

IT@Intel: Improving Sales Account Coverage with Artificial Intelligence

Artificial intelligence is projected to help Intel generate USD 130 million in revenue annually and is creating a more scalable and effective sales process

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Executive Summary

As businesses grow, meeting the needs of new markets, customers, and partners can be challenging. Sales and marketing organizations are constantly under pressure to effectively cover accounts and rapidly respond to customers' changing needs while maintaining—or even reducing—operational costs. Intel's Sales and Marketing Group faces similar challenges while growing in new markets and domains and evolving its existing business.

To meet these challenges, Intel IT developed Sales AI, an artificial intelligence (AI) platform that enables Intel to significantly scale its sales activity. Sales AI collects and interprets customer and ecosystem data, then translates it into meaningful and actionable insights.

Intel IT developed two applications that use the Sales AI platform.

- Sales Assist provides insights (referred to as assists) to account managers. These assists broaden account managers' opportunities to better interact with customers and increase efficiency so they can cover more accounts and create more sales opportunities.
- Autonomous Sales creates automatic sales motions, which are actions that Intel
 offers a customer or partner through an email, website ad, or newsletter. Whether
 or not a customer chooses to take an action teaches us about their needs and
 interests. Autonomous Sales operates daily and automatically, with no human
 intervention. It applies to all partners' accounts, even if they are not covered by
 an Intel sales team.

Together, these Sales AI applications are generating significant business value to Intel. The incremental contribution of Sales Assist to the opportunity pipeline is estimated to be greater than USD 100 million per year, while Autonomous Sales is helping create USD 30 million in new sales annually. However, in 2020 these applications exceeded our expectations and together delivered more than USD 168 million in business value.

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Acronyms

AI artificial intelligence

CRM customer relationship management

EOL end of life

NLP natural language processing

Business Challenge

Like many sales organizations, Intel's Sales and Marketing Group continuously seeks to meet the needs of its customers, improve partnerships, and increase sales, while also reducing operational costs. (Note that throughout this paper, the term "customers" refers to both customers and Intel's partners). Some of the challenges include:

- Covering more accounts and partners. Balancing operational cost reduction with expanding markets often means fewer people to maximize the value of existing and new accounts.
- Efficient and more effective support. Along with an account manager who can predict their needs, both existing and new customers want fast responses to inquiries based on their business goals and specialties.
- Penetrating new markets. Account managers must understand the market opportunities, value chain, and market landscape to better identify and engage new customers.
- Remote coverage. COVID-19 forces account managers to understand the customers' needs without face-to-face meetings. This is even more challenging when engaging with new customers and leads.

Intel Sales needed an innovative approach to help account managers work more efficiently and increase the number of accounts they cover.

Sales AI Platform Overview

Al has great potential to solve Intel Sales' challenges. Intel IT collaborated with Intel Sales to develop two applications, Sales Assist and Autonomous Sales, which both run on the homegrown Sales Al platform. These applications provide automated insights and recommendations to improve customer engagement and satisfaction.

Every sales activity should start with a deep understanding of the customer account. Whether the sales activity is performed by account managers or by an autonomous sales motion, the foundation is knowing accurate and timely information on each account to provide the most relevant products, offers, and best possible customer service. To provide this level of understanding and support on accounts, Intel IT and Intel Sales collaborated to develop the Sales AI platform, which is based on these modules (see Figure 1). See A Deeper Dive into the Sales AI Platform Modules for more details on these modules.

- Sense. The Sense module collects data about customers to provide a deep understanding of their business, growth potential, and needs. It collects all of Intel's sales data and data from millions of web pages per day, for hundreds of thousands of accounts. It can also collect behavioral information about customer engagement with Intel and social media information, totaling millions of data points.
- Reason. To clearly understand the relevant business processes and improve outcomes, this module interprets information, correlates different pieces, and creates actionable *insights*. Insights identify valuable events, such as a customer's investments or product launches, then scores and ranks them to filter out non-relevant information. The insights collected can lead to action recommendations, or *assists*.
- Interact. The Interact module recommends actions to account managers—or generates automatic direct activities with the customer (email, newsletter of web updates)—for both covered and non-covered accounts. These interactions occur through the Sales AI applications, which are connected to Intel Sales' customer relationship management (CRM) and marketing tools.
- Learn. Machine-learning algorithms base their learning on historical sample data. For the algorithms to remain accurate over time, the Learn module requires past account interactions, results, and input from account managers. The Autonomous Sales application also collects customers' direct interactions and responses as input. This module actively processes this input and feeds the algorithms to keep them accurate and up to date.

Sales Al Platform Modules

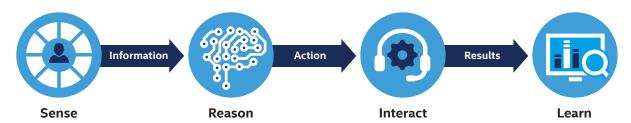


Figure 1. The Sales AI platform enhances the sales process using four modules: Sense, Reason, Interact, and Learn.

Sales AI Applications

The Sales AI platform was constructed to support many use cases and applications. Some of the use cases involve direct engagement with Intel customers, and some are used by the Intel sales teams. The two example applications described here are built on the platform.

The Sales Assist Application

In early 2017, Intel IT created the Sales Assist application based on the Sales AI Platform. Integrated into Intel's CRM system, the Sales Assist application provides valuable insights to sales teams about their covered accounts. These insights (called *assists*) are based on many different reasoning algorithms in nearly real time. Assists help account managers understand and follow up on opportunities, which vary based on the type of information the system analyzed. Sales Assist shows a range of assists, companies, and details about specific types of assists (see Figure 2).

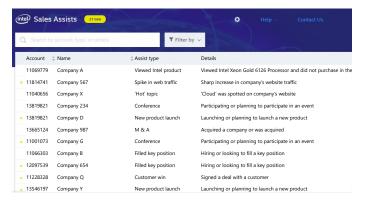


Figure 2. Sales Assist provides relevant customer activity to the account manager with elaborative details.

The sales teams use these assists to create sales opportunities and to better understand their customers' needs. Since its launch, the system has created more than 17,000 assists and delivered them to the relevant teams. In 2020, the system generated 46,385 assists.

Sales Assist is used by thousands of Intel sales account managers around the globe as part of their daily routines. With the move to a work-from-home environment in 2020, it became even more critical for sales teams to understand their customers' needs without physical meetings. This is where Sales Assist shines, in understanding the customers' implicit needs.

So that Sales Assist continues to learn and improve, whenever Intel sales teams use it for contacting customers, they indicate within the application if the data was valuable.

The Autonomous Sales Application

Human-based sales coverage is useful for complex sales motions and for establishing business relationships. Additionally, it would be ideal to provide Intel's customers with timely, relevant, and actionable sales promotions using AI technology, regardless of whether the account is covered by a sales team.

To accomplish this, we mimicked human actions and decisions. The AI-based Autonomous Sales application we developed supports decisions and actions on a large scale—that is, across Intel's entire product line—without human interaction.

Autonomous Sales starts by defining the different actions (actual human engagements with a customer via email or web) that Intel Sales can take with a customer to achieve a specific business goal. Today, a sales team or a partner program team manages those actions, and each action has a defined business process. Al technology enables us to take these actions with the correct partner, customer, and contact person, at the right time, and provide each customer with a relevant sales *motion* without human intervention. The motion is an offering to the customer, and whether or not they choose to take it teaches us about the customer's needs.

Using vast amounts of data that it collects daily, Autonomous Sales creates sales motions by identifying business *triggers* (a business partner's intent).

Depending on the trigger, Autonomous Sales responds with automatic, digital sales motions that address each customer's business needs. These sales motions match the customer's intent with a personalized sales offer for a specific Intel product. Further, some products can have associated point benefits as part of a partner program.

The Autonomous Sales application tracks three events that will trigger a motion:

- Direct Product Intent. This occurs when a customer shows direct interest in an Intel product on an Intel digital platform. Examples of a customer's direct interest include taking an online training class about a product, downloading a paper, or viewing a product page.
- Product Launch. When Intel launches a new product, the
 Autonomous Sales application looks for customers who will
 likely be interested in that product, based on the Sales AI
 platform's knowledge of their current business practices.
 This is also called "indirect product intent" because the
 customer did not actively express an intent on Intel's
 platform (this is a new product); however, the Autonomous
 Sales application identified it as relevant for this customer.
- Adjacent Product. To increase customer spending on Intel products, when the Autonomous Sales application recognizes a customer's direct or indirect product intent, it looks for adjacent products that could be used in combination with the one that the customer was interested in.

Once triggered, Autonomous Sales delivers the relevant sales motions to the customer using dedicated email, a website ad, or a newsletter article. After delivery, the Autonomous Sales application uses customer responses—such as email opens, purchases, and link click-throughs—to learn and improve.

A Deeper Dive into the Sales AI Platform Modules

The Sales AI platform is made up of four modules: Sense, Reason, Interact, and Learn.

Sense

The first step toward knowing Intel's customers is to gather all available information regarding their businesses, interests, needs, and ecosystem.

The Sense module automatically and continuously scans. mines, and collects data about Intel's customers from a variety of sources. The data sources are divided into two categories:

- Internal data reflects interactions and engagements between the customers and Intel. These include billing information, past opportunities, and first-party data engagements¹ on intel.com. Other sources of internal data include training completions on Intel University, responses to Intel communications, and any affiliations with Intel's partnership programs.
- External data reflects the digital footprint of each customer or partner in their ecosystem, regardless of their connection with Intel. This can include a customer's or partner's website, news mentions, social media information, and so on.

The Sense module runs on millions of web pages, tweets, sales transactions, and customer/partner engagements, transforming them into thousands of data points to create a timely and up-to-date full digital representation of the customer or partner. This data forms the foundation to achieve a deeper understanding of the business story of each customer or partner (see Figure 3).

Reason

Once the Sense module gathers the customer's digital representation, the Reason module uses this data to begin mining, correlating, and generating business insights. An insight is a prediction of a likely sales motion that the Sales Al platform makes based on the information it learns. An insight might be a recommendation that a customer needs an existing Intel product, based on a new direction published on their website. A customer might announce an acquisition of a smaller company in a new business line, and an Intel salesperson could subsequently recommend what they need to grow their business line. The Reason module can deduce business insights from one or multiple data sources. The module attempts to identify a customer's goals, needs, organizational changes, and shifts in focus areas—ultimately uncovering hidden opportunities for the Intel sales team.

Purchasing Information and Insights

Understanding the customers' purchasing behavior is a foundational part of understanding Intel's customers. Historical purchases create the baseline of past collaboration between Intel and each customer. The Sales AI platform can then comb through and correlate with additional data to detect potential customer churn and growth opportunities. For example, the Sales AI platform can identify and monitor:

- Changes in purchase patterns. To detect changes in a customer's purchasing habits, the platform identifies trends and cycles by analyzing their purchasing history and productrelated activities on Intel's digital platform. For example, a sudden and unexpected decrease in purchases of Intel products (compared to the customer's historical purchasing patterns) is an important trend for account managers. It can indicate that the customer is exiting a product line or market.
- Affinity to product. Using past purchases and activity on Intel's websites, the Sales AI platform finds similarities and patterns between products and customers. It uses those patterns to predict the customer's affinity to purchase each

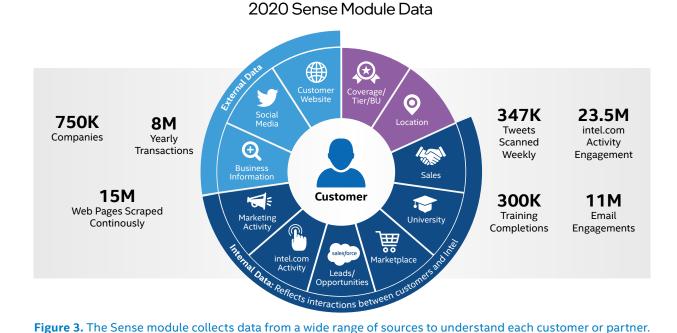


Figure 3. The Sense module collects data from a wide range of sources to understand each customer or partner.

of Intel's products. Account managers can use this affinity for segmentation (for example, a marketing campaign) and for recommending products directly to customers through a variety of channels. In addition, the Sales AI platform can alert an account manager if a new product Intel is launching might be a good fit for any of their covered accounts.

• Product end-of-life (EOL) insights. The Sales AI platform also monitors information regarding Intel's product life cycles. When a product nears EOL status, the Sales AI platform examines historical purchase patterns to identify the customers that would be impacted. This alerts the account manager to start a conversation regarding stock-up or upsell opportunities to this EOL product.

Web Mining and Insights

Information on a customer's website can translate into valuable insights. A company's website holds all the information they want to share with their own customers, and it tells the company's story.

The Sales AI platform uses web-mining methodologies to collect customer website information. Using natural language processing (NLP) algorithms, the Sales AI platform identifies cross-reference information about products, brands, advertisements, verticals, and other business-related data.

Based on this mined information—and based on crossing this information with additional data points—the Sales AI platform deduces business insights such as:

- Customer insights. The Sales AI platform extracts information about the industries in which the customer is operating, such as automotive, communications, or healthcare. This can include the customer's role, such as manufacturer, integrator, or reseller, and the technologies it uses (or is developing). Using pre-trained language models such as BERT and GloVe, the Sales AI platform extracts this information with a deep-learning-based model created for this task. This task is challenging because companies use different terminology. For example, Intel may define a company as an "integrator," but the company may not use this term to define itself. Therefore, as a pre-step to this deep-learning-based model, the Sales AI platform creates adjusted examples for Intel's needs.
- Ecosystem insights. The Sales AI platform analyzes the text, website structure, links, and images in a customer's website to learn more about them and extract the names of additional companies that are mentioned. This helps to create an ecosystem view of the customer and to understand the role that the customer plays in the ecosystem.
- Competition-related insights. Alerting an account manager about what a customer is doing in relation to Intel's competition can help that account manager identify new opportunities for growth and become more aware of a customer's growing affinity toward the competition. The Sales AI platform continuously tracks the customer's website. When it identifies mentions of an Intel competitor's product while not purchasing the equivalent Intel product, the Sales AI platform will generate an assist, notifying the account manager that there might be an opportunity for conversation.

A Closer Look at NLP

Natural language processing (NLP) investigates the interaction between computers and human language. Sales AI uses NLP to better understand Intel's customers by extracting information from sources such as customer websites, Twitter accounts, and intel.com pages. For example, it uses NLP for predicting the customer's role based on its website or identifying business scenarios mentioned on Twitter. To explain how Sales AI uses NLP, let's review these two tasks.

Predicting the Customer's Role

In any machine learning problem, the model requires some positive examples to learn from. For example, by having a few examples of companies that are "manufacturers" or "integrators," the model will try to find companies that are similar. One of the best sources to learn what a customer does is its own website. Sales AI crawls the customer's website and tries to understand the text. It uses pretrained language models (GloVe and BERT) to transform the website text into numeric matrices and then finds similar companies based on these matrices. This task has a few challenges:

- 1. The way customers define themselves in their websites can vary greatly among similar companies.
- 2. Intel's terminology is unique. When Intel is looking for "integrator," the customers may not define themselves that way.
- Pre-trained language models, such as GloVe and BERT, are not optimized for Intel's "technological language."

Therefore, Sales AI uses advanced methods to enrich the number of positive examples and validate their quality. In addition, deep learning models align the various terms and find the most similar and relevant companies. Sales AI then verifies whether the results are correct using validation models.

Identifying Business Scenarios from Twitter

Many of Intel's big customers provide a lot of information on Twitter. A tiny fraction of this might be relevant for Intel sellers, such as "new product launch" or "merge and acquisition." Finding these business scenarios poses three challenges:

- 1. Language on Twitter differs from common language.
- 2. Only a small fraction of tweets are business scenarios.
- There are no true labels—there is no indication if a tweet was a "merge and acquisition" or an "employee pizza evening."

So how can relevant business scenarios be found? Sales AI uses a weak supervision technology, jointly developed with Stanford, to create true labels. Using the deep-learning long short-term memory (LSTM) model, Sales AI identifies additional relevant business scenarios that are similar to the created true labels.

Behavioral Information and Insights

One way to effectively understand customers is by collecting their activities on Intel's digital platform. When the Sales AI platform combines these activities and actions with additional data points, it can identify a variety of insights, including:

- Purchase intent insights. If a customer is searching intel.com for data center products, or is downloading product information, the Sales AI platform correlates that activity with information it collects from other sources and generates actionable insights. The platform can also generate additional insights alerting the salesperson if the customer's purchase intent is a shift from their normal purchase behavior. Insights like these can indicate a new growth area for the customer and lead to new opportunity for collaboration.
- Customer topics of interest. From a customer's activity on intel.com, the Sales AI platform can also deduce the topics of interest to a person and company. If they are looking for specific types of technologies or products, or they are searching for solutions or offerings associated with a certain industry, it can indicate their interest. The Sales AI platform scans all intel.com pages, and by using NLP, it extracts the topics associated with each page. Then, it connects between the different pages using links and historical users' journeys to build a topic network of all intel.com pages. Based on that topic network, the Sales AI platform deduces the customer's topics of interest.
- Change detection insights. Because the Sales AI platform can identify topics of interest and track behavior, it can also identify changes over time. It can alert salespeople with an insight when the customer shows a shift in interest toward a new topic (for example, a new industry or technology), or if there is a shift in the documents the customer is consuming from Intel. The Sales AI platform monitors all data downloads from the Intel Research and Development Center. Using AI algorithms and NLP, it identifies the topic of each document the customer downloads, then generates an insight when there is a shift from previous interests or any unusual behavior, such as a sudden increase in activity.

Sales AI Recommender System-based Insights

The Sales AI recommender system provides product recommendations to a company or to an individual contact person. The system is flexible and considers multiple objectives, and it provides personalized and updated recommendations while increasing Intel's revenue. The Sales AI recommender system has three components: features creation, recommender model, and optimization model (for more information, see "A Closer Look at the Sales AI Recommender System" sidebar).

These insights represent just a portion of what the Sales AI platform generates. The Sense and Reason modules are expanding continually by adding additional data sources and by correlating and connecting data. These modules also apply advanced machine learning algorithms and techniques to provide additional business insights, which the Interact module serves to account managers.

A Closer Look at the Sales AI Recommender System

The Sales AI recommender system has three components:

Features Creation

The quality of any machine-learning algorithm relies on a few key factors, and one of those factors is features. Comprehensive and well-designed features are crucial to the model's success. In the Sales AI recommender system, the representations of a customer and a product are vital. The Sales AI recommender system uses a variety of data sources such as sales, training, intel.com activity, and product characteristics, while using advanced methods to create the features. For example:

- A word2vec-based model analyzes the sequences of the customer's purchased products to represent the place a product plays in the customer's patterns.
- A matrix-factorization-based model represents a user or item with respect to collaborative filtering.
- Smart affinity features are based on different data sources.

Recommender Model

Features that the Sales AI recommender system creates (for example, a user or item representation by the matrix-factorization model) might be sufficient to indicate which products are currently associated with a customer. However, the Sales AI recommender system also attempts to find which product might be relevant to a customer tomorrow. The model is based on Google's wide and deep learning architecture. This model considers multiple objectives in the learning process, including products that the user did or didn't purchase in the past, the customer's expected volume of purchases, and the customer's internal priorities. The recommender model produces a ranked list of products for each customer. The recommender system updates those recommendations weekly, based on the customer's activities and characteristics.

Optimization Model

The recommendations made by the recommender system are theoretically ready for use. However, the system makes some enhancements while using the optimization model, which attempts to fine-tune the recommendation and adjust it for each customer. It considers multiple aspects such as:

- The current and most updated activities of the customer or company.
- Intel's current sales strategies, so the system can adjust the priorities of different products.
- Feedback from the model itself, so that it won't always recommend the same products but will continually learn, grow, and provide a variety of potentially relevant products.

Interact

The Sales AI platform feeds the results from the Reason module into the Interact module. Interactions with customers can happen in multiple ways, often defined as push or pull interactions.

- **Push interactions**, where the account manager contacts the customer directly, can include emails or phone calls.
- Pull interactions, where the customer gets information for themselves, can include activities like visiting intel.com and downloading content.

The role of the Interact module is to push recommendations from the Reason module to the customers at the right time, in the right way, and in the right format. The Sales AI platform supports all types of interactions, from email, to web, to a recommendation to the sales team covering the account.

Learn

As the needs and businesses of customers evolve, we need to retrain the algorithms in the Sales AI platform so that they keep pace with the changes happening in real life. Different algorithms learn in different ways, but in general, the Sales AI platform uses all these different ways of customer and partner interaction to collect feedback. The platform then feeds that information back into the models for further improvement.

Solution Architecture

The Sales AI platform (Figure 4) uses AWS serverless services for tasks such as web crawling, data processing, data indexing, and search. It also uses an internal K8S cluster for data processing and running AI models. Intel IT chose AWS for its built-in security and high availability, along with its endless resources and scaling capability for huge workloads. The architecture for both ecosystems is based on microservices with a messaging queue for communication (Kafka/SQS/Kinesis).

For example, Sales Assist uses the Elastic Search service to provide access to indexing and search capabilities with simplified deployment and maintenance.

The Sales Assist and Autonomous Sales machine-learning models cross reference the data, analyze it for valuable insights, and send relevant assists to account managers through the Sales Assist application or to customers through the Autonomous Sales application. Because the models require high-performance compute, we chose servers based on the Intel® Xeon® processor family and Intel® Xeon® Scalable processor family.

Business Impact

Today, Sales Assist, Autonomous Sales, and the Sales AI platform provide Intel Sales with a wide view of customers' needs and which Intel products would be best for them. From their company's tweets to a contact person's browsing behavior on intel.com, these applications can build a comprehensive and complex view of each customer, their industry, and their needs, and make appropriate recommendations. Autonomous Sales can do this without human contact and track results over time.

Sales Assist

Sales Assist is now a fully automated, self-maintained production system embedded in Intel's enterprise CRM system. The incremental contribution of assists to the sales pipeline is estimated to be greater than USD 100 million per year. However, in 2020 the application exceeded our expectations and delivered more than USD 133 million.

Since its inception, the Sales Assist user base has expanded from 150 to more than 1,500. It has provided more than 17,000 assists relating to nearly 5,000 covered accounts. Account managers use approximately 80 percent of the assists that the system presents to them, and account managers' satisfaction rate for assists consistently exceeds 90 percent.

Sales Al Platform Architecture

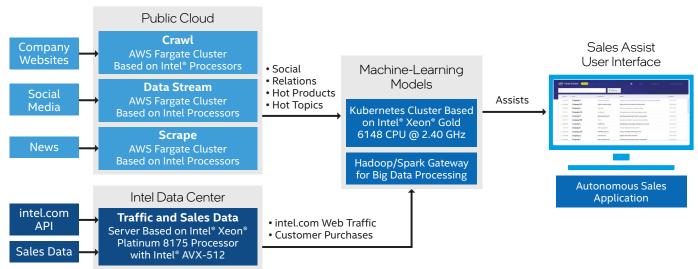


Figure 4. The Sales AI platform architecture relies on high-performance compute from servers based on the Intel® Xeon® processor family and Intel® Xeon® Scalable processor family.

Autonomous Sales

Autonomous Sales has become a growth engine for Intel's partner program, driving more than USD 30 million in incremental sales every year. It is also resulting in higher partner engagement and value for Intel's partners. The application delivers a yearly volume of about 30,000 emails to more than 10,000 contacts within Intel's customers. Further, the unique open rate of those emails is 36 percent. This is significantly higher than the average email open rate of 21.3 percent.² Finally, 16 percent of the purchases that followed Autonomous Sales recommendations are first-time purchases. This is significant, because the recommendations from Autonomous Sales encouraged them to buy something they had never bought before. We were incredibly pleased that in 2020 this application exceeded our expectations by driving more than USD 34 million in sales.

Next Steps

Intel IT is committed to helping Intel grow. We work to continually improve our sales solutions, and provide accurate, dynamic, and reliable information for Intel Sales. Several future improvements are planned.

One area of improvement is to broaden the applicability of the Sales Assist application. We can expand the number of account types that receive assists by using more advanced models to identify specific use cases required for Intel's growth. For example, Intel is investing heavily in developing AI solutions. A model may identify customers who are exploring AI, and alert a sales representative to present Intel's AI offerings to that customer.

Other prediction models can be dedicated to specific use cases; we call these deep assists. Examples include notifying an Intel sales team member when a customer makes specific investments related to data centers, or when a customer investigates Intel's tender (bidding) requirements.

Currently, the Sales Assist application provides information to sales representatives, but it doesn't suggest a specific action. We plan to add the ability for the application to make a recommendation. For example, if an assist indicates that a customer viewed an intel.com product page, the recommended action might be to send the customer a link to the relevant product brief.

Conclusion

Intel Sales continuously looks for innovative ways to expand in new markets and enhance coverage of its globally dispersed customers and partners without significantly expanding its salesforce. Intel IT is helping Intel Sales achieve its goals with Sales Assist and Autonomous Sales, built on our Sales AI platform. By collecting, analyzing, and using AI to act on data from a variety of sources, the Sales AI platform is transforming the way Intel conducts sales activity.

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