

DIGEST

1 Industry
110 million people
\$10.3 trillion

driver
trett



Welcome to the Driver Trett Digest

As I was reviewing this edition of The Digest it has led me to think about the pace of change in the world of construction and the impact of the global economy on our industry in the parts of the world where our business operates. At the time of writing this introduction, we are a month away from the Brexit deadline and the UK industry is forecast to grow by 1.3% if a deal is achieved, with no alternative forecast in the event of a no-deal. Challenging times to invest in property, which in turn is what drives much of construction outside of infrastructure. In other parts of the world, the oil price is driving new energy projects in some regions and holding back on investment in exploration in other areas. Predicting the future, and where to invest, seems to be a very challenging business. On the plus side, our industry has seen increases in the use of technology in recent years and I am sure that the development of BIM and design software, together with advances in scheduling and delay analysis, leaves our industry better able to respond to whatever challenges the developed and developing economies require of us.

Effective dispute resolution is essential to delivering large projects and supporting the industry. Without it, things can grind to a halt quickly and the cashflow that is the lifeblood of the sector can cease to flow. I note that Adjudication continues to develop, with planned introduction in Canada this year and perhaps at long last, Hong

Kong. Schemes to improve and develop Arbitration are under way in India and Pakistan, but at the same time in the Middle East the prison sentences for three arbitrators by a regional court does feel like an enormous retrograde step. Meanwhile, courts across the world are delivering specialist support to construction and engineering. I spoke at a conference recently about the growing topic of DABs and the fact that there are at least four versions of that acronym in common use. Dispute Boards, be they Avoidance, Advisory, Adjudication or Arbitration types – are here to stay. What is needed is a common process with international standards that can be used across the globe with minimum variation for regional legal reasons. This will enable our industry to respond to the changing world around us on an even playing field, resolving problems quickly and focussing on delivery.



Mark Wheeler
Global Chief Operating Officer



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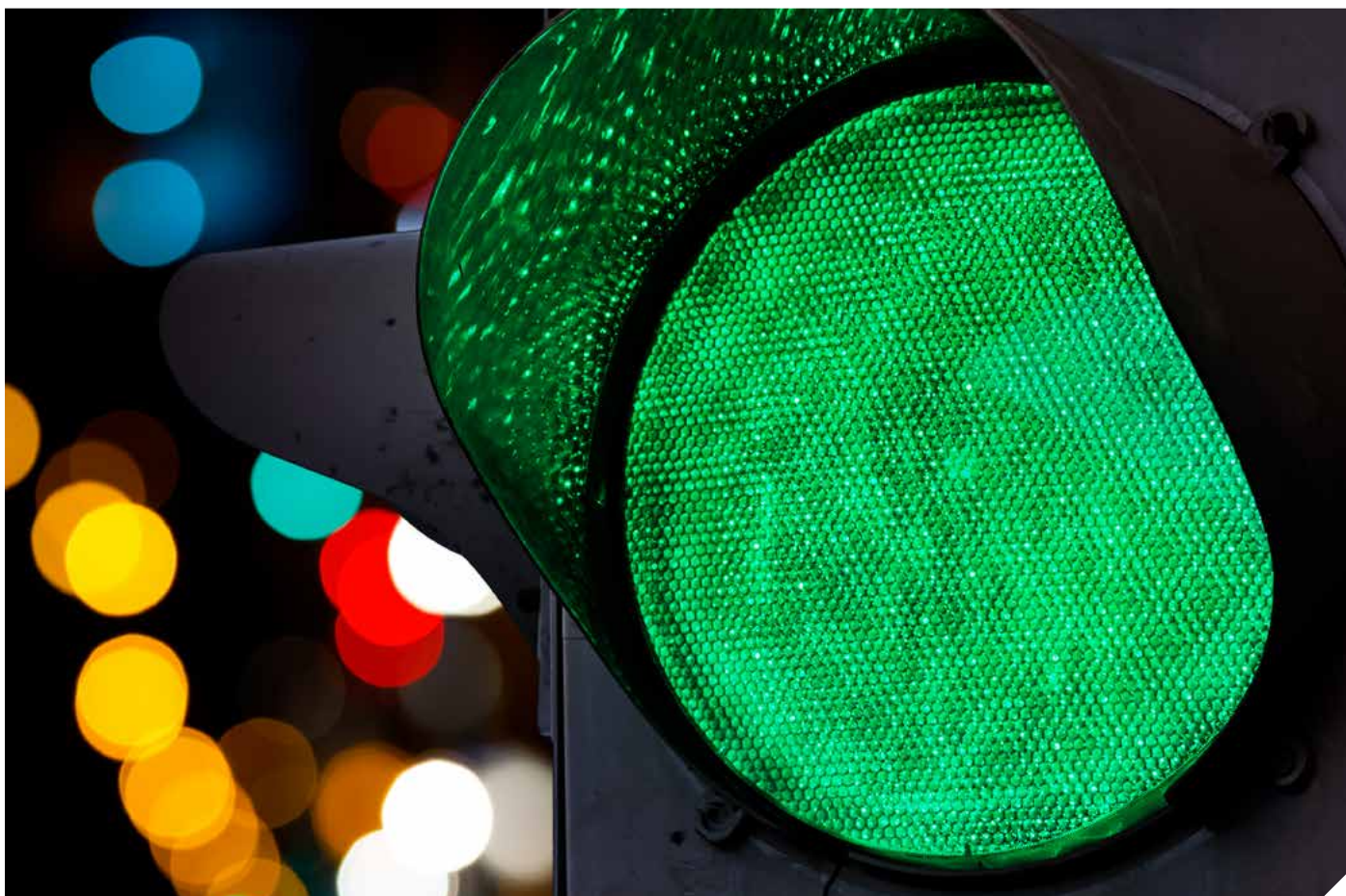
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Green lights for AI

Technology-Assisted Review with eDiscovery – a scientifically proven and court-endorsed AI tool.



James Millen
Technical Director
Driver Trett APAC

Artificial Intelligence (AI) has been identified as Construction technology's "next frontier" in a recent report by McKinsey & Co on the construction industry's digital revolution. However, McKinsey & Co also reported that construction and professional services are two of the most reluctant industry sectors to implement AI.

In the context of high value and high-profile construction claims and disputes, reluctance to pioneer new technology is understandable. There is inherent risk in any decision to invest resources into a claim or dispute. A suggestion to employ new or developing technology is often met with two challenges:

1. is it reliable? and
2. what have the Courts said about it?

AI in eDiscovery: Technology-Assisted Review

In the previous edition of The Digest, Garth McComb wrote about Driver Trett's use of eDiscovery software. It is a powerful tool for rapidly analysing the vast quantities of documents and data associated with a construction claim or dispute. Our eDiscovery capability implements a form of AI technology known as Technology-Assisted Review (TAR).

Contrary to the doomsayers' cliché that AI is coming to take all our jobs, TAR relies on a collaboration between AI algorithms and a human professional expert. Broadly a TAR-enabled eDiscovery system prioritises

documents that it believes are relevant to a search criteria, and returns a small sample of results. These results are then scored by the human professional expert for relevance. The AI technology in TAR then takes the scoring feedback and progressively 'learns' how to produce a more relevant set of results over a few iterations of the review:rank:repeat process. Internet search engines are an everyday example of TAR.

Reliability of TAR

A scientific analysis of TAR in eDiscovery by Grossman & Cormack was published in 2011 under the bold title 'TAR in eDiscovery Can Be More Effective and More Efficient Than Manual Review'. Grossman & Cormack experimented with five separate and different document review exercises.

Firstly, they found that the professional expert only needed to review 1.9% of the documents in order to 'teach' the TAR to return optimal search results. In other words, that's over 50-times fewer documents to be reviewed than in a

full manual search. 50-times less documents = 50-times less time = 50-times less cost, and that's not even considering the human effect of task-fatigue in a full manual review.

Secondly, their overall results were that "by all measures" the average efficiency and effectiveness of the five technology-assisted reviews were better than the five comparison manual reviews.

The Grossman & Cormack study has been put before the courts in several cases concerning TAR and has been persuasive.

What the Courts have said about TAR

TAR has in fact come before the courts in several jurisdictions. This focused initially on the fundamental issue of whether the courts would approve the use of the technology at all. Subsequently the question progressed to whether the courts would insist on TAR over traditional manual review.

The US - 'Bring Your Geek to Court Day'

The US courts were the first to approve the use of TAR.

In 2012, US Magistrate Judge Peck ordered the first recorded approval of a litigant's request to use TAR in a court proceeding, in the case of *Da Silva Moore v Publicis Groupe*. "Counsel no longer have to worry about being the 'first' or 'guinea pig' for judicial acceptance of computer-assisted review" he assured. His Order even noted the importance and helpfulness of what Judge Peck described as "bring your geek to court day" - being "able to explain complicated eDiscovery concepts in ways that make it easily understandable to judges who may not be tech-savvy".

In *Gordon v Kaleida Health* it was the judge, not the litigants, that suggested the use of a type of TAR called predictive coding. Impatient with the parties' year-long attempts to agree on how to achieve a cost-effective review of some 200,000-300,000 emails, the Magistrate Judge ordered the parties to try predictive coding.

By 2015, in the case of *Rio Tinto v Vale S.A.*, it was back to Judge Peck to declare that US case law had developed to the point that the courts' endorsement of using TAR for document review was "black letter law".

Ireland - Common Law endorsement

The first endorsement of TAR by a common law court came in the 2015 Irish High Court case *Irish Bank Resolution Corporation Ltd v Quinn*.

The issue before the court was IBRC's calculation that it would take 10 lawyers nine months to manually review the 680,809 potentially relevant documents, at an estimated cost of €2m. IBRC proposed using TAR to minimise the cost and time, but the opposing party argued against the suggestion.

Quinn argued that TAR could not be relied on to capture all relevant documents, and that there would be no savings in cost and time in real terms due to the human involvement in the AI 'learning' process.

The strength of the respective arguments



Approximately 1.4 million potentially relevant documents were identified, which the court estimated would take a junior solicitor in excess of 10 years to review, even if just one minute was spent on each.



gave weight to the ruling, because Mr Justice Fullam was required to analyse the evidence in detail.

The Court found in favour of TAR, persuaded largely by the Grossman & Cormack study's finding that TAR requires human review of only 1.9% of documents. In addressing Quinn's argument of whether TAR was sufficiently accurate, Mr Justice Fullam took the balanced view that "If one were to assume that TAR will only be equally as effective, but no more effective, than a manual review, the fact remains that using TAR will still allow for a more expeditious and economical discovery process [67]".

The UK - TAR endorsed when contested

In 2016, the UK courts were given a gentle introduction to TAR, because by the time *Pyrrho Investments v MWB Property* reached the court, both parties had already agreed to use it. They sought approval from the court, and an appropriate order was made.

However, the latter case of *Brown v BCA* is now considered the UK courts' landmark decision because, like IBRC in Ireland, the use of TAR was contested between the parties.

BCA held approximately 500,000 potentially relevant documents. It provided evidence that TAR would be 50%-60% cheaper than conducting traditional keyword searches. Brown opposed, arguing that the technology may not be as effective as the more expensive traditional keyword searching.

As with IBRC in Ireland, the court ordered the use of TAR. The Registrar was persuaded by the evidence of likely cost savings, and the corresponding lack of evidence that TAR might be less effective at identifying relevant documents than keyword searching.

Australia - TAR in a Construction Claim

Also in 2016, an Australian court endorsed the use of TAR in a matter specifically concerning a

construction project.

McConnell Dowell v Santam & Ors concerned a claim that arose from the design and construction of a natural gas pipeline. Approximately 1.4 million potentially relevant documents were identified, which the court estimated would take a junior solicitor in excess of 10 years to review, even if just one minute was spent on each.

The court appointed a Special Referee to report on a more efficient method for reviewing the documents and endorsed the recommendation to use TAR.

Where next for TAR?

Cases concerning the approval or endorsement of TAR appear to have dried up since 2016, perhaps indicating that the critical mass of precedent has been reached for TAR to be considered a judicially accepted AI technology. In recognition, in late 2016 the Federal Court of Australia updated its Practice Note on 'Technology and the Court' Electronic Discovery to expressly encourage "using advanced analytics technologies (or other electronic discovery solutions) to assist in understanding key documents and minimising the document review process".

The only apparent remaining difficulty the courts have expressed with TAR is, ironically, the level of human ability to properly use the tool. In *Triumph Controls v Primus* before the UK's Technology and Construction Court, for example, the parties were ordered to abandon TAR and switch back to a manual document review. In this case, the court held the view that the parties had failed to use the tool in a transparent and verifiable way.

However, given the number of cases evidencing the courts' endorsement of TAR, across several jurisdictions, it now seems a matter of 'when' rather than 'if' common use of the technology will cascade down through dispute resolution and into claims practice. A likely by-product of BIM is that the quantity of data and documents generated by large construction projects is likely to continue to increase. In parallel, AI technology is rapidly evolving, which will make TAR more powerful and more economically accessible. As an indicator of the developing technology Grossman & Cormack have continued their research into the application of TAR, publishing further papers in 2014 and 2017 that continued to demonstrate TAR's accuracy and reliability.

Finally, and given that the time-saving efficiency of TAR is widely accepted, a point made by Simon Waller in his book *Analogosaurus - Avoiding Extinction in a World of Digital Business* is particularly relevant when considering the use of TAR. Waller explains that using technology such as TAR to save time not only saves cost, but consequently allows professionals to spend that saved time doing valuable, creative, problem-solving work whilst the technology does the mundane. The quicker we can problem-solve, the quicker our clients benefit from cost and time savings. ■

Let's agree to disagree!

Arbitration: A preferred mechanism of alternative dispute resolution.



Antony Smith
Senior Partner
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Increasingly construction companies are doing more and more business overseas. Whilst this can present huge opportunities, it equally poses many risks, particularly in the event of a dispute. Whilst the battle over the choice of law will often be lost when contracting with overseas governments or large commercial organisations, arbitration is often a preferred mechanism of

alternative dispute resolution (ADR) in acting as a level playing field.

ADR includes dispute resolution processes between parties other than litigation, including amongst others: meeting of directors, mediation and arbitration. Many agreements contain an escalation clause that sets out the different steps of ADR before any litigation is commenced. One of the fundamental differences between arbitration and litigation is that the right to commence arbitration proceedings arises from a contractual agreement between the parties. Therefore, it is particularly important that the parties to an agreement negotiate an arbitration

clause which best serves both their interests. An arbitration agreement may be a free-standing agreement or, more commonly, a clause within a wider agreement.

Key benefits of arbitration

- 1 Arbitration is usually preferred among parties from different countries as it allows the parties to freely determine many aspects of the dispute resolution procedure.
- 2 Arbitration proceedings are usually confidential.
- 3 The parties usually can choose the rules that will govern the arbitration procedure and the seat of arbitration.

Pros and cons of the ICC, LCIA, and UNCITRAL Rules

| Arbitration Rules | Description | Pros | Cons |
|-------------------|--|---|--|
| ICC Rules | An arbitral institution based in Paris with offices in Hong Kong, Singapore, Sao Paulo, Abu Dhabi and New York. The place of arbitration is fixed by the ICC Court unless the parties agree otherwise. | <ul style="list-style-type: none"> Awards are scrutinised. | <ul style="list-style-type: none"> No express confidentiality provisions. Terms of reference must be drawn up after the appointment of the tribunal, negotiation of which can cause delay and increased costs. |
| LCIA Rules | One of the oldest international arbitral institutions. The LCIA's head office is in London and it has a regional office in Dubai. The place of arbitration will be London unless the LCIA court decides otherwise. | <ul style="list-style-type: none"> Confidentiality of awards and documents. | <ul style="list-style-type: none"> Awards are not scrutinised. |
| UNCITRAL Rules | Does not act as an arbitration institution or administer arbitrations. However, it has a set of procedural rules which are often used in ad hoc or unadministered arbitrations as well as administered arbitrations. | <ul style="list-style-type: none"> Can be useful for ad hoc arbitrations where parties cannot agree on a set of rules or a designated institution. | <ul style="list-style-type: none"> Additional procedural steps may be required as UNCITRAL does not administer arbitrations. Under the UNCITRAL rules information and documents in the arbitration process are made public, subject to certain safeguards, including the protection of confidential information. |

- Usually the arbitral tribunal can decide on its own jurisdiction, however, jurisdictional challenges are becoming more common, particularly in the Middle East.
- Decisions on the merits of the dispute by an arbitral tribunal are usually final and not subject to appeal.
- Decisions of an arbitral tribunal (an "award") are widely enforceable abroad by virtue of several conventions e.g. the New York Convention.

Clear drafting

It is often the case that little consideration is given to drafting effective arbitration clauses when negotiating contracts. However, in order to be effective and enforceable it is key that an arbitration clause is comprehensive and clear. Failure to draft effective arbitration clauses can result in jurisdictional challenges and satellite disputes amongst other things and in many cases extensive legal fees.

Key points to include in drafting an effective arbitration clause

1 Identifying which disputes are subject to arbitration

Parties need to consider whether or not the arbitration clause should apply to all disputes arising out of the contract or if it would be best to carve-out certain types of disputes. For example, it may be preferable to carve-out simple fee claims as arbitration may not be an appropriate forum for such matters.

2 Validly executed contract

It is important that the contract which contains the arbitration clause is validly executed in order

to avoid jurisdictional challenges. Parties need to ensure that their contract is validly executed by the relevant persons with delegated authority to sign the contract including powers of attorney. In addition, the parties need to ensure that they comply with the execution formalities whether the contract is executed underhand or by deed.

3 Choice of arbitrator

Arbitration disputes are usually heard by one or three arbitrators in order to avoid deadlock. In order for arbitration to work effectively, the arbitrator must be carefully selected and be an expert in their field of activity to which the dispute relates. There are a wealth of great arbitrators across the globe, with expertise in construction, to choose from, including a number of retired English high court judges. The parties should consider naming their preferred choice of arbitrator or the chair up front to avoid tactical disagreements and delay over the choice of arbitrator and/or a poor arbitrator being appointed.

4 Choice of seat of arbitration and location of arbitration

The law of the arbitral seat often governs applications to a court in connection with arbitration and therefore is essentially the legal jurisdiction to which the arbitration is tied. This is usually the same location where the arbitration hearings are held, however, this is not necessarily always the case.

5 Choice of language of arbitration

The parties should ensure to clearly specify the language of the arbitration. Failure to specify

an appropriate language could lead to parties incurring unnecessary translation costs.

6 Arbitration rules

It is imperative that the arbitration clause clearly sets out the arbitration rules of the arbitral institution, otherwise any ambiguity could lead to an award being ruled unenforceable by a court as was recently highlighted in a Russian Supreme Court ruling (Supreme Court of the Russian Federation dated 26 September 2018 No. 305-ЭС18-11934). In this ruling, it was held that an arbitration award was unenforceable due to the reference, in an arbitration clause, to the arbitration rules of an arbitral institution not being sufficiently clear.

Well-established arbitration rules include the International Chamber of Commerce ("ICC"), the London Court of International Arbitration ("LCIA") and the United Nations Commission On International Trade Law ("UNCITRAL") as set out in the table above.

7 Allocation of costs

As the costs of arbitration can be expensive, it is important to expressly draft a provision that the opponent to an arbitration must pay their share of the arbitration costs.

Summary

In order to agree effective arbitration clauses, it is essential that the parties to a contract clearly set out the key arbitration provisions, including the seat and location, appointment of the arbitrator(s), arbitration rules, language and allocation of costs. Most importantly, the contract must be validly executed in order that the parties have the right to arbitrate and the subsequent award is enforceable. ■

NEC4 – Treated Acceptance and Dividing Date

Examines the updates to the Treated Acceptance and Dividing Date concepts in NEC4.



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Driver Trett UK

I am a big fan of the NEC3 Contract. As a planner I salute any attempt to raise the profile of the programme (and by association planners) within a Contract.

Recently, the NEC4 Contract arrived with a bang. The NEC4 Engineering and Construction Contract (ECC) is said to offer "...increased flexibility, improved clarity and greater ease of use, helping to deliver real value in the procurement of works..."

With a sense of excitement, I whipped out my credit card and purchased the full suite hoping that the programme was still front and centre of the Contract.

I was not disappointed and certainly encouraged by what I consider to be significant 'tweaks' incorporated within the NEC4 Engineering and Construction Contract. I consider that two of the tweaks are definite improvements on the NEC3 relating to the concepts of "Treated Acceptance" of the programme and the programme 'dividing date'.

Treated Acceptance

I work with a significant number of contractors who, time and time again, struggle on NEC3 Contracts to get a programme accepted by the Project Manager, as a consequence of strategy or purely as a consequence of inactivity or fear. The NEC3 Contract provided a structure for the programme to be accepted but quite often such agreement was forestalled by Parties who worry that accepting a programme means that they have accepted that programme warts, liabilities, obligations and all, or by Parties who simply refuse to engage with the programme regime.

The day before I wrote this article I provided some training on the NEC3 (Option C) Contract to a project team who, during the seminar, complained that the Project Manager was using every tool in his armoury to avoid accepting programmes and was then using the lack of an Accepted Programme to undertake his own assessments of compensation events.

Some Project Managers (as above) avoid accepting programmes as a tactic, but others simply fail to understand what accepting a

programme means. The worry that accepting a programme thereby accepts revised liabilities and obligations is, in my opinion, unfounded as the Project Manager is protected by, including but not limited to, Clause 14. This clause states that acceptance of any communication does not transfer liability away from the contractor to comply with his obligations under the contract.

Clause 31.3 now states "If the Project Manager does not notify acceptance or non-acceptance within the time allowed, the Contractor may notify the Project Manager of that failure. If the failure continues for a further one week after the Contractor's notification, it is treated as acceptance by the Project Manager of the programme."

The NEC4 concept of "Treated Acceptance" (Clause 31.3) has been incorporated into the Contract to provide the Contractor with options (note "may notify") when a Project Manager fails to respond to a programme which has been issued for acceptance. The addition of the "Treated Acceptance" regime will assist the Parties when a Project Manager fails to respond (within the stipulated time) to a programme which has been issued for acceptance by helping to apply pressure within when dealing with a Project Manager who is reticent to engage with the Accepted Programme.

The importance of the Accepted Programme regime is reinforced by Clause 13.4 which slightly amends the text (from the NEC3) to provide that the Project Manager should now state reasons (in line with Clause 31.3) "...in sufficient detail for the Contractor to correct the matter..." thereby ensuring that the reasons are specific, quantifiable and hopefully capable of being remedied.

With respect to a Project Manager who engages but still, for strategic purposes, refuses to accept programmes, Contractors should ensure that they keep forcing the issue both by following the timescales stipulated in clause 31 of the NEC4 alongside reminding the Project Manager that, by reference to Clause 14, they are not signing a blank cheque by accepting the programme. Such a two-pronged persuasive attack may push previously reticent Project Manager's over the edge into accepting programmes. Strategic refusal to accept programmes should then be taken up the food chain to senior management via Clause W1 or W2. However, this should only be done when the Contractor is confident that its programme

is fully compliant with Clauses 31.3 in that the programme is practicable, contains all the correct information, represents the Contractor's intentions and complies with the Scope plus that any and all reasons given under Clause 13.4 have been addressed.

Project Managers should also be aware that the standard form stipulates "one week" after the initial period for failure to accept the programme and as such holiday cover is an absolute must.

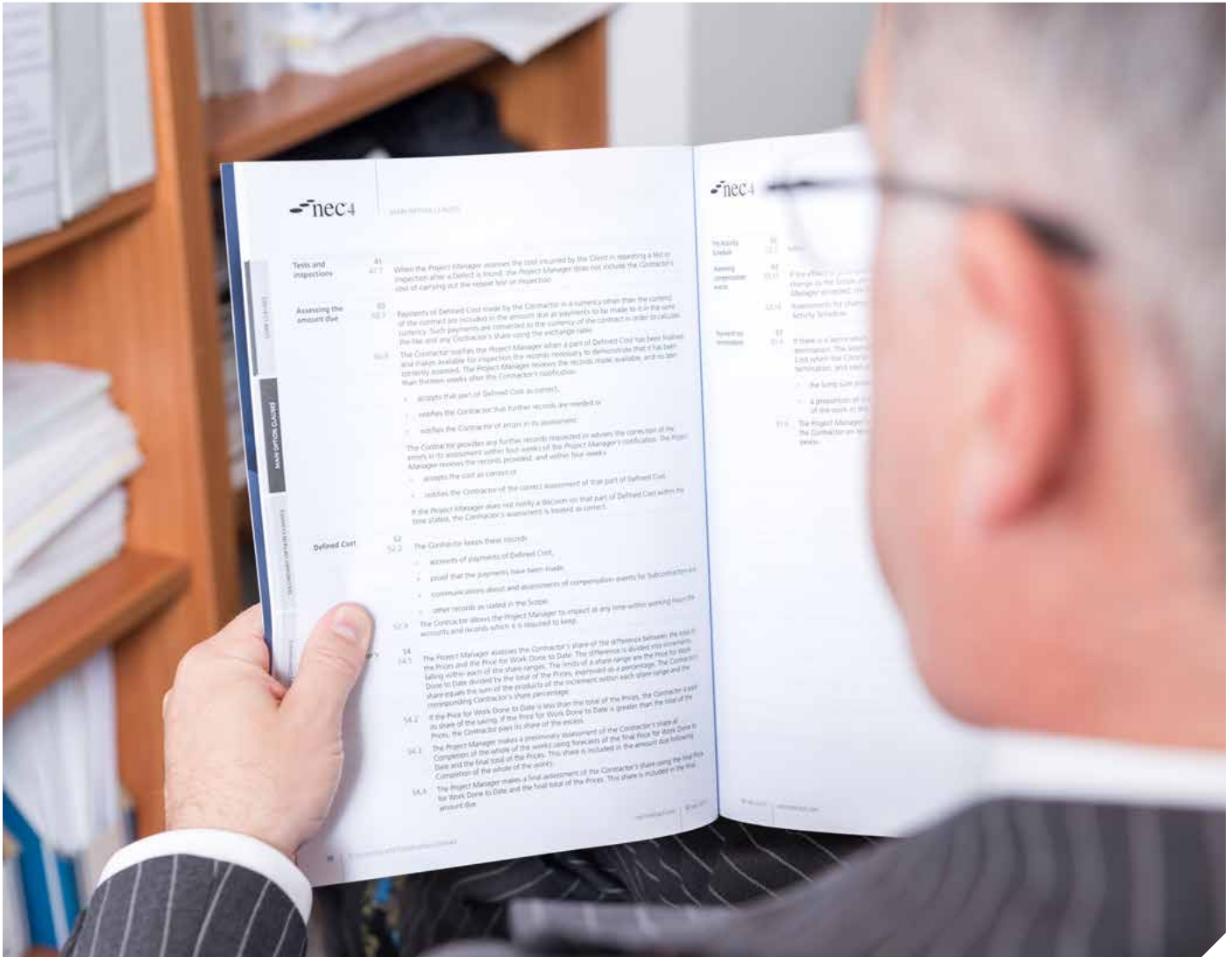
The Dividing Date

The concept of the dividing date (previously in NEC3 Clause 63.1 "the date which divides work already done from the work not yet done") has also been tweaked for the NEC4. Clause 63.1 states that the changes to the Prices is assessed as the effect of the compensation event upon "the actual Defined Cost of the work done by the dividing date" and "the forecasted Defined Cost of the work not done by the dividing date..." This dividing date therefore is used to determine whether actual or forecasted "costs" are to be used for compensation events. The dividing date being described as the date of the instruction / certificate / notification communication or the date of the notification of the compensation event.

Clause 63.5 (Assessing Compensation Events) states "A delay to the Completion Date is assessed as the length of time, that due to the compensation event, planned Completion is later than planned Completion as shown on the Accepted Programme at the dividing date..." and "A delay to a Key Date is assessed as the length of time that due to the compensation event, the planned date when the Condition stated for a Key date will be met is later than the date shown on the Accepted Programme current at the dividing date..."

'Dividing date' is not a defined term, though it is specifically explained in Clause 63.1 relating to a change in Prices which occurs when delay is incurred. The Guidance Notes advise that the inclusion of the '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. The dividing date is also explained within the 'NEC3 and NEC4 Compared' guide.

The dividing date removes any doubt as to against which Accepted Programme a



compensation event should be implemented and enforces the philosophy that compensation events should be added as soon as they are known about with associated Contractor's risk and Project Manager's assumptions where necessary.

This is an improvement on the NEC3 as it provides certainty as to the Accepted Programme against which the compensation event is impacted although it should be recognised that some compensation events have occurred before any instruction / notification / certificate has been raised and even before the notification of the compensation event has been written. Further, the finalisation of a compensation event can take some time through the stages of identification, notification, assessment and implementation with the Parties reticent to agree the effect until they are confident that the full extent of the event has been determined. On the basis a number of Accepted Programmes may have been created over the development of the compensation event.

Failure to introduce a compensation event speedily after the dividing date may force the Parties to go back some weeks / months to get

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The dividing date removes any doubt as to against which Accepted Programme a compensation event should be implemented
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back to appropriate Accepted Programme (as defined by the dividing date) which will then potentially have an impact on subsequent post dividing date Accepted Programmes.

The above situation needs to be effectively managed and communicated by the Parties to ensure that compensation events are impacted onto the appropriate Accepted Programme as close to the dividing date as possible. This is good practice as early impacting of compensation events provides protection from arguments of Contractor culpable delay and allows the Parties to determine possible mitigating / accelerative actions as early as possible. The emphasis on early action is explained in the guidance notes which also advises that the dividing date prevents the practice of a Project Manager making a retrospective and selective choice between a quotation and the final recorded costs of a compensation event.

Of course, the above relates to the assessment of delay during the project. A retrospective review undertaken after the Completion Date may provide somewhat different results. But that is a whole other article! ■

The importance of local knowledge

What are some of the nuances associated with expert services in the Middle East compared to those of Common Law in the UK.



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This article looks briefly at some of the nuances associated with undertaking expert services in the Middle East region compared to Common Law jurisdictions such as the United Kingdom. It explores the manner in which international arbitration is conducted, provides a brief comparison of arbitration as opposed to court proceedings, and looks at the diverse nature of the market and the parties involved in large complex disputes.

It is fair to describe the arbitration industry as having developed significantly over the past ten years within the Middle East region, although the various countries in the region are in different stages of development. Many of the Middle Eastern countries adopt international rules such as International Chamber of Commerce ("ICC") and the London Court of International Arbitration ("LCIA") and some of the local arbitration rules are based on international rules (such as DIAC). In addition, many tribunals contain Common Law educated arbitrators as well as the legal representation also primarily having a Common Law background.

As such, the trend seems to be that many international arbitrations are conducted similarly to those in other parts of the world, however, the arbitrators are mindful of taking into account the local laws under which the contract is governed.

Evidence in Court

The court systems where expert work is involved is somewhat different. It is unusual for an expert to give a testimony in court proceedings although this does occur in some instances. Therefore, usually once the expert report has been submitted, the expert's assignment is for the most part complete.

Commentary on Liability

It is often usual practice for the expert to address decisions on liability, or at least provide their opinion on such, whereas in International Arbitration the expert would almost always leave liability for the tribunal's consideration.

Where legal representatives or even members of the Tribunal are more experienced in the court system, predominantly having a Civil Law background, this has on occasion caused a misunderstanding of the expert's duties and their reports. It is accepted in International Arbitration that an expert's opinion is based upon a party having demonstrated liability sitting with the other party and therefore the comment "subject to liability" is not always explicitly stated within an expert's report.

In an arbitration a few years ago, I was cross examined by a local advocate who had extensive experience of court proceedings within the Middle East. The first question put to me during the examination was "why have you told the Tribunal that the Defendant (whom the local advocate was representing) should pay the Claimant the said amount?" In response to this, I had advised that the figures put forward in my expert report were subject to liability

and that I had not given any opinion on liability. In response, the local advocate asked why I hadn't stated that in my report. Although, as a general rule, I do not state that all my opinions are subject to liability (something the Tribunal in this case stated was the norm and what was expected from an expert), in hindsight and for the benefit of all parties, a paragraph confirming this may have been prudent.

Understanding the Parties

Another key issue is the diversity of the parties, their legal representation and the Tribunal. The decisions of the parties often take account of the behavioural traits of the people involved among other considerations. This can result in misunderstandings or something being "lost in translation". Understanding the people involved will help the expert tailor the report in a way which can be fully comprehensive and understood by all.

The use of certain words which seem overly complicated or a structure with lengthy paragraphs, and even the use of Latin phrases may not be appropriate in certain instances and this should also be a key consideration for the expert while drafting the expert report.

Report Structure

To conclude, it is advisable for all experts to understand not only their subject matter in the dispute but to also make time to understand all parties within the process to ensure they produce the best report possible in the circumstances, as well as providing a coherent and useful testimony. ■



The illusion of certainty?

Comparing Critical Path Analysis as a project management tool and its use in delay analysis.



Stephen Lowsley
Delay Expert

A brief search of the internet will provide a plethora of academic articles relating to the project modelling technique known as Critical Path Analysis (CPA). In this article I am not going to discuss the operational details and the various nuances of the technique, I am going to compare the use of Critical Path Analysis as a project management tool and its use in delay analysis to quantify delay and extension of time (EoT).

The development of CPA in the 1950's is largely credited to the US company DuPont with the technique being referred to as the Critical Path Method (CPM). Although there have been some refinements, the basic principle of CPM is employed in the modern programming software of today such as Primavera and the like.

At the same time that CPM was being developed, the US Navy Special Projects Office embarked on the Polaris Intercontinental Ballistic Missile program. This was a major project involving research and development of missile launch systems, government organisations, academic institutions and contractors. In order to monitor and control this vast project a system referred to as PERT (Program Evaluation and Review Technique) was developed.

PERT is similar to CPM, however rather than a single duration for each activity it allows for a 'three-point estimate' consisting of a most likely time, a shorter optimistic and a longer pessimistic time. These durations are applied to the activities statistically and in the case of the Polaris project allowed effective time management of the very many participants, the critical path and float and it is credited with a saving of two years in the overall project period.

The PERT three-point estimate of activity duration is used today in 'Monte Carlo Simulation' risk analysis techniques to estimate the probability of completion at specific times, recognising that there is not a single specific outcome and a single specific projected date for completion.

In the UK CPA programming software is extensively used for the planning and control of construction projects, unfortunately it is often probably not used as effectively as it could be. Many construction projects can be considered as being similar, however all projects are to a certain extent unique, involving many participants, a high level of complexity and uncertainty with plenty of scope for things to go wrong, probably not dissimilar to the US Navy's Polaris project.

I have been involved with the programming and management of construction projects for over 45 years and in this time have been involved with CPA from hand drawn networks in the 1970's through to the modern software of today. In my opinion CPA is an invaluable project management tool, however it provides a precise answer and as such requires precise information. Such detailed information is unlikely to be available and CPA provides an answer based on a very prescriptive set of circumstances, usually one of a very extensive range of possibilities.

In project management circles this programme uncertainty is clearly recognised with CPA being utilised to simulate the likely outcome rather than to predict the future with absolute certainty. Due to this uncertainty a CPA based programme is not static and operationally there is likely to be a need for an ongoing amendment of computer logic and activity durations to reflect the changing circumstances and to ensure that the programme reflects a realistic forward projection.

The PERT system developed over 60 years ago recognised uncertainty in respect of the management of time and in my opinion, programming involves looking at possibilities

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In my opinion CPA is an invaluable project management tool, however it provides a precise answer and as such requires precise information.

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rather than a search for absolute certainty.

In the world of delay analysis, the term 'Critical Path' can be very emotive and I have found that things can be somewhat different from project management with a static CPA being relied on to calculate and quantify a precise answer.

The introduction of the PC and the development of programming software was seen as a bit of panacea in respect of the analysis of delay with the credibility of expert opinion being dependent on a computer-based CPA. Over time, however this approach has attracted some criticism including adverse comments from the courts.

A more pragmatic approach based on experience of the construction process is now usually considered as more appropriate. This aligns more with the use of CPA from the perspective of project management rather than its use to quantify precise delay for delay analysis.

As a simple example of the differing approaches, on a two-and-a-half-year project a delay to the critical path of two days occurs at an



early stage.

From a project management perspective, it is reasonable to suggest that despite the delay being considered as critical the delay could be overcome in the future two-year period, required to complete the works without any additional effort or input. Although this is the case the risk of not meeting the completion date and the probability of a later completion will have increased.

In a typical delay analysis utilising the planned programme and CPA a precise measure of a two-day delay to completion will be calculated.

A two-day critical delay occurring in the last month of the project or an initial delay much greater than two days is more likely to result in a direct delay to completion in both scenarios.

This being the case the impact of a critical delay on completion may be dependent on the timing of the event and its extent rather than a blind calculation of the delay to the critical path.

One of my favourite analogies relating to the use of CPA for delay analysis was made by lawyer Doug Masson who when discussing problems with logic and causation said “CPA becomes as stable as a house of cards”¹

A similar comment was made by the courts in the case of *City Inn v Shepherd* where Lord Drummond Young considered that a major difficulty “is that in the type of programme used to carry out a critical path analysis any significant error in the information that is fed into the programme is liable to invalidate the entire analysis.”²

I concur with this statement, however in my opinion to provide a precise answer any CPA requires precise information and therefore rather than just error, as considered by Lord Drummond Young, any uncertainty is also likely to invalidate the entire analysis.

The development of PERT recognised uncertainty and in the use of CPA for project

management this uncertainty is recognised with CPA being used to evaluate likely outcomes, whereas with delay analysis CPA is often blindly used to calculate delay without consideration of the facts and difficulties and provides a false illusion of certainty.

I have some concern in respect of the use of CPA for the retrospective analysis of delay, particularly if it has not been used during the course of the project. This is not to say that it should not be employed, however any use should be undertaken with care with the emphasis being on experience and the evaluation of the factual evidence rather than a precise answer calculated by a computer. ■

¹Masson, D. *Following the Critical Path*, *Contract Journal* 16 Feb 1995 P34-35

²*City Inn Limited v Shepherd Construction Limited* [2007] CSOH 190



India's Reform of Arbitration: an attempt at commercial attractiveness

Arbitration in India has historically been subject to ad hoc procedures, however that is about to change through the proposal of two Bills. In a country with an ambition to become a hub for Arbitration, do the changes outlined in these Bills go far enough?



Marine Maffre Maucour
Senior Consultant
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Galloping urbanisation and the need for infrastructure has made the construction market one of the main drivers of GDP growth in India.

In an emerging country with a predicted GDP growth of 7.5% for 2019-2020¹, where most industrial and public infrastructure projects can be considered unprecedented, large numbers of foreign investors and contractors have already taken an active part in the construction of buildings, airports, metros, highways and railways for example:

- The Navi Mumbai Airport project which plans to increase capacity to 60 million passengers per year;
- The Dedicated Freight Corridor comprising 3,300 km of "freight-only" Railway Tracks;
- The Bharatmala project - the construction of 35,000km of highways across 16 states over a 5-year period for Phase I;
- The Sagarmala project - the modernisation of all 12 of India's existing major ports and the construction of 5 new 'megaports'.

India seeks foreign direct investments through its Ministry of Commerce & Industry to supplement domestic companies in "establishing a 'lasting interest' in an enterprise that is resident in an economy other than that of the investor"².

However, foreign companies are often obliged to establish local partnerships to comply



with a “lasting” requirement, such players are all the more eager to safeguard their interests and to limit the sources of uncertainty should a dispute arise.

Consequently, where attracting and promoting key foreign investment is key to sustaining economic growth, Arbitration has a broader importance.

In such a context, adopting arbitration to resolve potential cross-border commercial disputes, thus avoiding domestic Indian courts and laws which have been suffering from a poor reputation, can be a very attractive option for foreign investors and contractors.

To some extent, the lack of confidence in the Indian courts reflects a fear of partial decisions favouring Indian entities. However, it could also result from the fact that parties seek to compromise and settle to avoid enforcement

issues still faced for certain arbitration awards in India.

For these reasons, the potential for the use of Arbitration in India is an attractive reform for those seeking to make dispute resolution procedures in India more credible and effective.

The Arbitration & Conciliation (Amendment) Bill 2018 aims at addressing the challenges set out above to instil more confidence in foreign investors by “dusting off” the administration of arbitration and ensuring its independence.

The ongoing Arbitration process appears as a typical example of India’s exceptional iterative capacity.

Arbitration in India is currently governed by the 1996 “Arbitration and Conciliation Act” which is largely based on Article 34 of the UNCITRAL Model Law.

India participated in most of the frame

agreements following the New York Convention in 1958 related to international arbitration. In this regard, the enforceability outside India of an award made in India will depend upon whether or not the foreign jurisdiction has signed the agreement.

India is also a party to the 1923 Geneva Arbitration Clauses Protocol and the 1927 Geneva Convention for the Enforcement of Foreign Arbitral Awards. To this extent an arbitration award is binding and most of the awards reached by major arbitration seats are enforceable in India.

Nevertheless, the lack of control of the ad hoc proceedings has led the law commission of India to issue a report in August 2014 containing measures to reform the “Arbitration and Conciliation Act”. At the top of the list is the aim to reduce the number of reasons upon which an

award can be challenged and to clarify issues relating to the enforcement of foreign awards. Based on the recommendations published in August 2014, an order was issued in October 2015. This order was ratified following the "Amendment Act" of 31 December 2015.

Key dates

The Amendment Act led to several changes (such as accelerated proceedings, stronger response toward conflicts of interest and arbitrators' impartiality, provisional measures, a one-year time frame to provide the award) but it has not fulfilled all expectations.

The amendments are too recent for there to be any measurable results recorded. However, the amendment was considered incomplete by some players willing to go further and promote institutional arbitration in India and to provide confidence to international investors and contractors.

India is however, strenuously trying to overcome its reputation of being interventionist towards international arbitration.

The Indian Government established a dedicated committee chaired by Mr. Justice B N Srikrishna, Retired Judge, Supreme Court ('the Srikrishna Committee') which issued a report in August 2017. The aim was to establish a real institutional framework for arbitration in India. The Srikrishna Committee Report recommendations were gathered into two Bills.

The 'New Delhi International Arbitration Centre Bill, 2018' was presented to the lower house of parliament in January 2018 and the 'Arbitration and Conciliation (Amendment) Bill, 2018' introduced in August 2018.

One of the key measures brought by the 'New Delhi Bill' is the strengthening of the current International Center for Alternative Dispute Resolution, which at the same time became the New Delhi International Arbitration Center. The purpose of this operation is mainly to provide this institution with means to become emblematic in the conduct of national and international arbitrations.

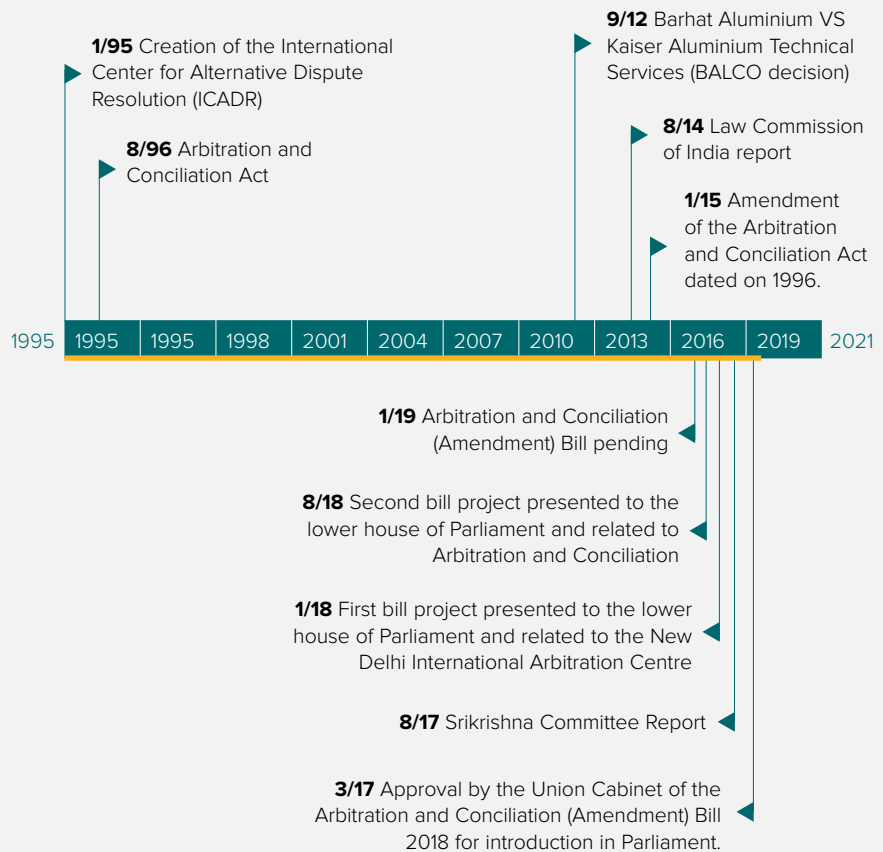
Thus, the new version of the International Center for Alternative Dispute Resolution is to administer arbitrations, promote Alternative Dispute Resolution, offer training and cooperate with other institutions related to arbitration, in India or abroad.

The creation of a new body called the Arbitration Council of India to act as a regulator aims to oversee and record Indian arbitration institutions, but also to certify and accredit the arbitrators and grade arbitral institutions.

The Srikrishna Committee also concluded that limiting international arbitration proceedings to one year (as per established with the previous amendment) was irrelevant and extremely restrictive. The imposition of a confidential regime was also deemed necessary and added to the Arbitration and Conciliation (Amendment) Bill introduced in August.

However, while some argue that additional challenges remain unsolved (for instance, to date The Arbitration and Conciliation Act

Key dates



remains silent on third-party funding) critics suggest that changing the recently enacted law once again will create confusion and uncertainty, two significant drawbacks for foreign investors.

My personal feeling remains quite positive. There is no doubt that Indian authorities are now convinced they need to keep developing and securing the dispute resolution procedures in order to be attractive. Thus, promoting institutional arbitration seems relevant. However, both the scale of ambition and the magnitude of challenges facing Indian legislators demonstrates the complexities involved in reaching a unanimous and satisfactory outcome.

It is not a surprise to see that discussions on the Bills are still ongoing before the amendment of the arbitration law passes. Will India achieve its ultimate objective: being recognised by foreign parties as a global arbitration hub? Time will tell (and the Indian polychronic vision of time will definitely need to be kept in mind!) but it is certainly moving in the right direction. ■

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Records, Goldmines and Pitfalls

The importance of records and their details.



Zulifqar Ali
Associate Director
Driver Trett UK

I have on many occasions heard people use the phrase 'It's not worth the paper it's written on', the question is, is it true?

In his book 'Engineering Law and the I.C.E. Contracts', Max Abrahamson famously said "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".

Generally, records fall into two categories those that are mandatory and those that are discretionary. Mandatory records are those required by the Contract (i.e. Notices, etc.), test results and those statutory records required to satisfy such matters as Health and Safety at work. Discretionary records are those that are project specific such as progress updates, general correspondence, daywork, etc.

A robust claim is generally founded on the quality and detail of the project records, e.g.

progress updates. The emphasis on maintaining detailed contemporaneous records cannot be stated enough. At the start of any project, a proper system should be established to keep accurate records of the events occurring on site in a secure and central location, which is organised in such a way that the relevant details can be easily extracted.

In my experience, I often find that contractors lack contemporaneous records, or where there are such records the quality and content of those records is not sufficiently detailed. One extreme example that comes to mind was when the only record on a daily allocation sheet was the weather despite other contract and varied work being carried out. It is good practice to keep records, but it is more important to ensure that the records contain the right detailed information.

Daily allocation sheets can be used in a claim for an extension of time, providing they include as-built data such as activities being worked on, details of any delays or issues impacting productivity, receipt of any instruction, adverse weather conditions, etc.

In addition, in my experience contractors very rarely keep detailed records relating to

variations, it is often the case that the only information available is the issue date and the value of the variation(s). Contractors often do not record as-built data, such as the activities that were affected by the variation(s) and most importantly the dates the varied work was undertaken. An extension of time claim relating to delays caused by variations can fail from the lack of detailed contemporaneous records.

It is also important to note that a record of what is not being done and a reason for that is often more important than a record of what is progressing.

In the modern electronic age, it is relatively simple to create an excessive amount of records. For instance I am often presented with a voluminous amount of photographs showing such things as pipes in trenches and corridors lined with plasterboard, without any reference to the timing, the location, or what they purport to show. Therefore, any benefit is limited.

I initially questioned the validity of 'It's not worth the paper it's written on', the fact is the saying holds merit, detailed records are the backbone to any claim. Without details the claim is not worth the paper it's written on! As they say.....it's all in the detail! ■



Big construction, big data, and big chaos

It can be argued that excessive change on mega projects can have unpredictable effects, so how do contractors substantiate this in associated claims for time and money?



Robert Dean
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You may well think that the term “chaos” isn’t something that should be associated with construction, yet you’d be wrong.

At its simplest chaos theory can be illustrated by the “butterfly effect”, a term coined by the American mathematician and meteorologist, Edward Lorenz.

In 1963 Lorenz created a model of a weather system that led to a powerful insight about the way nature works: small changes can have large consequences. The idea came to be known as the butterfly effect after Lorenz suggested that the flap of a butterfly’s wings in Brazil might ultimately cause a hurricane in Texas. And the butterfly

effect, also known as “sensitive dependence on initial conditions”, has a profound implication: forecasting the future can be nearly impossible.

The construction industry regularly provides examples of small changes on projects having large consequences. One illustration may be minor changes to a structure’s design having huge implications on pre-designed / preconstructed MEP systems.

Large projects which utilise bespoke elements of design are often executed in dynamic and nonlinear fashions. Such ‘megaprojects’ can involve changes over time that are hard to predict and are ultimately chaotic in nature. Changes may for example be disorderly, alter existing processes, have small inputs leading to large consequences and require decisions to be made even in the absence of all intended information.

The extent to which a change event on a project can be determined as ‘chaotic’ is however subjective. When considering that contractors are

typically constrained by tight timeframes, there are scenarios in which it is not unreasonable to badge the effects of events as being realistically impossible to predict, and therefore chaotic in nature.

If for example, a client was to enhance the design of a bespoke museum roof, which in turn meant that a crane was required to be in a location for an extended period, in order to adequately price and plan for that change the contractor would be required to assess all possible outcomes both internally and externally. The contractor would have to consider the effects of the prolonged presence of the crane on associated work packages / interfaces and would be required to collaborate with subcontractors, who in turn would have to assess implications with suppliers and so forth. It may seem far-fetched, but the prolonged presence of the crane could result in lower building works being delayed, which in turn delays flooring works, and

consequently results in marble suppliers being unable to meet demands when flooring works are due to commence - therefore delaying the project.

The above scenario retrospectively demonstrates that inherent order does exist; however, the contractor's argument may be that chaos trumps simple cause and effect on the grounds that issues in relation to flooring works were not reasonably foreseeable. It could perhaps argue that contractual time constraints deemed it impossible to query works and associated supply chains beyond those of the lower buildings, therefore resulting in the requirement to make assumptions for the likes of the flooring, which upon being incorrect, ultimately provoke dispute.

As a claims consultant I regularly see such scenarios, typically associated with design change. Having retrospectively collated claims for extension of time on large airport projects, I have witnessed the extensive evolution of project designs from which complex networks of change events have developed. In isolation it can be difficult to distinguish relationships between vast amounts of change events; however, I find that by plotting their connections graphically, it helps to decipher the chaos.

Such 'change event graphs' allow labelling and processing of multiple events, involving multiple

parties in one single system. Events within a graph may have multiple connections, loops and cyclical links and as a result allow parties to visually and transparently track change on projects. Collating such graphs on live projects encourages parties to agree on causation (or settle on the reasonable probability of causation) at or closer to the time of event occurrence; ultimately before the task of analysing it becomes too time consuming and expensive.

In absence of such tools contractors and subcontractors continually battle to manage change on projects. I often find that money claims are captured for compensable events with distinct and direct cause and effect; yet events of a more complex nature, with less distinguishable cause and effect, are left on the table or are subject to dispute. As a result, chaotic change events are often unaccounted for within interim claims yet tend to be significant contributors to contractors overspending on the likes of plant and labour. Consequently, and in an attempt to recover such losses, contractors retrospectively collate global claims. Most claims for disruption and productivity losses are, for example, dealt with on this basis. The issue however is that such claims often come under scrutiny, as even retrospectively it is a huge and ultimately expensive task to clearly link cause and effect. This is largely due to the amount of data analysis that is required to undertake the task.

When it comes to substantiating claims, the amount of project data available for mining and analysis is only increasing. The gradual adoption of Building Information Modelling (BIM) within the industry brings with it the requirement for projects to integrate large volumes of information into common shared databases, concerning all components of the building lifecycle. The evolving term for such large volumes of data is referred to as 'big data'.

The ability to find patterns and associations within large structured and unstructured data sets allows systems to analyse, learn and predict. The utilisation of tools that permit such smarter analysis of project data will assist parties in establishing more accurate effects of change, both prospectively and retrospectively. It will also help to increase the speed of undertaking such analysis.

It is for this reason that the industry ought to acknowledge that projects are generating 'big data', the analysis of which requires the utilisation of smart new tools and processes. There is an increasing necessity to engage specialists like Driver Trett on projects to ensure that data is utilised to its full potential, as efficiently as possible. Similarly, there is a growing need for tools that visually simplify relationships between change events and demystify causation complexities. ■



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NEC Post-Completion Delay Analysis: Prospective vs Retrospective

Should prospective or retrospective delay analysis be used when the facts are known?



David Bunn
Planner
Driver Trett UK

Introduction

With a dollop of enthusiasm and more than a pinch of optimism, I recently considered post-completion/time distant delay analysis under an NEC type contract as the subject of my Construction Law MSc dissertation. To mis-quote a meerkat 'not so simples'.

The NEC suite of contracts promote the use of prospective delay analysis to demonstrate an extension of time entitlement. However, when assessing delay after the effects of an event are known, such a prospective approach fails to consider what occurred as a matter of fact and is arguably in conflict with longstanding common law principles. The intention for my research was to finally clarify whether a prospective or retrospective delay analysis should be used when the facts are known. My name would then become a thing of folklore and I would be celebrated up and down the land. Close...not by a long shot!

Background

The basics are that the intentions of the

NEC3 (and NEC4) require the settlement of variations, employer risk events and minor breaches, known as compensation events, as and when they occur. The contract specifies contemporaneous prospective analysis of delay to establish an EOT entitlement. The key word being “intentions” as the NEC does not offer an alternative method of assessment after the effects of the event are known or when the contract is complete.

Livingstone v Rawyards Coal Co (1880) 5 App Cas 25 found that an injured party should be placed “...in the same position as he would have been in if he had not sustained the wrong for which he is now getting compensation or reparation” (not a better position). This presupposes knowledge of the actual loss or actual delay. A prospective delay analysis produces a forecast of the likely effect of an event that may not be consistent with what occurs.

The method of delay analysis described by NEC is consistent with a time impact analysis which requires updating the programme to the point in time at which a delay event occurs but does not address what happens for the remainder of the Project.

The Protocol - Prospective vs Retrospective Methods of Analysis

The Prospective time impact analysis was championed by the 1st Edition of the Society of Construction Law Delay and Disruption Protocol. With the footwork of Fred Astaire, the 2nd Edition has now adjusted its stance to say that a prospective analysis after the events are concluded may no longer be appropriate.

The Protocol sets out that a prospective delay analysis identifies the likely impact of historical progress or delay events of a completion date and it recognises that the conclusions of a prospective delay analysis may not match the as-built programme. Therefore, is such an analysis valid after the actual effects are known when viewed under the microscope of putting a party back to the same position had the wrong not occurred?

The Protocol recognises that post-completion effect and cause methods of analysis (retrospective methods) are generally considered to be more forensically reliable because they consider “any and all” potential causes of the delay incurred. Though it is arguable that a retrospective analysis conflicts with the terms of NEC; the bargain into which the Parties entered.

Northern Ireland Housing Executive

However, with respect to my dissertation help was on hand. The Northern Irish courts did consider a quantum case in 2017, Northern Ireland Housing Executive v Healthy Buildings (Ireland) Limited considering whether cost compensation events should be assessed on a retrospective or prospective basis after the effect is known. In short, the Consultant argued that its actual records and costs were irrelevant to the case as the contract requires

that any assessment should be carried out on a prospective basis.

The court ruled in favour of an actual assessment of costs incurred, in making his judgement, Deeny J asked, “why should I shut my eyes and grope in the dark when the material is available to show what work they actually did and how much it cost them?” Job done, dissertation put to bed, the pub beckons. I then considered that I should cast a bit further for views.

What the Textbooks Say

Pickavance quotes the case of Blackhawk Heating & Plumbing Co (1975), stating that “...extensions of time must be granted on the best evidence available.” As Lord Robertson put it, “...estimate and conjecture are superseded by facts...” Again, pretty conclusive, retrospective it is.

The nagging doubts as to certainty however kept pushing me on. The Protocol could be interpreted differently noting the text “Where the Contractor has complied with its contractual obligations regarding delay events and EOT applications, the Contractor should not be prejudiced in any dispute with the Employer as a result of the CA failing to assess EOT applications.”

Keating states that “...in cases where the contract clearly requires a prospective approach during the progress of the works, where there is no provision permitting a retrospective post completion review of entitlement and where the contractor had complied with all the steps required of it to obtain an award contemporaneously, it is possible that such a dispute should be resolved upon the basis of a wholly prospective analysis.” Though Keating also quotes the Protocol’s statement that “Irrespective of which method of delay analysis is deployed, there is an overriding objective of ensuring that the conclusions derived from that analysis are sound from a common sense perspective.”

“Common sense”, “what the contract requires” and “refraining from groping in the dark”. All sensible but potentially inconsistent approaches.

What the Experts Say

Then it struck me. Ask an Expert! Several experts (from many areas and different companies) were consulted as part of my research, all boasted excellent CVs and are highly regarded within their field. In relation to the Northern Ireland Housing Executive case all experts agreed that the decision was potentially applicable in relation to the assessment of delay, although the experts consulted were split on whether the decision in Northern Ireland Housing Executive is correct. Some experts felt that a fact based assessment is the correct approach, whereas others felt the decision conflicted with the provisions of the contract. This was not going as planned.

It gets worse, in relation to post completion assessment of delay under NEC3, the experts were very much divided in their opinions as to how delay should be assessed. Some felt that



The intention for my research was to finally clarify whether a prospective or retrospective delay analysis should be used when the facts are known.



whether the results of a prospective analysis under NEC calculates an EOT entitlement that differs from what actually occurred is irrelevant, the agreement between the parties prescribes a specific method for analysing delay (prospectively) and the agreement should not be interfered with. However, some felt that once the facts are known they cannot be ignored and because NEC is silent on post-completion assessment some scope exists to adopt a different approach to delay analysis after the effects of an event are known.

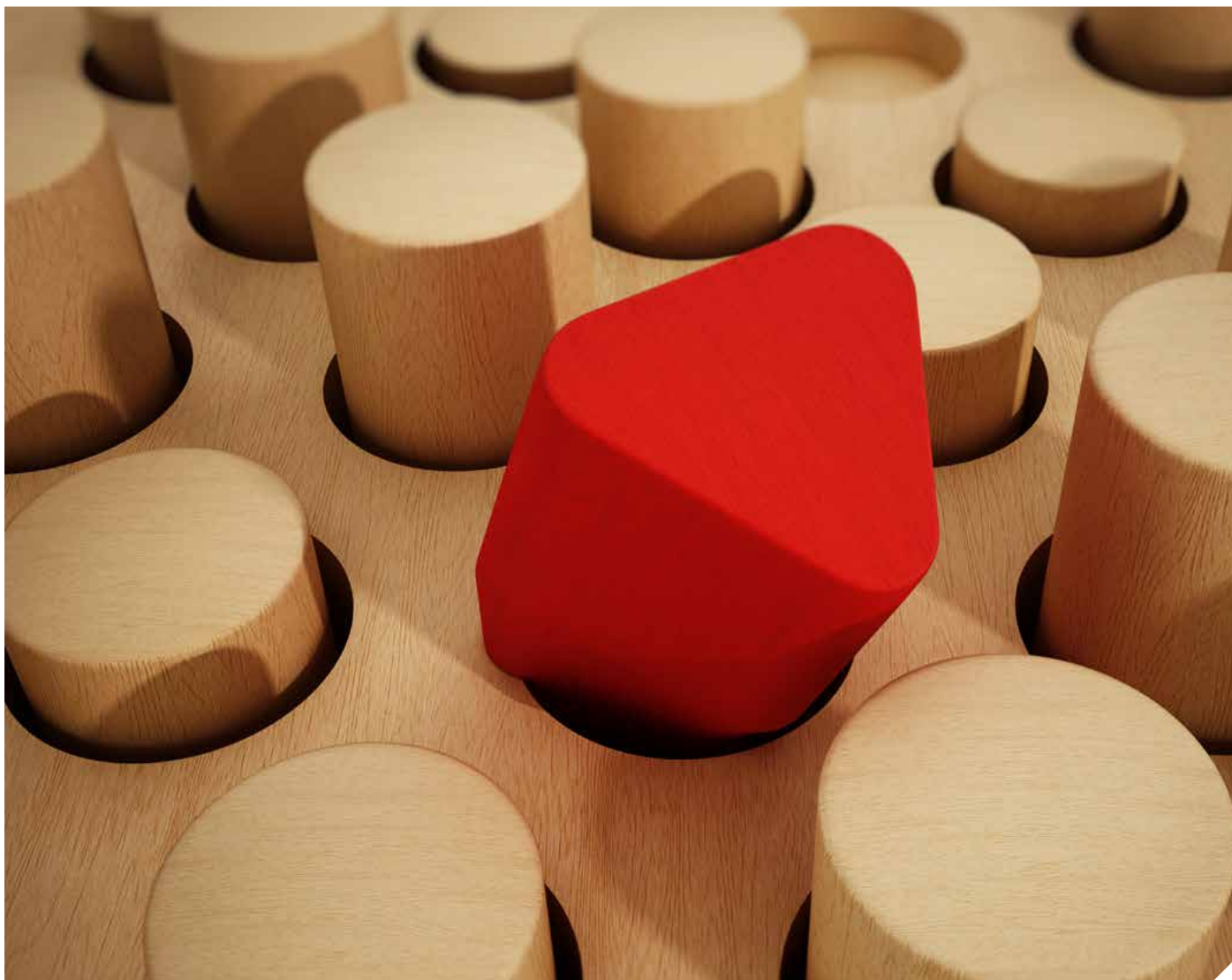
Most of the experts consulted consider the absence of provision for post-completion analysis under NEC to be by design as the opportunity arose to clarify the position in NEC4 and was not taken. Some experts considered that the inclusion of a provision for post-completion assessment of delay (or costs) would introduce the opportunity for the Employer to adopt a ‘wait and see’ approach conflicting with the ethos of the contract.

Conclusion

There is a clear breadth of opinion within the industry as to the correct approach to post-completion delay analysis under an NEC form of contract. This is most certainly not a case of “one size fits all”.

It is arguable that it is quite possible for a delay assessment to be undertaken both prospectively and retrospectively on the same project with differing results of which neither can be said to be wrong. This may seem counter-intuitive but the key seems to be the point at which the analysis is undertaken. During the project, for the purposes of agreeing a way forward, a prospective analysis is required but if the dispute ends up in court it is a brave delay analyst who tries to persuade a judge that the facts should be ignored.

More importantly though can I ask that the next student who prepares their dissertation on this subject gives me a ring, I will advise them that there are quicker and easier routes to the pub! ■



Adjudication – Fit For Purpose

Changes to the adjudication process in the UK.



Alistair Cull
Operations Director
Driver Trett UK

It is hard to believe that adjudication has been with us in the UK for twenty years having been introduced back in May 1998. Adjudication was originally intended to be used for relatively simple small-scale disputes concerning cashflow. Any party to a construction Contract could refer a dispute at any time, to an independent third party for resolution within 28 days, unless extended. The decision reached by the adjudicator being

binding on the parties unless and until it was finally determined by arbitration or litigation.

In the initial years the process worked as intended. Decisions were reached and the industry's 'lifeblood' (money) flowed. The fast-track nature of the process meant that there was not the luxury of time for each and every point to be thoroughly examined, and this led to adjudication being referred to as 'quick and dirty' or 'rough justice'.

Since these early decisions the process of adjudication in the UK has evolved along with the disputes that are being referred. The matters that are now being considered by adjudicators are often large and complex, a far

cry from the original intention.

As a result, the cost of adjudication has also increased significantly. More often than not one or both Parties have legal representation and depending on the nature of the dispute, expert evidence may also be required. There has also been a shift towards a general lengthening of the process beyond the planned 28 day or 42 day period, with each party making and responding to a number of submissions. Until the submissions stop the adjudicator cannot finally consider the matters and arrive at his decision.

So what factors have led to these changes within the UK adjudication process? There are

likely to be a myriad of possible explanations, but from my experience the reasons can be summarised into the following broad categories: referring a matter that is too large; complex technical matters; and poorly presented submissions. Taking each of these in turn:

Matters that are too large

I have been appointed as expert in several adjudications where one party is effectively seeking a decision on the entire final account. The matters to be considered include the evaluation of both unagreed instructed and disputed variations; the assessment of extensions of time and any associated costs and the evaluation of contra charges.

It is not reasonable or realistic to expect the Responding party to review, consider, and respond to such a submission in either 7 days or 14 days, particularly if the Referring party has been secretly preparing its documentation over a number of months and effectively launches an ambush. As with any generalisation there is an exception – if one party has sat on their hands and not dealt with submissions, which later form the basis of the Referral, then the 7 or 14 day period could be considered reasonable.

In order to respond to the claim that is being made the Responding party is likely to be faced with the prospect of employing additional external resources, be that independent expert evidence or simply additional commercial resources, and/or diverting internal resources from elsewhere in the business, or both.

Complex technical matters

Modern construction is becoming more and more complex especially in relation to the mechanical and electrical service installations. Therefore, any disputes surrounding complex



Modern construction is becoming more and more complex especially in relation to the mechanical and electrical service installations.



technical issues are likely to require expert evidence on both sides and there may also be a need to have an oral hearing in order that the adjudicator fully understands the issues and complexities involved.

Poorly presented submissions

Responding to a Referral in a limited period is difficult at the best of times, let alone trying to respond to one that is poorly put together. It is in the Referring party's best interest to ensure that the document is concise, fully supported, and as logically put together as possible. At the end of the day the objective is to make it as easy as possible for the adjudicator to understand your case and hopefully come to the right decision. The Responding party should always be in the position of understanding the case that is being presented. If the Responding party cannot understand the case being presented having 'project knowledge', then what chance does the adjudicator have? On

the basis that the Referring party controls the commencement of proceeding, no adjudication should be commenced until the documentation is the best it can be.

The above observations are based on my own experiences in the UK. Other countries around the globe, including Canada, Ireland, and Singapore are introducing, or considering the introduction of, adjudication and therefore it will be interesting to see if their process follows the experiences of the UK, or whether lessons will be learnt.

So is adjudication fit for purpose? Well, it is my opinion that it depends on the nature and type of dispute being referred. If the matter in dispute is a simple discreet issue, this should be capable of being dealt with in the prescribed periods. However, there is no guarantee as defences and legal challenges may be raised therefore, delaying the process.

If the dispute comprises numerous elements, or is technically complex, then adjudication may not be the correct forum. Yes, the timetable can be extended to allow each party sufficient time to produce its various submissions, but this is likely to only lead to the cost of 'adjudicating' the matter running into tens of thousands of pounds, especially if there is a hearing held. Effectively the process becomes almost a quasi-judicial hearing. It must also be remembered that each party bears its own costs with the losing party generally picking up the adjudicator's costs as well.

Therefore, prior to commencing an adjudication the Referring party needs to give careful consideration to the realistic level of recovery when compared to the cost of the adjudication and then factor in the 'rough justice' element. Having done this calculation it may become evident that in fact the better course of action is to sit down and have a sensible discussion. ■

Good faith, mutual trust and... Termination

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Monte Carlo Simulation

Assesses the usefulness of statistical techniques to assess the probability and risk associated with achieving a defined completion date.



Andrew Agathangelou
Technical Director
Driver Trett UK

In 2005, I was providing consultancy services to a developer regarding the construction of a major UK retail development. The project was beset with many delays and was running a year late at that point.

Each month, the developer received a progress report which included a forecast of the earliest date the project was likely to finish, based upon:

- A) Progress achieved to date; and
- B) Completion of the remaining works in line with the originally programmed periods and sequence of works.

Whilst a conventional progress forecast of this manner is a useful method of indicating the status of the works at a given point in time, it is not necessarily an indicator of the date a project might finish.

This is because this type of forecast method does not use the historical progress data achieved to date to calculate a progress trend, and then project the trend going forward to

establish the likely completion date. Neither did the exercise, in this instance, consider the probability of the remaining construction activities being achieved in line with their original planned durations which were, at best, only estimates of the expected durations based on previous experience.

Given this uncertainty, and the fact that the project continued to fall even further behind every month, the developer posed the following question: what date could the shopping centre be opened with 99% certainty?

Having been tasked with providing the answer, I researched my options and was directed to conducting a Monte Carlo simulation using an additional software package they supplied. The Monte Carlo method is a probability simulation which is used to understand the impact of risk and uncertainty regarding project management, cost, or progress forecasting models.

The simulation I employed required an estimation of the minimum duration, most likely duration and the maximum duration for some or all of the construction activities in the programme for the remaining works. For the purposes of the exercise I undertook, I chose only those activities that lay directly on the longest (critical) path of the works, which



Figure 1

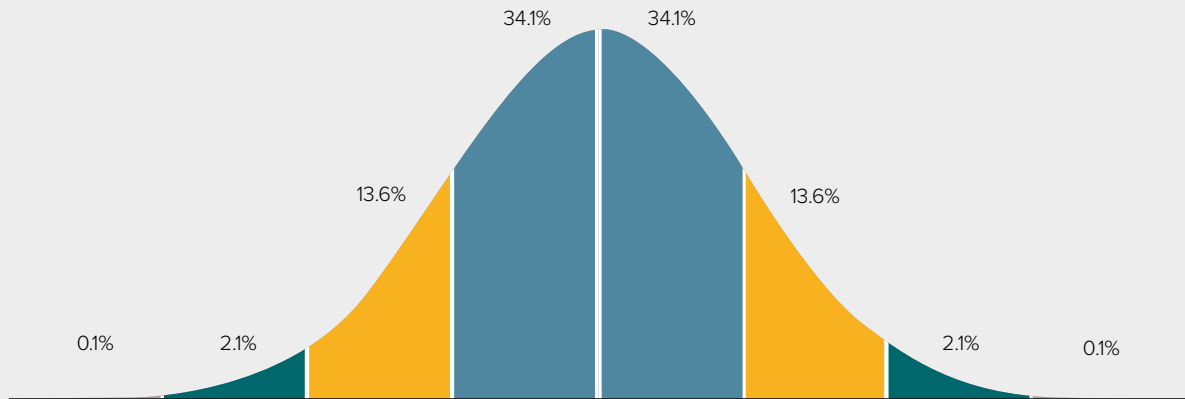
| Construction Activity | Minimum Time | Most Likely Time | Maximum Time |
|-----------------------|--------------|------------------|--------------|
| Concrete Frame Area 1 | 47 weeks | 55 weeks | 65 weeks |

Figure 2

| Construction activity | Possible Duration (Time) |
|-----------------------|-----------------------------|
| Concrete Frame Area 1 | 47 - 50 weeks - minimum |
| | 50 - 55 weeks – most likely |
| | 55 - 58 weeks |
| | 58 - 62 weeks |
| | 62 - 65 weeks - maximum |



Figure 3



determined the project's overall duration and completion date.

To illustrate how, in principle, the Monte Carlo simulation works, I will use a hypothetical project in which the concrete frame is one of the key critical activities determining overall completion.

In this example, I have estimated the following minimum, maximum and most likely durations for the concrete frame based upon personal experience: (Figure 1).

Having assigned the minimum, maximum and most likely durations for the concrete frame, a range of other possible durations are generated by the simulation which sit within the specified minimum and maximum periods, as shown in figure 2.

The establishment of the range of possible durations makes it possible for the Monte

Carlo simulation to use statistical techniques to establish the likelihood or probability of the duration value occurring.

In many situations where data is collected on a large scale, for example exam results, the distribution of the results will often follow what is called a normal distribution curve where the apex of the curve represents the mean (average). The distribution of the results will spread out either side of the mean value, as illustrated below. This spreading out or deviation from the mean is called the 'standard deviation' and measures the spread of the results. A small standard deviation indicates that the data or values obtained are tightly clustered around the mean - the normal distribution curve will be taller. A larger standard deviation indicates that the data or values are more spread out either

side of the mean – the normal distribution curve will be wider and flatter (Figure 3).

A characteristic of a normal distribution curve is that 68% of the values (whether they be exam grades or estimated construction durations) can be found within one standard deviation from the mean, as illustrated by the teal area in the diagram above. Further, 95% of the values can be found within 2 standard deviations from the mean – the first standard deviation is the blue area illustrated above, and the second standard deviation is illustrated by the yellow area. These two standard deviations combined account for 95% of the data or values under consideration.

Back to our example, for each of the above duration ranges, the Monte Carlo simulation would generate a minimum of 500 random numbers whose value fell within the range specified. For example, for the 47 to 50 weeks duration range the Monte Carlo simulation would generate 500 random numbers whose value would be either 47, 48, 49 or 50. Likewise, the 50 to 55 week duration range the simulation would similarly generate 500 random numbers whose value would be either 50, 51, 52, 53, 54 or 55. This generates a normal distribution curve for each of the concrete frame duration ranges, with each normal distribution curve containing the values of 500 random numbers whose values fall between the specified duration ranges.

Taking the duration range of between 47-50 weeks again as an example, a minimum of 500 random numbers were generated whose values were either 47, 48, 49 or 50. The Monte Carlo simulation records the frequency with which each number occurred in the simulation. In other words, the simulation records the number of times the number 47 occurred out of a total of 500, the number of times the number 48 occurred out of a total of 500 and so on. With 500 random numbers generated with values between 47 to 50 the simulation can calculate the mean value, and the two standard deviations from the mean in which 95% of the values are found as illustrated on page 26 (Figure 4).

Figure 4

95% of values are within 2 standard deviations of the mean.

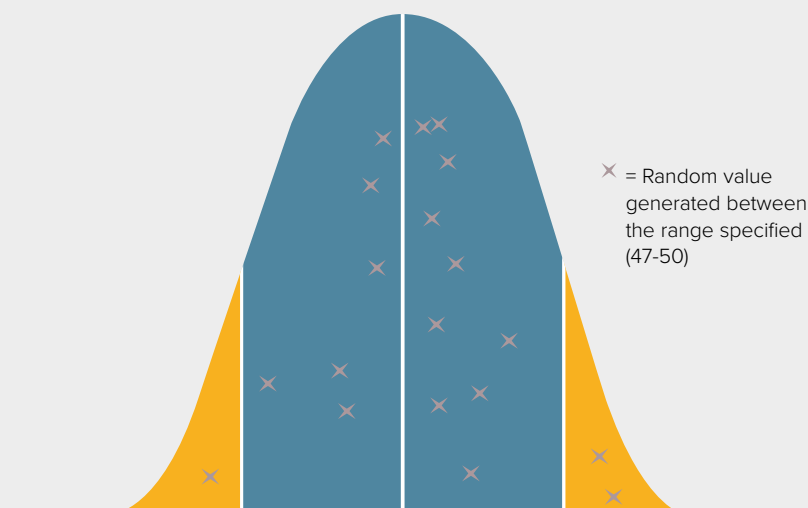


Figure 5

| Time (value) | Number of Times (out of 500) | Percent of Total |
|------------------------|------------------------------|------------------|
| 47 weeks - minimum | 10 | 2% |
| 50 weeks | 150 | 30% |
| 55 weeks – most likely | 225 | 45% |
| 58 weeks | 375 | 75% |
| 62 weeks | 470 | 94% |
| 65 weeks - maximum | 495 | 99% |

Figure 6

| Overall Project Duration | Probability |
|--------------------------|-------------|
| 105 weeks | 2% |
| 112 weeks | 30% |
| 125 weeks | 45% |
| 132 weeks | 75% |
| 147 weeks | 85% |
| 150 weeks | 99% |

“
Having been tasked with providing the answer, I researched my options and was directed to conducting a Monte Carlo simulation using an additional software package they supplied.
 ”

Likewise for the duration range of between 50 and 55 weeks, the simulation would generate 500 random numbers whose values were either 50, 51, 52, 53 or 55, and the frequency with which each these numbers occurred. This continues for the duration range of 55-58 weeks and so on.

The table above illustrates the number of times each of the specified durations occurred in the simulation, and thereby the likely probability of it being achieved;

If we take the minimum period of 47 weeks for example, the value 47 appeared 10 times out of the 500 random numbers generated, or 2% of the total. Therefore, the probability of the 47-week duration being achieved or occurring is 2%.

It can be seen in the above example that what was considered one of the most likely durations before the simulation was undertaken, 55 weeks, only had a 45% probability of being achieved i.e. less than a 50/50 chance. If we assume that the duration with a 75% probability of being achieved will be the most likely

duration, the most likely duration will be 58 weeks.

Running similar simulations involving all the selected critical path activities for my retail project, generated a range of possible outcomes for the overall project duration, as follows:

It can be seen from figure 6 that the overall project duration which could be achieved with 99% probability or certainty would be 150 weeks, with 132 weeks being the most likely overall duration (based on the 75% result set out in the table above).

Going back to the real question posed by the developer of the West London shopping centre in 2005, I ran the Monte Carlo simulation several times and obtained very similar results on each occasion. I reported to the developer that if it wanted to open the shopping centre with 99% certainty, the opening date would be 24 October 2008. The developer was taken aback because the reported forecast delay to the works was significantly less than this, with a far earlier completion date. The shopping centre opened some three years after the simulation was run – on 30 October 2008! ■



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As-planned v as-built – A Pragmatic Approach for Expert Testimony?

Binu Joseph and Sean Hugo take a look at the as-planned versus as-built method of delay analysis and assess the applicability of the method for expert testimony.

Binu Joseph and Sean Hugo
Senior Consultant and Operations Director -
Abu Dhabi, Driver Trett UAE

Introduction

The deposition of expert testimony within the specialist field of forensic delay analysis, can be ad hoc and inconsistent. The acceptance of such evidence, by triers-of-fact, appears on occasions also to be accepted and rejected through experience or instinct rather than the application of a standard test. In recent times Experts have looked to the as-planned versus as-built (APAB) approach when giving expert evidence largely because it is perceived to be factual and pragmatic. This article explores the APAB methodology through an assessment of the prevailing body of knowledge (BOK) and a practical case. The conclusion of which puts forward an opinion of whether the APAB approach conforms to a scientific test or a subjective interpretation which may be subject to heuristic bias (subjective interpretation). Pragmatic is defined as “dealing with things sensibly and realistically in a way that is based on practical rather than theoretical considerations”. Can the APAB methodology be considered as pragmatic and if so, what are the shortcomings of the analysis technique?

Definition Expert Testimony

Before exploring the mechanics of the as-planned versus as-built method of delay analysis, it is sensible to review the way in which the courts typically receive and interpret expert evidence. The Scottish case of *Kennedy v Cordia* is instructive in this respect where Justices Reed and Hodge provide obiter on expert evidence. Justices Reed and Hodge comment that there are four primary considerations which govern the admissibility of expert evidence (i) “whether the proposed skilled¹ evidence will assist the court in its task”, (ii) “whether the witness has the necessary knowledge and experience”,

(iii) “whether the witness is impartial in his or her presentation and assessment of the evidence” and (iv) “whether there is a reliable body of knowledge or experience to underpin the experts evidence”. In the author's opinion and experience the first three factors are usually clarified during the cross-examination process. Given the different methods and techniques embodied by the “science” of delay analysis and coupled with the varying levels of practitioner's expertise, the results of the analysis can be variable but not necessarily incorrect which presents significant challenges for triers-of-fact, ultimately negating any useful assistance to the tribunal or court.

As-Planned v As-Built Methodology

Originally, the SCL Protocol (October 2002)² has set out the basic methods of delay analysis i.e. Impacted As-planned (IAP), Time Impact Analysis (TIA), as-planned v as-built (APAB) and Collapsed as-built (CAB). Keane and Caletka (2008)³ defined these methods as the four primary methods of delay analysis.

The AACE International Recommended Practice No. 29R-03 titled “Forensic Schedule Analysis” (FSARP)⁴ further divides these primary methods into a broader grouping of “observational” and “modeled” methods. As the name implies the observational methods involve examining a programme of works by itself or in comparison with another programme. Whereas, in the modeled method of analysis the analyst inserts or extracts activities that model delay events into or from a CPM⁵ network and then compare the recalculated results of the ‘before’ and ‘after’ states.

While the APAB approach is an observational form of analysis carried out retrospectively, the other three primary methods viz. IAP, TIA and CAB are modeled forms of analyses. The fact that the APAB approach is an observational method makes this method a common-sense and factual based approach as it relies on observing and comparing the actual progress with the original planned intent. This method of analysis does not hypothetically simulate



the effect of added or extracted events from the schedule. The analyst draws important conclusions such as the As-Built Critical Path from interpreting the facts at hand using a sound understanding of the construction process and a thorough review of reliable contemporaneous planning records. This is the primary reason, the APAB methodology is a preferred method of analysis when giving expert testimony.

The conclusion sought by the courts is the quantification of excusable, non-excusable, and compensable delays and the function of the delay expert is to establish the causation and quantum of delay to critical and near critical paths.

The SCL protocol (2nd Edition)⁶ defines the critical path as “the longest sequence of activities through a project network from start to finish, the sum of whose durations determines the overall project duration”. Critical delay is referred to as “a delay to progress of any activity on the critical path...”. ‘Near-critical’ activities are activities with minimal total float values with a high probability of becoming a critical activity.



in complex construction projects, the as-planned and as-built critical paths are generally never the same.



As stated in the FSARP⁷, near-critical activities have the greatest potential of becoming concurrent delays. So, the process of evaluating concurrent delays involves identifying critical and near-critical delays. Liability of the delay is a matter for the court/tribunal to decide.

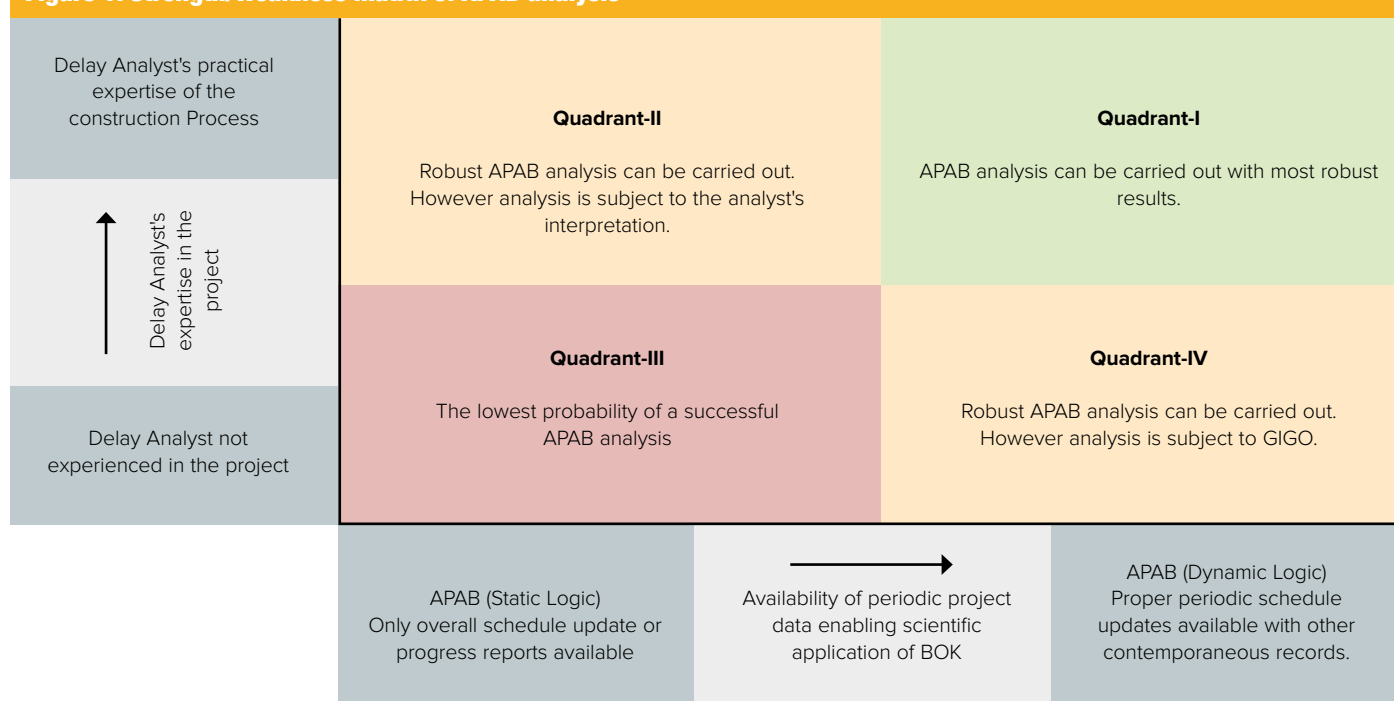
The base of APAB analysis is generally an approved planned programme where the sequence of works and logic links are agreed

by the parties involved. The actual progress information (as-built data) is compared against the critical and near critical paths of the planned programme. The review of progress/delays against an approved programme makes the APAB delay analysis contractually reliable. Accordingly, the APAB methodology involves the following steps:

- Assessment and validation of the as-planned critical and near critical paths;
- Identification of the as-built critical path and near critical paths; and
- Establishment of the causation and quantum of delays to critical and near critical paths.

The APAB analysis is straight-forward so long as the as-planned critical path and the as-built critical path are similar. This occurs primarily in works which are sequential in nature such as a tunneling project. However, in complex construction projects, the as-planned and as-built critical paths are generally never the same. This is because, as the project progresses the activities which were initially critical may fall off the critical path and become non-critical and the near-critical activities may become critical due to

The APAB Analysis (Dynamic Logic) is also an observational method carried out retrospectively.



Case Study

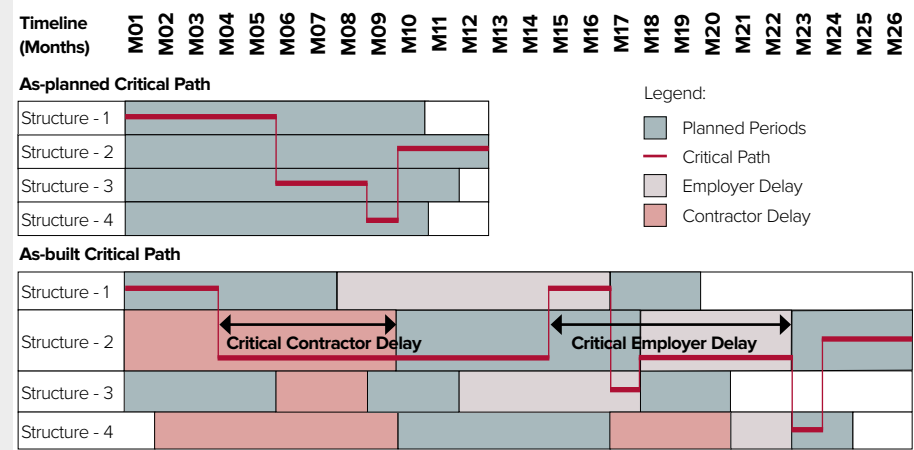
The following case study analyses a design and build project in the Middle-East which illustrates the practical and common-sense approach that can be applied in an APAB analysis. The project involved the construction of four structures. The critical path for the project ran through sections of structures 1, 3, 4 and 2 in a sequential manner (refer to Figure 2). There was only one completion milestone for the project.

The contractor did not update the approved programme regularly and the available programme updates were unreliable. However, the contractor submitted weekly and monthly progress reports which contained as-built progress quantities. Accordingly, the only practicable way forward was to compare the actual quantities against the planned quantities to assess the delays. For this purpose, monthly progress quantities were summarised and an as-built schedule/programme developed.

As discussed in the previous section of this article, this example illustrates a situation where reliable progress updates are not available and that a systematic analysis using the BOK was not possible. The expertise and experience of the delay analyst in the construction process was instrumental in this case. In the matrix provided in Figure 1 this case is an example to be placed in Quadrant-II.

The monthly actual progress quantities were plotted graphically against the planned quantities to develop an as-built critical path for each of the structures. Further analysis of the as-built critical paths of the four structures established the as-built critical path through the project. Expert review of the executed quantities against the required quantities in the planned sequence of works and the delaying

Figure 2: Case Study: as-planned Critical Path and as-built Critical Path (High level)



events helped in identifying the as-built sequence of works. As-built data shows that Structures 1 and 3 progressed well initially; whereas Structure-2, which was near critical in the planned programme was delayed. This resulted in the critical path moving from Structure-1 to Structure-2. A high-level summary of the as-built critical path against the as-planned critical path is illustrated in Figure 2.

This study illustrated the capacity of APAB analysis in non-programme-based delay analysis. APAB analysis gives the analyst the flexibility to subjectively interpret results through expertise and experience. In the absence of regular programme updates, a realistic evaluation was still possible using the APAB method. However, the implementation

of the methodology was time-consuming and required significant effort and expertise.

The results of APAB analysis is sometimes counter-argued as being subjective, as it depends on interpretation from the analyst. In the above example, the expert identified that the critical delays moved to Structure-2 as it was near critical in the planned schedule/programme. The critical path determined by the expert was disputed by the opposing expert, who also had significant construction process expertise. The opposing expert derived a different as-built critical path based on the same set of facts. This illustrates that a purely interpretive approach can lead to different conclusions, which then becomes unhelpful to the court/tribunal.

The difference from the static logic approach is that contemporaneous progress updates are used to identify the as-built critical path in this method. The analyst identifies critical delays periodically in order to develop the overall as-built critical path. The range of application of this methodology varies based on the availability and reliability of contemporaneous programme updates. To establish the as-built critical path using programme updates, the SCL Protocol (2nd Edition)¹⁰ provides two forms of 'windows' analysis – "time slice analysis" and "as-planned versus as-built windows". The difference between the two forms is that the latter is less reliant on the programming software and is used when there is concern over the validity of the planned programme and/or contemporaneous programme updates. Accordingly, the latter requires the analyst to have a higher level of expertise.

APAB (Dynamic logic) is observational analysis and different from 'dynamic analysis' since it does not involve the insertion or extraction of delays, instead it is based on observing the behaviour of the network from update to update.

From the above explanation it can be inferred that the APAB methodology which is identified as one of the basic methodologies in SCL Protocol (October 2002) has been further detailed as a "retrospective longest path analysis", "time slice analysis" and "as-planned versus as-built windows" in SCL Protocol (2nd Edition). This again shows the range of available approaches to the broad methodology of APAB analysis.

Conclusion

In conclusion, the APAB method of analysing delays is pragmatic and if competently implemented in a purely subjective capacity or a combination of a subjective and mechanical capacity satisfies the four criteria set out in the case of Kennedy v Cordia and can assist the court/tribunal. However, the expert's subjective interpretation of the as-built critical path should be rigorously tested under cross examination even if the analysis is founded on verified facts. ■

¹ Kennedy v Cordia is a Scottish case where Expert Witnesses were referred to as Skilled Witnesses.

² "Society of Construction Law (SCL) Delay and Disruption Protocol October 2002" (p46-p48)

³ Keane P J and Caletka A F, "Delay analysis in Construction Contracts" (1st edition, Blackwell Publishing Ltd, Oxford 2008) p124

⁴ "AACE International Recommended Practice No. 29R-03, FORENSIC SCHEDULE ANALYSIS, (25 April 2011)" (p12-p14)

⁵ "Society of Construction Law (SCL) Delay and Disruption Protocol 2nd Edition February 2017" (p62) defines Critical Path Method (CPM) as "The methodology or management technique that, through the use of calculation rules (usually automatically carried out by programming software), determines the critical path and calculates float."

⁶ "Society of Construction Law (SCL) Delay and Disruption Protocol 2nd Edition February 2017" (p62)

⁷ "AACE International Recommended Practice No. 29R-03, FORENSIC SCHEDULE ANALYSIS, (25 April 2011)" (p114)

⁸ "AACE International Recommended Practice No. 29R-03, FORENSIC SCHEDULE ANALYSIS, (25 April 2011)" (p12-p14)

⁹ "Society of Construction Law (SCL) Delay and Disruption Protocol 2nd Edition February 2017" (p34-p37)

¹⁰ "Society of Construction Law (SCL) Delay and Disruption Protocol 2nd Edition February 2017" (p34-p37)

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An update to the article written by Kirsteen Cacchioli, Driver Trett UK in the last edition of the Digest, regarding the case decision.

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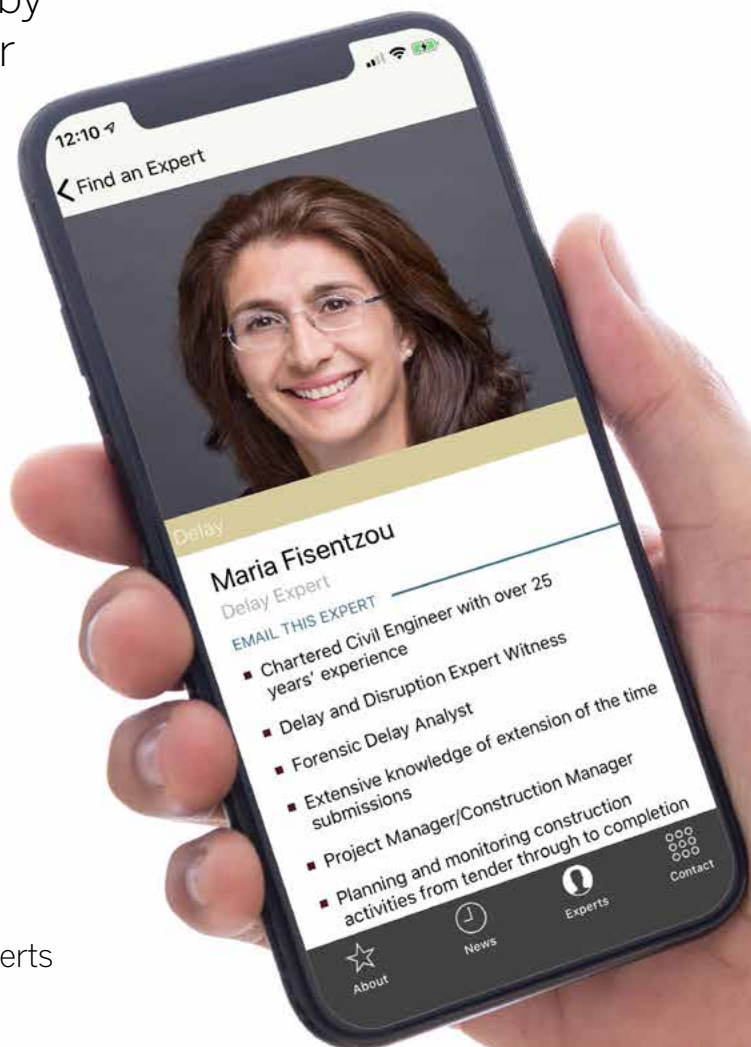
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