

The Smart Pool Revolution:

AI-Powered Pool Management Puts Lodging/Property Managers in Control, Saving Money and Elevating Guest Experiences

Real-time, accurate data is vital to a vast number of industries that have successfully harnessed their power to improve profitability, create customer value, and gain a competitive advantage. In this data-rich era, real-time information captured by sensors measures the physical environment and is connected wirelessly to the cloud, where its digital twin is stored and analyzed by AI. This has led to sweeping transformation across industries creating new winners and losers. These industries include transportation (airplane maintenance, autonomous driving, assisted driving safety), manufacturing and warehousing (robotic assembly and physical goods movement), agriculture (crop yield optimization and water conservation), energy (sun-tracking solar panels), security (AI-enabled security cameras), government (motion-detecting smart lighting), and so much more.

In the lodging and property management industries, the most complex and difficult-to-control assets are swimming pools and hot tubs. It is difficult because they are chemically-treated bodies of water that are both a source of guest enjoyment — when properly managed — and a liability that sometimes leads to guest dissatisfaction, tarnished brands, and legal liability when poorly managed. The stakes are high, yet the traditional tools used by hotels, property management staff, and pool service companies fall short. These antiquated tools — some invented over a century ago — continue to be used in a pool maintenance function that has been slow to embrace innovation.

The latest technological advance — AI-powered smart pool monitoring technology — is empowering forward-looking pool service companies to deliver superior pool care at far lower costs, gaining a competitive advantage and heightened profitability. This comes at the expense of service operators clinging to the old, conventional ways, which are increasingly losing business both to innovative pool service firms and customers utilizing the technical advances to take pool management into their own hands. Impressively, some forward-thinking property and lodging management companies have eliminated pool-related guest complaints, elevated guest satisfaction levels, significantly lowered pool-related staff, energy, and chemical costs, and mitigated legal exposure thanks to their embrace of AI-powered smart pool technology.

So dramatic are the savings that some lodging and property managers report recouping these smart investments in a single month. Other reported benefits include expanding property portfolios under management as property owners happily turn over the responsibility and cost of pool management to firms that have turned this aspect of their business into a core competency.

For those that are already on this innovation train, the outstanding business results make it impossible to imagine asset management the old-fashioned way. This should be no surprise when the deficiencies of the old ways are laid bare. These stark deficiencies — some of which have been with us for a century — include manual, labor-intensive water sampling and testing using liquid chemistry set and less accurate pool test strips. Compounding the inherent imperfections of these two water chemical measuring tools is the high human error that stems from the human eye reading test color spectrum results, which are read differently by each pool care technician due to the high variability of human eyes to see colors. Such inaccurate results become bigger problems when it leads to chemically mis-dosing pool water in which human bodies are submerged. Both under and over-dosing chemicals are bad for swimmers and consequently bad for the property brands whose customers expect a healthy and enjoyable pool experience. How widespread is this unhealthy pool syndrome? What are the consequences?

Exposure to Unhealthy Pool Waters is Widespread

[Industry data published by the CDC \(Center for Disease Control\) reveals that unhealthy pools routinely make hotel and lodging guests sick](#), which most likely happens far more frequently than reported. Without such guest complaints, pool-equipped property managers are clueless as to how widespread the problem really is. And when informed, they often resort to offering compensation in the form of discounted room rates or, if part of an HOA, dispatch staff to address the problem after the fact, when the damage has already been done. Worse, there are incidents of death each year, not just from drownings but from harmful pool water leading to deadly bacterial infections.

[In 2019 Ruben Gutierrez, 69, a community leader in East Texas, died from complications stemming from Legionnaires disease](#), which he contracted at a local county fair where he was volunteering. His was one of seven cases caused by a hot tub display that had been contaminated with Legionella bacteria at the fair. Cases like Ruben's are unfortunately not rare but are rarely reported on in the news as properties often offer bereaved families compensation in exchange for their silence about the cause of death. [According to the CDC, one in three swimming-related disease outbreaks occurs in hotel pools](#). The CDC further reports that [58% of hotel pools contain fecal matter resulting in increased E. Coli](#) and other recreational water illnesses.

With more than [27,000 people reported sickened by unsafe pools and spas and eight deaths reported in the past several years](#), which is likely to be a tiny percentage of the total number, hotels, and other lodging properties are at grave risk of reputational damage and expensive lawsuits. These incidents can be amplified by social media, where such incidents are quickly broadcasted and spread virally, causing future revenue harm to a property.

While often not reported in the media, [the number of guest health issues stemming from time in a hotel, rented vacation home, or HOA property's pool or, worse, the hot tub is numbered in the tens of thousands of incidents each year](#). Also unreported are the [15% of people who die after being infected with legionnaires disease](#) stemming from poorly maintained pool and spa water. The author of this paper was touched by such a death last year as a friend's father died in an Albuquerque hotel in 2022,

initially misdiagnosed as Covid but later discovered to be legionnaires disease from an under-sanitized hotel pool.

Proactively maintaining healthy pool water is the best way to shield a property owner from litigation and ensure guest satisfaction. Lodging businesses armed with well-documented data have successfully defended themselves against lawsuits, with the courts inclined to dismiss data-informed cases. Without data or with sketchy data, however, there is little defense against such claims. Relying on fully automated testing that guides the optimal water treatment while generating rigorous documentation is the least expensive insurance policy a hotel or HOA property could possibly buy.

No swimmer in the year 2023 should be subjected to uncomfortable or unhealthy water in pools or spas, yet sadly, this remains a commonly experienced occurrence for the vast majority of properties under professional management. A revolution is underway, however, and with these outdated water monitoring methods being phased out, everyone is benefiting, including guests, hotel brands, and property managers.

In fact, the best-run property management firms establish service-level agreements that build on their ability to precisely measure water quality throughout the day on a management dashboard. Rather than relying on guest complaints as their feedback mechanism or blindly paying for the services of pool maintenance companies with little quality oversight, these brands now specify water quality targets that pool maintenance staff are held accountable to achieve. With the always-available data graphed from a smartphone app throughout the day, there is no longer any mystery to managing these assets. With better swimmer outcomes at lower pool maintenance costs, this is a formula that is winning new converts every day.

The Old Ways Die Slowly

Why have the old, ineffective, costly ways of pool maintenance persisted for so long? First, appearance is deceiving. An over- or under-chemically treated body of water, uncomfortable or unhealthy for swimmers, often looks good to human eyes, including those of hotel or vacation rental guests, pool owners, and HOA boards. Guests and management, often unaware of this visual deception, unknowingly accept poorly maintained water. Conversely, when water is well maintained, it is achieved through enormous costs associated with human-administered testing. Second, swimmer complaints of burning eyes, itchy skin, ear infections, gastrointestinal issues, or worse, have become so commonplace that many property managers consider such undesired situations to be unavoidable. Yet, as brands that have embraced smart pool monitoring technology have discovered, it is within their power to banish such problems. Third, the latest advances in pool care technology are still relatively unknown by the management groups overseeing these assets. Even great breakthroughs need to be known and their benefits understood before widespread adoption follows.

Other pool management innovations, like variable speed pumps and robotic sweeping, have led to energy conservation and improved filtering, yet water testing methods remained stuck in the dinosaur age. As the saying goes, "It's tough to teach an old dog new tricks," and in the pool service world, the old guard is largely responsible for passing on their long ago learned knowledge to younger

staff. Water quality is everything for swimmers immersed in chemically-treated pools and hot tubs that intrude in mouths, ears, noses, and eyes. Small wonder that so many swimmers today have resorted to wearing goggles as their first line of eye defense, which is an obvious vote of no confidence in pool water quality.

The Limitations of Human Eyes and Manual Test Methods

Up until now, the limited toolset available to pool maintenance staff left property managers in the dark, never really knowing to what degree the pool water was safe and balanced from one day to the next. In the absence of such data visibility, the common practice was to assume pool maintenance staff were performing their work to a high standard. While occasionally true, these practices, including time-deficient tools, staff turnover, gaps in training, and poor oversight, resulted in low accountability and questionable water quality. The most luxurious vacation and hotel resorts throw massive staffing resources at this task, testing pool water hourly and relying on highly trained pool staff equipped with the most expensive equipment to ensure their prized asset doesn't become a liability. While such resorts, like the [Grand Wailea in Maui](#), can afford such rich resourcing due to luxury pricing, this measure is out of reach for most properties.

For non-resort properties where the pool amenity isn't the main attraction, maintenance often includes weekly visits from pool service contractors and daily testing and cleaning that is performed by the minimally-trained hotel staff as one of many tasks of their day. Those hotels that outsource pool maintenance entirely are dependent upon service firms whose own staff turns over and has varying levels of experience but are always limited by the weakest link - the testing tools used. When problems arise that are too difficult or complex for in-house staff to manage, adverse conditions have already affected the guest experience. Pool service contractors, who naturally lean towards trouble avoidance, often over-chlorinate pools as part of their own insurance policy.

Given this state of affairs, it's no surprise that so many guests resort to wearing goggles to protect their eyes from high chlorine levels and other chemical imbalances. In a balanced, healthy pool, however, goggles are unnecessary, but they have become the most popular pool fashion item these days, with parents understanding the hotel pool is more likely than not to cause physical discomfort to their children.

What is a Smart Pool Monitoring System?

Thanks to the latest advances in smart pool technology, the next generation of pool care has arrived, changing the calculus of this undesirable situation. Taking a multi-disciplinary approach, combining optical science, proprietary test chemistry, robotics, AI, and wireless connectivity, the smart pool monitor is a 'testing lab in the pool.' A smart pool monitor can be set to test once a day or multiple times a day without human intervention. Rather than staff going to the pool, the pool water test results come to the staff and to management, who, at a quick glance, can see whether the pool waterfalls are within the healthy range. For lodging properties that have adopted this groundbreaking

yet surprisingly affordable testing automation solution, pool maintenance costs and guest complaints have plummeted. It's rare for a technology investment to deliver such tangible benefits so quickly.

Seeing The Weather in the Pool

Just as the weather is constantly changing through the day, so does the unseen weather in the pool. Unlike the above-ground weather, the weather in the pool is mostly unseen, at least to the human eye. How to manage what is unseen to the human eye? Imagine if you could see the weather in the pool through robotic eyes designed to see what the human eye cannot. With smart pool monitoring, the hotel/lodging property's most complex asset can finally be controlled with no blindness to 'the weather in the pool.'

What has been missing for the past several decades of pool care is a lab-precision, real-time, in-pool monitoring system that uses advances in optical science and chemistry to achieve highly accurate readings. Because it's in-pool, no manual labor is involved. Rather than staff going to the pool to conduct tests manually, the testing is completely automated. The results are analyzed and transmitted to an app on a mobile device. Following the advice in the app doesn't require certified or trained staff. And for regulatory compliance and defense against guests' unfounded health claims, data is automatically documented, stored in the cloud, and available when needed.

Saving Money, Improving Guest Satisfaction, and Supporting a Property's Brand

Industry-wide change needs to come from the top, by professionals in lodging management deciding to make operational improvements that impact their profitability, address staff shortages and turnover, and elevate guest experiences. Rather than simply leaving the pool maintenance function to the trained staff or external pool service professionals, who often are not up to speed on the latest advancements in pool management, lodging executives need to question why best practices aren't being applied to their most complex and challenging-to-manage asset. Adopting this vanguard of pool technology requires a change in mindset, understanding the inadequacies of current practices, and questioning how this difficult-to-manage asset could be better controlled at a fraction of the cost.