Digital transformation is a top priority for C-level executives as organizations look to automate operations, deliver rich customer experiences, and launch service-oriented business models. Open ecosystems that can accelerate new technology and product innovation are proving to be the preferred approach to achieving success.

Benefits of the Open Edge: What It Is and Why It Matters Now More Than Ever

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Introduction

Capturing a piece of the digital transformation (DX) opportunity is at the center of business strategies today. Across all industries, this amounts to an opportunity for an increased annual economic value of $18.5 trillion, or nearly 25% of global GDP. This analysis is based on IDC DX research focused on the impact of digital technology and looks across the value chain — spanning product development, production (factory), supply chain, and customer experience.

Today, survival of the fittest is linked not to size or strength but to the ability to change — to move quickly, adapt, seize opportunities, and be agile. Transformation is driving organizations to rethink their technology strategy, and that includes the incorporation of innovation accelerators such as the Internet of Things (IoT), artificial intelligence (AI), 5G networks, and edge computing.

AT A GLANCE

KEY STATS

» Nearly 70% of new data is generated at the edge via intelligent endpoints.

» 73% of organizations view edge solutions as a strategic investment.

» By 2024, there will be an 800% increase in the number of applications at the edge.

KEY TAKEAWAY

Open source software and open ecosystems are providing the flexibility and security needed to increase the pace of innovation at the edge and create new business opportunities.

This requires a new product mindset that is based on the principles of continuous innovation. The old method of embarking on an 18-month development cycle for a new product or service is too slow for today's fast-moving world. Customer needs and the business landscape are constantly changing.

That is why guidance for DX initiatives often includes "start small." In an environment with a rapid pace of innovation, visibility ahead is limited. Getting comfortable with concepts such as failing fast, measuring results, and adjusting is essential. DX plus continuous innovation creates digital resiliency. A resilient business is not just thinking about today. It is equipped to sustain a competitive advantage into the future.

It is also important to understand where your core competency lies. Not all businesses need to become software companies just like not all software companies need to build hardware. This is why ecosystems are a critical component of strategy. Whether you create a new ecosystem or join an existing ecosystem, the network effect maximizes value for both customers and the bottom line.

DX leads to creation of new sources of data and associated value. According to IDC research, nearly 70% of new data is generated at the edge via intelligent endpoints. As organizations begin to harness the power of edge data, they are learning the value of it increases when it can be externally monetized. However, commanding maximum value requires confidence in the quality of the data as well as a secure way of sharing it with others. The emerging concept of trust fabrics is focused on making this vision a reality, creating the framework for data-as-a-service (DaaS) marketplaces. The true potential of DX is new business models and customer experiences enabled by interconnected ecosystems, and realizing this potential requires an open, trusted foundation.

None of this happens overnight. DX is a journey that starts with defining business objectives, identifying the technology needed to achieve those objectives, and participating in ecosystems where shared knowledge and experience create an accelerated path to success. There is no better time to start than now by investing in the right building blocks that allow an organization to scale both its business outcomes and the underlying technology.

The Importance of Edge

Edge is at the intersection of information technology (IT) and operational technology (OT) where the digital and physical worlds converge. After a decade of datacenter consolidation and migration to public cloud infrastructure, it is an acknowledgement that limitations exist in centralized computing architectures. There are several situations that require moving intelligence to where data resides rather than the other way around.

The most common motivator for edge solutions is attributed to latency, which represents a delay between an application request and the resulting response. For real-time applications, milliseconds matter. In an OT environment, excessive and especially unpredictable latency could mean an increase in defect rates or a safety issue. While 5G networks promise to dramatically reduce network latency, they address only one side of the equation. Fast response times between an endpoint and the network do not matter if the server running a critical application is a thousand miles away.

Bandwidth limitations are another key factor. IDC survey data shows 36% of IT organizations report lack of bandwidth between edge and core infrastructure as a challenge in implementing edge solutions. With the proliferation of IoT devices and other connected equipment, data generation at the edge is growing exponentially. Depending on the location, high-speed network connections may not be available or are prohibitively expensive. In response, some organizations have chosen to delay the implementation of AI use cases that depend on large volumes of data, not realizing that edge computing can reduce data transmission requirements by filtering and processing data locally.

Implementing an edge solution also allows an organization to limit the movement of data to address corporate governance policies or other regulations that require sensitive information to remain onsite. In Europe, the General Data Protection Regulation (GDPR) dictates data sovereignty rules as to where data can be communicated and stored. Other jurisdictions are following suit with legislation such as the California Consumer Privacy Act (CCPA). Edge provides more control over how data is managed.

Further, edge computing improves business continuity. As more organizations automate operations, it is imperative that the underlying systems remain available even if the network or cloud is not. Every major cloud provider has had a service outage over the past year. Applications running on edge infrastructure can continue to function until services are restored, limiting the impact on business operations.

Think of edge as a complement to — not a replacement for — systems running in the cloud or datacenter. It creates a continuum of computing resources that range from small, constrained devices to large systems in metro facilities running sophisticated workloads. While it is common to see descriptors such as industrial edge or enterprise edge highlight use cases, the technology itself is agnostic. Edge solutions allow you to place infrastructure and applications closer to where data is generated and consumed, optimizing performance. Additionally, edge computing lets you insert trust into the data from the moment it is created, which is a key element of the emerging concept of trust fabrics.

IDC sees a strong outlook for edge solutions as they attract the attention of C-suite executives. According to an IDC survey, 73% of senior IT and line-of-business decision makers view edge as a strategic investment. These organizations are looking to edge as a way of increasing productivity and improving security, leading to faster, more informed decision making (see Figure 1). IDC predicts that by 2023, over 50% of new enterprise IT infrastructure will be deployed at the edge rather than corporate infrastructure; by 2024, there will be an 800% increase in the number of applications at the edge.

FIGURE 1: *Organizations Expect Short-Term and Long-Term Benefits from Edge*

Q *What business benefits do you expect edge adds/will add to your organization?*
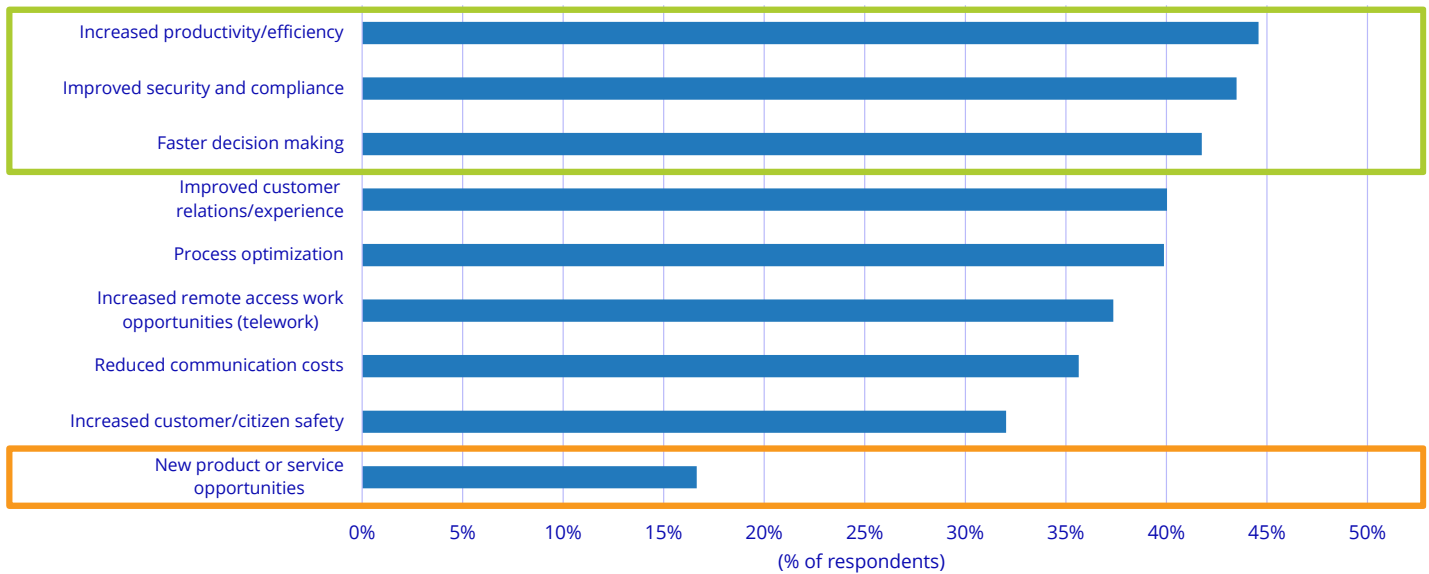
Source: IDC, 2021

The Benefits of Open Edge Infrastructure

IT organizations are familiar with the concept of "open." This includes open architectures that provide new ways of developing, delivering, and integrating systems and applications; open processes that create new ways of doing things across both IT and the business; open culture and ecosystems enabling new ways of working together and building partnerships.

Open source software development increases the pace of innovation by leveraging a community based on collaboration. The nature of open source projects leads to transparency in both access to software and the ability to act upon it. The community approach demonstrates that shared problems can be solved faster and that working together creates standardization.

Open organizations create sustained competitive advantage by establishing new delivery models and revenue streams. Open ecosystems take that to the next level by sharing knowledge and experience in terms of horizontal technology and vertical domain expertise. To capitalize on these new product and service opportunities, organizations must invest in open infrastructure to establish data confidence through trust fabrics, which facilitate the secure exchange of data between interconnected entities.

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These are newer concepts to OT organizations that have a long history of proprietary systems acquired from vertically oriented suppliers. Traditional OT systems are the opposite of open. They are considered closed, which makes OT teams dependent on their vendors for innovation. Closed systems are typically more expensive to purchase, operate, and maintain. Based on proprietary hardware and software, closed systems are often isolated or siloed, reducing the value of the data they contain.

This is changing as IT and OT systems converge. IT's experience with open systems is showing OT that it is possible to run mission-critical workloads on standard infrastructure in a manner that maximizes uptime and security. Open systems that can support both legacy software investments and new, cloud-native applications are the key to interoperability, creating a foundation for future innovation.

Open edge systems are also the best approach for multicloud environments. IDC research shows that 67% of organizations have data and applications in more than one public cloud provider. With a proprietary edge solution tied to one cloud, integration into multiple clouds is difficult, costly, and potentially impossible. An open mindset is the enemy of vendor lock-in. Even if only one cloud provider is being used today, open edge infrastructure future proofs the investment.

How to Get Started

Deploying an open edge architecture involves the following rules:

» Decouple domain knowledge, data, and applications from infrastructure. This layer of abstraction provides better utilization of the underlying resources and improves resiliency.

» Decouple edge investments from the cloud as close to the point of data creation as possible. This reduces vendor lock-in and provides more flexibility for future technology decisions.

» Take advantage of cloud native where appropriate while protecting legacy investments. Most environments have a mix of workloads that need to be managed and secured in a consistent manner.

It is also important to recognize that there is more than technology to consider — there is a cultural shift as well. Business case and people are fundamental considerations when developing a DX strategy. As with any change, staff can be concerned about whether they have the necessary skills to adopt a new way of doing business, leading to anxiety around obsolescence. Training and new standard operating procedures need to be part of the plan. Organizations should

focus on key capability needs (e.g., uptime, safety, security, governance) and look to cross-functional teams that can promote shared learning.

To meet future scalability requirements, edge solutions should be designed with simplicity and flexibility in mind. Open source software can address this by leveraging shared investment from the community. IDC reports that 45% of enterprises have already adopted open source. It is a modern way of driving standards and avoids "recreating the wheel" or spending time and money on undifferentiated functionality.

Ecosystems are another critical element. Whether organizations are creating a new ecosystem or joining an existing ecosystem, the pace of innovation is accelerated through the network effect. They should architect new products and services with an ecosystem mindset from the start, focusing on unique differentiation that adds value to others. Business problems solved at the edge often require domain expertise. An ecosystem facilitates partnerships that bring this necessary domain expertise and can lead to new opportunities.

Considering ZEDEDA Edge Orchestration

ZEDEDA is a simple and scalable cloud-based orchestration solution for the distributed edge that delivers visibility, control, and security for edge computing deployments in the field. The solution provides full-stack remote management and observability for any distributed edge computing hardware and application while connecting to any cloud or on-premises system (see Figure 2). ZEDEDA's solution features zero touch deployment without the need for IT skills in the field and a robust zero trust security model to protect critical assets and data.

ZEDEDA leverages EVE-OS, a secure, universal open source operating system, developed with vendor-neutral governance as part of the Linux Foundation's LF Edge organization. EVE-OS is architected to simplify the deployment, orchestration, and security of cloud-native and legacy applications on distributed edge compute nodes. It encrypts data, maintains device and software integrity, and supports VMs, containers, and Kubernetes clusters. Serving as an open and flexible foundation, ZEDEDA and EVE-OS help future proof edge deployments.

FIGURE 2: *Automated Orchestration for the Distributed Edge*
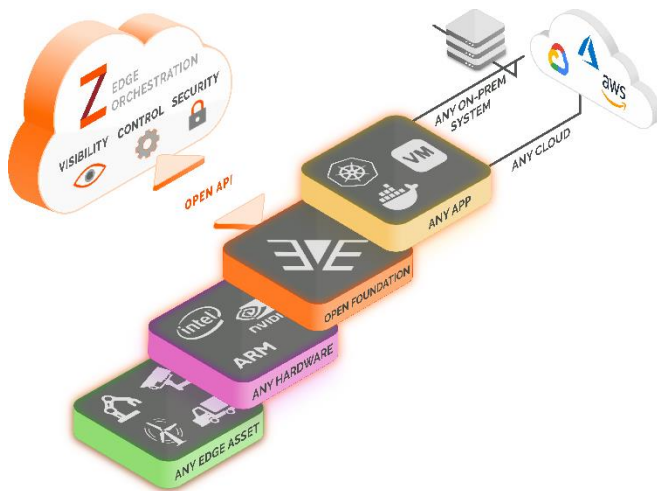
Source: ZEDEDA, 2021

The company focuses on three main principles:

» **Zero Limits.** ZEDEDA supports any hardware, any application, and any cloud without vendor lock-in. The solution can onboard and manage any number of nodes, consolidate workloads (legacy and cloud native), and bulk deploy (or update) applications remotely.

» **Zero Touch.** ZEDEDA makes it easy to get edge compute nodes up and running quickly. It is possible to drop ship and instantly provision hardware remotely at scale with all of the OS and system software automatically downloaded from the cloud. Upgrade risk is reduced with automatic roll-forward, roll-back, and failover mechanisms. The simple UI does not require IT skills for deployment in the field.

» **Zero Trust Security.** ZEDEDA employs hardware root of trust, eliminates hardware spoofing, detects anomalies in the software stack, and ensures device integrity with hardware root of trust while governing data flow across applications and nodes with distributed firewall capabilities.

ZEDEDA believes that an ecosystem built on an open foundation is critical for success in an increasingly connected and data-driven world. The company has created an open ecosystem of hardware OEMs, ISVs, and solutions integrators to accelerate the adoption of edge solutions. In addition, ZEDEDA is engaged with key industry efforts to grow edge interoperability and the vision of trust fabrics driving new business models and experiences through interconnected ecosystems. This includes helping lead the formation of the Linux Foundation's Project Alvarium, focused on developing trust fabrics that provide a measurable way of evaluating data confidence based on a system-level approach from silicon to cloud.

Challenges

Implementing an edge solution is not without challenges. The further you move away from centralized infrastructure, the greater the chance of diversity in hardware types. Applications at the edge can also vary in architecture ranging from bare metal to virtual machines to containers. To complicate matters further, integration is often required into legacy systems with proprietary network protocols and data formats. This perceived complexity can have a paralyzing effect on an edge-focused initiative.

An ecosystem that leverages open standards can bring together all the required components in a pre-integrated fashion that reduces complexity. However, creating an ecosystem is not trivial. ZEDEDA must continue to invest in and promote EVE-OS together with the open source community while building relationships with hardware, software, and services partners. This is a process that can take years to achieve, so ZEDEDA must continue to demonstrate short-term value for its customers while executing on its long-term strategy.

Conclusion

Organizations are investing in DX initiatives to automate operations, deliver rich customer experiences, and create new products and services. Edge computing is a key enabling technology that can collect, analyze, and act on real-time data generated in the field leading to quicker decision making and sustained competitive advantage.

The key to edge success is investing in open source technologies that promote open ecosystems that can accelerate innovation and allow organizations to capitalize on the network effect. Open, trusted infrastructure maximizes the potential to amplify the value of data and implement new business models, much like the internet has done for countless enterprises.

For solution OEMs or technology providers, it is critical to nail a niche by proving business value and commercial models early and then scale with the power of an ecosystem. End users should start small but architect for the long term, protecting investments as the solution grows. ZEDEDA is bringing together all the necessary elements (technology, ecosystem partners, and industry collaboration) to deliver on the promise of digital transformation at the edge. IDC believes the market for open edge infrastructure will continue to be important, and to the extent that ZEDEDA can address the challenges described in this paper, the company has a significant opportunity for success.

> ZEDEDA is bringing together all the necessary elements to deliver on the promise of digital transformation at the edge.

About the Analyst
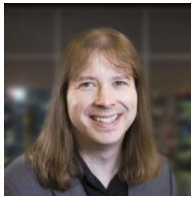
Dave McCarthy, *Vice President, Cloud and Edge Infrastructure Services*

Dave McCarthy is a Vice President within IDC's worldwide infrastructure practice, where he leads a team of analysts covering shared (public) cloud, dedicated (private) cloud, and edge strategies. Benefitting both technology suppliers and IT decision makers, Dave's insights delve into how hybrid cloud platforms provide the foundation for next-generation workloads, enabling organizations to innovate faster, automate operations, and achieve digital resiliency.

MESSAGE FROM THE SPONSOR

About ZEDEDA

As a leader in orchestration for the distributed edge, ZEDEDA firmly believes in the importance of open, vendor-neutral edge infrastructure to facilitate interoperability and choice starting as close to the source of data generation in the physical world. Our solution extends IT best practices to the edge while accommodating the uptime and security needs of critical OT systems, enabling full lifecycle management and zero-trust security with any combination of hardware, software, on-prem systems and clouds. The open-source EVE-OS foundation from the Linux Foundation's LF Edge organization provides enterprises with an insurance policy against cloud lock-in and serves as an anchor point for an ecosystem of hardware, software, and services providers. A multi-cloud strategy rooted in an open edge enables maximum flexibility for the future, including realizing the ultimate potential of DX - interconnected ecosystems linked together through trust fabrics that deliver data across networks with measurable confidence.

Learn more at www.zededa.com.

IDC Custom Solutions

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