Article

Borrowing Best Practices

Few industries could compare to the data center business when it comes to rapid growth. It's hard to overestimate the pace at which data centers are expanding both in size and number around the world. But with such rapid growth often come growing pains. For data centers that ultimately translates to downtime.

According to a 2013 report from Capitoline, there were 108 major data center failures over the preceding 48 months. Those are just the ones that were reported, and that figure does not include the many more instances of equipment failure that did not bring down the data center as a whole.

The same report put the average outage for major incidents at 16.5 hours and the median at 6 hours. Topping the list of causes were power failure (32%), IT equipment failure (21%) and the ever-popular "other" (16%). Fire, environmental disasters, attacks and HVAC failures rounded out the list. These figures represent proximate causes, however, and do not address the fact that, according to the Uptime Institute's Abnormal Incidents Reports database, fully 70 percent of reported outages are directly attributable to human error.

That single fact, perhaps more than any other, makes a compelling case for more rigorous application of best practices. The good news for the data center industry is that other sectors, notably process industries, which arguably include data centers, have already faced many of the same challenges. They have implemented standards and identified best practices, many of which can easily be translated for the data center market.

Data center design

One of the broadest trends in business is integration, and for process industries the integration of power and automation systems in particular. IEC 61850, a communications standard originally conceived to create an "open source" alternative to proprietary standards used in linking devices within a substation, offers one example.

In addition to enabling communication between smart relays and other power equipment found in substations, it can also be used to support power distribution systems in data centers. Even electromechanical parts of cooling systems can be integrated so that data from various devices spread across the facility can be collected and monitored in the control room. It also greatly simplifies the addition of new system components, a key advantage as data centers scale up rapidly.

When it comes to the control system itself, there are multiple existing standards that data centers can borrow from process control environments. Displays, for example, are governed by ISO 11064-5, which specifies elements of user interface design from information architecture down to fonts and color palettes. It also encourages multiple systems to be accessible via a single interface. This has been shown to reduce complexity and

improve the speed and quality of response from operators. Data centers could adopt the standard outright, or simply use it as a guide and cherry pick the elements that make the most sense for the sector.

Another aspect of special interest for data centers is energy efficiency. The UPS system is heart of the data center's power system, a critical insurance policy against power disruptions. Now, many data centers are operating their UPS in "eco mode," in which a bypass connects the incoming AC main power to the outgoing AC without incurring the losses associated with AC-DC conversions. Doing so raises UPS efficiencies from the 95-97 percent range up to 99 percent. That might not seem like a large improvement, but even small energy savings can become significant in dollar terms as facilities grow.

93 percent of companies that suffer a significant data loss are out of business within five years.*

UPS architecture is also undergoing change. Modular designs now enable data centers to easily scale up their UPS as needed while eliminating single points of failure with the use of parallel feeds. Modular systems also reduce the chance for human error thanks to simplified maintenance that does not require the entire system to be taken offline. Because of these benefits, modular UPS will likely become a best practice, especially for larger data centers and those experiencing rapid growth.

Data center operations

When it comes to operating practices, the data center industry has already developed some useful best practices. Virtualization of storage, for example, has been widely adopted. Still, there are several areas where techniques used in other industries could be imported.

Remote monitoring, for example, has been used with great success in mining and oil and gas, industries with operations in extremely remote locations. The cost, in both time and money, of having experts on site forced these industries to find another way. Data centers might not be as remote, but the economics of allowing a handful of experts serve multiple locations are just as compelling.

Modern control systems support video, so it's easy enough to allow remotely located subject matter experts to work with local technicians and see, literally, what they are looking at. Such a capability implies a lighter human presence at the given facility without sacrificing responsiveness or reliability.
Another trend from the process world that data centers could apply is the idea of predictive maintenance. This implies a redefinition of "asset management" for data centers, moving beyond simply keeping track of equipment locations (daunting enough in fast-growing facilities) toward active monitoring and automated responses to potential problems before they occur.

Some of this has to do with gaining a better understanding of interdependencies between systems. For example, if the data center control system detects unusually high temperatures around one server, the load could quickly be diverted to other servers automatically. The control system might even provide some guidance to staff as to whether the issue was in the server itself, the power supply, a nearby CRAC unit, etc.

The idea behind predictive maintenance is to apply intelligence to the increasing amount of data being generated by data center assets. This might take any number of shapes in practice, but the concept seems a good fit for the data center industry.

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*source: US Bureau of Labor Statistics

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