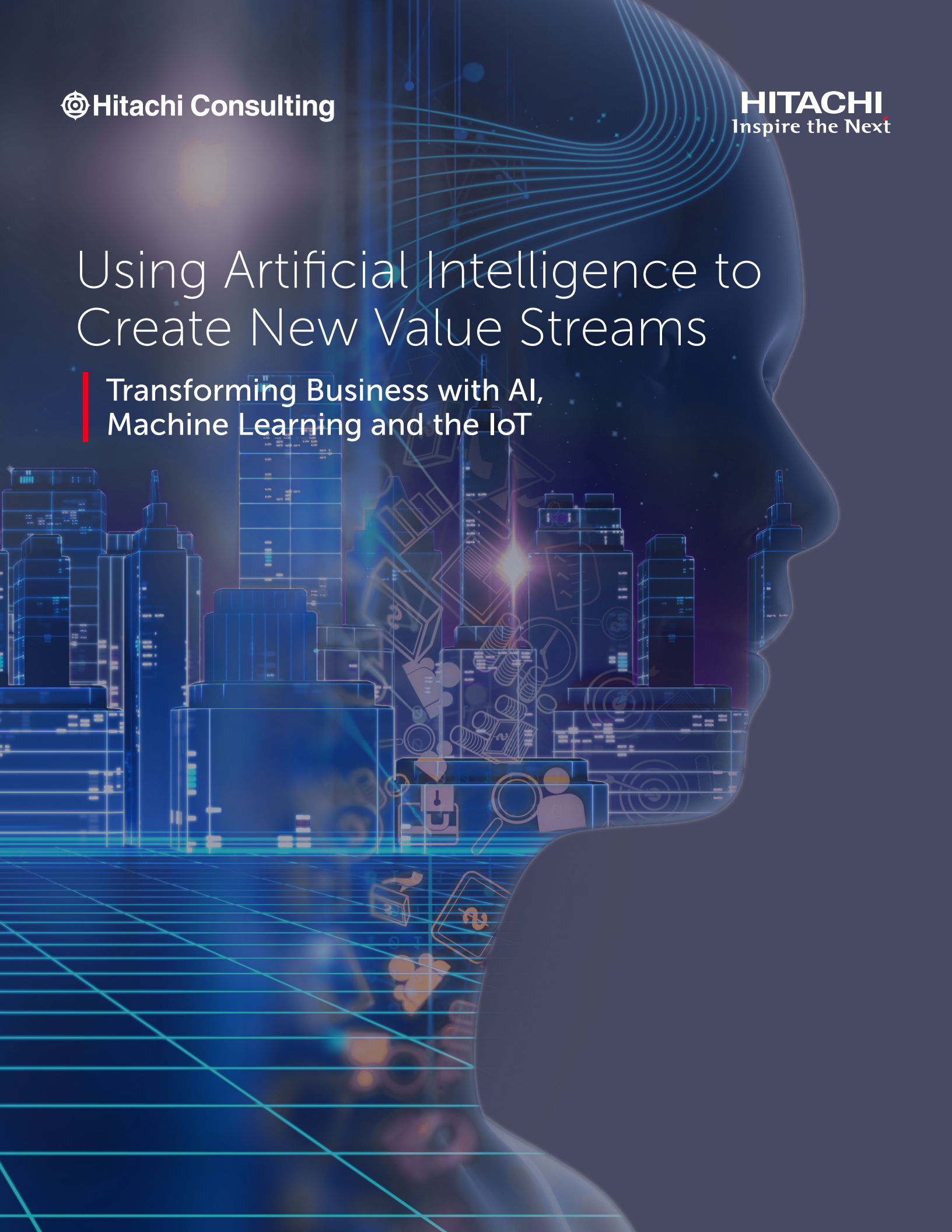


Using Artificial Intelligence to Create New Value Streams

Transforming Business with AI,
Machine Learning and the IoT



Artificial intelligence (AI) is enjoying its time in the technology “hype cycle.” The AI market is expected to grow to \$37 billion by 2025.¹ According to one report, AI technologies will have created a \$1.2 trillion insights-driven market by 2020 and will be found in almost all new software products and services.²

Innovations generated and supported by AI are now within the reach of most companies. However, it is a tremendous challenge to make AI and related technologies—the Internet of Things (IoT) and machine learning—work together securely at commercial or industrial scale to create business value.

And until those technologies are connected to form a new value stream, it will be very difficult for any company to generate returns in excess of their technology investments.

That is why it is imperative for companies to transform themselves into agile, milestone-driven organizations that can move beyond single, discrete use cases and instead integrate AI, machine learning and IoT into a powerful new value stream. It is imperative to do so now, because these technologies are developing at such a rapid pace that it may soon be impossible for the laggards to catch up.



What would an AI-based value stream look like?

Here are a couple examples.

Transforming paint into a smart, data collection tool

Consider an established global paint manufacturer on a course to becoming a business with data at the core of its operations, selling value-added services that generate recurring revenues instead of one-time product sales. It develops a smart paint for container ships. The paint is infused with sensors that transmit data not only about the condition of a ship's hull and the paint itself but also about the water it moves through, including its temperature and oxygen content, and the presence of pollutants.

The data is transmitted to an AI platform that determines the optimal time to apply antifouling treatments to the hull, reducing drag and increasing energy efficiency. By combining data from the paint with sensor data from ship components and analyzing it, over time the company learns how to improve ship performance and reduce operating costs. When the platform has accumulated enough data to make statistically reliable predictions, it becomes a marketable asset that the shipping

company can sell or exchange with other entities—other businesses but also regulatory and scientific agencies, maritime trade groups and nongovernmental organizations.

The manufacturer successfully moved beyond a single use case—applying AI as well as the IoT to the problem of reducing drag on the hull of a container vessel. By integrating multiple use cases, the company was able to transform itself into a digital business using data not only to improve its own operations but also to forge ties with other organizations that can derive value from the information. The manufacturer is positioned to transform itself into a provider not just of coatings but also of shipping solutions, including innovative solutions that will use data from the company's coatings and the hulls they protect. The manufacturer is prepared to compete on an equal footing with digital-native rivals. And because the smart paint must be reapplied every two years to maintain its optimal performance, the paint maker boosts its own coatings sales while delivering greater value to its customers. In short, smart paint becomes not just a single digital use case but the backbone of a new value stream.

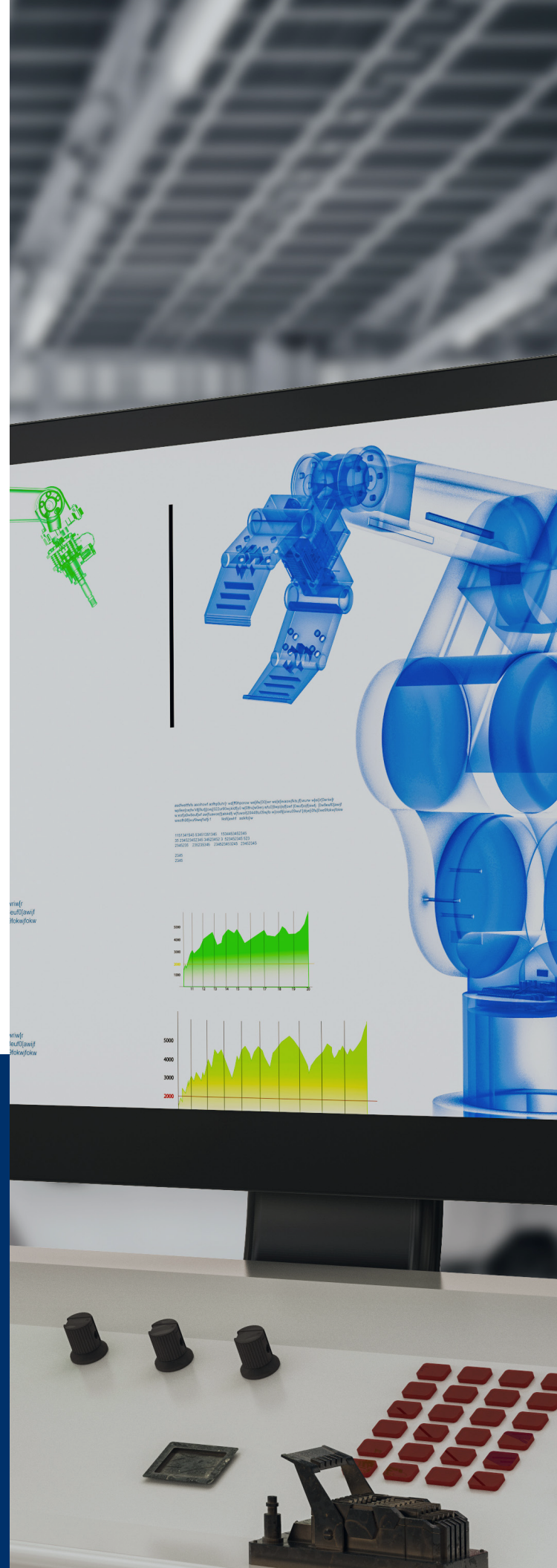


Building a super smart factory

Now let's look at an industrial equipment manufacturer that builds a smart factory to produce machines but also deliver across-the-board performance improvements. The manufacturer has outfitted all the machines in its factories with microprocessor-controlled sensors that feed terabytes of data per day into an AI platform. The platform analyzes the data and can, for example, identify defective parts, remove them from the line and order replacements. The platform can also spot when a skilled operator has deviated from standard operating procedure, pinpoint a design flaw as it emerges, and even design a new part on the fly to mitigate the flaw. That design is routed to a team that uses 3-D printing to produce a prototype and test it in a matter of hours.

The AI platform also uses data from the IoT-enabled manufacturing gear to optimize material flow in the plants. The flow can then be accelerated through the use of autonomous vehicles, which are digitally integrated into the platform. Meanwhile, the platform is analyzing data from manufacturing execution systems (MES) and points of production to determine energy use relative to production. The analysis feeds into energy procurement and production plans that reduce energy costs and minimize energy procurement at peak prices. MES and inventory control data are used to formulate an optimal production plan for each factory, map out distribution routes and optimize parts inventories. Together, these integrated systems add up to significant improvements in quality, fewer product recalls, increased customer satisfaction and vastly more efficient factory operations.

By thinking beyond use cases that work in isolation from others applying the same technologies, these companies are poised to upend an industry, create a new product category, shape a new business model or reconfigure a value stream from end to end. Such integration is possible only with a multipurpose AI platform. Today's AI scene is dominated by single-purpose AI applications such as search engines and product-recommendation engines. Evolving rapidly, however, are AI platforms that can be applied to a range of business needs, waiting only to be configured and loaded with data relevant to the problem at hand. Using such platforms, an organization can apply AI across a range of activities and create new value streams that can dramatically improve business results.



The five pillars of a successful AI-based transformation



1 Demonstrate effective digital leadership.

Leaders wanting to create new value streams from AI need to be collaborative with groups like R&D and IT, but also recognize that the digital vision ultimately cascades from the top down through the rest of the organization. One secret to success is to focus not on the technologies but rather on a vision for the outcomes that the technologies can facilitate. Using that vision, companies can move forward to developing the capabilities needed to integrate individual high-value use cases into a new value stream that can not only disrupt a business or industry, but also play a key role in a super smart society.

Senior leaders should spearhead the effort to find more fluid methods for aligning business priorities with the organization's needs and capabilities, as well as its supporting processes and systems. This effort requires constant vigilance and support to maintain the necessary alignment and may well require the organization to adopt leaner and more agile work practices. Senior leadership must drive the new ways of working, fund them adequately and encourage testing of new concepts. Small-scale testing helps keep the cost of the transformation manageable and allows the organization to prove concepts before investing to scale them up.



2 Create new value propositions.

The heart of this pillar is the belief that, by realizing its digital vision, an organization can create new forms of competitive advantage. To do so, senior executives must lead the organization in a re-examination of the ways in which it delivers value to customers and other stakeholders. That means continually reassessing every dimension of the strategic value model. Four key questions can guide this assessment:

- How can we ensure that we continue to deliver our overriding and enduring value—and that someone else doesn't deliver it better or sooner?
- How can we deliver our value in new ways or deliver it to new people—or both?
- How can we augment and accelerate this value in new directions, through new channels and models?
- How can we manage the AI journey for the workforce so that people think and behave in new ways?



Enhance customer engagement.

In practical terms, this means putting the customer at the center of the AI vision and building the capabilities required to move ever closer to customers, end-users, suppliers and investors. To help drive the use of digital technologies to create opportunities for delivering value to customers, organizations should ask themselves:

- How can digital processes and technologies close the gap between ourselves and our customer base and enable customers to engage with us through the channel of their choice?
- How can we use data and AI to better understand customers and more accurately predict their actions and needs?
- How can we use AI and other digital technologies to offer the same processes, options and services across all channels while delivering a better, more efficient experience?
- How do we nudge people toward the most efficient and cost-effective ways to engage with us?
- What is the best possible experience for our customers and suppliers?



Improve the operational environment.

This pillar is foundational because AI and other digital capabilities enable organizations to act faster, smarter and more cohesively, with unprecedented levels of clarity and precision. Companies should identify where digital-driven, data-intensive disruptions are occurring. They may be taking place in such areas as the supply chain, internal operations, product and service design, and customer engagement. Then they should determine which of those areas has a direct impact on the organization's core competencies and capabilities, and which ones offer opportunities for business improvement that are directly connected to the top and bottom lines. AI enables people to collaborate with technology to amplify and augment their abilities, improve the speed and quality of decisions, and find new ways to turn data into action. Properly deployed, AI capabilities can simplify processes, change behaviors and improve operational performance.



Evolve the core architecture.

An essential component of digital transformation using AI is evolving the core architecture. Streamlined, secure and robust IT drives the digital enterprise, creating a more responsive digital core that provides intuitive access to business data and apps that enable greater efficiency and effectiveness.

Transforming the digital core is a challenge to many established businesses, which face increasing pressure to keep pace with digital-native rivals. Established businesses can respond to that competitive challenge by adopting and embedding new technical capabilities and IT systems, while continuing to maximize the benefits of core systems. They can create these new IT capabilities either by evolving their systems or by reaching into them to expose their data and make them function in more fluid and user-friendly ways.

With these five pillars in place, organizational leaders can move on to a critical phase in the AI journey: identifying the highest-value use cases and core competencies that must be digitalized. Leaders can then seek industry, product or service adjacencies to expand the scope and reach of the transformation. This undertaking will involve value stream mapping and data asset analysis, followed by operational assessment of key performance indicators and benchmarking. It also may involve collaborating with other businesses to fashion new service offerings.

Most companies will need to undertake their AI transformation with the help of a guide and collaborator that can provide, tune and implement the AI platform.

Developing AI capabilities

The phase of work just discussed paves the way toward developing a suite of capabilities that embrace AI, machine learning and the IoT. Those capabilities ultimately make it possible for companies to integrate discrete use cases into a powerful new value stream. Organizations that succeed at this effort embody what Hitachi means by Human 3.0—using digital tools to augment and amplify human capabilities and increase the organization's agility, effectiveness and quality.

Developing such capabilities does not occur overnight. It is a journey. As noted earlier, organizational leaders should first identify the outcome they wish to achieve before turning their attention to the technologies and capabilities that can bring about that outcome. Is their aim only to improve the bottom line? If so, the organization may well disregard many use cases that could produce top-line growth. An organization that prioritizes top-line growth, on the other hand, will need to proceed carefully to avoid disrupting its day-to-day business.

Fortunately, because AI enables companies to run detailed simulations of business operations rapidly and inexpensively, such disruptions can be minimized. That's what the operator of a water desalinization plant learned when it ran an AI simulation of its electricity usage, its largest operating cost. The simulation produced insights that enabled the plant operator to reduce energy use by 6 percent—significant savings.

**An AI simulation
reduced energy usage,
a plant operator's
largest cost, by**

6%



Guidance on the AI journey

Most companies will need to undertake their AI transformation with the help of a guide and collaborator that can provide, tune and implement the AI platform and help create capabilities as the company builds out its ecosystem. Ideally that guide can bring together the formidable technical capabilities needed to create the ecosystem, the deep understanding of workflows and business processes that can transform how work is done, and the domain expertise that enables the organization to identify the highest-value use cases and generate the greatest value from its AI, machine learning and IoT assets.

AI, machine learning and the IoT enable companies to integrate discrete use cases into a powerful new value stream. Organizations that succeed at this effort embody what Hitachi means by Human 3.0—using digital tools to augment and amplify human capabilities and increase the organization's agility, effectiveness and quality.

Consider the experience of a company with a large warehouse operation. Working with a technology guide, the company connected its warehouse management system to an AI platform that used historical data to optimize the warehouse workers' pick lists—their prioritized instructions for fulfilling orders. The AI system recommended the best route for each picker to follow through the warehouse while fulfilling an order, but workers were free to override the AI system's instructions and improvise their own route-optimization strategies. Using motion capture and other IoT-enabled technologies, the AI platform analyzed the improvised strategies at the end of each shift to discover which had resulted in productivity gains and which had not. This information was fed back into the AI system, which used the learnings from the shift to inform the next day's scheduling. This approach helped the warehouse workers see AI as a collaborator rather than an enemy and enabled the company to score dramatic gains in productivity and labor utilization.

In another case, a manufacturer outfitted its workers with wearables that tracked their eye and arm movements. The data from the wearables fed into an AI platform that determined the ideal way to perform a particular task and alerted workers when they were deviating from the ideal. It also alerted shop-floor managers of impending errors or anomalies, enabling them to prevent breakdowns or waste. As in the warehouse example, workers learned that AI was not there to take their jobs but to help them do their jobs more safely, efficiently and effectively.

Conclusion: Value creation through integration

By integrating AI, machine learning and the IoT into their business processes and systems, leaders do more than make their organizations' operations more effective and efficient. They build the capabilities they need to compete with digital-native newcomers. They can make devices operate in an intelligent way across an entire value stream. They can make their people smarter and more effective and can better integrate global organizations with disparate cultures, work practices and levels of business maturity. They can create an environment in which the business becomes hypercompetitive, able to generate new business applications and value propositions in the ordinary course of business. They can make their organizations more flexible and adaptive, able to disrupt their industry or leverage disruption into competitive advantage.

Leaders can start with small-scale proofs of value and concept, then gradually spread the transformation across the enterprise, along the way gaining experience, momentum and, above all, data, until new value streams are firmly realized and delivering solid returns on investment. Thinking big about AI might sound risky, but the greater risk is to think small and be left irretrievably behind.

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