BUSINESS IMPACT OF WEB3 ON ENTERPRISE



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Contents

[1] Evolution of Data Center	4
[2] Barriers to Digital Transformation	5
[3.1] Decentralized computing and Web 3.0 on Serverless	6
[4] What is Web3 in the enterprise?	6
[4.1] The enterprise opportunity of Web3	7
[5] Can Serverless be cloudless?	7
[5.1] Serverless Limitations	8
[5.2] What is next for Serverless	9
[6] Web 3.0 Is Too Complicated	9
[7] Future of Enterprises: Serverless Solution	10
[8] Web3 for Business – How is Web3 Impacting Businesses?	10
Conclusion	11
Bibliography	12

[1] Evolution of Data Center

Data centers have changed throughout time in terms of their physical and virtual infrastructures. To benefit from the best of both on-premises and public clouds, most businesses now employ hybrid clouds. Earlier, data centers had to contend with infrastructural issues including power supply, cooling systems, cable problems, and a lack of mobility, but today, speed, performance, and efficiency are the principal areas of concern. Data centers will expand and become more prevalent as service complexity, diversity, and penetration increase. The data center landscape is being shaped by several factors, and we anticipate that future data centers will be much more than just larger copies of those that are now in existence.

A significant revolution is now taking place in the datacenter sector. A move away from tradition is being brought about by ongoing technological improvements; during the next five years, there will be a significant increase in demand for data centers due to investments in the cloud, 5G, and the metaverse area.

While cloud and 5G datacenters rely on virtualization technologies to enhance resource efficiency and cut costs, metaverse-driven datacenters are distinguished by their capacity to quickly adapt to changes in workloads and users. A strong demand for network, compute, and storage requirements is being created by the growing acceptance of Web 3.0 and the maturation of several technologies as VR (Virtual Reality), AR (Augmented Reality), Blockchain, Cybernetics, AI (Artificial Intelligence), 5G, etc.

The cloud computing approach enables the delivery of programs via the Internet, does away with the expense of owning and running data centers, and makes use of software developers' labor. The ownership of the infrastructure (and to whom services are provided) and the overall architecture that customers can see are the two main tenets on which cloud computing and services are often founded (e.g., are they providing a platform for applications, or are they providing complete application software solutions as a service). Based on the services offered, there are three primary types of cloud computing:

- Software-as-a-Service (SaaS)
- Infrastructure-as-a-Service (laaS) and
- Platform-as-a-Service (PaaS)

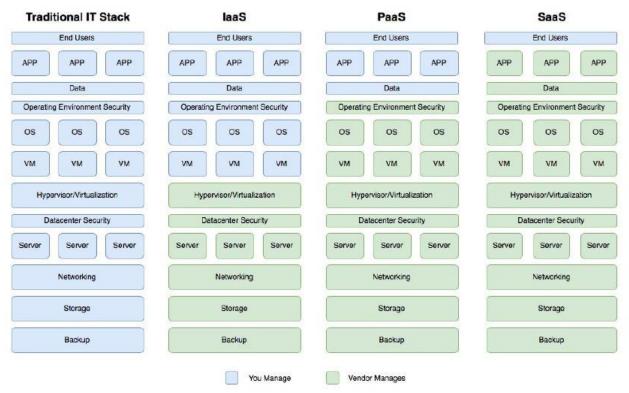


Figure Credit: Terence Fowler - Dell EMC (2018)

The Cloud Computing Stack is made up of these three services, with SaaS at the top, PaaS in the middle, and laaS at the bottom.

There are currently more than three common service models in use. More practical service models are emerging, including "Data Analytics as a Service" and "HPC/Grid as a Service." The need for an effective computing infrastructure, distribution of data, services, and infrastructure control and management requirements, the existence and complexity of enterprise IT (Information Technology), infrastructure, and datacenter/warehouse are all factors that must be taken into consideration when choosing the appropriate service model.

Based on the deployment models, cloud computing may also be divided into subcategories. These classifications are based on an organization's capacity to control business requirements and safeguard assets.

- Public cloud
- Private cloud
- Hybrid cloud

[2] Barriers to Digital Transformation

Let us look at some of the obstacle's businesses may face when they embark on their digital transformation journeys before moving on:

Silos and conventional IT systems: One of the key issues IT firms face today is the ageing of premises and the use of antiquated rules and technologies. The scalability, security, and performance demand of contemporary or next-generation applications cannot be met by existing IT infrastructure. Each application type has its own vertical stack of servers, operating systems, networking, security, and storage resources within the conventional data center. Although application demands have been satisfied, these strict infrastructure silos have made it difficult for IT to operate and maintain.

Lack of qualified personnel: To build and deploy innovative solutions using disruptive technologies like Augmented Reality (AR), Virtual Reality (VR), Artificial Intelligence (AI), Machine Learning (ML), Big Data, Blockchain, and Internet of Things (IoT), technical expertise is required. One of the obstacles preventing firms from implementing digital business is a shortage of qualified experts.

Organizations lack a vision for the digital transformation because they do not comprehend current digital trends and do not have any investments or plans in place. Inefficient data collection and use: Many companies lack an efficient system for collecting, storing, and utilizing data. The successful utilization of internal and customer data is the real secret to success in the digital industry.

Less funding for innovation: Since managing the existing infrastructure takes up most of an IT organization's budget, funding for innovation is often limited.

[3] What is Serverless?

The term "serverless" is currently used to describe an innovative approach to developing applications that depends on managed services and ephemeral computation, rather than merely Function-as-a-Service (FaaS). Developers of serverless software are content to rely on pre-built solutions that save them the time and effort of managing the essential parts of their infrastructure. Today, only the biggest cloud providers provide this service. But is it possible to envision Serverless services that are not offered by cloud providers?

Self-managed Serverless

The initial phase of cloudlessness Self-managed serverless would be serverless. It would give businesses all the benefits of Serverless (easiness of use, auto-scaling, scaling to zero, etc.) without forcing them to use a specific cloud provider. Kubernetes may be used to execute operations utilizing serverless resources with the assistance of open-source programmes like Knative, Open FaaS, or Keda. It is generally perceived as not truly serverless because infrastructure management is still necessary and these solutions provide almost no managed services, but from the perspective of the developer, this is serverless if a company wants to run its infrastructure on-premises, using a hybrid-cloud or multi-cloud approach while still giving its developers a serverless experience.

Serverless solutions at the corporate level can be cost-effective due to the mutualization of infrastructures, in addition to providing developers with easier deployment and administration capabilities.

Both the service users, who only pay for the resources used, and the cloud provider, which makes the best use of its resources, gain from this. In a self-managed setting, however, these benefits are applicable to the entity that put it up.

You can make the greatest possible use of the resources at your disposal with serverless architecture.

When someone self-host a serverless solution, they have the chance to maximize performance. For instance, they can pick the hardware and customize it to meet their needs. Since they can trust the software that runs on their infrastructure, shared servers provide less security challenges than cloud providers.

Self-hosting can be a workable alternative, but it needs specialized resources (infrastructure and personnel) to guarantee service availability.

[3.1] Decentralized computing and Web 3.0 on Serverless

To operate high performance software, the idea that developers and organizations required to know their complete stack—from hardware to software—was changed by serverless. Instead of maintaining computing resources, they might employ managed services and concentrate on their primary development duties. This initial abstraction of the underlying infrastructure is laying the cultural groundwork for the new paradigm of decentralized computing, which is the cornerstone of Web 3.0.

DApps, or decentralized applications, are applications that operate on blockchain platforms like Ethereum or Dfinity. Furthermore, blockchain technology operates on a federation of nodes (the global computer) rather than a single server, making it truly serverless. With such a system, you will not have to rely on a third party to ensure that business contracts are fulfilled, payments are made, or even that your data is stored. You do not need to be concerned about one of your providers failing because your application starts working as soon as it is deployed. The end-user offerings for web 3.0 are still restricted to particular use cases like storing information (contracts for the ownership of digital or physical assets, financial transactions, etc.), as well as already available web 2.0 services, now using decentralized tools for better privacy and fairer revenue distribution.

Since blockchain-based response times are now below those of the web industry, most DApps solely use blockchain to execute transactions through smart contracts and use traditional services to host their front and backend.

Recent advancements have made it more common for developers to operate their apps using completely decentralized methods

For instance, the totally decentralized network of IPFS (Interplanetary File System) enables the storage of data like photos and front-end code. Since the material is sent from the closest node, it makes them immutable, hard to delete, and helps lower bandwidth costs.

[4] What is Web3 in the enterprise?

One is that Web3 will undoubtedly advance over time and eventually play a crucial role in how our IT systems operate. An increasing number of digital firms and customers will urge on decentralization, which is now a major industry trend. Businesses will have to get used to depending on Web3 resources (data, computation, etc.) and sharing more of that control, rather than holding data in our own databases and executing code in portions of the cloud that we pay for or otherwise manage. A significant portion of the crucial information people use to run enterprises will be held in more secure and private locations, preserved in distributed ledgers like blockchain. Over time, a growing portion of our apps will operate utilizing smart contracts that can be seen, verified, and agreed upon by all parties and will be more analogous to open-source projects. Even different companies will have bizarre new subsidiaries that are totally programmed, operate independently, and receive digital feedback from stakeholders (the new active shareholders in the Web3 world).

And this is only the start. The immutable transaction ledgers and encryption protocols of Web3 have now withstood enough scrutiny to validate and pave the way. Decentralization is gradually proving to be a fundamental revolution, even if it is far from the only way technology will develop (since the technology universe is easily huge enough to allow multiple major revolutions simultaneously). Information technology (IT), customer experience, business models, and management structures are just a few of the fundamental beliefs and fundamental technologies that Web3 speaks candidly about changing.

Naturally, a simpler transition will also take place, such the simple acceptance of specific types of cryptocurrencies as payment or the issuance of intellectual property in the form of NFTs (non-fungible tokens). But they are not the profound changes that will take place gradually. As a sector, we have discovered that digital transformation is a moving aim, with the goalposts shifting with each significant technical development. Web3 is a huge advancement, and much like Web 2.0 before it, it will force businesses to consider their goals and methods of operation in whole new ways.

[4.1] The enterprise opportunity of Web3

If the past is any indication, most organizations will find it difficult and uneven to adopt many of the concepts inherent in Web3, from new financial models to decentralization itself. That is not to mean, however, that there are not currently a lot of worthwhile goals for businesses to start formulating plans for and testing with focused prototypes and proofs of concept.

- Decentralization. Some decentralized strategies are fundamentally altering human activities and industry.
 Probably one of the most important fields of study and development is decentralized science, or DeSci.
 Decentralized work, governance, and finance, which has grown to be the biggest of all, are other fields. As deliberate Web3 transformations of whole sectors, not simply of enterprises, these emphasis areas need their own mention, in my opinion.
- Metaverse. Virtual worlds based on virtual or mixed reality have attracted a lot of speculation and investment, many of which are based on decentralized ideas. A metaverse framework may be used to achieve several of the most important internal business use cases (team collaboration, onboarding, learning and development), as well as external use cases (shopping, markets, customer experience). Metaverses can be as simple as the long-standing virtual worlds or as complex and Web3-like services as Decentral and Voxels.
- Autonomous Distributed Organizations (DAOs). The idea of a DAO (Dell Americas Operation) is
 represented by a smart contract, the terms of which are made public. Stakeholders have a clear decisionmaking procedure, and tokens are issued. DAOs are a brand-new kind of digital organization that may be
 applied in a business setting for anything from open innovation and investment to IP-based professional
 services or industry-scale consortiums.
- Web3 Apps Useful applications can be created from the lower-level components of the Web3 stack, which for
 businesses will include internal business apps that operate on decentralized data, customer-facing apps that
 conduct transactions or offer data services, and decentralized ERP (Enterprise Resource Planning) and CRM
 (Customer Relationship Management) systems, which are just starting to emerge, like Energy Ledger for
 industry-specific supply chains.
- Creator Economy for Web3. Enabling the creation and exchange of media and other digital assets, such as art, music, and NFTs, is one of Web3's more thriving sectors. Numerous businesses are involved in this industry or have resources they may use, particularly in the areas of commerce, prediction markets, business media, design, and open data.
- Crypto and Digital Assets. Businesses are all about making money, and cryptocurrencies provide a
 bewildering number of options, such as converting loyalty programmes into virtual currencies, issuing tokens for
 corporate social responsibility, developing asset and commodity-backed currencies, and much more. One of the
 less strategic but growingly beneficial adoption routes is accepting cryptocurrencies as payment.
- Blockchain and Distributed Ledger (DLT). The use of blockchain for tracing supply chains, identifying fake
 goods, storing data, thwarting cybersecurity attacks, and many more purposes has been the talk of the industry
 for years. All these use cases are currently maturing, and several successful blockchain consortiums for certain
 industries have also appeared.

However, there will be significant differences in how this generation assesses the prospects and realizes their potential achievement. Web3 is purposefully made to be difficult for businesses to take control of or manage. But if corporations are ready to give up some control—which is a key principle of digital systems—the potential is unquestionably there. With a seat at the table for everyone who wants one, Web3 is a distributed ecosystem approach to digital that is possibly the most promising so far. It will undoubtedly result in one of the most improbable digital experiences to date. The time has come to investigate it.

[5] Can Serverless be cloudless?

Although such developments could appear to be a danger to cloud providers since they will lead to alternatives for cloud-based infrastructure, they provide an opportunity for us to make use of innovative technology to improve companies' products. For instance, we are looking at WASM (Web Assembly) to improve the performance of serverless products (Serverless Containers and Serverless Functions), which are built on open-source technologies that can be

used to create self-hosted serverless solutions. In a similar vein, blockchain-based software may be utilized to strengthen our adaptability while more efficiently allocating resources and data throughout our data centers, hence enhancing security.

Using managed services makes it simpler for users to test new features or products before moving to self-hosted, multicloud, or distributed solutions.

[5.1] Serverless Limitations

Platform-as-a-Service is an extension that focuses on making it easier for developers to deploy their code. However, Platform-as-a-Service often still ties your application to a server, which restricts scalability and results in fixed expenses. For instance, Heroku's Dynos allows you to deploy and run your code with only a few clicks, but it cannot "scale to zero" and does not automatically grow by default.

Some of its advantages include high scalability, pay-as-you-go, flexibility, and no server administration.

The use of microservices and EDA (Electronic Design Automation) to deploy any application seems to make serverless the best option (Event Driven Architecture). However, things are not as pleasant when it comes to keeping up such applications. There is no free lunch in a closed system, as D. Zimine states in his extremely pertinent paper on Serverless: "Something must be given to achieve a benefit." To get with provider restrictions, whether it is controlling latency (cold start) or just deploying many functions at once, developers and the Serverless community have had to create new tools, methods, and practices.

Let us analyze the main selling points of Serverless.

• No server management

Serverless, as the name implies, frees developers from having to maintain servers; instead, the cloud provider takes care of everything from system upgrades to access control, scalability, and server redundancy. There are servers underlying serverless systems, but they are safely shared by service users, and administration of the infrastructure and security is handled by cloud providers (specially to prevent users from disturbing or worse attacking other users).

Users lose control over where and how their code is performed, and most critically, how, and where their data is handled, when there is no server administration. According to the 2019 O'Reilly serverless study, security issues are the most often cited barrier to serverless adoption.

Scalability

The recent years have seen the emergence of efficient open-source tools that enable infrastructure-based traffic or resource consumption to be scaled automatically. Examples include container orchestrators like Kubernetes or micro VMs (virtual machines) like Firecracker. Building on these solutions, Serverless compute services can run code or containerized applications that adapt to traffic surges, and most of all, thanks to mutualization and system optimization, the code used in these applications can scale from zero in less than half a second. Server mutualization and containerization assist to conceal the fact that scalability is neither infinite nor immediate by allowing nodes with the capacity to quickly launch containers to satisfy demand to constantly remain active. There are still servers operating in the background, and their ability to be started or halted is limited by their physical nature. Additionally, sharing resources means that all users that share the same nodes will receive the same service. This thus entails the removal of restrictions and quotas that prevent the programmes used by consumers from scaling forever.

Flexibility

Serverless advances the idea of microservices to the point where any component of a system may be handled and scaled individually if we limit Serverless to Functions-as-a-Service. For instance, if a website receives a lot of requests for its billing or login systems, it will not influence the notification or user information systems, which are rarely utilized. Because each microservice may be reduced to a collection of functions, serverless can be thought of as a descendant of microservices-based applications.

However, as each distinct function or service is reduced to a single fundamental action, with the logic being provided by middleware or third-party services, this suggests a more complicated architecture (message queue, workflow engine, etc.). This opens a huge issue for serverless apps. However, some contend that these issues are cultural in nature and that Serverless necessitates a shift in the way applications are developed, from producing to consuming services, and from code to configuration.

Easy management

Cost efficiency

Cloud providers provide the option to scale to zero, which means that just their control plane is operating while clients' applications are on "standby" ready to handle incoming requests. This is made possible by economies of scale and mutualization. Additionally, developers may create an application in which each service scales independently by optimizing their apps for Serverless. This was the key driver behind the first adoption of Serverless by businesses.

Serverless is advised for asynchronous processes or those that can be readily parallelized and have unexpected loads, but cost effectiveness depends on your use case. As a result, serverless is very appealing for newly launched services, especially for smaller teams that lack the resources to manage their own infrastructure and can afford serverless as an additional expense, but less so for more established businesses that can afford to invest in their own system (using Kubernetes for instance). Be cautious since Serverless solutions are invoiced on a "pay-as-you-go" basis, which makes prices unpredictable depending on usage. Therefore, it is crucial to be able to keep an eye on your expenses or restrict how much your functions may grow.

[5.2] What is next for Serverless

You may make several upgrades to the original project. There are opportunities to experiment with changes to the real source code, for instance:

Function: Before transferring photos to S3, compress and/or resize them. Add a route to the container to receive all the photos at once.

Function: Add the temperature to a new column in the database for each record that is inserted, after retrieving it from an API.

Container: Enhance the front end's thumbnail presentation.

[6] Web 3.0 Is Too Complicated

We must resist the pull of data center-dependent, instantaneous user interface pleasure and incredibly straightforward API connections if we want a genuinely decentralized future.

The re-decentralization of the global information technology ecosystems is one of the most significant objectives and advantages of the Web 3.0 revolution. When it first began, the internet was a decentralized system. Over time, centralized mechanisms have very successfully overlaid themselves across this decentralized environment.

The foundation for the centralization of the Web 2.0 age is the economics of the software industry and the strength of network effects, and they are both aided by the liberal use of dark patterns on users (i.e., Web 2.0 tricks to get people to give up personal data). We run the risk of replicating some of the same trends in the Web 3.0 age if we are not attentive.

There are two major risks to a sustainably decentralized future:

Building effective blockchain interface tools is complex. It is difficult to interact with distributed systems when you add extra requirements like keeping numerous signatures or utilizing zero knowledge proofs to protect privacy.

These days, using an application programming interface is the most straightforward approach to handle that complexity (API). Need to create a token? For that, an API exists. Do you need to view the transaction history? There is also an API for it. These APIs (Application Programming Interfaces) in turn write to and from the blockchain while managing all the associated complexity. Although APIs make it easier to create blockchain tools, all of them rely on centralized infrastructure and software. In other words, widespread API use will result in the centralization of several crucial blockchain operations.

The most crucial task for developers is to provide libraries and tools that make it simple to access Web 3.0 ecosystems directly and maintain code without having to rely on APIs, to avoid excessive centralization through dependence on APIs and SaaS (software as a service) applications. Though it seems simple, that is quite difficult. It is hard it is to manage software distribution and how simple it is to maintain consistency and control using an API for software-as-a-service.

Web 3.0 will bring modernization to a great extent to create Web 3.0 services that function and operate precisely like Web 2.0 offers. The most universally accessible, high-performing systems will be given as rewards to the participants in protocols that provide "decentralized" computation and file storage. These are often found in central data centers managed by big businesses.

If we want Web 3.0 apps to be as quick and responsive as Web 2.0 applications, this is crucial. But is it really a worthwhile goal? Instead of transferring existing workloads to new platforms, the most effective modern technologies

focus on handling new workloads. Web 3.0 is more adept at a few extremely particular tasks, such as tokenizing value and facilitating intricate interconnections.

The self-service, cloud-native development capabilities of PCF are optimized by an enterprise-grade developer platform on hyper-converged infrastructure, which enables enterprises to innovate more quickly with cloud-native apps in one pre-packaged solution. Using dependable, robust infrastructure for straightforward, seamless lifecycle management that keeps the environment updated with almost no downtime, this provides the best approach for quickly implementing Pivotal Cloud Foundry on-premises. Along with this, adding Pivotal Function Service (PFS), a serverless computing solution, would increase the ability to automatically respond to events with container-based workflows. It provides event-stream processing and connects to message subjects using a function container interface, which is language-neutral. The idea of a "serverless" hybrid cloud is not far off if basic cloud FaaS products (such as AWS (Amazon Web Services) Lambda, Azure Functions, Alibaba Functions, etc.) are combined with this on-premises, hybrid-cloud capable architecture.

In conclusion, having the flexibility to divide workflows with serverless technologies will make the transition to a hybridcloud infrastructure easier. Users may utilize serverless as the main technology for the orchestration and administration of their on-premises monolithic apps so they can coexist with cloud-native ones thanks to the dynamic nature of the Publish-Subscribe pattern and the way it leverages events to activate infrastructure as code

[7] Future of Enterprises: Serverless Solution

Future technologies like AI and blockchain will enable serverless techniques more effectively. Because many businesses will soon be subject to stringent data privacy laws, we believe Dell Technologies can propose an architecture for prediction mechanisms and recommendation engines based on safe and self-learning AI models in the blockchain by combining serverless and these technologies. This enables the establishment of user personas that are entirely secure for the user and are private.

The blockchain's smart contracts are used to specify the abstractions used to create AI models, allowing for both updating and the development of new deep learning and machine learning models. Based on specific use cases, the AI formulation on blockchain may also be abstracted (i.e., Banking, Retail, Social media, etc.). A distributed digital ledger called a blockchain provides immutability, trust, and security by default. The foundation of a blockchain's design is the idea that all nodes in a network should always be operating in a state of consensus

The most well-known use for a blockchain is to eliminate duplicate spending in digital currency transactions without the usage of a centralized system. The possibility to incorporate blockchain to develop a distributed storage service, however, is less well recognized. Decentralized cloud storage is harder to hack than centralized data from the past. In a technique known as sharding, files are divided up and dispersed over several nodes in a decentralized network. A private key is used to encrypt these files, making it difficult for any other network node to access your data. Additionally, because of sharding, the files are only a small portion of what they once were, making it impossible to view their whole contents. Imagine safe data transfer from on-premises to a public cloud provider using serverless technologies.

This will prevent problems like SQL injection in serverless programmes, which is very advantageous for the adoption of the technology. This is where we see serverless technology going, but there are countless more alternatives.

[8] Web3 for Business – How is Web3 Impacting Businesses?

It is not difficult to anticipate that the Web3 revolution will have the same consequences given the tremendous influence Web2 had on the commercial sector. As a result, this offers important chances for both current and new businesses to alter the current business landscape.

With the help of Web3's underlying blockchain technology, organizations in any industry—from financial services firms to the healthcare sector—can enhance their current business models and create brand-new, creative ones. Furthermore, the decentralized design of Web3 is the source of these potential.

Companies are testing out ideas like revenue sharing, income sharing, ongoing funding, ICOs (Intersight Cloud Orchestrator), etc. The scope of this focuses on the following three categories instead of exploring all possible ways that Web3 may affect the corporate sector briefly:

- DAOs The governing structure of Web3 projects/protocols is referred to as DAOs. Tokens are
 distributed when DAOs are created, enabling stakeholders to take part in important decision-making.
 As a result, this offers organizations a creative chance to decentralize the structure of their governing
 body.
- Less Onboarding Friction The decentralized web includes a uniform identity layer, unlike the online ecosystem of today. As a result, users may log in with numerous platforms using just their Web3 identity, making the user experience smoother. Additionally, it reduces onboard friction, which is very advantageous to enterprises.
- Distributed Ledgers and Supply Chains Businesses have been experimenting with blockchains, which are distributed ledgers, to monitor data, store data, identify counterfeits, etc., inside their supply chains. The necessity for simple Web3 for business integrations is highlighted by the fact that Web3's influence on company will only increase.

Web3 has a big influence on businesses all around the world. Additionally, Web3's decentralized design enables developers to upend existing sectors by presenting fresh, cutting-edge economic models. Therefore, enterprises must be able to seamlessly integrate Web3 for business.

There are two reasons why Web3 integration must be available. First off, it offers entrepreneurs fantastic chances to expand and seize market share in sectors that would otherwise be difficult to enter. Second, it guarantees that well-established businesses may maintain their place in a market and continue to expand. However, adopting current technology without simple integration is always difficult, especially for larger firms with less flexibility.

Additionally, adopting and integrating Web3 for business has been difficult from a traditional standpoint, and the major cause of this has been the dearth of tools for professional development.

Conclusion

Deliberations and internal company power conflicts frequently center on the problem of whether IT should be centrally managed or decentralized. The truth is that organizations have had to grow increasingly decentralized because of the need for emerging technology among diverse workforces, enterprise firms in highly regulated sectors like healthcare, finance, banking, education, and government might not seem like a good fit for decentralized IT operations at first. Decentralized operations and technologies' associated concepts of independence veer sharply toward components of compliance, scalability, and solitary leadership. The idea is, instead of using centralized servers, Web3 platforms will host data on decentralized networks. Decentralized data is intended to prevent a small number of corporations from dominating the internet.

But, due to security and compliance considerations, this decentralization trend may cause chief information officers and compliance officer's anxiety. CIOs (Chief Information Officers) should strive to maintain oversight over compliance, security, and overall IT strategy while allowing their business divisions to operate independently.

Although the idea of a decentralized web has been debated for many years, most of the web is still centralized. Thousands of decentralized applications can be accessed through the Ethereum network, which is currently the largest community-run decentralized network.

Web3 will significantly disrupt our current workforce. The technology will converge with the expanding gig economy, giving employees more control over who they work for, what they work on, and how they are compensated. Business executives must now comprehend the next computer era, how it will affect businesses, and how it will create new value over time.

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