Insight

Take Advantage of the Intelligent Edge to Leverage Valuable and Extensive Data

Your guide to getting the most from your data

The perimeter is blurring.

In an Insight commissioned survey conducted by Foundry, 51% of respondents said their top IT priority for 2023 was optimizing their data and analytics capabilities like Artificial Intelligence (AI), machine learning and Internet of Things (IoT).[1] Much of the data collected from devices can be analyzed close to the point of origin — at the "edge" — to deliver near-instant, automated results. In the IoT age, nearly every connected device generates huge amounts of data — and the visibility that can be gained from it is invaluable. From factory floors, solar farms, retail stores and train stations, businesses aren't boxed in by how they can capitalize on their data.

The intelligent edge can be leveraged to improve end-user experiences, take advantage of IoT devices and tap into long-term ROI, as well as to achieve other benefits. This is done through:

- **Improving operational efficiency and reducing latency when making business-critical decisions**
- **Creating access to a real-time view of day-to-day operations across locations with oversight**
- **Optimizing operational costs by reserving cloud spending for deeper analysis and offloading the rest to localized compute**

Unlocking the benefits

When it comes to the intelligent edge, the benefits aren't limited to specific industries — and use cases are as unique as their organizations. First, organizations gain insight into valuable data they may not have been able to process before. Additionally, the intelligent edge shifts spending into CapEx to prevent OpEx bleed by reducing the amount of cloud bloat and investing in devices, local compute and storage where possible, saving businesses redundant cloud spend. Localized compute has additional benefits as well: Offloading cloud compute saves precious bandwidth, while localization brings compute-intensive, latency-sensitive apps closer to the end user for real-time decision-making. All these aspects of the process come together to optimize the user experience while reducing IT spending in the long run.

Exploring the components of intelligent edge

Network

Devices are portable and capable of localized compute, so how does networking fit into intelligent edge? We can't realistically send all data to the cloud in perpetuity from all endpoints. Besides the storage and cost containment concerns, real-time analysis and decisions wouldn't be possible, and the latency would be an additional challenge. To avoid this scenario, edge compute and localized data storage are used, allowing for that analysis and decision-making to occur at the source.

To allow this, the networks supporting the edge must be robust and able to optimize traffic flows across on-premises and cloud environments securely. Software-defined WAN addresses many potential challenges by providing path optimization, encryption, and wired and wireless solutions to provide endpoint connectivity. Today, many IoT devices leverage traditional Wi-Fi, LoRaWAN® and even cellular connectivity as low-latency 5G solutions gain popularity. Still, these devices require design and implementation planning to ensure the viability and successful application of intelligent edge technologies.

Infrastructure

With this shift toward more localized analysis and decision-making, supporting infrastructure needs to be part of the conversation. In general, intelligent edge architecture should aim for the following traits:

Resilient: Hardened devices with appropriate redundancies
Scalable: Can accommodate growth without waste
Extensible: Additional functionality and features on demand
Secure: Security at all levels of the architecture
Operationally efficient: Management and monitoring at scale

Businesses that need immediate responses and quick decision-making should prioritize computational infrastructure. Others that rely on data to be collected and sent to a centralized hub should prioritize proper storage and connectivity. Upgrades such as wireless and/or additional access points may be necessary as the implementation process gets underway. Additionally, the intelligent edge requires some high-level design components at the edge:

- A physical platform appropriate to the data needs and environmental rigors of the location (especially if remote)
- A software platform that processes data efficiently, can store it and forward it to a central repository
- Sensors, cameras and/or data feeds that gather relevant business data
- A secure, performant and reliable network transport

Security

With localized computation comes the reality that each device might be a potential entry point that needs to be secured. Some collected data will be too sensitive to send across the cloud even if encrypted, requiring alternative security measures. On the other hand, not all data needs to be encrypted (and doing so unnecessarily can be costly), necessitating data classification. Physical devices can be placed and designed with security in mind, and data can be locally encrypted as a backup to other measures.

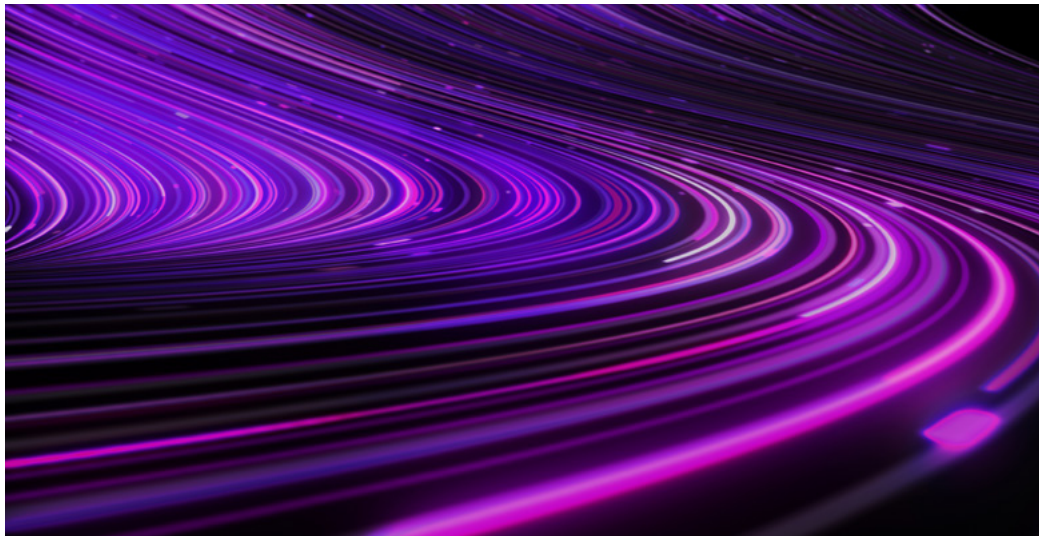
Businesses can also leverage integrated network security solutions that provide holistic coverage of their endpoints, applications, data and infrastructure. Next-gen firewalls have historically been a given for external edge security, but now with IoT devices, end users, applications and data all connecting to the internal network, security controls at the point of these devices are crucial too. Additionally, network access control solutions provide not only granular east-west traffic segmentation and enhanced visibility, but also provide security automation and threat detection and allow organizations to mature their Zero Trust strategies at the edge.

For sensitive data at the edge, organizations should adhere to the 3-2-1 protection strategy: 3 copies of your data, on 2 different storage mediums, with 1 stored off-site. However, replicating a copy of your data from the edge can introduce network and bandwidth challenges. Therefore, the cloud should be considered as an off-site immutable archive location. Lastly, recovery plans tailored to data recovery at the edge should be created and tested on a regular basis.

Data

The intelligent edge is all about leveraging the valuable data that can be captured and often forgotten or unused. However, managing the amount of data produced and stored in a cloud environment is still important. While local compute and storage are paramount to the intelligent edge, that doesn't mean data is no longer stored in the cloud now. Instead, data should be identified and classified for storage routing. For example, raw data can be stored locally or given an expiration. Alternatively, metadata, aggregate data and machine learning outputs are valuable and should probably be stored in the cloud.

The increase of data generated and stored at the edge also introduces new challenges in protecting, archiving and restoring data in the event of data loss or a cybersecurity incident. Data should first be classified to identify which data needs to be protected and what can easily be regenerated. Data classification will also help create retention policies that adhere to organizational standards and any government regulations that are applied to the type of data generated and stored at the edge.



Cloud

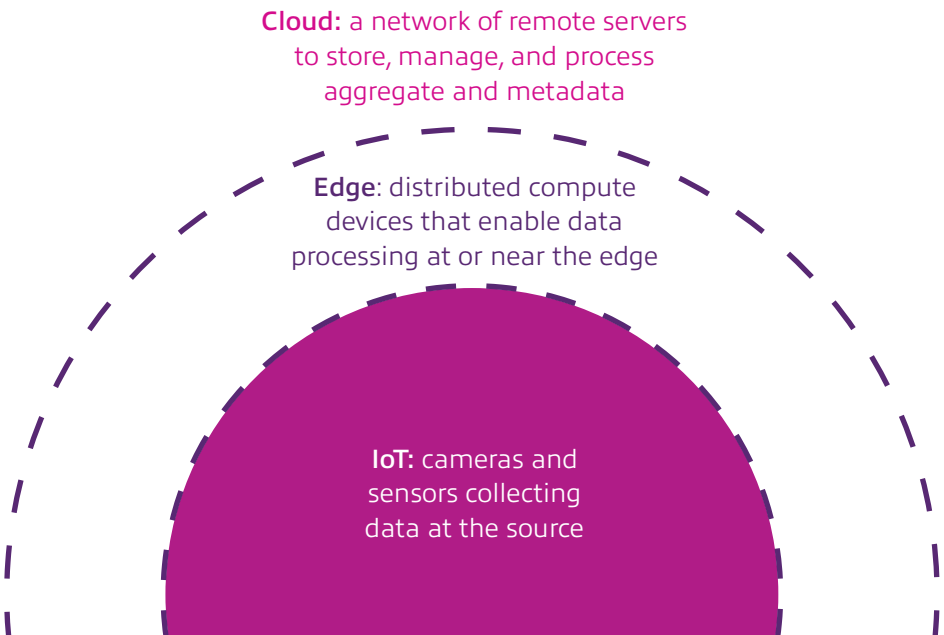
With the intelligent edge comes more localized compute, but this doesn't mean the cloud goes away. The goal is to move away from cloud compute to edge compute for the right use cases. This process will allow for cloud cost containment by saving organizations from storing every piece of data they collect from their expansive network of devices.

Cloud should be used for what it excels at: high compute and longer-term decision-making activities. This includes data being used for deeper analysis or the storage of aggregate and metadata. On the other hand, the edge should be leveraged for low-latency, medium-compute, quick decision-making activities. With the raw data remaining local, cloud computation bandwidth is preserved for those larger analysis workloads.

For example, a retailer might handle two kinds of data differently depending on the application. Its sales data, for example, is important but does not need to be used for near-instant decision-making. That data can easily be stored in the cloud without concerns about the amount of time it takes to transfer it there. However, that same retailer may have a vision of a system designed to assist in loss prevention that would require a more immediate response, and therefore the cloud would not be the best option for that data. While both scenarios are important for the retailer to account for, a different system is required for them to be handled effectively.

IoT + intelligent edge = endless possibilities

With the intelligent edge comes IoT devices, providing the perfect combination of collection and analysis. IoT includes the devices and sensors that are distributed and responsible for collecting different types of data. The intelligent edge also refers to the low latency and compute at the point of origin of the IoT-collected data. Together, they process data locally and in real time. For example, a driverless car uses cameras and sensors as well as onboard compute to determine when to brake, change lanes or turn in an instant.



Capturing long-term value

Outside of the initial benefits, intelligent edge also allows for value to be rediscovered in the long term to increase ROI. For example, updates can be pushed to the devices collecting data. The types of data collected can be adjusted, and the way you analyze that data can evolve with your business or customer needs. Additionally, technology is constantly maturing — and what may have been cost-prohibitive or impossible a few years ago may become possible for organizations in the future. This means that as businesses expand, scale and mature, their intelligent edge can too without missing a beat.

Improved end-user experiences

With analysis happening at the point of origin, localized compute means real-time responses and decisions. Because of this, intelligent edge solutions can enable businesses to provide enhanced experiences for their users at the point of interaction. Outside of devices that a user may directly interact with, sensors can be autonomous and react to actions or input to make a decision that impacts the customer. For example, a retailer may leverage computer vision for inventory management to ensure customers have timely access to the products they want without interruption. Additionally, these devices and sensors can "learn" from customers and optimize for improved experiences over time. This can have a huge impact on a customer's experience, especially as the data and technology evolve to provide an even more customized experience for each one.

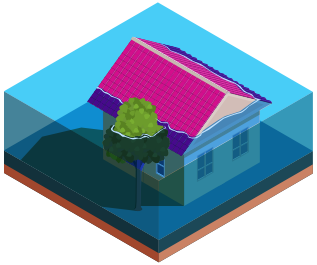
Valuable for any industry

Healthcare

- Wearables allow for real-time patient data to be collected and analyzed, and care can be streamlined where needed.
- AI is being applied to MRI and X-ray evaluation to help detect ailments and determine treatments quickly.

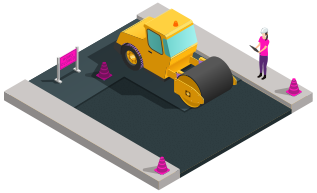
Retail

- Leverage computer vision for inventory management that can automatically alert when products need to be restocked or ordered.
- Cameras can also be used for theft detection and as a reliable loss prevention tool.



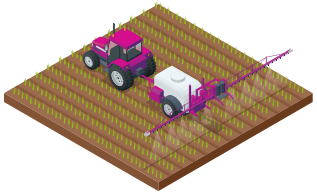
Public safety

- Disaster and emergency warning systems can detect incidents early, and alerts can be executed quickly.



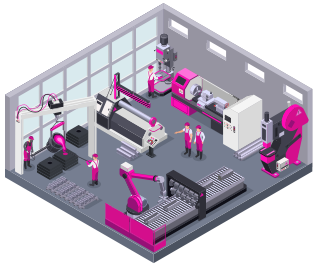
Construction

- Critical predictive maintenance can be addressed with cameras monitoring machinery and equipment.



Agriculture

- Crops and yield can be monitored to check on plant growth and detect issues such as disease or insects.



Manufacturing

- Use automation to alert safety breaches such as an employee entering a restricted zone without the required protective equipment.
- Camera-based systems can be implemented to detect defects in products before they leave the facility.

Transportation

- Routes can be tracked and optimized to ebb and flow with changing demand and conditions.
- Parking lots can be monitored to track the maintenance of spaces and recognize which car is occupying a spot.

Hospitality

- Restaurants can cut down on food waste by automating their processes from inventory purchases to carrying out orders in the most efficient way possible.

Computer vision

Use AI to derive valuable data and information from digital images or video from cameras, phones, webcams and more. The AI can be used to detect and classify objects and recognize faces, among other applications. An example that has gained popularity in recent years is smart home technology such as thermostats that respond to their environment and the presence of people to adjust and save the user money.

Take advantage of your intelligent edge.

Whether your organization has already begun its intelligent edge journey or is wondering where to start, knowing where you stand on your journey can help you reach the finish line efficiently. While our process below is chronological, we have served clients end-to-end and jumped in to assist after the process had already started:

Ideation

Typically beginning with an Envisioning Workshop, the ideation phase is all about discovery. With our experts as a guide, determine what business outcomes you want to see by leveraging the intelligent edge and what you need to make it happen. In this stage, it's important to be open to exploring questions that may not have been asked before and step beyond obvious solutions to dig deeper into the desired outcomes.

Proof of Concept (PoC)

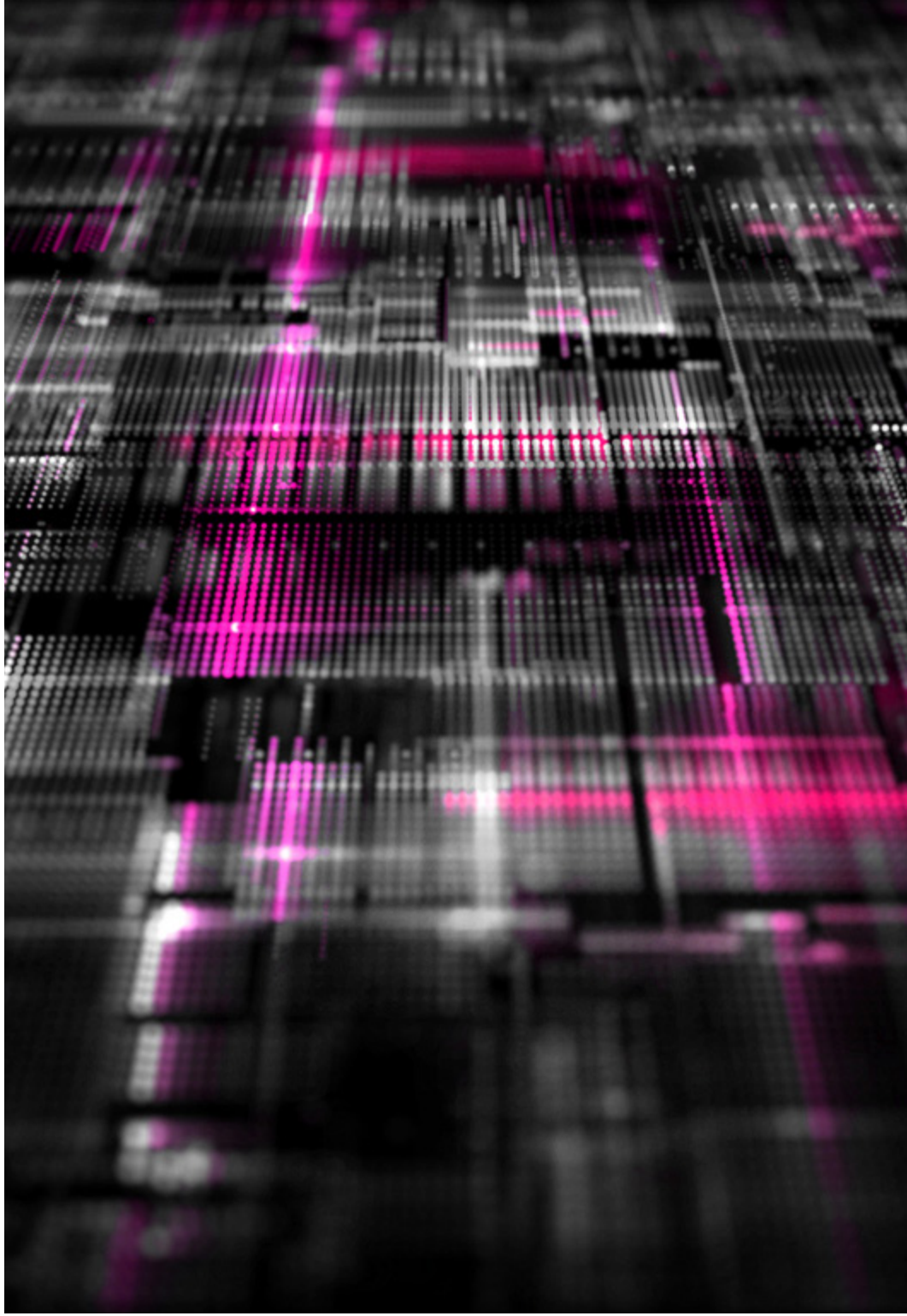
With those goals in mind, the PoC will help determine an effective, usable and realistic solution before investing expansive resources. This stage is about ensuring that the technical and design aspects of the solution are viable for the goal you are trying to reach.

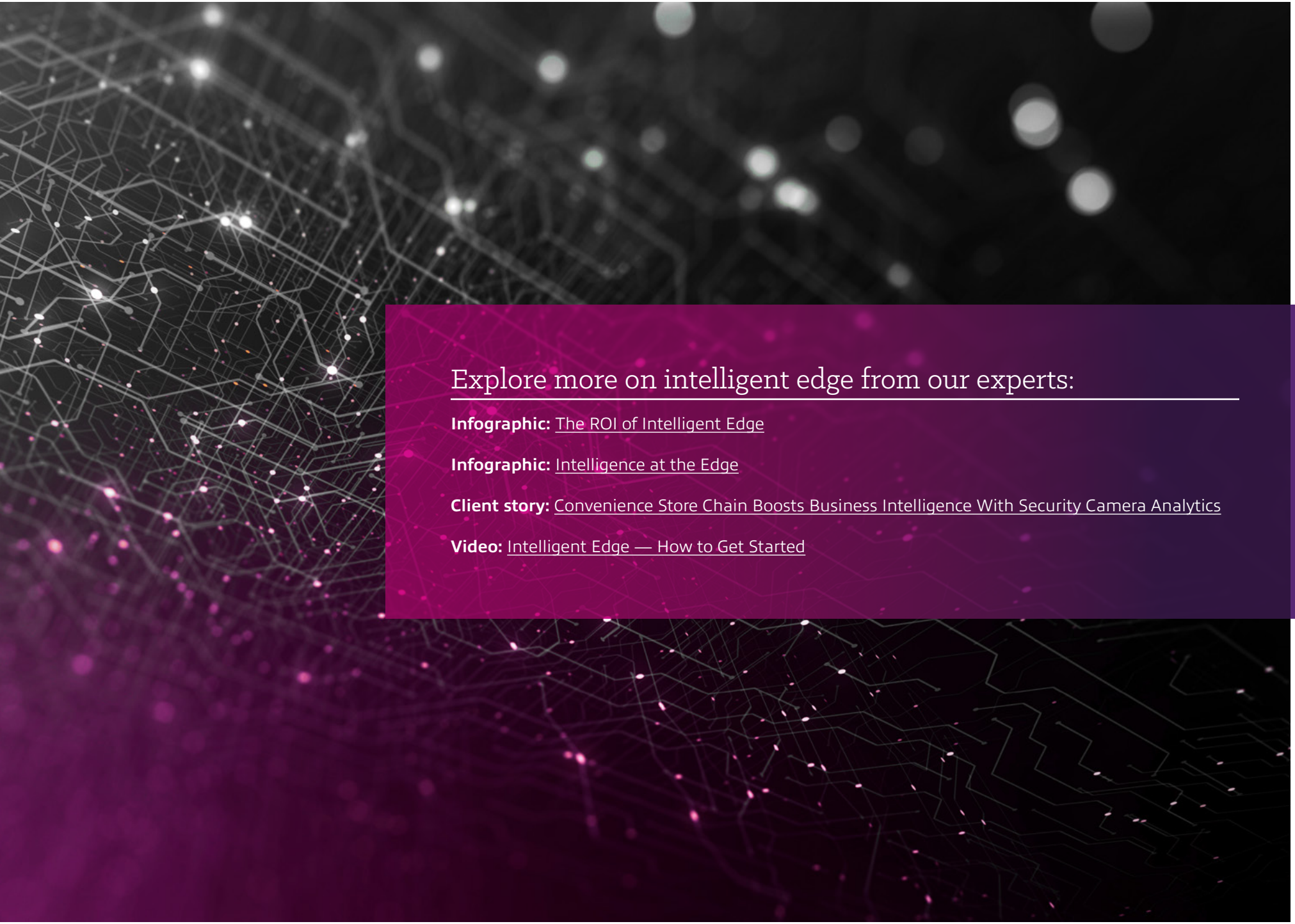
Pilot

Once a solution is developed, it's time to test its effectiveness in real-world scenarios. This phase allows for the evaluation of the solution and any needed adjustments to be made before a full-fledged rollout. This stage might reveal optimization opportunities or tweaks needed to get the most valuable decision-making capabilities out of your solution.

Scale

Now that the solution is proven viable, resources can be allocated for full implementation and scale-up of the solution.





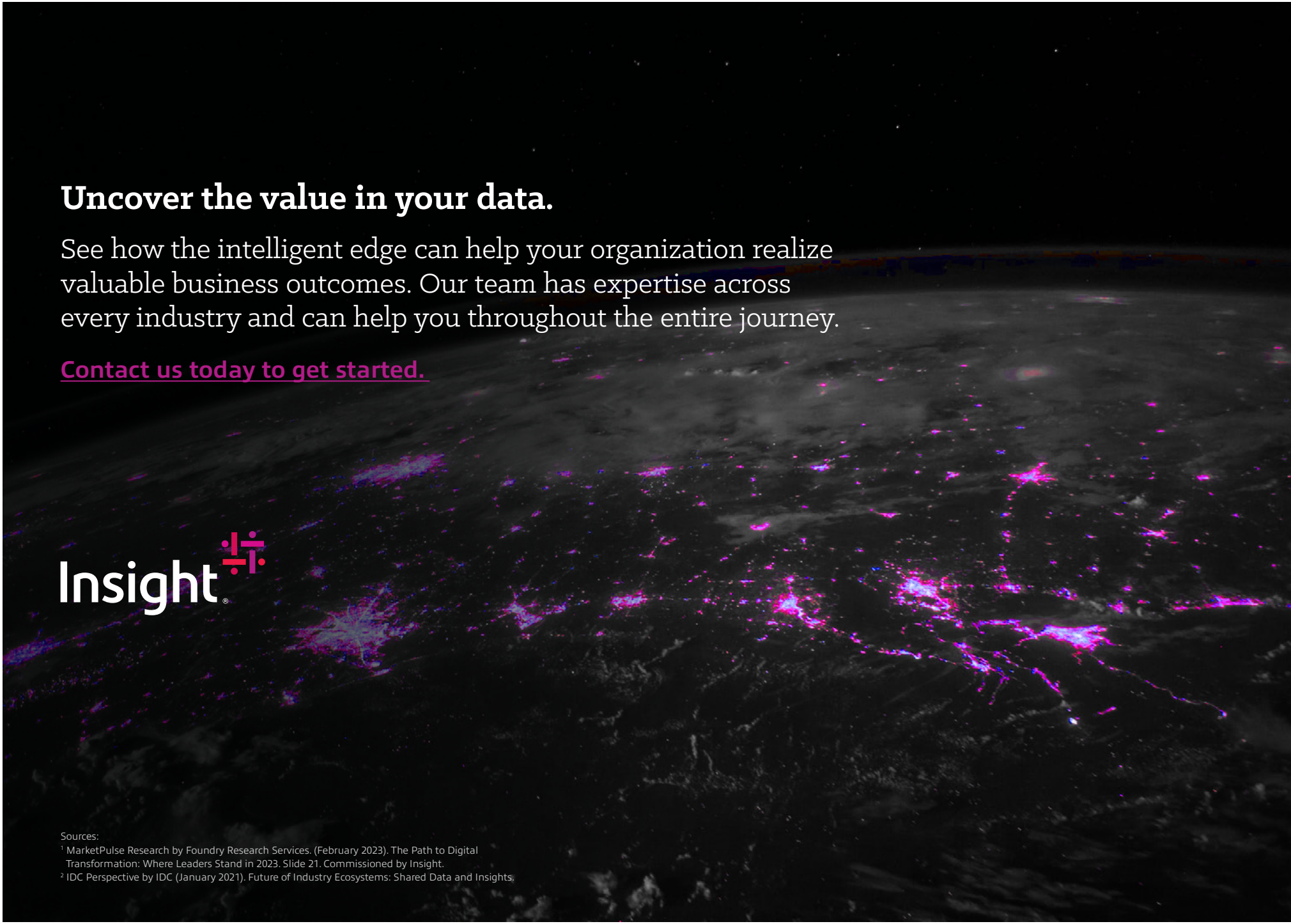
Explore more on intelligent edge from our experts:

Infographic: The ROI of Intelligent Edge

Infographic: Intelligence at the Edge

Client story: Convenience Store Chain Boosts Business Intelligence With Security Camera Analytics

Video: Intelligent Edge — How to Get Started



Sources:
[1] MarketPulse Research by Foundry Research Services. (February 2023). The Path to Digital Transformation: Where Leaders Stand in 2023. Slide 21. Commissioned by Insight.
[2] IDC Perspective by IDC (January 2021). Future of Industry Ecosystems: Shared Data and Insights.