IoT Analytics –

A NEW VISION IS NEEDED

Faster Analytics

Predictive Analytics

Real-Time

Streaming Analytics

Historical Analytics
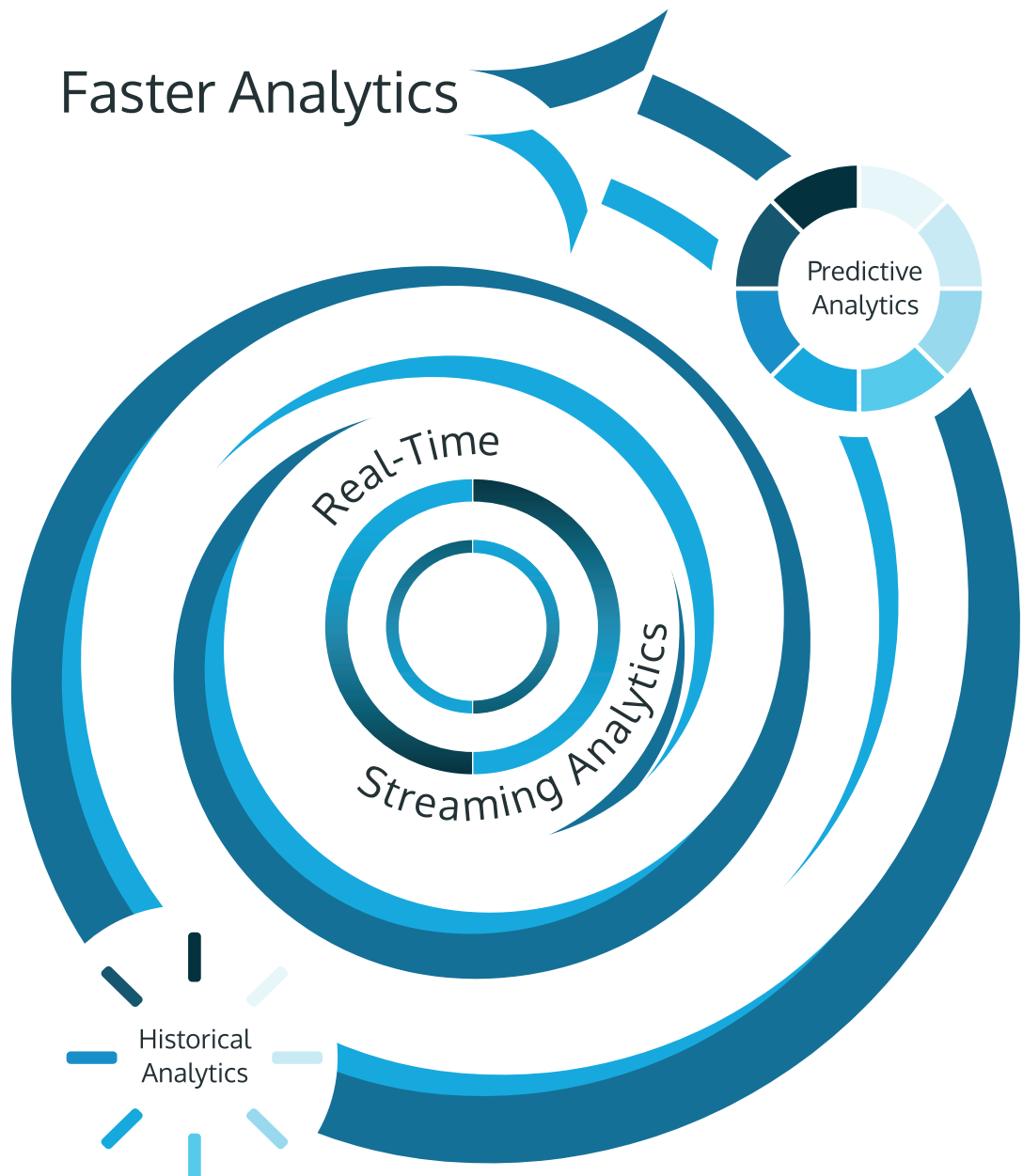
VITRIA®

www.vitria.com

TABLE OF CONTENTS

I. Executive Summary

The Internet of Things (IoT) has the potential to generate value measured in the trillions of dollars. As millions and billions of devices in IoT are connected, there is an overwhelming amount of new data generated.

Operations managers can capitalize on this data to detect anomalies, predict problems early, mitigate any disruption of service, and provide better customer experiences. But in order to realize these benefits, taking timely action in real-time is critical before the value gets lost.

Tackling these challenges and taking advantage of these opportunities in the IoT environment require new methodologies and approaches. As a first step, data management and analytics must be streamlined. Beyond that, analytics for IoT needs to be framed using the concept of an Analytics Value Chain.

This concept of increasing value by applying increasing refinement and processing of data and models can be applied across many industries such as utilities, manufacturing, retail, and more.

Vitria offer an Advanced Analytics platform for IoT that incorporates the Analytics Value Chain concept and provides the capabilities to help you develop analytics applications that can generate better business outcomes faster.

II. Market Potential, Growth, and Size

Interests in advanced analytics for IoT are stimulated by a number of market trends and business requirements that are emerging in the IoT era.

According to Cisco, IoT will generate $19 trillion of value in the next 10 years. Cisco estimates that $14 trillion will come from the private sector, and $5 trillion will come from governments and public sectors (from initiatives like smart cities and infrastructure).

In a recent survey by Tata Communications on IoT initiatives, industrial manufacturers reported a 29% increase in revenue from the previous year and predicted IoT initiatives will increase revenue faster than any other segment from 2015 to 2018.

It's not news that IoT is creating an explosion of data. It's a challenge to put all this growth in perspective and know what might be coming next. This infographic, originally created by Intel and updated by Datascience Central, puts it all in perspective.

III. Value Potential & Use Cases

The industry estimates there will be over 25 billion IoT devices by 2020. The proliferation of such IoT devices will be across industrial, enterprise and consumer segments.

This connectivity of devices, equipment, factories, products and supply chain to the network and the cloud is creating massive volumes of data every second. The volumes of data, combined with the capabilities of advanced analytics to provide insights and patterns, can deliver timely outcomes across 3 major segments of IoT (see Figure 1 below) – industrial, enterprise and consumer:
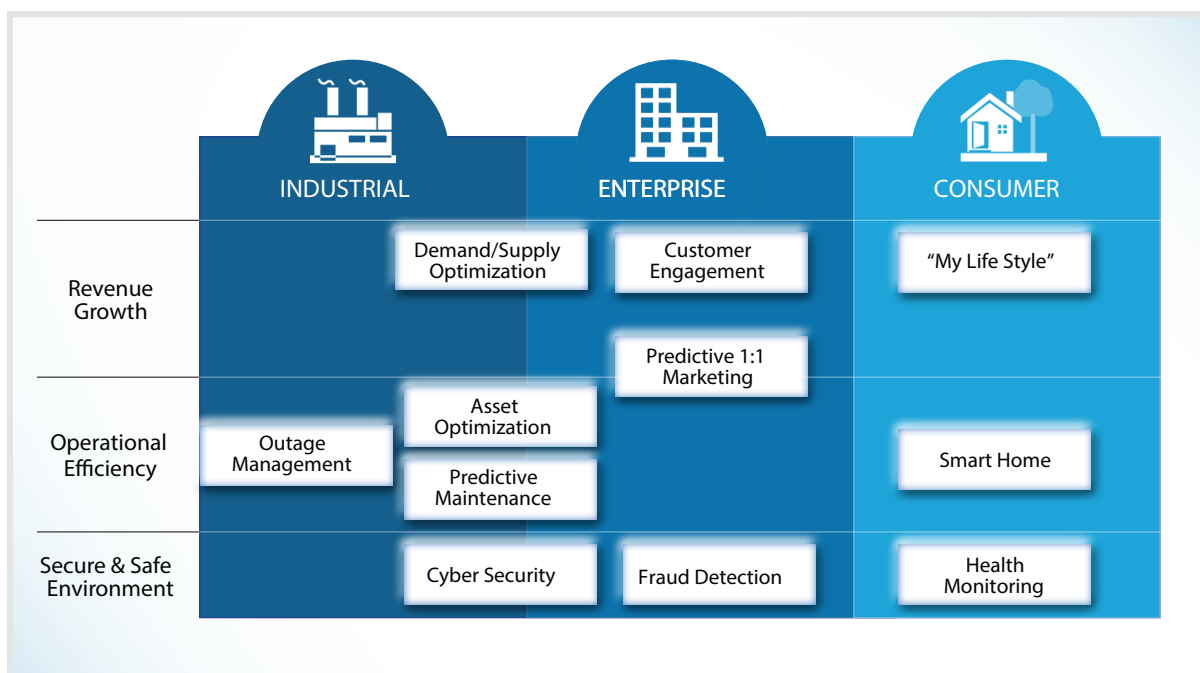

Figure 1: IoT Use Cases Across Market Segments

1. **Safety and Security** – This is the mission-critical aspect for all segments of IoT, addressing cyber security, physical security, fraud detection and personal safety.

2. **Operational Efficiency** – In Industrial IoT alone, a 1% of improvement in operational efficiency, such as predictive maintenance and asset optimization, can translate into $300 billion in savings over 15 years.

3. **Revenue Growth** – With new business models and services, service providers can enable better customer engagement models and predictive 1-1 marketing to provide end-user centric services based on the lifestyle of target consumers.

IV. Business Requirements in IoT: Timely Action and Faster Time-to-Value

a) Timely Action

In the past 20 years, response time of 2-3 days to resolve a customer issue in a supply chain was considered the norm. However, with the advancements of IP-based technologies for ubiquitous connectivity, mobility and cloud services, customers are expecting 24x7 always-on service availability with minimal service disruption.

More importantly, time to act in real-time is also becoming a key SLA (service level agreement) for many use cases. With IoT, the window for "time to act" will have to shrink from days to minutes to seconds to milliseconds, and the value of any particular action will diminish rapidly beyond that time window.

For example, as shown in Figure 2 below:

- In providing electric service, the time window to detect an electricity shortfall and respond will be less than 30 minutes.

- In a customer contact center, the time window to act on information from connected devices will be less than 30 seconds.

- In a smart grid, the time window to detect and respond to a cyber-security breach will be in milliseconds.
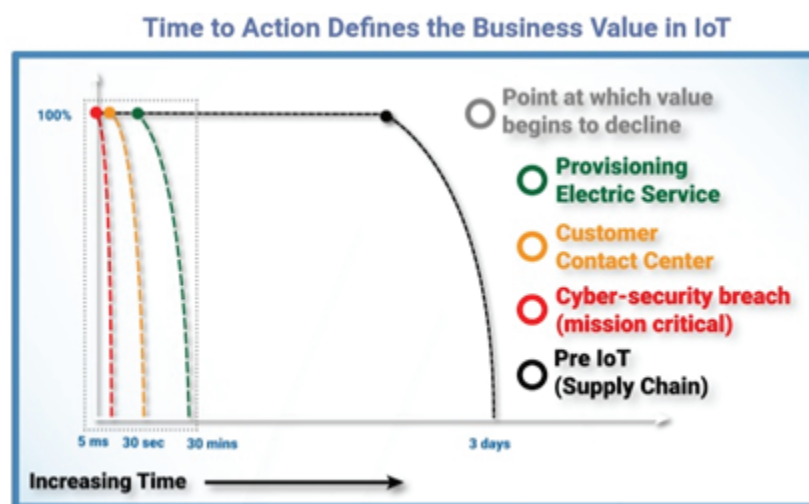

Figure 2: Time to Action is Critical – Defining the Business Value in IoT

With the growing volume of real-time big data in IoT and with the reduced time for decision making, companies need to use advanced real-time analytics with predictive and historical models to rapidly assess opportunities or threats before they occur.

Broader and richer context is required for this level of timely action. Enabling this type of capability will require new types of analytic methodologies and the unification of disparate software components and data acquisition technology.

Traditional approaches that use one-off projects to assemble a solution are unlikely to meet the business requirement outlined above.

b) Time-to-Value

Reducing the development and implementation timelines for IoT projects is another important business requirement. The typical approach of building analytic models and Key Performance Indicators (KPIs) over months is not viable in the IoT era.

The uses cases and applications often involve unifying new data and sources that have previously not been integrated in any way. Development teams need advanced self-service analytics tools and model-driven automation technology that can streamline the development of the core analytical building blocks of an application. Furthermore, these tools must be accessible to analysts and not confined to data science specialists, advanced users or developers.

V. The Problems with Traditional Analytics Approach and why a New Vision & Solution is Needed for IoT Analytics

Analytics Approach for IoT

Another major consideration in assessing the model of analytics needed for IoT is the various types of analytics and sources of data used in an application. Figure 3 below shows one version of the traditional model.
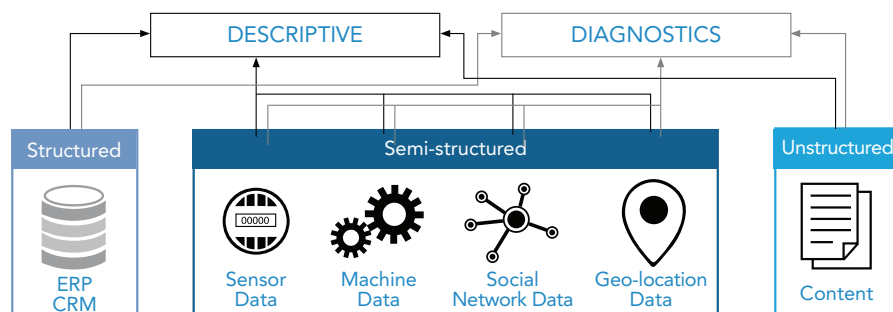

Figure 3: Traditional Analytics Approach

Descriptive and diagnostic analytics (sometimes grouped as historical analytics) are often developed independently and have multiple connection points to the various sources of data.

The structured, semi-structured, and unstructured data that is often stored in different data warehouses and logical locations is connected independently and requires multiple connectors to consolidate all the information. That is time and cost prohibitive. This also makes it difficult to build IoT Analytics applications quickly, and meet the business requirements for timely action. Furthermore, it significantly delays time to value and is not scalable from an economic point of view.

The first step in designing a new approach is to simplify the process by integrating all the data for an IoT application. That includes all the structured, unstructured, and semi-structured data. Better business outcomes can only be achieved when these silos are removed and analytics are used across a broad spectrum of valuable data.

The second key step in the streamlining process is to unify the analytics layer. In the traditional model, descriptive and diagnostic analytics made the problem challenging because of the "siloed" approach to data access. This issue will multiply rapidly in scale and become much more serious with the addition of predictive and prescriptive analytics.

This traditional heterogeneous and one-off approach will not suffice for IoT because it will take significant amount of time and efforts for data management vs. focusing on delivering outcomes based on the analytics. The explosion of data in all forms in IoT requires a more robust and broader lens in order to enable **smarter timely actions** and **better outcomes faster.**

In the new model, all the types of analytics must be unified into a single engine (as shown in Figure 4 below) to ensure scalability and real-time performance. This includes historical analytics (descriptive & diagnostic), real-time streaming analytics, predictive analytics, and prescriptive analytics.
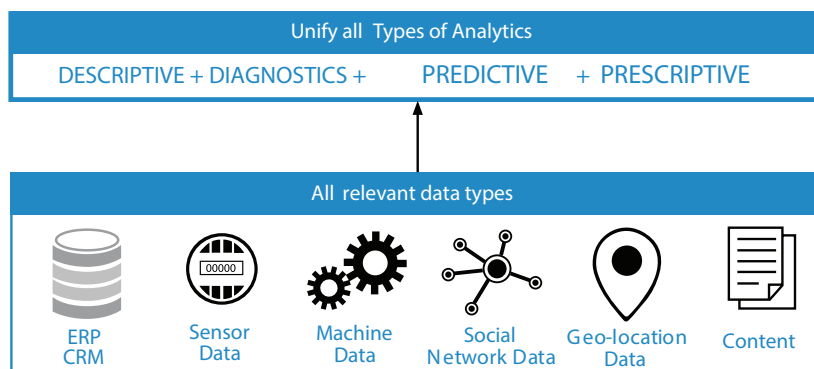

Figure 4: The Unifying Approach to Analytics for IoT

In addition, a design philosophy of openness and unification is needed to help businesses get results rapidly. Businesses looking to deploy IoT applications cannot be expected to "rip and replace" their existing investments.

Businesses need approaches that allow them to leverage their existing analytics and data investments and migrate them to a larger unified framework. The payoff is that users will now be able to spend more time on insights and business outcomes that matter most and avoid the time and distraction of creating or managing a complex infrastructure.

VI. The Analytics Value Chain – The Key to Achieving Timely Outcomes

The unifying approach to analytics outlined above is a good first step. However, it is the ability to execute analytics in real-time across the analytics value chain (streaming historical, predictive, and prescriptive analytics) with relevant contextual and situational data that is key to achieving timely outcomes.

This ability, combined with the ability to take the next best action in any particular scenario, is what creates the greatest value. The increasing value chain is depicted in Figure 5 below.
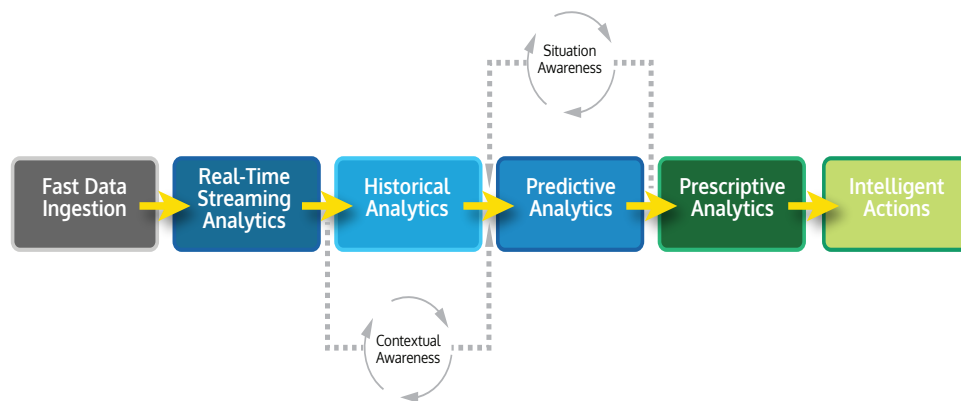

Figure 5: The Analytics Value Chain

The analytics value chain shows how each step in the process refines the data and adds more value and context.

1) Ingesting data at speed and volume sets the stage for additional processing

2) Real-time Streaming Analytics processes incoming streams of data from IoT sensors and devices.

3) This refined data is then correlated with contextual and historical data to provide a baseline for advanced analytics. Contextual data can include information like GIS (geographic information systems) data relating to an IoT application.

4) The next step is to predict failures, anomalies, or patterns using predictive analytics based on machine learning over historical and situational data such as external events like weather.

5) The final step in the analytics value chain is to apply prescriptive analytics to determine the next best action to take. This next best action could be a wide variety of actions associated with lowering risks, addressing an outage, or making a real-time offer to a customer to capture a sales opportunity in retail.

The important point is that specific actions (based on a rich understanding of history and context) must be taken now in order to capture that value. New tools are needed to achieve this ambitious goal in IoT.

Applying the Analytics Value Chain in Key Industries

In order to understand the application of the analytics value chain, let's examine how it can be used in certain specific industries. Energy utilities, manufacturing, and retail are three useful cases to examine.

a) Energy Utilities:

The Analytics Value Chain methodology can be applied to many of the challenges facing the utilities industry as they make a move to a Smart Grid environment. All of the Smart Grid use cases require the ability to create and build value across the value chain and take timely action to capture the value in a timely fashion. The updated value chain shown in Figure 6 below shows the value chain process for Smart Grid use cases and applications in the utility industry.
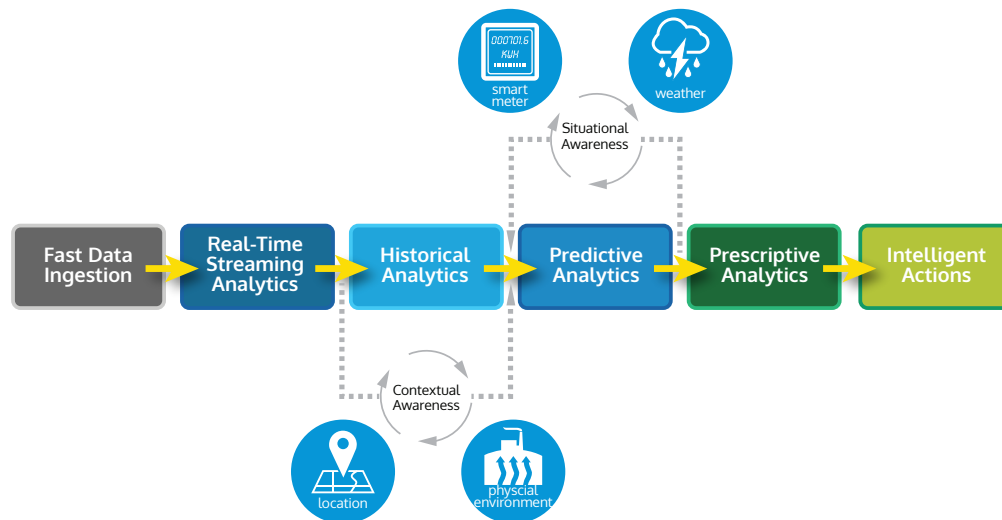

Figure 6: Analytics Value Chain in Utilities

1) In the case of a Smart Grid scenario, the standard value chain is given situational awareness by events like weather and smart meter status.

2) Contextual awareness for the Smart Grid would be provided by the physical environment or location of a particular Smart Grid element or transmission site. The additional of these two types of context provides the ability to increase value for Smart Grid use cases.

Achieving results in the complex world of Smart Grids requires a methodology and technology to move through all the steps of the analytics value chain and take timely action.

b) Manufacturing:

To meet the vision of a connected and intelligent Manufacturer, there is a need to execute analytics in real-time across the analytics value chain (streaming, historical, predictive, and prescriptive) with relevant contextual and situational data that addresses the critical last step for timely outcomes. The application of the analytics value chain in manufacturing would typically proceed as follows:

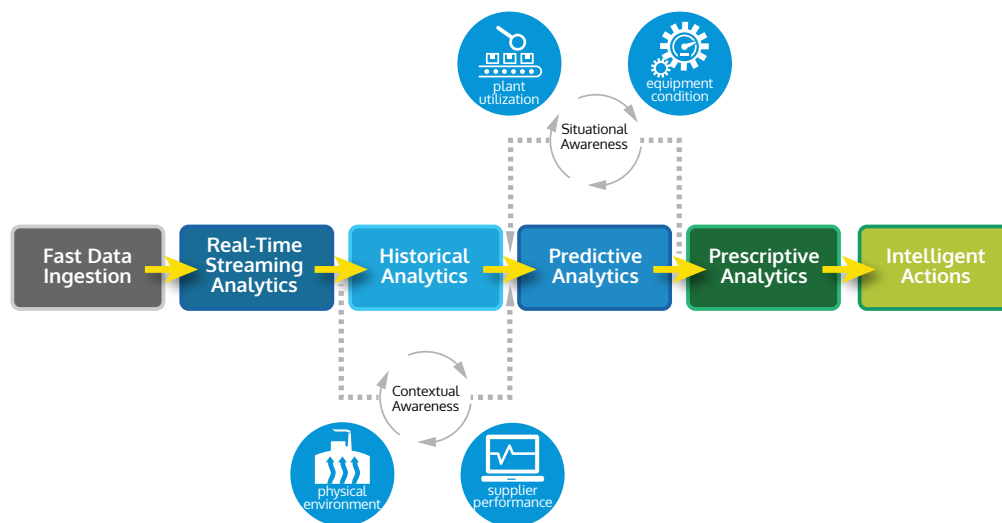Let's step through the process in Figure 7 below.

Figure 7: The Analytics Value Chain in Manufacturing

1) Fast Data Ingestion - Ingesting data at speed and volume throughout the factory sets the stage for additional processing.

2) Real-Time Streaming Analytics - Real-time Streaming Analytics processes incoming streams of data from sensors and devices all around the factory environment.

3) Historical Analytics - This refined data is then correlated with contextual and historical data to provide a baseline for advanced analytics. Contextual data can include information like the physical environment of the factory or historical performance of suppliers.

4) Predictive Analytics - The next step is to predict failures, anomalies, or patterns using predictive analytics that are based on machine learning over situational data such as external events like the current plant utilization rate or the condition of production equipment.

5) Prescriptive Analytics & Intelligent Actions - The final two steps in the Analytics Value Chain are to apply prescriptive analytics and intelligent actions to execute the next best action. This next best action could be a wide variety of actions associated with lowering risks, addressing an outage on the assembly line, or other timely actions that enable more efficient assembly line operations.

c) Retail

The application of the Analytics Value Chain concept offers interesting use cases in the retail industry as well. Stepping through the value chain again provides visibility for some of the high value applications.
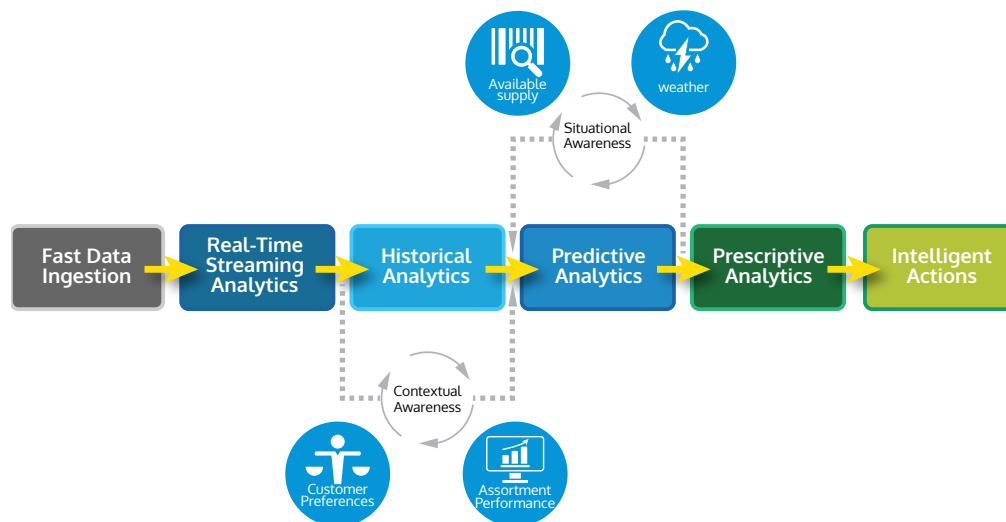

Figure 8: The Analytics Value Chain in Retail

1) Ingesting customer experience, customer and store sales history, and other data at speed and volume sets the stage for additional processing

2) Real-time Streaming Analytics processes incoming streams of data from IoT sensors and devices around a typical retail store

3) This refined data is then correlated with contextual and historical data to provide a baseline for advanced analytics. Contextual data can include information like customer preference data, or data relating to the performance of various assortments of goods in a particular store or set of stores

4) The next step is to predict buying or patterns using predictive analytics that are based on machine learning over historical and situational data such as external events like weather.

5) The final step in the analytics value chain is to apply prescriptive analytics to determine the next best action to take. This next best action could be a wide variety of actions associated with enhanced customer service, promotional scenarios, location-based offers, or other special services or marketing functions associated with high value or loyalty program for customers.

VII.Introducing the Vitria Advanced Analytics Platform – Designed to Help You Get Better Business Outcomes Faster

Achieving better business outcomes faster in IoT can only be achieved if the insights and associated action is executed in seconds, or in some cases, micro-seconds. Vitria's Advanced Analytics platform provides faster analytics in real-time via its unique Temporal Analytics Engine.

The Analytics Value Chain (figure 9 below) shows how the pieces of the Vitria platform leverage the faster analytics to build value.
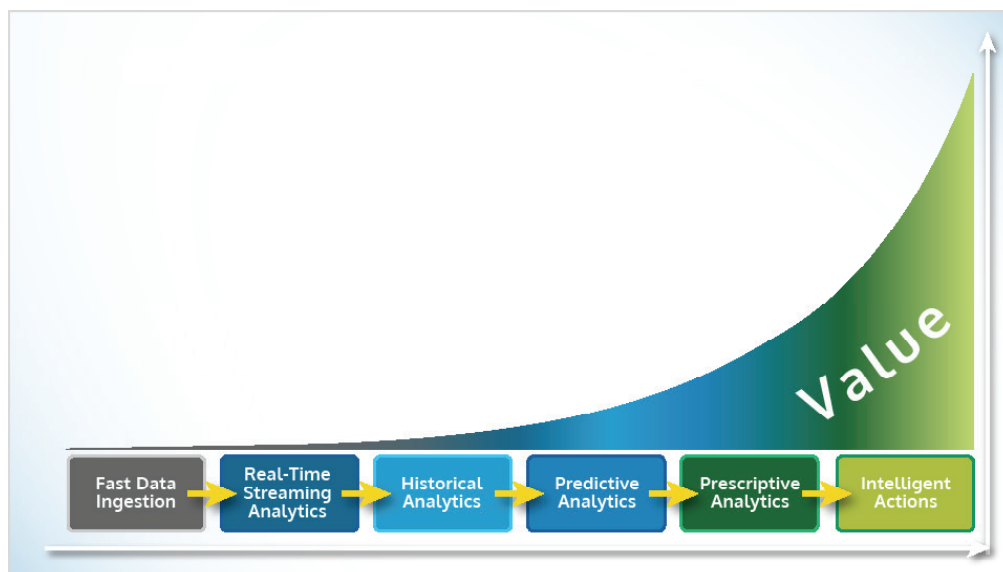

Figure 9: Building Business Value with the Vitria Advanced Analytics Platform

The ultimate value comes when prescriptive analytics and intelligent actions are used to take timely actions to effect business outcomes.

Such value cannot be achieved without a unified analytics platform that are equipped with self-service and model-driven tools and services. The platform combines rapid application development, broad analytical context for real-time IoT scenarios, and the ability to take action at the right time.

Furthermore, the combination of rapid development tools and unified analytics sets the stage for teams to build innovative IoT applications.

The unified analytics provide rich insights for potentially smarter actions, and the tools enable rapid testing of new applications based on those insights.

VIII. Closing Thoughts

To quickly gain value for your IoT projects, dramatic reductions in the time to develop is required. This is true for both the project timelines as well as the "time-to-action" scenarios in the specific applications.

Development teams, analysts, and operations staff need new tools to empower them to get desired results in minutes. Relying on specialists is no longer scalable and cannot meet the business requirements of the IoT era.

The time has come for operations leaders to leverage data and analytics as a key strategic asset and demand more from their technology solution providers across the board. New kinds of unified software platforms will be needed to meet the major challenges of IoT. Vitria's Advanced Analytics platform can help you overcome these challenges and deliver better business outcomes faster.

Watch a Demo of Vitria's Advanced Analytics Platform

Want to find out how you can transform your business operations and boost revenue growth through Faster Analytics, Smarter Actions, and Better Outcomes Faster? Contact us today to request a demo of Vitria's Advanced Analytics Platform!

[Request Demo](#) >

ABOUT VITRIA

Vitria's advanced analytics solutions empower enterprises and industrial customers to achieve better outcomes faster in their business operations.

The company was founded in 1994 and has a long history of success in streaming analytics, business process management, enterprise application integration, and operational intelligence. Vitria is also a leading player in the rapidly growing IoT (Internet of Things) analytics market. Customers include Fortune 500 companies and enterprises across a wide range of industries, including finance, manufacturing, telecommunications, utilities, retail and more. For more information, visit www.vitria.com

Contact us to learn more about how our platform can help you achieve better outcomes faster

Better Outcomes Faster

Smarter Actions

Faster Analytics
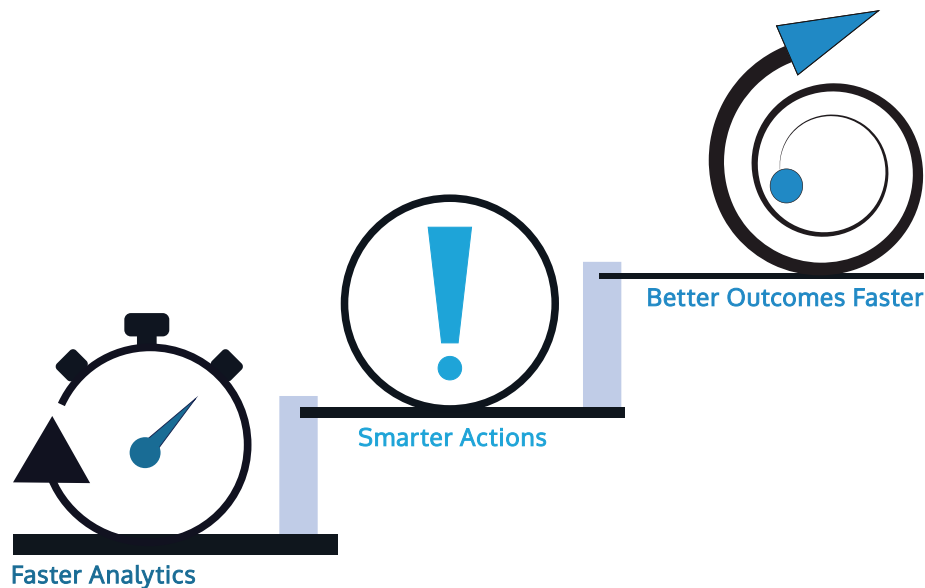
◇ VITRIA®

945 Stewart Drive, Suite 200
Sunnyvale, CA. 94085
Phone: 1.877.365.5935
Fax: 1.408.212.2720
www.vitria.com