OPTIMIZE DATA CENTERS FOR TOMORROW

From the inception of DCIM to the 2016 mandate impacting 98% of federal data centers

NORLINX

THE PROBLEM

The website, www.theemergingfuture.com, states that in five years, technology will be 32 times more advanced than it is today. In ten years, 1,000 times more advanced and in twenty years, 1,000,000 times more advanced! Amidst a world full of uncertainties, at least one thing is clear: technology innovation will continue to play a pivotal role in how we manage and protect *mission critical information*.

According to Gartner, worldwide data center system spending will increase by $5 billion in 2016, with a growth of 3% as compared to 2015. In addition, data centers are projected to undergo dramatic change in the near future due to advances in cloud computing, economic changes, and other technologies. Organizations that are able to respond to these dynamics in ways that support innovation and value creation, will be well-positioned both now and in years to come.

From the creation of the first data center to the dawn of the new millenium, data center optimization was an ideal that was only possible through technology devices that provided unsurpassed efficiency, reliability, and cost-effectiveness. Around 15 years ago, however, data centers began exponentially increasing in size, quantity, and complexity. This mass expanse created a surmounting and dire problem.

The need for modernization did not reveal itself in every data center. A small data center with a handful of cabinets and less than 50 servers wasn't significantly affected. Device moves, adds, and changes (MAC's), power consumption metering and monitoring, heating & cooling regulation, and other daily needs could be properly managed in manual fashion. Data center optimization was only limited by an organization's budgets or the technology capabilities of the time. **In stark contrast**, a data center with 10, 50, 100+ cabinets, consisting of 100 to over 1,000 servers, could not be optimized through manual methods. The result: *Inadequate Optimization*. Data centers were at risk of not operating efficiently or reliably, and were costing organizations more money to operate than necessary. The crux of this problem, however, was that inadequate optimization compromised the information and intellectual property that the data center's devices managed and protected. Such a problem carried massive implications and created unprecedented liabilities.

THE ROOT CAUSE

With inadequate optimization escalating within data centers across the country, the critical question became, "how can we address this now and into the future?" Like any problem, a lasting solution can only be implemented once the problem's root cause is understood. The root cause of inadequate optimization was the lack of critical information being available to make intelligent and accurate decisions. Data center stakeholders needed a solution that would expose the information they needed in order to bridge the gap between IT and Facilities departments, enabling them make the right decisions related to three areas of overall need:

1. **Data Center Management**
2. **Capacity Planning**
3. **Risk Mitigation**

THE SOLUTION

Data Center Infrastructure Management, or DCIM, software was created to optimize data center operations by maximizing the efficiency, reliability, and cost effectiveness of the modern data center. It would accomplish this through integrating into nearly every device within a data center, providing critical reporting, alerts and monitoring. Unprecedented levels of data center optimization became possible, through DCIM's unique ability to expose critical information to its stakeholders related to risks and opportunities within their data center.

Just exposing critical information, however, wasn't good enough. It had to be made available real-time, so that near-term risks could be averted and long-term decisions could be made with accuracy and confidence. Ultimately, the

availability of this information enabled data center stakeholders to become better stewards of the physical devices and virtual information that served as the backbone of their organization.

DCIM helps organizations make intelligent decisions related to:		
Data Center Management	**Capacity Planning**	**Risk Mitigation**
•Physical device assets, real-time monitoring, power consumption & ratings, and data center personnel	•Understanding current capacity, where devices should be placed, and accurately plan for future needs	•Real-time multi-channel alerts •Properly plan for device failover •Manage environmental risks

THE BENEFITS

As time has progressed towards the present day, data centers have maintained a consistent need for efficiency, reliability, and cost-effectiveness. DCIM software continues to provide the best path towards data center optimization by creating a granular view into the dynamics of the data center, helping stakeholders:

- Effectively measure power utilization for current capacity and forecasted requirements.
- Determine overall power efficiency through numerous metrics and ratings.
- Understand which equipment is being under-utilized.
- Project how tech refreshes or MACs will improve data center efficiency and capacity.
- Better manage risks associated with device failover.
- More effectively manage utility costs associated with energy consumption.
- Have a clearer projection of ROIs for improving data center efficiency.

As data center needs have evolved, coupled with new paradigms and global trends, data center optimization has broadened its definition and requirements. Today, data centers must not only run efficiently, be reliable and be cost-effective, but must also check the box of "Environmentally Sustainable." Environmental sustainability initiatives are now commonplace within organizations both in the public and private sectors, and numerous incentives are available to motivate organizations to achieve sustainability goals. Data centers, and more specifically, DCIM software, can play a key role in an organization creating and achieving environmental sustainability goals that are measurable and meaningful. As an example:

> DCIM software helps optimize data centers into the future through forecast planning tools. Such tools can simulate future environmental impacts from variables such as power usage, temperature control, and water usage for cooling. DCIM also helps data center personnel properly manage the disposal of e-waste, by managing each asset from the time of purchase to the end of its useful life. Through DCIM's predictive forecasting and asset management tools, data center personnel are in a better position to set and achieve sustainability goals that reduce their carbon footprint and that create more cost-effective, efficient operations.

To the data center stakeholder, DCIM software is like an omni-present and all-knowing companion, who not only works in the data center, but resides and operates *within* it. It is an essential tool and strategy to achieve adequate and lasting data center optimization.

TO SUMMARIZE

- Nearly 15 years ago, data centers significantly increased in size, quantity and complexity. This rapid growth created a wide-spread problem: *inadequate optimization* (inefficient, unreliable, and cost-burdened data centers). The implications of this problem created serious risks not limited only to physical devices/assets, but to the virtual information and intellectual property that was of most value.

- DCIM software was created to combat inadequate optimization, through arming data center stakeholders with information that would help them make intelligent decisions related to: Data Center Management, Capacity Planning, and Risk Mitigation. This method of empowered decision-making enabled data center stakeholders to be better stewards of the physical devices and virtual information they managed.
- DCIM software is the ultimate tool and companion for optimizing the efficiency, reliability, cost-effectiveness, and environmental sustainability of today's data centers.

DCOI – The 2016 Federal Data Center Mandate

BACKGROUND EXCERPT:

> *In 2010, the Office of Management and Budget (OMB) launched the Federal Data Center Consolidation Initiative (FDCCI) to promote the use of Green IT by reducing the overall energy and real estate footprint of government data centers, reduce the cost of data center hardware, software and operations, increase the overall IT security posture of the Federal government, and shift IT investments to more efficient computing platforms and technologies.*
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> *In December 2014, the President signed into law the Federal Information Technology Acquisition Reform Act (FITARA), which enacts and builds upon the requirements of the FDCCI. FITARA requires that agencies submit annual reports that are to include: comprehensive data center inventories; multi-year strategies to consolidate and optimize data centers; performance metrics and a timeline for agency activities; and yearly calculations of investment and cost savings.*[1]
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> *As of March, 2016, FDCCI is superseded by the Data Center Optimization Initiative (DCOI) established in this memorandum.*
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> *The DCOI, as described in this memorandum, requires agencies to develop and report on data center strategies to consolidate inefficient infrastructure, optimize existing facilities, achieve cost savings, and transition to more efficient infrastructure, such as cloud services and inter-agency shared services.*
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> *The requirements in this memorandum apply to all CFO Act agencies, including the Department of Defense*[2]

In short, the DCOI mandate has been put in place to optimize federal data centers. It is estimated that, out of over 10,000 Federal datacenters in operation as of 2015, only 240 such locations serve as true standalone data centers capable of efficiently providing computing and storage services[3]. In other words, **just over 2%** of federal data centers have adequate optimization in regard to efficiency, reliability, cost-effectiveness and environmental sustainability.

This mandate has been put forth due to the federal government's recognition of the vast majority of their data centers being at risk of *inadequate optimization*. As discussed earlier, inadequate optimization creates risks and avoidable costs related to the physical device assets within data centers. More importantly, inadequate optimization compromises critical data and intellectual property that data centers manage and protect. For the federal government, inadequate optimization not only can put a specific agency at risk of closure, but depending on the sensitivity and classification of

[1] https://datacenters.cio.gov/
[2] https://datacenters.cio.gov/policy/
[3] http://www.fedtechmagazine.com/article/2016/03/federal-data-center-consolidation-has-saved-28-billion-more-coming

the data, can expose risks to our country and its citizens as well. With nearly 98% of federal data centers exposed to the risks of inadequate optimization, this mandate has been issued in order to achieve specific data center optimization goals by September 30th 2018[4].

DCIM software will be an essential tool to help federal data centers achieve the optimization goals set forth within this mandate. Below is an extraction from the mandate, located in whole at www.datacenters.cio.gov, listing out all of the areas in which DCIM software will add value to this initiative.

DCOI Section	Excerpt from DCOI Mandate	DCIM Relevance
POLICY	*Optimize existing facilities*	Optimization is achievable through utilizing a DCIM solution that is robust, easy to deploy, use and maintain. DCIM software provides standardized reporting for energy metering as well as a data center's carbon footprint and environmental impact.
	Achieve cost savings	DCIM software will expose critical information to help federal data centers consolidate assets and make decisions that produce a more desirable cost/benefit ratio.
CONSOLIDATION AND CLOSURE OF EXISTING DATA CENTERS	*Transition to flexible technology such as Software as a Service*	DCIM software can be purchased as a product or as a service. The most efficient DCIM software is flexible to be customized based on user needs.
	Migrate to optimized data centers	DCIM software will help federal data centers plan for current and future capacity when migrating too new or already optimized data centers. Some DCIM solutions provide consolidation tools that create consolidation roadmaps.
CLASSIFICATION OF PHYSICAL DATA CENTERS	*Tiered and non-tiered*	DCIM is a scalable solution that can integrate within multiple departments at tiered data center locations, consolidating all applicable information under a single platform.
ENERGY METERING AND POWER EFFICIENCY	*Agencies shall install automated energy metering tools and shall use these to collect and report to OMB energy usage data in their data centers*	A key feature of DCIM software is automated energy metering of devices from servers to power strips. Top DCIM providers can monitor power gear to the outlet or breaker level.
	OMB will monitor the energy efficiency of data centers through a Power Usage Effectiveness (PUE) metric	DCIM software allows users to gauge and visualize PUE within a specific cabinet or aggregate across the entire data center. Top DCIM providers are able to show PUE ratings over-time, providing users a clearer indication of their power usage effectiveness as a whole.
	Agency CIOs are required to ensure that existing tiered data centers achieve and maintain a PUE of less than 1.5 by September 30, 2018. Effective immediately, all new data centers must implement advanced energy metering and be designed and operated to maintain a PUE no greater than 1.4, and are encouraged to be designed and operated to achieve a PUE no greater than 1.2	DCIM software is the only solution that can expose the critical information required in order to calculate stand-alone or aggregate PUE ratings. DCIM software will equip data center stakeholders with the information they need to make decisions that will reach or exceed the expressed PUE goals.

[4] https://datacenters.cio.gov/optimization/

DCOI Section	Excerpt from DCOI Mandate	DCIM Relevance
AUTOMATED INFRASTRUCTURE MANAGEMENT	*Agencies shall replace manual collections and reporting of systems, software, and hardware inventory housed within data centers with automated monitoring, inventory, and management tools (e.g., **data center infrastructure management - DCIM**) by the end of fiscal year 2018. These tools shall provide the capability to, at a minimum, measure progress toward the server utilization and virtualization metrics defined in the Metric Target Values section of this memorandum*	In order for inadequate data center optimization to be reversed, manual methods must be replaced with automated methods. **The federal government explicitly outlines the use of DCIM software to automate how devices are inventoried and managed.** Top DCIM software offers device level and warranty management functions, providing users the opportunity to house all relevant information related to the device within the DCIM platform. Additionally, work-order management features provide assistance when new devices are needed for moves, adds, or changes.
GOALS	*Energy Metering*	DCIM software is the only solution that provides adequate energy metering in an automated and scalable fashion.
	PUE	DCIM can calculate PUE in stand-alone or aggregate measurements.
	Server Utilization & Automated Monitoring	DCIM software provides graphical user interfaces to manage all devices within a data cabinet, in addition to reporting, alerting and monitoring all devices real-time
	Facility Utilization	DCIM software provides full-scale reporting, alerting and monitoring relative to a data center's "white space" and the impact the data center is having on the local environment.
COMPLIANCE MEASUREMENT	*Agencies must include progress toward meeting all optimization metric target values*	DCIM software is the ultimate tool to create aggregate reports over time, that show progress and that can predict future outcomes based on historical data and trends.
ANNUAL STRATEGIC PLAN	*Planned and achieved performance levels for each optimization metric, by year*	DCIM software will help federal agencies create a roadmap towards achieving the DCOI's objectives through DCIM's ability to expose information within the data center that will make federal stakeholders' compliance to this mandate possible. DCIM software cannot achieve the objectives of this mandate as a stand-alone product or service. It must be properly leveraged by federal data center stakeholders through partnering with a DCIM provider that not only has software expertise, **but the ability to ensure successful implementation and training for DCIM users and key stakeholders.**
	A description of the steps the agency is taking or will take to achieve its future planned performance levels and closure goals	
	Year-by-year calculations of target and actual agency-wide spending and cost savings on data centers from FY2016-FY2018, including the following:	
	A description of any initial costs for data center consolidation and optimization; and Life cycle cost savings and other improvements (including those beyond FY2018, if applicable)	DCIM software provides invaluable insight into data center management costs associated with analysis of physical devices, power consumption, & data center personnel. DCIM also provides insight into capacity planning and risk management functions that can outline current and projected cost impacts based on achieving data center optimization targets.
	Historical costs and cost savings and cost avoidances due to data center consolidation and optimization through	DCIM software can provide the reporting requirements necessary to fulfill the objectives of this mandate. Reports can be generated based off granular information in addition to

DCOI Section	Excerpt from DCOI Mandate	DCIM Relevance
	FY2015; and a statement from the agency CIO stating whether the agency has complied with all reporting requirements in this memorandum and the data center requirements of FITARA.	executive reporting dashboards, providing at-a-glance representations of data center operations.

CONCLUSION

The federal government's DCOI mandate was originally conceived with the idea to *"promote the use of Green IT by reducing the overall energy and real estate footprint of government data centers, reduce the cost of data center hardware, software and operations, increase the overall IT security posture of the Federal government, and shift IT investments to more efficient computing platforms and technologies."* Simply put – data center optimization was the goal.

Optimization means that a data center's overall efficiency, reliability, cost-effectiveness and environmental sustainability attributes are at peak performance. For many data centers, peak performance is only possible through utilizing an intelligent and comprehensive DCIM software solution.

- DCIM software creates **efficiency**, because it helps data center stakeholders select the right devices and create the right processes to fuel efficient operations.
- DCIM software maximizes a data center's **reliability**, through integrating within every device to minimize the risk of stand-alone or aggregate failures.
- DCIM software helps create a **cost-effective** operation, through helping users manage a myriad of variables in order to make well-informed financial decisions.
- DCIM software helps data centers achieve their **environmental sustainability** goals, by providing detailed reporting to help stakeholders make decisions that will reduce power consumption, utility use, and their overall carbon footprint.

DCIM software will continue to evolve with data centers as needs change and new requirements are revealed. Regardless of the speed of technology advancements, DCIM software is, and will continue to be, essential to helping data centers manage and protect *mission critical information*.

ABOUT NORLINX SYSTEMS

Easy to deploy, use and maintain, NORLINX's Global Site Management™ Software offers DCIM solutions from basic level to advanced level enterprise requirements. Through GSM's capacity planning, risk mitigation and data center management solutions, we are committed to delivering extensive value to our clients.

Norlinx places emphasis on innovating the best solutions that are not only efficient, but reliable as well. We ensure the continuity of our clients' mission critical Data Center operations while reducing their TCO (Total Cost of Ownership). Norlinx's portfolio covers a broad array of DCIM solutions with a complete range of data center services. Please contact us through our website at www.norlinx.com or reach our VP of Sales, Brennan Farrell, direct at bfarrell@norlinx.com.