Remote services for building equipment operations

The Why, The What and The How

Commercial businesses can achieve multiple benefits with technology driven remote services. This e-book details how commercial businesses can gain from deploying such remote services for building or store operations, what is the key aspect necessary to launch them and how they can go about setting up for success.

Remote services are essential for the digital transformation of building equipment operations and maintenance

Technologies like Artificial Intelligence and the Internet of Things are enablers, but they require human intelligence, to be successful.

Building operations are integral to commercial businesses. They need to be secure, smart and scalable to empower employees and engage customers. Intelligent buildings, a combination of connected structures and integrated systems, use data and insights for optimized operations and predictive maintenance to enhance occupant comfort, maintain compliance standards and reduce costs. These buildings become intelligent through the application of technology that allows them to operate in response to changing scenarios, rather than following a one-size-fits-all approach. The transformation of building operations to make buildings intelligent is a journey; technology plays a key role in that journey. But is it technology alone?

Evolving building operations through technology

Smooth building operations can be a source of competitive advantage today. Technology such as Artificial Intelligence (AI) and the Internet of Things (IoT), is dramatically changing the way vital operations in buildings are managed. These technologies contribute to making buildings more efficient and intelligent, primarily through using data from equipment to improve operations. AI technologies garner insights on energy consumption patterns, establish efficiency blueprints and support maintenance efforts and optimization. These technologies can also be used to predict issues with equipment in advance and proactively help to prevent failures. The predictive insights they offer facilitate the optimal operation of equipment and maintenance of peak performance, with IoT enabling the equipment to communicate and be controlled to suit different working scenarios. Insights and actions in workflows can enable organizations to achieve equipment performance objectives and to optimize processes around operations and maintenance.

However, data and insights do not offer value, unless acted upon. For AI and IoT solutions to be efficacious and meaningful, human intelligence and intervention are essential. The true value of AI is realized by interpreting analyzed information and ensuring that the predictions and recommended actions are acted upon through automation, remote resolution or field actions. There is a journey to transform building operations from its current state to a future state where it is more intelligent, using data from equipment operations and technologies like AI and IoT to operate. This is typically called digital transformation. The use of expert human intervention is key to successfully complete the same.

Remote monitoring services power the evolution

Successful organizations are increasingly monitoring their operations remotely, taking advantage of installing smart pieces of equipment and using human expertise to effectively operate them. They remotely monitor and control equipment to optimize energy costs while keeping occupants and inventory in optimal conditions. Remote services for building management and operations have become paramount as ultimate visibility of entire sites from a central operations center or 'Command Center' serves as the building operator's 'eye in the sky'. Knowing that the building and operations are remotely managed and controlled by experts 24/7, enables organizations to focus purely on their customers.

The underlying benefit of remote services is facilitating nearly instant accessibility to service personnel and their round-the-clock availability, even in far-off sites and locations.They allow operators to promptly react to anomalies or negative trends in the building performance and solve most issues swiftly, without dispatching technicians. An operator can seek expert assistance to address an issue and expect a resolution after evidence-based analysis. An expert remote team can even provide support across

multiple types of building equipment regardless of the manufacturer. This contributes to enabling portfolio-wide monitoring and control of equipment settings, managing thermal compliance and helping to increase energy efficiency.

Remote services enable organizations to access cross-functional skills of data scientists, analysts and domain experts and use their combined expertise to address problems. Remote services are scalable and can be applied from hundreds to thousands of buildings and can help optimize operations at each building by benchmarking against the other connected buildings being managed.
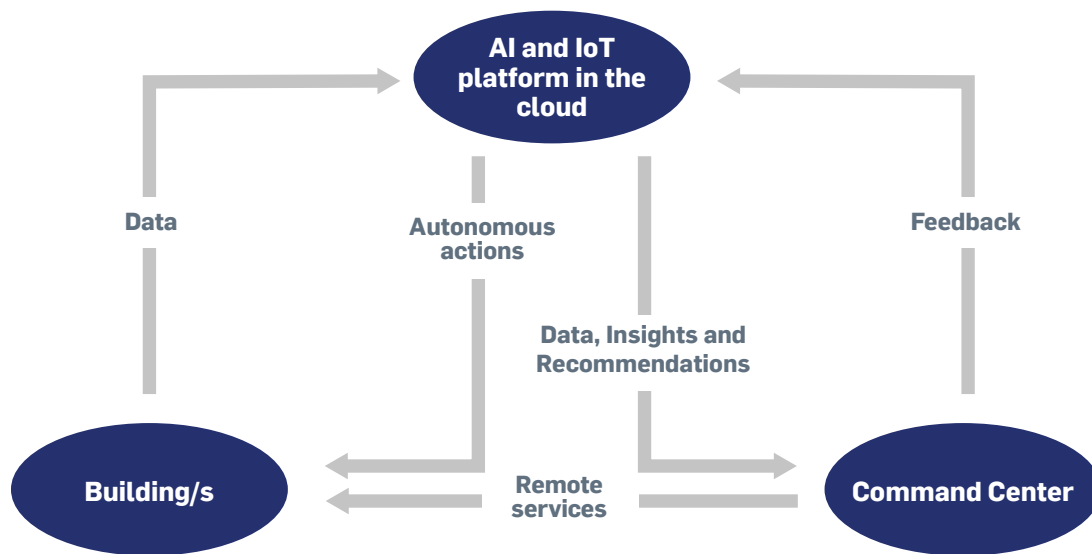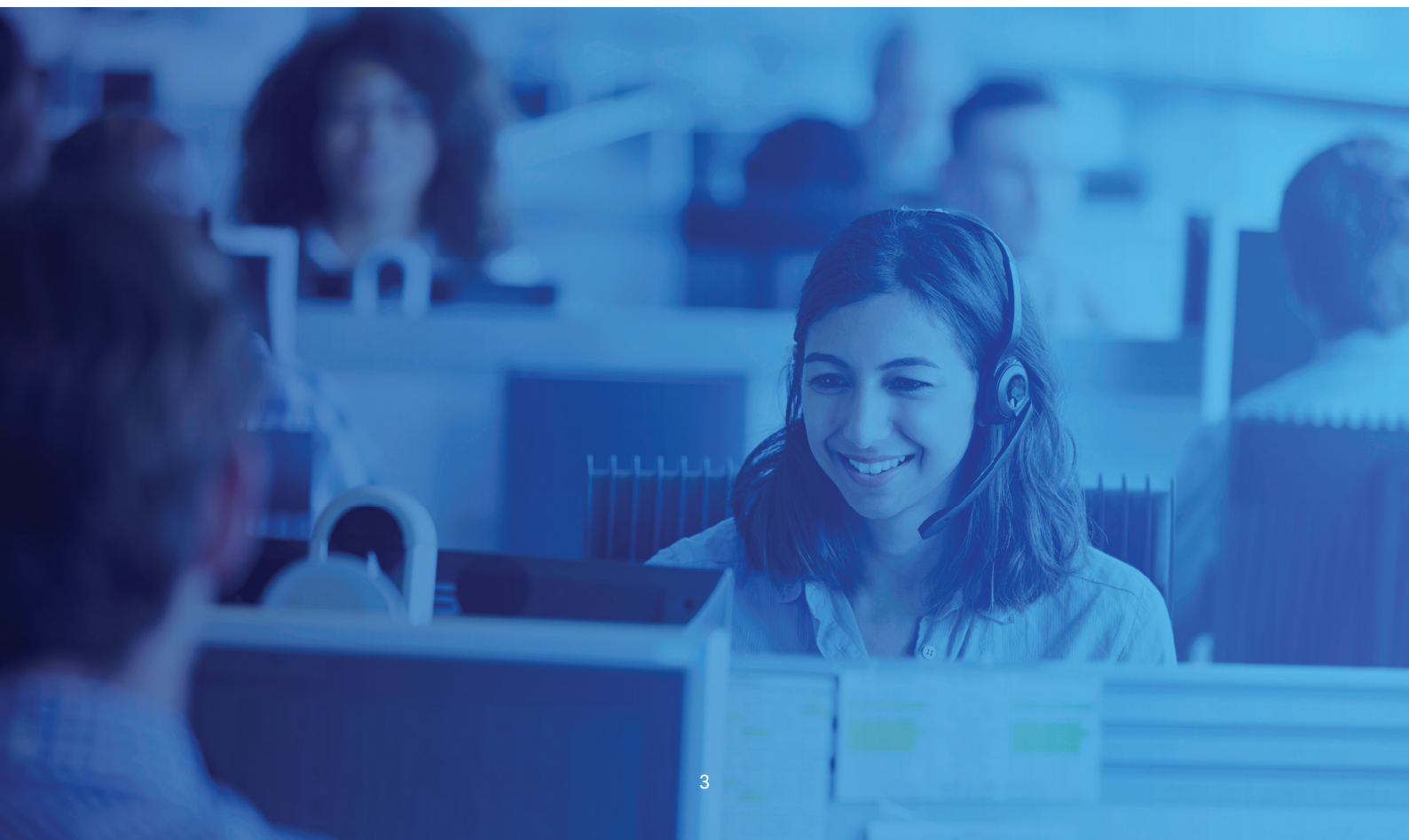

Figure 1: Architecture for Enabling Remote Services

Deployment of remote services

Taking advantage of remote services without the required setup, however, can be a challenge. Since remote services are powered by command centers, the solution is creating or contracting a command center. Command centers typically require highly-skilled people supported with advanced technologies and robust processes. Remote services for building operations provided by a command center typically include remote commissioning, monitoring, diagnostic and prognostic support.

Organizations that intend to implement remote services for their building equipment and operations should first consider the following:

1) The objectives they want to achieve, such as improving energy efficiency or maintaining thermal compliance.

2) The level of remote management they wish to implement, based on the level of staff they employ. Whether it is mere troubleshooting that is required or advanced monitoring and control of all equipment and systems onsite for proactive maintenance and efficiency. This is in line with how much they are willing to spend and how quickly they wish to achieve the objectives.

3) The enablers that are needed for remote services, like the procurement and installation of sensors and controls in their buildings, to manage building equipment remotely.

The future of building operations lies at the intersection of human intervention, digital innovation and robust processes. The ability to predict and avoid a problem in advance is not a luxury but an urgent need today. Technology has matured to the extent that it can help, but we need human intellect and expertise to complement the technology, to do so. Thus, on the journey of digitally transforming building equipment operations and maintenance, building operators need remote services to leverage the power of technology.

Not every center is a 'Command Center'.

Remote services are powered by operation centers, but only mature ones can help businesses transform their equipment operations & maintenance.

Intelligent buildings run smoothly when sophisticated network and operation centers or 'command centers' are deployed to realize the capabilities of the installed technology. However, command centers need to be well equipped with the right technology, staffed with the right mix of experts and have robust processes outlined, in order to be impactful. In general, such centers would consist of a committed team of analysts, data scientists and domain experts that are adept in remote commissioning, monitoring, diagnostics and prognostics for equipment operations. The highly skilled team needs to be supported by technology to access the insights from AI and IoT platforms. It also needs to be empowered to develop and improve processes by taking actions, like planning and performing preventive maintenance activities, to avoid equipment failure.

For commercial enterprises such as retailers, a command center is particularly useful, as it can remotely manage hundreds or thousands of buildings and provide expert services such as remotely changing setpoints or coordinating with the field teams to complete maintenance interventions. The use of new, technologically-advanced pieces of equipment in buildings and their ability to connect to the cloud and to be remotely managed, requires a technology-driven command center to operate efficiently. The command center is then able to view the operations holistically and drive the digital transformation journey to make building operations more intelligent. This journey can be represented as moving from a scenario where building operations are reactive (fix it when it breaks) to where they are proactive (using predictive insights to fix it before it breaks). Command centers can work with businesses or their vendor partners to provide support through actions like monitoring, responding, optimizing and even transforming processes. The actions of a command center define the value that it can bring to enterprises.

'Command Centers' can play different roles, and offer value accordingly

Advances in technology along with skilled personnel are changing the way businesses approach the function of remote support. A sophisticated, full-scale Command Center offers the following key services and enables transformation of operations. Depending on requirements and pace of change, organizations can determine the services necessary for their building equipment operations and maintenance.

1. Monitor
Nearly all command centers perform the primary function of efficiently monitoring building and equipment operations and informing when deviations occur, for both process and performance. Real-time data from equipment such as rooftop units, plants, controllers, generators, and refrigeration units are used to monitor performance. Insights indicate whether the equipment is operational and available for use. Equipment service alarms are monitored and the corresponding teams are informed – via a work order – about interventions to be taken to address breakdowns or impending breakdowns, depending on the equipment. The business value is having eyes on operations to ensure problems are spotted and resolved. For the typical challenge that businesses face of having no intelligence at this level to identify which problems need to be prioritized, problems are addressed in First-In-First-Out (FIFO) mode, thus offering limited value to businesses.

2. Respond
Advanced command centers offer assistance beyond monitoring and informing. They help in effectively controlling equipment operations, respond to calls or requests from the teams or technicians at the buildings, and make changes or schedule changes. The command centers can also offer the ability to remotely diagnose problems and advise on corrective actions. The command center can then support field technicians in taking these corrective actions. So, field teams can be better informed and, in many cases, equipped with the right tools to resolve issues effectively. The command center can also support in planning time-based periodic maintenance. This helps result in smooth operations where issues are attended to in a scheduled manner, to help with equipment availability.

These reports are a collection of equipment health information based on expert data analysis, based against established benchmarks.

3. Transform

The pre-requisite for a command center to transform operations is that equipment and controllers be connected to an AI and IoT platform, for better visibility, control and analysis. The use of technology allows teams to be more proactive. Proactive support is the game-changer in which teams make predictions and act either remotely or provide reports to the organization to proactively solve problems, even before customers or occupants at a site might notice the issue. This is the next level of support that goes beyond the above listed capabilities of 'Respond' and 'Monitor'.

The command center advises whether to repair equipment immediately or later, how frequently maintenance should be carried out (through condition-based maintenance) or whether equipment should be replaced. This helps with balancing up-time requirements and costs of maintenance.

Using the expertise gained from multi-level operational assistance, the center is responsible for achieving the desired outcomes. The center can transform operations from reactive to proactive, which can result in numerous benefits, such as sustainable energy savings, reduced unnecessary maintenance, significantly decreased downtime, and increased operational efficiency, to name a few. The operations and maintenance process itself can be looked at as an investment for business value rather than as an expense.

Command centers, when engaged with looking at sufficient data over longer periods of time, can also provide additional value in elevating operations and maintenance (O&M) by identifying ways to improve processes. The value of the insights garnered from studying trends from months or even years of operations, allows these teams to identify inefficiencies and advise how to improve the O&M process to make the business more profitable. In case of retailers with multiple sites, it allows them to scale operations as they increase the number of stores and apply best practices. These centers are still looking at past data though and are not equipped to predict the future and change processes. The focus is still on optimization. The additional business value is in acting on problems based on their level of seriousness (through data analysis) to ensure operations are not significantly impacted. The team proactively addresses what could be costly problems to reduce negative impact on the business.
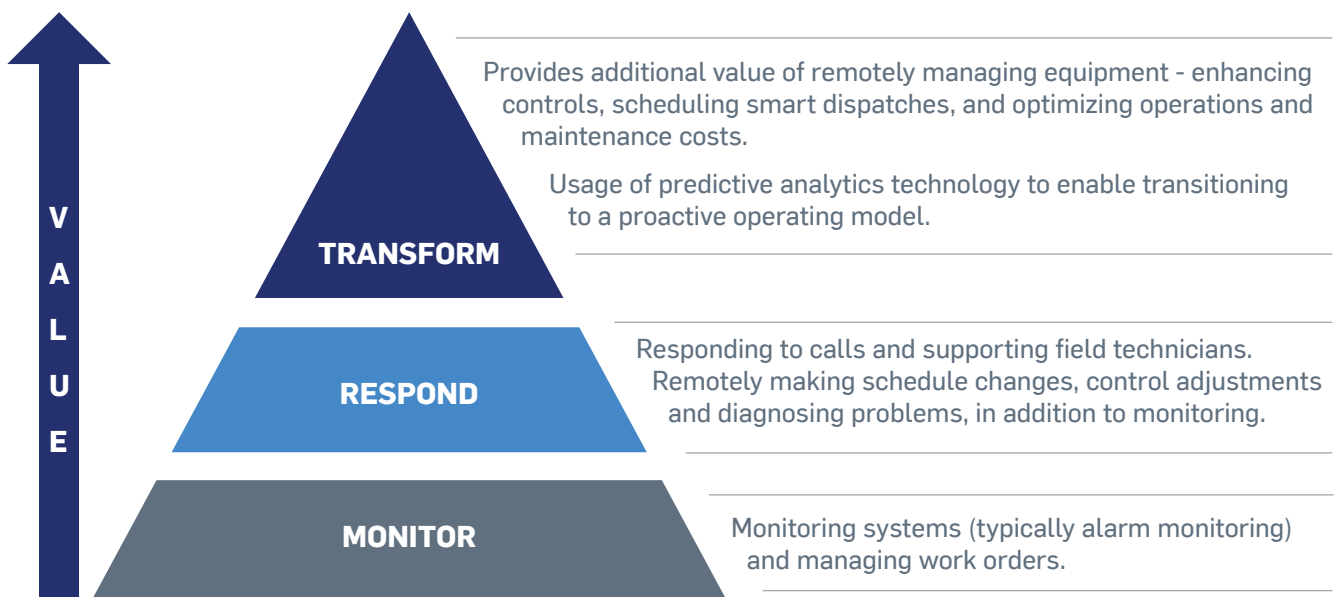

VALUE

TRANSFORM
Provides additional value of remotely managing equipment - enhancing controls, scheduling smart dispatches, and optimizing operations and maintenance costs.

Usage of predictive analytics technology to enable transitioning to a proactive operating model.

RESPOND
Responding to calls and supporting field technicians. Remotely making schedule changes, control adjustments and diagnosing problems, in addition to monitoring.

MONITOR
Monitoring systems (typically alarm monitoring) and managing work orders.

Figure 2: Capabilities of Command Centers and what they offer

Activities	Monitor	Respond	Transform
Equipment Service Alarm Monitoring	✔		
Technical Service Desk		✔	✔
Work Order Management	✔	✔	✔
Control Adjustments		✔	✔
Schedule Changes		✔	✔
Remote Diagnostics		✔	✔
Field Technician Support		✔	✔
Predictive Insights Management			✔
Control Enhancements			✔
Smart Dispatch			✔
Reduce Energy Consumption			✔
Optimize Asset Maintenance Cost			✔
Optimize Asset Retrofit/ Replacement			✔
Field Service Effectiveness			✔

Table: Actions typically performed by Command Centers based on their capabilities

Accelerate the journey to digitally transform operations and maintenance with the right Command Center

Command centers count on the experience of the inherent teams working together with the technology and continuously optimized processes, to offer value to customers. Mature command centers can offer guidance and action to transform operations processes. It is a journey for command centers to be able to apply technology and processes to make such an impact. There is a steep learning curve to move from being able to monitor systems, create reports and respond to calls, to being able to leverage the predictions from an AI platform and apply the right fix. Further, they need to be able to update processes to ensure such faults, that needed fixing, do not arise again or can be attended to before they manifest into a bigger problem. For this, there must be a culture of learning and an enthusiasm for driving change in the businesses, as only when the existing processes are updated from old to new using technology, can we truly say the digital transformation has taken place.

Businesses, especially those with multi-site operations, should leverage command centers to streamline operations or partner with service vendors with highly developed teams, to optimize operations tactically and strategically. While there are different levels of value offered by command centers, each level can also be a stepping-stone to improving the capabilities and thus represents value to be gained when embarking on the path to digitally transforming building operations.

Setting up a command center - The orchestra for playing the symphony of remote services.

Command centers need to have teams with the right skills and expertise, empowered by the right technology platforms and governed by the appropriate processes to be successful.

Remotely managing equipment operations and maintenance with a proficient command center is tough for most organizations. Setting up a system and implementing best practices for optimum results can be tricky. There are two major challenges that companies face.

The first, managing a skilled team, is costly and requires appropriate infrastructure. The second, technical expertise, is hard to come by and it is challenging for enterprises to manage the command center operations without a skilled team.

The effectiveness of a command center primarily depends on the capability of the teams that operate it. Sophisticated centers demand state-of-art technology platforms and tools, superior levels of expertise, and robust methods to ensure quality delivery of services and regular updates to processes.

Setting up a harmonious center also requires planning, accounting for technical considerations, and long-term support to function as per design. To use a command center optimally and keep pace with evolving technology, it is important to understand the key moving parts and how best to ensure they work together.

Command centers need the teams (people) equipped with the technology (platforms) to amplify and carry out their actions and the right procedures (processes) to ensure they can manage and timely improve equipment operations remotely.
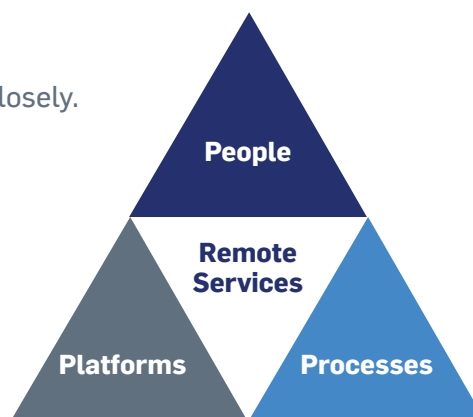
Let's look at each one of them closely.

Figure 3: The triad for successful remote services

People: The Musicians

Command centers need to be set-up in alignment with achieving specific business goals. They typically require a cross-functional team composed of highly skilled personnel aimed at performing activities in a timely manner. For example, actions to prevent a predicted failure of equipment need to be done quickly and in a defined period or else the prediction will come true. The requisite capabilities range from experienced operators and skilled technicians to seasoned analysts - with the ability to comprehend the meaning of multiple trends and what they point to.

Members of a command center require good communication skills in addition to being skilled in certain domains – be it on the type of equipment and their operations, the building controllers or on the industry application, like Retail. A holistic understanding of building and equipment performance is critical to managing operations.

Teams in a command center should be capable of:

- monitoring building performance
- managing system configurations across types of equipment
- implementing policies and schedule changes
- managing operations and performance to adhere to set compliance policies
- reporting, presenting and documenting

Effective command centers can provide expertise for remote commissioning, monitoring, diagnostics, and prognostic support for building and equipment operations. The centers should ideally offer 24/7 support so staffing needs to accommodate the same. Hiring of experienced personnel who are multifunctional and multidisciplinary is a vital aspect.

The next equally critical aspect besides staffing is a resolute focus on the training and quality of the team. In addition to data analysts, data scientists, controls experts and equipment domain experts, command centers need commissioning and onboarding teams, and project management teams, to deliver value to customers. There needs to be a dedicated training program for these critical roles.

Quality assurance is essential to offering an improved customer experience – customers being those that work with the command centers from business teams to equipment technicians. To run a successful and evolving command center, it is important to develop and retain the team because of the precision of the roles. It is also crucial to provide the individuals, not just with the tools and learning but also an encouraging environment that advances their personal growth and that of the command center too.

Platforms: The Instruments

The technology that needs to be used by a command center can be broadly classified into three categories of software: -

1. Service Process Management:

    This is aimed at ensuring that the customer is serviced at utmost priority. The core blocks are:

    a. Customer Lifecycle management – Onboarding a set of buildings to the service ecosystem and helping the representative team members through the phases from onboarding to the command center ecosystem, to going live with the remote support to ongoing management of the remote support program.

    b. Customer Support Channels – This is covering methods of interacting with the end customer – phone calls, emails, tickets, mobile apps, etc. A command center should have an omni-channel support system – i.e., interact with the others, say the store managers from the stores, in all possible convenient methods and also seamlessly navigate from one channel to another without losing context of the conversation, should multiple channels be used by a person raising an issue.

    c. Task Management – A key core competency of an effective command center is the ability to manage multiple tasks and adhere to Service Level Agreements (SLA). A task could be a 5 minute one, or even a 6-month project. Software that can help manage tasks of different durations and complexities seamlessly is extremely important.

    d. Integrated Knowledge Management – This is key to ensuring that the engineers are able to resolve issues correctly at the first time of asking.

    e. Engineer Management – For a command center that is offering support across countries, segregating tasks between time zones so as to support site engineers or technicians is an important piece.

f. Reporting & Analytics – This is the piece that enables the command center to offer meaningful insights and reports for tracking and measurement to the business. This helps with measuring the impact as well as staying on course when trying to drive a wider change or achieve a large goal.

2. Equipment Insights Management:

This is the software element that helps a command center identify issues with the equipment under management. Typically, it consists of an AI and IoT platform that has the AI engine and connects to underlying equipment at the buildings as well as controllers, meters and sensors. A platform that can help predict issues and identify deviations as well as prioritize them can help make command centers more productive as then they can focus on addressing high priority issues and planning out repairs or a preventive maintenance intervention, in case some issues require attention at the building.
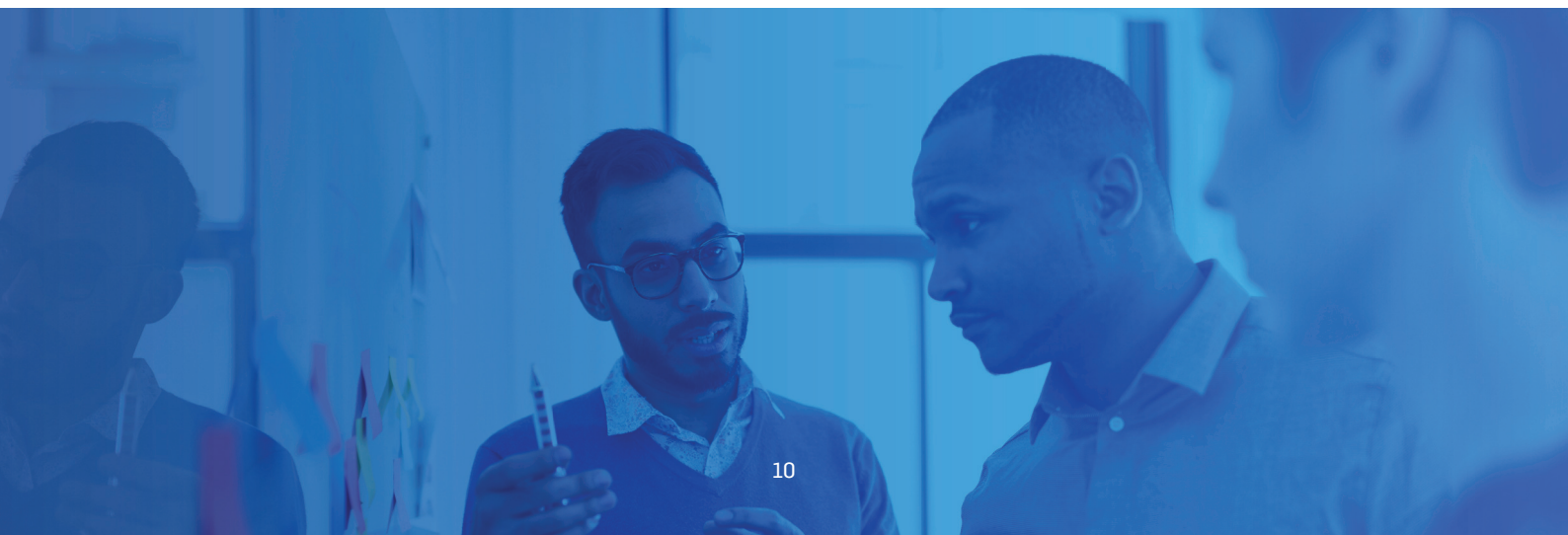
3. Catalyst Tools:

Operational innovation and improvisation are crucial elements of ensuring the service delivery keeps improving. Typically, there is a time lag between an enhancement idea becoming realized as a software feature either in the Service management system or the Equipment insights system. The catalyst tools comprise of quickly turned around, but less than ideal, software that helps the command center meet immediate business needs till the time the feature is made available in one of the main software system. While they act as a catalyst to operational efficiency, in certain cases they also act as proof of concepts to the main software feature as well. Catalyst Tools make up the connecting tissue between Customers, People in the command center, Processes and the platform technologies to enable Agile Innovation.

There could be other requirements as well and organizations need to look at procuring those technologies that can increase the productivity of the command center teams while also giving them more visibility into operations, track metrics better and automate or make more field work done remotely.

Processes: The Musical Notes to be Played

An effective command center designs and continuously improves its processes to make the best of the available technology, like predictive analytics, to help execute prompt and accurate remote interventions. The Center needs to work within strict guidelines to ensure quality service. The command centers also need to work with customers to improve processes and relay the results back internally to further improve the systems and processes.

The team will also need to conduct training sessions for on-ground teams and develop roadmaps to optimize operations. Overall, being focused toward the end-user of the services or customers is key. This helps follow a result-oriented methodology for grading efforts and improving processes within the command center.

Processes in a Command Center can be classified into four broad categories:

1. **Monitoring Process:** Inside a world class command center, monitoring is a proactive process, not reactive. The purpose is to analyze the incoming data and advise when interventions can be made to improve equipment performance.

2. **Incident Management Process:** Incident management is about defining and executing processes that helps ensure that problems are well-documented, broadcasted to all the involved cross-functional teams, and resolved as per the SLA timelines. Documentation is the most important function of an incident management team.

3. **Change Management Process:** Change management is the discipline that deals with laying down the blueprint for a successful organization-level transformation by leading individuals, teams, and entire organizations through the change. It also helps to keep the human element of change at the forefront and provides a winning strategy to decrease implementation risk due to poor user adoption.

4. **Problem Management Process:** Problem management process helps to ensure that problems have a sustainable and a permanent solution and necessary actions have been taken to ensure any future occurrence of a problem of similar nature has a swift resolution.

There is a delicate balance that needs to be maintained. The three core elements need to be looked at individually to ensure that they can deliver what is required from them, with regular up-skilling or upgrading or updating as the case maybe. And as a unit, this trifecta of People, Platforms and Processes need to work in sync to ensure that the command centers can effectively deliver remote services and make buildings intelligent. This can enable businesses to manage building equipment operations and maintenance better and achieve their goals.
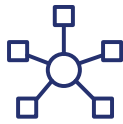
Launch remote services for your buildings with BluEdge™ Command Centers

The BluEdge Command Centers, offered by EcoEnergy Insights, a Carrier company, are teams of skilled analysts, data scientists and domain experts who manage requisite site interventions, define action plans and ensure their comprehensive completion in a timely manner. There are 3 such centers of excellence currently with one each in the USA, Czech Republic and India.

Here are a few performance metrics from the remote services offered by the BluEdge Command Centers

BLUEDGE
COMMAND CENTER

Buildings Managed	Equipment Managed	Remote Commissioning	Alarms Managed
51,000+	**498,000+**	**65+ on average / month**	**~40,000/month**

Customer Service Requests	Technician Service Requests	Remote resolutions of issues raised by customers
~12,000/month	**~10,000/month**	**63% on average per year**

Achieve your business goals like enhanced comfort, improved equipment health and increased savings. Rely on our team's proactive interventions based on insights from the award-winning CORTIX™ AI platform and benefit from their close communication with your on-site team and service technicians. Make your buildings intelligent with our BluEdge Command Centers.

Reach out to us at info.ecoenergy@carrier.com for more.

About EcoEnergy Insights

EcoEnergy Insights is a global leader in providing AI and IoT solutions for building and equipment operations. Their CORTIX platform collects data from multiple sources, analyzes it, acts on defined deviations autonomously and offers predictive actionable insights. The platform, combined with expert human analytics, has been delivering award-winning outcomes in comfort, maintenance and energy efficiency across multiple industries such as retail, hospitality and banking. EcoEnergy Insights is a part of Carrier, the leading global provider of healthy, safe, sustainable and intelligent building and cold chain solutions.

For more information on EcoEnergy Insights and the CORTIX platform, visit www.ecoenergyinsights.com and www.cortix.ai

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