



Professional Spotlight

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Mark is an experienced project leader and executive with more than 30 years of leadership in project management, engineering, and capital project delivery. He has led teams ranging from 3 to 30 professionals and brings deep expertise in risk management, process development and improvement, cost control, schedule oversight, earned value management, and contract risk. He has advised owners, contractors, and stakeholders on complex, high-value projects across healthcare, infrastructure, power, energy, manufacturing, and public-sector programs, including multi-billion-dollar capital portfolios.

His experience includes guiding a medical device start-up through FDA approval, performing expert analyses and testimony related to delays, productivity, design errors, and damages, and serving in senior leadership roles at firms such as Ernst & Young and MDCSystems. In addition to his professional practice, he has contributed extensively to industry through leadership and has taught graduate-level courses in construction risk management and project management. He holds a master's degree from Villanova University, a bachelor's degree from the U.S. Military Academy at West Point, is a licensed Professional Engineer in Pennsylvania, and is a U.S. Army combat veteran who served as an Infantry Captain.

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In this edition of the MDCAdvisor® Expert Newsletter:

**Once Upon a Time in Construction –
When Arbitrators Could Not Decide****By: Robert C. McCue, P.E., EUR ING, CEng MIEI, MCI Arb.**

When a major refinery explosion led to a complex rebuild, insurers challenged nearly every aspect of the owner's recovery—despite clear code requirements and extensive technical evidence. MDCSystems® was engaged to analyze the damage, rebuild scope, schedules, and costs, supporting the owner through a lengthy and highly technical Arbitration before a panel of retired federal judges. This case highlights how technically deficient expert opinions, inadequate early damage estimates, and arbitrators' lack of subject-matter expertise can derail dispute resolution—and underscores why the careful selection of arbitrators and timely use of independent technical experts are critical to a fair and effective Arbitration process.

**Once Upon a Time in the Future: Understanding
the Risks & Uncertainties of Artificial Intelligence
(AI) Development In Complex MEGA
Construction Project Environments****By: Robert C. McCue, P.E., EUR ING, CEng MIEI, MCI Arb.**

With the continuing trend of extensive construction projects for artificial intelligence development, there is a growing demand for essential materials like steel, cement, and lumber, alongside concerns about resource availability and logistics. These MEGA projects will also need significant infrastructure for utilities, housing, and transportation. Project teams face various risks categorized as known-knowns (clear estimating challenges), known-unknowns (uncertainties related to labor and competition), and unknown-unknowns (unpredictable events like natural disasters). Through examples such as the impact of an earthquake on a refinery project, this article explores the complexities of estimating and managing construction within this uncertain environment.

Once Upon a Time in Construction – When Arbitrators Could Not Decide

By: Robert C. McCue, P.E., EUR ING, CEng MIEI, MCI Arb.

A number of years ago, MDCSystems® was retained by a client that experienced an explosion and fire at its 30-year-old refinery. The damage was extensive, and the client immediately initiated a rebuilding effort.



As is customary, the insurers established a monitoring team on-site to observe the work as it progressed and participated in routine construction meetings and reviews of reports prepared by the construction team.

Following restoration of the refinery and its return to operation, the insurers disputed various cost elements of the client’s claimed damages. Although the client had adequate coverage for material damage and loss of production, the insurers nevertheless challenged nearly all recovery costs.

Several aspects of the restoration were required to comply with codes and standards that had come into effect between the original construction of the facility and the time of the incident. These updated requirements mandated significant work, including enhanced safe-shutdown controls; detailed inspection and rework of piping systems not directly involved in the fire area; and upgrades to electrical and instrumentation systems both within and outside the fire-affected areas.

The client was surprised by the insurers’ reluctance to make good-faith determinations of the rebuild costs or to engage in realistic negotiations regarding the magnitude of the loss. With no other recourse, the client proceeded to Arbitration. MDC® reviewed all aspects of the fire-related rebuild, including damage analyses; metallurgical inspection reports; corrosion effects under insulation resulting from age and firefighting activities; rebuild schedules; and safe-shutdown requirements for computer and instrumentation systems. The breadth of issues required hundreds of hours of inspection, review, analysis, and report preparation.

After approximately 18 months of preparation, Arbitration commenced before a panel of three highly qualified retired federal judges. Over six weeks of fact and expert testimony were required to address the technical and scheduling issues raised by both parties.

Some of the insurers’ arguments were largely opinion-based, including assertions that:

1. The owner had no need to use CPM scheduling to plan and execute the work.
2. Existing piping and wiring should have been reused rather than replaced.
3. The full cost of new safe-shutdown computers, instrumentation, and wiring was not compensable.
4. The rebuild should not have taken as long as it did, thereby reducing lost production costs.

These positions were readily addressed through inspection records developed during the rebuild and by citing updated codes and standards that required industry-mandated upgrades due to the scope of the restoration.

It became apparent that the insurers’ experts were offering superficially plausible but technically deficient opinions intended to confuse or obscure the core drivers of the rebuild costs. The client later learned that the insurers had anchored their position to an initial damage estimate prepared by an adjuster outside the refinery fence before the fire area had even been secured. This estimate lacked rigor and was unsupported by detailed analysis.

MDC® prepared an extensive report explaining the cost elements and their causal relationships and provided more than six hours of direct and cross-examination testimony addressing the delays and costs associated with the rebuilding effort.

The client and counsel were confident that the overwhelming technical, scheduling, and cost evidence would lead to a favorable decision.

Although the Arbitrators indicated they would need time to review the substantial record, it eventually became clear that they were struggling to digest the technical complexities of the case. Ultimately, the panel advised the parties that it was unable to reach a decision on the technical issues and would not further consider the matter.

At that point, each party had invested millions of dollars in preparation and presentation, and neither wished to restart the process before a new Arbitration panel.

The question then arose: how could Arbitrators overcome their reluctance to decide a case once proceedings had begun and they recognized their own lack of technical expertise? The most obvious solution would have been for the Arbitrators to retain independent technical experts to provide a sound foundation for resolving the technical issues before addressing the financial claims. Instead, the parties ultimately conducted their own negotiations using the Arbitration record to avoid repeating the process.

As is always the case, the selection of Arbitrators is critical to ensuring a full and fair hearing. If, after a panel is constituted, Arbitrators require impartial expert assistance, such assistance should be obtained in a timely manner. Parties to Arbitration must have confidence that the significant time and cost demands of the process will be responsibly and effectively invested.



Once Upon a Time in the Future: Understanding the Risks & Uncertainties of Artificial Intelligence (AI) Development In Complex MEGA Construction Project Environments)

By: Robert C. McCue, P.E., EUR ING, CEng MIEI, MCI Arb.



Recently, significant construction projects have been announced for extensive AI development, necessitating vast amounts of construction resources. These MEGA projects will require substantial quantities of steel, cement, lumber, electrical equipment, and miles of wiring. What potential challenges could arise during the delivery process? Where will this increased demand find reliable and stocked suppliers? Beyond the estimated material quantities needed for these identified projects, there will also be a tremendous need for utility, housing, and transportation infrastructure to support the construction of these MEGA projects.

When examining the common challenges faced by the project team and estimators, we identify three main categories of risk and understanding that guide the estimates for quantities and costs needed to complete the work:

Known-Knowns

This category includes the most straightforward estimating challenges, such as the tonnage of steel, cubic yards of concrete, volume of lumber, cost of transformers, amount of switchgear, and miles of wiring required. Develops plans and specifications into quantities and Costs.

Known-Unknowns

These include uncertainties regarding the location and availability of the labor force, utility expansions needed to support power, water, sewage requirements, as well as permitting and environmental issues. Additionally, there is the competition from other MEGA projects that may also be vying for the same critical materials and labor resources. This is experienced based and is percentages of identified hard costs.

Unknown-Unknowns

This most challenging category, is often referred to as Force Majeure events, and poses significant difficulties in estimation and management for project success. This is the realm of predicting future events and probability risk analysis.

The following three illustrative examples are based on our consulting experience and provide some context for consideration of Unknown - Unknowns:

- A large refinery in the Middle East had just begun construction when Japan experienced the Kobe earthquake. This disaster caused a sudden shortage in the global steel supply as Japan switched from being a major exporter to a net importer. Consequently, construction on the refinery was severely hindered, as design work had been completed without any procurement yet taking place. Recovery from the steel disruption required redesigning key structures and sourcing alternative steel dimensions that did not meet the original design specifications. This unforeseen impact could not be accounted for within the original budget or timeline. Recovery required extraordinary efforts to accomplish.

- A Multi-Fuel power plant in Asia was close to completion when delays in the transmission system due to poor planning, material shortages, and construction holdups halted its operation at commissioning. The plant remained unused for years while the power grid was extended and expanded. The expected revenue to cover construction costs did not materialize, rendering the project uneconomical.
- A high-rise condominium project that seemed poised for early and lucrative occupancy faced issues after residents moved in, citing persistent ammonia odors in their units. Investigations initially failed to find a source for the smell until forensic analysis revealed that changes to the environmental control system (Selective Catalytic Reduction) from a power plant that was providing fly ash additives to a concrete batch plant had contaminated the concrete. Ammonia carryover in the concrete was evolving during curing resulting in elevated ammonia levels in the building. Compounding the problem, the building’s energy-efficient ventilation system inadvertently intensified the issue by recirculating the ammonia. This was an instance of a true Unknown-Unknown that arose from unique unforeseen environmental conditions.

As teams prepare for the impending influx of AI projects, they must take into account all three levels of estimating and environmental challenges. Once projects commence, Construction Managers must remain vigilant for “Black Swan”^[1] events beyond their control that could significantly impact the project’s success. Employing the best practices from Systems Thinking^[2] and Complexity Theory^[3] can provide project teams with the tools needed to detect, respond to, and navigate the Unknown-Unknowns that may arise to challenging the project.

1. The Black Swan – Nassim Nicholas Taleb, The Impact of the Highly Improbable. Random House ISBN 978-1-4000-6351-
2. Ackoff Center Weblog: SYSTEMS THINKER Russell Ackoff
3. Complexity: A Transient Condition Precedent to Project Failure; Understanding and Surviving Project Complexity: MDC Advisor – www.mdcsystems.com

Case Highlight

Favorable Ruling in Complex Design-Build Case Involving U.S. Government Facility

Our client is extremely happy with the judgment in the United States District Court, Western District of Virginia, regarding the design and construction of a complex process facility. This Design – Build construction of a US Government process facility encountered several technical engineering and construction issues and associated delays before start-up operations. The contractor asserted that much of their work was outside the Design – Build contractual requirements. The bridging documents were complex and detailed, and their interpretation required a competent, knowledgeable engineering organization with many process design professionals. The bridging documents incorporated a 3-D CADD BIM model based on a foreign licensed technology process design.

During the litigation, MDCSystems® prepared three dispositive Expert Reports. Robert C. McCue, P.E., delivered over seven hours of deposition testimony and five hours of direct and cross-examination testimony at the trial. The court determined that the technical and interpretive Project and Construction Management determinations that MDCSystems® presented were significant in its final opinion.

