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Ineffective Use of Expert Evidence in Construction Arbitration

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I INTRODUCTION

In 1782, Lord Mansfield said that "in matters of science, the reasonings of men of science can only be answered by men of science".[1] With this statement, his Lordship paved the way for expert opinions to be accepted as evidence designed to assist judges in common law courtrooms. In the years since the 18th century, the use of expert evidence has only continued to grow.[2]

The civil law has followed a different path relying traditionally on court appointed experts for the assistance delivered in common law jurisdictions by party appointed experts.

In international arbitration both approaches have been combined, but with increasing reliance by counsel from both traditions upon party appointed experts, a development which can be traced in the developments of the IBA Rules on the Taking of Evidence in International Arbitration.[3]

Expert evidence has found itself particularly at home in construction arbitration, taking advantage of the complex legal and technical issues that are typically found in these kinds of arbitral disputes. Yet, although the reliance on party appointed expert testimony steadily increases, in many cases its value in providing assistance to arbitral tribunals has regrettably not followed suit. This is because the proliferation of party appointed expert evidence, bears with it numerous challenges which can limit the effectiveness of the evidence.

What are those challenges? In this paper three will be discussed: first, the partisanship of party appointed expert witnesses which can undermine the reliability of the evidence; second, the use by competing experts of conflicting facts, data and methodologies; and third, the asymmetric use of and over-reliance on experts. These challenges have the potential to increase the inefficiency, delay and cost in the arbitral procedure, and reduce the value of the expert's evidence.

Some ways in which these challenges may be overcome will be explored: first, considering a few existing solutions and protocols in international arbitration, and then proposing approaches to resolving these issues which build on and supplement the existing mechanisms. Finally, the appendices to this paper contain examples of how these approaches can be implemented in practice.

Before examining the challenges, it is instructive to briefly consider the role of the expert witness in construction arbitration.

II THE ROLE OF EXPERT WITNESSES IN CONSTRUCTION ARBITRATION

The general role of expert witnesses, whether they be appointed by the parties or the tribunal, is to assist the tribunal in its decision making by providing relevant and independent evidence in their area of expertise. Arbitral tribunals find particular value in expert evidence in cases with complex factual and legal issues as an expert can provide much-needed clarification on the more intricate points. Construction arbitration proceedings are an example of such a case in which expert evidence is critical. The construction arbitrations are notoriously fact-intensive and technically complicated. The rise of the

[1] *Folkes v Chadd* (1782) 99 ER 589, 590.
[2] Tal Golan, 'Revisiting the History of Scientific Expert Testimony' (2008) 73(3) *Brooklyn Law Review* 879.
[3] See, the first edition of the IBA Rules: International Bar Association, 'Rules on Evidence in International Arbitration' (1999, first ed)) arts 5–6; and the revised edition published in 2010: International Bar Association, 'Rules on the Taking of Evidence in International Arbitration' (2010, revised ed) arts 5–6.

modern 'megaproject'[4] has resulted in disputes that are commensurately 'mega' in size and in complexity. The importance and utility of expert evidence to assist a tribunal in deciding factual issues has, as a consequence, grown immensely. As such, identifying the challenges associated with their use is of heightened importance to ensure that common traps are avoided and that maximum utility is derived from expert evidence.

There are three broad categories of expert evidence that can be identified: strictly technical expertise, legal expertise, and expertise related to delay, disruption and quantum.[5] Technical experts assist where the dispute involves a specialist area of knowledge on which the tribunal may require assistance. Legal experts are primarily used to explain aspects of a relevant laws with which the tribunal lacks familiarity. Finally, delay, disruption and quantum experts are sorters of facts the analysis of which is crucial to evaluating such claims. They then apply methods of analysis to the facts to assist in assessing and evaluating the claims. Expert in fact analysis and evaluation, these experts are clearly distinguishable from technical experts and are deployed with greater regularity than technical experts.

As noted above, in common law domestic litigation, experts are almost invariably appointed by the parties, and only exceptionally by the court. Parties operating in an adversarial system retain control over the conduct of the proceedings and the way in which their case is presented, including the appointment, and deployment, of experts. On the other hand, in the civil law domestic tradition, the court typically takes the initiative in appointing experts since it bears the primary responsibility of fact-finding.

In international arbitration, the procedure relating to the taking of evidence is a combination of both common law and civil law traditions.[6] Subject to any express agreement between the parties, experts can be appointed by a party or by the tribunal.[7] That being said, however, the use of party appointed experts is the norm in practice despite the extensive involvement of counsel and arbitrators with civil law backgrounds.[8] It is with party appointed experts that this paper is concerned.

With that background and context, the question arises: what is the problem with expert evidence in construction arbitration?

III WHAT ARE THE CHALLENGES?

A Partiality and Bias in Party Appointed Experts

The first issue is that of partiality and bias in party appointed experts. It has often been lamented that party appointed experts are nothing more than 'hired guns' who feel beholden to their appointing party and will advocate their case, whether they are consciously, or not. This is a problem which has bedevilled common law civil litigation. Indeed, Lord Woolf, one of the United Kingdom's then most senior jurists, undertook a review of civil procedure and litigation in the UK, producing a set of Interim and Final Reports advocating major reforms. While his Lordship recognised the value of a "full, 'red-

[4] Bruce E Hallock and James G Zack Jr, 'What Have we Learned from Megaprojects?' (2019) 36(2) *International Construction Law Review* 208.
[5] Nigel Blackaby and Alex Wilbraham, 'Practical Issues Relating to the Use of Expert Evidence in Investment Treaty Arbitration' (2016) 31 *ICSID Review* 655, 660.
[6] Rolf Trittmann and Boris Kasolowsky, "Taking Evidence in Arbitration Proceedings Between Common Law and Civil Law Traditions: The Development of a European Hybrid Standard for Arbitration Proceedings" (2008) 31(1) *University of New South Wales Law Journal* 330.
[7] Most institutional rules and domestic legislative frameworks allow parties the freedom to determine the arbitral procedure and include express provisions for both party and tribunal appointed experts: see United Nations Commission on International Trade Law, 'Model Law on International Commercial Arbitration' (1985, with amendments adopted in 2006) arts 19, 26; International Chamber of Commerce, 'Arbitration Rules' (2017) arts 25(3), 25(4).
[8] Paul Friedland and Stavros Brekoulakis, '2012 International Arbitration Survey: Current and Preferred Practices in the Arbitral Process' (Survey, 2012) 29.

blooded' adversarial approach" to civil litigation,[9] he nevertheless expressed concerns over the excessive cost, inefficiency and delay prevalent in the civil justice system. The area of party-appointed expert evidence was identified as one of the sources of the problem and an area especially in need of reform. Lord Woolf highlighted the tendency, perceived or otherwise, of expert opinions to be biased in favour of the party which appointed the expert.

Similar concerns have been observed in international arbitration, where use of party-appointed experts predominates. The respondents to the 2012 Queen Mary University International Arbitration survey who preferred tribunal appointed experts said that, in their experience, party appointed experts often acted as partisan advocates for the party who appointed them. According to them, this would often result in the appointment of a third expert by the tribunal, which was an additional expense that might have been avoided by the appointment of an expert by the tribunal in the first place.[10] Additionally, the problem is worsened by the appointment by counsel of arbitrators with civil law backgrounds who may be unfamiliar with the measures that domestic courts in common law systems have implemented in response to perceived bias, or even of the issue itself.

The problem is two-fold. The first relates to the remuneration of party appointed experts. They are employed and paid by the appointing party. This is not to suggest that the payment of fees itself leads to explicit bias and the majority of cases of expert partiality are not scandalous occurrences of bribery and fraud. Rather, the partiality exists on a more subconscious level. It is only human nature for an expert to feel somewhat indebted, consciously or otherwise, to those who are paying their fees. And additionally a concern for repeat business. It is therefore said to follow that experts naturally feel inclined to use their testimony to 'assist' their appointing party's case.[11]

Secondly, and perhaps more insidiously, experts who are appointed by parties will develop a greater personal and professional connection with the party and counsel who appointed them. Again, it is not suggested that the time an expert spends with counsel or the party necessarily results in direct bias. However, the fact that the expert, in preparing for the hearing, will have had detailed exposure to only one side's case and materials, has the potential to subconsciously influence his or her analysis and conclusions. Further, it would be similarly natural for an expert to feel more familiar with the counsel and parties with whom they have spent more time in preparation and discussion. This may affect the way in which they approach their role (more favourably to 'their' side) and the way in which they view the other side (more unfavourably, for example during cross-examination).

This is a particularly relevant if the expert has been appointed in several different matters by the same law firm or party, an issue akin to repeat arbitrator appointments.[12] In circumstances where expertise is required in niche technical areas from which there is only a limited pool of experts to select, repeat appointments can be common. One of the concerns with this is that the financial benefit accrued from being repeatedly appointed by the same party may amount to that expert having a financial interest in the outcome of the arbitration, to ensure that re-appointment can continue. Another concern is that the expert will feel compelled to support the party's case in an effort to continue the appointments and maintain a steady income. Finally, an expert who has been retained by a party on numerous occasions may have greater knowledge of relevant information about the party in other cases which may impact his or her ability to neutrally evaluate the issues in the current case.

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[9] Sir Harry K Woolf, *Access to Justice: Final Report to the Lord Chancellor on the Civil Justice System in England and Wales* (HMSO, 1996) [13.6].

[10] Paul Friedland and Stavros Brekoulakis, '2012 International Arbitration Survey: Current and Preferred Practices in the Arbitral Process' (Survey, 2012) 29.

[11] As observed by Sir George Jessel MR in *Abinger v Ashton* (1873) 17 LR Eq 358, 374.

[12] Indeed, the 2018 Queen Mary University International Arbitration Survey considered whether experts should be "held against the same standards of independence and impartiality as arbitrators": Paul Friedland and Stavros Brekoulakis, '2018 International Arbitration Survey: The Evolution of International Arbitration' (Survey, 2018) 32–33.

Of course, the expression by experts of conflicting opinions and opposing conclusions are sometimes simply a natural consequence of expert testimony on complex issues. The problem arises where differences in opinion and conclusion can instead be attributed to the reluctance of the experts to deviate from the 'party line'. This casts doubt on the fundamental utility of the evidence and the value of a party appointed expert's testimony has therefore been criticised as being limited.[13] How can a tribunal accept expert evidence which is suspected of being tainted with bias? Experts who believe that they are assisting their appointing party's case by maintaining its position, no matter how unreasonable it becomes, are ironically not only merely unhelpful, but actively undermine their party's case.

Concerns of partiality also engender suspicion within the parties and create a lack of confidence in the evidentiary procedure. At its most extreme, this could have implications regarding challenges to the final award. Particularly in the context of virtual hearings, where suspicion of the remote evidentiary procedure and witness examination is already a live issue, the added problem of expert bias could be the straw that breaks the proverbial camel's back. It is critical, therefore, that arbitrators and counsel are aware of the issue, and its consequences, in order to develop the effective mechanisms to resolve the issue.

B Use of Conflicting Facts, Data and Methodology

The second problem is the risk that corresponding experts opining on the same issue use different datasets, facts or methodologies in their reports.[14] The assumption that experts, especially technical experts, are analysing objective facts and therefore necessarily come to the same conclusion is misguided. In many cases where there are multiple expert witnesses opining on the same issue, the experts will reach conflicting conclusions. While in some instances there is a genuine difference in interpretation of the data, diverging conclusions can also be attributed to a number of other variables, including, but not limited to, the actual methodology, factual evidence and data sets used in the calculations.

The difficulties that arise from this are self-evident. The existence of uncontrolled variables undermines the reliability and, importantly, the comparability of the experts' reports. Too often there are instances where the experts have passed each other like ships in the night, each using different facts or data upon which to base their report. The subsequent analyses and conclusions presented in their respective reports are unable to be usefully compared; had the experts used the same dataset and facts, their conclusions may well be different. Further, had the data and facts been mutually used, the corresponding experts may have reached conclusions similar to one another, allowing them to narrow the issues. Failure to use common data sets and facts therefore hinders the tribunal's ability to effectively use the experts' skills and decreases the utility of the evidence.

The reliance on differing methodologies is a particularly relevant issue for delay and disruption experts, as well as other experts in fields where there are a number of accepted methods that can be used to analyse data. The use of different – and sometimes conflicting – methodologies can result in similar issues where the tribunal becomes unable to sufficiently compare the experts' reports and assess the more persuasive position. This is the case even if both methodologies are independently acceptable (after all, both apples and oranges are acceptable fruits to eat, but that does not make their comparison easy). Ultimately, the same issues of cost, delay and inefficiency arise out of the wasted utility of the evidence in these circumstances.

When expert evidence is properly managed, however, it has a greater capacity to increase the efficiency and reduce the cost of the arbitral process. When the expert evidence procedure is not sufficiently

[13] See, eg, Mark Kantor, 'A Code of Conduct for Party-Appointed Experts in International Arbitration' (2013) 26(3) *Arbitration International* 323; Alexander Nissen, 'Expert Evidence: Problems and Safeguards' (2007) 25(7) *Construction Management and Economics* 785, 789.

[14] See Paul Friedland and Stavros Brekoulakis, '2018 International Arbitration Survey: The Evolution of International Arbitration' (Survey, 2018) 33.

tailored and the testimony not appropriately directed, then the expert evidence can confuse rather than clarify.

C Asymmetric Use of Experts and Over-Reliance

The final issue is the asymmetric use of experts between parties and the increasing trend of over-reliance on expert evidence. There often arise situations where one party wishes to adduce expert evidence on a certain topic while the other party has not thought it necessary, or where one party has called a multitude of experts on the topic, where the other has only called one. Such asymmetric use of experts creates perceptions of unfairness between the parties, causing the other party to call expert evidence despite the fact that it may be wholly superfluous. This leads to greater, usually unnecessary, reliance on experts. As the frequency and complexity of construction disputes has ballooned, so too has the use of party appointed experts.[15] Not all of it is necessary or worthwhile. In some instances, parties will also attempt to run their case through their expert witnesses. Rather than adducing expert evidence only on the truly relevant issues, they attempt to construct their entire case through the evidence. This can result in, as an example, delay reports that run to hundreds of pages, setting out and attempting to interpret provisions of the contract.

Much of this type of use of expert evidence is a misguided effort by parties to bolster their case, wrongly believing that the number of experts called adds to the strength of their submissions. On the contrary, excessive and unnecessary reliance on expert evidence is often nothing more than a drain on time, money and efficiency of the arbitral process.

IV WHAT ARE THE SOLUTIONS?

Having outlined some of the challenges of party-appointed experts, it is appropriate to explore some ways in which these challenges can be mitigated. First, it is important to identify the procedural options available in international arbitration. Then some of the existing solutions which have been developed in international arbitration will be examined and some additional options will be explored

The unique procedural capabilities of international arbitration make it well-equipped to mitigate the challenges mentioned. Tribunals are not limited by civil procedure rules or prescribed practice notes, as are domestic courts. This presents both advantages and disadvantages. On the one hand, procedural flexibility is a valuable tool which can maximise efficiency and curb cost and delay. The ability to flexibly direct arbitral procedure makes it possible for tribunals to proactively apply bespoke procedures suitable to the dispute. This, of course, depends on consistent proactive case management by the tribunal and its willingness to take initiative in deciding procedural matters. Even though arbitral procedure is determined by party agreement, the tribunal has the opportunity to guide the parties to the most efficient and effective processes.

The procedural autonomy afforded in international arbitration, however, is a benefit only if tribunals effectively take advantage of this characteristic. Where a tribunal has not, the challenges will remain, and may even be exacerbated. Furthermore, as tribunals lack the institutional support afforded to domestic courts, where a tribunal is not sufficiently proactive in monitoring and adjusting procedural steps, the process may be commandeered by a strong-willed party.

There are additional procedural limitations to arbitration which, if not appropriately managed, may hinder the effectiveness of expert evidence. For example, because hearings in arbitrations are typically shorter than those in court, the tribunal cannot simply rely on extensive cross-examination of the expert to test the accuracy and utility of the evidence. Further, international arbitrations, as the name would suggest, are typically conducted between geographically disparate parties and counsel. Members of the tribunal and the parties may be based in different countries, or, as we have come to appreciate, events

[15] Sir Harry K Woolf, *Access to Justice: Final Report to the Lord Chancellor on the Civil Justice System in England and Wales* (HMSO, 1996).

such as a global pandemic may compel hearings to be conducted remotely. In these circumstances, the development of expeditious and effective procedure is of critical importance, recognising the already challenging logistical issues.

A Existing Solutions

It is proposed to discuss commonly utilized strategies. They are:

1. the frameworks in arbitral institutional rules;
2. the use of expert witness conferencing; and
3. the use of tribunal appointed experts.

1) IA guidelines

Most institutional rules contain only general provisions on the process of taking evidence,[16] leaving the details to be determined by the parties and the tribunal. The International Bar Association (IBA) and the Chartered Institute of Arbitrators (CIArb), however, have developed more comprehensive standards of conduct in relation to the taking of evidence, including arrangements for party appointed experts.[17]

The IBA Rules on the Taking of Evidence in International Arbitration 1999, amended in 2010, are guidelines to assist parties and tribunals in facilitating efficient and economical evidentiary procedure. While the IBA Rules are not exhaustive,[18] partly due to the wide scope of their intended operation, they are a 'tried and tested' model on which tribunals can base the process for taking expert evidence.[19]

The 2010 amendments to the IBA Rules in relation to party appointed experts attempt to address the challenge of expert bias, echoing the findings of the Woolf Report. The IBA Rules require experts to provide a description of the instructions that they have received from the parties,[20] consistent with aims of transparency. They also require that experts' reports contain the expert's statement of independence from the parties, their legal advisors and the arbitral tribunal,[21] emphasising the overriding duty of the experts to the tribunal rather than to their retaining party.

The IBA Rules also provide for a consultation between the tribunal and parties at the earliest appropriate time "with a view to agreeing on an efficient, economical and fair process for the taking of evidence".[22] The consultation should include issues such as the "scope, timing and manner" of "the preparation of witness statements and expert reports", among other topics.[23] This emphasises the importance of efficiency and economy while, at the same time, balancing the parties' and tribunal's autonomy to decide procedural matters.

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[16] Klaus Sachs and Nils Schmidt-Ahrendts, 'Protocol on Expert Teaming: A New Approach to Expert Evidence', in Albert Jan van den Berg (ed), *Arbitration Advocacy in Changing Times* (ICCA Congress Series, Kluwer Law International 2011) vol 15, 137.
[17] International Bar Association, 'Rules on the Taking of Evidence in International Arbitration' (2010); Chartered Institute of Arbitrators, 'Protocol for the Use of Party-Appointed Expert Witnesses in International Arbitration' (September 2007).
[18] For example, there is some question as to how they operate in regards to hearsay: see SI Strong and James J Dries, 'Witness Statements under the IBA Rules of Evidence: What to Do about Hearsay?' (2005) 21(3) *Arbitration International* 301.
[19] Jones (n 12) 7.
[20] International Bar Association, 'Rules on the Taking of Evidence in International Arbitration' (2010) art 5(2)(b).
[21] International Bar Association, 'Rules on the Taking of Evidence in International Arbitration' (2010) art 5(2)(c).
[22] Ibid art 2(1).
[23] Ibid art 2(2)(b).

The 2007 CIArb Protocol for the Use of Party-Appointed Expert Witnesses in International Arbitration is similar to the IBA Rules. It emphasises the importance of independence of experts by setting out the ethical principles of independence, duty and opinion which should guide the expert's evidence, including specifically that "[a]n expert's opinion shall be impartial, objective, unbiased and uninfluenced by the pressures of the dispute resolution process or by any Party".[24] Article 8 of the CIArb Protocol provides that the expert must submit a declaration,[25] containing statements regarding the expert's foremost duty to assist the Tribunal[26] and the impartiality and objectivity of the evidence.[27]

The CIArb Protocol also provides guidance on procedural matters, including that experts must first enter into a discussion for the purpose of identifying and agreeing on the issues on which they are to opine, as well as agreeing on the tests or analyses to be applied on the facts.[28] This is the foundation for the majority of the expert evidence;[29] with the experts proceeding to prepare their reports on the terms that they have agreed. The CIArb Protocol allows the tribunal wide scope to direct the proceedings, for example, by directing the experts to confer further[30] or to hold preliminary meetings with the experts.[31]

Despite these positive provisions, it is unclear whether the regulation of evidence procedure itself, through codes of conduct and protocols actually reduces partiality and bias of many party appointed experts. It has been suggested that the prescribed statements of independence "conflate 'impartiality' and 'objectivity' with 'independence'".[32] An expert can be outwardly 'independent' from the appointing party, while nevertheless harbouring subconscious biases which may influence his or her report. Indeed, there remain concerns regarding the "appearance versus reality" of impartiality where codes of conduct and statements of independence are concerned.[33] Can an expert, even acting in good faith, can ever be entirely free from pressures from their employing party or from the case itself? Neither the IBA Rules nor the CIArb Protocol themselves explain how an expert can in fact *be* independent, and not merely *show* independence. Mark Kantor argues that "no protocol or code can regulate the ability of a party to hire an expert who is just a good actor or actress"[34] and who is able to appear objective while delivering fundamentally partisan evidence.[35] Whether or not this is the case in practice, the theoretical concern is shared by many.

2) Expert Witness Conferencing

Expert witness conferencing, also referred to as 'hot-tubbing', refers to the practice of taking evidence from experts from similar disciplines together. This enables each expert to engage both with the tribunal and with each other in a forum-like discussion on the differences in their analyses and conclusions. This method of taking evidence is especially effective in complex arbitrations which have difficult factual and technical issues and where the parties rely on evidence from multiple expert witnesses. In those circumstances, the conventional approach of examining witnesses from each side in a linear fashion can lead to confusion in the tribunal's and counsel's understanding of the issues. This is particularly the case if there are a large number of witnesses and opposing expert witness statements are heard days apart. By taking expert evidence via witness conferencing, the experts are able to engage with opposing views directly and in succession, thus facilitating deeper examination of the most contentious issues.

[24] Chartered Institute of Arbitrators, 'Protocol for the Use of Party-Appointed Expert Witnesses in International Arbitration' (September 2007) art 4(1).
[25] Ibid art 4.5(n),
[26] Ibid art 8.1(a).
[27] Ibid art 8.1(b).
[28] Ibid art 6.
[29] Ibid art 6.1(c).
[30] Ibid art 7.2.
[31] Ibid art 7.3.
[32] Mark Kantor, 'A Code of Conduct for Party-Appointed Experts in International Arbitration' (2013) 26(3) *Arbitration International* 323, 329.
[33] Ibid 333.
[34] Ibid 335.
[35] Ibid.

The experts can keep one another accountable for their views, and are less likely to present strongly partisan opinions in the presence of their peers who are able challenge those opinions directly. As a result, witness conferencing and hot-tubbing are seeing increasing application in international arbitration, frequently with positive results.

Guidance on expert witness conferencing can be found in procedures developed by common law courts. Australian courts were a pioneer of the technique[36] and the New South Wales Supreme Court Practice Note SC Gen 11 on 'Joint Conferences of Expert Witnesses' is a useful source of direction on the topic. It states that the objectives of witness conferences include:[37]

- "the just, quick and cost-effective disposal of the proceedings;
- the identification and narrowing of issues in the proceedings during preparation for such a conference and by discussion between the experts at the conference. The joint report may be tendered by consent as evidence of matters agreed and/or to identify and limit the issues on which contested expert evidence will be called;
- the consequential shortening of the trial and enhanced prospects of settlement;
- apprising the court of the issues for determination;
- binding experts to their position on issues, thereby enhancing certainty as to how the expert evidence will come out at the trial. The joint report may, if necessary, be used in cross-examination of a participating expert called at the trial who seeks to depart from what was agreed; and
- avoiding or reducing the need for experts to attend court to give evidence."

These principles are equally applicable to the use of expert conferencing in arbitrations.

In 2001, Justice James Wood of the NSW Supreme Court observed that his joint conference experiences had been "entirely positive" because it brought the disputed issues into sharper focus.[38] He noted that the practice of hot-tubbing frequently inspired discussion of facts that were unknown or underappreciated by one or more of the experts, while simultaneously allowing experts to dismiss peripheral issues that were identified as being of no consequence. Furthermore, he suggested that the discussion between the experts themselves would more likely be conducted on a more appropriate, scientific way than if it was led by counsel unfamiliar with the areas of expertise.

Justice Steven Rares of the Australian Federal Court, a court that has adopted specific guidelines for the concurrent taking of expert evidence,[39] has also acknowledged the many benefits of witness conferencing.[40] He recognised that "a great advantage" of concurrent evidence was that the experts were more likely to be on the same page, adopting the same assumptions and being able to diffuse any uncertainty immediately.[41] The process resolved the issues of experts using conflicting datasets or methodologies, as any discrepancies could be immediately raised and discussed. This expends less hearing time and cost than a conventional cross-examination process.[42]

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[36] Megan A Yarnall, 'Dueling Scientific Experts: Is Australia's Hot Tub Method a Viable Solution for the American Judiciary?' (2009) 88 *Oregon Law Review* 311, 312.
[37] Supreme Court of New South Wales, *Practice Note SC Gen 11: Joint Conferences of Expert Witnesses*, 17 August 2005, [5].
[38] Justice James Wood, 'Expert Witnesses: The New Era' (Paper, Eighth Greek Australian International Legal and Medial Conference June 2001).
[39] Federal Court of Australia, *Expert Evidence Practice Note* 25 October 2016.
[40] Justice Steven Rares, 'Using the "Hot Tub": How Concurrent Expert Evidence Aids Understanding Issues' (Summer 2010-2011) *Bar News* 64.
[41] Ibid 68.
[42] Ibid 70.

In international arbitration, witness conferencing is a similarly popular technique for the taking of evidence.[43] The Chartered Institute of Arbitrators published in 2019 its new Guidelines for Witness Conferencing in International Arbitration, which seeks to serve as a "useful aide-memoire" for arbitrators and counsel.[44] which adopt a three part structure: the Checklist, the Standard Directions and the Specific Directions. The Checklist contains a list of preliminary practical matters directing tribunals and counsel to consider whether witness conferencing is appropriate at all, taking into account the nature of the issues in dispute, the types of witnesses and other logistical matters.[45] The Standard Directions are intended to be adopted in an early procedural order and provide the basic procedural framework, including a chronology and a joint schedule with areas in agreement and disagreement.[46] The Specific Directions contain more specific procedural orders for three types of conferences: those led by the tribunal; those led by the witnesses; and those led by counsel.[47] The structure provided by these Guidelines remains flexible and non-exhaustive, allowing parties and tribunals to craft the procedure in a way which best suits the arbitration, while making the most of the benefits of witness conferencing.

Witness conferencing can be an efficient and effective tool when deployed correctly. This depends on the engagement of the tribunal in the process and the initiative taken to ensure the proceedings are conducted in a way that will facilitate, rather than hinder discussion.

3) Tribunal Appointed Experts

Tribunal appointed experts, as mentioned earlier, are a hallmark of domestic litigation in civil law jurisdictions.[48] The role of a tribunal appointed expert is to assist the tribunal in reaching the 'objective truth'.[49] In litigation, court appointed experts are remunerated by the court, although ultimately paid by the party who bears the costs of the litigation, and can be selected with little regard to submissions from the parties. It is said that this practice encourages experts to build favourable reputations with the court by rendering "a careful, succinct and well-substantiated report" so that they will be retained again in other matters.[50]

While use of party appointed experts remains prevalent in arbitration, there have been calls for greater use of tribunal appointed experts to avoid some of the issues that have been observed with their party appointed counterparts. For example, the Rules on the Efficient Conduct of Proceedings in International Arbitration ('Prague Rules') were developed by a working group of primarily civil law practitioners from Central Europe[51] as a response to growing concerns of the lack of guidelines and protocols which adopt civil law traditions.[52] The procedure suggested by the Prague Rules is accordingly heavily influenced by civil law practices. Article 6 of the Prague Rules stipulates that the tribunal may appoint an expert either at the request of a party or of its own initiative, where expert opinion is necessary.[53]

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[43] The majority of respondents (62%) in the 2012 Queen Mary University International Arbitration Survey believed that expert witness conferencing should take place more often: Paul Friedland and Stavros Brekoulakis, '2012 International Arbitration Survey: Current and Preferred Practices in the Arbitral Process' (Survey, 2012) 28.

[44] Chartered Institute of Arbitrators, 'Guidelines for Witness Conferencing in International Arbitration' (April 2019) 11.

[45] Ibid 16–17.

[46] Ibid 18–19.

[47] Ibid 20–23.

[48] Christian Johansen, 'The Civil Law Approach: Court-Appointed Experts' (2019) 13(4) *Construction Law International* 18, 18.

[49] Julian DM Lew, Loukas A Mistelis and Stefan Kröll, *Comparative International Commercial Arbitration* (Kluwer Law International 2003) ch 22, 553–83.

[50] John H Langbein, 'The German Arbitral Advantage' (1985) 52(4) *University of Chicago Law Review* 823, 838.

[51] G. Stampa, "The Prague Rules" (2019) 35(2) *Arbitration International* 221–244.

[52] See A. Rombach and H. Shalbanava, "The Prague Rules: A New Era of Procedure in Arbitration or Much Ado about Nothing?" (2019) 17(2) *German Arbitration Journal* 53–54.

[53] Rules on the Efficient Conduct of Proceedings in International Arbitration (2018) art.6.1.

When selecting an expert, the tribunal may have regard to candidates proposed by the parties, but is not bound by them.[54] Although party appointed experts are not precluded, they appear to be secondary to tribunal appointed experts.

The obvious advantage of using tribunal appointed experts is in reducing expert partisanship, whether perceived or in actuality. In theory, removing the financial incentive and other connections between an expert and the appointing party decreases the likelihood that the expert will be biased. The appointment of an expert by the tribunal reinforces the notion that the expert's ultimate duty is to the tribunal to be independent and impartial. Implementing procedures such as allowing the parties to each suggest a list of names and subsequently having the tribunal appoint one expert from each list may achieve a balance between the parties' autonomy to run their cases with concerns of impartiality.[55] Even in that circumstance, however, I would query the true impartiality of the experts, the parties having proposed their names in the first place. The use of a single tribunal appointed expert on each issue can also mitigate the other concerns regarding conflicting datasets among experts and the asymmetric use of experts, by virtue of the fact that there will be only one expert.

There are, however, significant disadvantages to tribunal appointed experts. First, and especially relevant to parties more familiar with the adversarial system, the tribunal appointment of experts removes the parties' autonomy to control their case. One of the reasons why international arbitration is so appealing to parties is because it allows them the freedom to decide the procedure of the dispute in a way that best showcases their submissions.[56] The way in which expert evidence is presented may be critical to a party's case, and to remove the party's ability to direct the presentation is a source of major concern.[57] Of course parties cannot be denied the opportunity to call their own experts to contradict the tribunal expert leading to greater cost than would have been the case without the tribunal exp[ert.

There is a further concern that the reliance on evidence from an expert appointed by the tribunal will result in the dispute being effectively decided by the expert, as a 'fourth arbitrator'. The use of a tribunal appointed expert bears with it the risk that the tribunal will rely too heavily on the expert's opinion, rather than making their own determination on the parties' submissions. The tribunal may end up delegating key decision-making responsibilities to the expert. Whether or not this in fact occurs, there arises nevertheless another perception issue, as parties are more inclined to *believe* that the tribunal is abdicating its function.

Finally, and relatedly, the use of only a single expert appointed by the tribunal could be equally unfair in determining the dispute, as the tribunal will only be given one perspective of the issue. Even if that perspective is impartial and unbiased, it may be wrong, or fail to take account of a methodology of relevant theory to which the single expert is unsympathetic . To rely only on one expert would force the tribunal to almost blindly accept his or her conclusions. Having multiple experts engage on the one issue allows for debate and discussion of differing approaches. Rather than confounding, this can often clarify the real position. The central premise of the adversarial system of law is that it is easier for a tribunal to make determinations when it is provided with multiple perspectives that challenge each other. Although this problem can be remedied by appointing more than one expert per issue, the other concerns relating to tribunal appointed experts would remain. Further, if a tribunal appointed expert is used, the parties are likely, in practice, to engage their own experts behind the scenes to comment on and critique the findings of the tribunal expert, in an attempt to overcome those difficulties. If this is

[54] Ibid art.6.2(a).
[55] As proposed by Klaus Sachs at the 2010 ICCA Congress: Klaus Sachs, 'Experts: Neutrals or Advocates' (2010, ICCA Congress, Conference Paper) 13–15.
[56] Respondents to the 2019 Queen Mary University International Arbitration Survey noted that the ability to tailor the arbitral process was a key advantage of arbitration: Paul Friedland and Stavros Brekoulakis, '2019 International Arbitration Survey: Driving Efficiency in International Construction Disputes' (Survey, 2019) 23.
[57] Klaus Sachs and Nils Schmidt-Ahrendts, 'Protocol on Expert Teaming: A New Approach to Expert Evidence' in Albert Jan van den Berg (ed), *Arbitration Advocacy in Changing Times* (ICCA Congress Series No 15, Kluwer Law International, 2011) 135, 141.

the case, then the perceived efficiency and cost-effectiveness of using tribunal appointed experts is called into question.

B Proposed Solutions and Best Practice

There is room for improvement to what already has been done. Two additional approaches will now be discussed. The first is a process of proactive case management of party appointed experts from an early stage in the procedural history of an arbitration. The second is a means that allows experts to be accessed and used by the tribunal after the hearing stage for the purposes of calculations in the final award.

The value of expert evidence can be increased by proactive case management. The suggested practice directions aim to maximise efficiency by focussing on limiting the differences between experts *prior* to the evidentiary hearing. This reduces the amount and scope of expert evidence to be tendered at the hearing to only that which is really necessary. At each stage of the process, the issues or topics requiring expert evidence are streamlined, and the variables between the experts and their opinions are reduced. At the hearing stage, therefore, only the most relevant issues are ventilated and it can consequently be conducted more expeditiously and with less expense. Put simply, this process helps ensure that each party appointed expert's report engages squarely with the issues raised by the other. The process of limiting the differences also means that even if there exists bias on the part of the expert, then the scope of the bias is also limited.

The following process is proposed:

1. first, identify the disciplines in need of expert evidence and which experts are proposed to give evidence in each discipline;
2. second, establish within each discipline a common list of questions;
3. third, defer the production of all expert reports until all factual evidence (documentary and witness) is available and ensure that the experts opine on a common data set;
4. fourth, require the experts within each discipline to produce a joint expert report identifying areas of agreement and disagreement;
5. fifth, require the experts within each discipline to produce individual expert reports on areas on disagreement only; and
6. sixth, require the experts to produce 'reply' expert reports containing views in the alternative showing what their conclusions would be if the other expert's assumptions and methodologies were accepted by the tribunal.

Above all, the effectiveness of the proposed directions depends on consistent preparation and proactive case management from the tribunal. It is important that the tribunal remains honest about acknowledging the difficulties of adducing expert evidence by the arbitral tribunal and maintains open communication with the parties on those issues. As a matter of general guidance, the tribunal should raise this issue with the parties at the earliest practical stage of the proceedings, to ensure that all involved are aware of the ensuing process.

The application of these directions has proved invaluable in my own practice. In a recent substantial (US$1bn+) dispute concerning a four-unit nuclear power plant, in which there were more than six separate areas of expert evidence. One was disruption, a notoriously vexed area, where the parties' experts reached agreement on how to measure and quantify disruption. At the hearing they gave a joint presentation on their joint findings and no cross examination was needed. Although this may be a particularly impressive example of the effect of this approach, these techniques have produced positive outcomes in virtually all cases in which I have deployed them.

For greater guidance within a practical framework, an anonymised extract from a procedural order detailing the above process has been appended to this paper in **Appendix A**.[58] It gives practical effect to the steps listed above. References in this paper will be made to the sections of the procedural order relevant to each step. Of course, the directions are not prescriptive and the extract provided should be simply noted as a guide that can be altered to suit the needs of the arbitration at hand.

Despite this procedure, some parties in memorial style cases are insistent on providing comprehensive memorials which include individual expert reports without waiting for the other steps in proposed directions. In those cases, I have also developed practical measures which attempt to nevertheless ensure that the experts are able to jointly engage on agreed and disagreed issues. This alternative framework has been appended in **Appendix B**.

The proposed steps will now be explored in greater depth.

First, it is necessary to determine at an early stage the disciplines for which expert evidence is required and, with tribunal approval, to identify and appoint the relevant experts.[59] This ensures, from the outset, that evidence will be tendered only on the relevant issues. It is not uncommon for parties to object to certain suggested experts, or to the need for experts at all on particular issues. Identifying the experts at this stage enables these objections to be dealt with early on. Parties may also find that, in the process of determining the relevant issues, the scope, or value of their dispute on those issues do not warrant the production of expert evidence. To further reduce the inefficiencies in the evidentiary procedure, only one expert on each side should opine on any given issue.

Once the experts have been appointed and the relevant disciplines selected, the tribunal must establish within each expert discipline a common list of questions for the appointed experts to answer.[60] It is vital that the tribunal maintains active oversight over this process, for instance, assisting where parties are unable to agree on the questions to be asked.

Next, the experts within a single discipline should provide their opinions on the basis of the same factual evidence and a common dataset. An expert should not have any more or any different information from the other experts in the same field. Any expert reports should be deferred until the production of the factual evidence (both documentary and lay witness) so that all experts have the fullest knowledge of the facts and circumstances of the matter. Furthermore, the experts must use a common data set to limit the number of uncontrolled variables that could cause differences in outcome in each expert's report. Only then are the true areas of expert contention revealed. If identified, the experts should inform the tribunal of any differentials in information so that they can be corrected or accounted for. Where the facts are mutually understood (even if disputed), any divergence in the expert reports can be attributed to the expert's genuine analysis, rather a difference in factual material available to them.

After detailed "without prejudice" conferral and exchanges of "without prejudice" drafts between themselves, the experts should provide joint reports identifying areas of agreement and disagreement, with reasons for their disagreements.[61] Individual expert reports should only be produced after this stage and only on the areas of disagreement.[62]

Requiring experts to produce joint reports before individual reports allows them to discuss their positions on a provisional basis, without having committed themselves to a particular position in their individual reports. This can be useful for experts to test their conclusions and analyses on a preliminary basis. In this respect, subject to party agreement, it is critical for the experts to meet periodically, without

[58] See Appendix A.
[59] See Appendix A, cl 1.2–1.3.
[60] See Appendix A, cl 1.4.
[61] See Appendix A, cl 1.8.
[62] See Appendix A, cl 1.9.

the presence of the parties' representatives.[63] At these meetings, it is important that the tribunal emphasises that these discussions are to be held in camera between the experts only. If there is to be any possibility of common ground between the experts, it is much more likely to be achieved before the experts have formally declared positions from which they must retreat.

It is of course to be expected that the experts may reach diverging conclusions. Where these differences are attributable to particular factual assumptions, it is important that the experts also provide their opinions on the basis of the factual assumptions adopted by their counter-expert. Essentially, this asks the experts to consider whether, if they adopted all of the same factual assumptions as their counter-expert, they would reach the same outcome, or different outcome, and if different, what that difference would be.

This approach is useful because the value of the experts' evidence is often contingent on the tribunal's findings on certain issues. It prevents a situation where, if the tribunal decides a particular factual issue one way, they are left with the assistance of only the expert who relied on the same assumption. The proposed directions ensure that experts from both sides consider all the possible factual assumptions and methodologies that may be adopted by the tribunal. Consequently, their final expert reports can be utilised regardless of the position eventually taken by the tribunal.

The tribunal should also inform the parties and experts that reply expert reports should respond only to the expert reports served by the opposing side and should not refer to any new issues not already addressed. This avoids any further proliferation of unnecessary and irrelevant evidence.

It will go without saying that it is critical that the tribunal remain proactively engaged throughout this process. Constant review and oversight by the tribunal in case management conferences is vital to ensuring the success of each of these steps. While this approach may appear to be labour-intensive and time-consuming, my experience has shown that the time and cost expended at this early stage will save a vast amount of time and cost in the future.

It is only at this stage, after these steps have been followed, that value of the evidence can be maximised from witness conferencing or hot-tubbing at the hearing. Tribunals wishing to implement hot-tubbing in the hearing should pay particular attention to the conferral of experts and joint reports to narrow the scope of the issues requiring expert evidence. This will ensure that the yield from the witness conferencing is as productive and valuable as possible.

C Post-Hearing Experts Access Protocol

I will now turn to consider the second of my proposed solutions, which relates to the involvement of experts *after* the main evidentiary hearing. Some may find this to be a radical proposal – what use remains of expert witnesses after they have provided their testimony? The answer, I suggest, is that experts – especially quantum experts – continue to have a valuable, and underused, role to assist the tribunal in their calculations regarding the final orders.

This concept has been realised in what is called an Experts Access Protocol. This is a tripartite agreement between the tribunal, the parties and the relevant set of experts (usually quantum experts, although the Protocol can be transposed for other expert disciplines). An example agreement in relation to the use of quantum experts can be found at **Appendix C**.

The Protocol contains a mutual agreement that the tribunal is able to communicate with the experts solely "for the purpose of their performing calculations on the basis of existing material contained in their expert reports forming part of the evidentiary record".[64] Those communications are to be kept

[63] See Appendix A, cl 1.12.
[64] Appendix C, cl 1.1.

entirely confidential from the parties,[65] until the tribunal's final calculations are provided together with the award to the parties.[66] The Protocol stipulates in express terms that the tribunal's communications with the experts must not involve "the provision of expert opinion, rather than the performance of calculations".[67]

The utility of such a framework becomes clear in complex proceedings. In cases, for instance, where issues of quantum are multi-factorial and highly variable based on numerous different assumptions, the assistance of quantum experts for calculation purposes is invaluable. An illustrative example of such a case, drawn from my experience, concerns change orders in construction disputes, where issues such as the base line of change, whether certain line items fall within or outside a contractor's scope of work and the contractually permissible methods of valuation are all in dispute. In some circumstances, it may be appropriate to require the quantum experts to prepare a valuation "model" ahead of time that allows the Tribunal to input certain data and receive a valuation output. In other cases, however, especially where they are more complex, the creation of such a model would be disproportionately time-consuming and expensive. Instead, the more efficient approach would be for the tribunal to decide the factual matters and subsequently provide that information confidentially to the quantum experts for them to agree on the ultimate valuation.

One might ask why the tribunal would take this route, rather than simply publishing its reasons and requesting that the parties attempt to agree on the consequential orders to be made. There are three reasons why this approach should be preferred.

First, in some cases, there are serious concerns regarding asset preservation. Limiting the period of time between when the parties can infer the outcome of the arbitration, for example by reading the tribunal's reasons, and when the final orders are made mitigates that risk. Second, in arbitrations involving publicly listed corporations, parties may be subject to continuous disclosure obligations relating to share market issues. If information is provided which can be translated into potential outcomes, a dispute may arise as to whether there has been a failure for one party or the other to meet those disclosure requirements. Third, and on a practical level, this approach ensures that the parties (both the client and its legal representatives) are simultaneously provided with a complete and comprehensive statement of their rights and liabilities, as finally determined by the tribunal.

As a concluding remark on the Expert Access Protocol, experience regarding such a procedure has been universally positive. In the author's experience no parties have refused to enter into such an agreement, and the experts have always been able to provide valuable assistance to the tribunal.

V CONCLUSION

Since Lord Mansfield's 1782 decision in *Folkes v Chadd*, the use of expert witnesses has evolved dramatically. Expert evidence no longer consists simply of an engineer making observations of a decaying harbor as it did in that case. As construction disputes have grown in size and complexity, so too has the use of expert evidence and the procedural challenges which follow. In circumstances where expert evidence has become so valuable to tribunals, it is critical that the issues which reduce its utility are adequately addressed. In this paper, I have sought to identify the most pressing challenges in expert evidence, including expert bias, the use of conflicting data and overuse of expert evidence.

This paper sets out a framework, which supplements existing mechanisms, to address these issues. The solutions suggested, at their core, seek to limit the amount and scope of expert evidence required and limit the differences between corresponding experts prior to the hearing. The intended result of this process is that the evidence tendered is limited to only that which is truly necessary. This technique will increase the efficiency of the process and utility of the evidence, and reduce the effects of any

[65] Appendix C, cl 3.1.
[66] Appendix C, cl 3.3.4.
[67] Appendix C, cl 1.1.

underlying expert bias. It is hoped that this paper, and the approaches proposed herein, will assist parties and tribunals grappling with the challenges of expert evidence in construction arbitration to maximise the value of party appointed expert evidence.

APPENDIX A – EXAMPLE EXPERT WITNESS PROCEDURAL ORDER

1. Experts

1.1 Dealings with any Party-appointed experts shall be carried out with the IBA Rules on the Taking of Evidence in International Arbitration and CIArb Protocol for the Use of Party-Appointed Expert Witnesses in International Arbitration serving as guidelines, subject to any applicable law.

1.2 **On or before [insert date]**, each Party shall provide the Tribunal and the other Parties with details of the expert disciplines and the identity of the experts within those disciplines whom it proposes to call, together with an identification of the topics upon which the experts in each discipline will be asked to opine.

1.3 In response to the advice in paragraph 1.2 above each Party shall provide the Tribunal and the other Parties with details of any further expert disciplines and the identity of the experts within those disciplines whom it proposes to call, together with an identification of the topics upon which the experts in each such additional discipline will be asked to opine on or before **[insert date]**.

1.4 The Parties shall confer and try to come to an agreement as to the principal topics and issues that the experts are to address by reference to the Parties' respective cases on or before **[insert date]**, advising the Tribunal any agreement reached, by that date. In the case of any disagreement, the Parties shall revert to the Tribunal for the resolution of any disagreement by that date, setting out the areas of disagreement with brief reasons for disagreement.

1.5 Any expert report shall:

(a) be prepared in accordance with the CIArb Protocol and the IBA Rules on the Taking of Evidence in International Arbitration;

(b) set out the name and business address of the expert, his or her relationship with any of the Parties, if any, and a description of his or her qualifications, including his or her competence to give evidence;

(c) commence with a summary of matters intended to be established by the expert;

(d) be signed and dated by the expert;

(e) take the form of a declaration under oath or affirmation; and

(f) contain numbered paragraphs and page numbers.

1.6 The Parties shall arrange for meetings and communications between their respective Experts to be scheduled in **[insert month]**.

1.7 **On or before [insert date]**, the Parties' experts, on each respective discipline, shall produce a Joint Expert Report of matters agreed and disagreed.

1.8 **On or before [insert date]**, the Parties may file and simultaneously exchange between themselves individual expert report dealing with areas of disagreement identified in the Joint Expert Reports.

1.9 Following such exchange, each expert shall be entitled to produce a report in reply, which shall be limited to responding to the matters raised in the report of the other expert. Such replies shall be exchanged simultaneously on **[insert date]**.

1.10 The Tribunal may, upon notice to the Parties and with the Parties' consent, hold meetings with any expert at any reasonable time.

1.11 Meetings between the Parties' experts, and any draft reports prepared by those experts shall be without prejudice to the Parties' respective positions in this Arbitration and shall be privileged from production to the Tribunal.

1.12 Although the Parties shall arrange for the meetings referred to in this section to be scheduled, it is expected that experts of like disciplines are to be otherwise unaccompanied at such meetings.

1.13 Any Expert Reports are to contain the following declaration:

"I declare that:

I understand that my duty in giving evidence in this arbitration is to assist the arbitral tribunal decide the issues in respect of which expert evidence is adduced. I have complied with, and will continue to comply with, that duty.

I confirm that this is my own, impartial, objective, unbiased opinion which has not been influenced by the pressures of the dispute resolution process or by any party to the arbitration.

I confirm that all matters upon which I have expressed an opinion are within my area of expertise.

I confirm that I have referred to all matters which I regard as relevant to the opinions I have expressed and have drawn to the attention of the arbitral tribunal all matters, of which I am aware, which might adversely affect my opinion.

I confirm that, at the time of providing this written opinion, I consider it to be complete and accurate and constitute my true, professional opinion.

I confirm that if, subsequently, I consider this opinion requires any correction, modification or qualification I will notify the parties to this arbitration and the arbitral tribunal forthwith."

1.14 Any expert who has filed an expert report shall make him or herself available to be cross-examined at the Main Evidentiary Hearing. Notice should be given requiring his or her cross-examination by the other Party **[insert date within 2 weeks of the exchange of the last expert reports]**. The Party relying on such evidence shall secure that witness' presence and availability at the Main Evidentiary Hearing in advance. Any Expert who gives evidence at the Main Evidentiary Hearing will do so after having given an oath or affirmation.

1.15 In the event that a Party does not make an expert available, the requesting Party may apply for any additional ruling from the Tribunal, including the setting aside of the prior testimony of that expert, or the drawing of an adverse inference.

1.16 The admissibility, relevance weight and materiality of the evidence offered by an expert shall be determined by the Tribunal in accordance with the IBA Rules.

APPENDIX B – EXAMPLE EXPERT WITNESS PROCEDURAL ORDER (MEMORIAL STYLE)

1. Experts

1.1 Dealings with any Party-appointed experts shall be carried out with the IBA Rules on the Taking of Evidence in International Arbitration and CIArb Protocol for the Use of Party-Appointed Expert Witnesses in International Arbitration serving as guidelines, subject to any applicable law.

1.2 Each Party shall serve any expert reports on which it intends to rely alongside its written pleadings.

1.3 Any expert report shall:

(a) be prepared in accordance with the CIArb Protocol and the IBA Rules on the Taking of Evidence in International Arbitration;

(b) set out the name and business address of the expert, his or her relationship with any of the Parties, if any, and a description of his or her qualifications, including his or her competence to give evidence;

(c) commence with a summary of matters intended to be established by the expert;

(d) be signed and dated by the expert;

(e) take the form of a declaration under oath or affirmation; and

(f) contain numbered paragraphs and page numbers.

1.4 Any Expert Reports are to contain the following declaration:

"I declare that:

I understand that my duty in giving evidence in this arbitration is to assist the arbitral tribunal decide the issues in respect of which expert evidence is adduced. I have complied with, and will continue to comply with, that duty.

I confirm that this is my own, impartial, objective, unbiased opinion which has not been influenced by the pressures of the dispute resolution process or by any party to the arbitration.

I confirm that all matters upon which I have expressed an opinion are within my area of expertise.

I confirm that I have referred to all matters which I regard as relevant to the opinions I have expressed and have drawn to the attention of the arbitral tribunal all matters, of which I am aware, which might adversely affect my opinion.

I confirm that, at the time of providing this written opinion, I consider it to be complete and accurate and constitute my true, professional opinion.

I confirm that if, subsequently, I consider this opinion requires any correction, modification or qualification I will notify the parties to this arbitration and the arbitral tribunal forthwith."

1.5 Any expert who has filed an expert report shall make him or herself available to be cross-examined at the Main Evidentiary Hearing. Notice should be given requiring his or her cross-examination by the other Party **[insert date within 2 weeks of the exchange of the last expert reports]**. The Party relying on such evidence shall secure that witness' presence and availability at the Main Evidentiary Hearing in advance. Any Expert who gives evidence at the Main Evidentiary Hearing will do so after having given an oath or affirmation.

1.6 In the event that a Party does not make an expert available, the requesting Party may apply for any additional ruling from the Tribunal, including the setting aside of the prior testimony of that expert, or the drawing of an adverse inference.

1.7 The admissibility, relevance weight and materiality of the evidence offered by an expert shall be determined by the Tribunal in accordance with the IBA Rules.

2. Expert Case Management

2.1 Within **[two (2) weeks of the submission of the Respondents' Statement of Defence]**, experts in like disciplines, who have each submitted reports with the Parties' first round memorials, shall meet on a without prejudice basis. The purpose of this meeting is to identify relevant issues and whether there is agreement or disagreement on those issues arising out of their reports in the first round of memorials. In the case of any issue which has been addressed exclusively by one expert in the relevant discipline, the experts in that discipline shall discuss the issue and ascertain whether it is an issue of agreement or disagreement.

2.2 If the Respondents introduce expert evidence in a new field with their Statement of Defence, or the Claimants introduce expert evidence in a new field with their Statement of Reply, the Parties' experts in the relevant like disciplines shall meet on a without prejudice basis **[within two (2) weeks of the submission of the Respondents' Statement of Rejoinder]**. The purpose of this meeting is to identify relevant issues and whether there is agreement or disagreement on those issues arising out of their reports filed to date. In the case of any issue which has been addressed exclusively by one expert in the relevant discipline, the experts in that discipline shall discuss the issue and ascertain whether it is an issue of agreement or disagreement.

2.3 Although the Parties shall arrange for the meetings referred to in paragraphs 2.1 and 2.2 to be scheduled, it is expected that experts of like disciplines are to be otherwise unaccompanied at such meetings.

2.4 Following any joint meeting(s) held in accordance with paragraph 2.1, experts in the relevant like disciplines which were the subject of such meeting(s) shall produce, and submit to the Tribunal **[within one (1) month of that meeting]**, a joint statement identifying issues of agreement and disagreement between them and (as the case may be) summarising the experts' agreed position or each expert's position on issues in dispute.

2.5 Following any joint meeting(s) held in accordance with paragraph 2.2, experts in the relevant like disciplines which were the subject of such meeting(s) shall produce, and submit to the Tribunal **[within one (1) month of that meeting]**, a joint statement identifying issues of agreement and disagreement between them and (as the case may be) summarising the experts' agreed position or each expert's position on issues in dispute.

2.6 Meetings between the Parties' experts, and any draft reports prepared by those experts, shall be without prejudice to the Parties' respective positions in this Arbitration and shall be privileged from production to the Arbitral Tribunal.

2.7 After receipt of one or more joint statement(s), the Tribunal may provide the experts and the Parties with any additional guidance or comments on the joint statement(s) which it considers appropriate, including the identification below, or otherwise) and/or which they would like to discuss with the experts and the Parties at an Expert Case Management Conference.

2.8 If the Tribunal considers it necessary, **[within two (2) weeks of the Joint Report provided pursuant to paragraph 2.4]**, the Tribunal may schedule an Expert Case Management Conference (which the Tribunal may request the Parties' respective relevant experts to attend) at which the Parties and/or the Parties' experts who prepared a joint statement in accordance with paragraph 2.4 shall report to the Tribunal on issues of disagreement and any other matter which the Tribunal may direct.

2.9 If the Tribunal considers it necessary, the Pre-Hearing Conference shall incorporate an Expert Case Management Conference (which the Tribunal may request the Parties' respective relevant experts to attend) at which the Parties and/or the Parties' experts who prepared a joint statement in accordance with paragraph 2.5 shall report to the Tribunal on issues of disagreement and any other matter which the Tribunal may direct.

2.10 The Tribunal shall make any further directions in relation to expert matters which it considers to be appropriate following an Expert Case Management Conference.

APPENDIX C – EXAMPLE EXPERT ACCESS PROTOCOL (QUANTUM EXPERTS)

1 Assistance to be Provided

1.1 The Parties agree that the Arbitral Tribunal will be given access to two of the Parties' experts, **[insert]** and **[insert]** (the **"Quantum Experts"**), on a confidential basis, for the purpose of performing calculations on the basis of existing material contained in their expert reports forming part of the evidentiary record, adopting assumptions to be provided to them by the Arbitral Tribunal (the **"Calculations"**). For the avoidance of doubt, the Arbitral Tribunal will not engage in confidential communications with the Quantum Experts about matters that require the provision of expert opinion, rather than the performance of calculations.

2 Confidential Information

2.1 In this Agreement, Confidential Information means: (i) all information supplied or made available to the Quantum Experts by the Arbitral Tribunal, (ii) all information supplied or made available to the Arbitral Tribunal by the Quantum Experts, (iii) all correspondence, discussions or queries raised between the Arbitral Tribunal and the Quantum Experts, (iv) all correspondence and discussions between the Quantum Experts, and (v) all material and working papers and spreadsheets prepared by, amended by or examined by the Quantum Experts in that context, all from the date of this agreement forward, for the purpose of the Quantum Experts assisting the Arbitral Tribunal with any and all Calculations.

3 Undertakings Regarding Confidential Information

3.1 Disclosure and Use: The Quantum Experts will keep all Confidential Information confidential and will not, except as permitted by this agreement, disclose or distribute Confidential Information, or permit it to be disclosed or distributed, or disclose its substance, to any person including the Parties to the arbitration or their legal representatives.

3.2 Security of Information: The Quantum Experts will at all times effect and maintain adequate security measures to preserve the confidential nature of the Confidential Information, at least equivalent to the measures they would prudently effect and maintain for their own valuable and sensitive confidential information.

3.3 Exceptions: The following disclosures only are permitted by this agreement:

3.3.1 Arbitral Tribunal's Agreement: Confidential Information may be disclosed to the extent that the Arbitral Tribunal has expressly directed in writing that the Quantum Experts need not keep it confidential or may disclose it.

3.3.2 Required by law: Confidential Information may be disclosed to the extent required by law.

3.3.3 Quantum Experts' Staff: Confidential Information may be disclosed to members of the staff working for each of the Experts only to the extent necessary to assist the Experts in their interactions with the Arbitral Tribunal and each other and on the basis that such members of staff provide an equivalent undertaking to the relevant Quantum Expert.

3.3.4 Final Calculations: The final calculations performed by the Quantum Experts which are relied upon by the Arbitral Tribunal for determining the quantum awarded shall either be attached to, or provided at the same time as, the Tribunal's Award. Thereafter any calculation errors that may be identified by any of the Parties shall be dealt with in accordance with **[the applicable rules governing Award correction]**.

4 Costs

4.1 The Party who engaged each of the Quantum Experts for the arbitration will remain responsible for each of their costs, including staff costs and other direct costs, and the Arbitral Tribunal will have no responsibility for any costs of the Quantum Experts. The Quantum Experts will submit all applicable invoices to the Arbitral Tribunal for approval and the Arbitral Tribunal will confirm within 15 days that the sums invoiced have been properly incurred.

4.2 The Arbitral Tribunal may allocate as costs of the arbitration the costs of the Quantum Experts arising from their assistance to the Arbitral Tribunal.

5 Disputes

5.1 All disputes arising out of or in connection with the present agreement shall be finally settled under the Rules of Arbitration of the London Court of International Arbitration by one or more arbitrators appointed in accordance with the said Rules. The seat of the arbitration shall be London and the language of the arbitration shall be English.