Hotel industry digital transformation: The current state of play

The right combination of technology investments can improve guest experience, boost profitability and equip the industry for growth

In advance of the 45th Annual New York University International Hospitality Industry Investment Conference, the Jonathan M. Tisch Center of Hospitality at New York University's School of Professional Studies and its HI Hub Experiential Learning Lab collaborated with PwC to examine the state of play in hospitality technology innovation today.

Hospitality stakeholders understand the benefits of updating legacy technology and migrating to cloud-enabled solutions. That is what we learned from a series of interviews and focus groups with them. They are also realistic about the challenges of doing so within the exceptionally complex hotel business ecosystem — one in which brands, owners and operators all strive to maintain profitability in an inherently low-margin sector that is also highly competitive.

Technology investments — upgrading front- and back-office systems and their supporting infrastructure — require financial and human capital resources as well as a change-management component to implement a data-driven culture.

Whether large or small, brands, owners and operators have the same ultimate goal when embarking on digital transformation: to satisfy investors while also meeting — ideally, exceeding — guest expectations.

In each of our five focus areas — automation, integration, data and analytics, artificial intelligence (AI), and technology investments — candid insights from our interviews and focus groups offered a roadmap moving forward:

- **Automation across the hotel ecosystem** is driving efficiency by minimizing routine data collection and entry. In doing so, it helps free up back-office employees to focus on real-time data analysis and reporting, insights generation and decision-making. Presently, brands are focused on automating a range of back-office workflows and systems, including procurement, workflow approvals and accounting. Their challenge? To incentivize and enable owners and operators to evolve from legacy software systems and adopt cloud-based solutions with standardized APIs and system architecture. To do so, they are illustrating the power of data analytics for added productivity.

- **Standardized integration** approaches and interoperability capabilities are helping the entire industry transform property management systems from a legacy client-server model to a cloud-enabled, API-powered architecture. With a plethora of applications to manage — compounded by too few people to manage them as well as legacy systems that struggle to interact — the right application programming interface (API) becomes a necessity. Vendors offer options that connect the disparate systems; however, data security and privacy are a challenge. The key is to build effective controls and governance into design and implementation from the start — to help protect guest data while leveraging it to enrich and personalize the guest experience.

- To unleash the power of **data analytics**, brands and owners need quality data, talent and a data-driven culture emphasizing insight generation over data reporting. Leading data analytics opportunities include business intelligence (BI) and smart revenue management systems that ingest market data to aid decision-making. Today's brands are gathering data via their guest-interface platforms and mobile apps. However, they also depend on hotel owners and operators who manage day-to-day interactions with guests. A key takeaway from our discussions was that none of the technologies can function without skilled workers using them. For a data-driven, analytics enabled culture to succeed, organizations need the right talent - achieved through proactive recruitment as well as training, upskilling and effective change management.

- Even as **AI and machine learning (ML)** are helping democratize insights and innovation across hospitality, the industry is fundamentally about serving people. Brands are combining the best of technology innovation with a human touch to create a personalized, seamless

guest experience - one that fosters loyalty and deepens the human connection[1]. They are deploying AI to analyze guest data from loyalty programs and mobile apps. Leading brands already have the capacity to send push notifications outlining customized, discounted trips created from guest preferences.

- While **technology investments** have been proven to boost profitability and deepen brand loyalty, some of the partnerships forged by brands and owners/operators as a result of the pandemic highlighted divergent investment goals. Brands tend to prioritize technology upgrades that drive guest loyalty. Meanwhile, owners and operators typically focus on investments that lead to revenue lift. A collaborative approach demonstrating long-term value concurrent with short-term wins for all - as well as governance standards for integration - is key to helping achieve broad-based buy-in from all stakeholders.

Everyone we spoke with agrees that delivering inventory at the right price and at the right time — combined with a memorable experience — is essential to driving growth while nurturing guest loyalty over the long term. Moving beyond legacy technology systems, however, remains a consistently challenging process. It requires a clear definition of vision and objectives, broad cooperation and a cogent demonstration of long-term value.

Not only does this mean aligning technology investment with overall strategy, it requires making a range of thoughtful choices along the way. Our discussions with stakeholders across the industry revealed that now is the time to make those choices by investing strategically in the human-powered, tech-enabled experiences that have already been proven to boost profitability for brands and owners alike.

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[1] PwC's 2022 Customer Loyalty Survey, https://www.pwc.com/us/en/services/consulting/business-transfo4rmation/library/customer-loyalty-survey.html

The hotel business ecosystem is exceptionally complex: Brands, owners and operators all strive to maintain profitability in an inherently low-margin, highly competitive sector. The goal? To satisfy investors while also meeting — ideally, exceeding — guest expectations.

Hotels also need to attract and maintain skilled talent in the constrained post-pandemic labor market, with rising wages and a diminished worker pool. With fewer employees, technology tools are a welcome option to help increase labor efficiency. According to the NYU-Stayntouch 2022 Hotelier Technology Sentiment report, 71% of hoteliers expected to use technology to automate some operations and increase employee efficiency in 2022[2].

PwC experience corroborates the benefits of technology investments. One brand, for example, recorded an 85% reduction in billing-cycle processing time after modernizing its loyalty program, reducing what used to take up to 48 hours down to seven. By deploying a scalable, extensible platform requiring minimal infrastructure management, the brand also recorded 50% fewer missed or adjusted guest stays year over year within loyalty-member billing[3].

Until recently, many brands, owners and operators had not prioritized the complex array of tasks involved in updating their legacy, sometimes decades-old, technology systems. Across the industry, stakeholders are now beginning to recognize the urgent need to move to cloud-enabled solutions — to upgrade both front-office guest-facing and back-office technologies and their supporting infrastructure. The technological profile of the hospitality industry reflects its complexity. In practical terms, that means various fragmented, sometimes incompatible, systems. Investing in technologies that bridge those gaps can make a world of difference for all stakeholders.


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[2] NYU-Stayntouch 2022 Hotelier Technology Sentiment Report, https://www.stayntouch.com/2022-hotelier-technology-sentiment-report-2/
[3] PwC case study: Rethinking the tech behind Wyndham's lauded loyalty platform, https://www.pwc.com/us/en/library/case-studies/wyndham-loyalty-program-technology.html

Organizations that are investing in cloud-based solutions to transform their businesses are already reaping the benefits of their strategies. They report fewer barriers to realizing value and can do so at *double* the rate of their peers who have yet to fully leverage cloud technology[4].

These investments can demand significant resources, not only financially but also by way of staff time and training, data security and integration with other systems. On the demand side, brands, owners and operators wonder what critical questions to ask as they consider the array of available applications in cloud-enabled hospitality tech. On the supply side, technology vendors wonder how best to fulfill clients' needs and how to convince potential clients that their solutions are valuable.

The hotel business ecosystem is exceptionally complex — with multiple stakeholders, focus areas and change drivers.
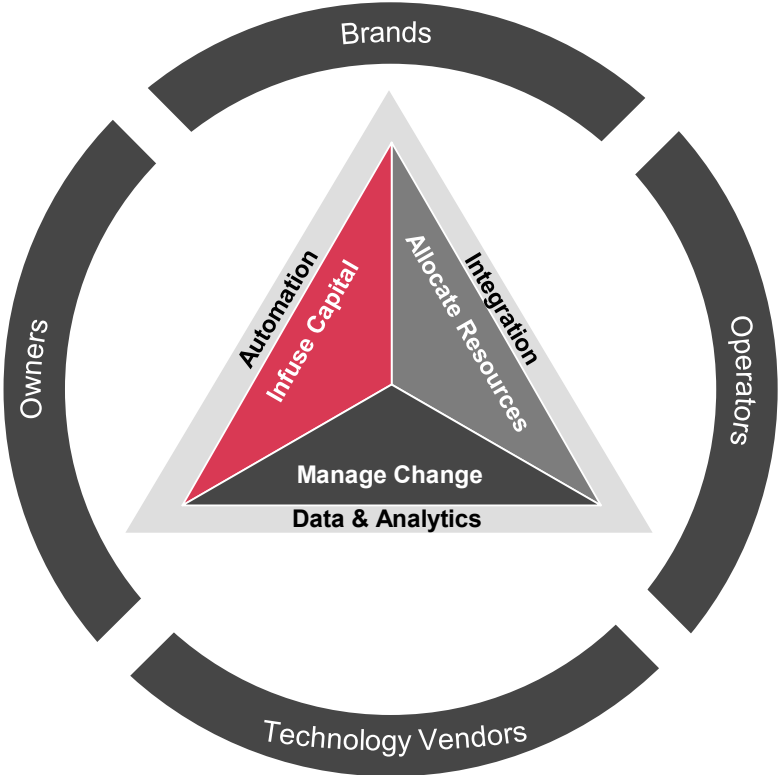
Source: NYU and PwC analysis

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[4] PwC's 2023 Cloud Business Survey, https://www.pwc.com/us/en/tech-effect/cloud/cloud-business-survey.html

Hospitality technology innovation today

In our interviews and focus groups with executives representing major hotel brands, operators and owners as well as a diverse array of technology vendors, we focused on five critical areas: automation, integration, data and analytics, AI and technology investments. In each area, we aimed to elicit candid insights by asking five key questions:

- **What is the level of digital transformation** in the hotel industry now and what are the factors affecting it?

- **What is the business case for investment** in specific hotel technologies to achieve strategic ambitions? What existing back-office technologies can be leveraged now - and which ones require new investment?

- **What are the current hurdles confronting digital transformation** in the hotel industry? What do hoteliers see as the biggest technology gaps and obstacles for meeting their strategic objectives?

- **Are hoteliers seeing tangible evidence** of the positive effects of digital transformation on their profitability?

- **What are the future hotel technology investments** that could accelerate digital transformation?

Depending on the scale of their enterprise — global, domestic, regional or local — brands, owners and operators all have different, yet convergent and complementary, needs. And vendors offer solutions to meet those needs. Below are some of our main findings in greater detail.

Automation: What you want depends on where you sit

> " The key is to understand the entire guest journey — encompassing the experience and pricing preferences as well as the implementation of automation."

Automation helps drive efficiency by decreasing routine data collection and entry, thereby freeing up back-office employees to focus on real-time data analysis and reporting, insights generation and decision-making instead.

When it comes to the specifics of automation in the hotel industry, however, owners and operators have slightly different immediate priorities from the brands we interviewed. Their three primary goals include improving guest interactions, combating labor uncertainties and streamlining procurement, all of which can be achieved through automating routine housekeeping scheduling, transaction triggers and procurement systems.

In general, however, independent owners and small-to-medium chains lack the budget to invest fully in automation. This leaves the biggest and smallest players in the best position to innovate and experiment, even if they also agree that third-party integrations are expensive.

> " How do hoteliers rely on a third party at a reasonable price? Outsourcing technology is preferred unless developing proprietary solutions offers a competitive advantage."

Brands, on the other hand, are focused on automating a range of back-office workflows and systems, including procurement, workflow approvals and accounting. Their challenge centers around incentivizing and enabling owners and operators to transform their property management systems from the legacy client-server model to a cloud-enabled, API-powered architecture.

Brands are also eager to see hotels adopt digital check-in and digital keys using brand-owned desktop, mobile apps and welcome kiosks. While this would give guests the ability to handle routine tasks themselves, they worry that still-embedded back-office systems and processes will complicate updating guest-facing solutions.

Robotic process automation (RPA) enables intelligent automation of back-office processes such as invoice processing and cash- and bank-account reconciliation. RPA can also enable employee tracking from online candidate applications through hiring and management, while also providing a competitive edge in reporting and decision-making.

With the democratization of dynamic pricing, both large and small hotels — as well as historically non-traditional accommodations such as serviced apartments and short-term rentals — can benefit from pervasive automated pricing, which can target ancillary revenue streams as well, such as events, parking, and food and beverage sales.

In addition to the obvious areas like pricing, reservations, labor and revenue management, many other data-driven and tech-assisted opportunities for decision-making exist. For example, vendors can use specialized merchandising and marketing technology to refresh data from Central Reservation Systems (CRS) relevant to individual guests on distribution channels.

Automation can also bridge the critical gap between the post-booking and pre-arrival experiences, which is the least-evolved part of the guest journey, making it ripe for innovation.

Owners play a crucial role in driving successful automation

Automation
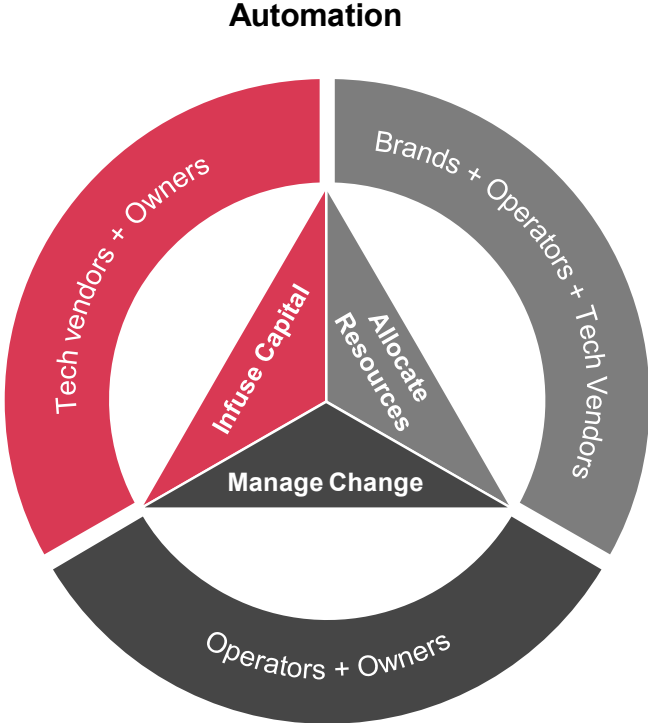
Source: NYU and PwC analysis

Integration: Beyond "taped-together" systems

> **Integration is the only way forward to help consolidate and realize the value of all the data available."**

In today's complex multi-disciplinary, multi-ownership, multi-application landscape, robust integration has become a necessity. Technology vendors view effective integration as the cornerstone of AI/ML-driven automation.

Brands are looking at opportunities to modernize their legacy systems and leverage the power of cloud and software as a service. One approach to embracing this modernization is integrating legacy applications with cloud-based systems such as property management systems (PMS), pricing intelligence and revenue management systems — which brands are increasingly prioritizing.

As one brand we interviewed suggested, a common set of standards driving decisions, integration approaches and interoperability capabilities can help the entire industry transform back-office operations and streamline integrations. However, property owners should recognize that their legacy systems might well have outlived their usefulness.

With a range of applications to manage — combined with too few people to manage them —the right application programming interface (API) becomes a necessity. Instead of the legacy systems that struggle to interact, vendors are offering options that connect all the disparate systems.

Plug-and-play APIs can help offset custom development costs. However, while APIs for enterprise-level apps are common, property-specific APIs are still being developed.

Until then, enabling integrations between property management systems, labor management systems, inventory management, point-of-sale and other systems will require custom development. Some early, highly visible use cases for integrations have focused on digital tipping and employing the television in a hotel room as a billboard.
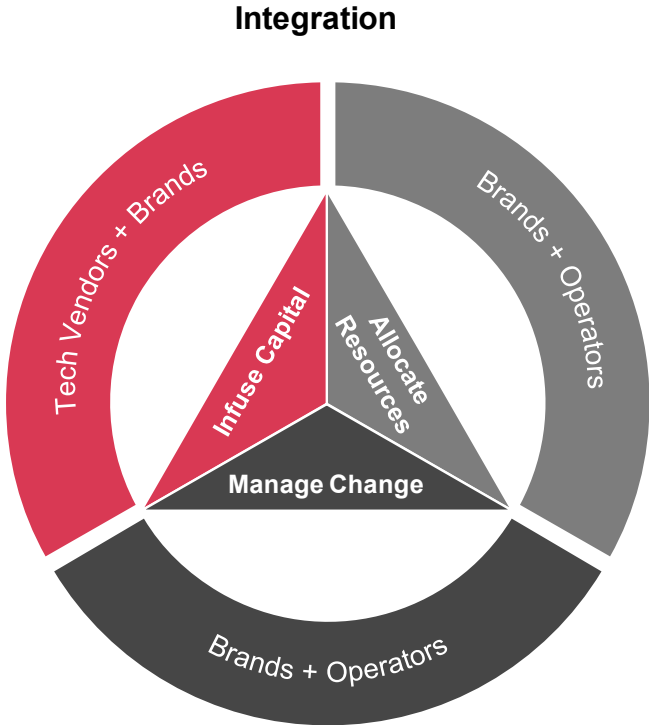
While open-source solutions avoid vendor lock-in, they sometimes do so at the cost of effective customization. Their present viability also depends on a variety of security and privacy concerns. In general, brands and owners would much prefer universal industry standards for integration across functions and the ability to enter and exit relationships with vendors easily. However, an intrinsic tension persists between standardization and flexibility.

Most operators prefer to buy third-party, off-the-shelf solutions rather than build custom versions — unless customization aligns with their organizational strategy. These solutions are usually API-driven to support real-time, streaming data consumption. Some operators have considered investing in new, easy-to-deploy POS systems but are constrained by challenges to integrating them with existing legacy technology ecosystems.

> **Who pays for integration costs — technology vendors, owners or operators — is not clear."**

Brands are key across all dimensions of back-office integration

Integration

Tech Vendors + Brands

Brands + Operators

Infuse Capital

Allocate Resources

Manage Change

Brands + Operators

Source: NYU and PwC analysis

Data analytics: Building the right foundation can take time

> " The integrity and accuracy of our data cannot be confirmed because we have multiple disparate data sources and parties involved."

Business intelligence (BI) and smart revenue management systems can ingest market data to aid decision-making. With the wider adoption and promised benefits of the cloud, many brands are planning to or already migrating their data from legacy data warehouses to cloud-based data lakes.

The potential of data analytics depends on the quality and volume of data collected, cleansed and used. Brands gather data via their guest-interface platforms and mobile apps, but they also depend on hotel owners and operators who manage day-to-day interactions with guests. While convincing them to migrate from legacy systems poses a challenge, brands are hoping to do this by illustrating the power of data analytics for added productivity.

As one brand representative said, about the importance of change management,

> " People are the hardest part of the equation."

Owners and operators struggle with procuring real-time data and mining it for actionable insights. This remains the case despite their understanding that, in the absence of a single source of truth, data integrity and veracity cannot be guaranteed. While they recognize the value that effective data analytics can bring to multiple key business processes — including regulatory compliance — operators face an ongoing challenge: providing the right data to the right people at the right time.

Harvesting the investment in analytics demands a data-driven organizational culture, which relies on authentic buy-in from all parties. The right solutions have enormous upside: the ability to forecast the cost per occupied room and enable adjustments to procurement for labor, food, beverage, room supplies, and more — all with little to no time lag.

The right solutions can also bolster hotel owners' ability to make capital allocation decisions, such as buying and selling properties for profit maximization. Fully achieving these capabilities, however, remains challenging because owners often struggle to develop the right business case that justifies the large investment in such elaborate systems. They also express concerns about the trade-offs between providing enough information to trust the system and avoiding sharing proprietary information.

For vendors, who prefer evaluating data with algorithms, data quality can be an issue. Variations in data formats, systems, structures and timeliness are still being resolved. And while vendors cite a 99.5% accuracy rate, hotels continue to be apprehensive about algorithmic evaluation of data quality. Ultimately, vendors tend to see a broad horizon for analytics that includes the potential to correlate multiple data sources to inform every aspect of decision-making.

Smaller chains are not always able to allocate resources toward data analytics. Further compounding the issue, staff are not always data-fluent, which requires vendors to be more accommodating about presenting information for a variety of users.

Operationalizing data requires alignment with all stakeholders

Data analytics
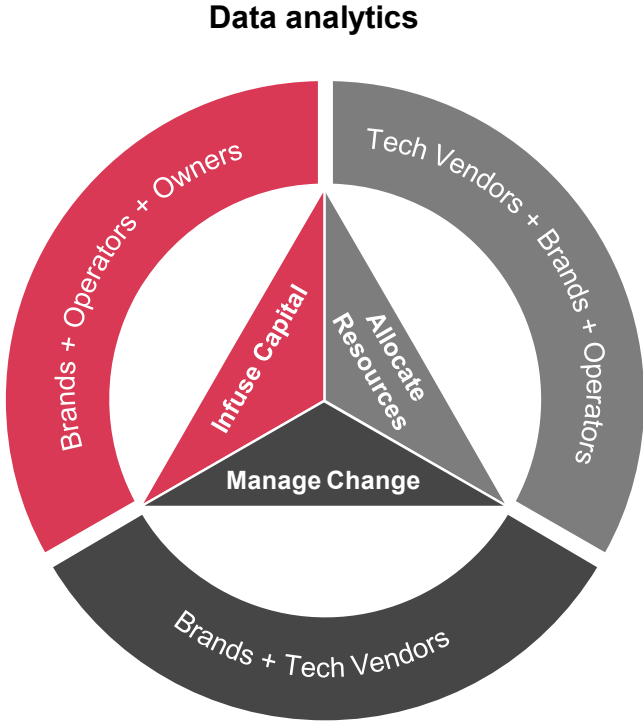
Source: NYU and PwC analysis

AI and ML: The promise of machines freeing a people-to-people industry

Automation rests on a foundation of artificial intelligence and machine learning. Many interviewees express confidence in the potential of AI/ML to benefit the hospitality industry, citing improved labor productivity and opportunities for cost savings, while some clients remain cautiously optimistic, believing these are early days for AI/ML adoption.

Besides utilizing AI/ML for revenue management, all stakeholders are employing it to estimate demand and provide dynamic pricing with models that incorporate multiple variables and externalities such as weather and sporting events.

As AI democratizes revenue management across all segments of hotels, technology vendors are diversifying AI-enabled pricing tools beyond hotel rooms. For instance, one hotel brand is investing in AI algorithms to make decisions on hotel room allocation, conference rooms and restaurant pricing.

For their part, owners view AI as a tool to help sleuth out the best properties to invest in. Technology vendors, meanwhile, are getting requests to explore how AI can provide attribute-based pricing, determine the return of corporate travel and make reservation distribution smarter.

As guests become more accustomed to using technology, AI-enabled virtual concierge services can begin to handle basic inquiries—such as questions about pool closure times and elevator

locations—thereby freeing up front-desk staff to center their attention around creating personalized experiences for guests. AI can also streamline data consolidation with RPA, help with property acquisition decisions, facilitate rate shopping and address the content discrepancy between CRS and online travel agencies (OTAs).

According to our interviews, most companies still know very little about guest preferences because only a small percentage of guests are enrolled in their loyalty programs. Deploying AI to analyze guest data already available can help create more personalized guest experiences, complete with customized offers. Brands who do collect guest data through their loyalty programs and mobile apps already have the capacity to send push notifications outlining customized, discounted future trips based on guest preferences.

Data-privacy compliance with regional regulations becomes increasingly challenging for businesses operating across multiple locations. To secure the benefits of AI while protecting guest data, companies are building effective controls and governance at the outset[5].

Overall, the industry is at varying stages of readiness for AI/ML technology implementation. Our interviewees emphasize that for AI to thrive, organizations must prioritize developing a culture that embraces change management, training and data quality. Ultimately, the industry hinges on serving guests. Our interviewees concurred that AI/ML should be used to improve human connection; not replace it.

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[5] PwC, Generative AI tools push new boundaries for responsible AI, https://www.pwc.com/us/en/tech-effect/ai-analytics/business-impacts-of-generative-ai-tools.html

Investments: Migrating from legacy systems is challenging

> " *IT modernization in hospitality is similar to performing a heart transplant while the patient is not just awake, but also running."*

The current state of investment in hospitality technology reveals a nuanced picture. All the stakeholders we interviewed agree that migrating from legacy systems is never simple.

Brands are fostering top-line growth by investing in CRS, PMS and revenue management systems as they transform their back-office core from the legacy systems they have been using for decades. The rich trove of consumer data they can compile — as more guests use their branded apps — is an asset they can use to instill and renew brand loyalty as the route to top-line growth.

At the same time, they also acknowledge that guest loyalty can be fickle, with guests quick to change loyalties in the wake of a bad experience. To address this challenge, brands are combining the best of technology innovation with a human touch to create a personalized and seamless guest experience that fosters loyalty.

In addition to nurturing guest loyalty, brands also seek smooth, scalable solutions to onboard employees. By leveraging technology and streamlining the employee onboarding process, brands can improve operational efficiency and reduce turnover, leading to improved guest experiences and, ultimately, increased revenue.

In general, these upgrades are a lot easier to promote in brand-managed properties. With owner-managed properties, by contrast, the potential technical debt and increased operating expenses make it a harder sell. These conflicts over investment priorities were highlighted by the partnerships brands and owners forged during the pandemic. To get all stakeholders on board, brands are finding ways to demonstrate the value of the investments.

With profitability as their priority, however, owners are often motivated by expense reduction and revenue growth. They are interested in systems that provide an aggregated, holistic view of data that reflects hotel performance in real-time at the enterprise level. While inclined to see opportunities in both labor management and guest experience, owners are also optimistic about improving front-office services around booking and check-in. They are less sanguine, however, about eliminating guest interaction with staff. In addition, they are investing in technology that makes booking, reservation, and PMS truly dynamic or intelligent.

Seeking ROI, operators prioritize strategic initiatives and results — such as revenue optimization. That makes it essential for PMS to offer features that are used daily while also providing a tangible return on investment. As operators focus on developing robust business intelligence platforms and improving operational efficiency, they also need to ensure that the systems are user-friendly and provide actionable data in real-time.

While they agree with owners that major advances are required for scalable, automated decision-making processes, they also face the challenge of aggregating and validating data across the variety of systems being used in any given market. To streamline these systems, centralized reporting is essential for strategic initiatives.

Keeping the top-line goal in mind

Across the complex hotel business ecosystem, many brands, owners and operators have been slow to prioritize the investments required to update their legacy technology systems. But this is beginning to change. As we learned through interviews and focus groups, industry stakeholders now recognize the urgent need to enable digital solutions as they upgrade their front- and back-office technologies and supporting infrastructure.

In addition to the benefits of and challenges to investing in back-office technology for the hotel industry, a few other key themes emerged:

- **Scaling the business**

Incorporating digital solutions is essential to scaling the business. Investments in cloud solutions, integrated systems and automation can improve labor productivity, lower capital expenditures and increase bottom-line growth. These investments demand significant resources, including developing a data-driven culture aided through appropriate training and change management.

- **Trust in technology**

While automation can offer significant benefits, stakeholders often want to maintain a degree of control over the *level* of automation implemented. A general concern about trust in data sources — as well as questions about the accuracy and reliability of data — also exist, in addition to the trustworthiness of AI. Meanwhile, trust in data ownership is taking on added urgency in the digital age.

According to one of the brands, "Whatever data is fed to AI ends up in the public domain — which is a major concern holding brands back from implementing AI use cases." Building trust in these areas is essential for driving efficiency, optimizing operations and delivering a high-quality guest experience.

- **The right fit**

    Successful implementations require:

    - **Standardizing the integration approach**

        As the industry continues to adopt cloud-based solutions and automated processes that integrate legacy applications, a key challenge is building and standardizing APIs and system architecture. Find a solution that addresses the issue of who should bear the costs to invest in this technology. A collaborative approach involving all stakeholders — as well as governance standards for integration — can help increase the benefits of using APIs.

    - **Defining your vision and objectives**

        Align your technology investment with your overall strategy and stakeholder needs. Create clear business objectives you want to accomplish. To fully realize the benefits of AI/ML, you will need to spend time on pre- and post-implementation.

    - **Aligning talent with technology**

        None of the technologies discussed can function without skilled workers using them. For a data-driven, analytics-enabled culture to succeed, organizations need the right talent

— achieved through proactive recruitment and training, upskilling and effective change management.

- **Designing effective governance**

  Guest data is the holy grail of the hospitality industry. Build effective controls and governance early on into design and implementation to ensure guest data protection while leveraging it to enrich and personalize the guest experience. Tailored convenience complemented with data privacy is of paramount importance to building trust and long-term loyalty.

All industry stakeholders agree that delivering inventory at the right price and at the right time — combined with a memorable experience — will engender guest loyalty over the long term. While digital innovation is an essential condition for increasing employee satisfaction and optimizing hotel operations across the entire value chain, it does require a range of thoughtful choices along the way. Now is the time to make those choices by investing strategically in the human-powered, tech-enabled experiences that have already been proven to boost profitability for brands and owners alike.

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