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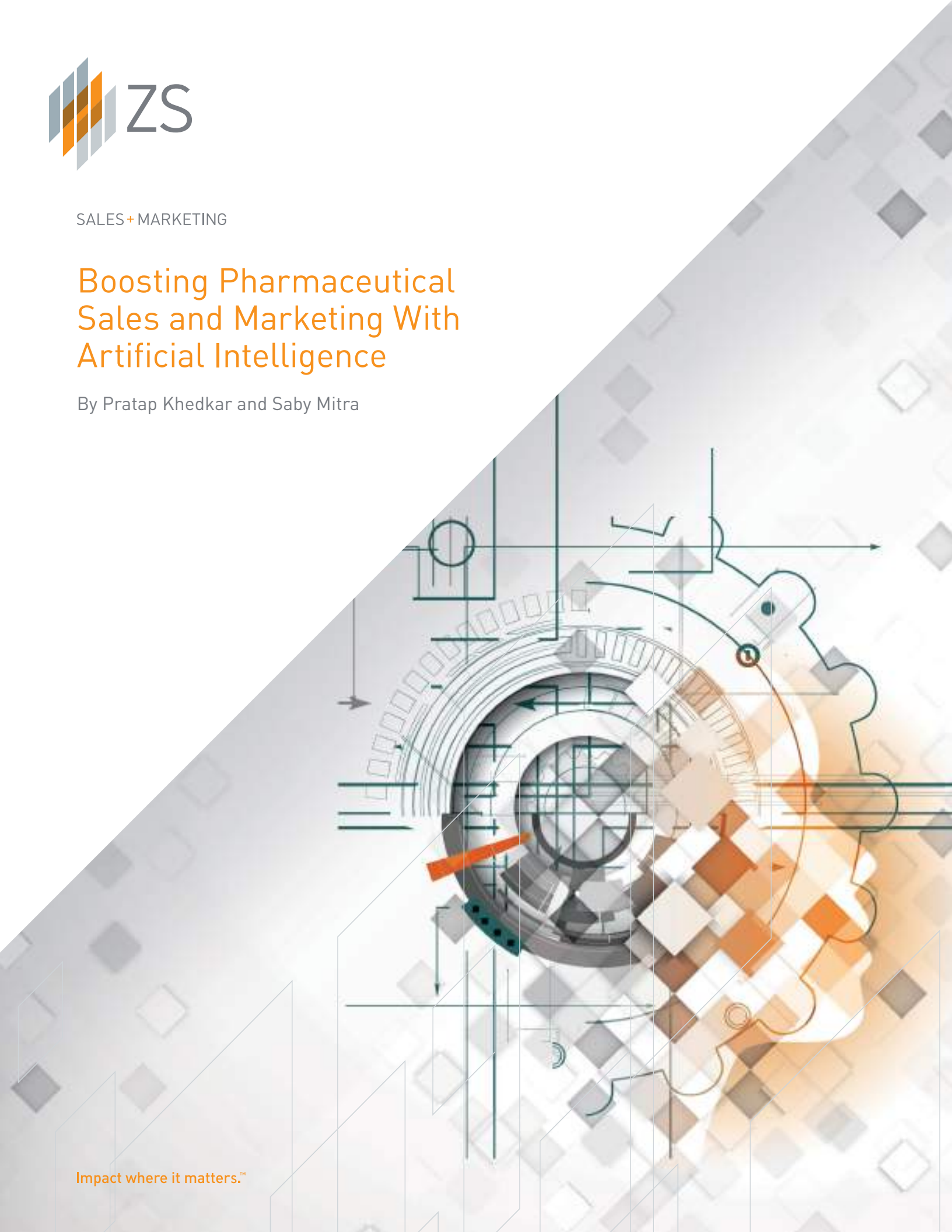
# Boosting Pharmaceutical Sales and Marketing With Artificial Intelligence

By Pratap Khedkar and Saby Mitra



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Innovations in artificial intelligence and advanced analytics are creating performance and efficiency opportunities across industries and markets. While experiments on AI have been conducted for at least 25 years now, only recently have technological advances in the areas of data collection, processing, algorithms and computing speed enabled successful implementation at an industrial scale.

AI holds great commercial potential globally, but the impact can be significant in developed economies with a high GDP per capita that are preparing for challenges, such as a quickly aging population. Similarly, AI is expected to elevate performance across most industries and functions, especially those with a high share of predictable tasks such as supply chain management or predictive maintenance. The impact of AI can't be underestimated in pharmaceutical sales and marketing, a domain that also has a significant reliance on human functions such as expertise and reasoning. Furthermore, there are clear and specific opportunities for machine and human integration, and a need for underlying organizational transformation to truly realize the value of AI enablement within pharmaceutical sales and marketing.

## The Potential of AI in Pharmaceutical Sales and Marketing

Pharmaceuticals historically has been a data-rich industry. Particularly in the U.S., the sector has managed to collect significant information about its healthcare professional customers—their demographics, specialty, educational background, institutional affiliations and prescribing behavior. Compare the data coverage and availability in pharmaceuticals with that of leading e-commerce providers such as Netflix or Amazon: The online outlets have great data on their products and the associated product attributes but have very limited customer information, something that's critical in driving a differentiated customer experience.

Additionally, in most major markets over the past five years, the pharmaceutical industry has adopted a more disciplined approach to collecting data from internal and third-party vendors, implementing better data-quality processes and investing in cloud-based enterprise data management capabilities.

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When it comes to analytics in a typical pharmaceutical commercial organization, the scope has remained limited to descriptive and, in some cases, predictive types, primarily executed via an ad hoc process that might not be automated and tightly integrated within commercial business processes. The standard analytical programs today rely on specific coded instructions and often find it difficult to sift through substantial big data sets to find patterns (like patient switching activity), identify associations such as key opinion leader (KOL) influences, or accurately detect trend breaks in customer behavior. Furthermore, building and maintaining these programs, which need to codify a large variety of scenarios, can be challenging and expensive. In contrast, as competition intensifies and promotional sophistication becomes a key imperative for differentiation in pharmaceutical sales and marketing, AI engines leveraging closed-loop machine learning techniques—where the algorithm is trained with a large volume of data and can adapt to new data inputs without the need for explicit reprogramming for every scenario—are the next frontier.

There are several applications of the machine learning form of AI in the pharmaceutical industry, but we believe that the following five use cases can have a significant impact on the commercial organization:

1. **Customer affinity prediction:** The personalization of tactics improves customer engagement by serving up relevant content through the right channels at the right time. Based on analysis conducted by ZS, aligning the promotional content and channel to healthcare professionals' affinities can garner up to three times the engagement. Affinity prediction for the channel and content can be conducted through the collection and analysis of healthcare professionals' interaction data across different types of channels (such as email, websites and mobile alerts) and different types of content or messaging (like product efficacy, safety and tolerability, and patient services). When historical data isn't available for customers, predictions can be made based on data from similar ("like") customers. ZS observes a prediction accuracy as high as 85% with affinity estimations as the model learns with new data over time.
2. **Customer journey design:** Historically, the scope of campaigns in the pharmaceutical industry often has been limited to a single-tactic execution instead of a coherent sequence of tactics. Brands that have deployed healthcare professional journeys often have designed them primarily based on broad brand imperatives and available content, and focused less on analytical computations that can help drive customer-centric campaigns. As the next level of sophistication in journey design, marketing organizations can use advanced machine learning techniques to find sequences of marketing tactics that have worked well (as shown in figure 1). The algorithm can then continue to develop the most optimal sequence from historical productive sequences, and self-learn to continually optimize and improve sequence generation as more data becomes available. Based on analysis conducted by ZS across several pharmaceutical brands, optimal sequencing of personal and non-personal channels is estimated to lift top-line sales by as much as 2%. While that percentage seems small, it may translate into tens of millions of dollars.

**TACTIC SEQUENCES**

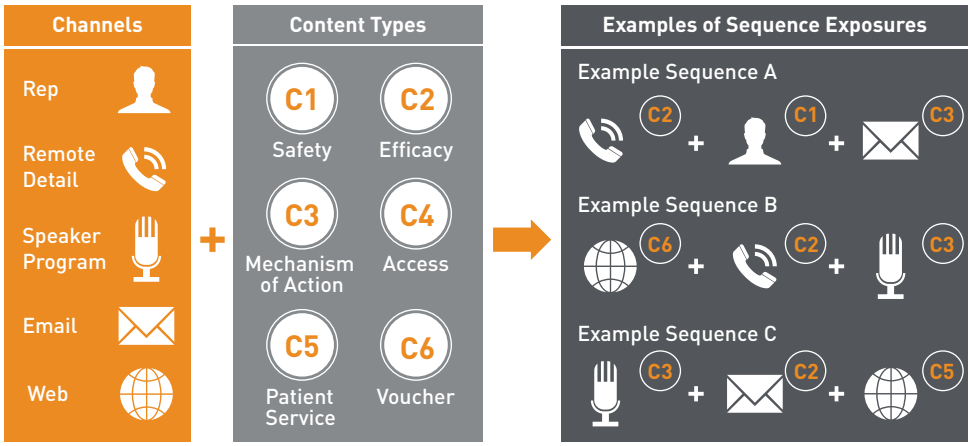



*Figure 1: Pharmaceutical marketing organizations are using machine learning to optimize message sequencing in an effort to engage the customer at the right time with the right content.*

3. **Next-best actions and suggestions:** Traditional customer journeys developed by pharmaceutical companies are more static in nature, and customer engagement is pre-defined based on business rules and few constraints. However, more progressive marketing organizations have started piloting next-best action programs that are based on near-real-time customer interaction data sets and multivariate computations while leveraging customer affinities and optimal tactic sequences, which make healthcare professional engagement initiatives significantly more dynamic. In other words, while customer journeys are still designed to provide a long-range plan on how to engage the customer, the next-best action approach provides customer engagement predictions, including the right customer, channel, content and cadence recommendations, more dynamically based on the most recent data.

   While next-best actions are analytically derived and generally enable machine-to-machine execution, the approach needs to be adapted when recommendations are extended to pharmaceutical sales teams, a channel that dominates more than 60% of pharmaceutical marketing investment, according to ZS research. The recommendations ("suggestions" for the sales rep) in this case need to be consumable by humans so that sales reps can use them to enhance the quality of their customer interactions, should allow for human judgment in whether or not to exercise them, and must facilitate feedback collection from sales reps to enable learning and optimization. ZS has observed an improvement in customer engagement rates between 15 to 25% and an increase in top-line sales between 2 to 4% across pharmaceutical brands as a result of the successful implementation of next-best action and field suggestion programs.

4. **Patient switch propensity and adherence:** Across therapeutic areas, as companies race to capture new patients between diagnosis and therapy initiation, algorithms that can learn relationships between diagnoses, treatments, procedures and prescriptions can drive significant competitive advantage. This approach can help brands mobilize field and marketing resources throughout patient journeys (as shown in figure 2), and proactively trigger actions by predicting different leverage points, such as a new patient diagnosis, the patient switch propensity to competitive brands, and patient discontinuations. Based on our analysis of one specialty brand, ZS estimates that a 1% increase in patient adherence can add up to $100 million in sales at peak.

**THE PATIENT JOURNEY**

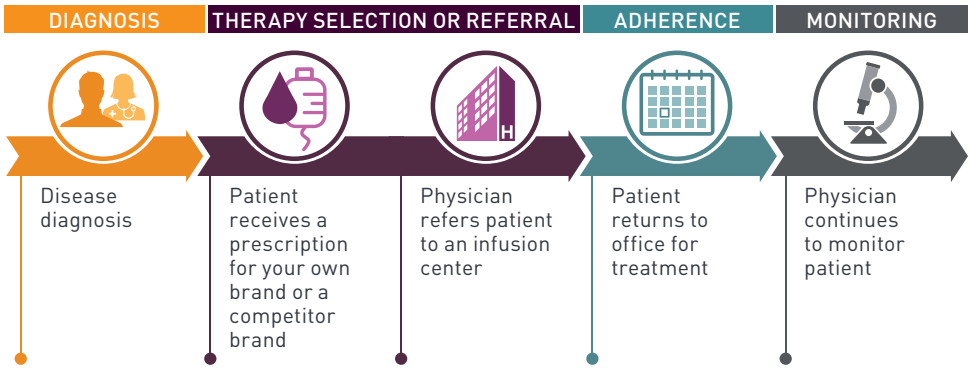



*Figure 2: A closer review of the patient journey helps identify trigger opportunities for marketing and sales activities.*

While AI and automation can significantly enhance the performance of pharmaceutical commercial strategies, true value realization from AI can only happen when innate human cognitive skills are purposefully integrated.

5. **KOL mapping and influence networks:** The mapping of leading healthcare professional influencers and their influence networks—leveraging data from social media and online communities—can bring value to commercial organizations in multiple ways, including the recruitment for collaboration on research and clinical trials, the evaluation of leading adoption targets for new product launch, and the identification of a key opinion leader for speaker programs. Search algorithms can help identify physician communities and referral networks. Physicians within a community tend to share patients with each other more often than they do with physicians outside of the community. The approach helps identify both treating and referring physicians, and establish referral patterns and influence networks. ZS estimates that referrals can account for as much as 50% of prescription volume for certain specialty brands.

## Limitations and Considerations With Machine Learning

While learning-based systems are geared toward delivering a strong competitive edge, companies should fully understand the limitations and accuracy potential of predictive models. Leveraging correlations derived from historical data to predict future outcomes implicitly assumes stable and steady-state conditions. However, models developed in pharmaceutical commercial organizations also need to consider a broader set of factors, such as competitive product launches, changes in local market access conditions, and recent marketing campaigns, to name a few, to simulate truly multivariate scenarios and improve prediction accuracy. For example, predicting content affinity can be a function of the product's life cycle. A physician may be more interested in scientific content for a newly launched product versus patient services, such as samples and vouchers, when a product becomes mature.

Additionally, if models heavily rely on dynamic variables, then careful consideration must be given to the training data window that the algorithm will consume. For instance, the prediction accuracy of next-best-action algorithms can be compromised because of insufficient training data on historic customer interactions across channels. Similarly, companies that have too much emphasis on one kind of promotion (such as sales rep visits) will have historical sequences that are heavily dominated by that channel, reducing the richness and capabilities of the predictive algorithm, at least in the initial stages.

## AI Alone Can't Drive Impact. Purposeful Integration With Human Intelligence Is Critical.

While AI and automation can significantly enhance the performance of pharmaceutical commercial strategies, true value realization from AI can only happen when innate human cognitive skills—such as reasoning, problem solving, creativity, expertise, coaching and people development—are purposefully integrated with machine learning algorithms and systems.

Figure 3 shows the degree of human engagement needed across a spectrum of capabilities that are delivered and managed by pharma's commercial operations organizations. AI-enabled capabilities, such as customer journey design, dynamic targeting and call routing of physician customers, marketing next-best actions

and suggestions for field reps, require relatively high human judgment and organizational change management—at least initially at capability launch, until the organization has developed trust and reliance on AI capabilities.

**MAPPING HUMAN INVOLVEMENT AND ANALYTICAL CAPABILITIES**

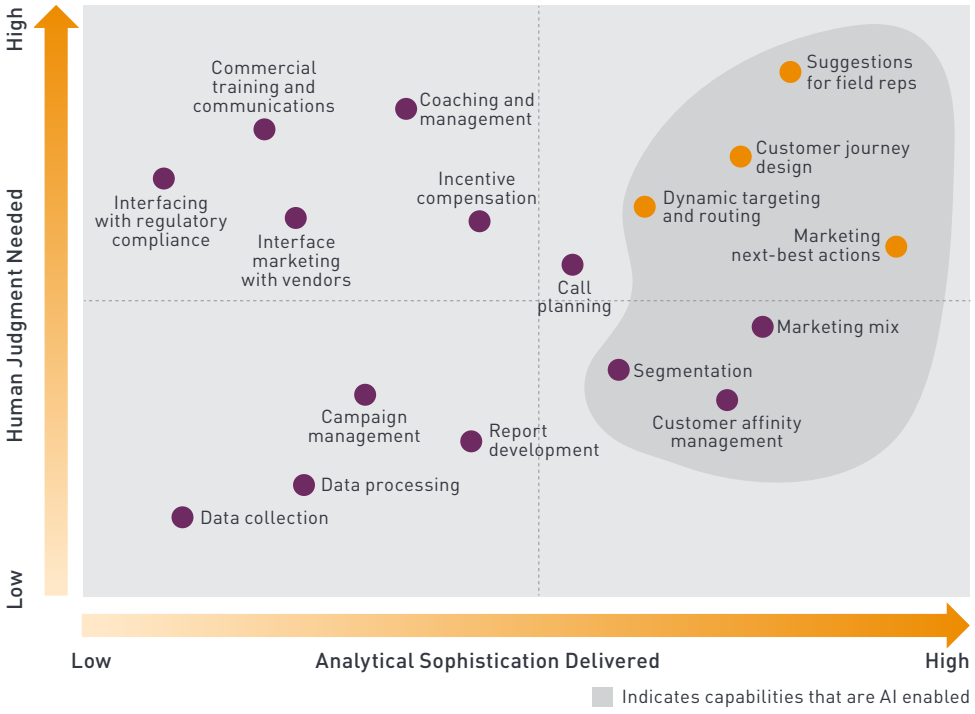



*Figure 3: Human engagement can vary significantly by capabilities across the commercial spectrum.*

Additionally, there are four key opportunities to significantly leverage people skills across many of the AI-enabled capabilities to truly bolster machine-to-human collaboration and amplify pharmaceutical sales and marketing performance:

### Domain Expertise

Domain expertise, when appropriately codified, can offer a significant lift in the effectiveness of an AI algorithm before self-learning initiates. We believe that, to demonstrate tangible value to the organization, the algorithm must be tailored to address market dynamics, prioritize brand objectives and enable customer strategy. The infusion of domain expertise into machine learning algorithms can be achieved in three key areas to integrate the algorithm into business processes and ultimately drive customer impact:

1. Expertise in the brand and market to help formulate business rules
2. Expertise in the industry data to identify and design triggers
3. Expertise in marketing and sales to integrate the algorithm into business processes

Subject matter experts should play a critical role in shaping the algorithms' requirements and in training or retraining the algorithms with relevant data. The work produced by an AI algorithm also will need to be regularly evaluated or reviewed by commercial operations team members with judgment, experience and domain expertise.

### Selling Excellence

According to ZS's AccessMonitor™ survey, the size of the pharmaceutical sales force in the U.S. has shrunk by about 25% in the past decade. Over the same time period, sales reps' access to physicians has dropped from approximately 80% to about 46% across specialties. As organizations increase automation and attempt to serve data-driven insights to the field sales reps, the expectation from a pharmaceutical sales organization gravitates toward doing more with less. However, while AI-driven insights can offer higher sales productivity and effectiveness, the sales rep's innate pharmaceutical selling competencies need to complement the analytics to ultimately drive a stronger customer experience.

The rep's selling competency can be organized into four key categories:

1. Selling and educational
2. Business management and organization
3. Clinical and product expertise
4. Analytical and operational

**COMPETENCY REQUIREMENTS OF PHARMA SELLING ACTIVITIES**

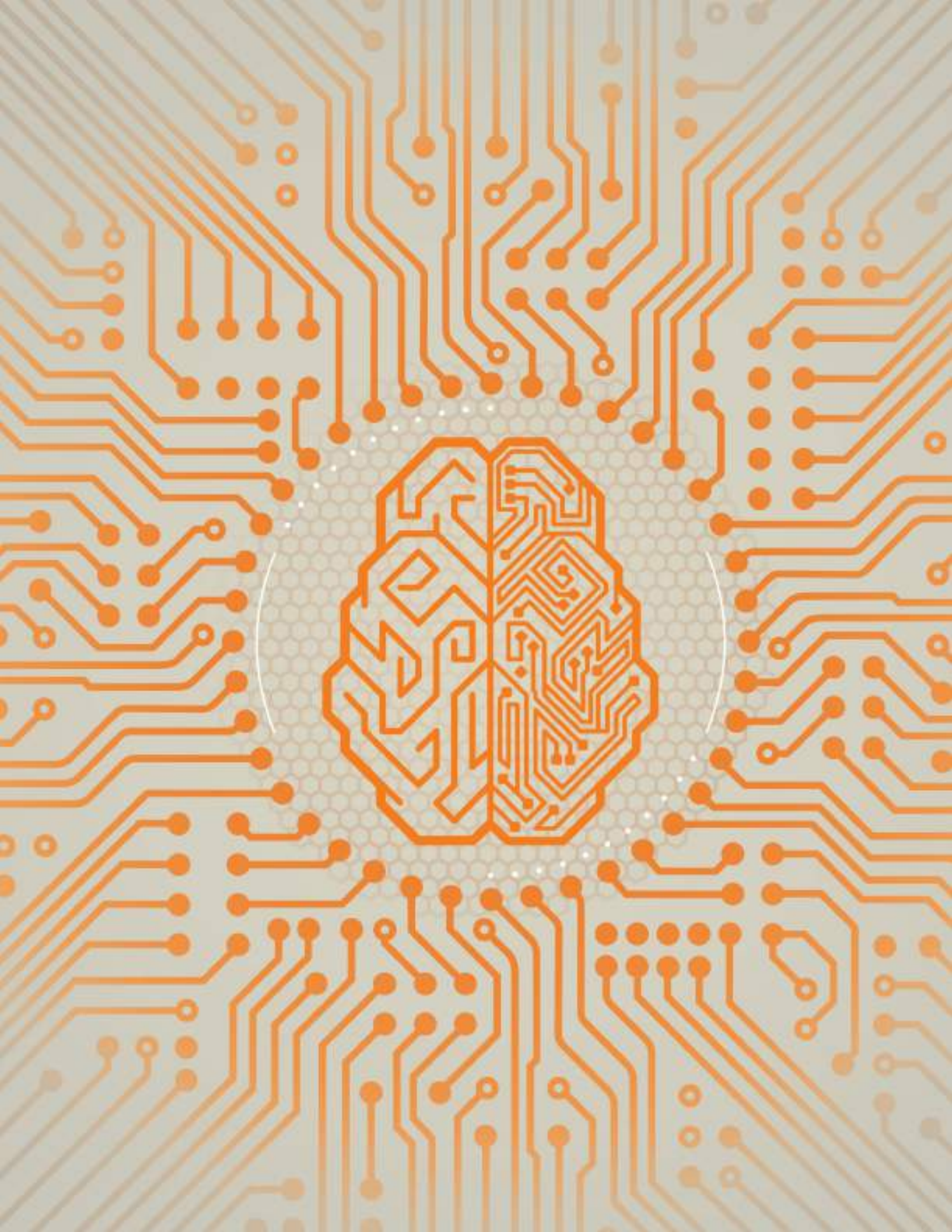
PLANNING → EXECUTION

| Category | Key Activities | AI/Automation Potential | Competency |
|---|---|---|---|
| Business Planning | Develop/assess business plan for top customers | Average | |
| | Review/refine call plans (generated by headquarters) | Above average | |
| Customer Visit Planning | Define MD call route | Above average | |
| | Review field suggestions (generated by headquarters) | Above average | |
| | Review recent customer interactions (multichannel) | Average | |
| | Prepare a customer engagement approach | Average | |
| | Coordinate with peers (such as mirrored reps, MSLs, KAMs) | Average | |
| Call and In-Office Activities | Pre-call planning | Average | |
| | Product detail and discussion | Below average | |
| | Enroll customer to marketing/headquarters programs | Above average | |
| | Meet office staff (claims issues, patient assistance, nurse educator) | Below average | |
| Post Call | Trigger pre-approved follow-up emails | Above average | |
| | Submit medical info request | Above average | |
| | Call activity logging | Above average | |

Above average · Average · Below average

Selling and educational · Business management and organization · Clinical and product expertise · Analytical and operational

*Figure 4: This glimpse of a pharmaceutical sales rep's activities shows the levels of competency needed in several categories to successfully execute major customer-facing or internal activities.*



To maximize the impact of AI engines, sales and marketing teams need to be adequately trained to interpret the insights generated and integrate them into their key activities.

First-line managers play a critical role in driving pharmaceutical sales excellence. While insights produced by AI systems can serve as excellent coaching levers and tips for reps, the rational and emotional coaching expertise offered by first-line managers will remain critical and augmentative in helping sales reps proactively identify new opportunities, diagnose customer behavioral trends, prepare for better objection handling, and be motivated to drive stronger business performance.

**Demystifying Prescriptive Analytics**

AI engines enable analytical programs at varying maturity levels: diagnostic, predictive and prescriptive. The prescriptive type of machine learning is ushering in a new paradigm for human and machine collaboration, and requires one of the biggest changes in the way we work. One commercial use case of prescriptive analytics in the pharmaceutical industry is field suggestions that offer prescriptive recommendations to sales reps on call timing and messaging. While the machine (AI engine) identifies multiple customer behavior patterns and makes the recommendation to the rep based on algorithmic optimizations, it's critical that the recommendations are provided in a human-readable format and also supplemented through intuitive rationale. For example, a suggestion may look like:

**Suggested action:** Visit Dr. Smith in the next week and reinforce the brand's clinical value proposition using the new, approved clinical endpoint.

**Supporting insight and rationale:** Dr. Smith's market share has dropped significantly relative to similar doctors in the territory, and his engagement with the brand also has decreased over the past three months. Dr. Smith has a high affinity toward clinical studies.

Due to AI's inherent inference approach, the relationship between the algorithm and the result that it produces can be obscure. Hence, the supporting rationale alongside the call to action can help with improving the suggestion's credibility, thereby furthering the chances of its adoption by sales reps. It's also important to have the sales rep provide feedback on the suggestions that the AI engine can consume and enable reinforcement learning.

**Behavioral Training**

To maximize the impact of AI engines, sales and marketing teams need to be adequately trained to interpret the insights generated and integrate them into their key activities. A new way of doing business comes with a change in mindset. Behavioral training can help marketing teams draw on their brand expertise and move away from a single-tactic campaign approach to more coherent customer journeys that leverage customer affinities and tactic sequencing principles as recommended by the algorithm. Similarly, sales teams can apply their judgment and local knowledge on the insights generated by AI programs to adapt call timing, message sequences and customer follow-ups to create stronger customer relationships and experiences.

## Building an AI-Enabled Organization

The success and adoption of AI in pharmaceutical sales and marketing will depend on pharma companies' ability to build a strong AI-enabled organization through five key levers:

1. **Champion an AI-friendly culture.** The recent advancement of AI and its underlying digital foundation is creating a new set of innovation opportunities for the pharmaceutical industry. Against this backdrop, a culture that encourages embracing new ways of working, motivates those with a passion for business intelligence, and eases barriers to adoption will be welcomed in companies that have started becoming comfortable with the value of AI.

   To maximize the impact of AI in the long run, companies need an organizational culture open to the collaboration between people and technology dimensions. However, most companies will take some time and education to adjust to the new paradigm created by AI. Active championship from senior leaders, including the C-suite, will be required to shepherd through the cultural transformation. Leadership also will need to invest in employees, especially in developing mid-management personnel into change enablers, while also remaining forthcoming on how AI can affect current employees and potentially create new opportunities for them.

2. **Institute a value assessment organizational function.** If it doesn't already exist, a value assessment group should be instituted to help separate the hype and buzz around AI from its actual capabilities in an industry-specific context. This includes articulating a realistic view of AI's benefits and a fair representation of its drawbacks. It's important not to make poor investment decisions on hyped technology without understanding how it can bring value to the business. It's also important for this function to manage skepticism from doubters by incrementally showing quantifiable results (such as a lift in both leading and lagging indicators) and prioritizing programs using a thoughtful and implementable road map, and early experience pilots.

3. **Modernize technology.** The core foundation of an AI technology stack remains its data management infrastructure. Traditionally, commercial data warehouses have served the pharmaceutical industry with its most common reporting and analytical use cases. However, with organizations starting to harness insights from unstructured or semi-structured data (like electronic medical records, social media, audio files, etc.), traditional data warehouse technologies can become inadequate. Additionally, as pharmaceutical marketing teams strive to become more nimble with their campaigns and attempts to deploy AI-learning-based systems, agility in onboarding new brands, channels and marketing vendors will become significantly relevant.

   Architectures that leverage traditional data warehouses often aren't equipped to handle such speed. Many progressive pharmaceutical companies have started implementing enterprise data lake platforms in the cloud to complement their existing data warehouse investments. While traditional data warehouses can continue to maintain certified and well-governed structured data, the enterprise data lake can offer the rapid ingestion and onboarding of new data sets, support for advanced analytics via native integration with analytical tools (R, Python, etc.) and the storage of unstructured data.

4. **Democratize data.** An abundance of data is a key dependency for training AI engines. However, departments may control data and unfortunately may politicize access to it. Some pharmaceutical companies have started creating a new role of chief data officer to develop data-friendly ecosystems to support enterprise-scale transformation across the value chain. To build robust data ecosystems, companies have to move to implement unified data standards, establish API-based data exchange contracts with third-party marketing vendors and agencies of record, develop open access and integration to public sector data (like clinical trials, consumer demographics and social media), and encourage cross-border data exchange protocols.
5. **Develop data science expertise.** As data becomes a key asset for differentiation and the race for innovation intensifies, it will be critical for the pharmaceutical industry to make a sustained push in data science and AI talent development across markets. However, the talent pool for data scientists worldwide remains extremely small, and we can expect competition for top talent to remain fierce in the coming years.

   Some large pharmaceutical companies have already taken the step of developing advanced analytics centers of excellence in both onshore and offshore facilities to build out nuanced data science expertise, retrain people with analytical competencies, and develop capacity and scale. As several universities plan to launch new data science programs and certifications, pharmaceutical companies have an opportunity to invest in university programs and recruit talent from academia. Companies also may need to look into their immigration policies to ensure that they're in a position to attract the best talent to support AI-related education and research programs.

As data becomes a key asset for differentiation and the race for innovation intensifies, it will be critical for the pharmaceutical industry to make a sustained push in data science and AI talent development across markets.

The promotional environment in the pharmaceutical industry requires significantly more sophistication in commercial approaches than in the past. A positive customer experience will be critical to building strong and enduring relationships in an increasingly crowded and complicated marketplace across therapeutic areas. Given that challenge, companies will win big by using AI to personalize customer engagement, maintain consistent exposure and improve coordination across promotional channels. Beyond delivering core messages about a product's clinical benefits, sales and marketing organizations that can leverage the advancements in AI to orchestrate a cohesive customer experience will drive stronger differentiation, better customer access and higher sales impact.

## About the Authors

Pratap Khedkar is a managing principal in ZS's Philadelphia office, and leads the firm's global pharmaceuticals and data science practices. He has advised many biopharmaceutical and healthcare companies on a wide range of business issues including commercial strategy, customer-centric marketing, market access, sales compensation and advanced analytics.

A recognized healthcare industry expert, Pratap regularly contributes his insights to publications including *The Wall Street Journal, Bloomberg Businessweek, Business Insider, Fortune, Medical Marketing & Media, NPR, Pharmaceutical Executive* and others. Currently, his thought leadership work focuses on topics including healthcare policy; life sciences companies' new commercial and organizational models; and the evolving relationships between patients, providers and payers, and the life sciences organizations that serve them.

Saby Mitra is a principal in ZS's Evanston, Ill., office and leads ZS's global customer-centric marketing technology practice. He has more than 18 years of experience in advising and helping clients shape their commercial organizations through customer-centric marketing and CRM solutions in the U.S. and Europe. Saby's expertise includes designing and implementing transformation programs in several customer-centric topics in the pharmaceutical industry and other verticals, including global multichannel customer engagement programs using big data, analytics and marketing automation platforms; commercial orchestration programs leveraging machine-learning-based next best actions; and field and marketing integration programs.

## Acknowledgements

The authors wish to thank ZS experts Omer Hancer, Ankush Gupta, Kiran Dhamane and Vikas Hegde for their contributions to this article.

## About ZS

ZS is the world's largest firm focused exclusively on helping companies improve overall performance and grow revenue and market share, through end-to-end sales and marketing solutions—from customer insights and strategy to analytics, operations and technology. More than 5,000 ZS professionals in 22 offices worldwide draw on deep industry and domain expertise to deliver impact for clients across multiple industries. To learn more, visit www.zs.com or follow us on Twitter and LinkedIn.

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12-17