CCC 2025 **Proceedings of the Creative Construction Conference** (2025)
Edited by: Miroslaw J. Skibniewski & Miklós Hajdu & Žiga Turk
https://doi.org/10.22260/CCC2025/0016

DELIVERABLE-DRIVEN AGILE MANAGEMENT: A NEW PARADIGM FOR EFFICIENT CONSTRUCTION PROJECT CONTROL

Adel Francis
ÉTS, Quebec University, Montreal, Canada

Abstract

In the field of construction project management, an approach focused on planned activities, such as the one commonly practiced using tools like MS-Project, often limits the flexibility and efficiency of managers. This article proposes a paradigm shift towards management that is centred on deliverables, work packages, and milestones, thus allowing for greater agility in decision-making while adhering to quality, budget, and time constraints. By emphasizing the evaluation of outcomes and performance rather than merely tracking activities, managers can better tailor their strategies to the realities on the ground. The integration of the Last Planner System principles and Lean Construction methodology is also recommended to enhance coordination and efficiency in construction projects. These approaches encourage collaborative planning and waste reduction, promoting smoother and quicker project execution. Furthermore, the use of earned value analysis is highlighted for a more accurate assessment of project performance. Rather than just comparing planned with actual figures, earned value analysis offers a more nuanced perspective by integrating the real added value of the work performed. Finally, the article emphasizes the importance of visual modelling, especially spatiotemporal ones, for project monitoring and management. These tools allow for a clearer and more intuitive visualization of work progress, thus facilitating informed decision-making by managers.

Keywords: agile management, construction, project control, scheduling, spatiotemporal.

Peer-review under responsibility of the scientific committee of the Creative Construction Conference 2025.

1. Deliverable-based planning: A new paradigm

The paper more or less should follow the following structure: Introduction, Literature review, Research goals and objectives (and limitations!!), Methodology, Presentation of the research, presentation of the findings, Discussion.

In the introductory section the problem is presented in a simple and clear manner so that the reader can understand it Traditional construction project planning, often centred on specific activities and individual tasks, can be restrictive and inflexible when faced with the unpredictable challenges that frequently arise on construction sites. Tools like MS Project, which break down projects into numerous isolated tasks, can make tracking progress cumbersome. Comparing each planned activity with its actual execution, as facilitated by tools like MS Project, is a significant error. This approach constrains project managers, limiting their flexibility, agility, and ability to make informed decisions. In contrast, deliverable-based planning offers a transformative approach by focusing on achieving tangible outcomes at each project phase, providing greater adaptability and a more strategic perspective on progress.

Deliverable-based planning shifts the focus from micromanaging individual tasks to prioritizing the completion of key project milestones or deliverables. Instead of rigidly adhering to a predefined sequence of activities, this method allows project managers to concentrate on the results expected at each stage, such as completing a building's foundation, structural framework, or interior fit-out. By emphasizing outcomes, managers gain the flexibility to adjust the sequence of work, reallocate resources, and adapt tasks to meet the project's evolving needs. For instance, rather than fixating on the precise timing of masonry or plumbing tasks, the team can focus on delivering a completed building phase, ensuring that quality, budget, and deadlines are met. This approach fosters a more holistic view

Corresponding author email address: adel.francis@etsmtl.ca

of the project, enabling teams to navigate unforeseen challenges without being bound by a rigid, pre-established schedule.

The advantages of deliverable-based planning are numerous. First, it enhances flexibility. Construction projects are inherently dynamic, with variables like weather, supply chain disruptions, or labour shortages often requiring rapid adjustments. By focusing on deliverables, managers can reorganize tasks and resources as needed, ensuring that the project remains on track without being derailed by minor deviations from the original plan. For example, if a delay in material delivery impacts one task, the team can prioritize other tasks that contribute to the same deliverable, maintaining momentum. This adaptability contrasts sharply with traditional methods, where deviations from the planned sequence can cascade into significant delays.

Second, deliverable-based planning promotes agility and informed decision-making. By evaluating progress based on the completion of deliverables rather than individual tasks, managers can make decisions that align with the project's broader objectives. This approach encourages a results-oriented mindset, where the focus is on achieving measurable outcomes rather than checking off tasks. For instance, completing a building's structural framework on time and within budget becomes the priority, regardless of the specific order in which tasks like concrete pouring or steel erection are completed. This shift allows teams to respond to real-time challenges with creative solutions, fostering a culture of problem-solving and innovation.

Finally, deliverable-based planning simplifies performance evaluation. Traditional methods often measure success by comparing planned versus actual task completion, which can obscure the project's overall progress. In contrast, deliverable-based planning assesses performance based on the quality, efficiency, and timeliness of completed milestones. This results-driven approach provides a clearer picture of project health, enabling stakeholders to gauge success based on tangible outcomes rather than granular task metrics. For example, stakeholders can assess whether a building phase meets quality standards and budgetary constraints, rather than focusing on whether every sub-task was completed as originally scheduled.

In conclusion, deliverable-based planning represents a paradigm shift in construction project management. By prioritizing tangible outcomes over rigid task schedules, this approach offers greater flexibility, agility, and clarity. It empowers project managers to adapt to challenges, make informed decisions, and evaluate performance based on meaningful results. As construction projects grow in complexity, adopting deliverable-based planning can enhance efficiency and ensure successful project delivery.

2. Integration of the Last Planner System and Lean Construction

The Last Planner System (LPS) [1], integrated with the principles of Lean Construction, offers a collaborative methodology that involves all stakeholders in the planning process. The LPS sets out what it should, could and would be doing. This approach significantly reduces waste and improves coordination between different project teams on construction sites. By focusing on short-term planning that takes into account real-world constraints, the LPS streamlines workflows and minimizes disruptions, ensuring smooth project execution.

The principles of Lean Construction aim to maximize customer value while minimizing resource utilization. In construction projects, this translates into streamlined processes, improved communication, and optimized use of materials and labour. For example, Lean methods can reduce material wait times, eliminate redundant tasks, and improve the predictability of delivery times. By fostering a culture of continuous improvement, Lean Construction encourages teams to identify inefficiencies and implement proactive solutions.

The synergy between LPS and Lean Construction lies in their emphasis on collaboration and efficiency. LPS facilitates detailed and reliable planning through tools such as just-in-time scheduling and weekly work plans, ensuring that tasks are only executed when feasible. Meanwhile, Lean principles, such as just-in-time delivery and waste elimination, complement LPS by optimizing resource allocation and reducing non-value-added activities. Together, they create a robust framework for delivering projects on time and within budget, while maintaining high quality.

This integrated approach has been shown to significantly improve project outcomes. By prioritizing stakeholder collaboration and real-time adaptability, LPS and Lean Construction transform traditional construction management into a more efficient and value-driven process.

3. Using earned value for better evaluation

Earned Value Management (EVM) is a powerful technique that enables a more precise assessment of project performance by integrating three key dimensions: actual cost, planned cost, and earned value. Unlike traditional methods that merely compare planned versus actual progress, EVM provides a comprehensive view of a project's efficiency and performance, offering actionable insights for project managers.

By leveraging EVM, managers can accurately determine whether a project is ahead of or behind schedule and whether costs are under control or exceeding the budget. This is achieved by measuring the earned value - the value of work actually completed - against the planned value and actual expenditures. For instance, if the earned value shows that only 50% of the work has been completed while 70% of the budget has been spent, this discrepancy signals a performance issue that demands immediate attention. Such insights allow managers to identify inefficiencies early, enabling timely corrective actions to realign the project with its objectives.

EVM's strength lies in its ability to quantify project progress in monetary terms, making it easier to communicate performance to stakeholders. Metrics like Cost Performance Index (CPI) and Schedule Performance Index (SPI) further enhance decision-making by providing clear indicators of cost efficiency and schedule adherence. By regularly analysing these metrics, project teams can proactively address risks, optimize resource allocation, and improve forecasting accuracy.

The Earned Value Method (EVM) is widely used for project management but faces challenges in accurately assessing schedule performance. [2] Earned Schedule method calculates the Schedule Performance Index (SPI) in terms of duration rather than cost, aiming to estimate project end dates and budgets based on performance indices. However, the stability of these indices is debated, with studies suggesting they may stabilize after 20% project progress [3] or as late as 80% [4]. This variability complicates reliable delivery time estimates, particularly as EVM struggles to distinguish between critical and non-critical activities [5]. Delays in non-critical activities, which have float, should not impact overall project duration, yet EVM fails to account for this, leading to inaccurate SPI calculations. PDP evaluates SPI based on cumulative delays or gains, avoiding penalties for using non-critical activity float for resource levelling.

In conclusion, focusing on deliverables rather than individual tasks enhances EVM's effectiveness, promoting transparency, cost control, and better schedule management for complex projects.

4. Visual Modelling for Proactive Management

Construction projects often involve a diverse array of teams, resources, and activities, all of which intersect within tight spatial and temporal frameworks. As modern projects grow in complexity, traditional scheduling techniques such as the Gantt chart or Precedence Diagram Method (PDM) have revealed their limitations. These techniques provide valuable graphical representations of activities and their sequence over time, yet they fall short by failing to consider critical spatial aspects—such as the availability and optimal use of workspaces, material flows, and crew rotations. In response to these challenges, visual modelling, especially spatiotemporal modelling and chronographic approaches, have emerged as transformative tools for proactive construction management.

At the heart of visual modelling lies the capacity to translate complex, multifaceted project data into intuitive and actionable visuals. Spatiotemporal models are particularly powerful, as they provide a dual view: not only illustrating which construction activities are taking place where on the site, but also revealing how these activities align with the overall project timeline. This synthesis of spatial and temporal information enables teams to detect potential delays, bottlenecks, or conflicts at a glance—

For instance, a spatiotemporal map can highlight if a critical section of a building is lagging behind, prompting managers to proactively deploy additional resources or adjust scheduling. By enabling early detection and intervention, these visual models significantly reduce the risk of project disruptions, helping keep projects on schedule and within

The benefit of visual modelling extends beyond rapid problem identification: it fosters collaboration and real-time communication among all project stakeholders. By integrating visual modelling tools with digital collaborative platforms - often cloud-based - construction teams, architects, managers, and contractors can share and access live updates, 3D models, and scheduling visualizations from any location. This transparency allows everyone involved to maintain alignment regarding project status, scheduled activities, and

Imagine a digital platform where updated 3D models of the site are accessible to both on-site and remote personnel. Teams can monitor progress, review plan changes, and propose solutions to unforeseen challenges instantaneously. Such a collaborative environment dramatically decreases delays caused by miscommunication and ensures a

While traditional scheduling tools focus on the critical path of activities, chronographic modelling [6, 7, 8] pioneers a new paradigm: the critical space. Chronographic models are rooted in highly visual and adaptable graphical approaches, allowing users to shift perspective and grouping criteria based on changing priorities. This flexibility enables more nuanced schedule optimization and communication, especially when managing the complex interplay between space, crews, and activities.

Unlike conventional 4D simulation tools, chronographic models intrinsically integrate space planning with scheduling. This integration accounts not only for when activities occur, but also for where, supporting optimal use of limited space, preventing worksite congestion, and improving worker safety. By focusing on site occupancy rates and the continuous, linear progression of teams through different zones, chronographic modelling encourages balanced workloads and resource flows, essential for efficient large-scale construction.

Though space planning optimization has sometimes relied on deterministic or stochastic algorithms, the sheer number of parameters in construction (activities, crews, spaces, resources, constraints) renders purely algorithmic techniques impractical for most projects. Instead, a hybrid approach - combining graphical, procedural, and algorithmic spatiotemporal techniques - proves most viable [7]. This strategy leverages the communicative power of visuals with the objectivity and precision of algorithms, empowering managers to maximize site occupancy rates, maintain linear production flows, and optimally rotate the workforce.

The proposed methodology typically delineates several “space management layers” (such as space creation, systems installation, envelopes, division, finishing, closures, and exterior work), ensuring all phases are planned with spatial and temporal coherence. Case studies have validated these hybrid spatiotemporal models, showing higher site utilization, improved work balance among teams, and enhanced clarity for project stakeholders. Furthermore, studies have noted that graphic clarity reduces cognitive effort—project managers and stakeholders can swiftly assess statuses, compare alternatives, and communicate next steps.

In summary, the evolution from linear, time-only scheduling methods to advanced spatiotemporal and chronographic modelling marks a pivotal advancement for construction project management. Visual and hybrid models that prioritize space alongside time yield superior communication, resource utilization, and proactive problem-solving. As building projects become more intricate, the adoption of these innovative tools will be crucial for successful, efficient, and collaborative project delivery. By integrating spatial and operational dimensions into scheduling, project teams maximize site performance, ensure optimal workforce rotation, and foster truly proactive management—transforming the future of construction.

Conclusion

Embracing innovative strategies can transform construction project management, making it more agile, efficient, and effective. By focusing on deliverables, integrating Last Planner and Lean Construction principles, leveraging Earned Value Analysis (EVA), and utilizing visual modelling, project managers can significantly enhance project outcomes. These approaches address the complexities of construction sites, enabling teams to navigate challenges and deliver projects on time, within budget, and to high-quality standards.

A deliverable-focused approach ensures that every task aligns with project goals, minimizing wasted effort and clarifying priorities. The Last Planner System promotes collaborative planning, empowering teams to commit to realistic schedules and adapt to changes swiftly. Lean Construction principles further streamline processes by eliminating inefficiencies, reducing waste, and optimizing resource use. Together, these methods foster a proactive mindset, allowing teams to anticipate and resolve issues before they escalate.

Earned Value Analysis provides a robust framework for tracking project progress and performance. By comparing planned versus actual costs and schedules, EVA helps managers identify deviations early, enabling data-driven decisions to keep projects on track. Meanwhile, visual modelling tools, such as spatiotemporal maps, offer intuitive insights into project status, enhancing communication and coordination among stakeholders. These tools enable real-time monitoring and scenario testing, further boosting agility.

Ultimately, adopting these innovative management strategies leads to greater client satisfaction through timely, cost-effective, and high-quality project delivery. By embracing these methods, the construction industry moves toward a more modern, competitive, and resilient future. As projects grow in complexity, these agile practices will be essential for staying ahead in a dynamic industry.

References

[1] G. Ballard, “The Last Planner System,” Lean Construction, pp. 45–53, Feb. 2020, doi: 10.1201/9780429203732-3.

[2] W. Lipke, “Earned Value Management and Earned Schedule Performance Indexes,” Wiley StatsRef: Statistics Reference Online, pp. 1–7, Aug. 2016, doi: 10.1002/9781118445112.stat07891.

[3] D. S. Christensen, “Using Performance Indices to Evaluate the Estimate at Completion,” The Journal of Cost Analysis, vol. 11, no. 1, pp. 17–23, Mar. 1994, doi: 10.1080/08823871.1994.10462282.

[4] O. Zwikael, S. Globerson, and T. Raz, “Evaluation of Models for Forecasting the Final Cost of a Project,” Project Management Journal, vol. 31, no. 1, pp. 53–57, Mar. 2000, doi: 10.1177/875697280003100108.

[5] B., Lennon, and A. Francis. “Improving the Practical Application for Monitoring Project Progress using the Earn Value Method,” 2010, Canadian society of civil engineering, Winnipeg, Canada.

[6] A. Francis, “A chronographic protocol for modelling construction projects,” Proceedings of the Institution of Civil Engineers - Management, Procurement and Law, vol. 169, no. 4, pp. 168–177, Aug. 2016, doi: 10.1680/jmapl.15.00039.

[7] A. Francis, “Chronographical Spatiotemporal Scheduling Optimization for Building Projects,” Frontiers in Built Environment, vol. 5, Apr. 2019, doi: 10.3389/fbuil.2019.00036.

[8] A. Francis, “Chronographical Site-Spatial-Temporal Modeling of Construction Operations,” Frontiers in Built Environment, vol. 6, May 2020, doi: 10.3389/fbuil.2020.00067.