The Data That Builds Datacenters

By Dr. Heather Moore & Phil Nimmo

Data is the new oil – like oil, data is extracted, refined, stored, and transported to help people work smarter and live better. With rapid advancements in technology and the rise of AI, datacenters are in demand more than ever.

This creates a self-fulfilling prophecy within the construction industry: The more we use data to build, the *faster, better,* and more *cost-effectively* datacenters can be delivered.

Drawing on MCA, Inc.'s experience supporting the planning, measurement, and tracking of more than a dozen datacenter projects since 2005, this article outlines data management strategies that can enable successful datacenter construction.

WHY DATACENTERS REQUIRE A UNIQUE APPROACH

Ask a contractor how to accelerate a project, and they'll say, "Add more labor." Ask a trade contractor how to improve quality, and they'll say, "Give me more time." But neither approach reduces cost.

Instead, success in datacenter construction hinges on the synchronized management of work, effort, and time[1] – across and within trades – to meet aggressive, customer-driven timelines.

After studying construction productivity trends for over two decades, Dr. Perry Daneshgari recognized that tracking work, effort, and time is convoluted in daily operations. To clarify their individual impact, he has advocated for tracking them separately, as each has distinct units of measurement.

TIME IS A FEATURE OF THE PRODUCT

While technology companies continue to demand more datacenters, the time-to-market of the infrastructure is as critical as its technical complexity. Ongoing changes in datacenter technology cause these megaprojects to start and stop, placing significant pressure on schedules and labor.

When projects pause but end dates remain fixed, teams are forced to complete more work in less time – driving up the demand for labor. At the same time, supply chain issues and design changes complicate material and equipment procurement, adding further challenges to already compressed schedules.

SCHEDULE MANAGEMENT & EXTERNALIZING WORK

Given these pressures, schedule management becomes essential – not only to define the project timeline, but to also allocate labor and materials effectively. A datacenter may require hundreds of electricians at peak, but with proper modeling and Externalizing Work®, at least half of the scope can be completed offsite, where productivity is typically higher and scheduling constraints are reduced.

With persistent labor shortages, sourcing skilled local labor is increasingly difficult. As a result, datacenter projects often rely on traveling labor – crews who may be unfamiliar with local conditions or company practices – leading to reduced productivity and heightened risk.

WHAT DATA IS NEEDED

Datacenters must be approached as standalone ecosystems. While strong financial controls, planning, and tracking are foundational, the scale and complexity of these builds require more effort than the average project.

The process begins before the job is awarded – during estimating – and includes monitoring the project's impact on backlog. For many contractors, a single datacenter can represent more than half of their annual volume, requiring planning months in advance for the management of labor, material, and cash flow.

Without clear visibility into the pipeline and backlog (Exhibit 1), planning is often reactive – jeopardizing the company's ability to deliver on time and within budget.

PLANNING WITH WORK BREAKDOWN STRUCTURES

Knowing what lies ahead allows participating contractors to plan, acknowledge, and manage the large amount of ambiguity associated with the constant changes in design and contracts for these large jobs.

A work breakdown structure (WBS) is an essential planning process for datacenter projects. Structuring the work and deliverables is more complicated than it may be for most projects, especially when multiple contractors are working together within the same trade. Attention is needed at both the top layers of the WBS to plan the structure and at the bottom layer, where the work and activities are identified.

Very often, the work itself is repeatable across various data halls or colocation centers, but the effort involved in each one could be slightly different. Importantly, the WBS is developed independently from the estimate, as the plan for the work needs to represent the knowledge and experience of the foreperson/field lead responsible for the build.[2]

Contractors should expect that a qualified field lead may spend several days – or even weeks – developing the WBS. According to MCA, Inc.'s data, every hour spent planning can yield up to 17 hours saved in the field, assuming the plan is followed.[3]

USING THE WBS & SCHEDULING FOR LABOR PLANNING

With the WBS complete, work and effort can be planned and linked with the overall project schedule to see how this work fits in with respect to time and resources. Many contractors develop a "resource loading plan" based on input from the field team – often relying on gut feel rather than actual data.

By integrating the WBS with the schedule, contractors can generate a labor projection based on network logic – grounded in data rather than assumptions. The projection should also be studied to flatten the labor curve by Externalizing Work®, using prefabrication and vendor support for logistics and material handling.

Conflicts in the schedule should be raised to the GC or other contractors; for example, if the schedule shows sequencing that will lead to trade stacking or peak labor that is simply not available, it's best to raise these concerns early and discuss alternatives.

BASELINES & PRODUCTIVITY MEASUREMENT

Once work, effort, and time are planned, this "expectation" is locked in as a baseline for measurement. In the schedule, the baseline must be set to measure changes and their impacts on time and resources.

For the work and effort, a labor productivity reference point is set, against which progress and changes are measured. Contractors should apply ASTM E2691, the Job Productivity Measurement standard, to track productivity and identify obstacles.[4]

This is done for each contractor and can be rolled up across multiple contractors for visibility on the entire job's progress.

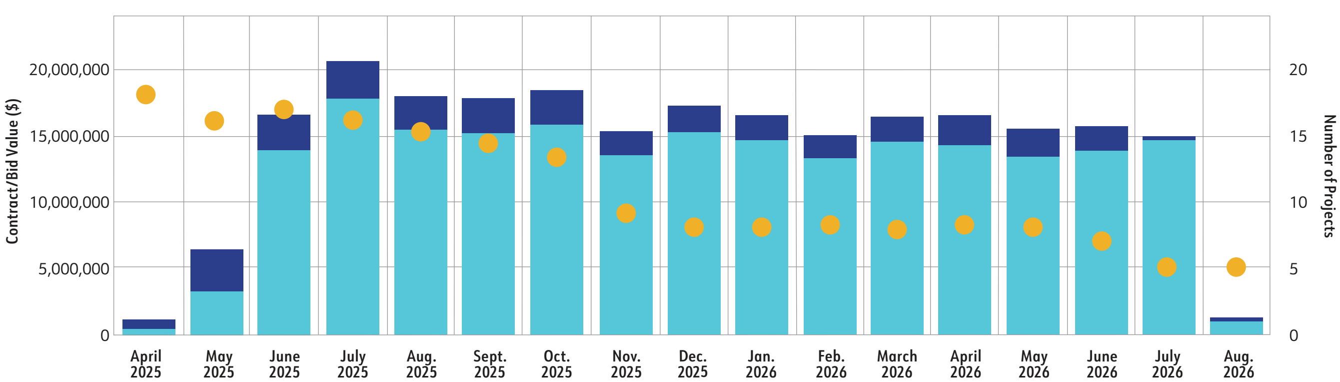
LOGISTICS & LABOR CHALLENGES

Labor is the biggest variable for trade contractors, especially with the transient

Exhibit 1: Visible Pipeline & Backlog

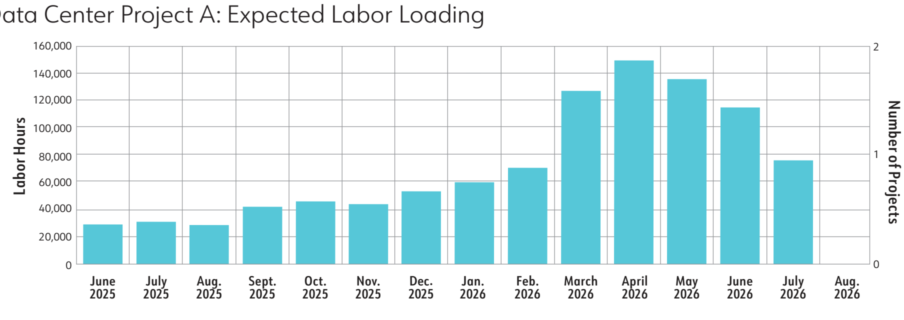
Subsidiary: All; Division: All; Project: All; Time: (4/28/2025 – All); Output: Contract/Bid Value

Company-Wide Pipeline & Backlog, Showing Impact & Timing of Data Center Project A



Data Center Project A: Expected Labor Loading

Subsidiary: All; Division: All; Project: Data Center Project A; Time: (4/28/2025 – All); Output: Labor Hours



workforce typically required for projects of this scale. While monitoring their productivity, progress, and obstacles happens using ASTM E2691, a plan for material logistics is also essential on datacenter projects.

With an already tight window for procurement (driven by ongoing changes and late decisions in equipment requirements), the plan for work, effort, and time should incorporate how material and equipment will get to the install location.

A comprehensive material logistics strategy should be integrated into both the project schedule and progress tracking systems.[5]

DATA MANAGEMENT STRATEGY

The planning and measurement methods discussed previously form the foundation for effective data use in datacenter construction.

In addition, datacenter projects require a broader data management strategy that addresses conditions beyond typical project operations. This strategy should include developing:

- Roles and responsibilities for data collection, reporting, and analyzing
- Common measurement methods (including what is listed previously)
- Common codifications and structures
- Clear processes for change management
- Plans for a data-driven feedback loop to the GC and customer (what will be feedback, how, and with what frequency)

Because of their size, speed, and risk profile, datacenter projects frequently involve unique contracting structures to spread the risk, share bonding capacity, and fulfill labor needs.

Most datacenter projects have several electrical and mechanical contractors involved, which may be contracted as:

1. One subcontractor takes the lead and uses labor from other local contractors, typically on a time and materials basis

2. One subcontractor takes the lead and subcontracts out scopes of work to others

3. Subcontractors create a joint venture that is directly procured

4. Subcontractors are separately procured and managed by a GC or construction manager

Each of these structures brings its own contract management risk and challenges the data management needed to build datacenters.

If a single contractor is managing a single scope of work, then they would use their own processes to plan, track, measure, and report on the progress.

However, when multiple contractors are involved, the result is often disparate accounting, cost coding, labor coding, and reporting mechanisms; industry codification standards do not exist at levels lower than MasterFormat/UNIFORMAT II levels.

Some GCs and construction managers have attempted to solve this by adding a project-specific reporting structure, which seems like it should help bring common data about the project.

In practice, however, these efforts often backfire; it requires additional reporting and resources to do that reporting, with poor data quality.

CASE STUDIES

Case 1: Digitalization, Commonization & Interconnection® in 2005

In 2005, when datacenters were in their infancy, the previous data and strategy were employed on a $120 million electrical scope that required a peak workforce of approximately 370 electricians.

The electrical contractor subcontracted five other electrical contractors with specific scopes of work and used a Work Environment Management (WEM®) system to collaboratively plan the work through a unified WBS and cross-referenced labor codes across the other electrical contractors.

Exhibit 2: Datacenter Electrical Scope Breakdown to Feed the WBS

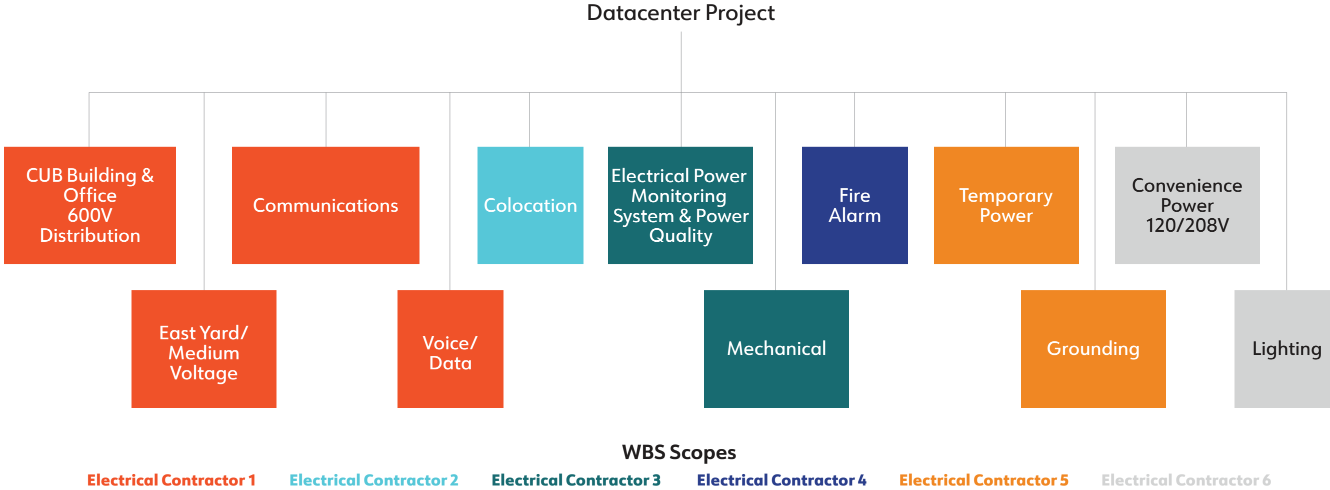


Exhibit 3: Common Productivity Tracking: Productivity Trends Per Electrical Contractor & Overall Project

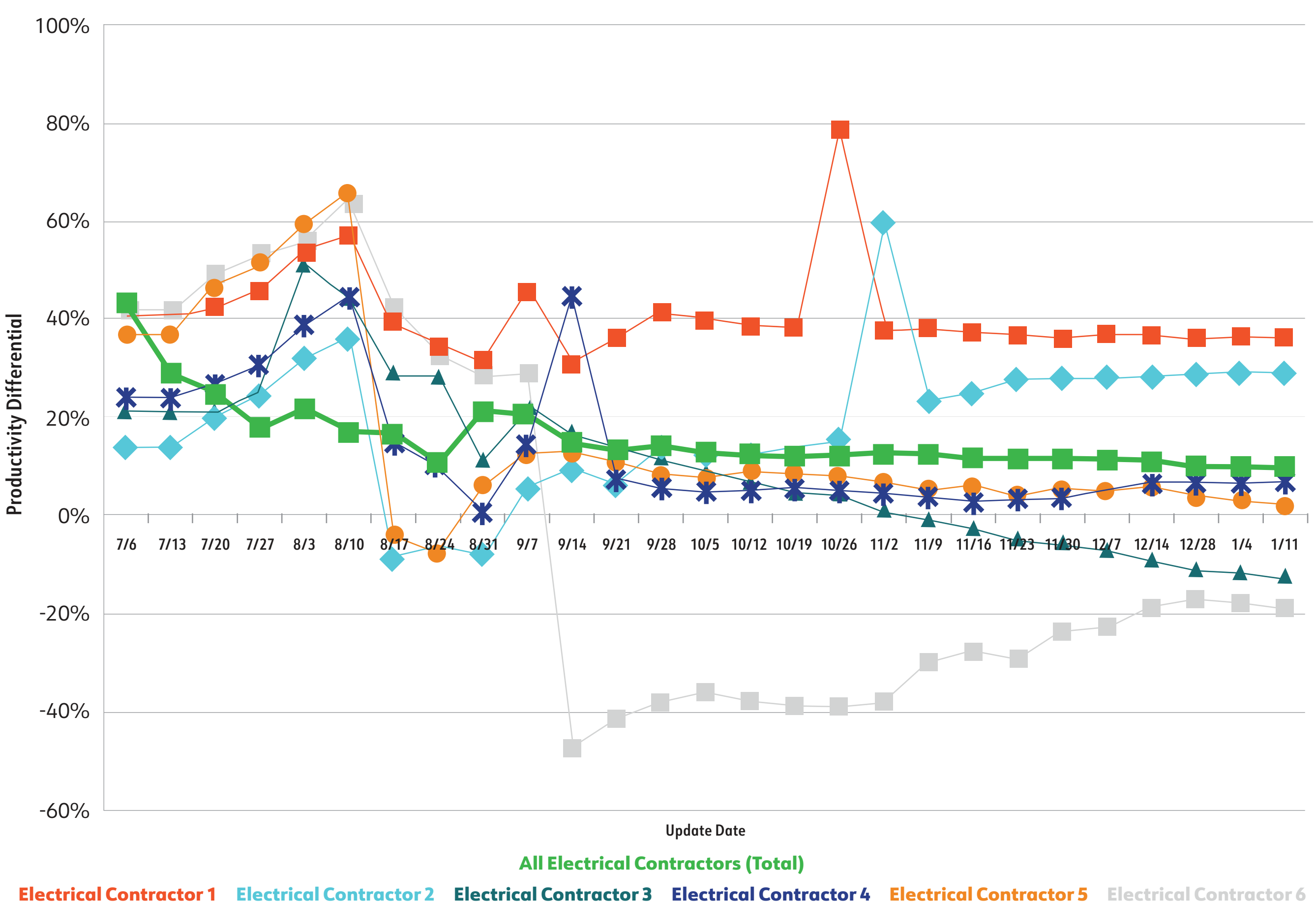


Exhibit 2 shows how the scopes were reviewed and broken down using a WBS to clarify gaps and overlaps.

All of the electrical contractors used JPAC® and SIS® to track progress, fulfill billing requirements by forecasting percent complete, and identify obstacles (see Exhibit 3 as a sample output, coinciding with ASTM E2691).

The project also had a relatively novel challenge: owner-purchased equipment, which led to some obstacles for the electrical contractors. These were captured, quantified, and reported (Exhibit 4).

The project was successful across all key metrics – completed on time, under budget, and with all six contractors reporting profitability.

Case 2: Digitalization, Commonization & Interconnection® in 2025

In 2025, a tech giant embarks on phase two of the world's first AI datacenter, facing daily changes to the technology involved. It is nearly 10 times the size of the 2005 project.

In this project, two electrical contractors teamed up, representing a subset of the original 2005 team, to commonly measure the job. Despite each having its own methods, the following steps were implemented to align and optimize performance:

• *Digitalize:* A WBS was created, linking work and effort with the project schedule

• *Commonize:* Both contractors' labor codes were mapped into a unified structure, enabling joint productivity tracking without requiring either party to adopt a new platform

• *Interconnect:* Data was exported from one contractor's rigid internal system and translated it into a format compatible with JPAC® and SIS®

Although the job is just approaching 50% completion, productivity has been trending positive in JPAC® for about two months, driven by reduced obstacles and real-time crew feedback captured in SIS®. This data about the build is now informing AI-based models to optimize work, effort, and time for future phases and similar large-scale builds.

Case 3: The Opportunity & Unmet Needs of Datacenter Consumers

With 20 years of time between case studies 1 and 2, MCA, Inc. has experienced several jobs with opportunities to build better with data.

Even though many of these jobs have been profitable and elevated the parties involved to a new scale of projects, several projects have experienced profit fade, back charges, and liquidated damages, all due to lack of data to model and lead the build process.

Here are a few examples:

1. A datacenter in the Midwest, requiring local skilled trades, that did not allow utilization of the contractor's remote prefabrication facility, plus avoided learning and using the methods mentioned previously (WBS, productivity, and obstacle tracking and measurement). The project ended up running 20% less productive than planned, resulting in a 50% labor cost overrun from the estimate.

2. A trade contractor highly familiar and successful with datacenter builds that ran into limitations with the logistics to get the volume of prefabrication and material needed to several datacenter projects across the country simultaneously. Despite success with its vendor partner to supply to datacenters for years, the datacenter work between them would plateau and ultimately erode margins of both the contractor and vendor due to the waste in material logistics.[6]

3. Due to lack of workforce power, significant labor cost markup masking the waste and visibility to the work that led to a windfall savings, but unnecessary cost for the consumer.

These gaps are often hidden in current datacenter projects, due to buffer in contract structures and the urgency to fill the hyperscaling market with material and workforce power at any cost to get the job done fast.

Just like the expansion of power plants after World War II and the race to electrify the U.S. over a century ago, the race to store and use data significantly escalated with the growth of AI, bringing a bubble that allows for waste, unnecessary cost, and other risks. The only way out is with data.

Once the urgency of the hypermarket depletes, margins will deplete and waste reduction will no longer be a luxury or a choice.

CONCLUSION

Effective datacenter construction is impossible without data-driven planning, rigorous measurement, and structured execution of work, effort, and time. If data is indeed the new oil, then megaprojects like datacenters demand a robust strategy to refine, apply, and distribute that resource across every phase of the build.

Datacenter projects frequently engage multiple trade contractors, each with their own accounting systems and operating models. Without a unified data strategy – defined early and reinforced often – these projects risk misalignment, inefficiency, and spiraling costs. The smartest teams know that whoever manages the data, manages the outcome.

As technology continues to evolve at breakneck speed – especially with the rise of AI – datacenter builds will only grow more complex, compressed, and consequential.

At the same time, contractors now have the opportunity to harness AI themselves – to model labor needs, predict material flow, and track productivity in real time.

When applied early and with intention, these models empower teams to make better decisions before the first shovel hits the ground – delivering datacenters faster, smarter, and with far less risk. **BP**

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Endnotes

1. *Moore, Dr. Heather & Nimmo, Phil. "Orchestrating Success: Connecting Work, Effort & Time." CFMA Building Profits. March/April 2024. www.cfmabponline.net/cfmabp/library/item/03042024/4191525.*
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6. *Daneshgari, Dr. Perry & Moore, Dr. Heather. "Connecting the Dots: AI & the Future of Construction." CFMA Building Profits. January/February 2024. www.cfmabponline.net/cfmabp/library/item/01022024/4172513.*

Exhibit 4: Obstacles Tracked by Subcontractor