VISILEAN
Construction, simplified

Rethinking Data Centre Construction

With Smarter Systems

www.visilean.com

Introduction

Deloitte reports a 10% rise in the construction industry's nominal value and a 12% increase in gross output for 2024. A significant part of this growth is driven by data centre construction. In fact, in 2023, the global data centre construction market was worth USD 225.33 billion and is expected to grow by 7.6% each year from 2024 to 2030.

With this growth comes an opportunity for stakeholders to streamline their construction processes and fully capitalise on the potential. Deloitte highlights technology adoption as a solution to industry challenges, focusing on better planning, waste reduction, and more efficient workflow management.

As a part of our series of quarterly industry reports, this report will analyse how adopting technology and industry best practices can help firms to achieve higher productivity in the construction of cutting-edge data centres.

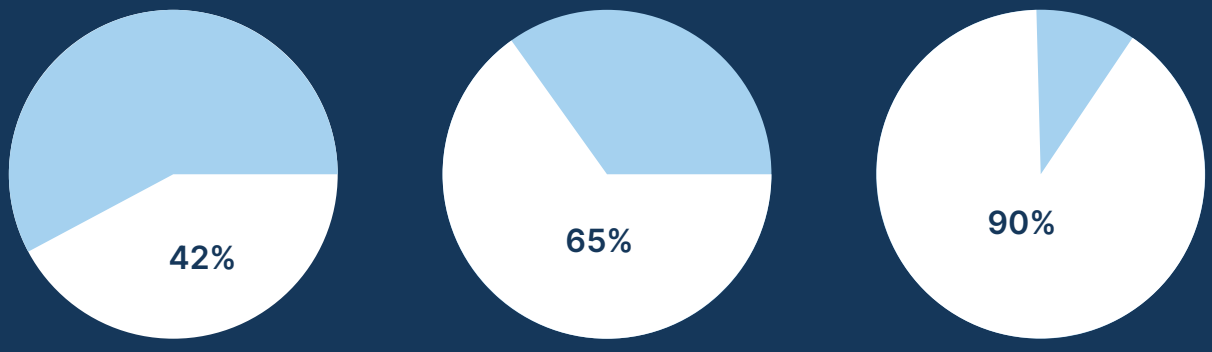
Global Overview of Data Centre Construction Industry

The global demand for data centres is projected to triple by 2030, and several key factors are driving this change. A major reason is the rapid increase in the amount of data being created. With the rise of smart devices, the 5G networks, and innovative technologies like artificial intelligence & Internet of Things, data storage requirements are shooting up.

Investors also see data centres as a highly profitable investment option due to the steady and reliable income stream. In the United States alone, the value of data centre deals has exploded from $34 billion to $48 billion in between 2020-21, marking a 40% increase in just one year.

Needless to say, private firms have been a big part of this growth. Between 2015 and 2018, private equity accounted for 42% of the money spent on data centres. Interestingly, between 2019 and 2021, its share grew to 65%, and by the first half of 2022, it contributed to more than 90% of the total investment value.

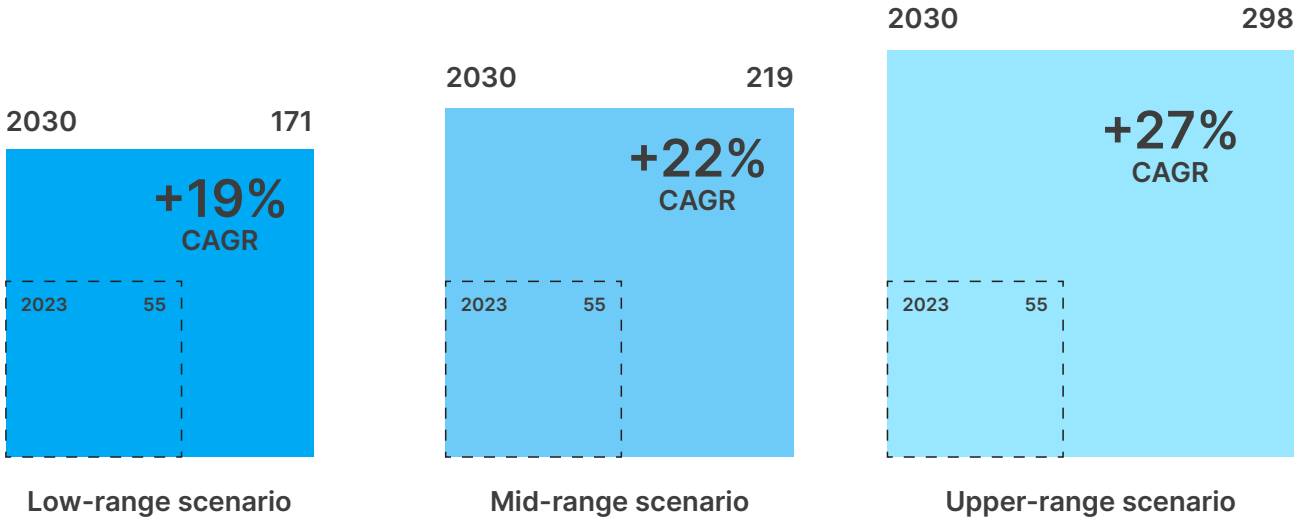
Private Equity's Growing Stake in Data Centres



A Gap Between Demand and Supply of Data Centres

Despite growing interest from private investors and governments, the current data centre demand remains insufficient to meet rising requirements. From 2023 to 2030, demand is projected to increase by 19-22% annually, potentially reaching 171-219 gigawatts (GW) per year by 2030. It could even surge by up to 27% each year in a faster growth scenario, reaching 298 GW.

Currently, demand stands at just 60 GW, underscoring a significant gap between existing demand and future requirements. To meet future needs, the industry will need to build more than twice as much capacity as it has since 2000—and achieve it in less than a quarter of the time it took before.



Source credit: McKinsey & Company

Regional Analysis for the UK and Europe

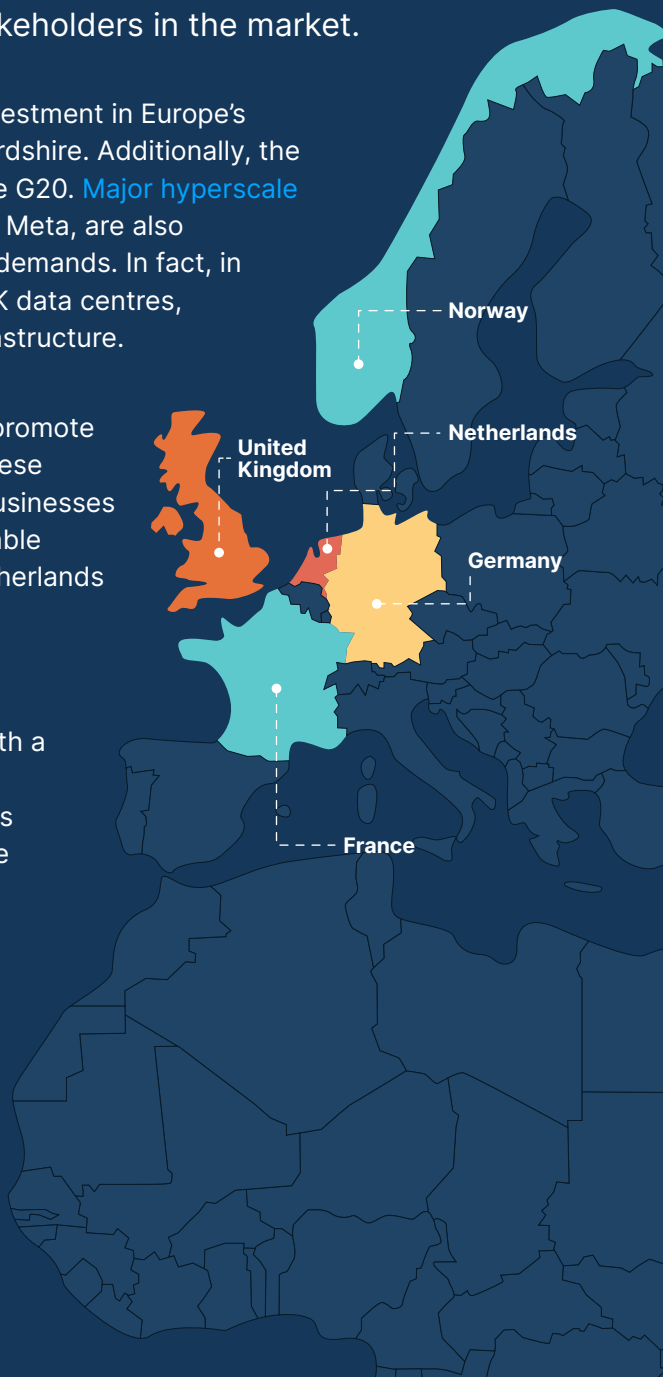
The European data centre market was valued at $54.5 billion in 2023 and is projected to grow to $133.69 billion by 2029 with a CAGR of 6.09%. Governments across Europe are implementing initiatives to increase data centre construction, creating lucrative opportunities for stakeholders in the market.

United Kingdom: The UK government is making a £4 billion investment in Europe's largest data centre, which aims to create 14,000 jobs in Hertfordshire. Additionally, the proposal includes a corporate tax rate of 20%, the lowest in the G20. Major hyperscale cloud providers, including AWS, Google, Microsoft, Oracle, and Meta, are also expanding their service capabilities to meet growing business demands. In fact, in March 2022, AWS announced a $2.3 billion investment in its UK data centres, highlighting the increasing demand for cloud services and infrastructure.

Netherlands: The Netherlands has implemented policies that promote the development of energy-efficient, modular data centres. These policies aim to reduce environmental impact by encouraging businesses to adopt sustainable practices. The focus is on utilising renewable energy sources and reducing carbon footprint, making the Netherlands a leading example of sustainability in the data centre sector.

Germany: The government in Germany is offering lucrative incentives to lead Europe's data centre construction sector. With a projected growth of over $12.24 billion by 2029, Germany is positioning itself as a key hub for sustainable data centres. This growth is driven by strong governmental support for renewable energy solutions and eco-friendly initiatives.

France: France offers substantial tax breaks for research and development (R&D), up to 30%, and provides reduced electricity taxes. These incentives make it attractive for companies to invest in data centre infrastructure, particularly those focusing on innovative, sustainable technologies. The government's support for R&D fosters growth in green infrastructure projects.



Challenges in Data Centre Construction

Constructing data centres is a highly intricate process that demands precision, scalability, and seamless coordination between multiple teams. Relying on conventional methods often results in inefficiencies, communication gaps, and delays, making it challenging to meet the rigorous demands of modern projects.

Multifaceted project management: Managing a data centre construction project is complex because it involves multiple stakeholders at every stage. Building a data storage facility requires advanced systems for power, cooling, and servers. Ensuring that these components work together effectively demands careful planning, clear designs, and the necessary technical skills to avoid mistakes and delays.

Miscommunication and lack of clarity: Miscommunication is a major challenge in data centre construction, leading to costly delays and rework. Unclear instructions or misaligned teams can disrupt progress. By ensuring effective communication, projects run smoother, reducing errors and keeping timelines and budgets on track.

Timeline adherence: Delays can happen with multiple tasks to be completed within a tight deadline. Bad weather, equipment shortages, or changes in design can push back deadlines. Additionally, data centre projects often have to meet strict requirements, such as ensuring enough power and cooling capacity for future growth. If any part of the process gets delayed, it can affect the whole project, making it harder to meet deadlines.

Unpredictable supply chain: Data centre construction projects face significant logistical challenges, particularly due to delays in the delivery and installation of system equipment. These delays can result in costly errors and disrupt project timelines. Additionally, the installation of system equipment in data centre construction is highly interdependent. For example, mechanical components cannot be installed without first ensuring the electrical components are in place. Delays in one component can have a ripple effect, slowing down the entire project and leading to inefficiencies, increased costs, and extended timelines.

Transforming Data Centre Projects using Lean Construction Technology

The rapid growth of data centre construction is pushing firms to adopt new technologies and Lean tools to manage complexities better, boost efficiency, and deliver high-quality projects. As demand for data centres continues to rise, construction companies increasingly turn to innovative solutions to enhance collaboration, improve workflows, and reduce risks.

Lean-based Planning & Execution: Construction firms can enhance their planning processes by integrating digital platforms that support Lean methodologies such as Takt planning, collaborative planning and more. These tools replace outdated approaches like static Excel-based planning, facilitating real-time scheduling and enhanced visual management. Additionally, by consistently tracking metrics such as Planned Percent Complete (PPC) and analysing project performance in real time, teams can minimise disruptions and maintain project momentum.

Constraint Management: Constraint management is a crucial aspect of data centre construction projects. It helps identify and address any blockade that can hinder the project's execution. Digital tools offer dedicated constraint management modules that enable teams to flag the absence of resources and discuss during the lookahead meetings to ensure a constraint-free execution in the upcoming weeks.

Efficient Workforce Management: Workforce management requires a make-ready process to ensure resources are fully prepared for specific task execution. Digital platforms simplify make-ready planning by providing real-time visibility into resource availability, task dependencies, and upcoming constraints. This approach enables teams to allocate the workforce effectively, minimise downtime, and ensure seamless task handovers, ultimately enhancing productivity and keeping projects on schedule.

Real-time Visualisation: Digital platforms with BIM integration are transforming data centre construction by improving precision and project control. These tools provide 4D solutions, incorporating the time aspect into 3D models, allowing teams to visualise project timelines, track progress, and simulate construction sequences. This enhances coordination, reduces clashes, and mitigates delays.

About VisiLean

VisiLean is one of the key enablers of technology in the construction industry, bridging the gap between industry practitioners and researchers. Our robust platform is used for various construction projects, including commercial, residential, data centres and more. Let’s walk you through how we implemented our expertise in previous data centre construction projects and delivered exceptional results.

Our Expertise

VisiLean is a powerful construction management tool that makes the delivery of data centre projects easier. With VisiLean, teams can plan, schedule tasks, and track progress in real-time. The easy-to-use interface gives a clear and organised view of tasks, helping teams efficiently prioritise and plan the next steps.

For complex data centre projects, lookahead planning is crucial to staying on schedule and avoiding delays. VisiLean makes this process easy and efficient, even for those unfamiliar with Lean construction methods. Lookahead planning focuses on tasks for the next 3 to 6 weeks. During weekly lookahead meetings, teams commit to tasks, identify potential issues (like material shortages or resource conflicts), and fix them before work starts.

For example, in data centre projects, tasks like setting up the structure, installing electrical systems, and fitting cooling equipment need careful coordination. Lookahead planning helps break these tasks into smaller steps, ensuring resources are available and problems are solved beforehand. This keeps the project running smoothly and ensures that all team members clearly understand their responsibilities.

Collaborative Planning in VisiLean

In VisiLean, collaborative planning is simplified through its intuitive digital tools:

Task Breakdown: Teams can break down larger tasks like installing electrical systems into smaller, actionable activities like laying cables, installing circuit breakers, or setting up power backup units. These tasks are displayed on an easy-to-understand timeline, as sticky notes or in Gantt chart, providing clear visibility into the upcoming work for 3 to 6 weeks.

Work Preparation: VisiLean allows teams to assign specific owners, locations, and trades to each activity, with a clear definition of the work quantity and the planned workforce needed to complete it. Real-time resource tracking ensures that any potential conflicts, such as delays in equipment delivery or labour shortages, are flagged early so teams can resolve them proactively.

Constraint Management: Teams can use VisiLean's collaborative platform to identify and document issues, such as material shortages or safety concerns, directly within the software. Issues are tagged to specific tasks, ensuring they are addressed and resolved before work begins.

Commitment Tracking: During Lookahead meetings, team members commit to their specific tasks. VisiLean makes it easy to monitor these commitments with clear indicators of progress, delays, or incomplete tasks. This promotes accountability and helps project managers identify bottlenecks quickly.

Dynamic Planning: If plans change due to unforeseen delays, VisiLean's custom functionality allows teams to adjust task schedules easily. Real-time updates ensure that all team members are notified of changes, preventing confusion and miscommunication.

Simplifying Commissioning and Handovers

Commissioning is a critical part of data centre construction. It requires detailed documentation to perform a systematic and comprehensive testing and verification process.

At VisiLean, we have not just simplified the construction planning and execution, but we have also made quality checks and assurance easy. Here's how VisiLean helps you at every stage of data centre commissioning:

Planning & Documentation: Data centre projects need precision and compliance at every stage. VisiLean's modular planning approach enables structured, phase-wise documentation, ensuring seamless quality checks while maintaining a comprehensive digital record for future audits and operational reference.

Systematic Testing & Validation: From Pre-Functional Testing (PFT) to Integrated Systems Testing (IST), VisiLean ensures strict adherence to quality and compliance standards. With dynamic checklists and real-time progress tracking, teams can eliminate bottlenecks and ensure that no critical test is overlooked.

Collaborative Planning: Data centre commissioning requires coordination between multiple teams—MEP, IT infrastructure, security, and operations. VisiLean's collaborative planning tools bring all stakeholders onto a single platform, optimising scheduling, reducing delays, and ensuring a seamless handover.

Case Studies

DPF Campus Frankfurt, Germany

Digital Realty (DLR), a leading data centre solutions provider worldwide, needed a streamlined approach to manage its rapidly growing portfolio while maintaining efficient scheduling, seamless collaboration, and clear trade responsibilities.

The complexities of large-scale construction projects highlighted the need for an integrated management system. To overcome these challenges and enhance efficiency, DLR partnered with VisiLean, leveraging its advanced construction management platform to optimise workflows and scale its data centre projects to the next level.

Outcomes

The implementation of VisiLean on the Digital Park Fechenheim (DPF) Campus significantly improved planning, execution, and control processes.

The key benefits observed include:

01. Enhanced Communication: Simplified task updates for workers and improved reporting for QA/QC teams.

02. Digital Collaboration: A shift from manual/conventional operational planning to a more structured and efficient approach through digital tools with connected data.

03. Improved Coordination: Seamless communication between DLR, Construction Managers (CM), and General Contractors (GCs), ensuring alignment across project milestones.

04. Increased Visibility: Weekly progress updates allowed teams to proactively identify and mitigate issues rather than reacting to delays.

05. Prioritising Safety: VisiLean is used to track high-risk activities for each task, which has greatly improved the Daily Activity Briefings (DABs) meetings. This has also helped in specifying activity types and coordinating logistics among all contractors on-site.

Results

- **60% Time Savings:** Weekly update processes reduced from 15-22 hours to 5-8 hours
- **Automated Reporting:** Reports that previously took 8-12 hours to compile are now automatically generated via Power BI.
- **Implemented a 12-Week, 3-Pronged Approach**, focusing on planning, execution, and control, ensuring the seamless transition to a data-driven decision-making process.
- **Weekly Progress Reviews Conducted** with each construction manager, leading to improved accountability and proactive planning.

How Did We Achieve This?

The implementation process included several key activities:

- **As-Is Assessment:** Identified strengths such as strong trade relations and acknowledged challenges like lack of detailed constraint analysis and limited visibility.
- **Training and Change Management:** Established a 20-week plan to enhance coordination and productivity.
- **Data Collection & Process Optimisation:** Shifted from fortnightly master schedule updates via email to real-time updates in VisiLean.
- **Training & Adoption:** Conducted multiple training sessions to onboard key stakeholders and ensure full utilisation of VisiLean's capabilities.

Status Today

After the comprehensive training sessions:

- **DLR's construction managers are now independently updating tasks and constraints in VisiLean.**
- **Lookahead planning has transitioned from reactive to proactive**, allowing construction managers to redefine schedules based on on-site feasibility.
- **VisiLean is now the single source of truth** for milestone tracking and constraint management.
- **Weekly progress review meetings** are being conducted with updated dashboards and reports generated from VisiLean.

> The integration of VisiLean into our project workflow has transformed the way we manage our milestones and constraints. The ability to visualise progress and collaborate in real-time has greatly improved efficiency on-site.

- Jaco Liebenberg,
Lead Project Control Manager - Digital Realty (DLR)

Hyper-Data Centre Dublin, Ireland

VisiLean played a critical role in successfully delivering a large-scale modular data centre project. Mace leveraged our platform to overcome the challenges of complex modular construction while adhering to tight schedules and high-quality standards.

The project involved the construction of multiple data halls in phased deliveries, each utilising modular design and off-site production methods. The scope demanded precise coordination across trades and rigorous adherence to Lean principles to ensure timely and defect-free delivery.

Key Achievements

01. Lean Construction Planning:

VisiLean replaced traditional planning methods with a digital platform that empowered the project team to:

- The transition from manual sticky-note planning to dynamic scheduling with real-time updates.
- Implement collaborative planning to improve task coordination and ensure team accountability.
- Maintain a robust workflow by anticipating constraints and resolving them collaboratively.

02. Proactive Risk Management:

Using VisiLean's integrated tools, Mace could identify potential risks. This enabled the team to:

- Address workspace clashes and material delivery constraints well in advance.
- Reduce rework by ensuring all trades are aligned with the production and installation schedules.
- Incorporate continuous feedback loops to adapt plans dynamically as project conditions evolved.

03. Enhanced Progress Tracking:

VisiLean's mobile application enabled real-time updates directly from the site, giving the team instant visibility into task completion and readiness for subsequent activities.

Benefits included:

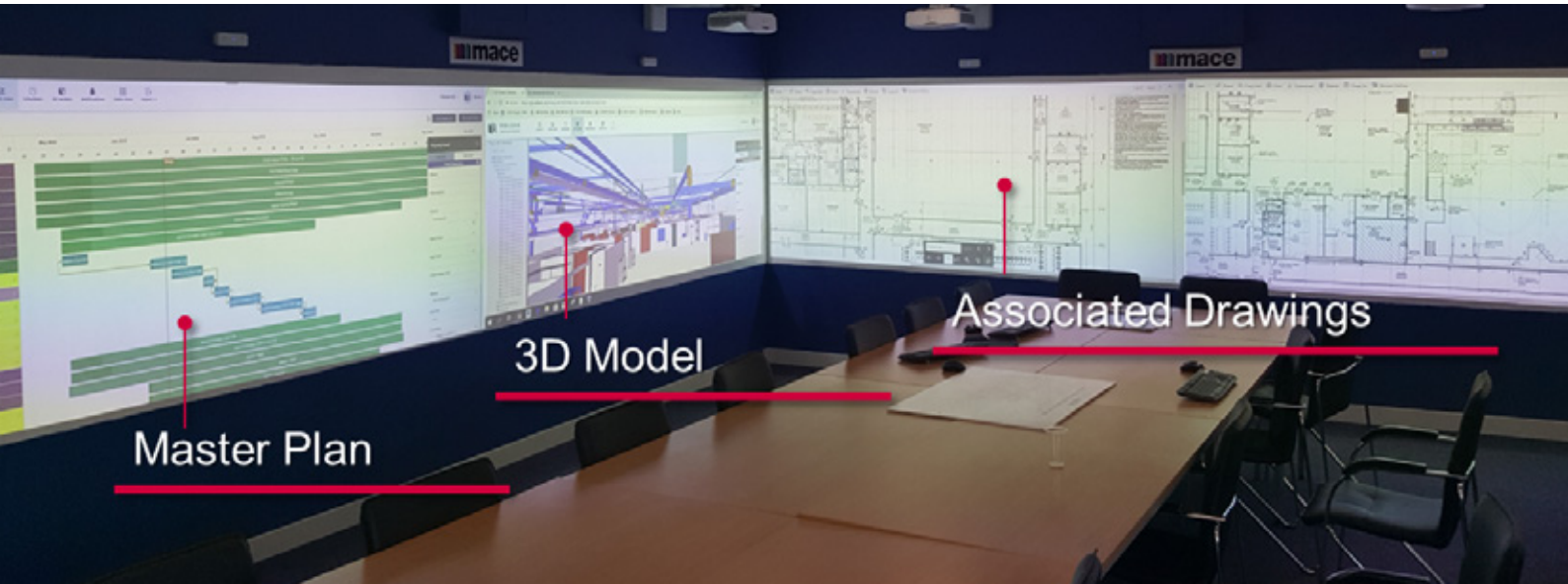
- Eliminating delays caused by miscommunication between trades and supervisors.
- Providing stakeholders with accurate, up-to-the-minute progress reports for informed decision-making.
- Facilitating seamless handovers between modules, leading to faster overall project completion.

Results

The partnership between Mace and VisiLean yielded remarkable results:

- **43% improvement in program efficiency,** achieved through better coordination and reduced idle time.
- **60% reduction in defects,** thanks to proactive risk management and detailed planning.
- **45% reduction in labour costs,** driven by streamlined workflows
- **Enhanced safety,** with a 75% reduction in work-at-height requirements due to modular assembly strategies.

The continuous improvement mindset, supported by real-time data and feedback loops, ensured that the project team delivered each phase more efficiently than the last.



Data Centre Retrofiting San Francisco, USA

In 2019, GRA, a project management consultancy based in Scottsdale, Arizona, was tasked with replacing ten Hitec Power Protection UPS units at a major data centre in central San Francisco. The project involved replacing these units sequentially to ensure uninterrupted business operations, with each replacement cycle initially projected to last four weeks over a year-long duration. However, the project faced significant logistical complexities. The UPS units were in a space-constrained, high-rise facility, requiring crane lifts, street closures, and demolition of structural elements for removal and installation.

Key Achievements

01. Accelerated Installation Cycles

- The first UPS replacement cycle, initially taking 11 weeks, was progressively shortened to just 9-10 weeks by VisiLean's planning capabilities.
- Teams optimised their processes, such as redesigning equipment frames, and used VisiLean's data-driven insights to make real-time adjustments.

02. Enhanced Team Collaboration

- VisiLean facilitated seamless communication and coordination across all the stakeholders, including city authorities, equipment manufacturers, and subcontractors.
- The platform's visual task boards and colour-coded progress tracking fostered accountability, with Planned Percentage Complete (PPC) rates increasing from 30–40% to over 90%.

03. Real-Time Visibility and Predictability

- The project transitioned from weekly to daily schedule precision, significantly enhancing reliability in planning and execution.
- Supply chain management improved, allowing efficient scheduling of specialist personnel and reducing downtime.

04. Cost and Resource Optimisation

- By avoiding delays and improving efficiency, the project saved an estimated $800K–$1.6M in direct labour costs.
- Effective scheduling reduced subcontractors' idle time, improving supply chain relationships and overall productivity.

Outcomes

- **Easy Adoption:** With just 5-10 minutes of daily usage, everyone in the GRA team committed to achieving their colour-coded activities. It boosted the overall efficiency of the project while significantly optimising the cost.
- **Improved Performance:** Early program overruns were mitigated, and the project was back on schedule for completion in late 2021.
- **Stakeholder Confidence:** Transparent scheduling and real-time progress tracking strengthened trust among clients, suppliers, and other stakeholders.
- **Operational Efficiency:** Substantial improvements were made to key performance metrics, such as PPC rates and critical path predictability, enabling proactive decision-making.

Conclusion

The data centre construction industry is experiencing unprecedented growth, driven by the global surge in digital infrastructure demand. As businesses and governments accelerate cloud adoption and AI-driven operations, the need for high-quality, scalable, and efficient data centres has never been greater.

However, delivering mission-critical data centres comes with its own set of challenges—strict timelines, complex commissioning, high energy efficiency standards, and rigorous compliance requirements. To keep up with the demand and overcome challenges, adopting cutting-edge construction technology with integrated project management is crucial. Digital tools not only streamline operations and reduce costs but also enhance project delivery, ensuring more timely, precise, and predictable outcomes.

At VisiLean, we're working on making construction more efficient for our clients. With the combined potential of cloud-based technology and Lean tools, VisiLean gives you more control over your project's workflow. You can plan, execute and track your project's performance using VisiLean with just a few clicks.