital management (HCM) and talent management suites will both shift to a platform approach. Platform as a Service, with its associated integration capabilities via restful APIs, is shifting into mainstream acceptance as a way to integrate applications that may not run on the same Cloud.

For HCM and Talent Management Platforms, the technology is still in its early days but the success in related markets, such as CRM, is undeniable. Enterprises that look for PaaS plays by their providers can leverage the best of a major provider and the innovation of a best of breed provider that can integrate into that particular platform.

**Representative Vendors:** Automatic Data Processing (ADP), Cornerstone OnDemand, IBM, and Saba.

## ▲ Predictive Lead Scoring

Predictive lead scoring (PLS) represents one of the faster-growing business applications for Sales Leaders. When implemented properly, PLS can predict whether or not a sales lead will close by establishing a profile for buyer behavior based on past deals.

Firms such as Box used PLS to drive much faster growth and many other firms are doing so as well. Enterprises that use PLS generally have a faster growth rate than ones that do not.

**▲ Transformative potential:** Sales is one of the last bastions of personal insight and intuition in the enterprise. Applying advanced analytics to lead management will improve the predictability and accountability of the sales process, moving it from art toward science.

**Representative Vendors:** Fliptop, Infer, Kxen, Lattice, Leadspace, Mintigo and Neustar, and SalesPredict.

## ▲ Social Selling

Social selling is the process of engaging with prospects and customers via social channels, either standalone or as an embedded app within CRM. Social selling is quickly becoming a must-have way to engage with prospects and customers.

Social Selling represents the reality that buyers are online and they are engaging on Social Media. The challenge for Sales organizations is that they often wait to shift gears

to Social Selling, often because Sales Leaders themselves are not as comfortable with the new approach.

By 2018 social selling will be a foundational element within sales engagement platforms (see above).

▲ **Transformative potential:** Engaging via the right communication channel improves sales communications (see below), speeds up the sales process, and increases the accuracy of lead scoring and the likelihood of closing.

**Likely representative vendors:** *Inside View, InsightPool, JourneySales, KiteDesk, LinkedIn, Nimble, and PeopleLinx.*

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## Phase 2: Adopt

In the Adopt phase, enterprises shift more aggressively toward implementation, generally over a 1-3 year period. This is a rolling process; for example, in our 2014 Tech Arc, Video Content Management was just entering the Adopt phase, but in 2015 it has moved well up on the adoption curve, as enterprises deal with growing amounts of business-related video.

### ▲ WebRTC

WebRTC (Web real-time communication) enables browser-to-browser communications via audio, video, and P2P file sharing. It uses JavaScript APIs and HTML5. WebRTC was open-sourced by Google in May 2011; the World Wide Web Consortium (W3C) is still drafting the full API definition. Enabling real-time communication without the need to download a separate plug-in is a major change from traditional UCC offerings.

The IETF has now mandated support for both H.264 and VP8 video protocols ending the long running debate. There is now a new update to WebRTC that comes in the form of the ORTC API, which has been referred to as WebRTC 1.1. It still offers JavaScript APIs, but it offers more flexibility for simulcast, layers video coding, and support for SVC.

▲ **Transformative potential:** WebRTC is a major threat to UCC and telecommunication providers because it opens communication capabilities to anyone using a web browser, and allows developers to create communication applications for any platform or device.

**Representative Vendors:** Avaya, Cisco, Fuze/Thinking Phones, Google, Microsoft, and Vidyo.

### ● Video Portals

Traditionally, video portals were a subset of video content management offerings, but we see a growing enterprise demand for them as a standalone category. The reason is simple: Video is growing rapidly as an enterprise content type, and traditional portals were not architected to support video, so people need a new way to access videos.

One thing to expect is that existing providers will not stand still. Enterprise software titans are already stepping in to challenge or acquire specialty video portal vendors. Just this year, Microsoft updated Office 365 to expand its ability to share videos. Also, enterprise app stores (see below) are expanding to provide content distribution as well, sometimes with video portal capability.



Video Portals fall into two categories: External and Internal. Many external video portals, such as YouTube and Vimeo are used for distributing and sharing videos. Internal Portals are focused on an internal or authorized set of viewers.

▲ **Transformative potential:** By making video “documents” easier to classify, manage, find and use, video portals will hasten the advance of video as a major enterprise content type.

**Representative Vendors:** Cisco, Google, Kaltura, IBM, Microsoft, Qumu, Sonic Foundry, UStudio, and Vimeo.

## ● Gamification

Gamification is the application of game mechanics to other kinds of software. Gamification uses two approaches. The first is the use of gaming elements in software design, an area where more work is needed. Second, some gamification software providers focus mainly on adding software to existing enterprise social network platforms. Gamification is a popular approach used in areas such as Support Communities and in Employee Onboarding.

Sales compensation, which rewards a sales executive financially for selling products and services, is a form of gamification. The compensation system is designed to reward certain behaviors, such as sales to new customers or sales of certain products. Sales executives quickly figure out the comp plan and tailor their activities for the maximum payout. Frequent flyers do similar things, such as planning their trips to maximize reward points. Enterprises should use gamification selectively where focused outcomes are desired.

**Representative Vendors:** Achievers, Badgeville, Bunchball, Gameeffective, Globoforce, Hoopla, and Mindspace.

## ▲ Digital Experience Management (DXM)

Digital Experience Management combines traditional customer-focused technologies including Web Content Management and makes them multi-channel, so that interactions with customers can be consistent across them. Besides web content management, DXM will also include e-commerce, social media, and sales communications to make visiting a company website a consistent and engaging experience.

Because so many potential buyers may want to act after visiting a website, part of the opportunity and the challenge of DXM is enabling a transaction (not just a sign-up) to occur. That puts e-commerce front and center in the DXM checklist. Today, many marketing suite providers are focused on DXM, but many have not delivered on that promise.

▲ **Transformative potential:** DXM is a paradigm shift for web content management, moving its focus from the technical aspects of web presentation to the business value of the visitor's experience and how the site contributes to the enterprise's revenue and reputation.

**Representative Vendors:** Adobe, CrownPeak, EpiServer, E-Spirit, Jahia, IBM, OpenText, Oracle, Salesforce, and SiteCore.

## ● Structured Collaboration

Structured collaboration combines presence and unified collaboration with elements of content management, business process management, and task management into an integrated work process that coordinates multiple activities by multiple workers to produce a desired business outcome. The idea of structured collaboration is that you can work and interact with other people at the same time towards specific and measurable outcomes.

Structured collaboration is part technology and part process framework to arrive at business outcomes that often include new ideas and innovation. Enterprises are plagued with meetings and ad hoc interactions that don't produce results or desired outcomes. This lack of structure or an outcome-based focus can lead to wasted time and lost opportunities for innovation.

▲ **Transformative potential:** Tying collaboration to the desired outcome of each business process gives each collaborative interaction an actionable context and ensures the best use of human participation in the workflow.

**Representative Vendors:** Asana, Clarizen, Mindjet, Smartsheet, ThinkTank, and Wrike.

## ▲ Digital Transaction Management (DTM)

DTM is a business application that focuses on fully digital document transactions. DTM business processes involve people, documents, data, and transactions both inside and outside the enterprise. DTM is also now a recognized business application category. Many traditional BPM and ECM providers see the opportunity and are buying e-signature providers to bolster their DTM platforms.

▲ **Transformative potential:** DTM is all about the shift from paper to digital documents and business processes associated with transactions. As more business activity goes all-digital from end to end, the speed, efficiency, security and accountability of all business processes will increase.

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**Representative Vendors:** Adobe, Assure Sign, DocuSign, E-Original, HelloSign, Kofax, and Silanis.

## ▲ Sales Communications

Sales Communications has become one of the most in-demand Sales Enablement applications that is helping sales professionals to engage with prospects and customers faster. Sales Communications goes further than regular email and web meeting tools to allow a sales professional and their manager to track interactions and meetings with customers.

While it can be used to deal with later stages of a sale, Sales Communications is great for initial engagement and qualifying. Interactive content, including video, is increasingly being used to add more visual cues and impact to sales communications.

▲ **Transformative potential:** Making the early qualification stages of the sales cycle more effective can free up resources to focus on closing and reduce wasted effort.

**Representative Vendors:** Brainshark, ClearSlide, Fileboard, Flipboard, Highspot, Seismic, and ToutApp.

## ▲ Mobile Collaboration

Mobile Collaboration combines cross-platform synchronous and asynchronous interaction modes with elements of collaboration infrastructure that may be mobile-first or mobile-optimized but must at least be mobile-friendly. It includes point-to-point and group chat/IM, audio and video, and screen/file sharing, backed up by presence and by social group and community services like activity streams, news feeds, profiles, and expertise location.

Mobile Collaboration is a necessity to support the needs of the increasingly mobile workforce. Apps like Biba, Cotap, Slack, and WhatsApp (now owned by Facebook) have democratized the communication paradigm, challenging UC and telecom providers. Mobile messaging and collaboration apps also threaten the revenue model of telecom providers. Most providers have made deliberate investments in an effort to stem this tide.

**Representative Vendors:** Biba, Cisco, Cotap, Facebook, Glip/RingCentral, Hipchat, Slack, and Unify.

## ● Enterprise App Stores

An enterprise app store is an online digital marketplace controlled by an enterprise, where people can download software to their phones, tablets and computers. The great success of mobile apps, especially for iOS and Android, has come largely from the ease of accessing and downloading apps through public app stores.

For enterprises, the need to get apps and content to their constituents is similarly critical. Over the air (OTA) distribution makes it easy for users to keep their software current and maintained. While the current focus of Enterprise Apps Stores is currently mobile, we see app stores making software available for PCs and Macs as well. The distribution architecture is also expanding to include portal elements that provide access to content as well as apps.

When enterprises deploy apps, they want to manage distribution, promote user adoption, and control releases and updates in ways that meet their specific needs, without adapting to the practices of a public app store

**Representative Vendors:** AirWatch, Apperian, BMC Software, Blackberry, IBM, MobileIron, and SAP.

## ● Marketing Suites

A suite is a collection of tools that is sold as a single product. Increasingly, marketing tools are being blended together into marketing suites, and while some are still just bundles, others are becoming highly integrated.

To date, most marketing efforts have focused on three elements: marketing automation (building automated campaigns), touch points, and social media monitoring. However, Aragon has identified 8 elements that should be in a marketing suite: marketing automation; social media management and marketing; social media monitoring; commerce; community; web site and web content management; analytics, dashboards and SEO/SEM; and Content Marketing. As a rising best of breed category, we expect Content Marketing to eventually become part of the Marketing Suite.

**Representative Vendors:** Adobe, IBM, Marketo, Oracle, Salesforce, and SAP.

## ▲ Video Recruiting

Video recruiting is a video-enabled business application (VEBA) that helps recruiters and hiring managers improve the recruiting process. Enterprises need a larger and better talent pipeline, and they are looking for ways to speed up and improve the hiring process. Recruiters and hiring managers spend a tremendous amount of time and money arranging candidate interviews. Video Recruiting has become popular as a screening process (offline submissions) and for real-time interviews.

For offline video submissions, using a mobile device, candidates can access a recruiting app and record answers to interview questions. Enterprises can increase the number of candidates who respond to job offers via mobile apps. Candidates in turn can access a myriad of jobs and record answers to pre-screening questions.

▲ **Transformative potential:** Video cuts costs and removes friction from the hiring process, but it also gives applicants access to more opportunities and improves the enterprise's ability to assess and evaluate candidates. Recording interviews also increases accountability and transparency.

**Representative Vendors:** *GreenJobInterview, HireVue, InterviewStream, Montage, VidCruiter, VideoBio, and WePow.*

## ▲ Innovation Management

Innovation management, also called *idea management*, is becoming more popular as enterprises realize they need to accelerate new product and service development. One reason this category is gaining traction is that C-level executives see innovation as a top priority.

Advanced innovation management solutions let enterprises build measurable and actionable innovation pipelines from the early stages of ideation to the later stages of product derivatives.

Many enterprises are making innovation management a strategic practice, particularly in areas like technology, manufacturing, telecommunications and financial services.

▲ **Transformative potential:** With innovation as a measurable competency, enterprises can more accurately predict the status and health of their innovation pipeline. Enterprises are now realizing that a healthy innovation pipeline has a direct impact on future revenue growth.

**Representative Vendors:** *Brainbank, Bright Idea, Hype, Ideascale, Innocentive, Innovation, Mindjet, and QMarkets.*

## ● Enterprise Profiles

The enterprise profile is part of a software application that identifies a person and can verify their identity. In addition to that critical need, a complete profile might also include what they know, what they have done and their performance in each role, who they have worked with and what those people have said about them. Ideally, the enterprise profile unites HCM, social-sourced, inferred and certified information about associates as part of a people-centric collaboration strategy.

Today, most enterprises do not have a strategy for managing employee profiles. Many different sources are needed to compile this much information. Social collaboration and HCM providers are the closest to offering rich enterprise profiles. HCM can play a role here, since HCM systems already have the secure framework, the data structures and critical elements of the information that makes up a full enterprise profile.

Beyond its social utility, information about an individual is a digital representation of that person, establishing their digital identity. Today the profile is moving beyond just being a feature of a social network, to being part of a social HCM/talent solution. The problem: many HCM professionals still don't see enterprise profiles as strategic assets.

▲ **Transformative potential:** Truly knowing *all* about your workforce can dramatically reduce the friction and overhead associated with collaboration, which are major limiting factors on the productivity of teams.

**Representative Vendors:** *Cornerstone OnDemand, IBM, Microsoft, Peoplefluent, Salesforce, Sitrion, and SuccessFactors/SAP.*

## ● Video Content Management (VCM)

Video content management (VCM) has become a critical category for the management and distribution of video files. VCM is gaining traction because enterprises need to share rapidly increasing volumes of video content. In the past, a form of VCM called *digital asset management* has also been used to manage video, but more from an internal perspective.

VCM focuses on managing small and large video files as easily as documents, something that traditional ECM systems struggle with since they were designed mainly to deal with text files. VCM uses advanced technology to search inside video files so users can access the right video documents and even specific sequences within them. Many VCM platforms also provide a video portal (an "enterprise YouTube") to surface video content for users to interact with. We will see live video analytics be major points of focus going forward for VCM providers.

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**Representative Vendors:** Brightcove, Cisco, Kaltura, Kontiki, Polycom, Qumu, Ramp, Sonic Foundry, Ustudio, and VBrick.

## ● Mobile Application Management (MAM)

The focus of MAM includes app store capabilities but also goes further. MAM is all about managing mobile apps: their use, configuration, and security across the full range of the mobile device portfolio. Software distribution is an essential ingredient, and MAM takes care of app distribution and updates. Some of the major players also offer analytics for app usage and even testing before app rollout.

MAM is important to businesses with growing app portfolios and widespread use of mobile devices. It is especially needed by enterprises that have embraced – or been overrun by – personal phones and tablets owned by workers. MAM capabilities will become more critical as applications continue to grow, fueled in part by apps needed to manage the exploding population of IOT Devices.

**Representative Vendors:** AirWatch, Antenna Software, Apperian, Blackberry, Citrix, and IBM (Fiberlink).

## ▲ Electronic Signatures

Electronic Signatures has become much more common place over the last two years and has become part of the business application category called Digital Transaction Management.

The race for e-Signatures and DTM is to fully automate paper transactions. The speed of keeping a contract or form electronic for the entire process offsets many of the initial costs of acquiring the software based service. Enterprises need to evaluate and prioritize all paper-based documents that require signatures and evaluate making them electronic.

**▲ Transformative potential:** Electronic signatures are not new, but a signature created on a PC, phone, or tablet that represents the person's real signature ushers in a new way to do business. The simplicity of new software tools, and the increasing ubiquity of devices that can record secure signatures, are helping to fuel a significant shift in business practices.

**Representative Vendors:** Adobe, AssureSign, Barracuda Networks, Citrix, DocuSign, Sertifi, and Silanis.

## ▲ Machine Learning

Machine Learning has evolved to become the de facto technology to make business and consumer applications smarter. It allows a computer to recognize patterns and use them to infer general rules about how to organize data or content and present it to users.

In layman's terms, Machine Learning is what allows applications to become predictive by categorizing and recognizing patterns in historical and incoming data. Enterprises are in a race to add machine learning to existing and new applications to make them smarter.

▲ **Transformative potential:** Properly used, machine learning algorithms, when deployed in multiple combinations, will begin to enable software programs to predict when things will happen and recommend ways to respond to them. The potential here is to become more of a real-time virtual assistant to humans and to other computer services.

▲ **Long maturation cycle:** Like cognitive computing, machine learning is cutting-edge computer science. Moreover, this domain is so broad and fundamental that it will take years to fully explore all of its potential applications.

**Representative Vendors:** Amazon, Apache, Ayadsi, BigML, Google, Grok, IBM, Loop AI Labs, Microsoft, Skytree, and Wise.io.

## ◆ Mobile Content Management (MCM)

Content management is at a crossroads. More content is being accessed and shared on mobile devices than ever before. There has been a lot of focus on sharing files, but Mobile Content Management (MCM) goes further to look at the spectrum of content and how it can be managed in the cloud, on mobile devices and in some cases on-premise. This means that it goes beyond file sync and sharing.

Security will become front and center in 2016 and Aragon believes that content theft remains an issue that needs to be addressed in the enterprise.

**Representative Vendors:** Accellion, AirWatch, Alfresco, Blackberry, Box, Citrix, Dropbox, Egnyte, Google, Huddle, IBM, M-Files, and Microsoft.



- **Enterprise Mobile Management (EMM)**

Enterprise mobile management (EMM) has become the de facto approach that incorporates and transcends mobile device management (MDM), mobile application management (MAM) and Mobile Content Management (MCM). The shift is away from merely managing the assets themselves and toward transforming business through mobilizing the enterprise.

The mobile market has shifted from a device focus a few years ago to focus on a total approach to mobility, which includes application management, content management, and data security. While MDM helps address authentication and security, success with mobility also depends on apps that are lightweight, secure and easy to manage, distribute and use. MAM is an inescapable part of the mix.

**Representative Vendors:** AirWatch, Blackberry, Citrix, IBM, SAP, SOTI, and Symantec.

### **Phase 3: Mature**

Mature technologies are well understood and widely used. This does not mean that further evolution is not possible or even likely, only that change is not necessary for the technology to be useful. Some technologies, like email, may stay in this adoption phase for decades, but maturity does not mean inactivity; market forces or tactical developments are always poised to transform the underlying process or create a new paradigm. In the case of email, for example, cloud-based services may shrink the market for local email servers, thus changing the vendor landscape; they may also replace peripheral functions like content archiving and instant messaging with more specific and suitable solutions, thus altering user behavior and redefining the “normal” scope of email. In 2020, there will still be email, but both the players and the game will have changed as a result of incremental changes in the use of enterprise social networks and other technology domains.

### ◆ Cloud Office Suites

Cloud office suites provide tools that can bring responsiveness and agility to businesses. Having ready access to office collaboration and productivity tools online in the cloud on any device for those behind and outside of the firewall, allows easy exchange of information to address business needs. The rise of computing platforms such as Google Chromebooks is due in part to the fact that Cloud Office Applications can be easily accessed and utilized.

For a growing number of enterprises, office communication and productivity suites are leading candidates for moving to the cloud. Combined with flexible client choices and support for the needs of an “anytime, anywhere” workforce, enterprises are finding cloud office to be a preferred workplace. As the workforce is more remote, cloud office suites and mobile access connects workers with information and each other in real time.

◆ **Cost-saving opportunity:** Cloud office suites offer cost savings over traditional on-premises office productivity applications. Costs have dropped to \$2-\$4 per user per month for full access to email, office productivity apps and real-time collaboration.

**Representative Vendors:** Amazon, Google, IBM, Microsoft, and Zoho.

### ● Mobile Device Management (MDM)

MDM was the first category of mobility management tools. It is mature, but it’s now being harnessed in different ways as part of a complete EMM suite (see above). MDM has become

a foundation for managing and securing the growing portfolio of devices and it is a cornerstone of a BYOD program.

Features such as configuration control, performance management, and over-the-air troubleshooting characterize MDM tools. The focus is on ensuring effective management of the device assets, and handling situations such as lost or stolen devices. MDM will grow in demand as the need to manage more than just mobile devices and PCs grows. The challenge for enterprises is that due to IoT, there will be a proliferation of Management platforms before consolidation occurs.

**Representative Vendors:** AirWatch, Blackberry, Citrix, Google, IBM, Microsoft, Oracle, SAP, SOTI, and Symantec.

### ● Unified Communication and Collaboration (UCC)

UCC as a market and set of technologies has emerged from UC to incorporate real-time and asynchronous collaboration capabilities into one suite. The original intent behind UC was to be an integrated multimodal communication capability including voice and telephony, IM and presence. What was the IM and presence platform has morphed into a full communications and collaboration platform.

However, UC's promise to improve productivity has for the most part gone unfulfilled. The fervor behind UCC is an effort to recast UC with people-oriented collaboration capabilities integrated into everyday business processes. Emerging trends dictate that vendors are now trying to recast their offerings as a PaaS platform to extend capabilities and also to embed their collaboration services into other business applications.

**Representative Vendors:** Avaya, Cisco, Huawei, IBM, Microsoft, Polycom, and Unify.

### ▲ Enterprise Social Networks (ESNs)

Enterprise Social Networks, also known as Communities, let people connect and share knowledge and content with others. ESNs continue to be deployed but not at the pace of several years ago. Social Intranets and Social Learning are two of the leading use cases for them.

ESNs can speed up communication and enhance the interaction between people inside and outside of the organization. ESNs can be transformative due to the ability to find people that might be able to help with a project or contribute an idea not otherwise known.

▲ **Transformative potential:** Since interpersonal dynamics are the foundation of the modern business enterprise, the social transformation affects every aspect of corporate life, both internal and external.

**Representative Vendors:** Bloomfire, BraveNew, Huddle, IBM, Igloo, Jive, Lithium, Microsoft, Salesforce, SAP, Sitrion, SocialText, Tibco, and VMware.

## ▲ H.264 SVC

Scalable Video Coding (SVC) is part of the H.264 MPEG-4 Advanced Video Compression (AVC) standard. It automatically adjusts the size of a video stream if there is a reduction in throughput (e.g., a connectivity bottleneck). SVC benefits the viewer by continuing to play (at a slightly lower resolution) instead of pausing or timing out. SVC helps web conferencing providers offer more reliable video to a broader base of users on a greater range of devices using more practical network bandwidth capabilities.

The WebRTC consortium has mandated support for both SVC and Google's proprietary counterpart, V8, in the release standard for WebRTC.

▲ **Transformative potential:** Everyone loves video - to see and to be seen. Ubiquitous, portable, bandwidth-efficient video will raise adoption rates, transform the phone experience, and re-emphasize face-to-face communication.

**Representative Vendors:** Acano, Cisco, Fuze, Pexip, Polycom, Saba, and Vidyo.

## ● Public App Stores

Public app stores will continue to be the destination for new mobile apps. Google Play and the Apple iTunes App Store are two of the dominant Public. It is important to understand the clout that each store has, since for business it is numbers of devices that start to focus development attention.

As the use of app stores has gone from a fad to an accepted business practice, enterprises need to manage their apps more holistically and completely. Branding and Image are important, since it is now commonplace for multiple business units to each offer their own apps.

Developers continue to monetize their work via public app store distribution, but have started to focus on in-app purchases instead of the sale of the app itself. These benefits alone have spurred the creation of over a million apps in the iTunes app store and the Google Play Store.

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**Representative Vendors:** Amazon, Apple, Google, Microsoft, Samsung, and SAP.

## ● Social Media Monitoring (SMM)

SMM is a way to manually or automatically track what is said about a person or a brand on public social networks, in order to manage and protect the person's reputation or the brand image.

SMM has become a must have option for channel support for users or customers who are having trouble with a product or service. The need to react quickly can prevent an issue or a perception of an issue from going viral. Meanwhile, the enterprise can use the SMM data as business intelligence, to adjust their offerings or their support.

**Representative Vendors:** Adobe, Cisco, HootSuite, IBM, Lithium, Oracle, Salesforce, and Sprout.

## ▲ Marketing Automation

Marketing Automation exploded onto the scene after 2010, and it is now the cornerstone of how marketing departments attract, nurture and qualify leads, and the main engine behind marketing campaigns. These had largely been email-based but have now expanded into multiple channels, including new ways to use the enterprise website and particularly social media, with techniques like social marketing and social media monitoring.

When the Tech Titans saw that marketing departments were spending more on sales and marketing technology, Oracle quickly acquired Eloqua and its rivals raced to build uber-marketing suites and other customer experience and marketing cloud initiatives.

**▲ Transformative potential:** Marketing automation leverages the same disintermediating technologies that give prospects and customers the power and autonomy they have today.

**Representative Vendors:** Adobe, IBM, Marketo, Oracle, Salesforce, and SAP.

## ▲ Customer Communication Management (CCM)

Customer Communication Management refers to the long-standing market segment of Content Management focused on document generation tied to communications targeted at customers or prospects. CCM uses rules to auto generate documents. Generation can be

basic or sophisticated. Historically CCM was a batch operation, tied to large volume applications such as credit card statements and the customer communications (e.g. letters) associated with the bill.

The new focus is on interactive or real-time document generation initiated by an individual, such as a sales representative. CCM for Sales is referred to as Document Generation.

**Representative Vendors:** GMC, Nintex, OpenText, Napersoft, Pitney Bowes, Prinova, and Thunderhead.

## ▲ Customer Relationship Management (CRM)

Customer Relationship Management (CRM) is the top application for sales professionals to track and manage sales. It involves adding leads, converting them to opportunities, and then developing them and promoting the opportunities into a forecast.

CRM applications have multiple layers, and sales managers count on them to track activities and understand what is happening in the sales pipeline. For any enterprise, the effective use of CRM in the sales process cannot be overlooked. It is a key way to accelerate sales activities.

The shift in CRM is the growth into what we call *CRM platforms that support ecosystems*. Leading providers are leveraging their core CRM platforms and adding app store functions to integrate third-party apps (via simple configuration) that can add major functionality to the platform. Examples include document assembly, marketing automation integration and more.

▲ **Transformative potential:** CRM is a high-level discipline subject to both social and technical influences. Developments in sales communication, marketing automation, and in particular, the social enterprise, will be significant. A customer who belongs to a social network of such customers will behave quite differently from those whose only connection is their last transaction.

**Representative Vendors:** Infusionsoft, Oracle, Salesforce, SAP, and SugarCRM.

## ● Search

Search has become the standard way to interface with computers, and voice search in particular is trending as a user interface due to the proliferation of mobile devices. Search is evolving into more of a pattern-matching system as machine-learning algorithms get attached to it.

For example, if a user types “ABD” the search engine can ask, “do you mean ‘ABC’?” This is also known as *smart search*, since the search engine itself incorporates sophisticated ways to compare words that are associated with each other.

**Representative Vendors:** *Google, Elastic, HP Enterprise, IBM, Microsoft, and Solar/Lucene.*

## ● Web Content Management (WCM)

WCM, also called a content management system or CMS, is the software or service used to manage the information on an enterprise website. Today WCM is integrated into marketing suites, ECM suites and the new category of digital experience management (see above), but many enterprises still use best-of-breed WCM tools.

Marketers often need more from their website and this is one reason WCM is more strategic than ever. The site visitor’s experience is key, and while some WCM players focus on that, others focus more on making a site an effective marketing tool or, increasingly, on making a site mobile-friendly and building great mobile apps to access it.

**Representative Vendors:** *Adobe, Akumina, Aquia (Drupal), EMC, EPiServer, E-Spirit, IBM, OpenText, Oracle, Percussion, Sitecore, and WordPress.*

## ● Corporate Learning

Corporate learning is experiencing a rebound, in part due to the growth of informal user-generated content, particularly video, and the demand by users to acquire knowledge faster. Social and video-based learning are emerging to support the needs of business leaders who want faster ways to deploy learning to sales, service, and customers. Of all the training content formats, video tutorials are poised to have the biggest impact on training outcomes.

The big shift in Corporate Learning is to the empowered learner. As such, Learning is become more decentralized and the need to offer more interactive and video based training content continues to grow.

**Representative Vendors:** *Allego, Cornerstone OnDemand, Desire2Learn, Expertus, Meridian KS, Mzinga, NetDimensions, Oracle, Peoplefluent, Saba, and SuccessFactors/SAP.*

## ◆ Web and Video Conferencing

Enterprises are realizing they can achieve significant savings by combining web, audio, and video conferencing. The expansion of software-based web conferencing to include video has caused a collision. WebRTC is enabling the creation of more video-enabled business applications (VEBAs) focused on specific business scenarios. New use cases and higher quality video should create more demand, particularly after the H.265/VP9 generation of codecs starts to arrive.

Web and Video conferencing has undergone major upheaval as newer players emerge with lower cost cloud-based offerings, which in turn challenges existing providers to innovate. Cloud and mobile has become the convergence point that impacts the collaboration market on a whole.

◆ **Cost-saving opportunity:** The biggest cost benefit of conferencing is the reduction in travel expenses, which can quickly save enterprises more than the cost of the most extravagant conferencing system.

**Representative Vendors:** Adobe, AT&T, Avaya, Cisco, Citrix, Fuze/Thinking Phones, Google, Huawei, IBM, Lifesize, Polycom, Vido, and Zoom.

## ● BPM Suites

Business Process Management (BPM) Suites focus on the complete lifecycle of designing, implementing, and monitoring business processes tied to business processes. Traditionally tied to business workflows, BPM is evolving to focus on digital transformation.

Many large BPM projects are closely intertwined with Content Management applications, since many of the workflows that are being automated involve content and information.

**Representative Vendors:** Adobe, Appian, IBM, Oracle, OpenText, and RedHat.

## ▲ Presence

Presence identifies which users are online and available for interaction at a PC or other device. Generally, presence is used before a real-time interaction, such as a text chat or a voice or video call. It is an invaluable tool for remote workers when you are either the requestor or receiver of requests for collaborative interactions. It increases productivity by reducing the time needed to locate and connect to others, and it is rapidly becoming an essential cornerstone of a robust collaboration and application integration strategy. When



ties to the individual's enterprise profile and identity, Presence helps to add context to interactions.

We have identified three generations of presence. The *first generation* was associated mainly with IM. The *second generation* is the use of presence in UCC platforms such as Cisco Jabber, IBM Sametime, and Microsoft Skype for Business to enable multimodal real-time communication. *Third-generation* presence engines focus on broadly integrating presence across many applications and devices. This approach is often part of an enterprise portal strategy, in which presence is a service tied to each user's profile and identity.

**Representative Vendors:** Avaya, Atos, Cisco, Google, IBM, and Microsoft.

- **Wikis**

Wikis are still popular in engineering and support environments. They are still useful for documents that need to be continuously updated and in some cases serve as a knowledgebase. Now they are often being replaced with newer cloud-based collaborative authoring environments. Many modern social-network tools provide wiki-like functions.

**Representative Vendors:** Atlassian Confluence, Google, and IBM.

- **Blogs**

Blogs are among the most effective tools for content marketing. In this light, they are gaining even more popularity – particularly with the effective use of SEO tools. Open-source tools like WordPress have become a standard even on large commercial websites. One interesting aspect of blogs is the rise of *blog ecosystems*, which allow for better content curating.

**Representative Vendors:** Blogger, EasyBlog, Google, HubSpot, Medium, Percussion Software, Tumblr, and WordPress.

- **Instant Messaging (IM)**

IM has become an integral part of UCC. IM is online text chat that is now a popular way to communicate on mobile devices. Presence and IM are at the center of the UCC platform, providing a single-click interface to multiple communication modes. The persistent group chat feature of most IM applications has emerged in vertical industries like financial services and defense. The group chat feature lets enterprise users set up channels or networks based on project or business-unit delineations.

**Representative Vendors:** Avaya, Cisco, Google, IBM, Microsoft, Mindlink, and Unify.

- **Portals**

Portals are still popular, but they are beginning to change as other workplace tools take on portal-like functions. For example, enterprise social networks are adding “portal lite” user interface functions that combine access to workplace tools like email and IM with tie-ins to activity streams.

An environment where users can easily access and collaborate around applications, content and processes remains a powerful tool both within and between enterprises. Portals are still very popular in banking and consumer businesses where identity and security are critical.

We do see mobile apps on a collision course with portals. The role of the portal as a single point of access into all of the enterprise’s role-specific resources is increasingly being taken on by mobile apps, which are rapidly becoming the primary way to reach users and deliver access and functionality. Rich browser-based portals remain important, but giving employees and customers an enterprise mobile app is essential. Mobile implementations of traditional portal functions can reach mobile users with minimal development effort.

**Representative Vendors:** IBM, LifeRay, Microsoft, OpenText, Oracle, and SAP.

- **Enterprise Content Management (ECM)**

ECM has been around for 25 years, and many enterprises still have multiple content repositories. Enterprises have to maintain critical content due to business and compliance regulations, and that has become the primary task for traditional ECM systems. Enterprises are also starting to connect their ECM farms to their enterprise social networks to increase access to content and maximize the investment in the ECM system.

Business users want flexibility, and many are starting to look at mobile and cloud-based alternatives. Often, business users pull out a credit card and make a technology purchase when they don't get what they want from IT.

**Representative Vendors:** *Alfresco, Box, EMC/Documentum, Huddle, Hyland, IBM, Microsoft, OpenText, and Oracle.*

## ◆ Email

Cloud-based email is now solidly established in many large enterprises, due to the substantial cost benefits. Another big advantage of cloud email is the large quantity of storage for each individual account. An exponential increase in mailbox size can improve employee productivity.

Email now has more tools for better management at the user level. Client architecture has expanded to support better search, some library functions, and multiple collaboration modes. As IT budgets get increasingly tied to a few vendors, savings in areas such as email should be evaluated.

◆ **Cost-saving opportunity:** Cloud-based email offers cost savings that can add up fast. Enterprises should evaluate shared-tenant vs. private cloud options.

**Representative Vendors:** *Amazon, Google, IBM, Microsoft, SendGrid, and Yahoo.*

**Aragon Advisory**

A shift is occurring: Business apps are coming to the forefront and combining different technologies to offer new functions that business users want. In some cases, providers are offering apps as services from their PaaS platforms via open APIs. Enterprises need to look carefully at these capabilities and start to prioritize their adoption:

- Look at transformative technologies that can help drive business opportunities.
- Focus any new investments based on business impact. Business focused applications may have a higher impact and thus should be given a higher priority.
- Evaluate technology providers that take advantage of products and services mentioned in this research note.

**Bottom Line**

The Tech Arc for the Workplace can help enterprises address the dilemma of when and how to evaluate technologies that make up software, hardware, and services. The new technologies for 2016 should not be ignored, particularly new applications that are powered by machine and deep learning. Business Leaders should be on the hunt for outcome-based applications, hence the reason for the growing popularity of Business Applications over legacy technology stacks.

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