driver trett

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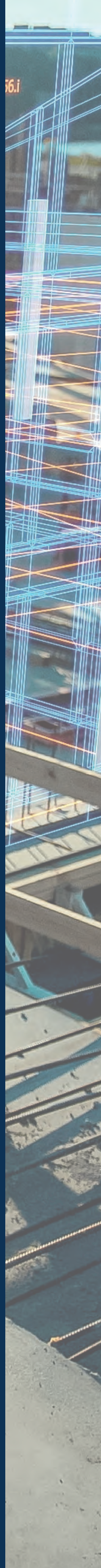
DIGEST

MANAGING PROJECTS AND DISPUTES



Welcome to the 26th Digest

I am delighted to welcome you to the 26th edition of the Driver Trett Digest. It is with great pleasure as the new Chair of the Group, that I write this introduction to the Digest with contributions from our people across the UK and mainland Europe, the Middle East and our Diales technical team covering a wide variety of topics.

I would like to start by thanking Scott Stiegler of Vinson and Elkins for his contribution to this edition, turn to page 12 to gain some of his insight into claims for prolongation costs.

Vincent Fogarty, Vice Managing Director of Diales Technical, looks at what corporate sustainability is and how we can make an impact.

Paul Mullen attempts to demystify cause and effect by discussing several of the essential elements for substantiating cause of delay and the subsequent effect.

From our Parisien team, Natasha Fortune, gives us an introduction to disruption claims, what they are, and some practical tips on how to succeed, and Mark Blackmore from the UK has procurement blues – why aren't things the way they used to be, and how they've changed. Amongst other excellent contributions from our global team.

You may notice that this issue has a new look and feel. We are constantly striving for the Digest to be an engaging and intriguing read, so, after 12 editions and 6 years since our last design update, we felt it was time to move the Digest forward again; never compromising on its quality.

I hope you enjoy this edition and all it has to offer. I look forward to meeting more of you in the near future, including the contributors to our updated Digest.

Shaun Smith
Non-Executive Group Chair

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EARNED VALUE

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BETTER PERFORMANCE MANAGEMENT FOR BETTER PROJECT OUTCOMES

WHAT IS EARNED VALUE?

Earned Value Management (EVM) can be a dry subject for some, however, the practicality and the benefits it can provide for organisations make it worthy of consideration.

EVM is a project controls process which, some say, comprises best practice to objectively measure and manage a project's scope, plan, and cost performance in a structured way.[1]

The basis of the method is to set up a performance measurement baseline (PMB - the baseline programme or schedule) which must include the defined scope breakdown and associated assumptions, the activities scheduled with the correct logical sequence and the resources or costs/time associated with the schedule. Then, one needs to keep track of the status of the planned work, physical percentages achieved of the different tasks, and the actual spend to date of the project's budget.

1. Association for Project Management. (2013). Earned Value Management Handbook. Princess Risborough: APM Princess Risborough.

WHAT IS IT USED FOR?

As EVM integrates planning, cost control and the definition of the project scope into a single tool,[2] it is used to forecast the final cost and project duration, and hence can act as an early warning system to provide opportunities to prevent and/or mitigate or overcome delays and cost overruns. Another positive aspect of EVM is that the data should provide points against which to objectively measure the project status (in time and cost).

EVM reporting, when done correctly and accurately, enables the user to see what has been achieved of the planned work and what the cost of it was.

Also, it should show if this cost is greater or lower than the planned budget (Cost Performance Index – 'CPI') and if the project is ahead or behind the planned schedule (Schedule Performance Index – 'SPI').

2. Candido, L. F., Heineck, L. F., & Neto, J. d. (2014). Critical Analysis on Earned Value Management (EVM) technique in building construction. Oslo, Norway: Proceedings IGLC-22.

DEFINITION OF MAIN PARAMETERS

It may sound complicated, but the main parameters or data points/metrics required for the analysis are low in number and can be counted on the fingers of one hand.

This measurement system uses the scheduled amount of work (Planned Value) with the achieved amount of work (Earned Value) at a point in time,[3] then measures the Earned Value against the cost (Actual Cost) of achieving that work. With these three data points one can calculate the true performance of the project and a trend analysis can be drawn of where the project might be heading to...

In simple terms:

(i) Planned Value (PV) also called Budgeted Cost of Work Scheduled (BCWS) is the initial plan for the work to be completed, otherwise known as the budget.

(ii) Earned Value (EV) also known as Budgeted Cost of Work Performed (BCWP) is the proportion of the budget that has actually been done, i.e., what is physically complete (% of the Plan).

(iii) Actual Cost (AC) also known as Actual Cost of Work Performed (ACWP) is the true cost of the work completed to date, in financial terms the sum of all the costs actually accrued for a project to date.

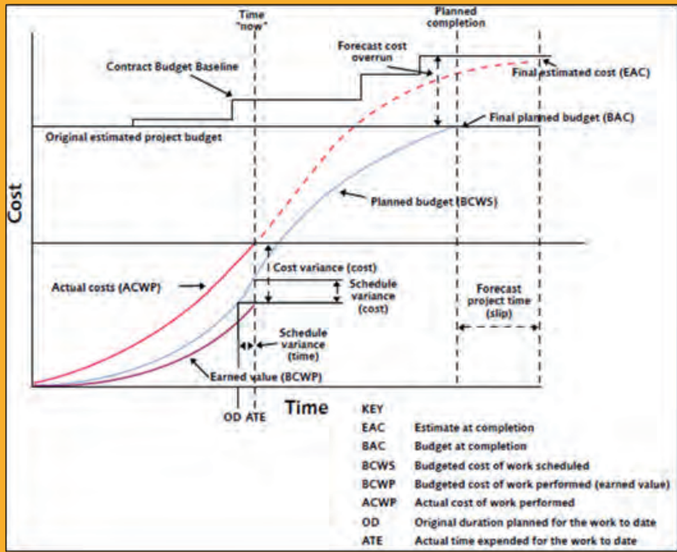
Figure 1 shows the correlation between the three metrics in terms of variances and indices. The first and foremost important one is Schedule Variance (SV) = EV – PV and it represents how much the project is ahead (when SV>0) or behind (when SV<0) the scheduled time of completion. In the graph it can be seen that the schedule variance can be measured in both time and cost.

Cost Variance (CV) = EV – AC indicates how much is the project is under (CV>0) or over (CV<0) its originally budgeted value. It must be mentioned that these cost variations are subjected to errors due to the correct set up of cost control systems.[4]

Two other main calculations provide a further outlook of the project's performance. Schedule Performance Index (SPI) = EV/PV, and Cost Performance Index (CPI) = EV/AC, where SPI represents production productivity in relative terms and CPI informs how efficiently resources are being used. If it should be seen that either are below 1, then the project is experiencing difficulties i.e., is behind schedule or over budget, respectively.

3. Association for Project Management, (2015). Planning, Scheduling, Monitoring and Control. The Practical Project Management of Time, Cost and Risk. Princes Risborough: APM.

Figure 1. EV Graph including Trend Analysis



Source: Association for Project Management 2013 //EV Management: APM Guidelines (2008)

For true project control enthusiasts and subsequently for a project's management, the forecasting indicators (Figure 2) can be even more valuable as they show that if no corrective or mitigating actions are taken, the project may be late with an associated cost overrun.

Figure 2. EV Forecasting Indicators

Indicator	Equation	Interpretation
Budget at completion (BAC)	-	BAC represents total budget at completion; at completion PV=BAC
Estimate at completion (EAC_t)	$EAC_t = \frac{BAC/SPI}{BAC/months}$	The estimated completion time for the project if the work continues at the current rhythm
Estimate to complete (ETC)	$^1ETC = BAC - EV$	Cost to complete the project if all packages remain achieving the goals of time and cost, irrespective of what happened to EV
	$^2ETC = \frac{BAC - EV}{CPI}$	Cost to complete the project assuming that current cost performance will remain the same (as occurred up to EV) throughout the rest of the project
	$^3ETC = \frac{BAC - EV}{CPI \times SPI}$	Cost to complete the project assuming that current performance cost and schedule performance will remain the same as occurred up to EV) throughout the rest of the project
Estimate at completion (EAC)	$^1EAC = AC + BAC - EV$	Final cost of the project based in the original budget. The optimistic scenario assumes that all remaining work will be performed just with what remains on the initial budget.
	$^2EAC = AC + \frac{BAC - EV}{CPI}$	Final cost of the project if current performance trends to CPI continue. The realistic scenario assumes that all work remaining will performed with the actual CPI.
	$^3EAC = AC + \frac{BAC - EV}{CPI \times SPI}$	Final cost of the project if current performance trends to CPI and SPI continue. The pessimistic scenario assumes that all work remaining will performed with the actual CPI and SPI, both in terms of cost and durations.
Variation at completion (VAC)	$VAC = BAC - EAC$	Cash balance at completion
To-complete performance index (TCPI)	$TCPI = \frac{BAC - EV}{BAC - AC}$	CPI to recover cost variances from the moment EV and AC are evaluated up to project completion
Legend: [1]optimistic scenario; [2]Realistic scenario; [3]Pessimistic scenario.		

Source: (Candido Heineck & Neto 2014)

4. Candido, L. F., Heineck, L. F., & Neto, J. d. (2014). Critical Analysis on Earned Value Management (EVM) technique in building construction. Oslo, Norway: Proceedings IGLC-22.

BENEFITS OF USE AND VALUE ADDED

With the use of EVM to measure project performance, management can have more certainty of a project's position in terms of what work has been achieved against the baseline and also what it has cost to achieve that amount of work.

The value for money equation (CPI) gives a good indication of whether the work done has been achieved efficiently. Earned Value Management provides data that can inform time and cost recovery action plans to avoid or mitigate major cost and time overruns. If the Change Control System behind EVM is set up correctly it can help manage the risks associated with scope creep throughout the project. If EVM is applied across an organisation's portfolio of projects, it can assist with good governance of how progress and performance of that portfolio is managed. With the cost management capabilities of EVM, cash-flow can be measured correctly and optimised if appropriate corrective actions are taken.

EVM is also one of the industry recommended methodologies for measuring loss of productivity, and one of the most common approaches followed when determining loss of productivity compensation via construction claims, as we shall develop further in our regional analysis. The following is an example of where EVM has been very effectively used.

London 2012 Olympics is one of the great examples of EVM usage to complete the venues on time and to the set budget by the U.K. government and the Olympic Committee. At the Olympics it can be seen that the system requirement to integrate several systems like Primavera P6 planning tool with the cost system through COBRA was fundamental to the setup. The EVM system benefited the 2012 Olympics with disciplined approach to measuring performance against a plan, it was a powerful tool for establishing Trends and giving Early Warnings. It acted as an enabler for Risk identification & implementation of successful mitigation action plans, also facilitated effective forecasting.[5]

A similar approach has been used at the London Power Tunnels project where the rewire of the capital electricity system used the same EVM approach to manage and control the project performance.

EARNED VALUE AS A RECOMMENDED TOOL TO MEASURE LOSS OF PRODUCTIVITY IN CLAIM PREPARATION AND IN DISPUTE RESOLUTION PROCEEDINGS

Loss of productivity is often one of the major causes of additional costs incurred in a project. EVM is one of the most common methods used to calculate loss of productivity where a claim is made for the same.

Loss of productivity occurs if a contracting entity does not reach its expected or achievable production rate. It can be described for example as that entity producing less than its anticipated output per hour of work. In such instances, the entity is spending more effort per unit of production than initially anticipated.

Two of the most internationally recognised advisory bodies in the fields of construction and engineering dispute resolution and project controls are the Society of Construction Law (SCL) and the Association of American Cost Engineers (AACE).

The SCL´s "Delay and Disruption Protocol 2nd Edition 2017[6]" under its chapter "Methods of Disruption Analysis" and the AACE´s "Recommended Practice 25R-03 – Estimating lost labour productivity in construction claims[7]" consider certain methodologies to be used to measure/analyse disruption. Both bodies give preference to the use of Project Specific methodologies in order to assess disruption. The SCL set out the following methodologies which it considers appropriate.

Figure 3. SCL Methods of Disruption Analysis

Productivity-based methods	Cost-based methods
1. Project-specific studies:	1. Estimated v incurred labour
(a) Measured mile analysis	2. Estimated v used cost
(b) Earned value analysis	
(c) Programme analysis	
(d) Work or trade sampling	
(e) System dynamics modelling	
2. Project-comparison studies	
3. Industry studies	

Source: SCL Delay and Disruption Protocol 2nd Edition

5. Marshall, A. (2019). Olympic Delivery Authority* Earned Value in the London 2012 Programme. Retrieved from SlidePlayer: https://slideplayer.com/slide/15019922/
6. SCL´s "Delay and Disruption Protocol 2nd Edition 2017" – Methods of Disruption Analysis.
7. AACE´s "Recomended Practice 25R-03" – Estimating lost labour productivity in Construction Claims.

Within the project specific studies, the most widely accepted method of calculating lost productivity according to the SCL is the Measured Mile Analysis. Earned Value is also one of the most reliable methodologies as can be observed in the figure below.

(i) Measured Mile compares productivity for two similar tasks when one of them is affected by disruption and the other is not. This is not always an option in cases where there is not a section on the works with similar circumstances to the section that is being analysed that has not been disrupted.

(ii) Earned Value compares productivity of the task affected by disruption against the planned productivity for that task.

Overall, it can be said that, Earned Value is a methodology which provides high reliability and requires a moderate amount of contemporaneous records, which makes it a good option when preparing and quantifying loss of productivity claims.

When performing an Earned Value analysis, the first thing necessary is to prove that the planned productivity or contract productivity is realistic. In order to prove that one ought to substantiate the productivity used based on construction cost databases, machine specifications or other recognised studies in the field.

By comparing both productivities (actual or current vs contractual or planned) one would be able to evaluate the loss of productivity.

If the project is divided into windows and sections where disruption is clearly identified, it is possible to get a measure of that disruption by applying EVM.

WHICH REGION USES IT THE MOST?

EVM is commonly used in the United States, the UK and in countries where the UK historically has had influence and involvement such as parts of the Middle East and Asia Pacific.

EVM is typically used in medium range and large projects and where there is budget for dedicated project controls resources.

SUMMARY

To be effective, EVM ought to be set up as early as possible upon commencement of a project, where the Cost Breakdown Structure (CBS) and the Work Breakdown Structure (WBS) may not yet be defined, in order that they can be defined in parallel. A correct fit between the CBS and the WBS is a crucial factor in successful EVM implementation.

On a world where the project requirements are rapidly growing and where the uncertainty can easily turn the results of a project from benefits into losses, a correct EVM implementation is a key objective to understand the cost and time position of a project at any given moment, and thus, implement the necessary measures to mitigate risks and ensure its success.

"Action is the foundational key to all success" – Pablo Picasso

INTRODUCTION TO DISRUPTION CLAIMS

Natasha Fortune
Senior Consultant
Paris, Driver Trett France

WHAT IS DISRUPTION ON A CONSTRUCTION PROJECT?

Disruption is defined by the second edition of the Society of Construction Law, Delay and Disruption Protocol (the "SCL Protocol") as:

"disturbance, hindrance or interruption to a Contractor's normal working methods, resulting in lower productivity or efficiency."[1]

For quantum, the crucial point of a disruption claim are the additional costs incurred, over and above the planned resources, due to a loss of productivity caused by unanticipated interruptions to the planned work progress. The consequence is a reduced rate of work which leads to an increase in direct hours spent on the relevant disrupted work. Examples of disruption include site access problems, changes in the work sequence, design changes, crowding of trades, fragmented work gangs, overtime, rework, labour availability and poor morale.

1. SCL Delay and Disruption Protocol 2nd Edition: February 2017.

DISRUPTION VS DELAY

As Hudson's Building and Engineering Construction Contracts states:

"The distinction between delay and disruption is important, but rarely articulated, and is to an extent a matter of definition. Delay is usually used to mean a delay to the completion date, which presupposes that the activity which was delayed was on the critical path. Disruption to progress may or may not cause a delay to overall completion, depending on whether the activity delayed is on the critical path as explained above, but will result in additional cost where labour or plant is under-utilised as a consequence of the event."[2]

Although the two common claims frequently overlap, only critical events are relevant for prolongation costs and may lead to compensation. Disruption claims are compensation for less than expected productivity of labour and/or equipment.

2. See Hudson's Building and Engineering Contracts, 13th edition, Chapter 6 - Section 6.15.

Disruption can be for critical, or more often, non-critical events. Therefore, winning an extension of time claim may not result in the recovery of losses associated with the disruption on site. However, the disruption rather than critical delay has often caused much of the losses suffered.

COMPLY WITH CONTRACT NOTIFICATION

Complying with contract notification may be stating the obvious but giving 'notice' is the prerequisite to bringing any claim.[3] Failure to comply with your contract notice provisions within stipulated timescales can be fatal and can result in the failure of the disruption claim in its entirety.[4]

DISRUPTION CLAIMS - HOW TO SUCCEED

For a disruption claim to be successful, the three elements of the 'common sense' approach need to be proven:[5]

1. Events occurred which entitle the claiming party to loss and expense;
2. That those events caused disruption to activities;
3. That the disrupted activities caused loss and/or expense to be incurred.

ESTABLISHING THE EVENT AND CAUSATION

Disruption claims are arguably harder to detect, prove and measure than other financial claims. Loss of productivity is often not identified until after it has occurred, and determining which work element(s) and trade(s) are suffering losses due to disruption depends on the quality of records to explain why those losses have occurred. By interviewing relevant personnel on site, the contractor often identifies the type of events that have occurred and the prospect of a successful claim. However, to satisfy cause and effect, it is necessary to analyse factual, contemporaneous project records such as project correspondence, progress records, site diaries, allocation of timesheets and meeting minutes. The better the records, the greater chance of being successful. It is no secret that a lack of records and reporting is unhelpful.[6]

3. Disrupted? Prove It! (Fenwick Elliott, Insight Issue, May 2017).
4. Van Oord and another v Allseas UK Ltd [2015] EWHC 2074 (TCC).
5. Walter Lilly & Company Limited v (1) Giles Patrick Cyril Mackay (2) DMW Developments Limited [2012] EWHC 1773 (TCC).
6. Van Oord and another v Allseas UK Ltd [2015] EWHC 2074 (TCC).

The better the records, the greater the chance is of being successful, and contractors should always take account of the quote of Max Abrahamson in his book, 'Engineering Law and the ICE Contract':

"A party to a dispute, particularly if there is an arbitration, will learn three lessons (often too late): the importance of records, the importance of records and the importance of records."

MEASURING DISRUPTION

Once the events in question have been identified as causing disruption, and a loss of productivity, the next step is to value the disruption.

The SCL protocol provides two categories: productivity-based methods, and cost-based methods.

Productivity-based methods	Cost-based methods
1. Project specific studies a. Measured mile analysis b. Earned value analysis c. Programme analysis d. Work or trade sampling e. System dynamics modelling 2. Project comparison studies 3. Industry studies	1. Estimated v incurred labour 2. Estimated v used cost

This introductory article will only cover the preferred productivity-based method, the "measured mile analysis."[7] This method works best on linear projects such as roads, rail and/or where there is repetitive work, such as cable laying.

A measured mile analysis looks at work productivity levels during the non-disrupted performance period, establishing the 'baseline' productivity ratio. Then, the baseline productivity ratio is compared against the claim-impacted performance period. The difference between the impacted and unimpacted ratio is the lost productivity. However, this assumes that the contractor can find an undisrupted period to use as a comparison or can prove it could achieve the productivity rates in the tender based on contemporary project records. What not to do is advance a disruption claim on a 'total cost basis'. Measuring loss by comparing resources planned with resources consumed, making no effort to prove causation, or to take into account other factors, is unlikely to succeed.

7. SCL Delay and Disruption Protocol 2nd Edition: February 2017.

This is because many causes can result in lower productivity which are unrelated to the claimed basis for disruption, including inadequate tender/tender sufficiency, poor planning, and reworks due to defects, as well as internal issues such as learning curves and staff turnover.

PRACTICAL TIPS

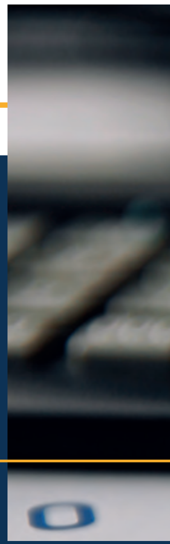
Although all the methods listed in the SCL Protocol are acceptable, as a rule, the easier the method for proving disruption, the least likely it will succeed.[8] Therefore, the most reliable analysis is methods which rely on contemporaneous information drawn from the specific project in question.

The type of records needed are generally the same as the records required for delay analysis:

- Tender documentation: the process and assumptions should be consistent with the tender information, for example, the location of material deliveries, size and capacity of the plant, any restrictions on sequencing etc.
- Contract notices and other contractual correspondence.
- Project programme: Include start and finish dates for each sub-contract activity and location to determine when and where activities were planned.
- Dated, time-stamped and catalogued progress photographs, including locations: To illustrate what actually happened, where and when.
- Substantiation of costs: Company database for costs incurred, paid and allocated to the project, invoices, and other payment records.
- Comprehensive site diary and other progress reports documenting information such as factors affecting work progress, key dates such as commencement of activities and progress of each activity, weather, labour, resources and materials deliveries.
- Minutes of meetings.
- **The contractor should keep note of the following:**
  - Intermittent working and reasons
  - Instructions, variation/compensation events, design or specification changes.
  - Access issues, obstructions, or orders to stop work in an area. Include a description of the progress at the time and when this obstruction or order to stop was removed.

This article introduced disruption to a construction project. As a recap, this article covered the difference between disruption and delay, the importance of complying with contract notification, and how to succeed in a disruption claim. Lastly, the article provided some practical tips.

8. Disrupted? Prove It! (Fenwick Elliott, Insight Issue, May 2017)



CLAIMS FOR PROLONGATION COSTS

Scott Stiegler, Partner — International Construction Disputes, Vinson and Elkins

A familiar situation: the project is late, but relief is in sight. The time for completion has been extended, so we can claim for our additional costs. However, the groundwork for such a claim should not be overlooked.

Prolongation costs are categorised as time related costs incurred as a result of a critical delay event extending the duration of the works for reasons not attributable to the contractor. Such claims, however, do not automatically flow from a successful extension of time claim, particularly, for example, where there has been concurrent delay.

When bringing a prolongation costs claim, a contractor should consider carefully the contractual terms, paying attention to the following:

1. What notification requirements exists;
2. The evidence needed to demonstrate the causal link between the delaying event and costs incurred; and
3. How costs are to be substantiated.

NOTIFICATION

When an event arises which a contractor considers may cause critical delay and consequently, will result in additional time-related costs, thought should immediately be given to the contractual notice provisions. In particular:

1. The form and method of delivery for the notice;
2. The timing of the notice; and
3. The content of the notice.

The form and delivery method for the notice are often specified in the contract, including for example, the requirement to be in writing, to whom it should be addressed, and the method of delivery. Notice provisions are regularly drafted to operate as a condition precedent to entitlement, meaning failure to comply could result in losing the right to bring the claim. Such provisions are readily enforceable, and examples are found in a number of standard form contracts, including the FIDIC suite of contracts.

Whilst the precise wording is determinative of whether the provision will be treated as a condition precedent, where there is a failure to comply with the contractual notice provisions it can still affect entitlement because of breach of contract.[1]

The required content for a notice will also be contract dependent. It is best practice to notify the type of claim being made. When it comes to notifying a claim for an extension of time, it is prudent to also notify of the corresponding claim for prolongation costs at the same time.

CAUSATION

Having notified the claim, the contractor should turn to causation. A claim for prolongation costs is a claim for actual time related costs incurred as a result of the delay. A common pitfall is the belief that the analysis necessary to establish entitlement to an extension of time will be the same as that needed to demonstrate an entitlement to prolongation costs.

As explained in Costain Limited v Charles Haswell & Partners Limited: "in order to recover substantial damages, the contractor needs to show what losses he has incurred as a result of the prolongation of the activity in question. Those losses will include the increased and additional costs of carrying out the delayed activity itself as well as the additional costs caused to other site activities as a result of the delaying event. But the contractor will not recover the general site overheads of carrying out all the activities on site as a matter of course unless he can establish that the delaying event to one activity in fact impacted on all the other site activities."[2]

1 London Borough of Merton v Leach (1986) 32 BLR 51, page 54 and 90 on issue 14.
2. Costain Limited v Charles Haswell & Partners Limited [2009] EWHC 3140 (TCC) at paragraph 184.

A QUICK, HOW-TO GUIDE

Notably, the court stated that "simply because the delaying event itself is on the critical path does not mean that in point of fact it impacted on any other site activity save for those immediately following and dependent upon the activities in question."[3]

Consideration must therefore be given to the type of analysis used to demonstrate the causal link between delay and costs.

Consistent with this, the Society of Construction Law (SCL) Delay and Disruption Protocol, notes that the objective of a claim for prolongation costs is to financially put the contractor in the position it would have been in if the employer risk event had not occurred.[4]

Whilst there might be a tendency to bring a global claim, these suffer typically from relying on assumptions and the general inability to sufficiently demonstrate causation accurately, or at all. Such claims are rarely successful.

SUBSTANTIATION

The contractor has the burden of proof to demonstrate its claim. It must show that: (1) the costs have or will actually be incurred, (2) they were incurred as a result of a relevant delay event and (3) such costs are recoverable under the terms of the contract. Having appropriate evidence to discharge this burden is of critical importance.

At the outset of a project, a contractor should give due consideration to the type and detail of records to be kept and should establish and maintain effective record keeping systems. It must also consider what documents the contract requires it to keep.

3. Costain Limited v Charles Haswell & Partners Limited [2009] EWHC 3140 (TCC) at paragraph 184.
4. Society of Construction Law's Delay and Disruption Protocol, Principle 20

Keeping well-organised records will allow a contractor to consider what records it has available and can also help identify gaps in records, for example, where a third party is the custodian for certain documents.[5]

Therefore, appropriate documentation requirements in subcontracts ought also to be given consideration.

When identifying the evidence to substantiate the claim, the contractor should review the records from the time period the delaying event was felt, not the period the project was extended into. The objective of the records is to demonstrate causation (e.g., 'but for' the delay event, the costs would not have been incurred) and to quantify the costs claimed. Many industry bodies provide helpful guidance as to what records to keep,[6] with examples including timesheets, daily reports, photos or videos of the works and pay roll records.

CONCLUSION

The key points to remember for bringing a well presented prolongation costs claim are these:

1. Always pay close attention to the requirements of the contract, particularly for demonstration of entitlement and notification;
2. Do not assume that an extension of time will automatically lead to a claim for prolongation costs;
3. Demonstrating causation is key; and
4. Always keep detailed records to sufficiently evidence the claim.

5. The Leicester Bakery (Holdings) Ltd v Ridge And Partners LLP (Rev 1) [2020] EWHC 2430 (TCC), in particular paragraph 15 in which the claimant alleged loss on the basis that Ridge held certain documents it needed during an adjudication between itself and a third party.
6. See, for example, Appendix B of the SCL Delay and Disruption Protocol, in particular Paragraph 4 which covers cost records; and CLC Covid-19: Contractual Disputes & Collaboration Guidance Record Keeping Guidance. Whilst this guidance was drafted in respect of Covid-19 claims, the general principles are useful for record keeping generally.

AN EXPERT IN CIVIL ENGINEERING?

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To many, this is a difficult concept; given the breadth of civil engineering they see a conflict with the principle of being an expert on such a broad topic. Of course, I do not see it quite like that, but it is probable that most would say I am biased! To support my case, I offer the following:

It appears to me that the crux of the concern relates to the definition of civil engineering.

The term civil engineer was first coined by John Smeaton in 1750 to contrast between the engineer working on civil projects and military engineers. Interestingly, he is also considered to be the first expert witness to appear in an English Court, when he testified on the silting-up of a Norfolk harbour in 1782.

Over the years I have come across many definitions of civil engineering. When I first started work, there was the traditional description by Thomas Tredgold which was essentially adopted by the Institution of Civil Engineers (ICE) in their Royal Charter:

".....being the art of directing the great sources of power in Nature for the use and convenience of man, as the means of production and of traffic in states, both for external and internal trade, as applied in the construction of roads, bridges, aqueducts, canals, river navigation, and docks, for internal intercourse and exchange; and in the construction of ports harbours, moles, breakwaters, and lighthouses, and in the art of navigation by artificial power, for the purposes of commerce; and in the construction and adaptation of machinery, and in the drainage of cities and towns."

Arguably, this definition may well have been influenced by Leonardo da Vinci, when he said:

"Civil Engineering is a noble profession that should be pursued for the public good."

In the 1980s, anybody who needed a hole bored could have found a somewhat insulting listing within the London Yellow Pages as: "Boring: see civil engineers" Thankfully this has now been changed and the ICE definition has also been updated. Turning to the modern day, I asked ChatGPT:

"Civil engineering is a branch of engineering that deals with the design, construction, and maintenance of the infrastructure that we use every day. This includes buildings, roads, bridges, airports, dams, water supply and sewage systems, and other communal facilities. Civil engineers use technical and analytical skills to plan, design and construct these structures in a way that can enhance public safety, promote longevity, and minimise environmental impact. Their expertise is also required to evaluate and manage potential risks and contingencies associated with natural disasters and other emergencies."

Given all the above, I would make two points:

Firstly, in broad terms, there seems to be something of an overlap with structural engineering. Traditionally, of course, there are close linkages. In my view, structural engineering is a specialised branch of civil engineering that focuses on designing and analysing structures such as buildings, bridges, and other constructions to ensure their safety, stability, and durability. To me, the main difference between the two is that structural engineering focuses on the design and analysis of structures, while civil engineering encompasses a wider range of disciplines; combining sustainability, resilience, safety and security, and involving the planning, design, construction, and maintenance of infrastructure. Civil engineering is everything you see, and much you don't see, that has been built around us and the kinds of things we take for granted but would find life very hard to live without. It is the profession of planning, designing, and executing works that serve society such as roads, railways, airports, ports, schools, offices, hospitals, water, sewage systems, power supply and other infrastructure.

The second point is that none of the above descriptions provide any guidance as to what technical disciplines are covered within civil engineering. This highlights further uncertainty in identifying precisely what skills a civil engineer possesses, and the misconception that all civil engineers possess the same knowledge.

With such a broad description, it possibly explains why civil engineers do not always come from a conventional engineering background of having mainly studied maths and physics – with many having come from backgrounds comprising planning, geography, science and the environment. Such diverse backgrounds provide an ideal wealth of wider knowledge, characteristic of a civil engineer.

Such a wide background available to civil engineers not only enables them to successfully grapple with the challenges of co-ordinating specialists but it also means that their own individual specialisms may be taken from a far broader spectrum. Significantly, as major infrastructure projects are getting bigger and more complex, with a seemingly ever-increasing range of specialist disciplines, the co-ordination and integration often (at least in terms of engineering) falls to the civil engineer, making use of their broad-based skills. Often labelled as project managers, these civil engineers have a broad breadth of experience that is frequently tested as an expert.

The overall educational standard for engineers is a subject in which I have become increasingly involved with over recent years. My involvement with the UK Engineering Council, Joint Board of Moderators and International Engineering Alliance particularly with accreditation of university courses both in the UK and overseas, has enabled me to appreciate the link between the demands of society/industry and the university curriculum.

The construction industry is changing rapidly not least due to issues such as sustainability, health and safety etc., but also in the context of emerging technology with the increasing development of computer software including BIM and most excitingly, AI. In my view, AI will not only impact design and construction but will inevitably need to be embraced by expert witnesses and indeed the courts.

My involvement with engineering education has also given me an insight into how civil engineering can be reasonably categorised under four main headings, each of which covers several sub-disciplines. I summarise this in the following table and in the absence of anything more definitive commend its use in demonstrating the range of skills that fall under civil engineering.

Of course, the disciplines / sub-disciplines shown can be further sub-divided, for example a highways expert may have chosen to specialise in pavement or alignments or lighting. It follows that a civil engineering expert can be expected to have specialised in one (or more) of the discipline skills shown with a generalist more likely to have their knowledge and experience spread across a far greater number of disciplines/sub-disciplines. These specialisms within disciplines seem to me to be very similar to the way that a structural engineering expert may have chosen to specialise in, say, the design of high-rise building within seismic zones.

To help further illustrate the breadth of civil engineering, and what a civil engineering expert may become involved in I provide, via superscripts below, a selection of examples from my own experience:

Transport	Utilities	Drainage	Structures and Geotechnics
Airports[1]	Power[2]	Foul water[3]	Buildings
Railways[4]	Water, including Fire water	Surface water	Bridges
Metro/LRT[5]	Chilled water	Irrigation/TSE	Retaining walls
Ports	Communications	Rivers/Open channels	Dams
Roads[6]	Oil & Gas	Hydrology	Tunnels
Traffic[7]	Renewables		
Pedestrian /cyclists			

In conclusion – civil engineering provides a canopy under which there are many specialisms, disciplines and sub-disciplines. It is quite normal for civil engineering experts to practice in, at least, one particular specialism whilst still bearing the title of civil engineer. Other civil engineering experts have developed their background skills over a much wider range of specialisms focusing more on overall co-ordination.

As with choosing any expert, it is vitally important to ensure their attributes are well matched to the task. Given the diverse range of specialisms within civil engineering, finding an appropriate expert can be especially demanding. The selection process may not be helped with having to contend with the detailed technical jargon and, for example, whether the subject is best addressed by an electrical engineer or a civil engineer who has specialised in power. Of course, when looking for more of a co-ordinator, it is clearly important that they have at least knowledge of the various disciplines involved.

1. Expert report on the design, co-ordination and supervision of civil engineering and utilities, in an arbitration relating to a major international new-build airport.

2. Expert report concerning the forecasting of demand and identification of reinforcement of power and water supplies, to sustain growth in operations of a major international airport.

3. Expert report commissioned by insurers relating to the damages incurred to commercial property arising from foul drainage problems occurring during the construction of an adjacent by-pass.

4. Expert report for inquiry into the Great Heck train crash, covering the suitability / adequacy of highway barriers limiting incursion onto the railway.

5. Expert reports and provision of evidence at a public inquiry on transportation and traffic impacts for the original TWA Environmental Assessment of the Thameslink 2000 Rail project.

6. Expert report and Joint Statement on road humps that had been constructed on a private road which provided access to a specialist car repairer, who claimed their vehicles were being damaged by the humps.

7. Expert report on the adequacy and safety provision of service yard facilities at a major superstore, where an employee had been crushed to death by a lorry reversing. Evidence given in the Crown Court.

The world's first 3D-printed commercial building, Dubai, UAE.
Dubai Future Academy (DFAc)

REVOLUTIONISING THE CONSTRUCTION INDUSTRY

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EXPLORING MODERN METHODS OF CONSTRUCTION AND MITIGATING DISPUTES

Construction has undergone a remarkable transformation in recent years with the adoption of Modern Methods of Construction (MMC). These innovative approaches have revolutionised the construction process and introduced strategies to mitigate construction disputes. From modular construction to 3D printing, MMC techniques offer numerous benefits such as increased efficiency, sustainability, and affordability while addressing common sources of conflicts. In this article, we delve into the exciting world of modern construction methods and explore how they can help minimise construction disputes while highlighting potential challenges.

DESIGN AND PLANNING

Inadequate design and planning are common primary causes of construction disputes. Traditional methods often lead to misunderstandings, miscommunication, and errors during construction. However, modern methods such as Building Information Modelling (BIM) have significantly improved design and planning practices. BIM enables stakeholders to create a comprehensive virtual representation of the project, facilitating effective collaboration and reducing design-related disputes. By identifying clashes and optimising design solutions before construction begins, BIM can minimise conflicts between parties and enhance project coordination.

While BIM has transformed information creation and dissemination, it does have drawbacks. Its effective implementation is expensive and complex, discouraging so far, its widespread adoption, especially on smaller projects and in less affluent regions. Differing levels of BIM adoption within a project team can also be an issue, as it relies on common standards and specific software and file formats. Compatibility issues and data loss may occur without adherence to these standards. Furthermore, BIM heavily relies on accurate and complete input data to generate reliable models. Flawed or incomplete data can lead to inaccuracies and rework during construction.

Local statutory requirements should also be considered when using MMC methods like modular construction. In the UK, the “Manual to the Building Regulations” published by HM Government, points out that existing approved technical guidance documents may not be applicable to MMC. Designers may need to go further to ensure compliance with Building Regulations for such structures, rather than relying solely on established guidance. Demonstrating the overall robustness of a structure can become more challenging and burdensome for designers compared to traditional methods, potentially leading to conflicting conclusions on compliance with regulations.

ENHANCED QUALITY CONTROL

Construction disputes often arise due to issues related to quality control and workmanship. Modern methods of construction, such as modular construction and prefabrication, offer controlled factory environments for manufacturing building components. These controlled conditions ensure higher quality control, leading to fewer defects and errors. By minimising the risk of poor workmanship, MMC techniques reduce the likelihood of disputes related to construction defects, delays, or non-compliance with specifications.

However, prefabrication introduces new challenges. Damage during transportation and handling is a common problem, especially with partially finished modular units containing delicate components. Off-site construction requires precise measurements and alignment of components. Any deviation from the required dimensions can result in assembly difficulties, poor fit, and compromised structural integrity. Maintaining tight manufacturing tolerances and constructing in situ elements with equal accuracy are important considerations.

STREAMLINED PROJECT TIMELINES

Delays in project completion are a common source of disputes in the construction industry. Modern methods of construction, such as modular construction and prefabrication, offer significant advantages in terms of project timelines. Off-site manufacturing allows for simultaneous construction activities, reducing construction time and minimising the impact of adverse weather conditions. By accelerating project schedules, MMC techniques mitigate the risk of delays and associated disputes, promoting smoother project execution and client satisfaction.
This can increase the criticality of early stage works – if, for example, off-site manufacture of modular units requires certain substructures to be in place prior to their arrival, any delays in their completion could lead to unforeseen storage and transportation costs which might not arise with traditional methods.

A further consideration is the impact that late changes may have upon production processes. Alteration of manufacturing lines can have significant implications on cost and programme, which may have been possible to resolve promptly with in situ construction. Ensuring the design is finalised well before production commences is critical.

CLEARER CONTRACTUAL ARRANGEMENTS

Construction disputes often stem from ambiguous or poorly drafted contracts. However, modern construction methods have encouraged a shift towards more detailed and standardised contractual arrangements. With MMC techniques, contracts can include specific provisions related to modular construction, 3D printing, or prefabrication, addressing potential challenges and clarifying responsibilities. Both NEC4 and FIDIC contract suites have introduced and addressed BIM protocols, as the adoption of BIM increases worldwide. Clearer contractual arrangements minimise disputes by establishing a mutual understanding of project expectations, deliverables, and risk allocation.

However, these new techniques come with new challenges that must be resolved. Methods like modular construction often require substantial costs for the contractor at an early stage of the project, which needs careful consideration. Dealing with changes can be challenging due to the lack of flexibility often associated with MMC, and managing the supply chain becomes crucial when timely delivery of components and materials is critical. Untangling liability for defects can also be complex, given the intricate contractual frameworks underlying these elements.

COLLABORATION AND COMMUNICATION

Effective collaboration and communication are vital in preventing and resolving construction disputes. MMC promotes enhanced collaboration through the use of digital technologies and platforms. BIM, for instance, fosters communication among different project teams, facilitating early identification and resolution of conflicts. Furthermore, MMC techniques require close coordination between designers, manufacturers, and construction teams, encouraging proactive problem-solving and reducing the likelihood of disputes arising from miscommunication or lack of coordination.

CONCLUSION

Modern methods of construction have ushered in a new era for the construction industry, not only in terms of efficiency, sustainability, and affordable construction techniques, but also providing opportunities to mitigate construction disputes. If integrated and properly coordinated, through improved design and planning, enhanced quality control, streamlined project timelines, clearer contractual arrangements, productive collaboration, and effective alternative dispute resolution mechanisms, MMC techniques have the potential to significantly reduce the risk of conflicts arising during construction projects.

As the industry continues to embrace these innovative methods, efficiencies in construction techniques will continue to be realised – provided all stakeholders are willing to work collaboratively and embrace change.

MMC techniques require close coordination between designers, manufacturers, and construction teams, encouraging proactive problem-solving and reducing the likelihood of disputes arising from miscommunication or lack of coordination.

WHAT IS CORPORATE SUSTAINABILITY?

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The United Nations (UN) defines sustainable development as 'development which meets the needs of the present without compromising the ability of future generations to meet their own needs'[1] It recognises that organisations can affect the economy, environment and people through their activities and business relationships, making negative or positive contributions to sustainable development. In 2015, all UN Member States adopted the 2030 Agenda for Sustainable Development,[2] which provides a shared blueprint for peace and prosperity for people and the planet, now and into the future. At its heart are 17 Sustainable Development Goals (SDGs) shown in Figure 1, which are an urgent call for action by all developed and developing countries in a global partnership. They recognise that ending poverty and other deprivations must go hand-in-hand with strategies that improve health and education, reduce inequality, and spur economic growth – all while tackling climate change and working to preserve our oceans and forests.

Figure 1. UN Sustainable Development Goals

1. United Nations Brundtland Commission (1987). *Report of the World Commission on Environment and Development: Our Common Future Towards Sustainable Development 2. Part II. Common Challenges Population and Human Resources 4.* [online] Available at: http://www.un-documents.net/our-common-future.pdf
2. United Nations (2015). *Transforming Our World: the 2030 Agenda for Sustainable Development | Department of Economic and Social Affairs.* [online] United Nations. Available at: https://sdgs.un.org/2030agenda

Organisations face increasing pressure from governments, investors, customers, and the public to operate in an environmentally and socially responsible manner. Investors may screen companies based on their ESG (Environment, Social, Governance) performance. Greenpeace's Clicking Clean campaign highlighted the renewable energy content of major digital platforms.

It has become commonplace for organisations to share their green credentials; however, this can sometimes be 'greenwashing' rather than transparent and verifiable reporting. The Global Reporting Initiative (GRI) aims to provide transparency on how an organisation contributes/aims to contribute to sustainable development and can form a framework for defining a company's sustainability strategy through the use of standards. These are aligned with the SDGs. Other sustainability reporting initiatives, such as the UN Global Compact and the World Business Council for Sustainable Development's (WBCSD) Green House Gas Protocol, are available.

Many building types have a high and ever-increasing environmental impact due to their high energy consumption and use of resources, and hence discussions around sustainability tend to focus on this area. Organisations commonly hold ISO 14001 certification. ISO 14064-1 specifies the quantification and reporting of greenhouse gas emissions and removal. When analysing emissions for accounting and reporting, these are commonly categorised into three scopes:

Scope one emissions	Direct emissions from sources owned or controlled by the company, e.g., combustion of fuel in boilers or vehicles, fugitive emissions from refrigeration equipment.
Scope two emissions	Indirect emissions from the generation of purchased electricity, steam, heating and cooling in activities owned/controlled by the company.
Scope three emissions	All of indirect emissions relating to upstream and downstream activities as a consequence of activities of the company but not owned or controlled by the company, e.g., use of sold products/services.

Organisations may set commitments and targets, such as the Science Based Targets initiative (SBTi)[3], which includes commitments for energy efficiency, clean energy, water, circular economy and circular energy systems.

ENERGY CONSUMPTION AND ENERGY EFFICIENCY

In recent years, the construction industry has become more aware of the opportunities to improve energy efficiency and reduce energy consumption. As energy prices increase (for example, due to recent geopolitical events in Europe), the business case strengthens – saving energy saves operating costs and increases profitability. However, there is a perception that saving energy is incompatible with reliability. The requirement for high performance is often used as an excuse for poor energy performance. In fact, there are many ways to operate redundant systems in a manner that is efficient and does not increase risk. One example is running all cooling unit fans at a reduced fan speed rather than running some at full speed with others switched off. The energy consumption is less (due to the cube law), and there is less wear on components operating at lower speeds. In unit failure, the remaining units are already running and need to increase their speed. Often, the designer has focused on sizing equipment for an entire load operation, and adjustments are required to optimise operation at part loads, as this is likely to be a facility's typical operational capacity.

Best practices for improving efficiency are well-documented. Most facilities apply several of these practices in design and operation, although there continues to be room for improvement in many cases; as is commonly observed in various building types, the performance gap between how they are designed to operate and how they operate in reality.

RENEWABLE ENERGY

It is not just the amount of energy being consumed that is important, but also how polluting that energy is. Electricity generated from fossil fuels has a much higher carbon footprint than that generated from renewables. Most buildings are connected to a regional or national electricity grid, so will be subject to that local grid carbon intensity. Two identical facilities in different countries could have very different environmental impacts due to their energy supplies.[4] More prominent building owners are advertising

3. https://sciencebasedtargets.org/about-us

4. *Minimising Buildings Environmental Impact – Beyond Energy Efficiency*, Flucker et al CIBSE ASHRAE Technical Symposium 2017.

their commitment to purchasing renewable energy. Microsoft has committed to a 100 per cent supply of renewable energy by 2025, meaning they will have power purchase agreements for green energy contracted for 100 per cent of carbon-emitting electricity consumed by all of their buildings and campuses.

This is an essential step in operating more sustainably, but there are some limitations to this:
1. In most locations, there is a limited amount of renewable energy available.
2. If the buildings are connected to the grid, the actual electricity being consumed will be whatever the grid energy mix is.

On-site renewable generation is rare for several reasons:
1. Cost – capex and opex.
2. Skills and expertise. Design, operation and maintenance of power generation requires different expertise and adds complexity.
3. Space limitations – generation plant takes up valuable real estate. Covering the roof with solar panels may only provide a fraction of the total energy requirements.

WATER USAGE

Many buildings have reduced the energy consumption of their cooling systems by using adiabatic, evaporative cooling, which uses the cooling effect of water evaporating rather than electricity-powered refrigeration. This results in increased water consumption on site. This is not desirable in locations that suffer from water shortages / seasonal droughts. The net water usage may be more, but the overall environmental impact may still be less when considering the reduced environmental impact of using less electricity. A life cycle assessment (LCA) is required to analyse the trade-offs.

HEAT RECOVERY

Reusing waste heat is one way that buildings try to improve their environmental credentials. Rather than rejecting heat from cooling processes to the atmosphere, this can be captured and used by others (residential buildings, greenhouses, swimming pools), for example via a heat network, thereby reducing their energy consumption for heating.

There are a few barriers to wider adoption of waste heat reuse:
1. Although there may be a large amount of heat available, it is usually relatively low-grade heat e.g., air <40C. This limits the economics, applications, and distance of the heat user. It is easier to look for an external user for waste heat during the facility site selection process and of course there is more need for heating in locations with colder climates. Note this is one of the selling points of liquid cooling – the ability to recover higher temperature heat from buildings.

2. The buildings will be rejecting heat all year round but for many applications heating is seasonal. A solution must be in place to deal with heat rejection 100% of the time. This may mean that waste heat recovery and a traditional heat rejection system must be installed, creating additional infrastructure and cost.

3. Risk and contractual commitments. Heat recovery systems and plants are not standard in building installations; it is unlikely that a building's operation team would have the skills and resources to maintain such an installation, meaning that a third party would need to be responsible. In many cases, heat pumps are used as part of the system to increase the recovered heat temperature in line with the heat user's requirements. The heat user would also need to be tied-in to specific commitments about how much heat they would consume and when. Managing these aspects in locations with existing district heating networks is easier.

There are examples of heat recovery systems being installed as part of a planning requirement but then never being connected (waste of capex and embodied environmental impact). The SDIA argues that the business case for waste heat recovery needs to be developed by looking at the economics and selling this resource to energy companies who have the interest and means of using it.

LIFE CYCLE IMPACTS

Energy consumption during the operational phase is only one part of a building's environmental impact. LCA is a methodology which considers the holistic impact of a product, process, or service on the environment. A LCA looks at the products and processes within a system from cradle-to-grave, from the extraction of raw materials to manufacturing, transportation, operation, and eventual disposal, as indicated in Figure 2.

> *There is now increased awareness that sustainability is not just energy efficiency. Although corporate social responsibility and brand value are driving change, the business case for addressing embodied impacts is less tangible.*

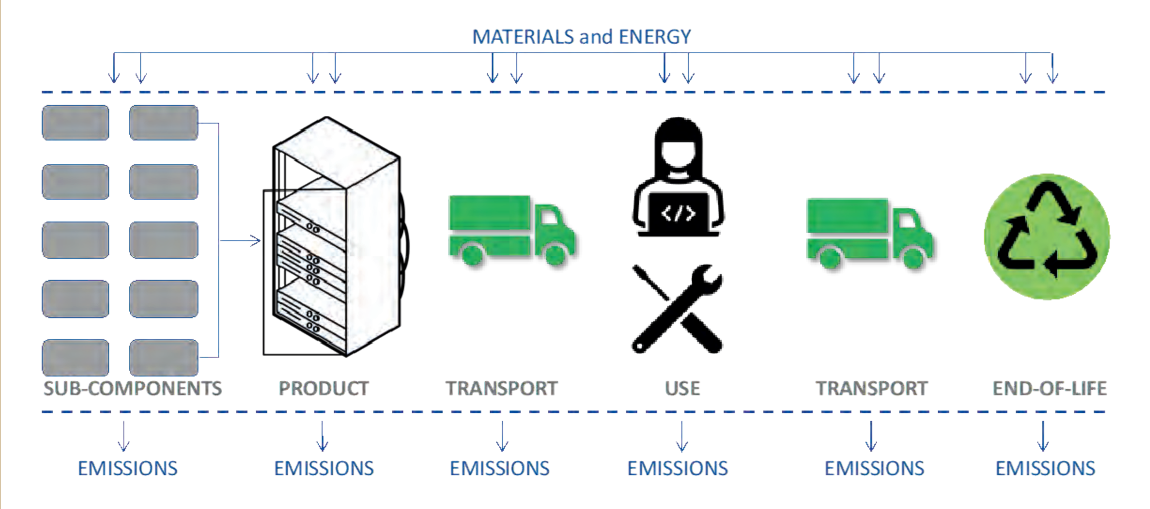

Figure 2. Product life cycle, by Operational Intelligence.

GREEN BUILDING CERTIFICATIONS

Some buildings may be independently accredited in order to demonstrate their green credentials. Schemes include BREEAM,[5] LEED,[6] and NABERS.[7] These originate from green building certifications from other building types, such as offices and are based on achieving specific credits in order to reach a scoring level. Although they use established and auditable methodologies, in most cases the scoring does not reflect the holistic environmental impact and focuses on their energy efficiency rather than the significant embodied impacts.

POLICY AND REGULATION

The high environmental impact of buildings has not escaped the notice of policy makers. The EBC's *International Review of Energy Efficiency in Buildings for IEA EBC Building Energy Codes Working Group*[8] presents a review of international policies and standards relating to building energy efficiency, including voluntary schemes and suggests possible future policies.

One way of influencing the market is through green procurement practices, i.e., actively seeking or requiring more sustainable solutions. The European Commission has developed green public procurement (GPP) criteria for different areas including buildings, in recognition of the fact that Europe's public authorities are major consumers and so can influence the market for goods and services.[9]

5. https://bregroup.com/products/breeam/
6. https://www.usgbc.org/leed
7. https://www.nabers.gov.au/ratings/spaces-we-rate/data-centres
8. *International review of energy efficiency in Buildings for IEA EBC Building Energy Codes Working Group*, Brocklehurst, Pacific Northwest National Laboratory 2022.

The World Green Building Council's 'Net Zero Carbon Buildings Commitment'[10] calls on businesses, organisations, cities, and subnational governments to reduce (and compensate where necessary) all operational and embodied carbon emissions within their portfolios by 2030, and to advocate for all buildings to be net zero whole life carbon by 2050.

It is important that policy also takes a holistic view of environmental impact and does not promote perverse incentives, e.g., support for waste heat recovery that does not incentivise reducing the amount of heat produced through energy efficiency.

Much of the work to improve the sustainability of buildings is driven by economics (saving energy saves operating cost and increases profitability and competitiveness) as well as corporate social responsibility pressures; however, there is also a concern that unless the industry acts voluntarily, it will face increasing legislative restrictions.

CONCLUSION

Sustainability needs to be embedded into all aspects of buildings design, build and operation.
It is not enough to buy renewable energy or design buildings with high efficiency – action is required by all stakeholders throughout the value chain. In order to make a real impact an understanding of key areas to prioritise is important – not just token gestures.

9. *Development of the EU Green Public Procurement (GPP) Criteria for Buildings, Server Rooms and Cloud Services*, Dodd et al, JRC 2020
10. https://www.worldgbc.org/thecommitment

PROCUREMENT BLUES...

WHY ISN'T IT LIKE IT USED TO BE?!

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I'm sure some of the readers can remember the 'good old days' when the design and specification for a new project were fully complete before even the mention of tender preparation was made, knowing full well that the Quantity Surveyor would be able to prepare a bill of quantities (BQ) without numerous queries and clarifications, more commonly referred to as Traditional Procurement.

The architect's drawings would be fully coordinated with the structural engineer's and the mechanical and electrical designs, even more remarkable in a time before BIM[1] (and most of the time you even got a builder's work schedule to produce the relevant section within the BQ!).

I started off my surveying career working at a small PQS practice, where the 'cut and shuffle' method of measurement and boq preparation was used, normally worked on by the whole office, and the hundreds of slips of paper containing quantities and codes were input into the software by the one user; and using the same one computer that had the only internet connection in the office!

Timescales were more realistic; the Client understood that the design works would take a minimum period, then the production of the boq would take a further period before the tender was ready for final coordination and issue to the selected contractors.

The tender period was long enough for the contractor to obtain quotations from several subcontractors, ensuring usually that the tender would be compliant with the requirements and competitively priced.

Bills of quantities can sometimes be criticised as representing an 'us and them' mentality, as when used conventionally they can only be properly prepared at the end of the design process and reduce the opportunities for contractor input / involvement. A counter to this criticism is that the production of the bills can also provide an audit of the design information; if there is insufficient information to produce a bill of quantities there would arguably be insufficient detail to construct the project.

The fact that the tenders were based on the same document enabled the QS to review and make a proper recommendation of the best suited contractor to carry out the works.

There are a number of advantages and disadvantages of using such a traditional procurement strategy:

Advantages	Disadvantages
Maximum control of design and specification(s).	Project programme can be lengthy as design must be complete prior to tendering.
Design to be complete prior to tender enabling maximum cost certainty.	Client retains risk / responsibility for design.
Original design team retained client side for duration of the project.	Full design costs incurred prior to tendering.
Suited to complex design projects and those requiring extensive client consultation.	Does not easily allow for contractor buildability proposals.
Complete design enables preparation of bill of quantities and maximum cost breakdown / transparency for valuing change and for evaluating interim payments.	Not normally suitable for fast-track projects

1. Building Information Modelling
2. Constructing the Team , Sir Michael Latham, July 1994

Everything then changed (starting in the 1980s); gone largely were the days of fully compliant designs and bills of quantities being prepared for projects and design and build, with outline designs and minimal quantities becoming the norm – a Design and Build Procurement.

Unless the tendering contractors agreed to have a bill of quantities jointly prepared, every tender would be submitted in a different format, with varying quantities and extent of pricing information, making the adjudication and review of the tenders more challenging. Without a common basis for pricing, the phrase 'comparing apples and pears' springs to mind.

There are also advantages and disadvantages of using a design and build contracting procurement strategy:

Advantages	Disadvantages
Enables contractor buildability input into design.	Less flexible / more costs associated with post-contract changes.
Has programme advantages as enables tendering earlier and design can continue during construction.	Less suited to more complex design and stakeholder engagement projects.
Greater risk transfer and single point of responsibility during the construction phase.	Risk of disjointed approach to design due to split preparation of same / or change of client mid-project (if design team novated).
Reduced pre-contract fees / costs for client.	Client expectations of a gold service; with contractors having priced for a bronze one.

The move away from traditional procurement to a design and build approach has been seen by some in the industry as part of efforts by parties to work more collaboratively and proactively, as advocated within the Latham Report.[2]

The increasing use of BIM ought to further enhance collaborative working, with projects at Level 3 being fully integrated, utilising 4D construction sequencing, 5D cost information and 6D project lifecycle management information. Tender analysis can then be focused on comparative rates, overheads and preliminaries costs as all contractors will be using the same base information for pricing and planning purposes.

My personal feeling is that the procurement process in general has changed over the last two to three decades for the following reasons:

- Clients no longer wish to go to the time and expense of producing a full design and bill of quantities to put out to tender their projects.
- Design teams no longer as a matter of course carry out the full-design work and have less expertise in producing a complete design package.
- Fewer surveyors are having to produce detailed measures and full bills of quantities and may even just work on discrete packages rather than projects as a whole, leading to their skills / ability to measure lessening.
- Software development, including BIM, is making the design process more integrated, where changes are identified immediately, making for what should be a smoother executed and better administered project. This does, however, have its own costs / challenges in that new investment in IT and associated skills is required.

Having spoken recently to two large national contractors, engaged in both civil engineering and building works, they have made the following comments in respect of traditionally procured projects:

"Two Nr. projects recently completed which have been a challenge since commencement as no one takes responsibility for discrepancies or changes."

"No-one wants to provide the complete design and bill of quantities due to the 'blame game' where liability sits squarely for errors with the design team."

The traditional procurement approach obviously worked and operated for a long time before Latham and Egan.[3] Done correctly, it ought to, in my experience, lead to less design and scoping issues arising throughout the course of a project, but it requires a full and complete design and tender preparation to be commissioned and paid for at the beginning by the Client. Could it be that traditional procurement now actually fits better with Latham and Egan? As stated above, cost surety was given with traditional procurement. The design was "audited" through the production of the BQ and everyone priced on the same basis.

3. Rethinking Construction, Sir John Egan November 1998.

DIVIDING DATE – NEC4

'THE LINE IN THE SAND'

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What is the 'dividing date', referred to in the NEC4 contract, and why is it so important?

The contract does not refer to the 'dividing date' as an 'identified and defined term' but its function can be easily determined from Clause 63 which sets out the procedure for assessing compensation events. **Briefly summarised, this comprises the actual defined cost of the work done at the dividing date, the forecast defined cost of the work not done by the dividing date, together with any fee.** The dividing date therefore delineates **'actual'** costs from **'forecasted'** costs in the assessment of a compensation event – it is the 'line in the sand'.

It logically follows that the dividing date is of significant importance.

Again Clause 63.1 provides the necessary guidance and states that for a compensation event that arises from the Project Manager or the Supervisor giving an instruction or notification, issuing a certificate or changing an earlier decision, the dividing date is the date of that communication. For other compensation events, the dividing date is the date of notification of the compensation event.

Therefore, all compensation events may contain an element of actual cost and an element of forecast cost of the work yet to be done as at the dividing date. This is reinforced by the NEC User Guide, Volume 4, 'Managing an engineering and construction contract'[1] which states:

"Nevertheless, for most cases, the inclusion in the clause of a dividing date set early in the assessment process reinforces the point that compensation events are not cost-reimbursable but are assessed on forecasts with the Contractor taking some risk."

But how does this sit with the ethos of NEC4 Option E – Cost Reimbursable contract?

Under Option E, 'Defined Cost', as described at Clause 52, **"includes only amounts calculated using rates and percentages stated in the Contract Data and other amounts at open market or competitively tendered prices with deductions for all discounts, rebates and taxes which can be recovered."**

1 June 2017

In addition, the contractor is specifically required to keep the following records:

- Accounts of payments of Defined Cost.
- Proof that payments have been made.
- Communications about, and assessments of, compensation events for subcontractors; and
- Other records as stated in the Scope.

Ordinarily, this would not be an unreasonable requirement for a cost reimbursable contract.

However, this approach would appear to be at odds with the 'forecast' element of a compensation event and for which there can be no accounts of payments or proof that payments have been made.

Furthermore, if the contract is premised on the reimbursement of all costs – providing they have been incurred in accordance with the contract – what is the purpose of attempting to value and agree compensation events in advance of them actually occurring?

From an employer's perspective, the argument would be that an early forecast of cost is necessary for the employer to make an informed decision as to whether or not it should proceed with a change or to take measures to reduce the impact of a change.

However, a contractor may prefer the certainty of cost reimbursement and this may have an impact on any contingency it may otherwise build into the contract. The principal reasons for using an Option E is the absence of work scope definition and the requirement for an early start to construction. As a consequence, the contractor's risk is – deservedly - minimised through cost reimbursement and a lower Fee. **On that basis, it appears somewhat unfair to require a contractor to forecast cost without having an adequate provision for risk.**

Therefore, when Option E is selected, it may be in both parties' interests to consider amendments through the Z clauses.

> *...if the contract is premised on the reimbursement of all costs – providing they have been incurred in accordance with the contract – what is the purpose of attempting to value and agree compensation events in advance of them actually occurring?*

DEMYSTIFYING CAUSE AND EFFECT

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The complex nature of construction and engineering projects often leads to delays that impact the completion date of a project. The provisions of the contract may enable the contractor to apply for an extension of time ('EOT') for completion.

Ultimately, the burden of proof is on the contractor to evidence the cause of the delay on a project and the effect such delay has on the completion date.

This article discusses several of the essential elements required for substantiating the cause of the delay(s)and the subsequent effect of the delay on the completion date of a project. We also consider good practice and recommendations to enhance the potential for succeeding with a claim under a contract.

THE CAUSE

A cause is an event that has occurred which may give rise to a claim for relief under a contract. Typical examples of which are, regardless of where the project might be located across the globe:

- Late issuance of an instruction / drawing.
- Late access to site.
- Unforeseeable physical conditions.
- An instruction to vary the works.
- Issue of revised drawings / information.
- Exceptionally adverse weather conditions.
- Force Majeure.
- Change in legislation.
- Acts of prevention / delays by the Employer and/or its agents.
- Delays by Authorities.

The above list is not exhaustive but provides details of some of the 'usual suspects'. The basics of clearly drafting the narrative of an event that has occurred can often be lost when drafting an EOT claim. It is important for the narrative of the event to be drafted in a clear and structured manner, such that a person who is not involved in the project may understand the event.

An example of a well-structured narrative is set out below:

1. INTRODUCTION

The introduction section should contain a brief description of the event, and the relevant facts that clearly describe the event that has occurred or is occurring.

2. CHRONOLOGY

The chronology establishes the facts of the event in a detailed manner. It should identify the start and end date of the event, or if the event is ongoing, it should state the same. It can be challenging to find a balance between 'too much' and 'too little' detail. In terms of 'too much' detail, this can occur where the chronology is presented in numerous pages of narrative, and in an unstructured manner becoming complex and confusing the recipient. In the case of the chronology containing 'too little' detail, the contractor can be at risk of failing to relay the facts of the event accurately.

3. BASIS OF ENTITLEMENT

Establishing the basis of entitlement will depend on the provisions of the contract. A common mistake in contractor claims is referencing incorrect clause(s) when attempting to establish entitlement, leading to rejection of the claim.

It is important for a contractor to understand the contract provisions relevant to the event to correctly establish its entitlement. By way of example, for the FIDIC suite of contracts, a common error by the contractor is where the contractor attempts to establish entitlement under Clause 20.1 [Contractor Claims].[1] This clause does not entitle the contractor to an EOT, rather it is the mechanism used for submitting the claim, which also contains specific provisions and requirements that must be adhered to by the contractor as part of the claim submission process. The entitlement, for time, is actually established under Clause 8.4 [Extension of Time for Completion].[2]

THE EFFECT

The effect of a delay event may result in delays to the project completion date and thereafter the contractor incurring additional costs. The issue of cost recovery is not tackled here but will be the topic of a future article.

There are several methods of delay analysis that can be used to demonstrate the effect of a delay event on the project completion date. In some cases, the contract may prescribe the method of delay analysis to be undertaken and the contractor may either apply the required methodology or give valid reasons for an alternative method of analysis being selected. Varying factors may also influence the choice of the most suitable delay analysis method such as the availability and quality of the data, records and information, the availability of the progress update programmes, as well as considering the nature, extent, and timing of the event(s).

Many leading industry publications such as the Society of Construction Law (SCL) Delay and Disruption Protocol[3] and the American Association of Cost Engineer's (AACE) recommended practice No.29R-03[4] provide guidance on appropriate methods of delay analysis.

Choosing the most suitable delay analysis methodology will depend on the details provided within the contract and / or the level of information available. However, some important elements of conducting a delay analysis are discussed here, by way of illustration.

1. There must be a programme to measure the impact of the event, and evidence ideally that it is an approved programme under the contract.

2. The analysis must firstly identify the critical path of the programme, before then demonstrating the impact of the event on the critical path of the programme.

3. The impact of the delay may be determined either by prospective or retrospective delay analysis. Prospective delay analysis identifies the likely effect of an ongoing event on the time for completion where the event and its actual impact have not ended. Retrospective delay analysis identifies the actual effect on the time for completion where the event and its impact have concluded.

4. Consideration should be given as to whether the cause must be identified before establishing the impact of the event (Cause-Effect), or where the effect must be identified before establishing the cause (Effect-Cause).

5. Cause-Effect – Certain methods of delay analysis will begin with the event (the cause) and then look to establish the impact (the effect). This method is generally adopted where the event has occurred, but the works are ongoing and the overall impact of the event is ongoing, thereby avoiding a 'wait and see' approach.

1. Sub-Clause 20.1 of the Conditions of Contract for Construction (First Ed. 1999) For Building and Engineering Works designed by the Employer.

2. Sub-Clause 8.4 of the Conditions of Contract for Construction (First Ed. 1999) For Building and Engineering Works designed by the Employer.

3. Society of Construction Law Delay and Disruption Protocol – 2nd edition – February 2017 – Guidance Part B: Guidance on Core Principals.

4. American Association of Cost Engineer's recommended practice No.29R-03 dated 25 April 2011, Section 3 'Method Implementation'

> *The basics of clearly drafting the narrative of an event that has occurred can often be lost when drafting an EOT claim.*

6. Effect-Cause – in contrast, other methods of delay analysis will begin with identifying critical delay (the effect) and then look to establish the reason for the delay (the cause). This method is generally adopted where the works have been completed or when the effect of the event has concluded.

It is important for the delay analysis narrative to align with the narrative and the chronology of the event which may be detailed in another section of the claim. Often, the narrative of the event and the delay analysis narrative is drafted by separate individuals which may lead to misalignment and conflicting information between the two sections.

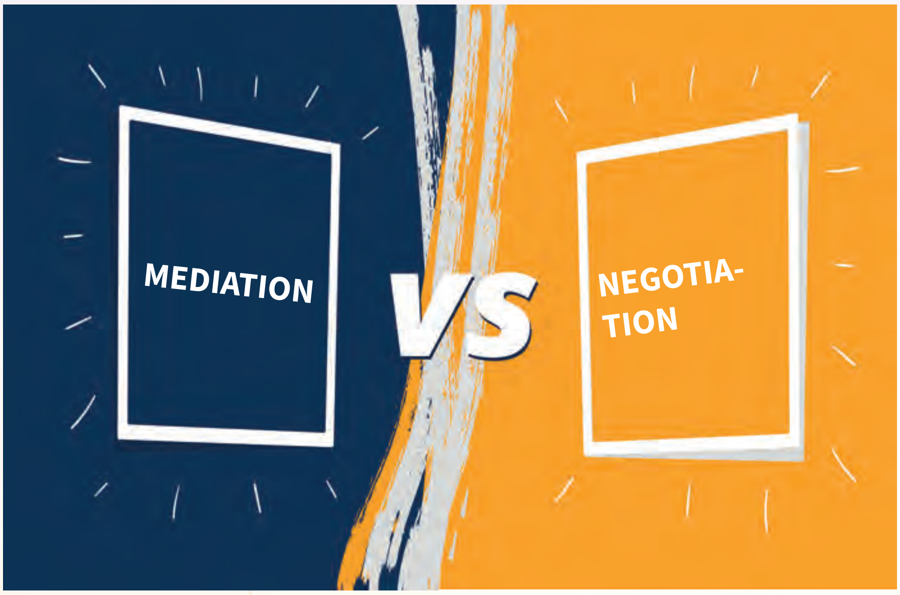
Consideration should be given to the fact that the recipient of a claim may not be an expert in the field of delay analysis or overly familiar with delay analysis. Therefore, the narrative should be drafted in a manner that a person who is not technically versed in delay analysis methodology can understand it, including a detailed step-by-step explanation within the 'claim'.

CONCLUSION

To conclude, the following takeaway points can enhance the possibility of a successful outcome of an EOT claim:

- When drafting the narrative of the event, use a detailed and factual chronology, substantiated through project records.
- When establishing entitlement to an extension of time, use the correct provisions of the contract.
- The delay analysis methodology chosen and the logic surrounding the same should be explained as part of the narrative.
- The delay analysis section of the claim should be clearly drafted in a manner that a non-technical person may understand.
- The delay analysis narrative should align with the narrative explaining the event.

Article byte



Mediation vs Negotiation

What are the differences and similarities between negotiation and mediation? When should they be employed? What are the advantages and disadvantages of these two methods for Alternative Dispute Resolution (ADR)?

In this previously-published comprehensive article, UK Regional Managing Director, Keith Strutt, outlines all of the above, and cross-compares the two modes of alternative dispute resolution.

Each, both generally and within its own context, will have advantages and disadvantages that will affect its choice as a method for Alternative Dispute Resolution (ADR) and it is proposed that these are examined to provide a contextual framework within which to assess and apply each.

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