



THE CASE FOR AI ENABLED RTLS PLATFORMS

Improve The Speed & Accuracy
of Business Decisions



INTRODUCTION

DOT COM BOOM AS A MODEL FOR THE EVOLUTION OF AI

The AI boom parallels the Dot Com boom, which unfolded in two distinct phases: an infrastructure boom followed by a software boom. During the 1990s, the infrastructure boom saw the expansion of the telecom networks necessary to support the internet, with internet hardware companies experiencing substantial growth. This set the stage for the software boom of the 2000s and 2010s, when internet applications and services were built on the established infrastructure. During this period, internet software companies such as Amazon, Google, and Microsoft created new business models and thrived.

CONDITIONS IN PLACE FOR AN AI SOFTWARE BOOM

The AI Boom appears to be following a similar trajectory, with the recent chip-buying frenzy laying the groundwork for a software explosion that is just beginning to take shape. Fueled by the chip-buying frenzy of 2023/24, companies are now fully prepared to develop and deploy next-generation AI models and applications. This surge is set to bring about a proliferation of AI-driven applications, with hundreds likely to emerge over the next years, permeating every aspect of society.

AI ASSISTS AND ACCELERATES BUSINESS DECISIONS

With the volume of data and speed of information, business decisions will get a big boost from AI assistance. AI can analyze large volumes of data instantaneously, providing immediate insights and actionable recommendations. It will enhance responsiveness to dynamic market conditions, reducing the time needed for human intervention and accelerating the overall decision-making cycle.

In short, AI-assisted real time insights like location information will **improve business decision making.**

RTLS: IMPACT OF ARTIFICIAL INTELLIGENCE

AI engines benefit from RTLS insights and vice versa

Location information significantly enhances AI applications across various domains by providing context-aware insights and optimizing processes.

- In the realm of navigation and maps, location data is indispensable, enabling AI to plan efficient routes using real-time traffic information and implement geofencing for logistical purposes.
- In agriculture, precision farming practices are enhanced by AI analyzing location-specific data to optimize crop management and soil health.
- In smart cities, location data is critical for optimizing traffic flow and managing public safety.
- Logistics and supply chain management are transformed through real-time location tracking, allowing for optimized route planning and inventory management, thus ensuring timely deliveries. Ensure compliance with asset management regulations.

Overall, the integration of location information into AI applications results in more efficient, effective, and user-centric solutions across diverse industries.

RTLS platforms benefit from AI

Real-Time Location Systems (RTLS) platforms stand to gain significantly from the integration of AI, enhancing their functionality and efficiency across various applications. AI can analyze the vast amounts of data generated by RTLS platforms to provide deeper insights and predictive capabilities.

I Healthcare



In healthcare, AI-enabled-RTLS can process location data to streamline patient flow, optimize the use of medical equipment, and ensure that staff are deployed where they are most needed, thereby improving patient care and operational efficiency.

I Logistics



In logistics and supply chain management, AI can enhance RTLS by predicting delays, optimizing routes in real time, and managing inventory more effectively, reducing costs and improving delivery times.

I Manufacturing



In manufacturing and industrial settings, RTLS data can be enhanced with AI to monitor asset utilization, predict maintenance needs, and improve safety by tracking the movement of workers and equipment.

Overall, the synergy between AI and RTLS platforms leads to smarter, more responsive systems that enhance decision-making, increase efficiency, and drive innovation across various sectors.

AiRISTA USE OF AI

AI Improves Location Accuracy And Probability

AI is also being used to address some of the historical challenges associated with RTLS platforms. AI can significantly enhance the location accuracy of RTLS systems by leveraging advanced algorithms and data processing techniques. AI algorithms, particularly machine learning models, can analyze vast amounts of location data and identify patterns that traditional methods might miss. For example, AiRISTA's sofia RTLS platform can filter out noise and correct for errors in the data by recognizing and compensating for common sources of inaccuracy, such as signal interference or

multipath effects. Furthermore, the sofia platform can continuously learn from the data it processes as data is collected over time to rule out RSSI values that are likely outliers. Applying a probability to the receiving gateway devices can self-correct when things in the environment change like obstructing objects. In complex environments like hospitals, warehouses, or urban settings, AI can integrate data from multiple sources, such as Wi-Fi, Bluetooth, GPS, and other sensors, to triangulate positions more precisely.

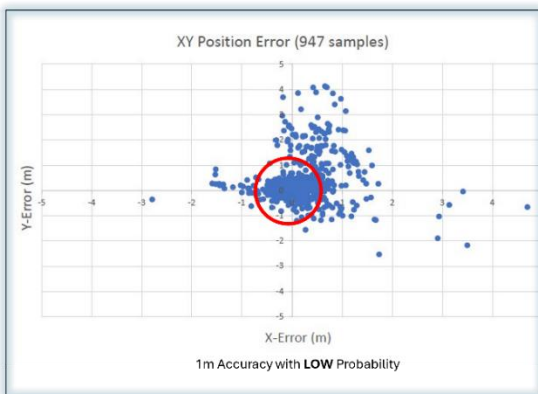


Figure 1 Location Calculation without AI Enabled Algorithms

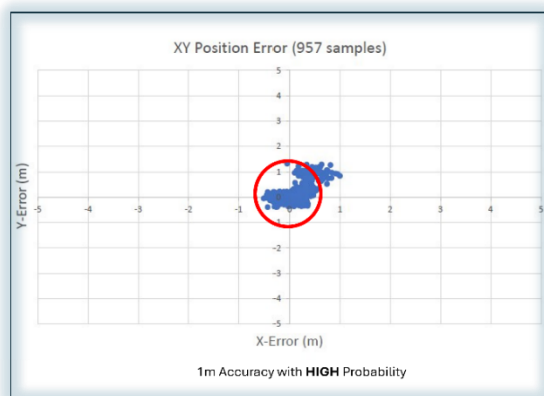
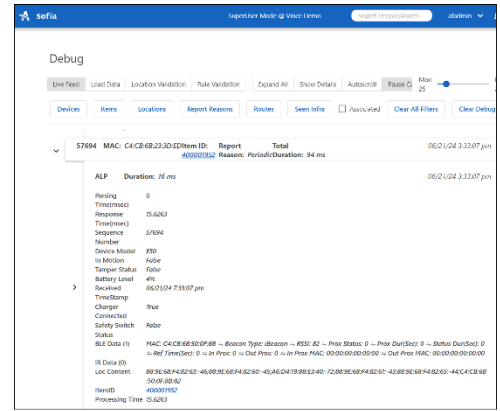


Figure 2 Location Calculation of Above with AI Enabled Algorithms

Combining the direction of movement with historical location, AiRISTA applies machine learning to produce the industry's most informed location calculations.

Overlooked in the discussion about location accuracy is the importance of location probability. Probability is related to the jitter in the location calculation. An RTLS engine with high probability will show little deviation in the location of a stationary tag with each location update. If we think of accuracy as a circle drawn around the location point (the smaller the circle, the better the accuracy), probability is the confidence that the tag is in that circle. AiRISTA, for example, uses advanced antenna technology in its BLE Angle of Arrival gateways which delivers extremely high probability in a small circle (0.9 meters or “submeter accuracy”) with 95% probability. To deliver both high accuracy and high probability, AiRISTA fuses a variety of information to recognize patterns of movement. Using the accelerometer embedded in most AiRISTA tags, true motion of the tag (moving from point A to point B) can be distinguished from random jitter in the location calculation engine.

Ongoing management of the RTLS platform is another opportunity for AI improvements to address some of the historical challenges of RTLS platforms. To calculate a location, RTLS engines use gateways at known fixed locations as reference points. It is not uncommon for reference points like Wi-Fi APs to experience problems. AiRISTA uses native intelligence built into the sofia platform to sense and then compensate when infrastructure behaves poorly. AiRISTA uses probability models to correct for any gap in geographic coverage and recalibrate based on the remaining infrastructure elements. Moreover, input from BLE, GPS, cellular, and even satellites can be assimilated across heterogeneous wireless environments to maintain confidence in the system. And platform management wouldn't be complete without automated notifications sent to the network team.



Sofia Debug Utility
Continuous capture & analysis of detected RSSI values.

AI Improves Ease Of Use Of RTLS Platforms

AI is increasingly replacing human activities by automating tasks that were traditionally labor-intensive, repetitive, or required extensive data analysis.

Customer Service



AI chatbots and virtual assistants handle a vast array of inquiries, providing quick and consistent responses without the need for human intervention.

Healthcare



AI systems assist in diagnosing diseases, interpreting medical images, and personalizing treatment plans, reducing the workload on medical professionals and increasing accuracy.

Logistics



AI also transforms logistics by optimizing routes, managing warehouse operations, and predicting maintenance needs.

Even creative fields are seeing AI's influence, with algorithms capable of generating music, art, and written content. By taking over these activities, AI not only enhances efficiency and productivity but also allows humans to focus on more complex, strategic, and creative endeavors. And in the case of RTLS, AI is improving the way busy staff interact with the platform.

Traditionally, RTLS is a useful tool when you have access to a keyboard for manual entry of location lookups. But to put RTLS usefulness in the hands of people on-the-go requires support for voice commands delivered from a mobile device. Natural language processing (NLP) is a form of generative AI that can distill sophisticated text into a simple command. By speaking a command into a mobile phone, an NLP engine can reduce this to a simple command which is fed to the RTLS platform. Responses are then delivered to the user's phone in the form of a voice or an image of a map. Now users can speak commands like,

To put RTLS usefulness in the hands of people on-the-go requires support for voice commands delivered from a mobile device.

- “Where is the nearest bariatric wheelchair”
- “How does the level of inventory compare to a year ago”
- “Is the number of fork trucks on the floor similar to last month”



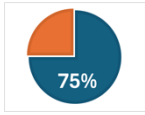
Because there are many excellent 3rd party NLP engines, it makes sense for RTLS vendors to partner. In fact, the biggest impacts of AI on businesses will be the result of connecting multiple AI engines, each expert in some specific analysis. As described below, AiRISTA is stringing together multiple 3rd party AI engines to help improve business decision making. So, the question of AI use in an RTLS platform should be expanded to consider how the RTLS platform is architected to take advantage of 3rd party AI engines.

HOW DOES AI TRANSLATE TO BUSINESS VALUE?

People often lack the time and appropriate data to make optimal decisions at the right moments. In a recent IDC study¹, 25% of necessary decisions are not being made due to operational challenges with data and analytics. Problems include,

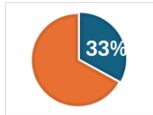
¹ “What Every Executive Needs to Know About AI-Powered Decision Intelligence”, Dan Vesset, Chandana Gopal, IDC, November 2023

Data Decay



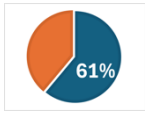
75% of decision makers say that data loses its value within days.

Data Waste



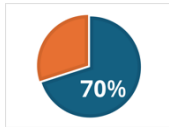
33% say they often don't get around to using data they receive.

Data Disconnect



61% say data complexity has increased compared with last year.

Data Neglect



70% say that data is being underutilized.

Decision intelligence, which enables the digitization and automation of decision-making processes, offers immense value. By integrating an intelligent engine into existing solutions and data sources, decision intelligence enhances and accelerates decision-making. This technology allows for faster, more accurate decisions made at the critical moment. Companies can evaluate complex variables and receive recommendations based on specific business rules, leading to impactful, value-generating decisions.

Decision intelligence enables real-time prediction and informed action, dismantling process and data silos, and leveraging data and systems to execute decisions. It supports both team-made decisions and autonomous decisions based on predefined rules and KPIs, offering capabilities to model, track, and continuously improve decisions. According to IDC, the resulting benefits include customer retention, employee retention, and product or service innovation

Enterprise Event Bus as the quarterback for automated decision making

Recall the enterprise service bus (ESB), an IT platform that allows different applications to communicate with each other in a standardized and efficient way within an enterprise. The ESB is giving way to the enterprise event bus (EEB), which includes streams of real time data combined with AI modules to automate decisions. The EEB consumes information from broadcasting business data sources, performs inspection & analysis, and shares the data and analysis with subscriber applications and notify the right individuals.

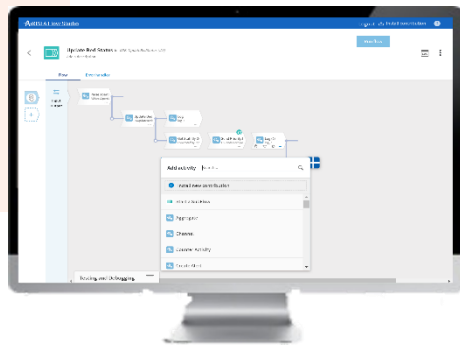
The EEB is fundamental to reacting in the moment and to automate decisions for optimal business outcomes. For example, disruptions to supply chains can be evaluated in real time for their potential impact,

but even more, establish a mitigating workflow. Imagine an EEB that immediately finds a new supplier, reroutes shipments based on weather, or adjusts production schedules to accommodate disruptions.

Central to the function of an EEB is the ability to consume, evaluate, manipulate and deliver data stream. Unlike traditional store & forward techniques, stream-oriented data operates on real time data and coordinates with other subscribers on “topics” within the stream. Windows of data can be retrieved and inspected within user defined time periods for time-based analyses. Data lakes that consume terabytes of unstructured data use built-in streaming interfaces as repositories, ideal for data modeling and AI analysis. AI engines are designed to work well with stream data. Streaming data facilitates the constant flow of diverse and up-to-date

information, enhancing the AI model’s ability to adapt and generate more accurate, contextually relevant outputs. And streaming data facilitates interconnection of multiple AI engines to steer an analysis through specific functions for more comprehensive results. For instance, consider a chatbot that helps travelers book their travel. Real-time access to airline inventory, flight status, hotel availability, and price changes is crucial for accurate guidance to customers. Stream processing enables the chatbot to adapt promptly to changing conditions, improving the overall customer experience.

Flow Studio, AiRISTA’s Enterprise Event Bus, orchestrates combinations of AI engines through its drag & drop pallet.



AiRISTA has created an EEB, Flow Studio, that facilitates low-code development of workflows based on sources including AI engines. Libraries like GitHub provide code modules that are dragged onto the UI pallet and interconnected with logic icons. As a natively streaming platform written in the language Go, Flow Studio is AI-friendly and machine learning ready. Discreet AI engines can exist as code modules in the library or as 3rd party engines, interconnected to create a cascade of intelligent decision making from a variety of AI sources and destinations.

AI-powered decision making improves the speed and accuracy of predictive maintenance to anticipate machine failures. Streaming input from temperature sensors, vibration sensors, and others are combined and fed to an AI engine. Machine manufacturers as well as upstart companies are providing the analytics engine which combines the real time inputs with historic patterns to anticipate failures. An enterprise event bus, like Flow Studio, coordinates the resulting decisions and workflows from an anticipated failure. Creation of a trouble ticket can be automated, production schedules can be updated, and staffing levels inspected to ensure a coordinated response.

Appropriate staffing levels have taken on new importance in healthcare, where a double squeeze is taking place. The strains of the pandemic have put over half of hospitals’ budgets in the red. Simultaneously, patient ratios are increasing, which creates a negative impact on staff retention. With the assistance of AI, it is possible to schedule staff based on real-time patient census and historic trends that account for external influences like weather and patterns of infections. AI can analyze vast amounts of data quickly and accurately, enabling hospitals to predict patient admission rates more effectively. By doing so, they can

ensure that they always have the right number of staff available, improving both patient care and staff satisfaction. Additionally, AI-driven scheduling can help to identify periods of peak demand, allowing hospitals to allocate resources more efficiently, or to defer elective procedures, thereby reducing the risk of burnout among healthcare workers. Overall, leveraging AI in staffing decisions can lead to more sustainable and responsive healthcare systems.

WHAT TO LOOK FOR IN AN RTLS PLATFORM

“CIOs require a platform strategy that manages the complexity and risks of this expanding universe of smart things.” Gregg Pessin, Gartner

As AI “crosses the chasm”, there is a danger that the hype exaggerates the ability of the RTLS platform to deliver. Some vendors are making general AI claims completely unrelated to any RTLS technology in their platform. Misrepresenting AI capabilities risks damping the enthusiasm of AI-assisted RTLS and delaying its evolution. Gartner’s Hype Cycle for Healthcare Providers 2023 (Andrew Meyer, Roger Benn) positions many AI technologies to the right of the “trough of disillusionment” where “the innovation does not live up to its overinflated expectations, it rapidly becomes unfashionable.”

AI capabilities can and should be built into the heart of the RTLS platform. Through AI, RTLS solutions will overcome many of the past challenges, ease of use, location accuracy, manageability, etc. But the real business value to RTLS platforms will be unleashed as they leverage the next-generation AI models and applications. Many of these AI engines are hitting the market now that the infrastructure, which drove the chip-buying frenzy, is in place that has been driven by the chip-buying frenzy.

ACCOLADES

AiRISTA is proud to be recognized by Gartner for being in the “Leaders” quadrant in 2022, 2023, and 2024.

The report is available on request.

PROJECT PROCESS

AiRISTA and our partners provide a consultative sales process to ensure success criteria are well understood and requirements will be met. The process includes the following major steps.



Discovery

Consult with you to understand your challenges and objectives

Design

Develop with you a recommended solution

SW Installation

Deploy an instance of Sofia - cloud or premises

Location Points

Use existing APs or deploy BLE gateways overlaid on maps

Integration

Third-party application intergration as necessary

Test/Training

Exercise system, review results, fine tune

Rollout

Assign and deploy tags to people and equipment

CONTACT US

Find out what AiRISTA can do for your organization by getting in touch for a consultation.

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