Lack of trust will hinder adoption of AI-based controls

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The number of AI-based software products available to data center operators is increasing, with many software vendors telling Uptime Intelligence that they are developing new AI-led functionality.

At the same time, more operators are adopting AI, albeit slowly — the industry is known for its risk aversion. Some of the most advanced pilots are driven by colocation and cloud providers, whose efficiency indicators are publicly reported and scrutinized and who can replicate the results of successful projects across their large portfolios.

Those that decide to introduce AI-based tools face a challenge: AI is neither a single category of software nor a single set of capabilities. It has many applications in data center management and operations, with each carrying different risk profiles.

Not all approaches are equally welcome in the data center. While most operators would trust adequately trained AI systems to analyze sensor data, prioritize alarms or suggest predictive maintenance tasks, they would not trust AI with decisions about staffing, equipment settings or configuration, according to findings from the [Uptime Institute Global Data Center Survey 2025](#).

These opinions will shape data center infrastructure management for years to come — and determine which AI-based tools are adopted ahead of others.

What can AI do today?

AI in data center management and operational support is not a new development; machine learning systems have been used in data centers for more than 15 years. However, investment and interest have grown considerably over the past three years, with the number of use cases continuing to expand.

AI-enabled systems are proving useful in data center operations, primarily because of their ability to track relationships and influences within complex systems that produce thousands of data points each day.

Generative AI is a specific subset of AI applications that includes large language models (LLMs). These models excel at generating text or images, making them useful for drafting first-pass documents, creating models and designs or even performing calculations. However, they can struggle in environments that require exact, predictable and error-free outcomes (see *What role might generative AI play in the data center?*).

The application — and the problem it aims to solve — will often dictate the combination of AI technologies used. In most cases, AI-based applications for data center management have modest infrastructure needs, often requiring only a server or two.
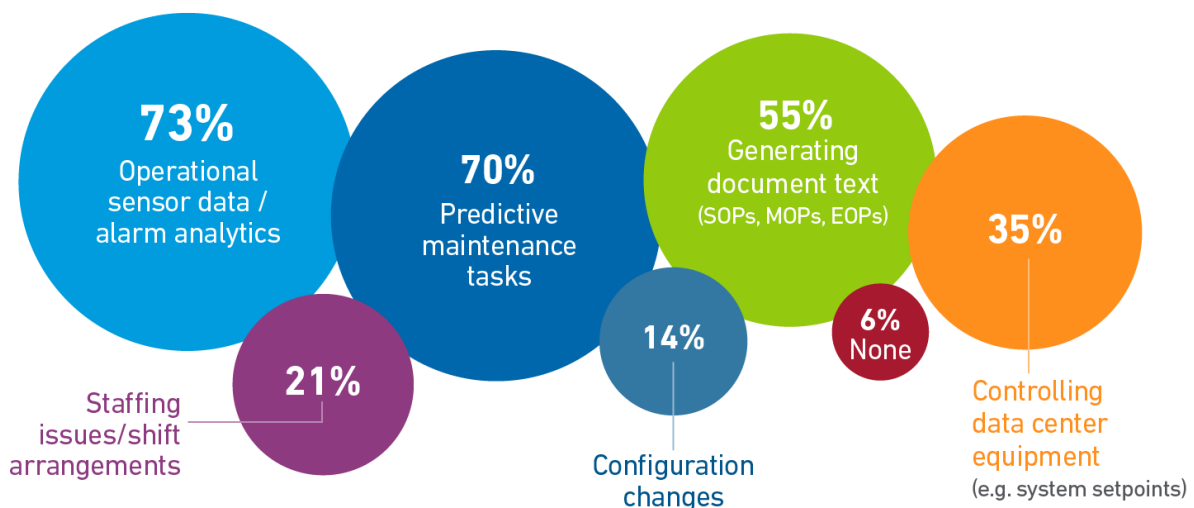
Common objections to adopting AI in facilities include:

- Loss of control over automated functions.
- Lack of visibility into the decision-making process.
- Lack of accountability for outcomes of decisions.
- Concerns about data quality and security.
- Negative impact on skill acquisition.
- Risk of AI hallucinations — when generative AI models occasionally produce confident but inaccurate responses.

As a result, opinions on the trustworthiness of AI as a tool vary widely, depending on the specific application of the technology (see **Figure 1**).

Figure 1 Confidence in AI for operations depends on use case

For which of the following (if any) would you allow AI to make operational decisions in a data center, assuming it has been adequately trained with historical data? Choose all that apply. (n=630)

73%
Operational sensor data / alarm analytics

70%
Predictive maintenance tasks

55%
Generating document text
(SOPs, MOPs, EOPs)

35%
Controlling data center equipment
(e.g. system setpoints)

21%
Staffing issues/shift arrangements

14%
Configuration changes

6%
None

("Other" responses are not included.)

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To put the results in perspective, Uptime has compiled examples of existing software products that may fit into each of the categories identified above.

Operational sensor data or alarm analytics — trust rating: 73%

Example products: EkkoSoft Critical (EkkoSense), Coolgradient, MultiSensor AI

A growing number of software products are using AI to analyze sensor data. Specialized models can track equipment health, identify poor and abnormal performance, and assist in capacity planning. AI-based systems can also be used to prioritize alarms, replacing hand-coded rules and policies.

Some recent software products can provide recommendations based on automated sensor data analysis, which can help improve efficiency and lower PUE.

Predictive maintenance — trust rating: 70%

Example products: EcoCare (Schneider Electric), SmartSignal (GE Vernova), Maximo (IBM)

Predictive and condition-based maintenance build on sensor analytics.

Traditional maintenance models rely on fixed schedules or reactive responses to equipment failures. Predictive maintenance tools optimize maintenance schedules using historical sensor data and failure rates. Condition-based maintenance places greater emphasis on the current state of the asset, monitored in near real time.

Not all of these tools involve AI, but its role in this area is increasing.

Document generation (SOPs, MOPs, EOPs) — trust rating: 55%

Example products: major LLMs (ChatGPT, Claude, Llama), Scribe, Zavanta

LLMs are well-suited to synthesizing new content based on patterns learned from existing data. They can follow templates and historic documentation examples, and they have already been used to draft data center operating procedures.

However, adopting LLMs for this task carries some risk. As such, an experienced manager should review all AI-generated documentation. The benefits and pitfalls of using LLMs for operational documents will be discussed in an upcoming Uptime Intelligence report.

Control of data center equipment — trust rating: 35%

Example products: Vigilent, Phaidra, Etalytics

AI-based data center optimization software is a data center management software category with significant potential. These tools use facility-specific models to automatically set equipment parameters such as cooling set points (see *The intelligent loop: AI and chilled water systems*).

Cooling systems — where dozens of variables including motor and compressor operation, flow speeds, containment systems and floor tile placement can affect performance — are a good fit

for established, non-generative models. They can analyze the combined effect of these factors and enact control decisions that improve thermal service level aggreement compliance while reducing energy and delivering other benefits.

Staffing issues/shift arrangements — trust rating: 21%

Example products: Major LLMs (ChatGPT, Claude, Llama), ShyftPlan, Workeen, Deputy

Creating shift arrangements, schedules and checklists is a task that most LLMs can accomplish. Models can accept instructions in natural language to create schedules based on defined constraints and factors, such as availability, skills, preferences, labor regulations and business demands.

In addition, over-the-counter workforce management applications that use machine learning for shift optimization are already available.

Configuration changes — trusted rating: 14%

Example products: none

This category assumes fully automatic configuration of electrical and mechanical equipment. This would require the software to understand the physical layout and characteristics of the facility. At present, there are no known examples; however, digital twin technologies offer a potential pathway toward a future where equipment configuration no longer requires human intervention (see *Digital twins: reshaping AI infrastructure planning*).

Barriers to entry into AI-based software development continue to lower; basic applications for the use cases mentioned above can be developed internally with sufficient resources.

Outlook

At a time when many businesses are rushing to adopt AI, data center operators remain conservative in their planning. It is up to the software vendors to make a convincing case that their AI-based products will enhance operations without introducing additional risk — a challenge that becomes greater for products that take direct control of equipment or deal with staff management.

US software developer Vigilent, which has been applying machine learning for cooling controls since 2008, maintains that its product has never caused an outage. Vigilent says this is due to guardrails and fail-safes that ensure full cooling if the event of an issue with AI controls.

In control-related applications, it is essential to distinguish between recommendations and actions. Some systems focus on fully automated control, while others advise operators on steps to improve facility efficiency; some software platforms can do both.

While advisory functions cannot deliver the same levels of efficiency gains that are possible with

fully automated controls, they can help build operator confidence in the decisions made by AI-based software. In the short term, operators are likely to favor AI-based analytics and advisory functionality over control functionality.

The differences between various AI technologies will continue to cause confusion: some systems are better at handling precise work in mission-critical environments, while others are better suited to generating documents or summarizing meeting notes.

To navigate the growing array of software options, operators will need to understand the complexities of applied AI. Software vendors can assist in this by describing in detail what their products do and where exactly AI comes into play.

The Uptime Intelligence View

Adoption of AI in data center management will take time, and some applications will gain traction faster than others.

Control of cooling equipment is one of the most promising use cases for AI; it has been proven to improve facility efficiency, yet it finds little support among operators.

The industry is entering a period of careful testing and validation of vendor claims; it will soon become clear whether the perceptions of increased risk associated with AI in operations are justified.

Other related reports published by Uptime Institute include:

[Digital twins: reshaping AI infrastructure planning](#)

[The impact of AI on data center operations (Part I)](#)

[AI will have a limited role in data centers — for now](#)

ABOUT THE AUTHOR

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