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CLOUD COMPUTING

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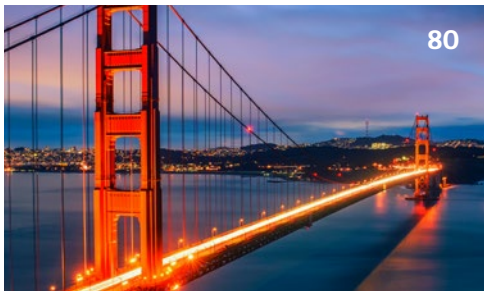

CLOUD COMPUTING IS A CHALLENGE TO SECURITY, BUT ONE THAT CAN BE OVERCOME.

WHITFIELD DIFFIE,
AMERICAN CRYPTOGRAPHER

Cloud Computing Security Issues and Challenges

BY ANTHONY ENGLISH

When I was studying to become a Certified Novell Instructor and then a Microsoft Certified Trainer way back in 1993, the internet was only beginning to come into being and private computer networks came in two forms: “sneakernet” and a pile of competing technologies including ArcNet, Token Ring, and some early forms of ethernet. Sneakernet was a cute term used to refer to the process of just putting the data you wanted to share or transfer on a portable storage medium (floppy disk, usually) and then walking that disk over to whatever computer you wanted to transfer it to. Considering that the local area network (LAN) technologies were sometimes slow or unreliable, sneakernet remained a reliable fallback process for transferring data. Not many of us thought about the security of data in transit to any great extent although we all understood packets structure and what “good” network traffic looked like.

Fast forward to August 9, 2006, (and I may get some who debate this) when Eric Schmidt, CEO of Google, first introduced us to the term "cloud computing" at a conference. For the first 7+ years after this newly introduced concept, cloud computing was studiously avoided as an IT tool in most large or security-conscious organizations. The thinking of the day was that it was safer to keep your data and systems in house in your own data center, on your own servers, on your own networks, and managed/oversighted by your own IT staff... or at least by the IT staff that you paid for. This thinking was, of course, at least partially accurate in that the world of cloud was still a little Wild West-y with everyone trying to get into the growing market but with not a lot of standardized security controls or normalized design principles being applied.

When IT professionals started to think about it, they realized that the idea of cloud computing had actually been evolving inside of their own data centers for some time with technologies like computing clusters, drive arrays, network traffic distribution via intelligent switches and routers, and RAID arrays; all of these technologies, when brought together and upgraded a bit, is what a good cloud environment is made of. So then the question became: is it safe to put my data, applications, and/or my infrastructure in the hands of an external entity either in whole or in part? Well, data center outsourcing was also a thing at the time of the birth of cloud computing so, again, the concept really was not (and is not) as revolutionary as it might have seemed.

The challenge that I was faced with as a security professional during the early days of cloud services was, as pointed out above, the issue of there being no security standards or best practices against which to measure the security of any cloud computing solution. I was also challenged by the fact that the people I reported to in my job at the time were all entrenched in their view that cloud equaled less security for our organization's data. This was partially understandable since I was working in an industry that required very durable security and my employer was a major supplier in this industry so the stakes were high and jumping to a new tech like cloud computing was not going to happen without a lot of safety nets in place first.

Cloud providers all began with their own ideas of how cloud computing products should be designed and this is still somewhat true today, although these days, it is more about semantics because the core technologies used are pretty much the same. Virtual technologies are the norm in cloud computing: from virtual servers to virtual firewalls, virtual networks, etc. In addition, container-based technology is relied upon to build cloud content and functions. Cloud technologies can also be categorized in a handful of silos such as: Infrastructure as a Service (IaaS), Platform as a Service (PaaS), Software as a Service (SaaS), Backup as a Service (BaaS), and Disaster Recovery as a Service (DRaaS).

With all of the various elements needed to build a cloud environment or cloud-based solution, and with all of these various types of cloud services, how can security standardization or general standardization of cloud services happen?

Well, there have been some evolutions on this front as well: the Cloud Security Alliance Security Framework, various ISO standards such as ISO/IEC 27701, NIST, CIS, and even some cloud providers themselves (e.g., AWS, Microsoft) have all contributed to a large tapestry of cloud security guidance, best practice, and compliance requirements.

So, where could anything go wrong, security-wise, when it comes to using cloud technologies if there is this much security guidance out there? Well, as we all probably know, not many security standards or frameworks are mandatory when it comes to complying with them. Cloud service providers realize this as well so, the more security astute cloud providers will get themselves a few security-related certifications such as C-Star, ISO/IEC 27001, and, usually the one I always try to verify with a bunch of my own fact-checking, a SOC report. The only one in this list that is dedicated to cloud security is C-Star while the others contain good security controls, there are those who think that they are sufficient for cloud security evidence but they do require additional cloud-specific security controls (something that covers container security, something about data residency requirements, etc.). Security compliance and the proper implementation of the correct set of security controls/best practices is of paramount importance in cloud solutions. It is also critical to include data privacy controls in addition to the usual set of security controls in whatever standards or frameworks that are utilized in designing your secure cloud environment.

As mentioned above, data privacy in the cloud has garnered a lot of attention as cloud services have grown. Considering that cloud solutions can literally be storing your data anywhere or transferring it anywhere, data residency is another important element to add to your security checklist. For example, if you are storing, processing, or transferring personal data belonging to residents of the EU, then you will be subject to compliance with GDPR; storing that data with a cloud provider in, say, the United States, will require that the cloud provider in the USA is also compliant with GDPR. This also applies to residents of the New York state or California or other U.S. states if you have their data and there are lots of other examples worldwide with varying requirements around that data when it is in country or in jurisdiction versus when it is outside its parent country or jurisdiction. Privacy of personal (or health) client data can be addressed in a few ways with data residency in jurisdiction being just one way to reduce your risk profile (because violations of data privacy laws can be expensive in a few ways) but it is always critical to address both privacy and security in a very clear manner in any agreement with any third-party cloud service provider.

We had a lot of horses when I was growing up that we rode and showed; I grew in a country where winter was cold with lots of snow so the horses spent their nights, as well as all of the very cold days, inside the barn. This meant that my

siblings and I had barn chores to do every morning and every night and you could not shirk your chores at any of those times because that would pile today's chores on top of the next day's chores. Similarly, in cloud computing, you do not want to simply take what you currently have in-house and shove it into a cloud environment or solution because then you are only moving any issues or weaknesses in your current infrastructure or solution into the cloud. Instead, cloud solutions should be treated just like any new hardware or software that you are installing – they should be subjected to security hardening based on best practices and standards such as NIST, CIS, and even the cloud provider's guidance (e.g., AWS and Microsoft provide security best practice for their environments). First, understand the various features and options available in your cloud solution and understand how the solution will work (or hire a contractor who does) and then design your specific implementation of the cloud solution you are buying or moving to and secure it.

If your cloud provider has tools that might help you either secure or monitor the security of the cloud service or solution that you are purchasing from them, then it is probably a good idea to utilize those tools. For example, Microsoft has a Security Dashboard in their O365 product but each time I ask a client if they are using it (even when they are licensed for it), I am often met with silence and then a question asking me what it does. Another example is two-factor authentication (2FA): if your cloud provider offers it, then you should use it (and use it with an app such as Microsoft Authenticator instead of sending 2FA codes to a cell number). Every cloud provider out there is working on security and many have learned the hard way (because of breaches and attacks) that they also need to educate their customers on security so you should not ignore the security best practice guidance from the cloud providers. If you want extra assurance, most full endpoint security providers and other security product providers are including cloud integration in their security toolsets so they can monitor, alert on, and even manage security events in your cloud product.

Like every technology, cloud services have come a long way from their early days with regards to security, integrity, and reliability but, because attackers know that cloud services house a lot of data, these services will remain high-value targets thereby making their security all the more critical. The basic principles of good due diligence and sound security practices must be applied to cloud services just like any other technology out there today.

Here's wishing you a safe and secure end of 2020 and 2021!

About the Author

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Anthony English is a seasoned IT and Security professional with multiple certifications in both disciplines. Anthony has worked in health care, utilities, law enforcement, lottery and gaming, auditing, education, and consulting and has more than 34 years of applied experience. Anthony volunteers on a Standards Council of Canada committee for IT Security, a Cloud Security Alliance committee for securing health care data in the cloud, on ISC2's CISSP Certification Committee, as a member of the Disaster Recovery Institute of Canada's Certification Committee, and as a member of the International Association of Privacy Professionals CIPP/C certification exam committee. Anthony has conducted threat risk assessments, privacy impact assessments, security gap and maturity assessments, security testing (both physical and IT), security audits, built BCP, IRP, and DRP plans and SSDLC's, and many other tasks during his time in the security field. Anthony holds multiple certifications including: ISO/IEC 27001 Master, PCIP, CISSP, CBCP, CIPP/C, ClCISO, CRISC, CGEIT, ISO/IEC 27032 Lead Cybersecurity Manager, CISM, CISA, and more.

Leadership in the Cloud Computing Era

BY KEVIN DERMAN

If you are a CIO (Chief Information Officer) or CTO (Chief Technical Officer) in business today then you are in a most fortunate position. A position that has the ability to create impact across the entire business. This role has changed so much in the last 15 years, that only the most adaptable and forward-thinking individuals are able to fulfill this role successfully. Many will fall by the wayside as the ever increasing demands of the evolving workplace are translated into a need that must be fulfilled by an information technology solution. The rest of the business looks towards the IT department to not only solve business issues but also bring competitive advantage into the business.

This evolution of the role of the technology leader has largely been driven by the rapid pace of development of cloud technology services. The ease with which one can access these services, try them out, conduct a POC, and then deploy them, results in an increase in the number of options for solutions to business problems, the speed that they can be tested and deployed, and the number of possibilities for innovative solutions.

IT is no longer about the infrastructure that supports individuals to get their job done, the servers, desktop PCs, and laptops. It is no longer about the systems that keep track of sales and profit margins. It is no longer about the storage of data for analysis at some stage. Of course, all of these aspects need to be there, but they are just the starting point, as the cloud building blocks of solutions grows.

IT today is about every function of the business. It is about the customer. From the mechanism of introducing the customer to the company's products, taking them on a journey, fulfillment, and then encouraging them to be a repeat client. IT is about your employees. From providing them with the tools they need to understand what they are selling, how to function within the company, how to apply for leave, and, of course, how to complete the role that they are paid to do. It is about turning data into information and then turning that into knowledge, utilizing machine learning and artificial intelligence. It is about simplifying the complex so that people can do what they need to do in the most efficient way possible. It is about creating competitive advantage. Putting the business ahead, and creating the space to innovate further. With this in mind, the successful IT leader of today needs to be a visionary, a creator, an autodidact, a change manager, a financial manager, and most importantly, a realistic optimist. This article examines why these six traits are key to career success for the IT leader.

Figure 1

Hype Cycle for Emerging Technologies, 2020

Plateau will be reached:

○ less than 2 years ● 2 to 5 years ● 5 to 10 years ▲ more than 10 years ⊗ obsolete before

gartner.com/SmarterWithGartner

Source: Gartner

The Visionary Futurist

Technology leaders have to be visionaries. Visionaries are people who can see into the future. Now obviously this skill does not scientifically exist (for the time being), but what is expected of an IT Leader is to have a view of where their industry, and the technology that supports their industry, is heading. Part of this visionary skill is to imagine a future for the company that is better than the present. Once this vision is formulated, it is then their responsibility to share this vision with the other leaders in the business and convince them of this potential direction.

Each year, Gartner releases their Hype Cycle for emerging technologies. The technologies presented represent Gartner's view of which technologies will have a significant impact on business, society, and people over the next five to ten years (See the Gartner 2020 Hype Curve in Figure 1). Many IT leaders tend to dismiss the importance of this annual report as it has little impact on their current working environment. The present, urgent, and burning issues will always take precedence over some future technology. However, what the past fifteen years have shown us is that these technologies are reaching mainstream production a lot sooner than anticipated.

> **It is safe to say that the Hype Cycle represents a view of where aspects of your business solutions are heading over the next few years. This means that IT leaders need to ensure they are investigating these future technologies and keeping them on the radar for possible future solutions.**

The Creator

Technology leaders of today are creators. Cloud technology has placed so many new domains of technology at the fingertips of the technically inclined. We often describe this as "push-button rocket science." AWS has more than 175 products and services available in their console, while Microsoft Azure has just over 169 unique services. These offerings range from virtual servers to fully managed artificial intelligence and machine learning solutions. The creative component comes to light in one's ability to combine these services to create a unique solution for your business. The first part of any creative process is an understanding and familiarity with the tools of the process. Therefore, technology leaders need to be constantly updating their education on the major vendors that are out there. Keeping up to date with one vendor can be challenging enough. So you can imagine the effort involved if you are aspiring to a multi-cloud strategy. The next step involves your imaginary capabilities in putting together the cloud LEGO blocks of IT.

The Autodidact

The successful IT leader cannot afford to allow their knowledge to grow stale. Apart from the sheer volume of vendors available, the accelerated rate of progress of technology places additional stress on the individual. Without having a passion for technology, keeping up to date with the latest products, methods, programming languages, etc., becomes an impossible feat. This is probably one of the biggest commitments to the role. The successful IT leader needs to be always learning, and

there certainly is no shortage of courses and certifications. While it is not necessary for the CIO/CTO to be technically certified, having this knowledge will provide great benefit for their decision-making ability. In addition to looking after their own knowledge, the IT leader needs to be involved and concerned with the teams continuing education and not only their ability to support the businesses current systems but also the future solutions that may be implemented.

Financially Savvy

If you are deploying cloud solutions, you will be aware that it does not take long for costs to increase as everyone in the organization starts spinning up services. IT leaders need to understand cloud economics and governance in order to ensure that the processes and procedures are in place to avoid any cloud bill shock. It is not uncommon for companies to not know what servers and other infrastructure they have running in the cloud. From zombie instances to understanding when and where to use reserved instances, there is so much to comprehend.

> **While one can use third-party systems or consultants that can assist, in order to succeed at managing the new normal of cloud, you will need a level of understanding of the cost structures involved.**

Being able to communicate this at the board level is equally as important, as the expectation is that cloud technology is deployed as a cost saver. Another key financial component to master is the concept of ROI (Return on Investment). ROI is a lot easier to calculate when you are dealing with a single capital purchase of a system that will remain in use for a period of X years. However, when you are dealing with a cloud environment, many other factors come into play as the system morphs and evolves over time to the needs of the business.

Change Management

All new technology comes with an aspect of change. Understanding this process seems to be a skill on its own. Many IT projects fail, not because the technology is bad, but because not adequate consideration was given to the change process involved in the implementation. Large enterprises can afford to have a Change Manager who will design the programs and interact with the people involved in the system change to ensure all the critical roadblocks

are removed. If you are an IT leader who does not have this luxury then you need to build in this change management outcome into any new deployment. This involves the process of getting buy-in, managing stakeholders, evaluating the fit into the companies' culture including the rewards and consequences of those involved in adopting or not adopting the new system. Needless to say, an important skill to have here is a high EQ or emotional intelligence, to assist in reading and managing others emotions as you go through the change process.

A Realistic Optimist

This final element is probably the most important of skills to embody in order to be an effective leader in the cloud computing era. With so many opportunities and possibilities available to organizations through cloud computing, there seems to be two paths to choose from. One path holds a conservative, risk-averse approach. This is the IT leader who will only utilize technology once it has been firmly established in the sector. The other is the early adopter, forever on the lookout for new technology to try out in the organization, while managing the potential impact this can have should something go wrong. I would like to suggest that the "realistic optimist" holds a bit of both of these personas and is able to balance the

benefits with the risk. This individual anticipates that the project will not always go right, but still has the optimism to try new things. This realistic optimistic approach, that systems and processes can always be better, enables businesses to find a competitive advantage, often enabling new businesses to leapfrog well established brands.

Our Lead Developer shared a concept with me that resonates so well with the skills needed to lead successfully in the cloud era. Leaders need to be able to hold these two conflicting concepts in their minds and actions simultaneously in a beautiful cognitive dissonance. These concepts are:

Cloud is Simple and Cloud is Complex!

We need to think of cloud being simple enough to try new things. Experimentation is the key to innovation, and it is this innovation that will lead to improvements, cost reductions, and competitive advantage. However, without thinking of cloud as complex at the same time, we will not have enough respect for the skills, effort, and work needed to make these projects a success.

I often comment that we are so fortunate to be in the IT industry. No other industry moves at such an accelerated pace. This places huge demands on those who want to succeed in this area for a lengthy period of time. The statement that current success does not guarantee future success could not be truer. It demands constant learning and growth. Projects need to be re-evaluated, skills need to be enhanced, and value needs to be proven. However, what we can be assured of is an evolving landscape that will always hold excitement, opportunity, and success for those who are realistic optimists.

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About the Author

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Kevin Derman is a Technology and Human Potential Evangelist. His favorite topic being the potential when these two forces are combined. Kevin is the CEO of Kaskade.Cloud a cloud technology consultancy. He has headed up the Partner and Channel Strategy both for Microsoft South Africa and IBM for the Sub Saharan Africa region. He has had various career experiences incorporating global corporates and entrepreneurial start-ups, while also being a motivational and business speaker. Kevin holds the following degrees: BSc, Honors and Masters in Science, an MBA from UCT's Graduate School of Business, and is an AWS Associate Cloud Architect.


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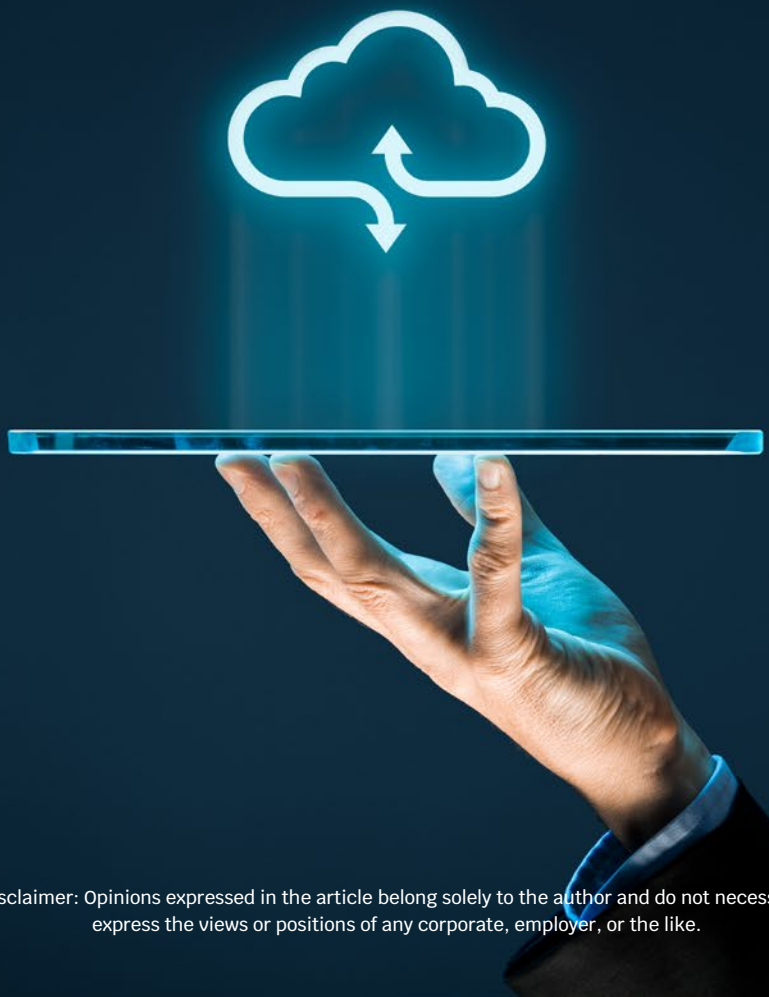
2021 Biggest Cloud Computing Trends

BY SUSANNE TEDRICK

The global pandemic had a significant and unprecedented impact on businesses' cloud computing usage and spending for 2020. These impacts will continue to reverberate well into 2021.



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Cloud Adoption Key to Pandemic Recovery; Adoption to Accelerate

In 2020, businesses that were reluctant to embrace cloud soon realized that cloud was a necessity - not an option - for the livelihood of their organizations. With businesses having to close their offices and facilities, as well as having their employees work from home, many found that they needed to quickly adjust how they operate and find the right infrastructure and tools to move forward. At the same time, businesses also needed to minimize IT operations costs, save cash, and operate as efficiently as possible.

2020 reinforced that cloud computing was a critical and necessary tool in helping businesses adapt to a new and unknown "normal." The pandemic forced businesses to re-examine their relationship with cloud – whether to finally commit to adopt, accelerate existing adoption plans, or re-examine their proposed cloud use cases completely. According to the 2020 State of the Cloud Report survey by IT software management firm Flexera, more than 50% of the survey's respondents indicated that their cloud usage will increase or significantly increase due to the pandemic.

While we are closer to finding viable vaccines for the COVID-19 virus, it remains uncertain when businesses may be able to partially or completely return to their normal operations. Until then, businesses will adopt cloud on a much faster timetable.

Increased Public Cloud Usage

Businesses, in the past, have been reluctant to use public cloud platforms. Of the National Institute of Standards and Technology (NIST) deployment models, public cloud offers them the most cost-effective cloud services, as resources are pooled together for everyone to use. But public cloud offers businesses the least amount of administrative and operational control than private cloud. With public cloud, service providers retain the ownership and responsibility for the underlying infrastructure and security of their platforms, giving pause to some businesses on how secure their infrastructure, applications, and data will be, and whether resources will be available when needed.

Over time, however, major cloud providers like Amazon, Google, Microsoft, and IBM have demonstrated to the market that their public cloud offerings are secure and have a high degree of service reliability. Each of the cloud providers mentioned state service uptimes (amount of time that a service will be up and operational) of at least 99.9% in their basic cloud service level agreements.

In addition, public cloud has allowed businesses with limited budgets and other constraints to spin up services as needs arise, or to experiment with cloud services, without needing to make a long-term commitment or investment. For 2021, IT research and advisory company Gartner predicts that public cloud spending by businesses will grow 18.4% for a total of $304.9 billion.

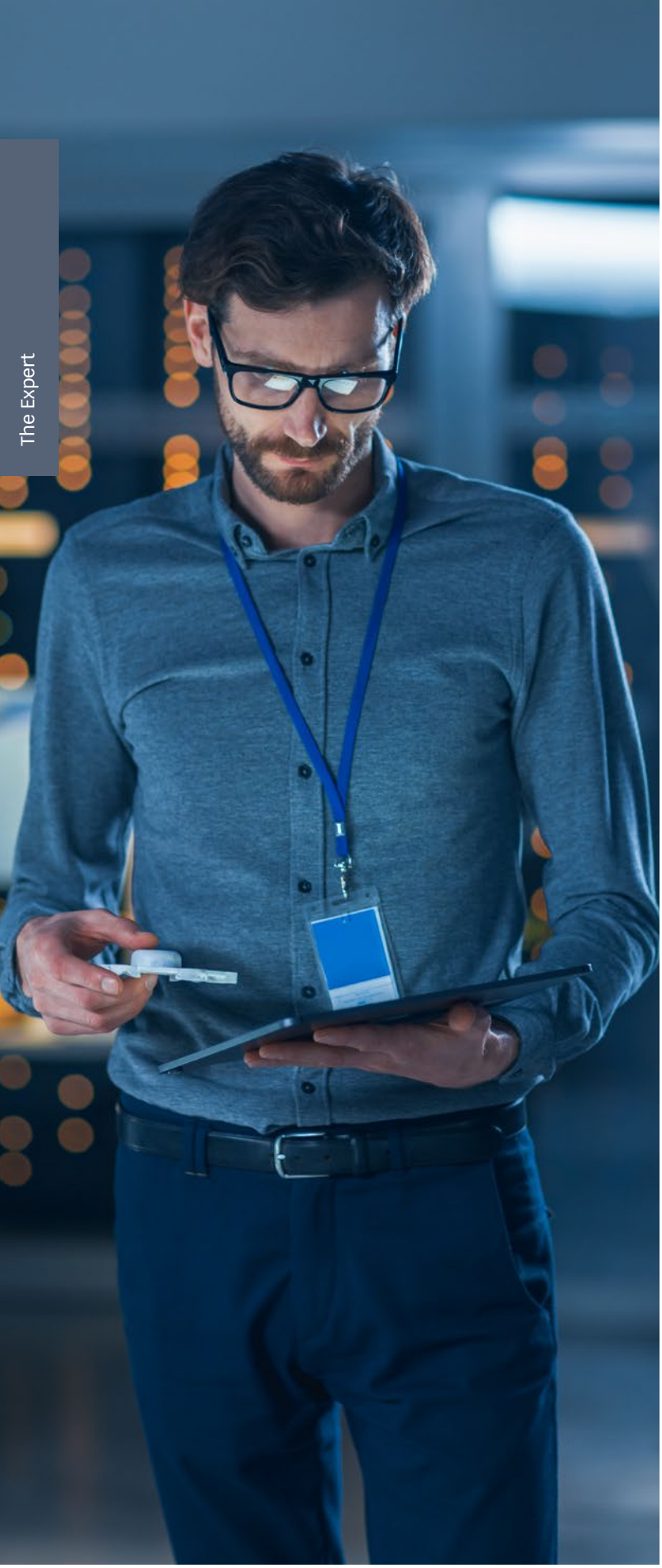
Multi-Cloud and Hybrid Cloud: The New Norm for Cloud Deployment

While more businesses are embracing cloud usage, they are not just using one cloud provider. And in some cases, they may be using clouds connected to their existing physical infrastructures. According to a study conducted by the IT research company IDG, 55% of respondents were using more than one cloud provider in 2020, with 34% using two, 10% using three, and 11% using more than three providers. Additionally, 38% of respondents indicated that they had adopted a hybrid cloud strategy approach for their organizations.

Multi-cloud is the usage of multiple cloud environments to create a single architecture. Rather than rely on a single cloud provider, companies are using multiple providers for their needs. Hybrid cloud utilizes both cloud platforms and traditional on-premises resources to comprise a single, unified architecture. For businesses, multi-cloud offers many advantages – they have the ability to utilize a cloud provider's key offerings and capabilities, like artificial intelligence or advanced security features. It also helps diminish the likelihood of vendor lock-in or the inability to use another cloud provider because it would be too cost-prohibitive to switch. Adopting a hybrid cloud strategy allows businesses greater control over infrastructure and application security, reliability, and costs.

Increased Focus on Cloud Security

Cloud security encompasses the policies, procedures, and tools a business uses to protect data, applications, infrastructure, and networks in cloud environments. As the adoption of multi-cloud and hybrid cloud architectures increases, cloud security threats and risks grow exponentially. Using several platforms hinders the ability to have complete architectural visibility. Without that visibility, gaps in security, data leaks, noncompliance with industry regulations, and other problems can go unidentified. IT security firm Nominet reported in a 2019 study that businesses that use a multi-cloud approach are both more likely to experience a security breach and to experience multiple breaches.



Adding more complexity to cloud security is the shared responsibility model of cloud services. As described by NIST, both businesses and cloud providers are responsible for ensuring the security of the cloud environment. The level of responsibility, as well as control, shifts depending on the service model in question. Not understanding who is responsible for what in these models can also lead to unintended security risks.

For example, the provider of a Software as a Service (SaaS) word processing application is responsible for the application's underlying application and infrastructure security. When a business decides to use a virtual server, which would be classified as Infrastructure as a Service (IaaS), the cloud provider is responsible for the infrastructure security. Everything else, like any applications and other middleware installed, is the business's responsibility to secure.

Businesses realize that security threats are becoming more sophisticated, and that the operational, financial, and reputational risks from not having a comprehensive cloud security program are too great to bear.

Cloud Native — Microservices, Container, and Serverless Adoption to Grow

Cloud native has become a popular approach to software application development. Here, cloud resources are exclusively used to build and deliver applications. This gives software development teams the tools to quickly create scalable and resilient applications, without burdening them with administrative or operational tasks.

One of the most common characteristics of cloud native applications is the use of microservices and containers. Microservices is a software development architectural style where development teams create an application through a series of loosely linked, small services, rather than one large monolithic application. The approach allows teams to upgrade or add new capabilities to an application as necessary, without having to take an application completely offline. If one or more parts of an application fail, the application would still have the ability to run the other services unaffected. Should an application experience a high period of demand, the application will automatically scale to the demand, rather than time out completely.

IT research and advisory firm Forrester expects cloud security spending to increase to $3.5 billion for 2021.

Containers are a key component in developing microservice applications. At a very high level, containers hold the minimum level of application files and configurations within them, so that they can be easily moved and deployed to almost any environment. For more complex applications, particularly ones that have several hundreds or thousands of containers, container orchestration and management tools, like Kubernetes, become crucial for containerized application management and deployment.

Given the unique advantages cloud native can offer, Forrester predicts that adoption of cloud native technologies in 2021 will increase by 60%, and container adoption to increase by 28%. Kubernetes, the popular, open-source container orchestration tool on the market (now six years old), will continue to be adopted by businesses now that there are established enterprise use cases and success stories.

Serverless is also helping to accelerate cloud native adoption. Serverless computing allows businesses to create, start, and gracefully shut and tear down cloud resources, like virtual servers and storage, through the use of code. Serverless emphasizes business's need for speed, efficiency, and automation.

The benefits of this approach for businesses are using services only when you need them – usually with compute and storage resources, you are committing to using them for a fixed unit of time, perhaps hourly or monthly. There is also nothing for businesses to continually manage, as the code will instruct when to build a resource and when to take down the resource. Finally, there is the potential for cost savings. With serverless, businesses are only charged for the actual time that a resource was up and running. If a user provisions a virtual server to run for 10 minutes and then completely spin down, then the user is only charged for 10 minutes of run time vs. a full hour or month.

Edge Computing on the Rise

The goal of edge computing is to process data and compute resources as close to end users, rather than having the processing take place in a centralized and distant location. With edge computing, data would no longer have to travel great distances for processing and analysis; end users would be able to access real-time data quickly and as their needs arise. For Internet of Things (IoT) devices (like sensors or internet-enabled devices and appliances), and resources that utilize machine learning/artificial intelligence, the need for real-time data is essential. As data is traveling shorter distances, and no longer in a centralized location, data is less likely to be intercepted and stolen, adding to security benefits. Edge computing also has the capacity to increase overall network speed and reliability. While the major cloud providers have been heavily investing in edge computing the past few years, the space also has telecommunications and networking giants like Cisco and Juniper Networks, technology companies like Hewlett Packard and Intel, and a considerable number edge computing startups. Forrester predicts that the business desire for edge computing will grow considerably from now through 2027.

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About the Author

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Susanne Tedrick is an experienced cloud computing specialist and the author of the award-winning book, Women of Color in Tech. Susanne is the winner of CompTIA's 2020 Diversity Technology Leader Spotlight Award, for her advocacy for increased diversity, equity, and inclusion in the tech industry. She is also the winner of a Technology Rising Star Award from the 2020 Women of Color in STEM Conference, and CompTIA's Association of Information Technology Professional's Rising Star of the Year Award in 2018.

Serverless was cited as one of the fastest-growing Platform as a Service (PaaS) cloud services for 2020, according to the 2020 State of the Cloud report, while Forrester cites that 25% of enterprise application development teams will leverage serverless in the coming year.

The PECB Lead Cloud Security Manager training course is on its way!

As the number of organizations that adopt a cloud-based technology is significantly increasing, it has become crucial for these organizations to ensure a satisfactory level of security for their cloud computing systems.

The PECB Lead Cloud Security Manager training course is a recently developed training course that will offer candidates knowledge on how to plan, implement, and manage a secure cloud infrastructure. The cloud management framework, among others, is based on ISO/IEC 27017 and ISO/IEC 27018 guidelines, as well as on the industry's best practices.
The training course contains mixed-approach activities, which include essay-type exercises based on an interesting and very practical case study, and multiple-choice quizzes which are based on real-life scenarios.

Keep an eye out for the availability of the training course.
For more information contact us at marketing@pecb.com.

Subscribe to our newsletter and be the first to know when the training course will be available!

Cloud Business Advantages and Eligibility Criteria

BY ROMAIN HENNION

Cloud or not cloud? That is the question!
The market of cloud computing is growing every day.
This article answers two basic questions in a pragmatic way:
1. Why cloud computing: The business advantages
2. How cloud computing: How to benchmark cloud solutions

Why Cloud Computing: The Business Advantages

To meet every business expectation, the technological choices of CIOs must contribute to the growth of the company, the user experience, and the reduction of production costs.

The message is clear: the movement towards cloud services and solutions is inevitable. It is every CIOs plan to migrate their applications and infrastructure to the cloud over the next four years. The five main areas in which cloud solutions are primarily deployed are:

- Messaging solutions
- Security management
- The web and instant messaging
- Virtual offices
- Incident or log management

But cloud computing actually affects all sectors: collaboration solutions, customer relationship management (CRM), financial and human resources management, access, analysis and delivery of data, office productivity, and supply chain management application.

So the real question is no longer “Why the cloud?” but “How to manage a cloud project that creates value to the business?”

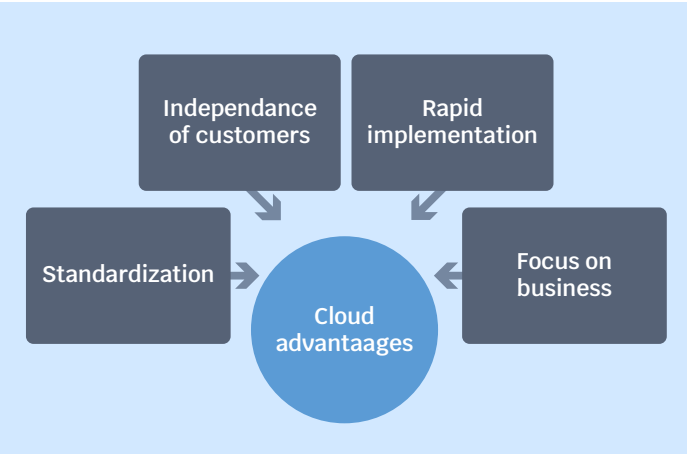
The cloud could provide solutions. Most companies own their hardware and software that they manage on their production sites (on-premise) in data centers or specialized IT facilities.

In this context, the expected value of cloud projects is very high. Gartner indicates that decision-makers expect from the cloud greater flexibility in the business, the capacity of IT to adapt to demand (whether upward or downward, what we call “Elasticity”), reduction in production costs, as well as a contribution to business continuity and the IT backup plan. Will the cloud be able to meet all these expectations?

Four Main Advantages for the Company

The main benefits of the cloud for organizations are as follows:

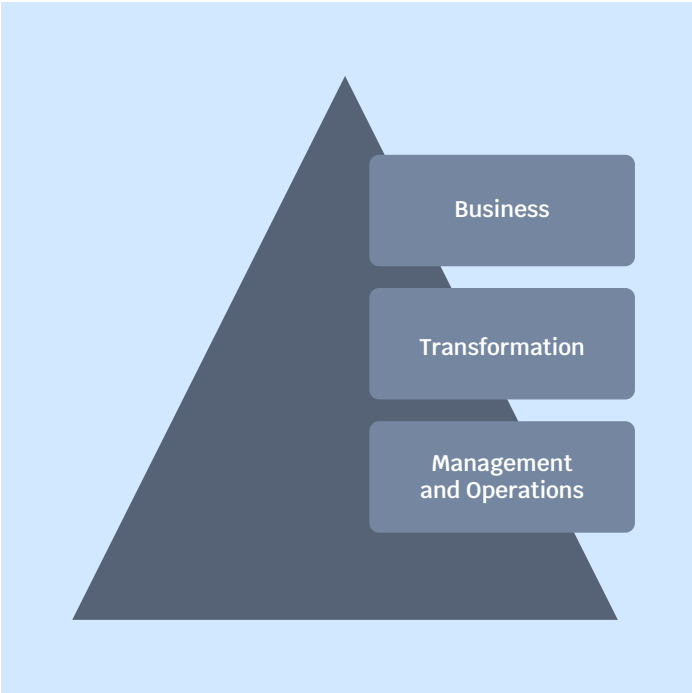
- **Standardization:** Cloud offers automated, self-service, and large-scale services, which contributes to the reduction of production costs.
- **Independence of customers from suppliers:** Customers are no longer locked into a contract in which they depend on their supplier, this time they only pay for what they consume. It is an extension of the traditional model of IT outsourcing. The cloud thus offers greater flexibility in outsourcing contracts. However, the lack of standardization prevents the comparison of different offers (each supplier puts forward its own system of metrics and indicators), and makes benchmarking all the more difficult,
- **Rapid implementation of services:** Since the solutions are already ready to use, as soon as the customer subscribes to an “off-the-shelf” service, without customization, they have almost immediate access to the solution.
- **Focus on business:** This is a controversial point, with its supporters and detractors. Would migrating IT services to cloud providers allow the company to focus on its core business?



Three Sources of Value Creation

To present all the advantages of a cloud approach, we will rely on the best practices of BPM (Business Process Management), which distinguishes the following three dimensions:

- **The business dimension:** The business is part of a pure value creation process for all stakeholders, especially customers. Each project must support the goals and objectives of the company: growth, improvement of performance (efficiency and effectiveness), search for innovation, customer satisfaction, etc. This approach also promotes rapid business adaptation and agility to meet and even create customer demands.
- **The transformation dimension:** It contributes to the principle of value creation through activities called processes. A process is a structured set of activities, with input-output transformation objectives, which is measured by monitoring and performance indicators. To define, manage, and perform these activities, roles are assigned. Transformation is a company's know-how, its "magic elixir." The more effective it is, the greater the value. This approach refers to leading authors of management and quality such as Deming, Juran, Shingo Crosby, and Peters, or to methods such as Lean and Six Sigma.
- **The operational dimension, or management:** This is the mobilization of people and resources. It is everyday work.



How Cloud Computing: A Benchmarking Approach

Once upon a time, two people talked to each other but did not understand each other: the business and the IT. The first one talks about market share, increase of revenue, number of new customers, reputation, and so on. The second talks about network bandwidth, processor speed, the quantity of memory available in gigabytes, software version number, or communication protocol. Two strangers who must move in the same direction without any common vocabulary.

In this context, it is important to define a series of indicators and performance criteria that are common to business and IT service providers. Once these parameters are defined, they can be applied to all projects. It will therefore be necessary to standardize these selection criteria, in order to avoid approaches that are isolated and disconnected from each other. Remember that each project must be part of the company's strategy. Therefore, each project should be judged in light of the business's strategy, with a broad vision covering the entire organization.

How to compare cloud and on-premise solution? Gartner has written an interesting report, "Economics of the Cloud: Business Value Assessments," and suggests a set of indicators. It is by no means exhaustive, but provides an excellent analytical grid that is easy to adapt depending on the context. To assess the value of a cloud computing solution, we highlight six criteria:

- Economic value
- Agility
- Creativity and innovation
- Simplicity
- Trust and risk
- Social impact

These criteria can then be ranked by order of significance and quantified according to their weight in decision-making:

- Economic aspects account for 25%
- Agility for 25%
- Creativity and innovation for 15%
- Simplicity for 10%
- Trust and risks for 20%
- The social impact for 5%

If we apply this evaluation model to a cloud computing solution compared to a traditional solution, the winner is... the cloud! However, everything obviously depends on the context and your needs.

Economics

Economically, cloud computing is the best choice. Indeed, it offers a payment-on-demand model, both for hardware and software aspects and for services. Most ERP vendors offer such a model. The rental of applications and services according to needs and the number of users is part of this process.

The other economic advantage of the cloud is that it optimizes the return on investment (ROI), since the initial investments in terms of hardware, software, infrastructure, premises, etc., are minimized. This finding is all the more true if the organization calls on an external service provider, who takes care of a large part of the investments, making it profitable by sharing the resources among numerous clients.

Agility

When it comes to agility, cloud computing creates more value for two reasons:

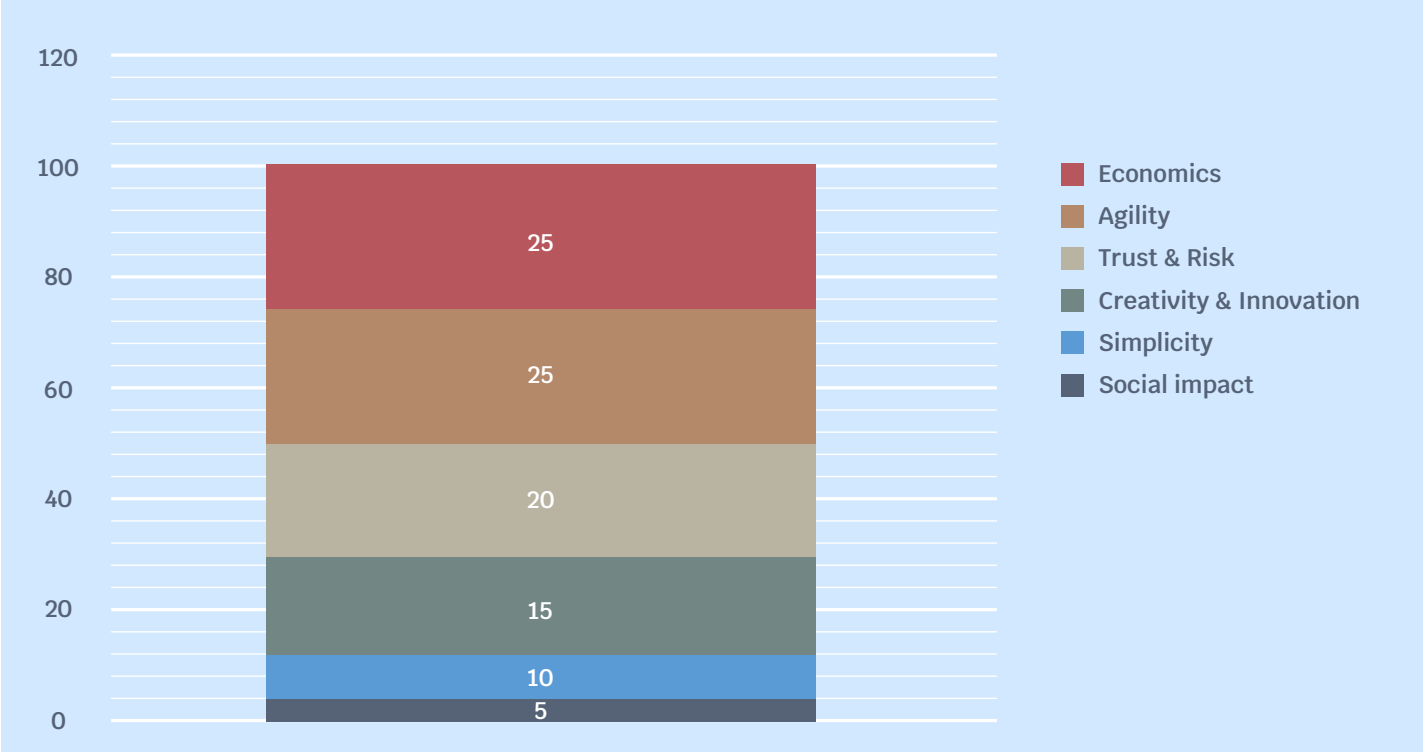
- The elasticity of solutions, which makes it possible in particular to adapt quickly to the increase in business demand
- Resource sharing, which provides access to more powerful solutions, without having to bear the full cost or complex technical management

Therefore, cloud computing solutions require less effort and are faster to deploy than on-premise solutions, which involve full production, including both hardware, software, databases, infrastructure...not to mention the increase in the skills of the players (training plans) and the resistance to change based on innovative and new business and operational models. The compromise could be to host a solution in-house in the form of private cloud computing. The company would thus benefit from complete control over its applications and data, while benefiting from the agility advantages and the development and scale-up possibilities of the cloud. This concept is defined by the term scalability.

Creativity and innovation

In terms of creativity and innovation, the cloud outweighs a solution hosted on premise because it allows companies to focus more on their business objectives. In addition, the cloud democratizes complex solutions.

On the other hand, an on-premise solution offers more extensive customization possibilities, and at a lower cost compared to a cloud computing solution. Currently, cloud solutions are “limited” to standard services. We will see later that it is, of course, possible to customize a solution, but if this basic cloud service remains very affordable and very attractive in terms of ROI, any additional customization module can considerably increase the bill, to such an extent that an on-premise solution remains more cost-effective.



Simplicity

Cloud computing providers emphasize rapid access to their services, without the hassle of hardware and software, infrastructure, let alone release and maintenance. Users and customers can thus concentrate on their businesses and free themselves from the technical constraints of IT. In addition, cloud computing enables small and medium-sized businesses to access advanced services, previously reserved for large accounts.

Risk management

According to a study conducted by Gartner, while a cloud computing solution has many advantages over an on-site solution in terms of economy, agility, creativity, innovation, and simplicity, this is not yet the case with regard to security, and risk management. Remember that risk management covers in particular:

- Reliability, confidentiality, integrity, and availability of applications and data
- Control exerted on the service provider and the possibilities of intervention
- Risks associated with the ownership and portability of applications and data
- The existence of best practices, standards, and certifications in safety management

On all these aspects, Gartner argues that an on-premises solution is more secure and reliable than a cloud computing solution. It is indeed based on a set of best practices and much more widespread security certifications (notably ISO/IEC 27001), and more significant experience feedback.

This point of view is not shared by all cloud computing players. Thus, some argue that, as cloud solutions currently have a bad reputation in terms of security management, suppliers are investing heavily in this area, even providing solutions whose level of security greatly exceeds that offered by the companies themselves.

Social impact

Finally, in terms of social impact, cloud computing would be a winner over a traditional on-premise solution. It would indeed contribute to reducing the impact on the environment, since the sharing of resources would proportionally reduce the consumption of electricity and water: less pollution, traffic jams, buildings and concrete, etc. We have not yet found a reliable study on this precise point and are therefore awaiting precise data. The debate remains open.

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Romain Hennion is the Director of Formind, a leading cybersecurity company in France. He has been a trainer for PECB for more than 10 years. He is a specialist of Cybersecurity, Risk, Cloud, and Digital Transformation. He is also a professor of Cybersecurity at Centrale Supélec and Sciences Po. Romain is the author of the book called “Cybersécurité”, published by Eyrolles.

Underneath The Cloud

With cloud computing revolutionizing the way that we socialize and work, ISO standards are providing much needed answers.

For many of us, the cloud is something like a virtual hard drive. A place in the ether to keep our data, pics and videos safe and secure. The cloud adds flexibility to our lives, since we can access it wherever we have a connection, and it also frees up space on our laptops and phones. But it does so much more than that. It not only underpins the video conferencing technology that has enabled millions to carry on working through a global health crisis, but it also powers online retail from fun fashion to vital medical supplies.

With flexible work and remote conferencing becoming new norms, and the search for a COVID-19 vaccine still underway, we're going to need to see a rapid expansion of reliable cloud services to keep life running smoothly. But what are the challenges here, and how can we ensure that our information is transferred safely and securely?

SC 38 is a group of global experts working hard to answer to these questions. They are a specialized committee within the ISO and IEC joint technical group dedicated to information technology, JTC 1, who are providing both technical underpinnings and much needed reassurance to everything that is cloud computing.

> **In a very real way, our global economy and daily lives now depend on online services and the COVID-19 pandemic has merely highlighted their essential role.**

Formed in 2010, just a few years after the cloud floated into public awareness, the subcommittee has had their work cut out to keep pace with the growth of this foundational technology. In a year where COVID19 changed the way that we work, meet, shop and exchange ideas and data, millions of new users flocked to the cloud. SC 38 Chair Steve Holbrook explains the challenges that they're focussing on in 2020, and beyond.

"In a very real way, our global economy and daily lives now depend on these online services and the COVID-19 pandemic has merely highlighted their essential role," Steve explains, pointing to SC 38's strategic decision to broaden interactions and build stronger links with governments, customers and developers. "Improving our connections with these key audiences isn't in response to the global pandemic, but the situation has definitely accelerated use of online services and the need for ISO standards in this area."

SC 38 is addressing that through seven new standards that will join more than 20 already published. They have also identified fellow JTC 1 subcommittees with whom they can work on interconnected topics. One of the challenges addressed by International Standards are people's concerns around privacy and security of transfer. Steve tells me that there is an ongoing need to strengthen public confidence in the area, pointing out that the integrity of personal and company information is a top priority for SC 38; "how data flows between the cloud and different devices relies on bringing together elements from a variety of providers. The role of ISO standards is to make it clear who is responsible for what."

ISO/IEC JTC 1/SC 38 is pressing ahead with an ambitious standards programme, but is the approach dynamic enough to match the speed of change? Is it flexible enough to create standards that can help a global economy as it comes to terms with COVID-19 and reconfigures supply chains and services? "Through collaboration on technologies that intersect with cloud computing, areas like the Internet of Things, artificial intelligence and security and privacy, and through working together with the committees that develop standards in those areas, we're eliminating overlap and creating synergies that can accelerate entire industries," Steve confirms.

Bridging the Gap between Work & Well-Being

BY ENDRITA MUHAXHERI

The long-term effectiveness and success of an organization largely depends on employee outcomes. Therefore, moving toward a culture that proactively manages and promotes mental health and well-being in the workplace is crucial because healthy and productive employees are more likely to deliver better outcomes.

While many organizations often focus on increasing awareness about the importance of physical health, now more than ever, it has become important to focus their attention on recognizing the importance of employee well-being too. Making the workplace a decent place to work requires better leadership and communication, and a special focus on employee development.

According to the World Health Organization (WHO), more than 264 million people suffer from depression globally. The estimated cost of anxiety and depression is $1 trillion per year. It is also estimated that for every dollar spent in supporting mental health, there is a return of $5 on average due to increased productivity.

It is a well-known fact that we spend most of our lives at work; more specifically, 90,000 hours over a lifetime. This means that our job can make a huge impact on the quality of our life. So, how can organizations support their employees to maintain their well-being? One effective solution that plays a powerful role is workplace counseling or therapy. This will offer employees the possibility to discuss anything that they are struggling with and help them cope with everyday challenges. It is about giving an empathic and nonjudgmental solution. It can be done both in-person, which is a more preferable mean (and will produce better results), as well as through phone, which is a more immediate option. Considering technological developments, the need to offer different means of counseling is increasing. Some counselors are also offering the online option, communication through email, and instant messaging.

Each of us faces challenges, be that personal or professional. Too often, employees feel discouraged from speaking about their well-being. Creating a culture of a workplace which is open and relaxed, decreases the possibility of employees to feel stressed and anxious. Therapy stress-proofs employees. It teaches them the skills that will help them to deal with the changes they are experiencing, as well as recover from depressive times.

This is not only helpful for employees but for employers as well, because it will improve the performance of employees, decrease their costs related to absenteeism and turnover, and builds trust and loyalty. Additionally, the organization establishes a reputation that they take care of their employees' well-being.

The success of such initiative is heavily impacted by the principle of confidentiality. Employees need to feel that their communication with the therapist will not be disclosed. In addition, this should be voluntary and not be made a requirement for the employees.

It is also of utmost importance that HR managers as well as the top management receive introductory counseling training, to help them better engage with employees. However, that does not mean that this can substitute the importance of having a professional therapist.

We know that no one is immune to everyday stressors. Stress and anxiety is higher especially when our lives are disrupted by unexpected circumstances, as is the case with the current pandemic. This has made many employees adapt to the new life of "work-from-home" and deal with the stress of isolation. This added to the challenge of setting new boundaries and dealing with new distractions. During such times, leaders should make employees feel supported and connected and check how the staff is managing the situation and if they need support on that.

Maintaining mental health, will not only help maintain physical health but emotional health too. Integrating counseling services in order to get practical advice and solutions, especially during such events, will help employees manage these situations in order to maintain a motivated and capable workforce.

Despite significant initiatives that are made to date, it will still take a while before the mental health and well-being of employees takes an evident role. Organizations with greater competition will need to address these issues in order to attract the best talent. Investing in employee well-being is a win situation for all, including employers, employees, and the economy.

Building a Cloud-Native Infrastructure for 5G

BY SAAD SHEIKH

Cloud computing use in the Telecom industry has been increasingly adopted during the last decade. It has changed many shapes and architectures since the first phase of NFV that started back in 2012. In today's data hungry world there is an increasing demand to move cloud architectures from central clouds to loosely coupled distributed clouds; both to make sense from a cost perspective by slashing transport cost to anchor all user traffic back to central data centers, but also certainly from the security perspective where major customers prefer to keep data on premises.

Similarly, with the Hyperscaler's and public cloud providers targeting the Telco industry, it is evident that the future cloud will be fully distributed and multi-cloud constituted by many on premise and public cloud offerings. 5G by design is based on cloud concepts like:

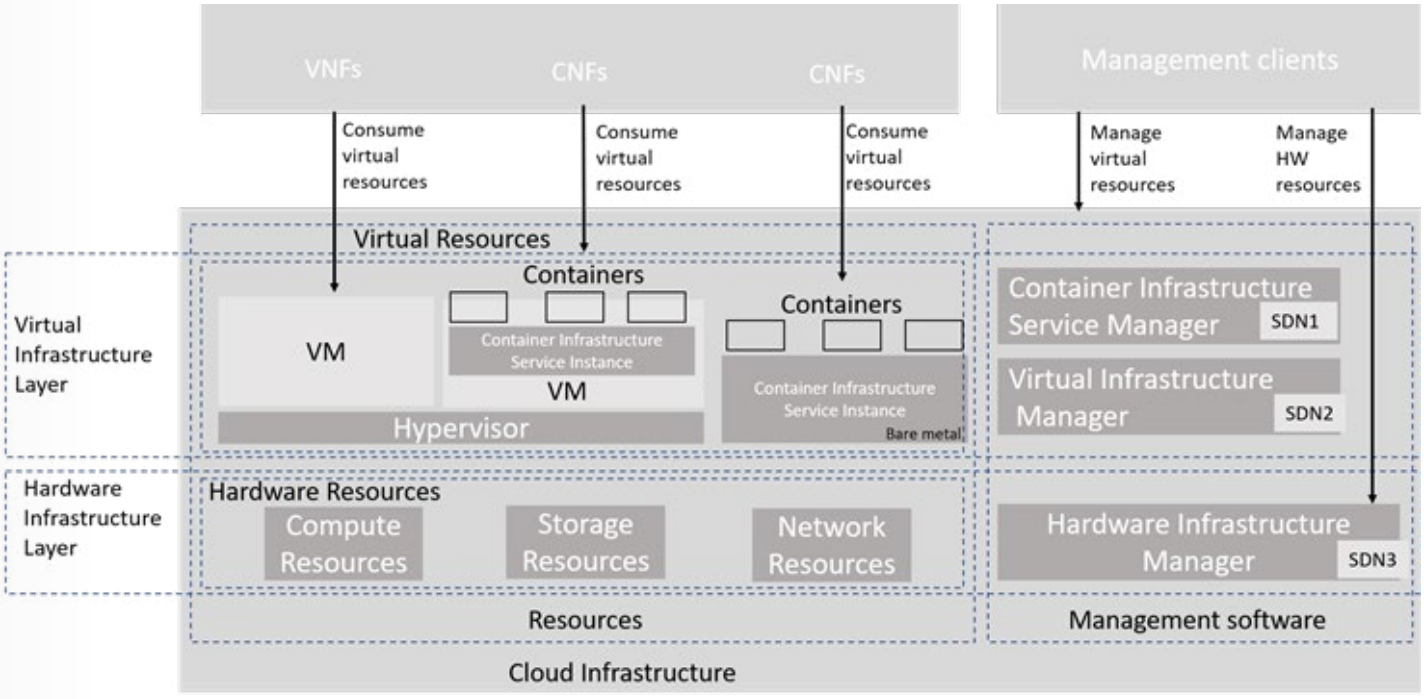
- Service-based architectures
- Micro services
- Scalar
- Automated

Hence, it is evident that many operators are embarking on a journey to build open and scalable 5G clouds that are capable to handle the future business requirements from both Telco and industry verticals. The purpose of this article is to highlight the key characteristics of such clouds and how we must collaborate with a rich ecosystem to make 5G a success to achieve industry 4.0 targets.

Cloud native does not refer to a particular technology but a set of principles that will ensure future applications are fully de-coupled from infrastructure, on an atomic level it can be a VM or container or may be futuristic serverless and unikernels. As of today, the only community accepted cloud-native standard for 5G and cloud is an OCI-compliant infrastructure. In general, cloud native for Telco means a Telecom application as per 3GPP, IETF, and related standards that meets the criteria of cloud-native principles as shared in this article, supports the vision of immutable infrastructure, declarative, and native DevSecOps for the whole infrastructure.

Cloud native is the industry defacto for developing and delivering applications in the cloud, and since 5G by its design is service-based and micro-service enabled, the basic principle for 5G infrastructure is cloud native which will support scalability, portability, openness, and most importantly, flexibility on a wide variety of applications.

According to the latest industry studies, the data in 5G era will quadruple every year; this will make cloud native a necessity for the provision of automated infrastructures that will be fully automated, support common SDKs, and above all, will enable CI/CD across the full application life cycle.



Scalability to deploy services in many PoPs is the other key requirement for 5G along with the possibility to build or tear the service on the fly. As 5G deployments will scale, so will cloud instances. That is why it is a necessity that future cloud infrastructure can be scaled and managed automatically.

Application portability is the other key characteristic of the 5G cloud. As 5G use cases will become mature, there is an increasing requirement to deploy different applications in different clouds, and to connect them is a loosely based mesh. In addition, as network capacities and usage will increase, the applications must be capable to move across the different clouds.

What Cloud Means for Telco 5G

Telco operators, through their mission-critical infrastructure, hold a seminal place in the post-COVID-19 digital economy. Telecom network use impacts the economy, society, commerce, and law order directly. This is why Telecom networks are designed with higher availability, reliability, and performance.

The biggest challenge for Cloud Native Infrastructure for Telco lies in:

- Granularity of Telco app decomposition
- Networking
- Performance acceleration
- O&M and operational frameworks

Due to the reason that Telco 5G applications need to fulfill special SLA-based performance and functions which somehow are not possible in the containerized and Kubernetes-based cloud platforms of today, we must define a Telco definition of cloud. Similarly, how we will connect workloads E-W is very important. The questions become more prevalent as we move towards the edge.

The downside is that any deviation from standard cloud native means we cannot achieve the promised Scaling, performance and distribution, of the very purpose for which we have built these platforms.

Any tweaks on the cloud principles means we cannot provide and manage a truly automated Cloud Infrastructure following DevSecOps which is vital to deliver continuous updates and new software codes in the 5G infrastructure. Lacking such functions means we cannot meet the fast pace of innovation requirements which are necessary for the 5G new use cases especially for the vertical markets.

The last and most important factor is leveraging advances from hyper scalers to achieve cloud and 5G deployments. Today, we already see a movement in the market where carrier grade clouds from famous distros like IBM can be deployed on top of public clouds but here the top question is whether “abstraction will impact performance” — the one top reason NFV first wave was not such disruptive because we defined so many models and used a model to define another model which obviously added to complexity and deployment issues. Cloud native for 5G Telco needs to address and harmonize this as well.

Applications for 5G

The application economy is vital for the success of 5G and edge. However, based on T1 operators' deployments of open 5G platforms, only deploying an open infrastructure is not enough as adherence to cloud by application vendors will vary, and to truly take advantage of cloud, it is vital to define principles for an infrastructure lead delivery by devising frameworks and tools to test and benchmark the 5G applications classification as Gold, Bronze, Silver with common direction to achieve fully gold standard applications in the 5G era. Although cloud native by principle supports the vision to achieve common, shared, and automated infrastructure, it is easier said than done in real practice, as achieving a Telco grade conformance for Telco services is complex and it requires rigorous validation and testing. Based on real open 5G cloud deployments and corresponding CNF benchmarking, there are still certain gaps in standards that need both standardization and testing.

- Application resources over committing
- Application networking dependence that slows scaling
- Use of SDN in 5G cloud
- Lack of Open Telemetry which makes customized EMS mandatory
- Hybrid management of VNF and CNFs

Luckily, there are a number of industry initiatives like CNCF Conformance, CNTT RI2, NFV NOC, OPNFV which fundamentally address these very issues, the results of which we have already seen. It is vital that 5G cloud infrastructures are capable to support east to use SDKs and tools that vendors and developers can use flexibly to offer and deploy different applications in the 5G era.

Orchestration and Automation

Orchestration refers to the way the end user models, provides, and manages the applications. The very nature of 5G, which necessitates a distributed cloud and thousands of clusters, requires handling all infrastructure in a software fashion that is friendly to use like drag and drop from an intent point of view.

From Telco's perspective, open and highly performant orchestration is the backbone for the 5G cloud infrastructure. Manual deployments of 5G services and their connection by using legacy approaches will be complex, error prone, and not resource-efficient. Decoupling of application and infrastructure is a vision that orchestration solutions make it possible by using declarative API like YAML, TOSCA, Terraform, as it makes it possible to make infrastructure irrelevant for the application and hence make infrastructure totally immutable that is provisioned using standard artefacts and templates. Declarative means an end user only defined "What" without specifying details of "How." In fact, 5G cloud infrastructure is open and flexible in terms of "How" as it can use an extended set of tools to deploy it. It is by virtue of these characteristics that Telco's target evolves from a manual to a Level4 autonomous network of the future.

As highlighted above, the Telco for 5G and Edge applications will require some enhancements and that will require new frameworks. Today, CNI plugins and CRD (Customer Resource Definitions) provided by different vendors for their offering, made it possible to ensure all the Telco-required enhancements can be deployed in an open cloud through open frameworks of Helm and concord.

In addition, orchestration will not only support vision towards software-defined Telco but also automated management of all the 5G infrastructure all the way from physical servers/storage to the application itself.

> **Telco CNF for 5G means a Network Function which delivers a Telecom service and is constructed as per Cloud Native Principles.**

E2E Network Slicing

Network slicing is the segregation of one physical network into a number of logical networks, each serving varying use cases and business tenant that meet the desired SLA for different tenants.

To achieve this goal, Network Slicing needs to be designed from an E2E perspective, spanning over different technical domains (e.g., device, access network, core network, transport network, and network management system).

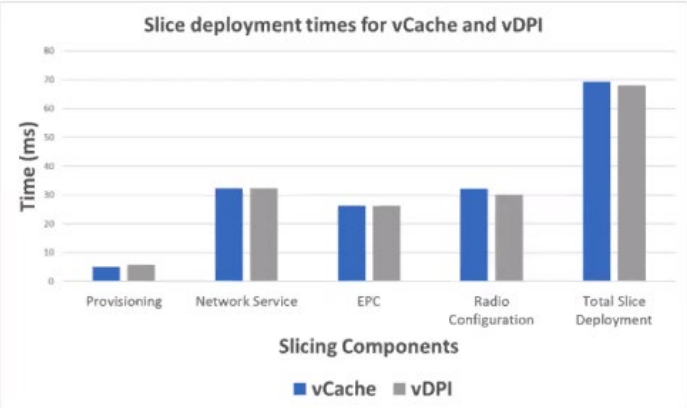
> **Orchestration and service constructs are vital for container-based multi cluster CNFs.**

However, today there is still a number of gaps which need more cross-community collaboration. For example, the 3GPP SA5 resource model does include modeling of the

TN end-points. It does however not include modeling for the 5G transport network itself, nor the RAN. Furthermore, the indication of whether a slice may share resources or not is indicated as part of the ServiceProfile. This indicates cooperation with other bodies, e.g., ETSI, as mentioned above, is needed. However, the problem is that many other bodies define management function and interfaces regarding what and how they could allocate resources. Yet, there is a lack of end-to-end view since transport and NFVI is not part of 3GPP. It is expected to specify a management framework for SLA compliance and that is ongoing in SA5 with regards to RAN and Core. In addition, if resources are handled by vertical industry customers directly, further discussion will be needed. Based on our industry efforts, we are bringing cohesion among the following standardization organization for commercialization of 5G slicing:

- 3GPP RAN
- 3GPP SA
- Broadband Forum – 5G Transport architecture
- IEEE 802 – Switched Ethernet networking and TSN
- ITU-T SG15 (optical networking and synchronization)
- MEF – Transport Services for Mobile Networks
- IETF – IP, MPLS SegRtg, EVPN, DetNet
- TMForum
- OSM and ONAP
- ETSI NFV

The integration of automation and Telco DevOps for automating the end-to-end slices means E2E all the services can be provisioned in an agile manner from current 1Week to 1hours which is necessary to pace up with the innovation required in 5G era. One of the typical issues with Slicing is that as tenants we need single Pane not just for services (GST or NEST) but also for the ways how to connect them. Today, frameworks like GANSO (GST and Network Slice Operator) are supporting the industry to standardize on it.



AI/ML and Closed Loop for 5G Cloud Infrastructures

Recently, AI for Telecom has gained industry interests. This was primarily driven by both wide deployments of 5G platforms which generates 4X more data compared to early generations alongside other global events like COVID-19 which necessitates a close loop operation avoiding the human. This initiative requires not only orchestration but, in fact, intelligent policy generation based on real-time use and customer behaviors, and will enable an SLA-based offering for each 5G business tenant.

The use of ML/AI is still in its initial phases of standardization, to ensure the realization of successful autonomous networks. So, the ML/AI should address the following domains:

- Analysis
- Intelligence
- Automation and policy

There is not just the technical side of ML/AI use in Telecom but the business side too. As we are well aware that many of NFV/SDN products in the market today that come with native ML/AI functionality which are enabled not only at intent-driven software level but also in chipset level, (e.g., Intel Atom), Intel 3rd gen Xeon processors with built in bfloat16 support that reduces data required to build training models.

However, Telcos in 5G are still trying to find sweet spots that will make business case of 5G positive. This is a fact that to build the same coverage as 4G we need to pump 4 times more sites which means the use of ML/AI for automation and use cases to optimize infrastructure is mandatory. In this context, we also need to evaluate new business models for 5G to see "If 5G data can be monetized then service can be free. From infra view to managed services view to the vertical industry offering view."

In this context, in 2021-2022 era, I think Telco's need to evaluate and commercialize the following key cases for 5G ML/AI to speed up the deployment:

1. Life cycle management of infrastructure
2. Automating application and infra dependency
3. Automatic output rule to optimize NW specially RAN and transport
4. Advanced AI e.g., build new network topology
5. Workload placement, SLA analysis in case of PoP migration

The Telco operators should take an active interest in the following industry efforts to successfully use ML/AI in 5G cloud infrastructure:

1. ITU-T focus group on ML for future NW (FM ML5G)
2. TSI enhanced network intelligence (ENI)
3. O-RAN alliance for RIC (RAN intelligent controller)

Security Cloud Infrastructures

Cloud infrastructure by its nature becomes more secure than black boxes over time. However, until their maturity, there is an increasing risk of security vulnerabilities primarily due to increased attack surface and ease to access and use of APIs once a security hole is concealed by hackers. It is clear that the existing security solutions are not tailored to handle such architectures. The future security solutions in the cloud must consider:

- Real-time monitoring
- API discovery
- Policy management
- Distributed security
- Software-based security frameworks

The service mesh is the futuristic technology that is required to protect the future 5G infrastructures. Delivering security as a service is a definite requirement for Telcos. It is very important to deliver security enhancement in a software manner to cover the following:

- Advanced cluster management that encompasses private, public, and hybrid cloud
- Security of networks
- End-point protection IPSec and DTLS
- Open-data platforms and mTLS for scalability
- Platform attention for disaggregated cloud

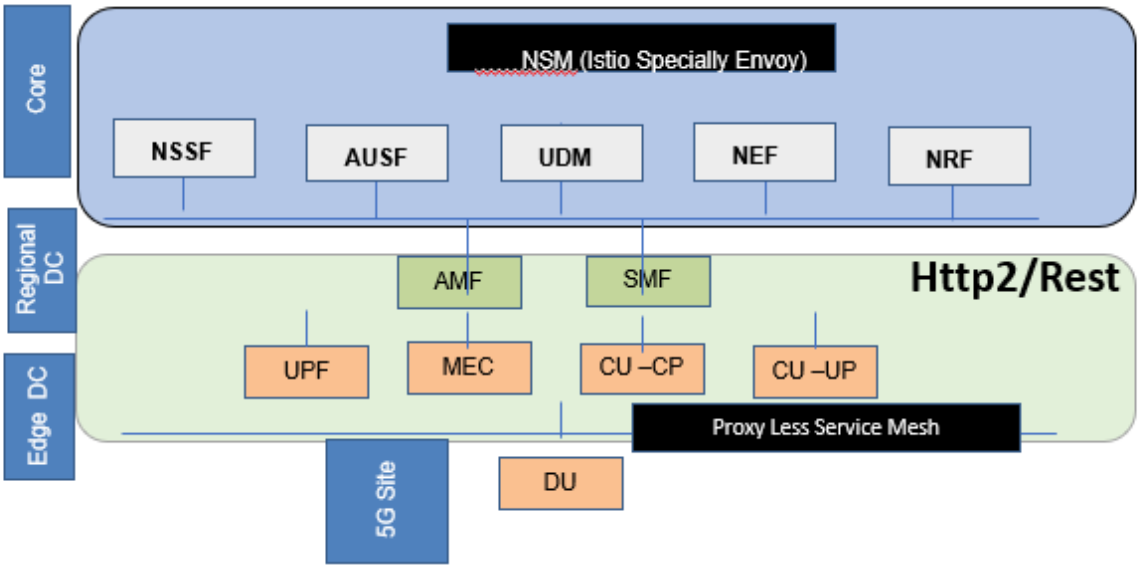
Cloud security for 5G is more complex than VM-based deployments and need software-based approaches.

Today, secure networking using NSM is a reality in Core. 5G CNF's like NEF, NRF, AUSF. However, due to high performance and resilience requirement the nodes like UPF, DU, CU, AMF, SMF is not hardened today however the Kubernetes's 1.20 is adding a number of enhancements around like secondary networking, monitoring, CNI extensive models, and storage acceleration which means we are converging faster towards open and standard deployment of 5G networks.

Co-existence of 5G infrastructure with VNFs and PNFs is vital for successful network evolution.

Evolution and Migration

Cloud native infrastructures and functions, also known as CNFs, are increasingly gaining momentum. However, with the huge legacy investments in the form of Physical functions (PNFs) and Virtual functions (VNFs), it is not possible to build and manage 5G services using CNFs alone. There is a need to integrate and manage hybrid infrastructures to ensure seamless connectivity. In a Telco journey towards cloud native infrastructures, the most impacting domain for evolution is the operational model as it is both inefficient and costly to manage different forms of infrastructure using different frameworks and tools. This is why both cloud and orchestration for the future considered support for both VNF and PNFs to support common operational models. Defining clear interfaces



supported to locked specifications is the key to introduce new greenfield cloud-native infrastructures together with existing brown field deployments. Connecting these different environments and automating them, E2E is the only way this evolution can be successful.

As 5G standalone architectures will become mature and services will be migrated, less and less dependence on early generations of infrastructure will be required. Only then a fully cloud native 5G infrastructure will be realized. Depending on the maturity of market-available solutions and wide adoption of technology, there is a varying requirement to keep interworking with legacy infrastructure.

Hyperscaler and 5G Cloud

Recent acquisition of major Telco 5G companies like Affirmed and Meta Switch, and big T1 operators deal with partners like AWS, Azure, and Google are continuously changing the roles and dynamics of the 5G cloud infrastructure market. However, it is clear that in the future there will be an increasing role of Hyperscaler primarily due to its rich experience in the enterprise market and its capability of global scale and "developer experience."

Although the exact delivery model of 5G cloud infrastructure especially with Public Edge is not clear with hyperscales, but based on our rich involvement and understanding of their solutions I can suggest that the best direction for Telcos is to phase out the journey based on use cases to introduce and integrate public clouds in a controlled manner in the below sequence:

1. Edge deployments together with 5G primarily for small cells and enterprise
2. 5G Core Networks deployments for campus and private enterprise networks
3. Build DR sites for 5G SA Core increasing Telco services resiliency at optimized cost and in an agile manner
4. Migrate OSS and VAS applications something that is most mature to support cloud native in a standard fashion
5. vEPC and vIMS deployments

Conclusion

Traditionally, Telco has relied on custom-built solutions which are closely coupled, oversized, and operated in a manual manner. Similarly, all of those appliances have to be managed by some arcane and trained resources, all this making the Telco business case more challenging as industry converging towards digital and Industry 4.0 era. Innovation is not the fancy word but a necessity for the next era Telecom Networks that is supported by a wider community of developers and testers. According to GSMA, there are more than 107 Live 5G Deployments as of now, by 2025 it is expected that there will be more than 1.8B 5G connections offered by 410+ Telco's in 123+ markets. In addition, there will be 4X growth every year, all this preludes for Open and Cloud native infrastructure for 5G. In fact, it is the only way to ensure wide scale deployments of 5G that achieve both technology and business targets for both Telco and vertical use cases whose applications will come from diverge ecosystem. In addition, it is possible to adopt standard cloud-operational models if we deploy standard clouds and not purpose-built infrastructures. Today, both form DevSecOps where tools like Argo, Tekton, Flagger has been defining the way, also the open telemetry has made it possible to successfully use ML/AI in the cloud, the Open Telemetry frameworks like Prometheus, Jaeger, etc. have enabled a policy and data-based decision assuring SLA to business tenants something Telco's have been struggling the past NFV and virtualization era.

From Telco's business point, building a common infrastructure which is neutral to applications is vital if we had to avoid a situation of telling stories to future generations on "How open became closed." We as an industry should strive to make such a cloud infrastructure that can run on any physical infrastructure like X-86, ARM, support optimizations needed for Telco applications like DPDK, SR-IOV, FD.IO, developer toolkits like OpenNESS and other EPA enhancements where the workloads are hosted in different clouds like Public, Private, Hybrid, and support new and unique use cases for future 5G, Open RAN, and Edge solutions.

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About the Author

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Saad is currently working as the Chief Architect at Saudi Telecom Company (STC) where he leads planning and architecture design teams of company's future programmable networks using Cloud, NFV, SDN, 5G, Edge, and Open-RAN. In addition, he works as the Chief Architect for Swedtel Arabia where together with 10+ niche ecosystem partners he leads system integration across the Middle East for Cloud, 5G, Enterprise, Smart city, Edge, Automation, and AI. Saad is a dedicated technologist and prolific evangelist with demonstrated commitment to continuous learning and skill advancement. He is the author and creator of numerous articles, whitepapers, blogs, and informative videos. During his free time, he shares experiences to the community through his blog channel

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Bill 64 Mapping of the Controls of ISO/IEC 27701:2019

BY PECB, PECB MS, AND FASKEN

1. Introduction

Almost every enterprise processes personally identifiable information (PII) nowadays. As the amount and types of PII increase, so does the number of situations where enterprises need cooperation with others regarding the processing of PII. Protecting the privacy when processing PII is a societal need. Therefore, this has been the prevailing topic of legislators and regulators worldwide.

As a response to this need, the International Organization for Standardization (ISO), an international organization of worldwide recognition and the oldest and most experienced in the field of industry standardizations, in cooperation with the International Electrotechnical Commission (IEC), published ISO/IEC 27701:2019, Security techniques — Extension to ISO/IEC 27001 and ISO/IEC 27002 for privacy information management — Requirements and guidelines.

The standard specifies requirements and provides guidance for establishing, maintaining, and continually improving a privacy information management system (PIMS) as an extension to the information security management system (ISMS) based on the requirements of ISO/IEC 27001 and the guidance of ISO/IEC 27002. The standard can be used by both PII controllers and PII processors and is applicable to any enterprise regardless of its size and type.

In addition, the standard includes mapping to the privacy framework and principles defined in ISO/IEC 29100, ISO/IEC 27018 (protection of PII in public clouds acting as PII processors), ISO/IEC 29151 (protection of PII), and the EU's General Data Protection Regulation (GDPR).

In order to expand the mapping of ISO/IEC 27701 to another privacy law, this time from Quebec, Canada, a similar mapping exercise was decided to be done to compare the ISO/IEC 27701 to Bill 64, an Act to modernize legislative provisions as regards the protection of personal information, introduced by the government of Quebec, on June 12, 2020. Bill 64 proposes to modernize the existing framework applicable to the protection of personal information by amending various public and private sector Quebec laws. The Act respecting the protection of personal information in the private sector (the Act), which regulates Quebec's private sector privacy law, will be significantly impacted by Bill 64. Special attention was put into Bill 64 for two main reasons:

- First, the Act, adopted in 1993, was the first private sector privacy law in Canada. The federal Personal Information Protection and Electronic Documents Act (PIPEDA), the Alberta Personal Information Protection Act (Alberta PIPA), and the British Columbia Personal Information Protection Act (BC PIPA) came about 10 years later.
- Second, with Bill 64, Quebec is taking the lead in Canada on reforming privacy legislation to follow the new trend of stronger privacy laws, such as the EU's GDPR, in terms of respecting both individual rights and business obligations.

In many ways, this proposed reform brings Quebec's privacy laws in line with other privacy laws, such as GDPR, and with the anticipated changes as part of the PIPEDA modernization.

This paper compares ISO/IEC 27701 to Bill 64. PII, as used in ISO/IEC 27701, is used as a synonym for personal information in Bill 64.

2. Executive Summary: Main Similarities and Differences

Some of the main similarities between ISO/IEC 27701 and Bill 64 are outlined in the following:

- ISO/IEC 27701 refers to privacy impact assessments. In Bill 64, these assessments are referred to as assessments of privacy-related factors.
- In ISO/IEC 27701, requirements for transferring PII between jurisdictions are defined. Similarly in Bill 64, but as requirements for communicating PII outside Quebec and restrictions to transfer PII to jurisdictions which do not offer an equivalent level of protection for the PII as Quebec.
- In both Bill 64 and ISO/IEC 27701:
  - Specific purposes for which the PII will be processed must be identified.
  - Consent to the collection, communication, or use of PII must be freely and explicitly given for specific purposes.
  - Every person carrying on an enterprise must provide a copy of the PII they hold on another person (referred as PII principal in ISO/IEC 27701), if that person requests it.
  - Any person carrying on an enterprise who uses PII to render a decision based exclusively on automated processing must inform the person whose information is concerned that their information will be used for automated decision-making.
  - The collection of PII should be limited to the minimum that is necessary.
  - PII must be up to date and accurate.
  - PII minimization is favored.
  - An enterprise must destroy or anonymize PII once the purposes for which that information was collected or used are achieved.
  - The right to data portability requires transmitting PII to the PII principals in a computerized, written, and intelligible transcript.
  - Requirements for contracting (referred as subcontracting in ISO/IEC 27701) are defined.

Some of the main differences between ISO/IEC 27701 and Bill 64 are outlined as in the following:

- Under Bill 64, the only legal basis for processing of PII is consent of the concerned individuals, subject to certain specific exceptions, whereas ISO/IEC 27701 requires to determine, document, and comply with the relevant lawful basis for the processing of PII for the identified purposes.
- Under Bill 64, PII that has been used to render a decision should be kept for at least one year following the decision, whereas in ISO/IEC 27701, PII should not be retained for longer than is necessary for the purposes for which the PII is processed.

- Under Bill 64, there is no legal obligation to maintain a record of processing, but a compliance system must be documented and published, whereas in ISO/IEC 27701, the necessary records in support of demonstrating compliance with its obligations (as specified in the applicable contract) for the processing of PII carried out on behalf of a customer, should be determined and maintained.
- According to the requirements of ISO/IEC 27701, the disclosure of subcontractors used to process PII is required, whereas, under Bill 64, the enterprise is accountable for each subcontractor and performance of an assessment of the privacy-related factors prior for authorizing an international disclosure is required.
- According to the requirements of ISO/IEC 27701, the customer is required to be informed of changes that the subcontractor used to process PII, whereas in Bill 64 this is not a requirement.
- In contrast to ISO/IEC 27701, Bill 64 does not:
  - Recognize the notions of joint controller, controllers, and processors
  - Incorporate specific requirements regarding temporary files
  - Specifically set out policies for the method of the disposal of PII
  - Have a functional equivalent for records of transfer of PII
  - Specifically address customer agreements and obligations
  - Specifically address infringing instruction

3. Preliminary Legal Notes

A preliminary mapping of the controls of ISO/IEC 27701 against the Act, as it would be amended following the passing of Bill 64, can be viewed here. The mapping between ISO/IEC 27701:2019 and Bill 64 shows how compliance to the controls of ISO/IEC 27701 can be relevant to fulfill obligations of Bill 64. However, it is purely indicative and as per this document, it is the enterprise's responsibility to assess their legal obligations and decide how to comply with them.

The Act applies to the personal information collected, held, used, and communicated to third persons while carrying on an enterprise (as defined under 1525 of the Civil Code of Quebec). It also applies to the personal information held by a professional order and, if Bill 64 is adopted, to the personal information of electors held by an authorized entity under the Election Act.

The Act applies to the collection, use, and disclosure of PII which occurs exclusively in the province of Quebec, as inter-provincial collection, use, and disclosure are subject to the federal legislation. The Act, in contrast, does not apply to federal undertakings, works, and businesses which are subject to the federal legislation. The same data flow may have some actions that fall under the federal law and others that fall under the Act.

Art. 2 of the Act defines personal information, referred as PII in this document, as "any information which relates to a natural person and allows that person to be identified." As per Art. 93(2) of Bill 64, the notion of personal information excludes "personal information concerning the performance of duties within an enterprise by the person concerned, such as the person's name, title, and duties, as well as the address, email address, and telephone number of the person's place of work." This refers to business contact information, not employees' PII processing.

Bill 64 was introduced on June 12, 2020, during the 1st session of the 42nd Legislature and has been adopted in principle on October 20, 2020. However, it is currently, as of October 2020, still subject to additional modifications, which may impact the mapping against ISO/IEC 27701. As such, the table provided here will be updated accordingly, if changes are made. The last date of modification, which is indicated below, is the date at which this table is accurate.

To learn more about Bill 64 and have free access to many articles, guides, and other resources covering and summarizing amendments proposed through Bill 64, please visit Fasken's Resource Center on Bill 64.

To use this mapping effectively, it is important to note that the use of expressions such as "information security" under ISO/IEC 27001 should include "privacy" and "information security risk assessments" should include privacy-related risk assessments.

Last date of modification: October 25, 2020.

FASKEN

Company Profile

Fasken is a leading international law firm with over 750 lawyers and 10 offices on 4 continents. We offer a full range of legal advice on privacy and cybersecurity issues and have been recognized as the "Law Firm of the Year in Privacy and Data Security Law" by the Best Lawyers Guide 2021. We assist businesses of all sizes in implementing privacy management systems in accordance with the requirements of ISO/IEC 27701:2019 through FaskenEdge, a unique technology for compliance, risk, and governance management. Our data governance team is certified against ISO/IEC 27701:2019 Lead Implementer and Certified Data Protection Officer. For more information, please visit our website.

PECB INSIGHTS VIRTUAL CONFERENCE 2020

Moments that build relationships and trust

The PECB Insights Virtual Conference 2020 has wrapped a successful first run. This has been the first virtual Insights Conference that PECB has hosted and, with over 2000 registrants, it was a great success.

For four days straight, attendees tuned in to two sessions a day, one in French and one in English. The panels covered different topics that were related to the theme of Digital Transformation, Security, and Privacy. The stellar selection of panelists, all of whom are professionals from different areas of expertise, shared their views and discussed the topics with one another, therefore providing insightful information to all of the attendees present. If you have missed any of the conference sessions, stay tuned as they will be made available to view for free on our PECB YouTube channel and Conference website.

On November 20, we closed our conference week with a special Live Stream on our Facebook page where we announced the winners of the Trainer and Reseller of the Year awards. You can watch the Live Stream by clicking the video below.

We hope you have enjoyed the PECB Insights Virtual Conference 2020, and we hope you will participate in our upcoming virtual conference on Anti-Bribery on May 17, 2021. The registration for the Anti-Bribery Conference will open soon.

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CMMC, ISO/IEC 27701, and ISO/IEC 27001 — Best Practices and Differences

January 20, 2021 at 3:00 PM CET

Presenters:

Peter Geelen
Director and Managing Consultant
at CyberMinute & Owner of Quest for Security

Erwin AM Geirnaert
Co-founder & Chief Hacking Officer
at Shift Left Security BV

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PECB WEBINARS

You and PECB: One Plus One Equals Three?

BY RINSKE GEERLINGS

Relationships are critical to success in life. Being able to cooperate with others and truly understand what is important to them, enables you to have fruitful relationships — both in one's personal life, as well as in the professional world.

Since first discovering PECB in 2012, I have noticed their core values being well aligned with those of me and my firm, Business As Usual. So I thought the time has come to put PECB in the spotlight. Where my comments may sound a little flattering, I can assure you I was not bribed for Belgian chocolate to write it.

Innovate…or stagnate

Firstly, PECB seems to always be re-inventing itself. Its management generally encourages fresh ideas from its partners and clients. While it can be a bit of a challenge to ride the PECB waves of change as a PECB partner, it would be impossible to enable inventions, future growth, and diversification if we all took the easy way out and continued our business 'as usual.'

It needs to be noted that the above does not make PECB's life particularly easy either, as it requires substantial time and effort to consider new suggestions from partners and customers alike, and jeopardize the status quo. True brainstorming techniques about improvements are recommended to be conducted without initial judgement of the validity/feasibility of the suggestions. PECB understands this concept well. As opposed to many other professional boards that I have personally dealt with in my career, PECB truly commits to constant renewal. "Standing still is going backward" seems to be their motto.

Reaching out and providing support

In its day-to-day business, PECB reaches out naturally to its partners and customers. While this may not sound like a big deal, in fact *it is* when one considers that PECB's partners and customers literally come from all corners of the world, and that each of them has its unique perspectives, requirements, and limitations, as well as languages!

It can be as simple as an exam candidate based in a remote location not being able to use stable internet services, therefore urgently requiring a paper-based alternative (a situation I personally had to manage and received instant advice for, from a PECB staff member whose role did not normally include this type of support, but who still put all her effort towards escalating the issue and facilitating immediate resolution).

Trust, honesty, and openness

Specific challenges may arise in any relationship. Equal partners understand that constant micro-managing and intervening by one partner is not just a nuisance, it can also cause a true breakdown of trust. In my dealings with PECB, I have noticed that raised issues are dealt with at the appropriate seniority level (if not the very top) and with respect as well as healthy banter. I am Dutch and therefore perhaps naturally quite direct, but I have learned that trait is actually not required for anyone to feel confident in raising a problem with PECB.

Diversity and feeling welcome

If any professional organization successfully reaches out to people from all regions, cultures, and maturity levels — plus different genders and age groups — it is PECB. The global interaction and mentoring that occurs between trainers and candidates, as well as facilitators and participants, is very inspiring.

I have experienced business partnership opportunities naturally coming to fruition between PECB partners, spanning the globe from Ghana to Australia and from Belgium to Mexico, whether via PECB's online platforms or its offline events. This is a key reason to be part of the PECB network.

Sharing fame and celebrating success

In excellent partnerships between confident parties, people see each other as equals and appreciate each other's differences too. Instead of zooming in on problems, they find ways to concentrate on solutions. On the other hand, they also aren't afraid of putting others in the spotlight and give credit where credit is due.

PECB's award process is a strong example of this. Additionally, its webinars with presenters from its partner base as well as invited speakers shows that PECB seeks opportunities to promote anyone who has an interesting story to share. During PECB's global conferences, this is further demonstrated with an array of speakers from the closer PECB community as well as a wider playing field…and let's not forget the PECB's ability to party! You'll just have to join one of the events when they come along again in the future.

About the Author

Rinske Geerlings
Founder, MD, and Principal Consultant
at Business As Usual (Australia)
"Oceania PECB Partner of the year"
multi-award winner

Ms. Rinske Geerlings is an internationally known, award-winning consultant, speaker, and certified trainer in Business Continuity, Security, Disaster Recovery, and Risk Management with over 20 years of global experience. She founded Business As Usual in 2006. If you want your Risk management, Information Security, and Business Continuity plans to work when you need them most, contact her via www.businessasusual.com.au, or via LinkedIn.

Cloud, the Backbone of the Tech Ecosystem

BY ANDREAS CHRISTOFORIDES

With new technologies and the rapid pace of change in video and mobile communications, businesses are finding better ways to improve the level of communication to increase productivity and performance which is every businesses' ultimate goal. Today, most B2B communication market has been significantly influenced by a series of trends such as seamless mobility and enhancement which is imbibing consumer communication devices and application within the enterprise. The impact of limited resources on businesses is making it difficult to balance the quality, cost, and end-user acceptance level.

I truly believe that with the emerging technologies and solutions arriving at our doorstep, there has been a tremendous shift in the way we communicate and connect via mobile phones, social media, and texting. Now, the increasing needs of businesses are aiming to combine the scattered parts of communication (voice, video, call, and text message) into a single platform to reduce the level of complexity and cost. In addition, they are finding all possible means of unified communication to accelerate their projects from any location to the experts in a minimum span. The evolution of new technology is increasing awareness among the companies about their business value and objectives to ease their computing needs and concerns towards business productivity and cost-effective communication. Cost-saving has always been an important driver too. Businesses can save money on hardware and IT infrastructure cost by integrating remote workers and distributed sites into a single solution. Cost-saving in new technology is significant when IT infrastructure is treated as an operating expense.

TYPES OF CLOUD

The practice of using virtual networks and software of remote servers on the internet which is no longer constrained by physical locations has resulted in the growth of "Cloud Computing" or "Services in the Cloud." Cloud is a type of internet-based computing that relies on sharing computing resources rather than having local servers or devices to handle applications. Cloud services can be leveraged for efficient operations with various deployment models depending on specific business requirements.

Public Cloud

In this deployment model, services and infrastructure are owned and operated by cloud providers to various clients to offer rapid access to affordable computing resources. This model is best suited for business requirements where no large investment is required to utilize infrastructure for developing, testing, and managing applications. Thus, public cloud helps to reduce capital expenditures (CapEx).

Private Cloud

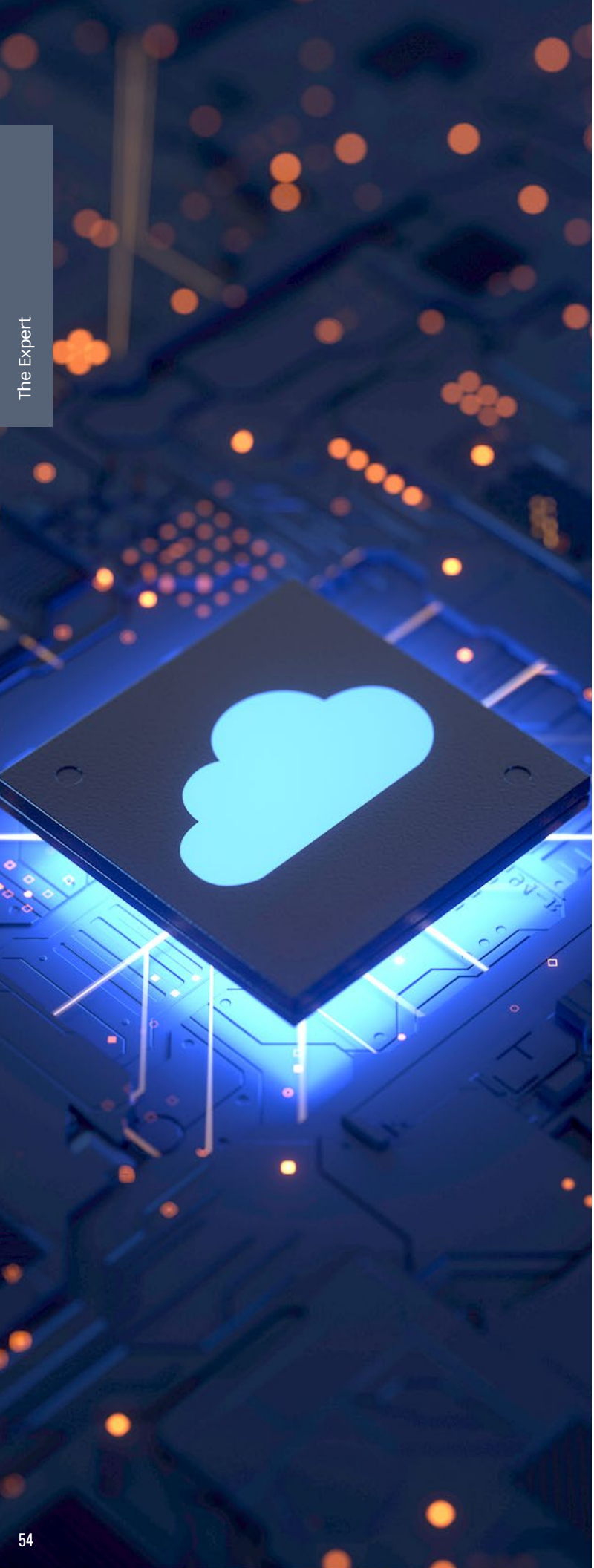
Private clouds are owned and managed by a single organization. Data security is the biggest advantage with private cloud since the infrastructure usually resides in the organization's premises. The IT resources that an on-premise infrastructure hosts are still considered "cloud-based" as they are made remotely accessible to cloud consumers.

Hybrid Cloud

Hybrid cloud is a cloud which uses a combination of public cloud with the strategic use of private cloud and can be handled individually by multiple cloud service providers. It takes the advantage of public cloud to keep shared data and applications and that of the private cloud for secured applications across data centers. For example, organizations can use a public cloud for sharing or storing data but may use a private cloud for storing critical information.

Community Cloud

Community cloud is shared by a specific group of organizations which help to reduce cost as compared to private cloud. It may be deployed on-premises or off-premises or may be managed by third-party service providers or by organizations collectively.



HOW HAVE BUSINESSES BENEFITED FROM CLOUD?

The cloud-based services arose due to their intangibility and virtualization which gives companies the opportunity to access data, outsource, and save valuable resources in terms of operational and capital expenditure. Enterprises have greatly benefited from cloud-based services such as cloud storage, web applications to get access of the reliable technological solution in an efficient manner. In addition, the biggest benefit of cloud-based services for small businesses is to get access to the already tested software solutions and applications making their budgeting and planning easier.

Business and Revenue Growth

Cloud computing seamlessly integrates an organization's resources into its existing system.

Mostly, small businesses possess no ICT (Information and Communication Technology) infrastructure, so they require reliable and fully functional ICT services in a minimum span to implement and enhance their business ideas. Therefore, to meet the demands of businesses and increase productivity, cloud computing, provides a scalable and flexible solution at a foreseeable cost. In addition, young companies can reduce their hardware and software cost by using the cloud server which simultaneously provides some security mechanisms. The small businesses can also save their capital in other core activities as initially they can only access their own application such as access to their emails and software from anywhere at any time. In comparison with small businesses, larger companies often value security aspects more than computing flexibility. This is because of the well-established ICT departments and resources available to operate and store data. For a company's survival and growth, safety and security of data is of utmost importance which can be made available through the cloud. The unused resources can also be made available to other companies via cloud which results in increasing business revenues.

Enhancement of the Business Ecosystem

The strong alignment of Cloud Computing with the requirements of business is re-inventing the way IT can rapidly enable the business outcomes. As the cloud is the emergence of a new way of delivering computing services, it also impacts all the features of the business ecosystem. In order to enhance the business ecosystem, IT solutions and service vendors will need to adapt their people, infrastructure, and processes.

The Role of Leadership in Adopting the Cloud Ecosystem

The business owners now need to act as strategic executives in order to expedite and transform the business through innovations and improvements in modern technology adopted by the organization. They are also expected to set certain strategic directions to guide their partners on the development and execution of cloud strategy. This will help the in-house team focus more on technology decisions and usage of the cloud to meet the business demands rather than focusing on strategic business decisions.

The use of high-capacity and reliable network connection to access the cloud could be achieved by utilizing the cloud service models. For on-premises/co-located data centers, the IaaS service model is used for efficient collaboration in the cloud. Similarly, implementing, developing, and hosting the applications through the PaaS service model will help to reduce costs and save time for application development.

Access the Cloud through Quick Processes

The computing resources available will enable the organization to quickly meet the business needs. The bottom line is that businesses could rapidly deploy the scalable applications using the key features of the cloud and easily balance the market needs in a nimble manner. This could lead to business productivity and the development of new business models.

Leverage the Computing Needs of the Customers

Cloud computing and its innovative business model leads to a paradigm change for production and innovation across businesses and customer value proposition. Cloud is viewed as a means to move from Capex to Opex. Enterprises with a well-established infrastructure still struggle, in offering secure solutions to their clients and ways to securely share their employees' information internally using cloud applications. Cloud service enablers are therefore aiming to address these concerns efficiently. The critical success factors for our customers will include:

Trust and security: This includes securing data, support and backup in large and medium-sized organizations. Cloud service providers should therefore be ready to invest in providing the best digital security to the customers. Online 24hr customer support is a must for businesses to handle critical services like communication and application issue.

Simplicity and usability: Managing the applications with simplicity is a key differentiator for small- and medium-sized organizations as handling their complex application is a burden for them. Hosted or managed services can help address these issues, thus aiding the business scalability and growth. In addition, for superior customer experience, the easy to use, buy, and understand services are primary factors when building the market.

CLOUD USAGE IN VARIOUS INDUSTRIES

Cloud is widely recognized as an important technology which helps to drive innovations in various sectors and offering capabilities that positively affect the IT industry. The impact of the cloud would be most advantageous in certain sectors like Government, Healthcare, Education, and SMEs (Small and Medium Enterprises).

Bridge the Communication Gap in Government Sectors

The adoption of cloud in government sectors will help to increase the interoperability and collaboration between various government agencies, monitor the effective government schemes, reduce the redundancy, and simplify the work proficiently. It helps to build effective communication especially with the citizens living in remote parts of the country. The cloud services improved technology, applications, and computing resources empower the central and state government to share critical information and achieve transparency at a faster pace. This results in reducing infrastructure cost. The cloud service potential has not only benefited government sectors but also millions of people.

Streamline Workflows for Healthcare Service Providers

Cloud can be leveraged in Healthcare Information Technology (HIT) to provide seamless management and access to Electronic Health Records (EHR) of patients, thus increasing access to remote locations and making health care products and quality medical services available to them. This will relieve the stakeholders from the burden of maintaining the records and enable them to focus on their core competencies.

Overcome the Challenges of Education Sectors

The adoption of cloud in education sectors helps to overcome the barriers of high cost, quality, and limited reach which have become a matter of grave concern especially in remote areas. The education sector has already embraced the cloud for email services, and now, its potentiality and unique resources are moving the education system towards critical applications, such as LMS (Learning Management System) and SIS (Student Information System) to make these resources readily available to all students.

SECURITY AND PRIVACY CHALLENGES FOR CLOUD

Like any new technology, the adoption of the cloud also brings on a new set of challenges but still its aim, potential, and approach to overcome the challenges related to security and privacy is convincing many businesses to move their communication to the cloud. Here are several critical loopholes from the security and privacy point of view that are being discovered by cloud researchers and developers while inspecting and implementing the current cloud.

Security Risks

Data security is the biggest issue with cloud-based services. Data hacking and damage of business data are the primary concerns as cloud-based resources are generally shared by multiple organizations. The security risks can be lowered by using encrypted file systems and security applications. In addition, by buying security hardware, users can track and manage the server utilization to an optimum level.

Private Cloud

The most common challenge of the cloud is the location of data and servers in the cloud as the cloud technology allows the cloud servers to reside anywhere in the cloud. Thus, it becomes difficult for the enterprise to know the physical location of the server to store and access their data and applications. To overcome the challenge of data location and portability, it is important to avoid lock-in which has the potential to obstruct mobility and interoperability. Using existing technologies and techniques it is possible to handle data in the cloud to keep it accessible and ensure.

CLOUD, THE BACKBONE OF THE TECH ECOSYSTEM?

Cloud computing is a breakthrough in information technology that is not only impacting the way the computing services are used and delivered but also the way in which the users will adopt it. Cloud is a game-changing phase of IT and other industry sectors such as Government, Healthcare, SMEs, and Education sectors which enables them to compete more effectively with other sectors and larger organizations.

Cloud's cutting-edge technology and unique resources delivers affordable, reliable, and flexible computing solutions to businesses, but the challenges too need to be considered when planning for cloud adoption. For businesses to move to the cloud, a well-planned strategy to gain a competitive edge in the market is required. In addition, the need to redefine their business models is a critical success factor in the cloud to better reflect changing trends in the use of IT and other sectors.

In a nutshell, I think businesses will continue to adopt cloud in order to increase their productivity and stay ahead of the curve. Considering the recent advances and offerings in cloud computing, it is clear that this technology has begun to realize its potential and is here to stay with its new offerings.

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About the Author

Andreas Christoforides
Business Development Manager at BEWISE CYPRUS LTD

Mr. Christoforides is an active IT auditor and trainer for various organizations on Information Security Management Systems. He is a member of the Cyprus Computer Society, a PECB certified Trainer for ISO/IEC 27001, ISO 22301, GDPR — CDPO, and a former Deputy Head of IT Infrastructure at a Bulgarian Leading Bank.

In 2019, he joined BEWISE and delivered to clients a wide range of Cybersecurity projects in the areas of strategy, governance and risk management, data privacy and protection (GDPR), and business resilience and recovery. He conducts IT risk assessments and develops IT policies and procedures towards establishing an effective and secure IT Governance framework.

Mr. Christoforides holds a BEng degree from Birmingham City University and a variety of other certifications from Microsoft and CISCO.

Digital Jewels' Success Story

Our Reason for Being

- Building centers of excellence, one professional at a time, one institution at a time.
- Strengthening IT Governance policies, practices, systems across Africa; in a sense addressing Africa's soft governance underbelly and equipping it with critical competencies to leapfrog the digital divide.

These are the key aspirations of Digital Jewels Ltd (DJL) — a leading specialized Afrocentric IT GRC consulting firm and capacity building firm. The vehicle of choice to achieve the aforementioned aspirations are global best practice standards with the span of deep competence-covering Cyber/Information Security, Business Continuity Management, IT Service Management, IT Risk Management, IT Governance, Project Management consulting services, and massive capacity building. These may seem formidable goals yet well-suited to this ambitious, tenacious firm that seeks to be a formidable institution that creatively, competently, and profitably adds distinctive value to our chosen stakeholders by securing, assuring, enabling, empowering, and managing (their) information assets to improve performance and enhance competitive ability.

Our values are:

- **P** Professionalism
- **A** Appetite for knowledge
- **T** Tenacity and commitment
- **R** Resourcefulness
- **I** Integrity
- **O** Openness
- **T** Teamwork

Key Achievements — Digital Jewels Today

Corporate credentials:

- PCIDSS QSA (CEMEA)
- ISO/IEC 27001:2015 Certified
- ISO 9001:2015 Certified
- Accredited to train global certifications
- NDPR DPCO
- CRS: Scholarships, career counseling

Consulting:

- Conducted over 200 projects
- Delivered over 150 certifications

Capacity Building:

- Trained 5,000+ professionals
- Conducted over 500 training sessions
- PECB African Partner of the year 2020
- PECB Titanium Partner
- AMPG Accredited

Thought Leadership Sessions:

- 84 sessions
- 150+ speakers
- 5,000+ delegates

Publications:

- 3 compilations
- 2 research reports
- 3 videos

Locations:

- 4 offices
- Footprint in 9 African countries

Starting out in February 2008 with this bold ambitious mission with Africa as its focus, the firm has grown from one office in Ikoyi, Lagos State, Nigeria, to establishing a footprint in nine African countries and a staff strength of about 70 professionals and still counting. Having been at the forefront of facilitating the adoption of global best practice standards such as ISO/IEC 27001 (Information Security Management System), ISO 22301 (Business Continuity Management System), ISO/IEC 20000 (IT Service Management), ISO 9001 (Quality Management) and ISO 45001 (Occupational Health and Safety). The firm has itself achieved many firsts while providing end-to-end support for its clients to enhance performance and improve competitive ability through implementing and certifying their processes to global best practice standards.

The firm's key achievements to date include the following:

- Implementing and obtaining certification to the ISO/IEC 27001 standard in 2012 in a bid to secure its sensitive information assets as well as practise what it preaches and take a taste of its own medics
- Becoming a Qualified Security Assessor (QSA) for the Payment Card Industry Data Security Standard (PCIDSS) for the CEMEA jurisdiction
- Implementing and certifying the firm to the ISO 9001:2015 standard in 2016 in a bid to improve and build a world-class QMS
- Built up a highly skilled crop of professionals as staff and clients across Africa, many of whom are now in various substantive positions globally
- Supported the 1st public sector company in Africa to achieve the ISO/IEC 27001 certification (Galaxy BackBone in 2010)
- Supported the National Switching Company in Nigeria to achieve certification to the ISO/IEC 27001, ISO 22301 and PCIDSS standards (Nigeria Interbank Settlement System, NIBSS, in 2014)
- Supported the 1st Pension Fund Administrator (PFA) in Africa to achieve the ISO/IEC 27001 certification (Premium Pensions Limited)
- Supported the 1st Bank in Accra to achieve both the ISO/IEC 27001 and PCIDSS certifications (First Atlantic Bank in 2016)
- Supported the 1st National Identity Agency in Africa to achieve certification to the ISO/IEC 27001 standard (National Identity Management Corporation, NIMC, in 2014)
- Supported the 1st bank in Rwanda to achieve the ISO/IEC 27001, ISO 22301, and PCIDSS certifications (Access Bank Rwanda in 2019)
- Supported the 1st bank in Zambia to achieve the ISO/IEC 27001, ISO 22301 and PCIDSS certifications (Access Bank Zambia in 2019)
- Supported the 1st bank in DRC to achieve the ISO/IEC 27001, ISO 22301, and PCIDSS certifications (Access Bank DRC in 2020)
- Supported the 1st bank in Gambia to achieve the ISO/IEC 27001, ISO 22301, and PCIDSS certifications (Access Bank Gambia in 2019)
- Supported the 1st bank in Sierra Leone to achieve the ISO/IEC 27001, ISO 22301, and PCIDSS certifications (Access Bank Sierra Leone in 2019)
- Supported the largest bank in Rwanda to achieve the ISO/IEC 27001 certification (Bank of Kigali in 2020)
- Trained over 1000 professionals to the ISO standards across Africa
- Licensed the Data Protection Company for Nigeria Data Protec Regulation (NDPR)
- Delivered over 150 ISO certification projects across West and East Africa for banks, FinTechs, switching companies, and other financial institutions, Telcos, ICT companies, and public sector players
- Released five landmark publications
- Generated an International Platform of Thought Leaders for knowledge sharing, information exchange, and business networking

Growth Stages

Starting off in 2008 with an office in Lagos, the firm established an office in Abuja — the nation's Federal Capital Territory just a year after in response to the opportunities for the implementation of global best practice standards in the public sector. Over the next five years, the firm focused on building awareness, capacity, and capability for the adoption of global best practice standards across the financial and telecom sectors in Nigeria given their rapid adoption of technology. The market responded well and soon enough, we built a solid track record of delivering excellent implementation projects leading to a seamless and independent certification process.

Soon after, the Banking Regulator, responding to the high volumes of cash and attendant insecurity in the country, galvanized an initiative called "Cashless Nigeria" to reduce the amount of cash in circulation by promoting the use of electronic delivery channels such as cards, ATMs, and internet/online banking. Understanding that the growth in Digital Financial Services if left unbridled, would likely lead to large amounts of electronic fraud, the Central Bank of Nigeria released a comprehensive roadmap for the adoption of global best practice standards among banks and other players along the e-payments value chain. This roadmap provided the necessary impetus to mandate the implementation of these standards and increased the demand for our services significantly.

In 2016, the firm had its first client in Ghana and established an office in Accra shortly after. The growth in the adoption of global best practice standards in Ghana was propelled more by the concern of business owners and operators to their exposure to cyber fraud and Information Security breaches as a result of increased digital services, particularly among financial institutions. The regulation was to catch up later and this also provided the additional stimuli to encourage the adoption of these standards.

Our foray to other African countries such as Gambia, Sierra Leone, Rwanda, Zambia, and DRC have been driven more by banking groups headquartered in those countries whose regulators have mandated compliance to the standards extending this to their other subsidiaries. This has been an interesting journey and has provided the opportunity to trailblaze the adoption of global best practice standards across many more African countries.

An integral part of our consulting approach has always been to build capacity and capability in our clients' teams to ensure informed adoption of the standards and sustainability beyond the certification stage. Alongside the implementation of the standards, we were privileged to deliver certification training to implementation teams for each standard implemented.

Our expansion to East Africa — specifically Kenya and Rwanda — has been the most recent over the last three years. Without any regulation to encourage the adoption of standards, we have had to engage in widespread advocacy and awareness which has yielded fruit more amongst FinTech and technology companies who seek to demonstrate effective governance and secure practices to their larger clients.

Partnering with PECB

Early in our firm's journey, before we developed the capacity and capability to train internally, we partnered with a Canadian firm to deliver training courses for our ISO clients.

One of our first programs was the ISO/IEC 27001 Lead Auditor training course for about a dozen auditors from the Standards Organization of Nigeria to build capacity in the standard. Our firm's founder and CEO, herself an astute IT GRC professional previously certified as an Information Systems Auditor (CISA) and Information Systems Security Professional (CISSP), among other global industry certifications, attended the class and struck a chord with the class instructor. The same instructor ran more than one program for the firm in those early days and also participated in one of the firm's thought leadership programs. They both kept loosely in touch and our firm's CEO was one of the first to be informed when Eric Lachapelle (this instructor) set up PECB.

By that time, we had trained our consultants rigorously as instructors in partnership with another training provider but soon moved over to PECB as soon as we were able to agree on mutually beneficial terms. The rest, they say, is history, as the firm has grown and expanded across Africa, its partnership with PECB has deepened and broadened. PECB's high-quality offerings have become the de-facto standard for our staff and our clients as we continue to deepen our competency development initiatives aimed at building centers of excellence, one professional at a time, one institution at a time.

Over the years, our skilled and knowledgeable facilitators, also practitioners of the standard themselves as we live the standards in our organization and provide painstaking support to our clients in numerous implementation exercises, have delivered hundreds of PECB training courses in ISO/IEC 27001, ISO 22301, ISO/IEC 20000, ISO 9001, ISO 45001, ISO/IEC 27032, ISO 31500 across the continent — both in-person and more recently virtually. The volume and delivery of our PECB programs have earned us the PECB Reseller of the year in 2019 as a Platinum Partner and an upgrade to Titanium Partner status in 2020 alongside the PECB Reseller of the year 2020 despite the challenges of the pandemic. Our firm's CEO has also participated as a panelist for two consecutive years in the PECB Insights Conference.

As we deepened and broadened our footprint in implementing standards across Africa, PECB was also growing and launched its Management Systems Certification division, which became later a separate entity PECB Management Systems Inc. Given the uptake of adoption of global best practice standards in all our operating bases across Africa, we saw an opportunity to invest in a separate independent vehicle that will work closely with the PECB Management Systems division. This firm is staffed with highly experienced and well-trained auditors who work with PECB to deliver effective audits across Africa.

Partners in Progress

When we look back at our 12+ year growth journey, we are thankful for our landmark achievements and notable accomplishments, deeply intertwined with PECB's. As we look forward, we are excited about the future prospects of growth, partnership, and progress.

Some Certificate Award Ceremonies

NITDA (National IT Development Agency). L-R. NITDA DG, Federal Minister of Communications and Digital Economy, Nigeria. Founder/CEO Digital Jewels, Permanent Secretary Ministry of Communications & Digital Economy

Access Bank Zambia Certificate Award Ceremony 2019. L-R: CEO Access Bank Rwanda, Representative of the Central Bank of Zambia, Founder/CEO Digital Jewels, CEO, Zambian Association of Bankers

Access Bank Rwanda - Board Certificate Award Ceremony 2019.
L-R Chairman Board of Directors & other Board Members In the Centre in blue
Founder/CEO Digital Jewels, CEO Access Bank Rwanda. R - Regional Manager Digital Jewels

Cloud Tools: Better Solutions to Technology

With the advent and growing development of cloud computing, the need for cloud computing tools rises too. This article introduces you to the top five picks of cloud tools. Identifying the option that is the best fit for your organization is an important step; once you do that, building a cost-effective and useful cloud infrastructure and resource optimization will be easier. Each option has its strength and weaknesses; however, many of the options offer free trials, which you can test to see which one works best for you. Using cloud solutions is a smart move to make, considering the benefits associated with them such as cost-benefits, increase in business efficiencies, better serving customers, and maintain a competitive advantage.

1. Sematext Cloud

Sematext Cloud is a monitoring solution which offers a quick setup and provides you with a comprehensive view of your IT Infrastructure. It offers log management and analytics, and it allows you to build great charts and dashboards from data in the logs. Pricing for each solution differs depending on the plan that you choose. The price for logs starts at $50 per month, monitoring at $0.007 per container host/hour, experience starts at $19 per month, and synthetics plan starts at $29 per month. This tool also offers a 14-days free trial, so you can use this time to see if it is the right one for you.

2. AppDynamics

AppDynamics is a flexible tool which can be adaptable to any infrastructure or software. It offers an efficient way of application monitoring and performance. The reports provide detailed data which can be customized. Moreover, it provides insights into your environment, which can also be understood by executives as well as code-level information required for developers and DevOps. It offers App Performance Monitoring Packages, as well as End User Monitoring Packages. You can get the prices upon request and get a free trial to test it out.

3. Datadog

A SaaS monitoring tool which provides comprehensive features that are required to monitor the applications, cloud infrastructure, logs, network, etc. It also offers observation for logs, metrics, real user, security, etc. Moreover, Datadog has flexible data analysis features, which allows you to create custom dashboards. Regarding pricing, hourly, monthly, and annual plans are available. Billing plans can also be customized to meet the customer's needs. As was the case with the other tools, Datadog also offers a free trial period.

4. Amazon CloudWatch

The primary use of this tool is aimed at Amazon Web Service users. It is used to monitor the usage of cloud resources, services, infrastructure, as well as the applications of the Amazon AWS. Amazon CloudWatch offers volume-based pricing, meaning that this depends on the visibility you want to have and how detailed it is. You can get started with this service for free. However, there is not a fixed price for the paid option. Your bill will depend based on your monthly usage, and prices vary based on the region.

5. Azure Monitor

A tool designed to monitor the services of Microsoft Azure cloud services, which provides insightful information about applications, services, infrastructure, as well as Azure resources. Custom metrics for resources outside of the cloud are also supported by this solution. Through this tool, the performance optimization of many applications can be maximized and issues can be detected in a short time. Pricing is based on the volume of the data used or reserved capacity. Selected metrics are free; however, once you pass 150 MB per month for custom metrics, a fee occurs.

Express Your Appreciation

GIFT IDEAS FOR HOLIDAYS

At each end of the year, it is important to pause for the moment and reflect on what we have gone through and what the New Year will look like. On top of all that, we can use this time to surprise and appreciate important persons in our life, be that family members, friends, working partners, end of year gifts come at the right time. As gifts are the symbol of celebration, whatever the nature, they should be chosen carefully.

Here we present you with some customizable gifts, from more affordable to more expensive ones. Hopefully, this list will help you a little bit!

Chocolate Box

Thinking of giving chocolate as a gift? Do not think twice, because chocolate is always the perfect gift. If you are looking for an exquisite chocolate box, Godiva Assorted Chocolate Gold Gift Box is the answer! This box has a great combination of delicious white, dark, and milk chocolate. It includes 36 pieces of assorted chocolate. In addition, if you are looking for a great chocolate box for your partners, you can consider this box which you can customize with your logo or add a custom message.

Wireless Charging Stand

This is a brilliant gift for anyone working at a desk. This wireless charging stand from Belkin is fast and it is compatible with Apple, Samsung, as well as Sony, and LG. You can charge the phone in both landscape and portrait mode, which gives you the opportunity to use the phone even when it is charging. It comes in four different colors.

Gift Card

Choosing the perfect gift sometimes can be difficult. Even though sometimes gift cards can be viewed as impersonal gifts, they are ideal because it lets the person pick whatever they want.

Instant Pot Coffee Maker

We all have that one friend who is an espresso lover. So why not brighten their day and make their coffee-making routine easier by giving them a portable espresso maker. The Wacaco Minipresso is a great option: compact and very suitable while traveling. It is easy to operate, you only need to add the ground coffee, the hot water, and unlock the piston and pump and you will make a delicious coffee.

Rocketbook Holiday Bundle

Have a tech-savvy friend, family member, or partner? This notebook is the best option. It has 32 pages dotted grid and lined notebooks and it comes with two microfiber cloths and two pens. This notebook can be used limitlessly by wiping clean with those two microfiber cloths. The best part is that by using the Rocketbook app, you can transfer your handwritten notes to multiple cloud services like OneNote, Evernote, Slack, Google Drive, Dropbox, etc. You only need 15 seconds for the ink to dry on the pages of this notebook.

DECEMBER 9

INTERNATIONAL ANTI-CORRUPTION DAY

#UnitedAgainstCorruption

No one is immune to the crime of corruption. The economic and financial costs of corruption are huge. It does not cost money only, it costs lives too. Combating corruption requires determined efforts and everyone can do their part in this never-ending battle.

It is the duty of all of us to challenge corruption. PECB is here to help. Check out our Anti-Bribery Training Courses and do your part in winning this "fight."

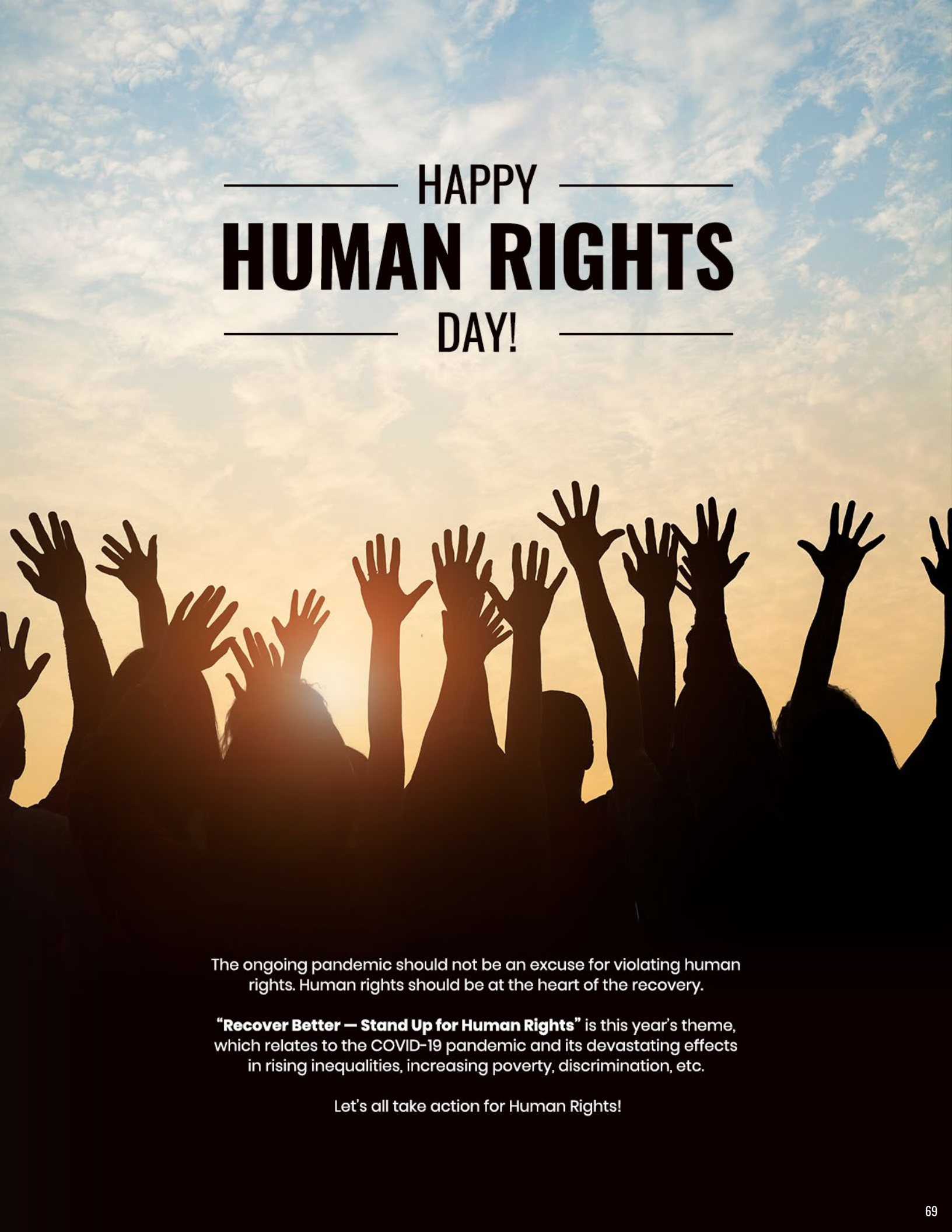
THE GLOBAL COST OF CORRUPTION IS AROUND $2.6 TRILLION.

WORLD ECONOMIC FORUM

MORE THAN $1 TRILLION IS PAID IN BRIBES EVERY YEAR BY BUSINESSES AND INDIVIDUALS

WORLD BANK

UNITED AGAINST CORRUPTION



The ongoing pandemic should not be an excuse for violating human rights. Human rights should be at the heart of the recovery.

"Recover Better — Stand Up for Human Rights" is this year's theme, which relates to the COVID-19 pandemic and its devastating effects in rising inequalities, increasing poverty, discrimination, etc.

Let's all take action for Human Rights!

R THE O ETE

Rome, alias Urbe, Caput Mundi, Eternal City has been considered the center of the world for centuries. It is the birthplace of Caesar, home to the Catholic Church, full of ruins, history, and some delicious food!

Consider this article as a small guide to Rome that can help you plan your trip, navigate the endless amount of sites and attractions, and learn how to get around in the chaos!

Are you a fast traveler and don't like idle times? Or do you prefer to take your time? A "fast" traveler can visit Rome in two or three days and discover the major attractions. If you will have more time, it is better to organize a journey of four to five days which will allow you to explore the tourist attractions of the city at your own pace.


PECB advises you to avoid traveling nowadays due to the ongoing COVID-19 outbreak. However, make sure you add this incredible destination on your travel bucket list.
ERNAL
M
CITY
E

Rome is known for its sunny Mediterranean climate, and is a great escape in every season. No amount of time will ever be enough to see everything in Rome, but 48 hours is just enough time to visit the city's main attractions and eat at some of Rome's best restaurants.

Friday evening you can visit the Vatican Museum and see one of the world's most important art collections after dark, making for a once-in-a-lifetime experience.

Friday night you can spend the evening having dinner at one of the city's bistros: start off with some local wine and a platter of cold-cuts and cheeses before moving on to the daily specials.

Saturday morning you can't miss visiting the world's largest amphitheater. After exploring the Colosseum, head over to one most important forums in ancient Rome, and the greatest sign of the Roman Empire, the Roman Forum.

Saturday midday you can't miss the opportunity to walk around the Trastevere district and try the specialties of some local bakeries.

How to Get to Rome

After a long flight you might be inclined to fork out for a taxi for door-to-door service. Just make sure you know what you're paying before you jump in the taxi.

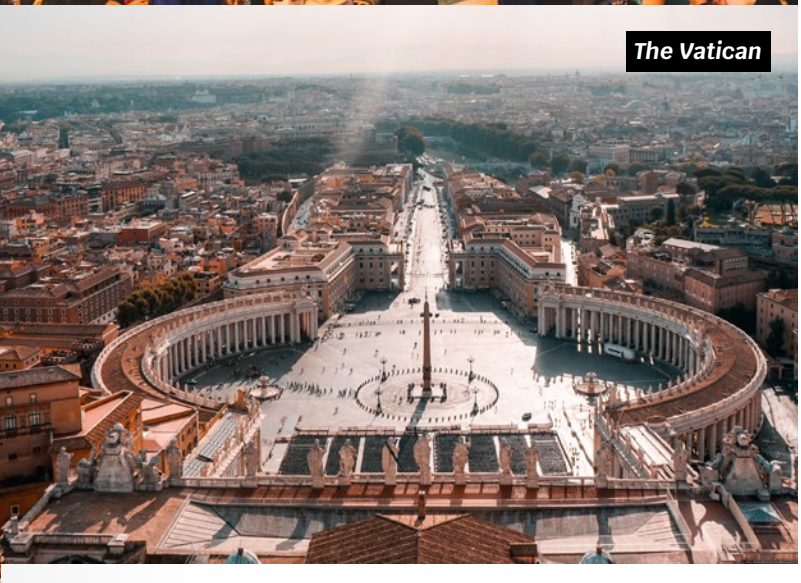
There are airport transfers available. For a fixed rate of 30€, you can take a taxi from Ciampino Airport to Rome. This includes a stop in the center. A more affordable option is the airport shuttle bus which costs around 6€ and it takes around 45 minutes. Rates from Fiumicino-Leonardo da Vinci Airport are 48€. However, the fastest way to reach the city is on the Leonardo Express train to Termini Station which costs 14€ and lasts 30 minutes.

Getting around Rome

Buy your ticket in advance, a one-way ticket is approximately 1,50€. There are plenty of choices for unlimited journeys. A mixed solution named Roma Pass offers free use of the city's public transport, free skip-the-line admission to one or two museums (although not the Vatican), and discounts for other museums, services, and activities in Rome. A 48 or 72-hour city card is available.

Colosseum


Fontana di Trevi


The Vatican

Attractions

The Colosseum: This monument dates from AD 72 and is known for its oval shape and enormous proportions. It is also known as the Flavian Amphitheater and it was the largest setting for mass slaughter with a seating capacity of over 50,000 – 80,000 people. Stories of glory battles between gladiators, slaves, prisoners, and wild animals have emerged from this monument.

The Roman Forum: The forum was the center of the city and you can see ruins of ancient markets, administrative, and religious buildings. However, you will not find any explanation on the sites, so if you're interested in history, you should really opt for a guided tour.

The Pantheon: The greatest evidence of the great Roman empire, a temple devoted to all divinities, draws tourists from all over the world for its magnificence and for its particular architecture. The dome in fact is the magnificent part of this building, opening to the eye called "*Oculus*," the only source of light. Outside is covered by seven eaves that offset atmospheric pressures and guarantee the way down of rain alongside curves.

Fontana di Trevi: Within walking distance from Pantheon, you will find one of the most important attractions of Europe, Trevi Fountain, enveloped in charm of the legend and of the tradition of launching two coins: one to express a wish, and the other one to go back in Rome!

The Vatican: A building by the Vatican City State, the church was made by Gian Lorenzo Bernini in 1661. It is smaller world's nation but more visited by travelers during the holidays in Italy. It's surrounded by two colonnades of almost 280 columns and 145 Sainte's sculptures. In the middle of the square stands an Egyptian obelisk surrounded by two big fountains. Inside the church you can see masterpieces such as the "Piety" made by Michelangelo and the "Canopy" made by Bernini.

Castel Sant'Angelo: If you keep walking from the square of the St. Peter's Church, you'll get across the Sant'Angelo's Bridge, and then you will arrive at the homonymous castle. The bridge is decorated with 10 statues representing angels, all designed by Bernini, offering an incredible view of the river and the city. The primary purpose of the Castel Sant'Angelo, built by Emperor Hadrian, was to serve as a mausoleum. It afterwards served for military purposes, and even as a place of refugee for the popes during invasions. Over the centuries it became a prison, next, a Renaissance residence, and today is a museum.

Capitoline Museum: These museums are set across three buildings in Piazza del Campidoglio, a trapezoidal piazza designed by Michelangelo in the 16th century and one of the many must-see museums in Rome. Considered as the first public museums in the world, they are home to Renaissance marble statues and Roman bronzes such as the Equestrian statue of Marcus Aurelius and the Capitoline Wolf, which symbolizes the founding of Rome.


The Pantheon

Accommodation

Living la dolce vita does not always come cheap! There are Vespas to rent, attractions to explore, Negronis to imbibe at the best bars in Rome, and truffle-topped pasta to eat. Prioritizing more budget-friendly alternatives for hotels allows you to enjoy more cultural temptations and iconic and tasty dinings. And luckily, some of the city's best hotels are also most budget-friendly; finding cheap accommodation does not require being stuck in some soulless suburb. Here are some of the recommended cheap hotels:

Relais Le Clarisse: The hotel is located in the heart of Trastevere and is housed inside a former church convent that dates to 1122.

Alice Vatican House: Located 450 meters from St. Peter's Square, this place has contemporary rooms with neat decoration from 95€ per night, with breakfast included. The place has an ideal location, a terrace overlooking the Vatican, and a warm welcome. This is the best choice for your stay in Rome under 120€!

iRooms Pantheon & Navona: Everything in the hotel is controlled by the in-room iPads, and even the front desk needs to be reached by Skype rather than a landline.

Roma Luxus Hôtel: This is the best hotel for a luxury stay in Rome and is located only 400 meters from Piazza Venezia. Beautiful double room starting at 200€ per night, breakfast at 20€. The room design, the 5 stars service, the superb breakfast, the spa, and the amazing staff are what make this place worthwhile.

You can also rent exclusive apartments from many private individuals in any place in the city.

Best Rooftop Bars in Rome

Although in cities across the world an escape from tourists takes the form of ventures down little-known side streets, in the capital of Italy, respite comes in the form of the best rooftops in Rome.

- Roof Garden Les Étoiles
- Chiostro del Bramante
- Marco Martini Cocktail Bar
- Zuma

Shopping and Restaurants

Shopping in Rome is a study in extremes, from the breathlessly expensive Italian fashion houses asking you to part with hundreds of euros (for good reason, of course) to wallet-friendly street wears, plastic models of classic attractions and spray-paint art sold clandestinely on street corners, the city is basically a shrine to shopping.

You won't go hungry in Rome. Rome's dining scene is a symbol of excellence worldwide. The city is home to thousands of great restaurants and trattorias. The area south of Spanish Steps has a lot of little restaurants offering casual and fine dining. Trastevere is a very popular area and lovely to wander around the narrow side streets of it lined with bars and restaurants. Piazza Navona contains several cafés which face the Pantheon although walking back a street or two from the main squares and attractions will find you a meal for half the price.

It's tough choosing where to eat but you won't go far wrong with menus offering simple, fresh traditional dishes like pasta, pizza, chicken, veal, seafood, and the typical Caprese salad. In most restaurants, the house wine is unusually good.

Business

Italy is considered an attractive place for investment as it is growing at a steady rate and continuously recovering from the global financial crisis. It is the third-largest economy in the European Union and eighth in the world.

While known for its art, food, and rich history, Italy also offers businesses well-established infrastructures for R&D, innovation and design, and a strong manufacturing base. Italy's geographic location is significant, making it a strategic logistics hub and a gateway to the European Single Market.

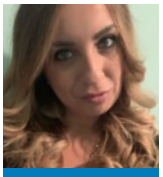
Advantages of doing business in Italy:

- Strategic logistics hub
- Pro-investment culture
- Robust manufacturing base
- A tradition of innovation
- High-tech performance

Based on the Doing Business 2020 report, out of 190 economies, Italy performs below the EU average, ranking 58th for overall ease of doing business.

Ten Tips to Visit Rome

1. Book all your attraction tickets in advance: Spend your time getting to know the city and don't follow the crowds, buy your tickets online.
2. Wear comfortable shoes in Rome: The city very big, and you will be walking a lot.
3. Always carry cash: Coins, or "spicci," are especially welcomed at cafés and small shops.
4. Visit Rome in the low season: Spring and Autumn are the best periods to visit the city.
5. Ice cream is good anytime: Italians enjoy this treat year-round and Rome has many artisan ice cream shops, where will you try the "gelato."
6. Buy bus tickets ahead of time: Be sure to stock up on bus tickets ahead of time because you can't buy them on the bus.
7. Always order coffee at the bar: Italians don't really linger over their coffee and quite literally down it, so do it like the locals. If you are planning not to sit, a coffee will cost 1-2 euros. You will pay 5 euros for coffee if you sit.
8. Never pay for water: Use the water fountains instead, affectionately called "nasoni" or big noses around every other corner and these fountains have good to drink water.
9. Get ready to dine very late: If you're an early dinner person, you'll have to wait a little to get yourself dinner in Rome. Dinner in most restaurants is served at around 8:30 p.m. or later. You can order until 11:30 p.m. when the last order is received.
10. It's free museum day on every first Sunday of the month: Rome's state-owned museums, galleries, archeological sites, parks, and gardens are free on the first Sunday of each month.



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About the Author

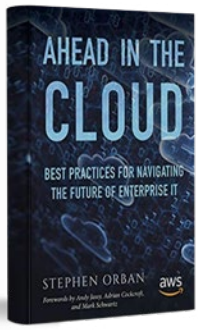
Vanessa Ceccarelli
Travel Writer

Vanessa is a young jurist and travel writer by pleasure of culture. She loves to travel around the world and discover the beauties of the cities, photograph them, and write a short article of each with useful tips for travelers. But more than anything else, she loves her city, Rome, the Capital of Italy. Her passion for writing led her to win a literary prize by U.L.I. by the Ministry Cultural Heritage and Activity.

Road to Cloud: Top Cloud Computing Books

Cloud is the most rapid-growing technology and has quickly become a must-have one. It is estimated that by 2025, the cloud computing industry will grow to $832.1 billion from $371.4 billion in 2020. The need for professionals in this specific field is also increasing, together with the awareness level on its importance, being applicable in almost every field you can think of. Cloud-based services provide a much more trustworthy IT infrastructure that specifically aims to rationalize business performance and support advancement and growth.

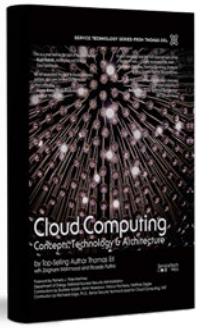
Books continue to be an excellent source of building a foundation and understand different perspectives on a subject. For that reason, we present the top four books you can consider to get acquainted with cloud computing.



Ahead in the Cloud: Best Practices for Navigating the Future of Enterprise IT
by Stephen Orban

This book is for all organizations who want to transform to the cloud. It is composed of short chapters and has all the information you need in one place. It explains that migrating to the cloud requires a transformation of the culture as well as people and processes. The author brings together his experience by providing the best practices and lessons learned and it provides links to resources if you want to explore more about the topics.

This book is a must-read no matter what stage of cloud adoption your organization may be. It is a blueprint for a successful cloud migration strategy and journey.



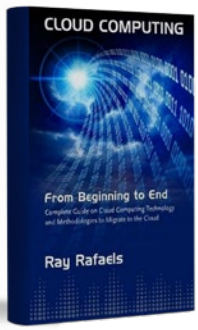
Cloud Computing: Concepts, Technology & Architecture
by Ricardo Puttini, Thomas Erl, and Zaigham Mahmood

This excellent book provides a detailed look at cloud computing and covers several dimensions of the subject. The way the book is written makes cloud computing concepts easy to understand and it will help you create a strategy for a smooth transition by making the most of cloud computing benefits.

This book is great even for those who have no previous knowledge regarding cloud computing but have an idea of basic networking concepts. It also includes the formula for calculating SLA-related quality service along with the many explanations of the SaaS, Paas, and IaaS, as well as 29 architectural models, 260 figures along with 20 mechanisms. This book serves as a foundation for cloud computing education that will benefit you every time.

Architecting the Cloud: Design Decisions for Cloud Computing Service Models
by Michael J. Kavis

In order for you to be able to choose the right cloud service provider it is necessary to get equipped with the right information. This book is the right source of information for this matter as it is a comprehensive guide covering everything you need for choosing the right cloud service model that works best for your business. It is suitable not only for technically focused people but also C-level executives because it does not thoroughly elaborate and delve into technical areas. The author does not only provide theoretical information but real-world cases and practical ideas. It also discusses the advantages and disadvantages of each cloud service model, as well as cloud computing worst practices which shows the reader how they can avoid failure when migrating to the cloud.



Cloud Computing from Beginning to End
by Ray J. Rafaels

Apart from fundamentals, this book covers strategy technical side and implementation details, as well as the best methods when migrating to the cloud. The author does a great job explaining the business benefits that come with cloud computing. It also provides real-life practical solutions and experiences on why some things fail. This book is a great reference for everyone who wants to gain a better understanding of cloud computing. The author also discusses the security issues that are associated with the cloud technology, as well as provides an analysis of the Return on Investment of migrating enterprise applications to the cloud and linking KPIs to business/mission outcomes.

San Francisco

THE GOLDEN GATE CITY

San Francisco is the awesome city of California and one of the bucket-list places that you should not miss. It is one of the most popular tourist destinations in the United States of America.

The city is known for its Mediterranean weather (where temperatures remain moderate all year round and rarely gets any snow in winter), amazing landmarks like the Golden Gate Bridge, Alcatraz, Fisherman's Wharf, Chinatown district, Alamo Square (Full House shoot location), cable cars, Sausalito, Coit Tower, to name a few.

PECB advises you to avoid traveling nowadays due to the ongoing COVID-19 outbreak. However, make sure you add this incredible destination on your travel bucket list.

ARTICLE BY TOSOMEPLACENEW

Over the years, San Francisco has received several nicknames by locals, tourists, and magazines. Nicknames include "The City by the Bay," "Fog City," "San Fran," and "Frisco." It is also affectionately called "The Paris of the West," or simply "The City."

Ways of Getting to San Francisco

San Francisco is well connected via air and roadways. San Francisco's airport is located within San Mateo County (San Francisco International Airport).

There are many ways to reach SF city from the airport. Get San Francisco airport transfer to and from the city here (car) or the public transport here – this transit pass includes access to the airport, shopping areas, downtown, and more.

If you are flying to San Francisco, look for cheaper flights to San Jose. San Jose is located 50 minutes away from the San Francisco Airport. Accommodation (hostels and hotels including Airbnb accommodation) will be slightly cheaper in San Jose as compared to San Francisco.

Using Caltrain to reach San Francisco from San Jose, Standford, Menlo Park, Mountain View to reach San Francisco – If you are staying in any one of these suburbs, then using the Caltrain will save you money. Typically the train journey from the suburban areas to San Francisco takes 30 – 45 minutes. The Caltrain is valid per zone and with crossing each "zone" the fare prices are slightly different. One way ticket costs $3.75 to $15 (for all 6 zones). A day pass is generally cheaper, so definitely consider buying one if you will be using the Caltrain multiple times a day. Check Caltrain fares here.

Where to Stay in San Francisco?

There are luxurious options for accommodation in San Francisco. Some of them offer stunning views of the sea and the Golden Gate Bridge and some come with great hospitality. The hotels mentioned here are located near Fisherman's Wharf (the itinerary is structured with the Fisherman's Wharf as the starting point, meaning less travel time for sightseeing).

We normally choose a centrally located hotel (in the mid-range budget), so that sightseeing and exploration are easy. Depending on your budget (and the season of travel – peak or off-season), you might find one of the hotel recommendations to suit better than the others. We have included both luxury and budget options for San Francisco hotels.

Luxury Hotels

Hyatt Centric Fisherman's Wharf San Francisco: Upscale hotel located near the Fisherman's Wharf

- Great location, close to sightseeing spots in San Francisco
- 4-star hotel with stylish rooms, pool, and a heated outdoor pool

Stanford Court San Francisco: 4-star hotel located in the Financial District

- Good location – access to tourist spots
- Elegant rooms, good hospitality
- Awesome views and on-site café
- Mid-range

White Swan Inn: 3-star bed and breakfast style hotel

- Located in the financial district – good location and accessibility
- Rooms come with a vintage (floral décor); good value room rates
- The INN does wine socials and provides gourmet breakfast (and cookies)

Budget

USA Hostels San Francisco: Hostel

- Modern hostel, with amenities
- Free breakfast (and Wi-Fi)
- Hostel conducts group activities as well

Stanford Court, San Fransisco

Pro-tip: You may also consider staying in San Jose or Mountain View. The only thing to remember is the commute (roughly 45-50 minutes one way and the fare). Click here to browse for San Jose hotels or hotels in Mountain View. Food or access to trains is easy from these two areas to San Francisco.

Map & Sightseeing Tips

For sightseeing in San Francisco, we recommend using the hop on and hop off sightseeing tour for 1 or 2 days. During our visit, we used the 2-day pass. Most tours commence at the Fisherman's Wharf – so it makes sense to explore this attraction first and then join the bus route. Grab your hop on and hop off city pass 48 hour with Alcatraz tickets.

This 48-hour pass is a good value for transport to city attractions for 2 days. It also includes a tour of Alcatraz, tickets to Madame Tussauds, and a 45 minute night tour.

Fisherman's Wharf

DAY 1

Fisherman's Wharf

Start your first day in San Francisco with some coffee and crepes at the Fisherman's Wharf. Take a stroll, enjoy the lovely breeze as you start your day exploring this new city.

Fisherman's Wharf is a well-known neighborhood in San Francisco and quite popular with tourists. This touristy neighborhood is located along the waterfront area of San Francisco. It is filled with sea-food restaurants, cafes, and souvenir stores. Most day tours to the San Francisco area and around start at the Fisherman's Wharf.

Fisherman's Wharf has a long history, it speaks volumes of the sea and the fishing community and its contribution to the state. To learn more about the city's past in a unique way, hop on a cable car for sightseeing. This one also includes an optional walking tour (s). You can learn all about it here. This tour is perfect if you wish to explore the major highlights (minus all the research work).

Within walking distance are the Ghirardelli Square, Pier 39, Pier 35, and the Ferry Building. Ghirardelli Square is a restored neighborhood that once housed a Ghirardelli chocolate factory. Today it is a sprawling retail square.

Pier 39

Pier 39 is another shopping center located at the Fisherman's Wharf. There are tons of activities to indulge in at the Pier 39. Although very touristy, every day is a big festival here – with balloons, cotton candy, food, souvenirs, and whatnot. This center is usually quite busy and is better to explore in the early hours when it opens.

On the east side of the Pier 39 is the Pier 35 – the largest cruise terminal in San Francisco. You will also notice a big terminal close by, it is the Ferry Building.

The Ferry Building was constructed and opened in the latter part of the 19th century. The bell at the Ferry Building was inspired by The Giralda bell tower in Seville Spain.

After all the sightseeing (and walking), settle down for brunch (or an early lunch) at the Fisherman's Wharf. Try some fish and chips, with a light beer (c'mon, you are on vacation).

Alcatraz Island

From Fisherman's Wharf, you will see an island far away. That is Alcatraz Island. I remember watching a documentary on Discovery Channel about the Alcatraz prison and the atrocities meted out to the prisons – it is scary and gruesome. Today guided tours are available for visitors who wish to learn about its history.

Alcatraz Island first came into prominence when a Spaniard mentioned Alcatraz – the land of pelicans. Over the years, a lighthouse was created for sea safety. Due to its isolated location, Alcatraz was later used as a military fortification and a federal prison. When the federal prison was in operation, it was believed to have kept the hard criminals at bay. Most notorious of them all was Al Capone, who was imprisoned here. It is also believed that no one has ever escaped this prison.

You can take a guided tour of Alcatraz Island. You will have to take a ferry (15-minute ride on way) to reach the island and back (another 15 minutes), with a 1.50 to 2 hour guided tour at the island. Here is a guided tour of Alcatraz with a city tour.

Chinatown

Chinatown in San Francisco is the oldest Chinatown in North America. It was built in the mid-19th century and portrays the stories of Chinese immigrants to the country. What will take your heart away are the red lanterns that are hanging all over the neighborhood, along with the dragon gate. It is worth taking a stroll here and enjoying the ambiance. Everything here looks like you are in a different world altogether. This neighborhood had maintained many of the old traditions and customs for years.

If you are hungry or if you LOVE Chinese food, try the hot and sour soup, with Schezwan Chicken and noodles for dinner. They are delicious. After ChinaTown, you can either call it a day or spend some time at the Union Square area before heading to your hotel.

Golden Gate National Recreation Area

DAY 2

The Golden Gate Bridge is San Francisco's iconic landmark. So much so it is sometimes used synonymously with San Francisco as well.

Golden Gate Bridge Park Area

The Golden Gate Bridge is an engineering marvel and a California Historical Landmark. Today there are other areas like the Crissy Field, Palace of Fine Arts, and the Japanese Tea Garden – which form a part of the Golden Gate Recreational Area.

As you might already know, the Golden Gate Bridge is a suspension bridge. You can reach there by car or train or by taking a bus tour. Once you are at the bridge, you can walk across (like I did and took pictures) the bridge, learn about the bridge's history and mechanisms at the information center or picnic at the Crissy Field.

Crissy Field

Allot 2-4 hours at the Golden Gate and the nearby recreational area. If you love to walk or take a light hike, then head to the Crissy Field.

You can easily reach the Crissy Field by arriving at Fort Point (located just below the Golden Gate Bridge). Originally used as a military airfield, today it is home to some of the stunning views of San Francisco. You can hike, bike, or picnic here (they have designated picnic areas). Be camera ready for photographs.

Palace of Fine Arts

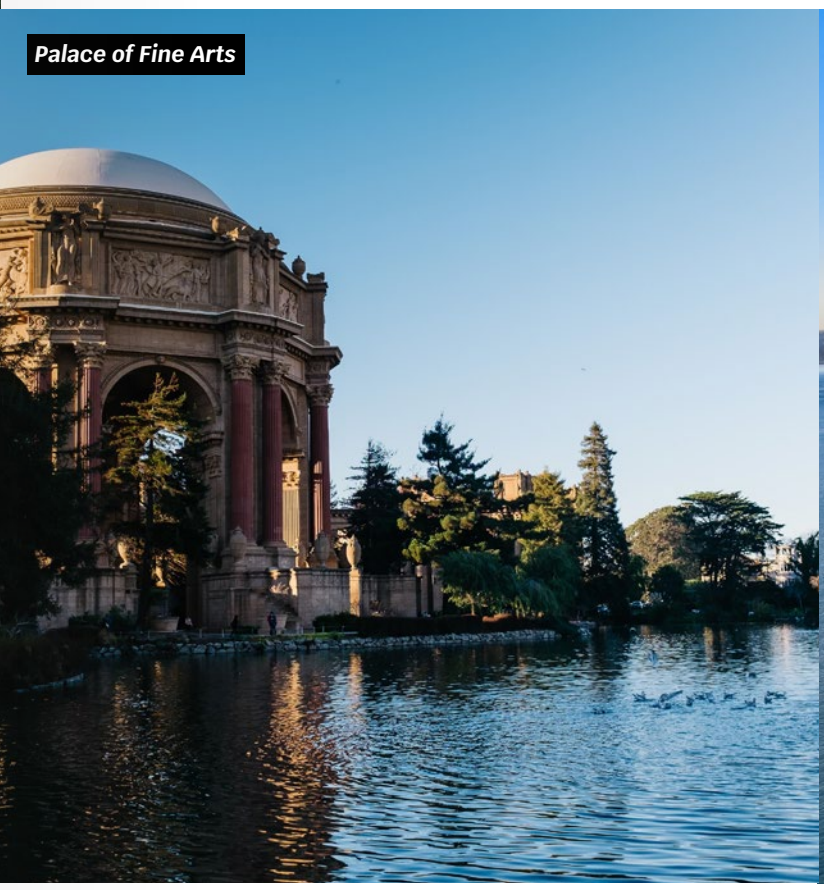
Located close to the Crissy Field is the Palace of Fine Arts. It is a monument structure that was built in 1915, for the Panama Pacific Exposition for an art exhibition. The original structure was completely demolished, with only the steel frame remaining on site. It was reconstructed later with lighter concrete material and walkways, and other structures were built around it. The Palace of Fine Arts gives a twist to the landscape with its Greco-Roman details. It is a popular event and wedding venue.

At the Golden Gate Park and nearby recreational area, you will find restaurant options for lunch (includes Crissy Field and Golden Gate Information center – small café)

Japanese Tea Gardens

From the Palace of Arts, head to the Japanese Tea Gardens. These gardens were created as part of the World's Fair and these oldest public gardens just stayed after the Fair/exposition. Over the years, many improvements and additions were made. The gardens are beautiful with Buddhist and Shinto religious structures and tons of greenery all around. My favorite structure here was the pagoda. Isn't it pretty? The Japanese Gardens also have a tea house. Try some matcha tea here.

After a fun-filled but relaxing day at the Golden Gate, I think there is still time for absorbing more stunning views of the Bay City. Let's head to Sausalito.



Palace of Fine Arts

Sausalito

Sausalito

Located just a ferry ride away is the community of Sausalito. Sausalito is situated at the northern end of the Golden Gate Bridge. From the Golden Gate Bridge (south side of the bridge) it is about a 10-kilometer walk/drive to cross the bridge and reach Sausalito. It is a perfect way to enjoy a romantic dinner in this lively waterfront (but expensive and luxurious) neighborhood.

Sausalito gets a steady stream of visitors due to its close proximity to the Golden Gate Bridge. Sausalito is a waterfront community and so you will find houseboats of all shapes and sizes, yachts, and, of course, fancy restaurants facing the Golden Gate and the sea.


Painted Ladies

Lombard Street

DAY 3

Alamo Square and Painted Ladies

Day 3 of San Francisco starts with a beautiful morning at the Alamo Square. The Alamo Square Park is a residential neighborhood in San Francisco that was popularized with the TV sitcom "Full House." Today visitors of the park and the city admire the painted ladies and you can take a stroll or picnic here at the park square. Try to arrive in the morning to enjoy the uninterrupted views (and also to score a parking spot). Spend as much time as you like. This place does get busy around noon, so time to head for lunch.

San Francisco City Hall

After lunch, head to the City Hall, located just five minutes away from Alamo Square. The San Francisco City Hall is the administrative seat of government for the City and County of San Francisco, California. San Francisco City Hall Docent Tour Program provides guided tours to the public. Tours are from 45 minutes to 1 hour in duration. If you do not wish to tour the City Hall, we would still recommend admiring the monument's architecture from the outside – it is beautiful.

San Francisco Museum of Modern Art

The San Francisco Museum of Modern Art is attracting locals and visitors alike to its 170,000 square feet of gallery space in Bay City. It is newly renovated with more displays and stairs on every floor. Tickets for adult entry are $25 (you can save up to 45% with the San Francisco City Pass). The SF MOMA is open Friday–Tuesday, 10 a.m.–5 p.m., and until 9 p.m. Thursday. They are closed on Wednesdays. You can easily spend 2-4 hours here. More about the SF MOMA activities.

Cable Car Ride at Union Square to Lombard Street

From the SF MOMA, head to Union Square. No, not to go back to the hotel. But to take a cable car ride from Union Square to Lombard Street.

You must have seen images of a steep, crooked street in San Francisco – that's the Lombard Street. The Lombard Street stretches from the Presidio east to the Embarcadero. The crooked part of Lombard Street is located in the Russian Hill neighborhood (eastern side).

You can opt for a cable car ride, starting at the Union Square and taking you to Lombard Street. The cable car operating here is the Powell-Hyde cable car – it takes you to the top of the block on Hyde Street.

San Francisco operates three types of cable cars – Powell-Mason (brings you to the Pier 39, Fisherman's Wharf Area), Powell-Hyde (Lombard and Fisherman's Wharf) and the California Line.

DAY 4

For the 4th day itinerary, take a day trip from San Francisco. If you like wine and are ready to splurge, then Napa Valley is a great option. If you do not drink, but wish to take a day trip and explore more of San Francisco – then Half Moon bay is your answer! Here are some San Francisco day trip itineraries for inspiration.

Napa and Sonoma Valley Day Tour

Located only 1.50 hours away from San Francisco is the beautiful Napa Valley. Napa Valley is known for its wine and picture-perfect vineyards and if you are a wine lover (or love the countryside), this is a great day trip option. There are tons of day tour options for Napa Valley and typically they range from 6-8 hours. Here is a suggested day tour from San Francisco to Wine Valley Napa and Sonoma.

Napa Valley Hot Air Balloon Adventure

Duration: 4 hours

★★★★★

San Francisco: Minibus Wine Tour of Napa & Sonoma Valleys

Duration: 8.5 hours

★★★★★

Redwoods and Wine Country: Napa and Sonoma Full-Day Tour

Duration: 9 hours

★★★★½

Other than the Napa Valley wines, there is the Napa Valley wine train that runs through the valley and is a real treat to experience. You can also experience hot springs, gourmet food and in some ways get transported to Tuscany. Here is another Wine Valley tour, this one includes three wine tours and lunch. You have to be at least 21 years of age to experience wine tours in the state of California.

Half Moon Bay

Half Moon Bay & Mountain Valley

If you are not into wine and would rather visit a beach, then Half Moon Bay is the answer. Located in San Mateo County, Half-Moon Bay is about 45 minutes (drive) away from Mountain View. This coastal town has a much laid back feel to it as compared to the bustling Bay Area. You can grab a bite or two to eat and hike or picnic on their beaches.

The town that services the Half Moon Bay gives a very small-town vibe, with colorful stores and cafes. You can easily spend 4-6 hours at the beach and the nearby town (or the whole day, totally up to you).

Are 4 days in San Francisco Enough?

If you are interested in exploring just the city highlights and take one relaxing day trip outside of the city, then it is possible to do that in San Francisco in 4 days. The attractions listed here in the first 2 days are not located close to each other (like in Europe's cities – city center), so travel time is required.

Using the sightseeing bus to reach there is a smart idea. This bus tour is just a convenient way of commuting in the city without driving or having to track down all the spots on your own.

How to make the best out of your eLearning experience?

BY LUNDRIM SADIKU, PECB

So you have decided to invest in your career by taking an eLearning training course by PECB. Great! Now you need to think – strategically – about how to get the most out of it. Here are some tips:

The first step is to look at the training course in its entirety. This means that before you start listening to the lectures or reading the additional materials assigned to you on KATE, you should first get acquainted with the training course. You can do so by quickly browsing through the training course and skimming through the materials.

Paying close attention to the first section of the PECB training courses will also enable you to get valuable information before starting to study.

For our clients' convenience, we have decided to provide our training course materials in written (PPT), in addition to the video lectures. If you feel like using the written materials to review the training course quickly, then you have the chance to do so.

The second step is to know what to expect by making a plan. Whether you use detailed notes on your calendar or just summarize your studying path by noting important steps across a roadmap, it is of utmost importance that you start planning beforehand. What's important is that you are actively deciding your learning strategy and pace.

To facilitate the plan-making process, you can simply check the training course material and the length of the lectures, and then evaluate it against your own agenda. Fortunately, once you purchase a training course or it is assigned to you, KATE gives you unlimited access to the materials, therefore time allocation should not be a problem in case your agenda is filled.

Another point that must be highlighted is that you should know what to expect in the exam. Therefore, it would be wise to spend some time analyzing the aims and exam areas that are provided at the beginning of the training course. This way, even if you can't watch the entire training course carefully, you will be aware of the areas you need to pay close attention to.

The third step is to discuss with colleagues on the topics touched upon in the course you're taking. Not only you benefit by having the chance to hear things from someone else's perspective, but also you sharpen your own critical thinking skills – and you can see that you might even reevaluate your opinions on particular issues.

The PECB network is wide and spans across all continents, so networking is doable. Perhaps the easiest way to expand your network and get in touch with people who are going through the same training course as you is to share this information on LinkedIn. In a platform full of professionals, it isn't difficult to find people who share the same interests.

I cannot stress enough how important networking is – be it on LinkedIn or on any other platform. Something that starts as a simple discussion group might lead to becoming business partners and valuable career opportunities.

The fourth step is broadening your horizon. This means that as a professional with career aspirations, it is advisable to go above and beyond the expectations set in the training course when studying the subject matter. It might take a while for you to see the benefits, but they sure will come!

A useful way of studying beyond the training course materials provided by PECB is by following up on the references provided to you in the written training course materials.

It is worth noting that international standards usually comprise families. For example, the ISO/IEC 27001 standard is part of the 27000 family of standards; each standard complementing the other. Therefore, following up on related standards is not a bad idea!

The fifth step, and this is something that you must do throughout the entire course, is to take notes. KATE allows you to take notes directly on the app, or you can use the classic pen-and-paper method. Bottom line is, how you do it does not matter for as long as you do it.

Taking notes in a way that they will make sense to you even after several days have passed is an indicator that you did a good job. It is equally important to bear in mind that note-taking contributes to knowledge retention.

Finally, pay attention to the exam. Before scheduling the exam, it is advisable to go through the PECB Exam Policy which can be accessed on the PECB website. You should know what type of exam it is that you are taking (multiple choice; essay-type open book, or closed book, and so on) so that you prepare accordingly. Whatever you do to prepare for the exam, please do it days or even weeks in advance! In short, here's a list of the items you need to pay attention to when taking an eLearning training course:

- ✔ **Review the training course in its entirety**
- ✔ **Make a personalized plan for your learning**
- ✔ **Find a friend or a colleague who might help you in your studying**
- ✔ **Go above and beyond the set expectations**
- ✔ **Take notes systematically**
- ✔ **Prepare for the exam days or weeks in advance**

Good luck!

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Updated	ISO 37001 Lead Auditor	English	→ VIEW
Updated	ISO/IEC 27005 Foundation	English	→ VIEW
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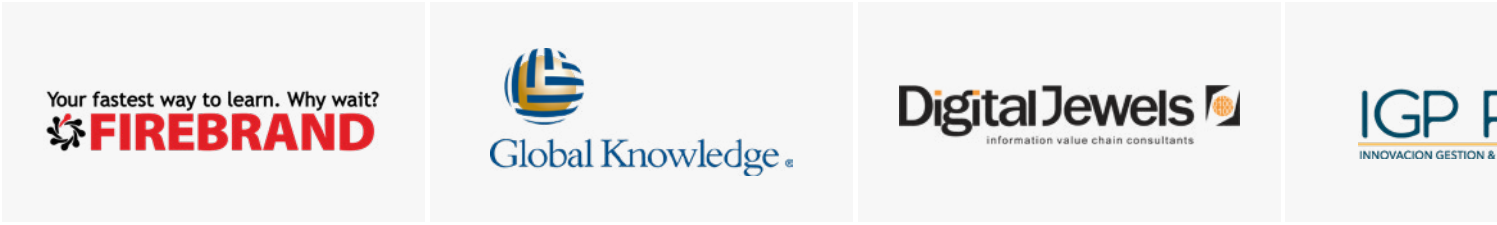

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Wishing you
a Happy New Year!
2020 has been a challenging year for everyone. Let's start a new chapter and appreciate the valuable things in our lives by slowly adapting to this "strange routine." To take care of others, you have to start by taking care of yourself.
#AloneTogether