

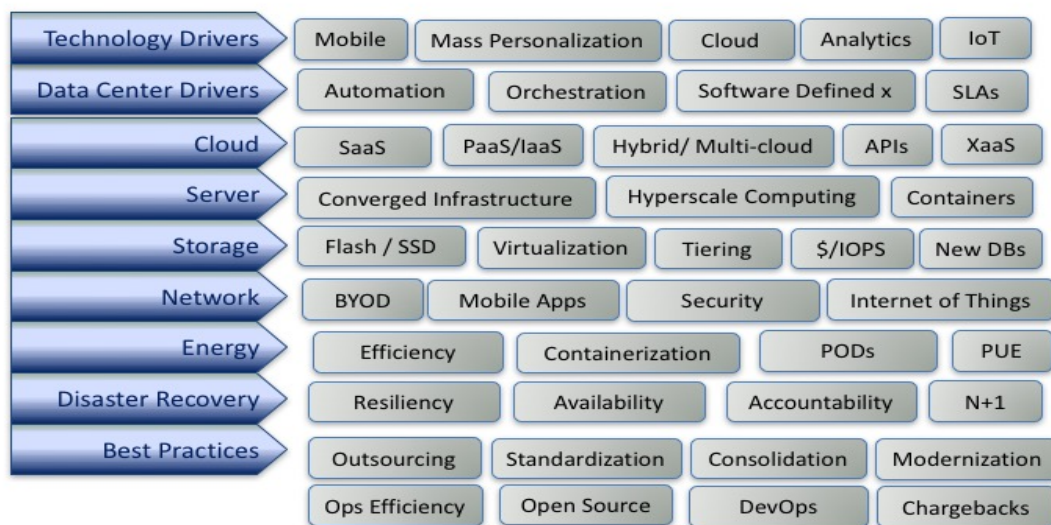


Predictions: Tech Trends – part 1 – 2018

RFG Perspective: Unlike the past few years, there will be global economic and geopolitical tailwinds in 2018, which will enable more businesses to increase their IT budgets. Additionally, the disintermediation impacts of the digital economy will disrupt more businesses – and whole industries – which must be addressed by corporate executives before their firms' revenues are usurped by new or transformed competitors. More business executives recognize the need for cloud computing and collaboration and strategic planning with IT executives. Business and IT executives must address the technology issues driving the digital economy and produce productivity improvements. IT executives will have to work with non-IT teams to satisfy analytics, mass personalization and mobility requirements that demand more collaborative, interactive, personal, and predictive real-time information. Simultaneously, IT executives will have to tackle the data and service level concerns that impact business outcomes, productivity, revenues and security so that there is more confidence in IT. IT executives will also need to increase their focus on artificial intelligence (AI), automation, componentization, hybrid and multi-cloud platforms and integration, machine learning, operations effectiveness, orchestration, and security so that IT can deliver more and better offerings quicker and at a lower cost while better protecting the organization from cybersecurity attacks and vulnerabilities.

The global economic environment will have one of its best years in 2018 in a long time, unless a black swan event occurs (such as a war with North Korea). IT budgets will be a little less constrained but not commensurate with the backlog of work expected to be delivered. The optimism generated by the incoming Trump administration has changed the dynamic for U.S. domestic companies but the impact of the expected changes will not hit all industry sectors equally. Additionally, protectionism is gaining traction across the globe, which could impair growth as well. Therefore, IT executives must invest in process improvements to help contain costs, enhance compliance, minimize risks, and improve resource utilization. Below are the top areas that RFG believes will be the major technology initiatives that will get the most attention.

Enterprise IT 2020 Tech-Driven Business Transformation



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Analytics – Analytics is now mainstream. It is integral to online real-time transaction processing systems in the areas of anti-money laundering (AML), fraud, mass personalization, and security. Leading edge firms – and some others, especially new entrants like the FinTechs – are using analytics to augment marketing, privacy, revenue generation, and security objectives. The merger of analytics with real-time transaction processing is instrumental to mass personalization (discussed below). Cognitive computing, deep learning and machine learning are starting to be incorporated into systems, including chatbots (which enable users and businesses to interact through a variety of mediums, including text, voice, image, video, and file sharing) so that enterprises can improve the user experience and better target their audiences individually.

API economy – The ability to utilize cloud applications and microservices through standard APIs is enabling the pace of delivery of new, innovative applications by new digital disruptors across multiple industry sectors and is being implemented by existing industry players, where possible. This methodology is shaking up more than IT – it is lowering the barriers to entry and enabling entrants to provide services at lower costs with rapidity. Look for 2018 to be another big year of disruption and disintermediation.

Blockchain – While blockchain has been around since Bitcoin (and even earlier for the general technology), 2018 will see a consolidation of blockchain solutions, as enterprises settle in on a few offerings. RFG expects 2018 to still be a pilot year while the options mature and companies figure out what transactions are best suited for blockchain databases and solutions. RFG expects smart contracts to be the first general use case for blockchain as there are fewer regulatory hurdles to overcome in their usage.

Cloud Service Providers (CSPs) and Managed Service Providers (MSPs) – CSP and MSP competition and pricing pressures will not abate in 2018, as providers vie for market share and survival. However, the year-over-year growth rates for the various types of clouds is falling. Nonetheless, Software as a Service (SaaS) will remain the public cloud revenue leader as more and more providers recognize the need to make their services available as part of the digital economy. Most large enterprises will still retain their data centers and create internal private clouds. The primary concerns with use of public cloud providers remains security, loss of control, and data privacy. **Amazon** Web Services (AWS) may have trouble retaining its overall dominance of IaaS/PaaS providers as **Microsoft** is rapidly overtaking AWS in terms of customer acceptance. **IBM** and **Google** will continue to hold onto the next set of slots and the Big Four will solidify its share of the market, which exceeds 50 percent. Enterprises, building on existing relationships, will view IBM as the leader and preferred choice for managed private clouds. **Oracle's** bravado of becoming a leading player as a CSP will not occur in 2018 (if ever) while others will have to figure out where they fit as niche players. Because the leading CSPs do not share common APIs, interoperability is an inhibitor to cloud growth, as users plan on utilizing hybrid and multi-cloud solutions. While there is limited movement by the providers to fix this, third party providers are offering solutions so that the choice of which cloud is used is transparent to the user.



Consolidation – Data center consolidation in 2018 means moving applications and services to the cloud, and modernizing and standardized internally run applications and platforms. Advancements in cloud offerings, especially SaaS solutions, along with a diminished concern for the cloud security risks will lead more small and mid-sized businesses (SMBs) to shift the majority of their application workloads to the cloud and operate fewer internal data center sites. Large enterprises, still worried about compliance, data privacy, interoperability, scalability, and security, will look to utilize clouds and colocation sites for development/test environments and handling spikes in capacity. But for the most part, large enterprises will limit business- and mission-critical production systems to in-house data centers or company-managed colocation sites, even though a few leading-edge users will move mission-critical applications to select cloud providers.

Containers – DevOps groups will be primarily using containers, mostly Docker containers, as their code development vehicle. Within the next three years containers may achieve a 20 percent share of the market, while VMs will retain the lion's share of the installed base. Serverless computing or function-as-a-service will begin to gain traction, as it reduces complexity while providing added efficiencies, scalability, and standardization without dependencies. In 2017 Kubernetes won the battle and became the dominant orchestration tool but Google open-sourced it, which may lead to multiple code forks and future confusion and inconsistencies. Containers expose organizations to 18 new attack surfaces and vulnerabilities, which cyber attackers will try to exploit. Hence, RFG expects to see multiple news stories about successful container cyberattacks – both on-premise and in public clouds.

Converged and Hyperconverged Infrastructure – The market for converged and hyperconverged infrastructure will have matured and IT organizations will focus on the set of best use cases for adoption. These platform solutions do result in productivity, time and cost savings and IT executives that have not done so should be piloting one or more of the use cases as well as software defined solutions (software defined data centers, software defined storage, etc.) in 2018 to determine the role and value each can play in the corporate data centers.

Data center transformation – Data center transformation is not about IT any longer but now ties to the redefinition of an organization's business model. Disintermediation of the business is forcing business executives to re-evaluate their business strategies, which trickles down to the IT strategy for making the firm competitive in the new digital economy as well as the brick and mortar space. In this new world, it is no longer just about the products being offered – it is all about satisfying customers. Recent entrants like Alibaba, Amazon, Monzo, Netflix and Venmo, are disrupting businesses in multiple sectors globally and if the traditional firms fail to respond effectively in 2018, they could see their firms share a fate similar to Borders (a mega-bookstore for those that have forgotten). IT executives should expect a transformation to be a minimum of a three-year process but could be longer depending upon the level of cultural resistance. The challenge for IT executives will be overcoming fear of failure and initiating the first steps of the transformation and providing early delivery of the initial services (and/or microservices).



The first phases must be completed quickly and frequently upgraded, which DevOps and containers can enable. In addition, the average data center power usage effectiveness (PUE) holds in the 1.60 – 1.80 range whereas optimized solutions (like those used by **Amazon, Google, Microsoft**, and some others) enable a savings of up to 40 percent or more – driving PUE to the 1.05 – 1.20 range. This savings, if IT executives can utilize it in their business case, can be used to fund the overall IT transformation.

DevOps – The trend toward DevOps will continue to gain momentum in 2018 but there is resistance, as it is a significant cultural change to IT development and operations. The challenge is not the technology, of which there is much to implement, but overcoming the organizational resistance to change as well as the acceptance of new, and expanded, roles and responsibilities for developers. The transformation will also dramatically reduce the size of the operations staff, which will be passively aggressive in its attempts to slow the process. Success will depend upon IT executives putting the right metrics in place and monitoring progress.

3-D printing – 3-D printing successes in automotive, healthcare and manufacturing are demonstrating the value of the technology, which should make 2018 another year of solid growth for the technology. The use of 3-D printing will revolutionize the way companies produce materials and provide support services, including self-help components. Leading-edge companies will gain a competitive advantage from their first-mover advantage. The technology continues to mature while costs drop and leading-edge companies will gain a competitive advantage in terms of costs and speed to market.

Energy efficiency/sustainability – For all its value, this remains a low priority (again) for most executives. IT executives should be making it a part of other initiatives and a procurement requirement. RFG studies find that energy savings is just the tip of the iceberg (about 10 percent) that can be achieved when taking advantage of newer technologies. RFG studies also show that in many cases the energy savings from removing hardware kept more than 40 months can usually pay for new better utilized equipment. Most organizations still keep zombie servers in operation and they can be up to 20 percent of the server population. The shift to containers may exacerbate this problem until new and better tools are in place. The half-life of IT hardware is less than three years; IT executives should act accordingly and lease, move to the cloud, outsource, or rent.

Hybrid and Multi-Cloud – The next phase of cloud computing is hybrid and multi-cloud environments. There is no one CSP that offers everything that an enterprise needs so there is the need to use multiple cloud service providers. Thus, it is likely, for example, a firm might use AWS, Azure, Box, IBM Cloud, Salesforce and Workday while also utilizing its own in-house private cloud. Some firms will become cloud providers as well as users. Thus, the use of multiple cloud environments is becoming more complex than many perceive and the compliance, management, orchestration, security, and support tools are not fully available. This will prove to be a big challenge in 2018 as IT executives struggle to create a manageable holistic operational environment. RFG expects some of the problems will end up in the news media as shortcomings and human errors result in



breaches and data exposures. RFG expects the majority of all environments will be hybrid and multi-clouds in the near term, as firms mix and match in-house and provider offerings with business needs. Cloud service brokers will gain traction as organizations seek assistance solving these issues as they seek to integrate cloud services with each other and on-premise applications.

Internet of Things (IoT) – Multi-cloud environments are not the end game but part of the journey. IoT usage with some key data kept at the edge will be part of the next stage. The use of personal assistants, sensors in appliances and other connected products (to other IoT devices and someone's cloud systems and databases) will mushroom again in 2018. Personal assistants and smart agents will improve productivity and simplicity for users, especially non-technical ones. Since the price for these items is well within the average person's grasp, millions of them will sell – and they will be integrated with cloud and data center applications where the information will be analyzed and massaged. Businesses will be able to incorporate them into their mass personalization experiences as new and enhanced applications incorporate IoT into their user interactions and workflows. Additionally, sensors will enable IT operations staff to better monitor and manage system capacity, maintenance, and utilization. IoT devices will have major impacts upon processing and storage needs and boost demand by orders of magnitude. For example, the ability for a personal biometric device (like a Fitbit or heart monitor) to ship data continuously to a healthcare provider for analysis and incorporation of the information into the ongoing processes increases the amount of data collected by orders of magnitude. In addition, IoT also may prove to be a security weak link in 2018. IoT vendors are more interested in getting their products out with the desired user functionality than they are in ensuring they have not created a security gap that can be exploited by bad actors. Companies need to understand and address the security and data center performance and latency impacts – hardware, networks, and software – before implementing what may seem to be a simple user IoT application.

Mass personalization – Analytics, artificial intelligence (AI), big data, deep learning, machine learning, mobility, and the emerging digital economy are coming together to create unique interactive experiences for consumers. Mass personalization means each individual will be presented with content uniquely tailored for him or her. On the business side this is geared to drive loyalty and revenues. But on the IT side, it will represent a major change to applications, databases, and the underlying platforms – which for the most part today are focused on the products and services the organization offers and not on a consolidated user view. It will be transformative on both sides, with new disruptive players leading the way and the traditional firms struggling to catch up in both dimensions. FinTechs are driving this in the financial services sector while other SaaS providers are leaping into the other sectors. Leaders in this space are not small firms – Amazon is the biggest retailer; airbnb tops the list for accommodation providers; Uber is reshaping the taxi industry; Venmo is the new norm for millennials for P2P payments; and eBay leads in the online auction space. RFG believes that all these AI and analytic advances will create more new jobs (different skill sets) than they will displace.



Software defined x (SDx) – The hype on software defined networks, storage, data centers, etc. has subsided some but the concept retains strong interest in 2018. The new year will see a greater transition from hype, vaporware, and limited functionality to delivered solutions than 2017 saw but there is still a long way to go. Moreover, containerization competes with the shift to SDx, leaving users to decide to go with pure abstraction or hyperconverged abstraction. Both options will make headway in 2018 but RFG expects containerization to gain the upper hand.

Storage - Flash SSD et al – Hard disk drives (HDDs) running at 15,000 and 10,000 RPMs have lost the war and are becoming history. Flash, solid state drives (SSD), thin provisioning, tiering, and virtualization are now mainstream for most applications and workloads. Enterprises are employing petabytes of data on flash systems that fit on a single rack as the cost differential between enterprise flash and high performance hard disk drives (HDDs) are gone. HDDs only make sense now for storing vast quantities of infrequently accessed data.

RFG POV: 2018 will be another challenging year for IT executives and those that wish to achieve their goals for the year and keep their companies competitive will need to keep pace with technology advances. This will require IT to understand the rate of technology change and adapt a data center and hybrid/multi-cloud transformation plan that incorporates the new technologies at the appropriate pace. Additionally, IT executives will need to invest annually in new technologies to help contain costs, minimize risks, and improve resource utilization. IT executives should consider a turnover plan that upgrades (and transforms) a third of the data center each year and phases out the legacy platforms that have been around far too long. Nonetheless, first steps in the transformation must begin now. IT executives should collaborate with business and financial executives so that IT budgets, plans and strategies dovetail with the business and remain tightly integrated throughout the year.

Additional relevant research is available at www.rfgonline.com. Interested readers should contact RFG Client Services to arrange further discussion or interview with Mr. Cal Braunstein.