

## Welcome to issue 28 of the Diales Digest

A warm welcome to this 28th edition of the Diales Digest.

It is a real privilege and honour for me to provide this introduction. I have been with the company for six years now, and was recently appointed to lead the Energy and Environment team within Diales Technical. You'll certainly hear more from me and my team in the coming editions as we grow and share our expertise.

This edition showcases the breadth and depth of Diales' expertise across the world. A highlight for me is Abram de Pagter's article 'Contract Management in Flood Protection Projects' in the Netherlands (page 4). Abram discusses flood defences protecting us both now and in the future, the management of complex contractual interfaces, as well as the management of powerful external stakeholders who are not always party to the contract. We can all learn something valuable from the Dutch.

I am also grateful to Vladimir Milovanovic from LUPA Technologies for contributing his insightful article (page 24) entitled, 'Analysing cause and effect in construction disputes: the role of data and AI analytics'. AI is here and advancing at pace, and I cannot wait to see how it assists our practice as construction professionals and experts.

Finally, in a world where we are facing increasing uncertainties, I want to reiterate and paraphrase something that our CEO Mark Wheeler said in a recent LinkedIn post: Diales has helped our clients and colleagues weather storms in the past, and we will continue to do so whatever the coming months and years may bring.



Frances Hale Technical Expert - Energy and the Environment



# Diales

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## CONTRACT MANAGEMENT IN FLOOD PROTECTION PROJECTS



Abram de Pagter, Senior Consultant Goes, The Netherlands

#### The Netherlands is renowned worldwide as a country that lives in harmony with water. As a low-lying delta, the country has a long history of pioneering solutions to prevent flooding.

This relationship was famously captured in 1865 by the American author Mary Mapes Dodge. In her story about Hans Brinker, she tells of a boy who saved his town from flooding by plugging a leaking dike with his finger. Although a myth, it symbolises the Dutch ethos: an ongoing battle to keep their feet dry. Today, this battle unfolds through large-scale flood protection projects. These initiatives, carried out under the Flood Protection Programme (in Dutch: Hoogwaterbeschermingsprogramma or HWBP), require a blend of advanced technology, seamless collaboration, and meticulous contract management.

### COMPLEXITY OF FLOOD PROTECTION PROJECTS

Flood protection projects, such as dike reinforcements, face a unique combination of technical, social, and ecological challenges.

From a technical perspective, these projects demand expertise in hydrology, soil properties, and climate change. Teams must anticipate rising water levels and increasing pressure in the years ahead. Moreover, designs must withstand extreme conditions while integrating seamlessly into the surrounding landscape.

Socially, these projects often impact residents, businesses, and agricultural areas. Intensive stakeholder engagement is essential to create support, minimise conflicts, and address legal or ownership challenges. The interaction between public interests and private rights adds complexity to both planning and execution.



Ecologically, there can be tension between water safety and environmental conservation. For instance, reinforcing a dike might disrupt ecosystems, necessitating measures to preserve or restore biodiversity. At the same time, designs must comply with stringent regulations such as the EU Water Framework Directive and align with broader climate adaptation strategies.

These multifaceted demands make flood protection projects inherently complex and require innovative, multidisciplinary approaches combined with precise coordination among all stakeholders



### CONTRACT MODELS: THE FOUNDATION FOR COLLABORATION

Design & Construct (D&C) contracts, executed under the Uniform Administrative Conditions for Integrated Contracts (UAV-GC), are commonly used in the Netherlands for flood protection projects.

In this model, the contractor takes responsibility for both design and execution. While the client, typically comprising governmental bodies such as waterboards, municipalities, and 'Rijkswaterstaat' (part of the Ministry of Infrastructure and Water Management), provides functional requirements, the contractor has the freedom to develop a technically sound solution. This arrangement encourages innovation and efficiency. However, it also shifts much of the responsibility for design and execution onto the contractor.

This responsibility extends beyond technical aspects. Contractors must engage with a broad range of stakeholders, such as residents, local governments and utility providers. While the contractor holds formal responsibility, the client's role remains essential, leveraging its knowledge of the area and established relationships to facilitate smooth collaboration.

A notable recent development is the adoption of the two-phase approach. In this model, projects are divided into a design and acquisition phase, followed by an implementation phase. During the first phase, detailed designs are developed, permits are secured, and land acquisition is completed. This reduces risks and enables more realistic pricing before entering the implementation phase. However, since the contractor remains responsible for the feasibility of the design, risks cannot be entirely eliminated. Yet even with clear contract structures, the real test lies in execution—this is where effective contract management becomes crucial.

### CHALLENGES IN CONTRACT MANAGEMENT

Contract management associated with flood protection projects, as with other projects, revolves around effectively managing agreements between clients and contractors. While traditional tasks such as reporting, monitoring procedures, and managing risks remain important, D&C contracts in these projects present unique challenges.

### SCOPE MANAGEMENT: A CONSTANT BALANCING ACT

One of the critical aspects of contract management is maintaining control over the project's scope. Functionally defined requirements provide room for innovation but may also lead to differing interpretations during design and execution.

The integration of the project with its environment further complicates scope management in this sector. Changes in legislation, unforeseen technical complications, or resistance from stakeholders often necessitate adjustments. During the tender phase clients frequently request detailed plans, such as technical designs, execution strategies, and risk management frameworks. These plans play a vital role in aligning expectations and reducing uncertainties.

However, commitments made during the tender phase may be interpreted differently once the contract is signed. It is the role of the contract manager to ensure these commitments are made specific, measurable, and enforceable throughout the project's duration. Such clarity promotes mutual understanding and trust.

### GOING THE EXTRA MILE TO FACILITATE SCOPE CHANGES

Changes are inevitable in flood protection projects. Whether due to technical adjustments, unforeseen ground conditions or evolving demands from stakeholders. Scope changes require careful coordination and collaboration among all parties involved.

The success of such changes largely depends on the ability of the contractor and client to jointly build support within the community. Achieving this calls for not only technical expertise and organisational skills but also an active and empathetic approach to stakeholder engagement. Open communication and a clear explanation of the necessity and impact of the changes are crucial to this process. The contractor must take a leading role in identifying risks, maintaining transparency, and creating opportunities for input from the community. At the same time, the client's support is indispensable. With its local knowledge and established relationships with stakeholders the client can help foster a positive dynamic throughout the process.

This joint effort ensures that changes are implemented with care and consideration for the surrounding community while safeguarding the progress of the project.

### **COLLABORATION: THE KEY TO SUCCESS**

While D&C contracts under UAV-GC formally separate the responsibilities of clients and contractors, close collaboration is critical to project success. Effective contract management teams strike a balance between maintaining professional boundaries and fostering constructive cooperation.

Clients often adopt a supervisory role, while contractors are given the freedom to innovate. However, joint efforts are essential to resolve challenges and build stakeholder support. For instance, although the contractor is formally responsible for stakeholder engagement, it often has to rely on the client's knowledge and influence to achieve effective outcomes.

A skilled contract manager acts as both a coach and a mediator, helping parties define clear responsibilities while facilitating collaboration. This creates an environment where teamwork can thrive without compromising the contractual framework.

### SYSTEM-ORIENTED CONTRACT MANAGEMENT AND AUDITING

Building on the necessity of collaboration, System-Oriented Contract Management (in Dutch: SCB) serves as a crucial tool for clients to ensure compliance with contractual requirements by contractors working on flood protection projects. This methodology enables clients to verify that contractors meet agreed standards and specifications through a risk-based auditing approach.

SCB focuses on auditing the systems contractors implement to maintain quality and ensure project progress. Clients use this method proactively, identifying and addressing potential risks based on substantive and technical analyses. By targeting the most critical aspects of the project, SCB helps to prevent issues before they escalate. While SCB primarily emphasises compliance, it also plays a vital role in building and maintaining trust. Through transparent audits and constructive feedback, the process fosters an open dialogue between clients and contractors. Contract managers have a pivotal role in this process, actively engaging with both parties to ensure smooth execution and reinforcing the collaborative spirit essential to the project's success.

### CONCLUSION

Flood protection projects in the Netherlands are a testament to the country's ability to innovate and collaborate. They integrate technical expertise, social responsibility, and ecological awareness to ensure safety from flooding.

Contract management is the invisible engine driving these projects forward. Combining strategic vision, technical knowledge, and people-focused leadership, contract managers ensure clear agreements, mutual understanding, and effective collaboration.

Through this approach, the Netherlands not only safeguards its future but also reaffirms its position as a global leader in water management—a legacy to be proud of, both now and in the years to come.





## BY FAILING TO PREPARE, YOU ARE PREPARING TO FAIL

Adam Pinney, Senior Consultant, Bristol, UK

Having spent many years working for main contractors, both as a Project Planner and a Project Manager, I have seen first-hand how messy and expensive a project can get if the programme does not do what it needs to do. Add to this the experience I have since gained from working both as a Delay Analyst and a Programme Advisor for Diales, I can probably say that I have seen the full scale of programme challenges and failures on some very complex projects, both within the UK and overseas.

As much as I enjoy picking the brains of the project team and searching through the copious records on projects that have gone wrong, I can confidently say that clients would much rather I have a low level of input at the outset of a project, than a high level of input when a project is later in formal dispute.

The baseline programme is a fundamental tool in the management and the delivery of a project. Often, contracting organisations will have an experienced planner put this together, who will gather input from the delivery team as well as using their own experiences and expertise. However, in practice how thoroughly is this programme ever validated and stress-tested?

Does the programme adequately comply with the requirements of the contract? Does it allow for risk at all stages? Does it include all elements of the work scope? Does the programme contain adequate activity durations? Is it practical, realistic, and agreed by the delivery team and does it take into account the conditions of the site and its surroundings, and the expectations of the client?

If the programme is lacking in any one of these things, it creates an unnecessary risk to the timely delivery of the project to budget. It also places unnecessary pressure on the delivery team to re-sequence / re-programme the works to try and mitigate or rectify any deficiencies.

Unsurprisingly, baseline programmes are sometimes flawed, resulting in inadequate programmes being adopted by delivery teams. I have encountered many projects where key elements of scope have been missed, often resulting in the planned sequence being incorrect and the forecast completion dates being unachievable.

In one such project, the contractor had failed to include the screeding of the floor plates, resulting in a significant delay to the follow-on trades. Furthermore, I have encountered many baseline programmes that have failed to include any relevant external interfaces (i.e., access dates, statutory provisions, approval periods), as usually set out in the contract documents, causing significant delay to the works and an unachievable completion date.

I have spent a lot of time in recent years working with contractors and key subcontractors when they are putting baseline programmes together. Together we stress test the programme for the specific project using industry guidance as a starting point.

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This can take as little as a couple of hours but typically provides a strong grounding for the future planning of the project.

It may seem like a small task, but the benefits to a contractor of engaging an experienced third party to review or assist with the preparation of a baseline programme can be:

- Getting to a validated programme for issue to an employer, which is robust and can be used for project monitoring purposes;
- Confirmation that it complies with the contract and is more likely to be accepted by an employer and/or its representatives;
- Comfort that the programme sets out a practical working sequence taking all known circumstances into account, creating a sensible critical path that allows for effective use of resources;
- 4. A route map for the project team through the project, highlighting the risks and where efforts should be concentrated at specific times; and
- 5. A guide to where mitigation of delays can be implemented should that be required.

In addition to these benefits, the contractor has had the benefit of an experienced delay analyst involved with the project at the outset, albeit for a short time. Should the worst-case scenario then play out, and unforeseen delays happen, the analyst can provide support to the project team quickly and efficiently without the learning curve that comes with being instructed to assist on a project that is unfamiliar.

In my experience, in most cases, spending a few hours with a contractor at the outset of a project to assist with the preparation of a baseline programme can help avoid significant issues with the programme subsequently. This can save the contractor costs and save the project team from the inconvenience of having me sat with them for long periods of time asking difficult questions.

## MEET THE EXPERT

### TIM BAILLIE

*Tim joined Diales in September 2024, and we took the opportunity to get to know more about him in this article.* 

### **Q-1** What is your role at Diales?

I am a Technical Director, and a Construction Management and Project Management Expert Witness.

### Q-2 Who has been the greatest influence on your career?

Having worked with a number of great people in my career, it would be unfair for me to single anyone out in particular. However, I was lucky to have been taught the principles of engineering, temporary works, and quality control by an engineering manager early on in my career. He would always take the time to explain 'why' things were done and impress upon me the importance of accuracy in construction. These foundations continue to serve me well to this day!

I realised the importance of effective leadership and mentoring from my project director on the same project. It was remarkable watching this individual orchestrate the delivery of a major project, whilst under intense scrutiny, yet still giving up his own time to pass on his knowledge and experience to younger people like me.

He showed me that you're never too busy to take time out to guide and assist the next generation in your business.

## Diales



I will be forever grateful to them both for the guidance and support they offered me during my early years in the industry.

### Q-3 What has been the best moment of your career?

Undoubtedly being part of a project team that delivered a major healthcare project in the UK ahead of time and on budget. It was fantastic to see the work of all the stakeholders involved in the project being turned into a world-class facility that continues to benefit society to this day, and improve patient outcomes.

The project was, and always will be, a great reminder that people can achieve more when working together, than as a group of individuals.

### Q-4 What makes you tick?

I am motivated by the sense of satisfaction that comes from solving complex problems. I enjoy taking the time to articulate my findings in such a way that they are understood clearly by others. Another key driver for me personally is helping others to grow and improve. I enjoy supporting colleagues on their professional journeys, such as obtaining their charterships and gaining practical experience of construction projects.

### Q-5 Tell us a little-known fact about you.

My dog was excluded from a prestigious gundog school on his first day. I am sure that if you asked him for a little-known fact about me, it wouldn't be suitable for print!

### **Q-6** What are you looking forward to in your role at Diales?

I am looking forward to working with an established, market-leading team of experts and growing the business' market offering. Diales is well positioned to advise our clients on matters across the lifecycle of a project and our global footprint means that we can bring practical solutions, underpinned by local market knowledge.

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## **INTERFACES** CAUSE FOR **DISPUTE?**

Stuart Holdsworth, Technical Expert, London, UK

### FREQUENT ISSUES ADDRESSED BY THE DIALES CIVIL AND STRUCTURAL TEAM

The structural and civil engineering design process is inherently complex, involving multiple professionals from different disciplines. Engineers, architects, contractors, and other stakeholders must collaborate to ensure that all elements of a project come together seamlessly. A critical challenge in this process is managing interfaces; those points where different systems, materials, or structures meet.

# Poor communication and lack of

coordination at these interfaces can lead to significant issues, including compatibility issues, disputes, delays, and costly design errors.

This article explores the importance of ensuring that, from the project outset, interfaces are identified and that management of them is addressed. It also explores the idea that communication between owners/ employers, project managers, and designers is a critical component in achieving a successful delivery of a project, as well as the consequences of poor coordination. Some examples of problematic interfaces are examined.

### THE IMPORTANCE OF COMMUNICATION **BETWEEN STAKEHOLDERS**

At the heart of any successful construction or engineering project, clear, precise, and effective communication between all the parties is necessary. In structural and civil engineering design, projects are rarely the work of a single entity. Cooperation must be built in from the project inception. Collaboration between the project stakeholders, including the owner/ employer, project managers, structural engineers, civil engineers, architects, MEP (mechanical, electrical, and plumbing) engineers, and specialist subcontractors is essential. Each specialist contributes their expertise to the project, but they may also rely heavily on the experience and knowledge of others to ensure that the overall design is coherent and integrated.

Limitations in each party's scope of works and division of the project into work packages create a series of interfaces. They are introduced at the outset with the distinct purpose of establishing clear and precise boundaries for each party's work share. Each interface is commonly conditioned by a change of structure or architecture that defines a clear break in the form and function of the elements. Examples of this include the boundary between a building's frame and its facade, or the track bed of a railway and other rail-related infrastructure, such as tunnels, bridges, signalling systems, or vehicle specification.



Such works may involve a hierarchy in which parties may be dependent upon the appointment of a lead contractor so that the works can be coordinated. This is a common feature of transport projects. It is essential in such cases to manage the contract procurement stages to reflect this hierarchy.

The shared feature(s) at such boundaries require careful investigation to ensure that the objectives of each of the interfacing parties are properly addressed. This typically involves agreeing on a common specification, usually comprising an agreed performance and set of tolerances, for the interface which will ensure compatibility between the work phases.

Without careful investigation and management, these interfaces can become points of conflict in which the project management, conflicting requirements, assumptions, or design philosophies lead to serious issues with the construction. The introduction of late changes to the design or procurement process, requiring re planning and scheduling, or remedial works, inevitably introduces delays to project delivery with resulting claims.

To avoid conflicts or lessen the risk of them occuring, it is vital that all parties involved in the design process have a deep understanding of the interdependencies of their work. Project managers, commercial managers, architects, etc., involved in setting the boundaries at the outset and who later control and manage the works must clearly understand the consequences of introducing these boundaries. Failure to manage interfaces will commonly result in each party adopting the commercial approach that suits their aspect of the work, including the adoption of more stringent technical standards, which can result in an incompatibility in the contracted works at the interface.



With all projects, and particularly for those in which the design is subcontracted to specialist subcontractors, it is also important to have a clearly understood process for sharing information, conducting design reviews, and resolving any discrepancies that arise. The use of BIM (Building Information Modelling) is an example of a technological tool designed to improve communication between stakeholders by allowing for the visualisation and coordination of all aspects of the design.

### **EXAMPLES OF PROBLEMATIC INTERFACES**

Coordination issues can result from a temporary requirement or a permanent works requirement. Temporary issues commonly result from a lack of understanding or experience of the requirements relating to testing, or stability not being specified and thus understood. Permanent works interface issues commonly occur because of compatibility issues between the structural frame and interior and exterior architectural and MEP elements.

### **PERMANENT CONDITIONS**

#### 1. Façade engineering and structural frames

One of the most common areas where problematic interfaces occur is between a building's structural frame and its façade. Façade engineers are typically responsible for designing cladding systems that protect the building from the elements and provide aesthetic appeal, while structural engineers ensure that the building can withstand various loads, including those from the façade.

Structural engineers in the UK work to a set of advisory deflection limits codified in British Standards. These limits are not always compatible with interior finishes or external cladding tolerances. In such cases, a bridging interface is required. To resolve this interface the compatibility issues arising must be included in a party's contract, with clarity as to the issue being addressed. This is usually performance related and can include the overall allowable deflection, the live load deflection, and air and fire sealing, etc.

#### 2. Foundation and superstructure coordination

If there is a division in responsibility between the building elements and foundations, there are risks that require management at the interface. This is particularly so where basement structures are involved, and cladding and interior finishes interface with them.

Heavy machinery foundations and other mechanical elements with subcontracted structure can also lead to complicated interfaces with the remainder of the substructure.

#### 3. Mechanical systems and structural design

MEP systems present another potential point of interface problems. These systems are typically integrated into the structure during construction,

but their design must be closely coordinated with the structural engineers to ensure that they do not interfere with the building's architectural and structural performance.

For example, MEP engineers commonly need to run large ductwork and duct work risers through floors or walls. These require large openings that can compromise the structural integrity of the surrounding structural elements. If the structural engineers are not made aware of the size and location of the ductwork, a delay as the structure is redesigned will occur or, if discovered post contract, will result in structural issues, requiring some degree of reconstruction, compromise, and strengthening works, with a consequential loss of value, disruption, and delay, or an underperformance in the originally specified structure.

#### 4. Utilities

The provision and location of utility supplies is for the most part outside the direct control of any developer or contractor. The timing and route of any connection must be agreed well in advance of the required utility work being implemented by the relevant party. If this work is critical to the function of the development, which it is in almost all cases, then the routing and construction sequence requires careful coordination with the build. This is to ensure the utility work does not impact upon the construction and progress of the development but is timed to be available when required, particularly so if the utility company is responsible for the complete package of the works such is commonly the case with public transport schemes.

### **TEMPORARY CONDITIONS**

Temporary conditions can also cause issues if they are not properly understood and considered. It is obvious that if the construction requires temporary works to allow the formation of the permanent structure, then working room and interfaces and connections for the temporary works must also be provided.

A less obvious example is conditions that involve water. Empty pipes/containers and swimming pools in water bearing soils when temporarily sealed or emptied of water will float and, if insufficiently ballasted, lift or displace from their correct alignment. Similarly, gas pipes require pressure testing, and when connected to external structures, can fail if insufficient support is provided for the flooded condition under which the pressure test is undertaken.

### AVOIDING DISPUTES AND IMPROVING INTERFACE MANAGEMENT

To mitigate the risks associated with problematic interfaces in structural and civil engineering design,

several best practices can be implemented. First, clear delineation of responsibilities must be established at the outset of the project. Each party must fully understand their role in the design process and the areas where their work interfaces with others. Above all, there must be a single controlling mind or body capable of identifying and addressing the issues that are caused by contract boundaries, particularly those which are hierarchal, or performance related and that require detailed specification and addressing in the work schedule at the time of contract.

The use of BIM and other collaborative design tools can significantly improve communication by providing a shared platform for all stakeholders to access the latest versions of the design. BIM can identify clashes and issues relating to the detail design of components but will not resolve issues of responsibility that required addressing at the contract stage. Regular coordination meetings where potential interface issues can be further reviewed and resolved early are also crucial.

Finally, the adoption of robust contract frameworks that clearly define the process for handling disputes and allocating responsibility for any issues can help to minimise the legal and financial risks associated with problematic interfaces. When disputes do arise, Alternative Dispute Resolution (ADR) methods, such as mediation, expert determination, or, arbitration, are often preferable to litigation, as they can provide quicker and less adversarial solutions.

#### CONCLUSION

It is essential for the timely and on-budget delivery of a project that critical interfaces are addressed at the contract stage. Identifying these interfaces at the outset will help ensure their successful management of them, which is critical to delivering the project, and ensuring the safety, efficiency, and cost-effectiveness of the project.

Post contract, the effective management of the project requires active communication between the various parties and design teams. Such communication plays a critical role in minimising the impact and avoiding any further issues that can arise at key points of interaction between the teams. If this communication fails, the results can be costly, leading to design errors, delays, and disputes. By improving coordination and using technological tools to enhance collaboration, those enabling projects can help minimise the risks associated with problematic interfaces and ensure that their projects proceed smoothly from design to construction.





## COMPUTATIONAL FLUID DYNAMICS

Computational Fluid Dynamics, or CFD, sounds like a complex science, but at its core, it is a sophisticated way of simulating how fluids (like air and water) move. In our work as structural engineers, we use CFD to study how wind interacts with buildings and structures.

Imagine a virtual wind tunnel where we can see how air flows around a building or structure, all simulated in a computer. With CFD, we analyse wind pressure, windspeed, turbulence, and the resulting loads on structures. This helps us design safer, more efficient buildings.

Often the particular shape of a building channels the wind to produce highly localised, extremely high, wind-loads that can peel cladding from a building or worse. With CFD we can simulate these conditions by modelling the geometry of the building and its surroundings, adding the wind, and testing what happens. Bruno Postle, Associate Director, London, UK

Another critical application of CFD in our work is forensic analysis. When structures fail, it is essential to understand why. CFD allows us to recreate environmental conditions, such as strong winds or sudden gusts, that may have contributed to the failure. This helps identify the root cause.

It is not just extreme conditions that cause failures, a whole class of problems are caused by resonant effects where two parts of a building, a single part such as a chimney, or two different structures, interact through vortex-shedding at very low wind speeds. This can produce disconcertingly large motions, and potentially structural fatigue failure.

The sculpture in the photograph above, structurally designed by Diales Technical, has the kind of complex geometry that benefits from CFD analysis. By constructing a 3D model and a virtual wind-tunnel we can see where the high loads are likely to be. These loads can then be fed back into the structural analysis model to check that the steel is not overloaded.





By combining physics, mathematics, and computer simulations, CFD allows us to visualise and solve problems that would otherwise be difficult or impossible to test in the real world. It is a cutting-edge tool that plays a key role in creating resilient structures while optimising materials and costs.



## SECTIONAL COMPLETION MILESTONES

A tool for successful monitoring of a project's progress or an unnecessary burden? A Delay Analyst's point of view

Rola Sabbah, Senior Consultant, Dubai, UAE

The use of sectional completion milestones in complex construction contracts has become increasingly common. Are such milestones useful to better monitor and control a project's progress, or are they simply an unnecessary administrative burden?

### WHAT IS SECTIONAL COMPLETION?

Sectional completion is a contractual provision allowing a project to have multiple completion dates for separate sections of the project. For example, if a project consists of several different buildings in adjacent areas, each building in each area can be defined as a separate section with its own completion date, i.e., a sectional completion milestone. These sectional completion milestones are usually reflected in the contract and then in the project's approved programme within the overall completion date for the project.

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Careful use of sectional completion milestones is necessary to avoid potentially turning a contractual obligation and useful project control tool into a source of unplanned complexity...

### WHAT ARE THE BENEFITS OF SECTIONAL COMPLETION MILESTONES?

The benefit of sectional completion milestones for an employer is for it to be able to take over completed stand-alone sections of the project and use that section without having to wait for the full completion of the works. The benefit for contractors is being able to plan and monitor the progress of each section separately and target actions to mitigate any delays to a specific section. The timely completion and handing over of sections also reduces the insurance liability for the contractor and the overall liability for any delay damages or penalties as typically these are assigned for each section.

### BUT .....WHAT HAPPENS WHEN SECTIONAL COMPLETION MILESTONES ARE DELAYED?

Most contracts with sectional completion milestones include provisions for extensions of time for each section and allow for the imposition of delay damages or penalties to each sectional completion milestone.

From a delay analyst's perspective, analysing delays for each milestone can be challenging as the critical path for each milestone must be analysed separately. In an ideal scenario, the critical paths for different milestones are independent of each other, simplifying the analysis.



However, often the sections are highly interdependent leading to complex relationships between them which complicates the delay analysis.

For example, a project involving a single building may define several sectional completion milestones by floors. While the structure can be progressed on a floor-by-floor basis, MEP installations often depend on full-system integration across the entire building. In these circumstances, identifying and analysing the critical path for each milestone and the progress and delays against each sectional completion milestone can be particularly challenging.

On projects with numerous sectional completion milestones, analysis of the progress and delays to an individual milestone may require the modification of relationships to reflect the actual sequence of work, adjusting the critical path. Such changes can affect the critical path of other sectional completion milestones, resulting in a cycle of revisions to establish the proper critical path for each sectional completion milestone. In relation to time-related costs, it is usually very challenging for contractors to allocate costs per sectional completion milestone(s) rather than allocating the costs to the overall completion date of the project. This can involve the assessment and allocation of resources to individual sectional completion milestones, which is complex and can present difficulties in substantiation.

### CONCLUSION

Sectional completion milestones can be beneficial to all parties involved in a construction project. However, their effectiveness depends significantly on the nature and complexity of the project and the level of interlinked relationships between them. Careful use of sectional completion milestones is necessary to avoid potentially turning a contractual obligation and useful project control tool into a source of unplanned complexity, especially when assessing the impacts of delays on a project. The use, number, and interdependence of sectional milestones should be carefully planned and managed with a balanced approach that promotes clarity and flexibility.

## THE CHANGING LANDSCAPE OF DETERMINING QUANTUM...

VALUATION BY PROBABILISTIC RATHER THAN DETERMINISTIC METHODS

Vincent Fogarty, Managing Director of Diales Technical, Quantum and Technical Expert, London, UK

### Is the construction industry witnessing the end of deterministic methods in quantity surveying in favour of probabilistic approaches?

In my experience working on large-scale projects such as airports, transport infrastructure, and data centres, it has become increasingly clear that cost estimation and procurement are evolving towards probabilistic models. With the advent of AI, these methods are likely to expand.

The Royal Institution of Chartered Surveyors (RICS) predicted these changes<sup>1</sup> in 2020, recognising that the "scale ruler" for measuring cost elements was nearing the end of its life cycle, particularly for large-scale complex infrastructure.

This shift is particularly evident in target cost<sup>2</sup> procurement contracts designed to accommodate a more flexible and risk-aware approach to construction.

As the industry adapts to a growing uncertainty, the role of probabilistic cost prediction is becoming beneficial and essential.

### THE LIMITATIONS OF DETERMINISTIC METHODS

Traditionally, quantity surveying has relied on deterministic methods to predict construction costs. This approach involves measuring quantities, applying rates for materials and labour, determining indirect costs such as preliminaries, and calculating overhead and profit percentages. However, this method has one significant drawback: it assumes that all inputs and outputs are predictable and fixed, which is rarely the case in modern construction projects. In fixedsum contracts, the design must be mature and fully defined to provide a reliable cost point. But in practice, especially in Design & Build contracts, designs often remain fluid at contract formation, sometimes only reaching the Employer's Requirements stage and/or a

2. Such as NEC Option C forms and similar target cost contracts.

<sup>1.</sup> RICS, Cost Prediction, 1st edition, dated November 2020, effective from 1 July 2021.



Royal Institute of British Architects (RIBA) 3 Stage<sup>3</sup>.

As a result, the deterministic method cannot accurately address the inherent uncertainties in the design and delivery process.

### ENTER PROBABILISTIC METHODS

In contrast, probabilistic methods take uncertainty into account. Instead of relying on a single value cost estimate, these

methods use historical data to create a range of possible outcomes. This range is then analysed through models such as Monte Carlo simulations which account for the risk and variability inherent in complex projects.

Over the past few years, there has been a noticeable increase in the use of Monte Carlo simulations within the construction industry. This trend has been partly driven by the heightened awareness of risks highlighted by events such as the COVID-19 pandemic, but also by a broader shift in the industry toward data-driven, analytics-based decision-making.

Monte Carlo simulations are particularly powerful tools for cost and programme/schedule forecasting. By running thousands of random simulations based on a range of input parameters—such as Expected Value, Best Case, and Worst Case —Monte Carlo analysis can produce a probability distribution of potential project outcomes. This allows stakeholders to assess the likelihood of various cost and programme/schedule scenarios and to make more informed decisions.

### THE ROLE OF MONTE CARLO IN TODAY'S CONSTRUCTION INDUSTRY

The technique has proven to be very useful in complex and high-stakes projects. As an example, in a recent expert appointment at Diales under joint instructions, we utilised Monte Carlo simulations to determine an "On Demand" bond value that provided surety in the event of default<sup>4</sup> concerning a Settlement Agreement. The diversity and complexity of the scope, coupled with strict time constraints, made the probabilistic approach not only useful but necessary.

By incorporating a range of scenarios we established a reasonable and well-supported bond value that balanced all the relevant factors.

The UK's Treasury and Cabinet Office<sup>5</sup> and the Infrastructure and Project Authority have recognised this shift and are actively promoting probabilistic techniques to ensure greater cost certainty in largescale infrastructure projects. This is not just about improving the accuracy of cost predictions but is also about providing the confidence necessary for stakeholders to make sound, data-driven decisions. The UK's Environment Agency mandates the use of Monte Carlo cost modelling.

### THE FUTURE OF QUANTITY SURVEYING

The shift towards probabilistic methods does not spell the end of deterministic approaches, but it does signify a profound transformation in how quantity surveying and cost management are practised.

### The rise in the use of Monte Carlo simulations and similar probabilistic techniques highlights a growing need for data literacy and an ability to handle complex risk modelling.

As the construction industry continues to innovate, the quantity surveyor's role will likely evolve into a more analytical and strategic one, blending traditional expertise with new methodologies that can better address the uncertainties of modern construction.

For those in the profession, staying ahead of this shift means embracing the technologies and techniques that can provide deeper insights into project risks and cost implications. This evolving skill set will not only enhance the accuracy of cost predictions but also instil greater confidence among clients, investors, and the public, increasing the likelihood that construction projects can be delivered successfully on time and within budget. In the expert witness world, this will mean that those with practical experience in applying cost model techniques ought to flourish.

<sup>3.</sup> RIBA Stage 3: Spatial Coordination Formerly known as the 'Developed Design' stage; this is where the practical aspects of the concept are decided. For instance, at RIBA Stage 3, the design team should consider how the project will meet legal requirements, such as building regulations 4. In the event where defects were not remediated within a time limitation period.

<sup>5.</sup> Infrastructure and Projects Authority; Cost Estimation Guidance, A best practice approach for infrastructure projects and programmes, Crown Office, 2021.

# CAREER PATABAS THE JOURNEY OF A CIVIL ENGINEER INTO CLAIMS CONSULTANCY



Mayar Matar, Trainee Consultant, Dubai, UAE

### **INTRODUCTION**

As a recent civil engineering graduate, I am delighted to have joined Diales in the United Arab Emirates as a Trainee Consultant where I have spent the past three months gaining hands-on experience in the world of construction claims and disputes. This journey has already provided me with invaluable insights, inspiring me to share my experiences and to encourage those who may be considering a similar career path.

### MY UNDERSTANDING OF CLAIMS CONSULTANCY

Claims in construction projects typically stem from a variety of causes often leading to project delays. This in turn usually leads to a claim for the additional time required by a contractor or subcontractor to complete a project together with recovery of their associated additional costs.

Conversely, claims can be levied by an employer against a contractor or by a contractor against a subcontractor if it considers that the contractor or the subcontractor has failed to comply with its contractual obligations and has delayed the project. Such claims would typically include for things such as delay penalties and other damages. The role of a claims consultant is therefore diverse; it can involve preparing claims on behalf of a contractor, subcontractor or employer. It can also involve assessing claims submitted by a contractor on behalf of an employer, a subcontractor on behalf of a contractor, or providing impartial opinion as an independent third party. With the increasing complexity of modern construction projects and the ever-expanding advances in technology, there is a growing demand for skilled consultants, who possess a good understanding of the requirements of construction contracts, project programmes, and the technical elements of construction.

In the example of project delays, consultants are usually required to review contemporaneous project documentation and investigate and analyse the cause and effect of events that have arisen during a project and to assess the impact on both the project time for completion and the costs incurred by the parties to the contract arising from delays.

### TRANSFERABLE SKILLS OF CIVIL ENGINEERS

Civil engineers offer a wealth of technical knowledge and problem-solving abilities that I believe make them effective in the field of claims consultancy. Their understanding of construction processes, project

## Diales

lifecycles, and their familiarity with project programming and resource allocation, facilitates their ability to assess project delays and cost overruns in a pragmatic manner. Their analytical skills, coupled with forensic insights, enable them to interpret complex data, investigate delays, uncover root causes, evaluate the impact on project completion dates and subsequently provide individual and tailored advice.

### KEY AREAS CIVIL ENGINEERS SHOULD BUILD ON IN CLAIMS CONSULTANCY

To succeed in this role civil engineers may wish to consider focusing on areas that complement their existing expertise. Gaining familiarity with standard forms of contract allows civil engineers to appropriately interpret contract terms, identify potential risks, and proactively address issues before they escalate into disputes. By utilising programming software such as Primavera P6, civil engineers can conduct precise programme analysis and model potential scenarios to identify delays. Pursuing professional membership of organisations such as the Institution of Civil Engineers (ICE) or the Chartered Institute of Arbitrators (CIArb) enhances credibility while providing access to exclusive resources and opportunities to develop skills.

### IMPORTANCE OF SOFT SKILLS IN CLAIMS CONSULTANCY

Given the collaborative nature of the work, I have quickly learnt that effective communication is one of the most important skills for claims consultants. They must clearly articulate often complex issues to their clients and opposing parties. Managing multiple projects demands efficient time management and organisational skills to handle various claims in a manner that allows you to meet deadlines and manage client expectations. These skills, combined with technical expertise, enable claims consultants to deliver effective, well-rounded opinion and solutions.

### CONCLUSION

As a civil engineer entering the claims consultancy field, I am excited about the prospect of integrating my technical background with new skills to navigate complex challenges in the field of dispute resolution. Each project and assignment brings valuable lessons, such as discovering innovative ways to resolve disputes or manage client expectations. The challenges within this field have and continue to encourage me to develop both professionally and personally, aligning with my drive for continuous learning and growth, whilst contributing to complex and challenging projects in a dynamic environment.





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## ANALYSING CAUSE AND EFFECT IN CONSTRUCTION DISPUTES: THE ROLE OF DATA AND AI ANALYTICS

Vladimir Milovanovic, Chief Executive Officer, LUPA Technology

### INTRODUCTION: THE CHALLENGES OF IDENTIFYING ROOT CAUSES IN CONSTRUCTION AND ENGINEERING DISPUTES

#### How long does it take to count to 2 million?

If one were to count for eight hours a day, it would take 70 days to reach 2 million. Now, imagine reviewing 2 million documents manually, logging relevant information into Excel. That would take over 20 years! Why is this relevant? Because in construction and engineering disputes, millions of records hold the answers, yet traditional approaches make extracting them a near-impossible feat.

Construction and engineering disputes often hinge on establishing a clear cause and effect relationship between delays, cost overruns, and technical issues. However, the sheer volume of project records: emails, reports, drawings, schedules, and quality assurance documentation, poses a significant challenge. The critical evidence is often buried in vast amounts of unstructured data making traditional methods of dispute resolution slow, costly, and prone to subjective interpretations.

Historically, experts have relied on high-level documents such as formal letters and nonconformance reports (NCRs). However, these documents are often shaped by contractual positions rather than an objective representation of events. Meanwhile, raw site communications where the real project story unfolds, remain largely untapped due to the overwhelming effort required to process them manually.

How can dispute resolution be improved to establish a precise and verifiable cause-effect relationship? The answer lies in combining structured data management, advanced analytics, and AI-driven insights to extract and validate key facts efficiently.

### THE TRADITIONAL APPROACH: LIMITATIONS AND CHALLENGES

Proving cause and effect in construction and engineering disputes has always been an uphill battle. Traditional dispute resolution methods rely on:

- Manual document review, requiring months or even years to process large data sets.
- Selective and incomplete evidence, often shaped by legal and commercial interests rather than factual accuracy.
- Expert analysis based on limited records, increasing the risk of biased conclusions and weak argumentation, built on selective records rather than a complete dataset. This is particularly relevant in dispute resolution proceedings where actual project events matter, and where an accurate storyline with substantiation is key to success.

### CASE STUDY: THE PITFALLS OF A TRADITIONAL APPROACH

In a project delay claim worth \$100 million, a delay expert was tasked with reviewing over 2 million emails, written in both English and Dutch. Without automation, language barriers and data volume made a comprehensive review impractical. The conventional approach: translated summaries, keyword searches, and selective document sampling would have taken years and left critical gaps in the evidence.

The inefficiencies of this approach result in escalated costs, drawn-out legal battles, and increased uncertainty in dispute outcomes.

### A NEW APPROACH: AI AND DATA-DRIVEN CAUSE-EFFECT MAPPING

#### To form an opinion, two fundamental elements are required:

- **1.** A clear narrative that accurately maps cause to effect.
- 2. Substantiated claims backed by verifiable records.

Advanced data-driven tools transformed this process. **Using semantic search**, automation, tagging, and summarisation, the expert identified 200 relevant emails per head of claim within just three hours - an impossible feat with traditional methods.

### A powerful data management system, coupled with advanced construction analytics and AI insights, allowed the expert to:

- Label all documents and emails with specific predefined contexts.
- Generate real-time situational reports of project activities going back four years, analysing patterns and trends leading to the dispute.
- Al-driven summarisation of responsive documents to speed up review.
- Identify and validate responsive records, ensuring AI accuracy and reducing hallucinations.
- Exporting 200 key emails/documents for each head of claim, forming a clear and substantiated narrative.

### FROM FRAGMENTED DATA TO A COHERENT ARGUMENT

Beyond efficiency, automation provided deeper insights, revealing five additional narratives that further substantiated the expert's opinion.

#### Traditionally, construction disputes are hindered by:

- Selective or biased interpretation of evidence Stakeholders often present documents that align with their position while overlooking contradictory records.
- Incomplete/missing documentation Critical emails, site logs, and reports may remain undiscovered due to volume and complexity.

By utilising concept-based classification and Al-driven summarisation, the expert developed a multi-faceted opinion, demonstrating that the delay resulted from multiple interconnected factors.

### This data-driven methodology not only reduced review time but also uncovered additional storylines that further substantiated the expert's opinion.

In the previously mentioned case, semantic search and

AI-assisted classification allowed the expert to pinpoint

200 highly relevant emails per claim within just three

hours, a task that would have been impossible through

CASE STUDY: ENHANCING DISPUTE

#### Traditional vs. New Approach:

**RESOLUTION WITH AI** 

manual review.

- Traditional: Experts sift through scattered records for months, to form their independent opinion which assists the court/tribunal.
- New Data-driven: Al pinpoints precise, relevant information in hours, forming a robust opinion.

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Meanwhile, the opposing party was faced with increasing challenges.

#### Indicators of a Weakening Position:

- Key personnel were dismissed mid-process, disrupting the continuity of their argument.
- New delay experts were introduced late in the proceedings, distancing themselves from prior assessments.
- Supporting documentation became increasingly inconsistent, exposing critical gaps in their case.

### LEVERAGING DATA VISUALISATION FOR DISPUTE RESOLUTION

Clear documentation and visual representation of evidence are essential in complex disputes, even more so considering that 30% of design changes are not clouded on drawings. With AI-powered document management, thousands of drawings can be analysed, summarising all design changes automatically.

#### AI-powered tools enable this by:

- Identifying undocumented design changes across thousands of drawings. For example, the Employer's engineers documented design revisions with handwritten notes, explicitly stating that modifications were required due to scope changes or previous errors, a critical piece of evidence, provided it is identified and properly analysed.
- Using geolocation and timestamps to link site photographs with specific project activities. As an example, AI analysed 25,000 site images, matched cable labelling to drawing revisions, and provided irrefutable proof that design modifications were necessary due to prior errors.

### THE HUMAN FACTOR: AI AS AN ASSISTANT, NOT A REPLACEMENT

A common concern: "Will AI replace experts?" The answer is a resounding no. While AI and data analytics significantly enhance dispute resolution, expert judgment remains critical.

### Al tools provide efficiency, but human expertise ensures:

- Proper contextual interpretation of extracted data.
- Strategic questioning and legal positioning.
- Clear, evidence-based report writing tailored to dispute resolution forums.

Al is not a substitute for professional expertise, it is a tool that allows experts to focus on high-value analysis rather than sifting through massive data sets. "Most people dream of retiring at 60. If you manually review every document, you'll be lucky to retire by 120... On Monday, you're optimistic. On Tuesday, you're overwhelmed. By Wednesday, you are questioning your career choices"

Lupa CTO, Djordje Nedeljkovic.

### CONCLUSION: THE FUTURE OF CONSTRUCTION DISPUTE RESOLUTION

The industry is evolving. Traditional methods of dispute resolution relying on manual review, selective documentation, and subjective argumentation are no longer sustainable. The new way – leveraging automation, transparency, and AI-driven workflows coupled with construction specific advanced analytics can help to ensure disputes are resolved fairly, efficiently, and based on facts.

## By integrating AI-driven analytics and data visualisation, the dispute resolution process can become:

- Faster, reducing document review from months to hours.
- More transparent, ensuring decisions are based on comprehensive, factual evidence.
- More reliable, eliminating subjective biases and strengthening claims.

As the construction industry evolves, the ability to harness data effectively will determine the success of claims and the resolution of disputes. The key question is no longer if AI will be used in dispute resolution but how it will be leveraged to ensure accuracy, efficiency, and fairness in resolving complex construction and engineering disputes.



## **ARTICLE BYTE** TRADE TARIFFS AND TERMINATION

Mark Wheeler, Diales CEO and Quantum and Technical Expert, Bristol, UK

The changes made to tariffs for goods coming in and out of the USA, by President Trump, are having far reaching global effects on economies and businesses throughout the world. How can we protect ourselves as far as possible from the impact of tariffs, when they effect the price of basic materials such as steel and aluminium?

If you are considering purchasing something, let's say the construction of a building, you will be aware that the prices of raw materials are changing, on a daily basis. It is logical and perhaps habitual, for those commissioning construction work to want to seek a fixed price from the contractor. A Guaranteed Maximum Price (GMP) is the Holy Grail of construction contracts for most developers. However, experienced commercial people will know that the contractor is always going to price the risk. In the current market, that either requires a great deal of bravery, foresight, or a very large increase in tender price. I would suggest the latter would be the more common approach. It is therefore more likely than not that the end user will be paying for risks priced by the contractor which did not fully crystalise.

A lack of forethought by both contractor and employer as to how these issues should be dealt with is likely to lead to a breakdown in relations, arguments, disputes and the potential for the termination of the contract when a deadlock has occurred between the parties. During the contract everyone would like certainty of the time of delivery and certainty of outturn of cost. Both of these things are effectively heading down the drain, when the contractor is not being paid for losses created (by parties other than the contractor) and I also think that employers seeing work delivered late, while focus is spent arguing over contract clauses, are likely to be less keen on engaging in settlement discussions. A lot of wasted effort can be incurred by both parties along with significant wasted costs when lawyers and consultants are required to help resolve disputes.

If you did manage to tie a contractor down to a GMP you will also be aware when that contractor starts to lose money they will, logically, seek to make that money up elsewhere in prices for change and claims for extra time and money. My view is that the client would look to build in a price escalation protocol into the contract ...taking a proactive approach, is in my view, far more likely to deliver long term success than being reactive, especially in the volatile world in which we now live.

that will mean the contractor can provide a competitive tender because they are not exposed to all of the risk of changing prices in the market, meaning tenders will be lower. As prices go up and down, the escalation provision will mean that the developer should only pay the actual cost of the increase in prices. This is a risk, but it is much better to be in control of risk rather than pay the price of leaving it to others.

There are also more practical measures that can be taken by looking at the design and limiting the amount of volatile materials used, and in specifying suppliers in jurisdictions that are maintaining normal relationships with each other, ie: outside of the USA.

For contractors looking not to take an unquantifiable risk, my advice would be exactly the same. Propose a fair price escalation protocol that means you are able to be protected by unexpected rises in the prices of material, but that you do not expect to profit from them by unexpected, undue windfalls that may arise. This will foster better client relations, avoid the risk of termination, and dealing with people in an open way is, in my experience, always the way to engender long term relationships.

This advice, which is notably the same for both parties entering into a contract, is based upon spending the last 20 years helping contractors and employers resolve disputes and in doing so, learning a great deal about the art of avoiding disputes in the first place.

The cost of lawyers and consultants when parties fall out will rise rapidly and can often end up exceeding the value of the dispute. Therefore, taking a proactive approach, is in my view, far more likely to deliver long term success than being reactive, especially in the volatile world in which we now live.









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