Pinnacle Solutions White Paper

IoT Analytics

Understanding the impact of IoT data across industries

PINNACLE SOLUTIONS, INC.

The Internet of Things (IoT) is much talked about and fast becoming a fixture in some industries. And the technologies for transformative business applications are at hand.

So what are some practical applications for IoT that businesses across industries are adopting today?

Let's dive deeper into IoT and its impact and value across industries:

- Manufacturing
- Energy and Utilities
- Healthcare and Life Sciences
- Retail and Hospitality
- Government and Cities
- Transportation and Automotive
- Oil and Gas
- Insurance

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What is Internet of Things (IoT)?

If you've ever seen the "check engine" light come on in your car, you've experienced an early-stage manifestation of the Internet of Things (IoT).

According to the Internet of Things Global Standards Initiative: The Internet of Things (IoT) is the network of physical objects or "things" embedded with electronics, software, sensors, and network connectivity, which enables these objects to collect and exchange data (International Institute for Analytics, 2015).

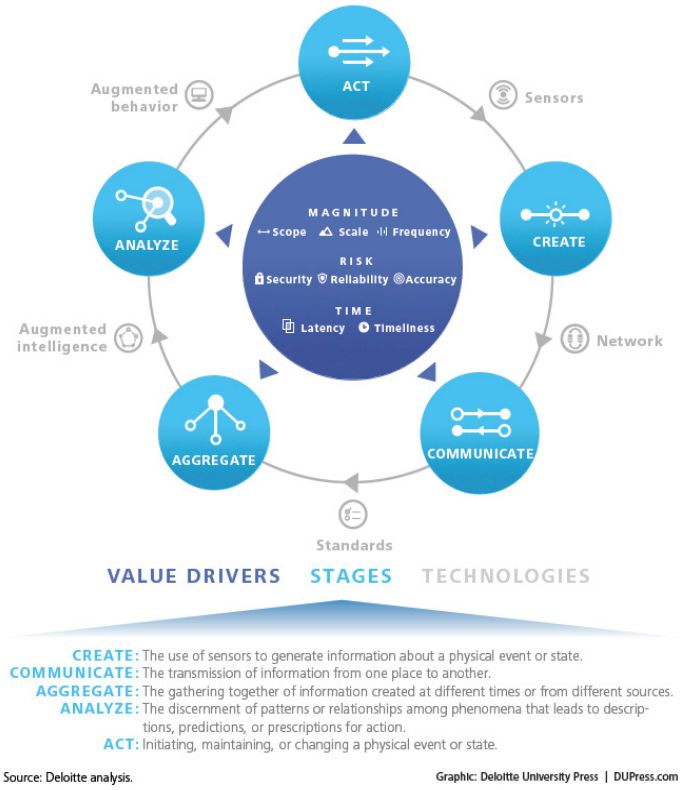
The essence of IoT resides in the source of the data: sensors. Smart devices generate data about activities events, and influencing factors that provide visibility into performance and support decision processes across a variety of industries and consumer channels.

Though a relatively new technology, IoT has been in place for quite some time in several industries. For others it is a totally new concept.

Today, IoT is regarded as highly valuable and is recognized as being beneficial and transformative to companies. Consider this:

In a survey by McKinsey & Company, 98 percent of survey respondents reported that most companies within their industry include enterprise IoT initiatives in their strategic road maps. When asked of IoT's importance, 92 percent of survey responders stated that it would have a positive impact over the next three years (Chui, Ganesan, & Patel).

Yet, despite the obvious importance of IoT across industries, a significant portion of companies across industries struggle with executing their IoT initiatives. According to a recent study by PWC, "more than six out of ten organizations have failed to take operational IoT initiatives past proof-of-concept stage or beyond implementation." (PWC) The first step to implementing any IoT initiative is understanding the life cycle of IoT. A great way to understand the IoT life cycle is through an Information Value Loop, a process with discrete but connected stages.



The use of sensors *create* information about a physical event or state. Next, this information is *communicated,* or transmitted, from one place to another. The data is then *aggregated* across time and source and *analyzed* to discern patterns and relationships. These patterns lead to descriptions, predictions, or prescriptions that initiate, maintain, or change future *action* (Holdowsky, Mahto, Raynor, Cotteleer, 2015).

What is Internet of Things (IoT)?

So why is IoT suddenly gaining traction now? Accoring to Jason Mann, Director of Industry Product Management at SAS® Institute, the main drivers are: price reduction of sensors, lower power requirements, and more compute capacity. Sensors are now literally everywhere, from traffic signals to smart watches.

This combined with the explosion of data generation and commodity storage options in the cloud creates all the necessary ingredients for businesses to gain tremendous value from insights that analysis of IoT data can provide.

"The primary driver is the broader adoption and deployment of sensors and smart devices. Sensors are smaller, cheaper and they require less power and have more compute capacity."

- Jason Mann, Director of Industry Product Management, SAS®
(International Institute for Analytics)

Additionally, the availability of the technology and analytical methods that can be applied to streaming data from sensors has increased exponentially. Now, businesses can push decision support and performance monitoring to the edge, the source of the data. This provides expanded options for businesses to monetize IoT data.

As businesses begin IoT initiatives, there are three key points they will want to consider.

First, the opportunity to leverage IoT as a competitive advantage is here and now. If business and technology leaders at your company don't see an IoT use case, they need to think harder. The slow progress of others can create opportunities for you today, but if you're not working on IoT, you may quickly fall behind.

Second, IoT requires different ways of thinking - about how data is used, how much of it we can handle, how fast we can process and analyze it, and utimately where and how decisions are made. Go beyond just better informed and automated business processes. Take steps to change your capabilities in ways that provide unprecendented opportunities in business integration and customer connection.

Third, the definition of "edge" is changing. Compute capacity once on servers has moved to routers and gateways, and what used to be on routers and gateways is now on local devices and sensors themselves. You can now take analytics to the data, while it is in motion.

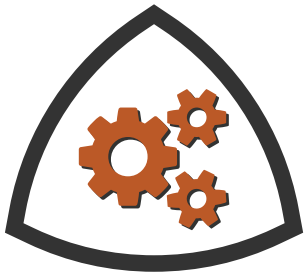
To take advantage of these trends, the technical architecture for IoT must be adaptable - at the same time that it serves the full life cycle of data, analytics, and decisions (International Institute for Analytics, 2015).

The expanded capability of IoT and its potential to address long-standing challenges has prompted numerous industries to investigate opportunities for IoT. From manufacturing to retail, businesses are realizing new ways to leverage IoT data to solve age-old challenges.

With that background, let's dive into some business use cases for IoT Analytics across industries.

Manufacturing Use Case

IoT provides new opportunities for some of the most complex organizations, from chemicals and metals to packaging.



Customer Profile

Discrete and process manufacturers alike are faced with disparate data sources. Manufacturers are unable to manage the enterprise, and instead time is wasted on one-off non-scalable oversight. These companies also lack a central repository of up to date reports and analytics to inform engineers up to the C-suite. Additionally, production runs often seem inefficient because of human intuition of the maximum throughput instead of data based decisioning. IoT Analytics provides manufacturers with the opportunity to address these obstacles.

How Pinnacle Solutions Can Help

Powered by IoT Analytics, Pinnacle Solutions can help manufacturers through connected manufacturing and production quality monitoring. Connected manufacturing can minimize impact of after sale defects, improve manufacturing quality, and maximize equipment performance. Production quality monitoring provides additional benefits with anomaly detection, fault detection, and preventative maintenance. Enterprise-wide data aggregation and real-time dashboarding shows manufacturers their OEE and other key metrics, providing the insight to reduce downtime and maximize throughput.

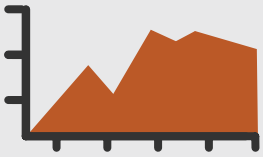
The Key Value Drivers of IoT Analytics for Manufacturers

MINIMIZE AFTER SALE DEFECTS

Manufacturers can identify potential defects and take action to reduce waste. This saves the manufacturer money and improves customer satisfaction.

MAXIMIZE EQUIPMENT PERFORMANCE

By measuring overall equipment effectiveness with sensor data, manufacturers can adjust operations so that they get the best performance out of their machines.



YIELD OPTIMIZATION

Historical data is analyzed to identify patterns among discrete process steps and inputs. Advanced, real-time analytics can then optimize factors that have the greatest effect on yield.

ANOMALY AND FAULT DETECTION

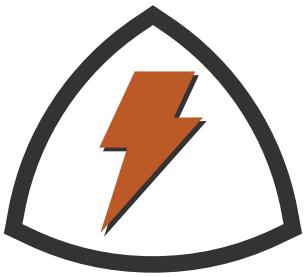
IoT Analytics can identify anomalies and faults in real time, pinpointing the type of fault and its location on the plant floor. Manufacturers can quickly respond to isolate and resolve anomalies and faults.

PREDICTIVE MAINTENANCE

By analyzing sensor data, manufacturers can help predict when machines will need repairs. They can also adjust operations to keep machines running optimally and prevent wear and tear.

Energy & Utilities Use Case

IoT can make existing energy infrastructure more efficient and help open up new possibilities and resources.



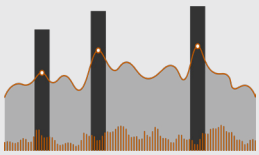
Customer Profile

While the energy sector has been evolving in terms of generation and distribution, the IoT has the potential to be the most transformational if challenges related to reliability, integration, system complexity and security can be overcome. While reliable connectivity is an ongoing problem, many companies are struggling to integrate IoT technology with existing platforms, which tend to be overly complex, and may need to rethink their approach to data security in order to deploy IoT projects safely and securely.

How Pinnacle Solutions Can Help

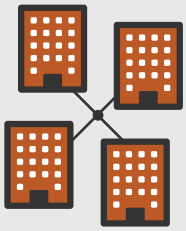
Powered by IoT Analytics, energy and utility companies can leverage asset monitoring, grid surveillance, Phasor Measurement Unit (PMU) and grid monitoring, distribution asset health monitoring, load forecasting, microgrid optimization. IoT Analytics empowers these organizations with predictive and preventative maintenance capabilities through asset performance management. Energy and utility companies can also use IoT Analytics to avoid connected grid outage with renewable and distribution asset analytics.

The Key Value Drivers of IoT Analytics for Energy & Utility Companies



LOAD FORECASTING

With IoT Analytics, power companies can accurately predict the power/ energy needed to meet demand and supply equilibrium.



MICROGRID OPTIMIZATION

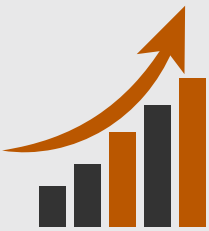
IoT and smart grid infrastructure can help improve operational efficiency as well as allow customers to manage energy consumption costs.

GRID SURVEILLANCE

IoT can provide the knowledge necessary for electricity producers to make the right decisions for an increasingly distributed and complex power grid.

RAPID EVENT RESPONSE

With IoT, Phasor Measurement Unit data can be used to accurately discern event types in near real-time, which is critical to formulating and deploying a response.



INCREASED EFFICIENCY

IoT enables better understanding of operations and demand so action can be taken to increase supply chain efficiency and decrease unplanned downtime.

Healthcare & Life Sciences Use Case

IoT has the potential to change market and policy landscapes, making it an important capability to understand and harness.

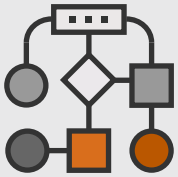
Customer Profile

Patients today expect more personalized interactions as well as customized therapies that are effective and cost-efficient. Health care systems can be overwhelmed by the flood of rich new data sources, including social media, wearables and medical devices (known as the Internet of Medical Things, or IoMT). The digitization of the healthcare industry - from patients to clinical infrastructure - provides unprecedented opportunities to transform delivery and meet the challenges of cost, quality and access.

How Pinnacle Solutions Can Help

IoT Analytics can help create the personalized, connected healthcare experience that patients expect. IoT Anlaytics make telehealth services and remote health and monitoring possible, increasing access to healthcare and improving patient outcomes. Additionally, IoT Analytics can optimize workflow, increasing operational efficiency. Staff can even receive predictive alerts that help them anticipate and respond to situations proactively. IoT Analytics also empowers healthcare and pharma manufacturing companies with predictive and preventative maintenance, allowing staff to monitor machine health.

The Key Value Drivers of IoT Analytics for Healthcare & Life Science Companies



WORKFLOW OPTIMIZATION

Intelligent facility management systems use IoT data for inventory management, real-time asset tracking, operating room optimization and emergency infrastructure.

PHARMA MANUFACTURING

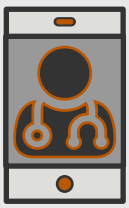
Pharma can improve equipment effectiveness, leverage predictive maintenance, and have a paperless record of the entire production process for compliance requirements.

PREDICTIVE STAFF ALERTING

Detailed patient data from by IoT devices and predictive analytics alert staff about potential events before they happen so staff can make informed decisions on how to proceed.

REMOTE PATIENT MONITORING

IoT Analytics can support passive, real-time and intuitive ways of diagnosing and managing various health conditions. Long-term care patients can be monitored at home.

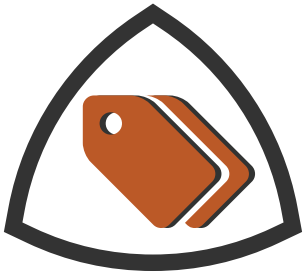


TELEHEALTH

IoT Analytics expands the capabilities of telehealth, aiding in patient care by expanding access, providing timely, accurate data, and reducing costs.

Retail & Hospitality Use Case

IoT can remake supply chains and help hospitality organizations adjust their business models.



Customer Profile

Retailers are striving to find ways that IoT can create a direct channel between retailers and consumers, and to use IoT data streams to inform the customer relationship at every step along the customer journey. The differentiation with IoT will come from a retailer's ability to sense, understand and act on IoT data with analytics. To take advantage of this new promising area, retailers will need to focus on IoT applications that better serve customers and create value.

How Pinnacle Solutions Can Help

Through connected inventory management, IoT Analytics can help retailers with inventory optimization, preventing over- or understock. IoT Analytics can also facilitate a connected in-store experience for customers, enabling retailers to leverage proximity marketing for customized, individually targeted promotions. With IoT hospitality companies understand guest context, travel frequency, and patterns, and can unify customer data across all interaction channels. IoT enables retailers and hospitality companies to effectively combine staff capabilities, operational systems, and on-property resources to provide an optimal, and contextual connected guest experience.

The Key Value Drivers of IoT Analytics for Retail & Hospitality Companies

INVENTORY OPTIMIZATION

Using IoT Analytics, you can make sure your inventory is optimized to meet demand across your locations. No more over- or understocking.

PROXIMITY MARKETING

Beacons and in-store video tracking allow customer-specific messaging and promotions based on exact location and proximity to products within the store.

CONNECTED GUEST

Guestroom IoT products give guests the ability to unlock the room and control lights, power outlets, and temperature all from their phone through a guest loyalty app.

INSTANT PROMOTIONS

Custom promotions based on a customer's profile can be delivered to them instantly, making shopping more convenient than ever.

GUESTROOM AUTOMATION

Techniques such as "daylight harvesting" saves energy and increases the consistency of indoor lighting by automatically adjusting lighting with natural light.

Government & Cities Use Case

The pace of technological change is driving governments to turn to IoT to increase efficiencies and improve delivery of services.

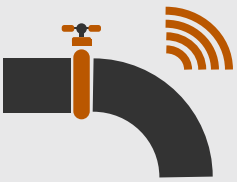
Customer Profile

Citizens expect constant access to city services. In addition to services such as water, gas and electricity, citizens also depend on effective transportation and security systems to get from place to place quickly and safely. As modern cities evolve to become smarter, leaders are faced with a variety of challenges. For example, how can leaders engage with citizens more effectively? Ensure the availability of clear air and waste? Manage traffic congestion during peak hours? Make neighborhoods safer?

How Pinnacle Solutions Can Help

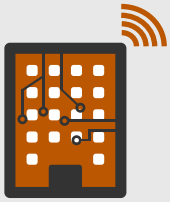
Through connected energy and utilities, IoT Analytics can empower government and city leaders with asset monitoring, grid surveillance, Phasor Measurement Unit (PMU), grid monitoring, distribution asset health monitoring, load forecasting, and microgrid optimization. Additionally, IoT Analytics add capabilities like smart mobility services, predictive and preventative maintenance of fleet, infrastructure and buildings. The result: cleaner and safer cities, more effiecient use of city and government resources, and smoother transportation operations.

The Key Value Drivers of IoT Analytics for Governments & Cities



SMART UTILITIES

IoT can provide the right information at the right time so governments can better manage utilities and increasingly complex power grids.



SMART BUILDINGS

IoT devices connect disparate systems to a central management application, which highlights areas of high use and energy drifts so staff can correct them.

TRANSPORTATION ANALYTICS

IoT Analytics can help make sense of vast amounts of data, aiding with infrastructure monitoring, traffic management, and law enforcement.

EFFICIENT WATER SUPPLY

Smart meters can improve leak detection, prevent revenue loss from inefficiency, and provide residents with real-time information on their consumption and water supply.

IMPROVED PUBLIC SAFETY

IoT helps officers react quickly using video recordings. Smart lighting also provides real-time outage details so workers can ensure areas are well lit to deter crime.

Transportation & Automotive Use Case

IoT Analytics opens opportunities for new modes of travel and allows companies to operate more efficiently.

Customer Profile

IoT brings unprecedented flows of data, presenting transportation companies with tremendous network and data management challenges, as well as greater security risks. To overcome challenges, transportation and automotive companies will have to adopt better network intelligence, automation and security in order to securely handle and extract value from vast flows of data.

How Pinnacle Solutions Can Help

IoT Analytics bring predictive maintenance, early warranty detection, and recall optimization capabilities to the transportation industry. With IoT Analytics, the transportation industry can overcome age old challenges and operate more efficiently and securely. Additionally, IoT Analytics present new opportunities for the transportation and automotive industry, such as connected mobility services. These services enable smart mobility services, contextual affinity partner marketing, and real-time value added offers/content, improving and personalizing the customer experience.

The Key Value Drivers of IoT Analytics for Transportation & Automotive Companies

PREDICTIVE MAINTENANCE

With IoT Analytics, companies can predict when machines will need repairs. Operations can also be adjusted to prevent unnecessary wear and tear.

RECALL OPTIMIZATION

With IoT Analytics, onboard diagnostic data can lead to early detection of equipment failure, safety risks, and defects.

CUSTOMER EXPERIENCE

Customers on the move can access travel information, like updated timetables, smart parking, points of interest, street maps, etc.

PREDICTIVE REPAIRS

IoT data can identify potential break-downs. Technicians are pre-notified on what repair parts are needed for the quickest turn-around possible.

CONNECTED CAR

Connected cars provide all promotion components: the customer profile, geo proximity to retail or service outlets, and the channel for message delivery.

Oil & Gas Use Case

Oil and gas companies are using IoT to address a new environment of lower prices and faster investment cycles.

Customer Profile

An industry with a history in IoT Analytics is oil and gas, specifically production and refining. Downtime incurs huge risk and cost, so the industry continues to improve and expand how it uses sensors, networks, and analytics to generate predictive insight into the degradation of equipment performance and predict failures in oil fields, pipeline networks, and refineries. The result is expedited identification of possible equipment failures and optimization of the entire production process.

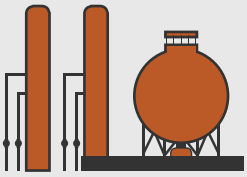
How Pinnacle Solutions Can Help

With IoT Analytics, oil and gas companies can leverage predictive and preventative maintenance. Predictive and preventative maintenance are especially important for refinery, pipeline, and wellhead monitoring. Additionally, IoT Analytics gives oil and gas companies the insight they need to combat gas leaks and machine malfunctions. The result is prevention of accidents, less downtime, improved overall equipment effectiveness, and speedy repairs.

The Key Value Drivers of IoT Analytics for Oil & Gas Companies

GAS LEAK PREVENTION

With IoT Analytics, companies can analyze vast amount of sensor data to identify equipment in danger of leaking and take measures to prevent leaks.



REFINERY MONITORING

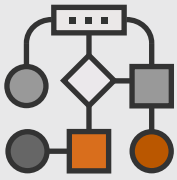
Downtime incurs huge risk and cost. IoT sensors and analytics generate predictive insight into the degradation of equipment performance and predict failures.

ASSET ANALYTICS

Using IoT data, asset analytics can optimize maintenance strategies and decrease time and resources required by previous methods.

OPERATIONAL PERFORMANCE

IoT Analytics and sensor data can reveal opportunities to improve operational efficiency, lowering repair and maintenance costs.



WORKFLOW OPTIMIZAITON

IoT Analytics, operators and engineers are equipped with the tools they to prevent unplanned downtime, and increase asset availability and reliability.

Insurance Use Case

IoT enables collection and analysis of more data, used to determine health risk and improve outcomes for populations.

Customer Profile

Recently the insurance industry has seen significant disruption and innovation. Major investments have been made in digital initiatives, but the most dramatic changes relate to the Internet of Things. IoT has started to radically disrupt the traditional insurance business model and modernize processes, especially in the area of risk assessment. Smart home devices, wearables and driverless cars will usher in a shift toward a new type of customer relationship where insurance becomes less reactive and more preventative. The winners will be organizations that overcome today's obstacles to embrace change and capitalize on uncertainty.

How Pinnacle Solutions Can Help

IoT Analytics empower insurers with connected proactive loss/damage prevention through early detection of risks and alerts, preventive maintenance (telematics), early detection of unsafe environments, equipment breakdowns or malfunctions, proactive repair and preventive maintenance based on real-time data. Using automated detection, IoT Analytics can also help with fraud claim management. Insurers can receive timely notification of damage from the imagery data provided by sensors and drones, and then adjuster teams can perform inspections and take action to minimize loss.

The Key Value Drivers of IoT Analytics for Insurance Companies

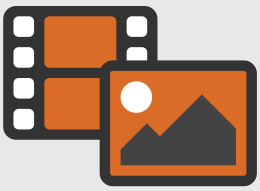


IMAGE CLASSIFICATION

Insurers no longer have to wade through paperwork. With IoT Analytics, customers can submit claims via mobile apps by taking a few pictures.

FRUAD CLAIM

Data from IoT devices allows insurers to know their customers on a deeper level with more accurate personal information, which can help more easily detect fraud.

RISK ANALYSIS

By capturing fine-grained details about customer behavior, IoT can help insurers set more appropriate rates and prompt behavior change to reduce risk.

PERSONALIZED PLANS

In a digital world, insurers can know of changes, like a house going on the market, and can recommend a personalized plan with more accurate estimates.

REDUCED COSTS

Automation can cut the cost of the claims process by as much as 30%. In some cases, IoT devices have helped insurance companies lower premiums by as much as 25%.

How Pinnacle Solutions Helps

Pinnacle Solutions' analytics experts can empower you to create and sustain true value from diverse IoT data and initiatives. Whatever your analytics maturity level, we can help you gain real business value.

In today's data driven world, utilizing the ever growing amount of sensor data is an initiative every organization is focused on. Using sensor data alongside data from other sources has shown potential to significantly improve operations, generate new revenue streams, and reduce total operating costs in numerous industries. Yet, despite IoT's value most organizations have failed to take operational IoT initiatives past proof-of-concept stage or beyond implementation.

Only a fraction of companies have clear strategies for how they will use IoT. They admit to still being in the early phases of creation or implementation. Despite the complex nature of these new technologies, industry leaders also say they recognize the future value of advanced IoT use cases.

Half of organizations state that they struggle to establish clear business use cases to justify their investments and over 60% of organizations simply didn't have the analytics capability or knowledge to derive value from their IoT data. Add to that constrained resources, competitive pressure, and the sheer volume of data being created by sensors, and it's clear why it is so difficult to get an IoT initiative off the ground.

This is where Pinnacle Solutions can help.

We've helped our customers with their initiatives using the SAS Platform to enable IoT use cases and support a journey toward tackling additional challenges using the same analytic foundation. Most of our customers also rely on us to provide the resources and analytic expertise to strategically navigate the IoT journey and prioritize which use cases can bring the most value to them.

Pinnacle Solutions realizes companies are at various stages of their IoT journey: from mapping out a plan to mid-implementation. We can provide you guidance on: how to approach an IoT journey, where to get started, and how to alleviate barriers blocking your current IoT initiatives.

If you're looking for a partner to help with your IoT Analytics journey, we'd love to talk with you more. Stop spinning your wheels. **It's time to make your IoT data work for you.**

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152 East Washington St, Indianapolis, IN 46204
Tel: 1.866.MOVE.FWD (1.866.668.3393)
Email: info@thepinnaclesolutions.com
Web: https://thepinnaclesolutions.com