

October 2015 - Technology Trends

Unlike, say, accounting, the world of technology changes daily in our fast paced world. Keeping a pulse on those changes becomes increasingly challenging given the diversity in how technology is developed and applied throughout the globe, in various business sectors, as well as how it's leveraged by individuals day to day. Within many organizations, there exist a few business units, each within a federated structure with specific demands of technology in order to support their business processes, products, services and solutions. To address capturing those needs as well as looking forward into newer technologies that could potentially change how business is done or create optimizations, the Enterprise Architecture team regularly researches new trends in order to synthesize where "best bets" can be placed in order to support those business unit and company-wide goals.

Working from the ground up, it's often best to think about what's supporting all of these efforts, the technology frameworks that act as enablers for all of the delivery of products, services and other solutions. This is typically your infrastructure – network, hardware, operating systems and core applications. For many organizations, much of the core has started to migrate to the cloud, and while not new, the tools and applications used to develop, deploy and manage such infrastructure has rapidly changed and matured. Much has changed in the past decade, and even more so in the last five years as the market has weeded out the competition into top tier and second tier providers. Those top tier, Microsoft (Azure), Google and Amazon essentially become the default for many organizations that need turnkey cloud services at predictable pricing and performance and scalability, with global tenancy and the current customer list luring many others to come along for the ride. The second tier cloud providers, while still major providers, are less turnkey and tailored towards specific needs, such as Salesforce, IBM, Oracle and SAP, which are strong in a few categories but lack capabilities in others. To that end, since the start of many analysts reporting in the past five years, "X as a Service" has been flourishing – whether it be Infrastructure (IaaS), Platform (PaaS), Network (NaaS), Software (SaaS) or pretty much anything else that can be broken down and commoditized into an offering and managed has fallen under that category. In particular note, given the rise of major efforts for identity management, IDaaS has gained traction recently as many organizations have found it challenging to integrate their legacy management and authentication systems with a hybrid of cloud and traditional on-premises solutions. However, unlike some of the other sectors seen in Figure 1, below, current organizations still tend to see cloud-based activities as high risk, but also high reward value.

Virtualization is also an area of cloud and on-premises computing that has taken off in use, as legacy hardware and systems have reached end-of-life or reduction in active use, migrating them to a virtualized environment has saved on operational costs, but extended the life of some critical systems while plans can be made to upgrade, retire or modify them for a more modern computing environment. Virtualization has also increased the resiliency of many systems and applications as cloud providers offer the ability for replication, grid and other scaling techniques to ensure uptime and availability. This has led to the uptick in the utilization of containerization for systems and applications to work within new cloud architectures and

ease in deployment and migration. However, this is still a new area under an extensive amount of change and flux, but has gained a lot of traction within organizations that have a high level of cloud use maturity.

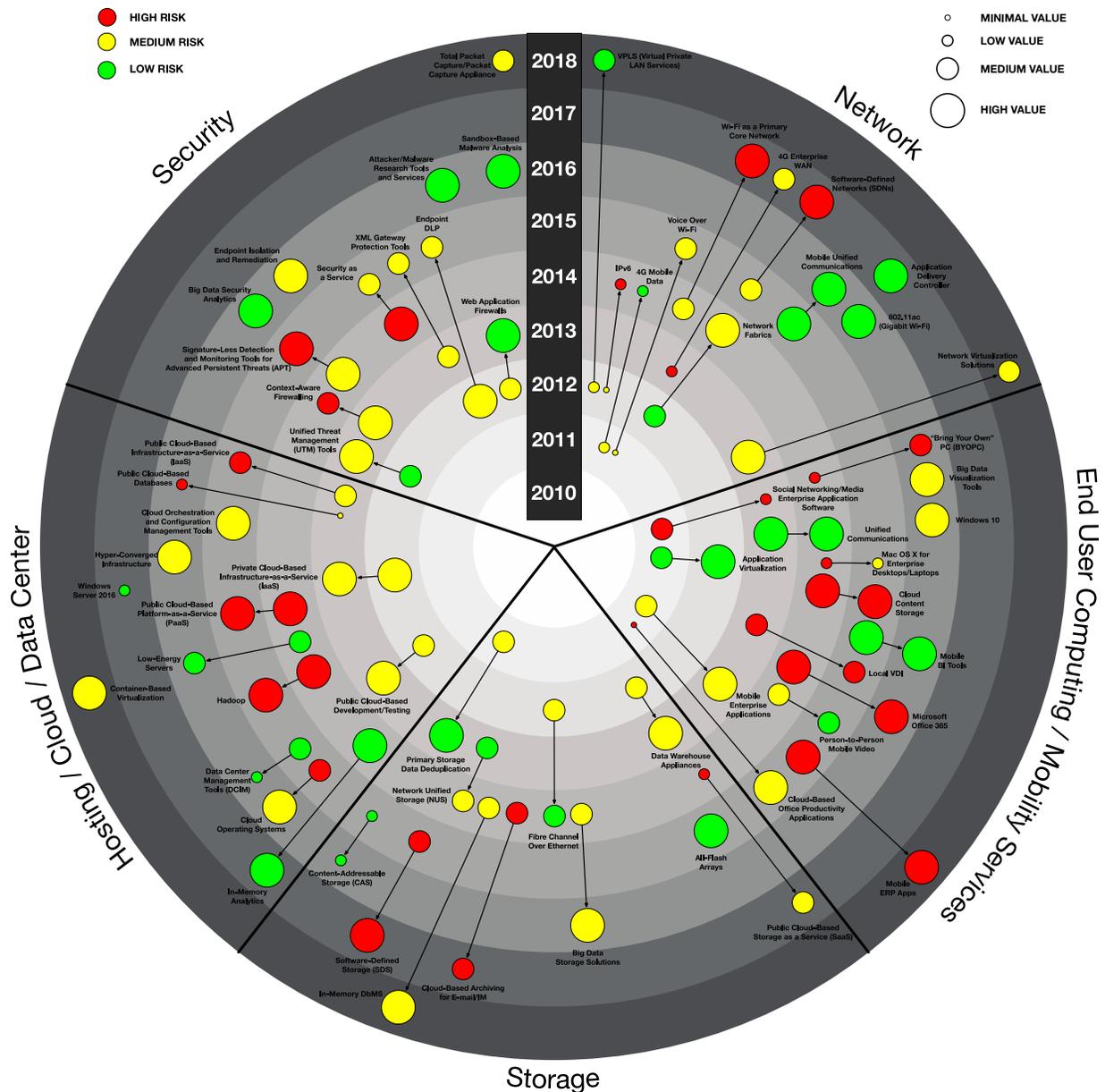


Figure 1 - 2010 - 2015 CEB Emerging Technology Report Overlay

With the cloud, and since the rise of mobile in 2007 with the release of the iPhone, a device that democratized the smartphone in an easy to use and genuinely “hip” device that combined a number of core functions in an easy to use package, enterprises and the general public have been making this the largest category of end user technology. This has generated an entire new category of software development, mobile “apps”, that require knowledge of the specific platform frameworks (Android, iOS, Windows Mobile, Blackberry) but also how to build

solutions over wireless networks on a distributed infrastructure, whether is be provided centrally by a developer on their infrastructure, or, as above, leveraging cloud services. Cloud and mobile have really matured, hand-in-hand, and benefit from the utilization and growth of both. With the mobile workforce, a closer tie to cloud has also taken form in the rise of virtual desktop interfaces (VDI) that allow mobile or remote users to securely access a virtualized hosted desktop instance. Besides the “anywhere, anytime” aspect of this, it’s also allowed for other tech to flourish as well, including allowing bring your own PC/device (BYOPC/BYOD) programs to become reality, as no corporate data is actually on these VDI solutions in most cases, removing many of the security and data protection issues that had existed even with enterprise owned hardware. Also, while being virtualized, the core images and applications, including license management, is much more streamlined via VDI solutions, having a trickledown benefit to traditional work for end-user and infrastructure maintenance and operations. In other cases, for the end user, many of their core applications, particularly productivity apps such as spreadsheets and word processing, have made the leap to cloud instances – particularly with Microsoft’s own Office suite that has seen even their desktop applications become heavily backed and integrated with cloud services, but also having a browser-accessible version that nearly mirrors that application experience. Currently in this space, it’s a battle between Google Apps and Microsoft Office (while Apple beat Microsoft to the cloud-office space, the lack of market share kept these from being a major coup) for dominance, but opening up the fluid experience for users regardless of which platform they choose to work with.

One carry-all through cloud, to mobile, and back to general enterprise concerns has been storage. Gone are the days of hundreds of dollars per gigabyte anything, now it’s down to cents for hardware or free for anything cloud-based. Enterprises are becoming wise to this shift, especially considering the costs of maintaining large and expensive filers for enterprise data, and new technologies such as cloud storage gateways and even hosted storage companies with apps and service integrated into commonly used applications are gaining significant traction. One of the more promising technologies to take advantage of the technology and cost trends are cloud storage gateways, in which those cloud storage services are proxied into the enterprise and appear to show up as any other typical network storage resource (shared drive, block storage for databases, backups, etc.). Again, this presentation of storage to the enterprise has also seen a shift due to various shifts in technology and cost, including the desire for faster speeds, higher capacity, and ease and ubiquity of access. Two methods, application-centric storage and content-addressable storage have been investigated substantially the past few years by organizations, the former being a useful companion to cloud-storage gateways, as that method doesn’t care where and how the data is stored. The latter option works to address how to quickly access data, large amounts of it, in a way that is much faster than typical methods of storage and retrieval, which are extremely useful for archival and logging types of data objects.

Besides storage technologies tying emerging tech up, the nice bow on top is the technology sector that literally connects all of this together, that which is networking. It’s not new news that our IPv4 space is in more of dire draught of available resources that water is in California, but organizational moves to support the next generation of addressing, IPv6 is still not being

treated with some of the urgency it needs. Simply relying upon proxying RFC1918 space will not work well for the oncoming slew of Internet of Things (IoT) which, like RFID, will become nearly ubiquitous in our everyday world. The trillions of addresses that IPv6 enables, as well as layers of security and better handling of new and older networking protocols, is essential for making this new ecosystem of technology functional. While it is doubtful that many of these IoT devices will be wired due to the logistics and infrastructure changes (easier to install an access point versus running conduit or putting holes in a wall), addressing wireless networks on top of the IPv6 migrations will be a major push, if not started already, in the age of mobile devices and flexible work arrangements by companies who are trying to maximize employee productivity and effectiveness. While much of traditional IT is in motion towards the cloud, this core component of infrastructure will still be the parlance of most organizations and either require investment to support it, or leverage external wireless data networks, such as LTE and other technologies, to enable it.

However, back on the more traditional networking arrangements, the era of software defined networking (SDN) has gained rise in virtualized and cloud environment as a way to enable flexibility and scalability to solutions. And while not entirely relying upon “big iron” switches, taking the routing and optimization to more easily changeable software from hardware circuits, enhances components of management such as more effective instrumentation and monitoring, resiliency for failures, and security. In some cases, just having software assist in self-healing of the network infrastructure by talking directly with the application riding on top of the infrastructure, can be the sole major benefit of leveraging this architecture. Other efficiencies are gained as the flexibility of these defined networks are taken into account when developing cloud-targeted architectures, having them optimized based on how they are used, dynamically and scaled depending on use rather than pre-scoping more traditional hardware-backed alternatives. As noted, as seeing SDN work its way into cloud services and “white box” hardware (Open Compute Switches) that uses this technology to be open as well as changing character depending on its use, the next step is virtualizing the entire network. Along with the oncoming rush of containers in the cloud, taking all levels of the network model and using the advantage of software virtualization to optimize and scale, as well as enabling technical pathfinding, will be likely to be the major selling point. Currently such virtualization capabilities are being used primarily for emulation and testing and less so in production environments due to the immaturity of this technology.

Finally, today you can rarely touch on technology topics without discussing security, and as there is no real “edge” left to the enterprise form where typical security controls have been placed, all of these new advancements have required nimble thinking of technologists to address these changes. It hasn’t necessarily been just technology changes that have made security challenging, but the treats to this changing landscape has made the efforts multitudes more difficult. There’s hardly a week that goes by without a revelation of a breach – either from a recent event, or from months or years previous – once finally discovered due to some triggering incident or other revelation. While it used to be safe to assume, that in most organizations, that all computing services existed within the boundaries of a well-defined network boundary. With mobile and cloud technologies, that barrier not only has been

expanded, it's been irrevocably demolished and traditional methods need to be reengineered or new ones developed. In some of the more current advances, "self protection", much like the self-healing capabilities of SDNs, are being addressed as part of application development, allowing services and applications protect themselves based on detected anomalous activity, data, or activity. This builds upon the changes from traditional signature-based protection technologies and behemoth unified threat management solutions, to more specific function-centric solutions and behavior analysis tools that build up knowledge of what is "normal" and make protection decisions off of changes (via a threshold) to that pattern of activity. In the mobile environment, where the activity is most likely location independent and activity less predictable, those behavioral tools are less effective, and such techniques as "social" protections utilizing older edge tools (but the edge residing within the device itself) but taking in real-time threat signatures and information (reputational) and developing action decisions based on community consensus is becoming more effective in this space.

In conclusion, there's a greater than a 50/50 chance that market changes recently with major acquisitions and positioning of companies into spaces they have not had a strong presence in before, or strategic absorption can see some of these identified technologies become much more matured by this time next year. With recent moves by Dell to purchase EMC, it's expected that while EMC was primarily considered a storage company, their ownership of RSA (security) and majority stake in VMWare (virtualization) is primarily what most see as the real benefit of the purchase for Dell, who's traditional hardware business has given way to stronger efforts in professional services. Other sectors, particularly in network providers, have seen a boom in mergers and acquisition activities, in both an effort to gain more customers, but also consolidate the "pipes" from which content is increasingly being streamed over. In some cases, such as Comcast NBCUniversal, those providers are one in the same, and it's causing companies who which to deliver information and data over these network infrastructures some level of pause on what the future holds in store for costs of operation as well as reliability of such infrastructure. So outside of the basic considerations of changing technologies, it will be vitally important to watch the external influencers that are not directly involved in developing these emerging technologies.