

Rethinking the Structure of Construction Arbitration: A Dispute Systems Design Approach to the Position of Experts

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ABSTRACT

Technical issues, such as factual questions of engineering that require specific scientific knowledge to be answered (e.g., analyzing whether a bridge collapsed because of the chemical composition of the steel used to build it), play a critical role in the development and outcome of construction arbitration proceedings. Almost by inertia, such issues have consistently been treated as a matter of expert evidence. In the present work, I inquire into whether this is the correct approach for all technical issues, and I argue that certain technical issues should be treated as matters of adjudication due to their level of complexity and logical proximity to the legal issues of the case. There is an essential asynchrony between the nature of highly complex, outcome-proximate technical issues and the procedural structure under which they are assessed and resolved. This reality significantly reduces the extent to which the interests of the tribunal, the parties, their legal counsel, and the experts themselves are met. To address this tension, I draw from Dispute Systems Design methodology in order to evaluate the existing mechanisms for producing expert evidence. Using that analysis, I outline a new design that coheres with the nature of these technical issues and properly addresses the interests of the relevant stakeholders.

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CONTENTS

- I. Introduction 45
- II. Factors that make assessment of technical issues no longer evidentiary 47
 - A. The level of complexity of the technical issue 49
 - B. The logical space between the technical and the legal conclusion 52
- III. A Dispute Systems Design approach to the assessment of technical issues in construction disputes 54
 - A. Conflict assessment: Identifying the issue, the stakeholders, and their underlying interests 55
 - B. Assessment of available procedures: Main challenges that arise around expert evidence and existing mechanisms to address these challenges 58
 - 1. Cost-effectiveness 59
 - 2. Satisfaction with the outcome 63
 - a. Independence and impartiality of expert witnesses and party control over expert evidence 64
 - b. Submission of conflicting expert evidence 67
 - i. Civil law approach: Tribunal-appointed expert 68
 - ii. Common law approach: Witness conferencing 70
 - 3. Conclusion: Current solutions are intrinsically inadequate for critical and complex technical issues 72
- IV. Characteristics of a cost-effective and satisfactory assessment of technical issues in construction disputes 73
 - A. WTO panels 73
 - B. Dispute Boards 75
 - C. Sachs Protocol 77
 - D. Expert arbitrators 80
- V. Design for improvement: Fitting the forum to the fuss in complex construction disputes 82
 - A. General description of the model 82
 - B. Technical expert as part of the arbitration tribunal 84

C. Appointment of the technical expert	85
D. Relationship with the tribunal	86
E. Relationship with the parties	86
F. Timing of expert member appointment and scope of her assessment	88
G. Predicted benefits of implementing the proposed model	89
H. Possible challenges of the proposed model	90

I. INTRODUCTION

In 1901, Judge Learned Hand argued that expert witnesses constituted an anomaly¹ from a logical and legal perspective and proposed that so-called expert evidence be transferred to an advisory tribunal that would provide the jury with the general technical propositions applicable to the case at issue.² Despite Judge Hand’s criticism,³ the institution of expert witnesses not only survived but became ubiquitous in several legal systems and dispute resolution mechanisms. Today, expert evidence has received special attention by scholars, practitioners, and dispute system designers when it comes to construction arbitration.

In this Article, I acknowledge the evolution that construction project disputes have undergone over time, and I inquire into whether current dispute resolution mechanisms properly address modern issues in a satisfactory way. I show in the present Article that when the technical issues that arise in construction disputes reach a certain level of complexity and logical proximity to the legal

1. As early as 1860, but from the perspective of a scientist, the Scottish chemist R. Angus Smith argued that playing the role of expert witnesses leads scientists to become mere barristers who know science. This, as he puts it, “is far removed from the idea of a man of science. He ought to be a student of nature, who loves whatever nature says, in a most disinterested manner. If we allow him or encourage him to be an advocate, we remove him from his sphere; we destroy the very ideal of his character; we give him duties which he never was intended to perform, and we turn him aside from the objects which first in early life led him to study in the direction of science.” R. Angus Smith, *Science in Our Courts of Law*, 7 J. SOC’Y ARTS 135, 137 (1860).

2. Learned Hand, *Historical and Practical Considerations Regarding Expert Testimony*, 15 HARV. L. REV. 40, 50–56 (1901).

3. A constant critique has accompanied the institution of expert witnesses from its conception until the modern day. While such criticism has focused on several issues, almost all commentators have agreed “that the partisanship displayed in court prevented the appropriate resolution of the scientific issues presented in court, tarnished the public image of sciences, and thus should be neutralized one way or another.” Tal Golan, *The History of Scientific Expert Testimony in the English Courtroom*, 12 SCI. CONTEXT 7, 27 (1999).

dispute that must be resolved by an arbitral tribunal, and the tribunal is not an expert in the relevant science, such issues are deprived of their evidentiary nature.⁴ Consequently, a structural asynchrony arises between the nature of the issue and the procedural mechanism under which it is resolved.⁵

When this structural asynchrony arises, applying the rules of evidence to the assessment of highly complex and decisive technical issues becomes problematic. The nonexpert decision-maker will not necessarily be able to perform a substantive evaluation of the experts' conclusions or integrate the conclusions into broader legal reasoning—let alone properly decide in the face of conflicting expert evidence. This suggests that certain issues should then be revisited, namely, the standard of impartiality applicable to the person who performs the technical assessment, the control that the parties and counsel are able to exert over such technical assessment, and the level of reliance or deference of the nonexpert decision-maker towards the expert's conclusions.

I address these issues from a Dispute Systems Design ("DSD") perspective. In Section II, I define the types of issues on which I focus and explain why they should not be considered nor treated as evidence. In Section III, I evaluate current mechanisms for the assessment of these technical issues in light of the underlying interests of the relevant stakeholders. Then, in Section IV, I draw from several existing dispute resolution mechanisms to identify the features that should be present in a design that properly deals with the assessment of technical issues.

Finally, in Section V, I propose a model wherein the technical assessment comes from the arbitral tribunal in the form of an expert who is agreed upon by the parties in the same way as the arbitrators are agreed upon and who becomes part of the decision-making body. This model is designed to address the issues raised in Sections II–IV, and it is based on the assumption that the assessment of technical issues that are both highly complex and determinative of the answer to the legal issue is not a matter of evidence, but rather of adjudication. Ultimately, the expert does not take part in the decision of the

4. The analysis contained in the present work is also applicable to other types of disputes where technical issues can be especially complex and critical to resolve the case, including energy, oil and gas, mining, financial, or patent disputes.

5. The purpose here is not to revive Judge Hand's concerns regarding expert evidence generally or in relation to all construction disputes. Rather, my objective is to critically analyze the way in which certain technical issues are addressed in construction disputes and to propose a new model based on such analysis.

case (as a nonlegal expert arbitrator would) but rather has the sole task of resolving the specific technical issue that justifies her presence and providing her assessment to the tribunal.

II. FACTORS THAT MAKE ASSESSMENT OF TECHNICAL ISSUES NO LONGER EVIDENTIARY

When a technical issue is both (1) too complex for an adjudicator to understand, and (2) amounts to a judgement on the legal issue at dispute, its assessment is no longer merely evidentiary but instead becomes a judgement. Evidence is “any material which would aid the court in establishing the probability of past events into which it must inquire.”⁶ As a general matter, the object of producing evidence is to demonstrate disputed facts⁷ (minor premises), which are afterwards evaluated by the decision-maker in light of the applicable legal rule or standard (the major premise) in order to resolve a conflict. When facts fall within the realm of a specific science or specialized form of knowledge and require technical expertise to be understood, and when the adjudicator does not possess such expertise, expert witnesses are called upon to assess and explain those facts to the tribunal.

Despite the established conception of an expert’s legal nature as a “witness,”⁸ the expert witness can hardly be characterized as a “witness” at all. Indeed, as opposed to lay witnesses, who testify about the facts that they have perceived, the expert

is not limited to personal knowledge and may base her testimony on information that was gathered solely for the purpose of testifying in litigation. Under the proper circumstances, an expert witness may offer an opinion on the cause or consequences

6. RICHARD GLOVER & PETER MURPHY, *MURPHY ON EVIDENCE* 3 (13th ed. 2013).

7. Carlos Alberto Matheus López, *Reflexiones en Torno a la Función y Objeto de la Prueba*, 14 *REVISTA DE DERECHO* 175, 180 (2003); José Ovalle Favela, *La Teoría General de la Prueba*, 93–94 *REVISTA DE LA FACULTAD DE DERECHO DE MÉXICO* 273, 292–93 (1974).

8. Some scholars insist on emphasizing that the expert, despite the special features of their role, is still a type of witness. In many respects experts are treated in the same way as witnesses: they are obliged to speak the truth (on matters of fact), appear at the hearing to answer questions, and their evidence or credibility may be contradicted or challenged in the proceedings. As with other witnesses, the tribunal has the obligation to evaluate and give such weight to expert evidence as it considers appropriate.

Bernardo M. Cremades & David J.A. Cairns, *Expertise in International Arbitration*, 10 *TRANSNAT’L DISP. MGMT.* 12 (2013)

of occurrences, interpret the actions of other persons, draw conclusions on the basis of circumstances, and comment on the likelihood of events. She may even state her beliefs about such seemingly nonfactual issues as fault, damages, negligence, whether the occurrence was avoidable, and the like.⁹

In other words, the expert witness, far from declaring the facts that she has observed, does something much more similar to the decision-maker's task. She is presented with some facts (minor premises), learned retrospectively through some sort of evidence, that are evaluated in light of a technical rule or standard (the major premise) that allows her to reach a conclusion on the specific question at issue. The similarity between this scheme and the adjudicatory function is inescapable. In fact, that is precisely the reason why the acclaimed evidence scholars Glover and Murphy note that opinion evidence, in general, "usurps the function of the court to form an opinion on the facts in issue on the basis of the facts proved by the evidence placed before it."¹⁰

In this sense, expert testimony (which is, in essence, evidence in the form of an opinion) is tolerated because of necessity. As opposed to facts declared by lay witnesses, the facts interpreted by the expert are, in general, not understood sufficiently by the tribunal to form its own opinion to be incorporated into its reasoning. For this reason, the nonexpert decision-maker requires the expert to present both the facts and an informed opinion.

The fear of expert witnesses generally usurping the role of tribunals has been overcome by a legal-doctrinal understanding that the tribunal retains its ability to make a judgement on the case at issue even if it implies departing from the expert's conclusions. However, this can only be true if the expert's assessment remains evidentiary in nature. I postulate that at least one of two circumstances must be present for this to be the case. First, the level of complexity of the facts to be interpreted by the expert must allow the decision-maker to perform at least some evaluation of the content of the expert's conclusion and not be forced to rely substantially on it. Second, there must

9. STEVEN LUBET & ELIZABETH I. BOALS, *EXPERT TESTIMONY* 2 (3d ed. 2014).

10. GLOVER AND MURPHY, *supra* note 6, at 403. According to the authors, the admissibility of expert evidence constitutes an exception to the general rule against opinion evidence, which "is justified by the fact that the court would be unable, unaided, to draw proper inferences and form proper opinions from such specialized facts as might be proved, and even perhaps to judge what facts have been satisfactorily proved." *Id.* at 407.

be some logical space between the conclusion of the disputed technical issue and the legal issue. In other words, the expert opinion qualifies as evidence when acceptance of the expert's opinion does not itself resolve the legal issue in dispute, but rather, the tribunal finds itself in need of combining the expert's conclusion with some other premises to reach a legal conclusion.

However, when the conclusion of the expert's assessment (1) is too complex for the nonexpert decision-maker to substantively evaluate and (2) amounts to a judgement on the legal issue (or one of the legal issues) of the case, it should not count as evidentiary in nature. Such a conclusion departs from evidence's core purpose—to provide the judge with a minor premise (which is generally a fact) to be incorporated into her reasoning to resolve the dispute. When neither of the two circumstances described above is present, the expert evidence assumes part of the tribunal's function because it is not subject to any “assessment” by the decision-maker. In such cases, the “evidence” does not inform a decision but effectively constitutes a decision in and of itself.

A. *The level of complexity of the technical issue*

Parties present evidence to a tribunal in order to persuade a human decision-maker about the truth of a fact that will bear on the resolution of a legal dispute. Since parties commonly present various forms of evidence that aim to persuade the tribunal of different and contradictory facts, the decision-maker must be able to weigh the probative value of each piece of evidence and assess the extent to which it educates her about the truth of the facts in question. For that to be possible, the decision-maker must understand the facts well enough to determine whether a piece of evidence is more or less persuasive¹¹ as to what is intended to be proved.

11. According to Taruffo, there is a widespread idea in procedural doctrine according to which “evidence consists of an instrument—or, more specifically, an argument—of an essentially persuasive character. This is the ‘rhetorical’ idea of evidence, according to which its purpose is to create in the mind of the judge (who would be the specific and privileged audience) a conviction about the way in which the facts of the case took place.” Michele Taruffo, *Ermeneutica, prova e decisione*, 4 *REVISTA BRASILEIRA DE DIREITO PROCESSUAL PENAL* 129, 133 (2018) (original in Italian) (“*La prova consisterebbe in uno strumento -o, più propriamente, in un argomento- di carattere essenzialmente persuasive. Si tratta dell’idea ‘retorica’ della prova, in base alla quale il suo scopo consisterebbe nel creare nella mente del giudice (che sarebbe l’uditorio specifico e privilegiato) un convincimento intorno al modo in cui si sarebbero svolti i fatti del caso.*”) (internal citations omitted). However, Taruffo himself provides a critique to this concept of evidence. Indeed, he explains that such an understanding of evidence would correspond to the perspective of lawyers (whose

When it comes to expert evidence, however, the ability of the nonexpert decision-maker to weigh or assess its probative value becomes increasingly limited as the issues grow in complexity. In other words,

the more complicated and specialised the questions involved and the methods adopted by the experts, the greater is the dependence of the tribunal on their opinions and findings. If there are certain subjects on which the Court cannot, for lack of special knowledge or experience, form its own conviction, it is likely also that it cannot properly assess the value of opinions and other evidence covering such subjects.¹²

As a consequence, when complex technical issues arise in a dispute—something particularly common in construction arbitrations—the arbitrators will be pushed to rely to some extent on the substance of the expert’s opinion.

This is not to say that tribunals will always accept the expert evidence without analysis. The decision-maker must still decide whether to include the expert’s conclusion in her legal reasoning process. As Scott Brewer puts it,

[w]hen a nonexpert practical reasoner solicits the view of a theoretical expert in the course of making a practical decision, the minor premise of the practical syllogism is actually the *conclusion of a distinct syllogism*; it is the conclusion of an independent chain of reasoning by the practical reasoner *about* the theoretical reasoning offered by the expert, which functions as a lemma for the principal syllogism.¹³

fundamental purpose is achieving victory in the case by persuading the judge to agree with their client’s theory of the case), but not to the function that evidence has for the decision-maker, who is not a mere passive subject of persuasion and whose task is determining the truth of the facts that are relevant to the case, regardless of how persuasively they are presented. Thus, for Taruffo, the function of evidence for the judge is not rhetorical but rather epistemic: to the decision-maker, evidence is an instrument of knowledge. In order to reach this conclusion, Taruffo refers to the distinction between the persuasiveness and the cognitive capacity of a statement, concluding that, for the judge, evidence must be assessed with respect to the latter. *Id.* at 133–34. This reinforces the importance of the decision-maker having the epistemic competence to properly understand the facts that are the subject of the evidence.

12. H.A. Hammelmann, *Expert Evidence*, 10 MOD. L. REV. 32, 33 (1947) (internal citations omitted).

13. Scott Brewer, *Scientific Expert Testimony and Intellectual Due Process*, 107 YALE L.J. 1535, 1634 (1998). This distinct syllogism, which Brewer calls *secondary argument*, is construed by “a chain of reasoning that includes a set of related judgements *about* the reasoning that the expert himself used to arrive at the judgements he reports testimonially to the practical reasoner.” *Id.* at 1646. The purpose of such chain of reasoning, according to Brewer, is to determine whether the scientific process employed by the expert in reaching the conclusion that serves as a minor premise in

Such a chain of reasoning that accompanies the expert's conclusion can be translated, for example, into the scientific reliability test adopted in *Daubert v. Merrell Dow Pharmaceuticals*.¹⁴

The *Daubert* test is used by U.S. courts to assess whether an expert's testimony is based on scientifically valid reasoning and, thus, may be admitted as evidence. Under the *Daubert* test, courts analyze (1) whether the theory or technique in question can be (and has been) tested; (2) whether it has been subjected to peer review and publication; (3) its known or potential error rate; (4) the existence and maintenance of standards controlling its operation; and (5) whether it has attracted widespread acceptance within a relevant scientific community.¹⁵ But the assessment performed by the nonexpert judge or arbitrator will not refer to the substance of the conclusion itself, because the decision-maker often lacks the necessary expertise to do so. Instead, it will be limited to the process by which the expert arrived at a conclusion and other circumstances that makes the expert's testimony procedurally reliable. For instance, arbitrators in construction disputes are usually experienced in the field and possess enough knowledge to evaluate the substance of the expert's assessment regarding many complex technical issues. However, this will not necessarily be the case for all complex issues that arise in modern construction disputes.¹⁶

Construction projects often involve certain common stages (e.g., tendering, design or engineering, procurement, civil works, erection, commissioning, and operation) and types of documents (e.g., tender documentation, civil, mechanical, and electrical drawings, flow diagrams, procurement documentation, schedules, daily reports, transmittals, requests for information, non-conformities, and variation orders) with which arbitrators can become accustomed despite their volume and complexity. However, certain construction projects entail greater technical complexity as they "involve specialist engineering works such as shipbuilding; bespoke plant and machinery such as

the legal/practical syllogism provides the appropriate level of confidence to justify the nonexpert's reliance on the conclusion, at least for practical reasons. *Id.* at 1634–71.

14. 509 U.S. 579 (1993).

15. *Id.* at 593–94.

16. "The complexity of process design and construction technologies are way beyond the comprehension of 'ordinary' engineer/technical arbitrators, let alone law professors or other legal practitioner arbitrators." Martin Hunter, *Expert Conferencing and New Methods*, 4 *TRANSNAT'L DISP. MGMT.* 7 (2007).

turbines, generators and aircraft engines; or works that aim to support energy projects such as upstream oil and gas projects or renewables (wind, wave, solar) and nuclear plants.”¹⁷ In the case of the latter, for instance, “[e]very stage of the process [to develop a nuclear power plant] will likely involve thousands of engineers, manufacturing and construction personnel in an iterative process that cannot fully be reflected in a traditional project schedule.”¹⁸ Most arbitrators will probably lack the specific knowledge necessary to evaluate very technical disputed issues arising out of such projects and, consequently, will need to rely on the experts’ conclusions.

To sum up, when expert evidence relates to issues that pose a sufficient level of complexity that the nonexpert decision-maker is unable to assess the substance of the expert’s opinion, she will have to rely on such opinions, provided that they are procedurally reliable. Construction disputes, wherein complex technical issues are ubiquitous, are arguably among “those instances where the complexity of technical issues requires more than expert *assistance*, and where that assistance crosses a threshold and becomes *reliance* on expert opinion by the arbitral tribunal.”¹⁹ As with many other types of international disputes,²⁰ such reliance is unavoidable.

Yet, the sole fact that the arbitrator must rely on the expert opinion’s substance, by itself, does not deprive the opinion of its evidentiary nature. In most cases, even if the arbitrator treats the expert’s conclusions as true facts, they must be subsumed in a broader legal analysis, that is, they must be measured against a legal rule or standard for the legal issue to be resolved.

B. *The logical space between the technical and the legal conclusion*

A separate problem arises when the issue addressed by the expert (i.e., the technical question that must be answered) is at the

17. Stavros Brekoulakis & David Brynmor Thomas, *Introduction*, in *THE GUIDE TO CONSTRUCTION ARBITRATION* 1, 1 (Stavros Brekoulakis & David Brynmor Thomas eds., 3d ed. 2019).

18. Jane Davies Evans, *Construction Arbitrations in the Nuclear Sector*, in *THE GUIDE TO CONSTRUCTION ARBITRATION*, *supra* note 17, at 288, 297.

19. Sophie Nappert & Fabricio Fortese, *Assessing Expert Evidence*, in *THE LEADING ARBITRATORS’ GUIDE TO INTERNATIONAL ARBITRATION* 837, 837 (Lawrence W. Newman & Richard D. Hill eds., 3d ed. 2014).

20. Matthew W. Swinehart, *Reliability of Expert Evidence in International Disputes*, 38 *MICH. J. INT’L L.* 287, 296–97 (2017) (“The complexity of international disputes means that when decision makers rely on expert evidence, they rely heavily on it. Expert evidence often has wide-ranging and significant influence on decision makers and may even determine the outcome of key issues in a dispute.” (internal citations omitted)).

same time or at least to a great extent indistinguishable from the issue (or some of the issues) of the dispute itself (i.e., the legal question that must be answered by the tribunal to resolve the controversy). Continuing with the syllogistic description of the legal reasoning task, the relevant instance is one in which the expert provides both the major premise (in the form of a technical rule or standard) and the minor premise (the particular instance whose predicate is the subject of the major premise, which in turn is materialized in other means of evidence).²¹ In other words, the expert reaches a conclusion that is not incorporated in the nonexpert's own reasoning process, but rather goes directly (or with very little intervention from the adjudicator) to the outcome of the case.

For example, take a hypothetical dispute where one of the legal issues is whether the bridge collapsed because the composition of the materials used by the contractor did not accord with best practices or because of an unforeseeable increase in the strength of the wind (i.e., *force majeure*). In this hypothetical, the expert is supposed to answer this precise question, and her conclusion, provided that the report is admitted as evidence by the decision-maker, will determine the outcome of that specific legal issue. This synchrony of issues is not uncommon in construction arbitration, where “the outcome often depends almost entirely on the technical assessment of the facts.”²² When the issues are so synchronous, the objective of the expert's assessment is essentially identical to the arbitrator's task.

A natural objection against this argument would be that the described situation is covered by the “ultimate issue” rule, which “prohibit[s] an expert from testifying about his opinion on the ultimate issue in the case [because] such testimony would invade the province of the jury.”²³ This rule originated in the context of jury trials and was intended to prevent the jury from being unduly influenced by the expert's opinion.²⁴ Cogently, this would not be the case in construction arbitration proceedings, where the decision-maker is not only a

21. Hand, *supra* note 2, at 51.

22. Elina Mereminskaya & Fernando Landeros, *Suggested Policies for Tribunal-Appointed Experts in Construction Disputes*, 14 *TRANSNAT'L DISP. MGMT.* 1 (2017).

23. Faust F. Rossi, *Modern Evidence and the Expert Witness*, 12 *LITIG.* 18, 24 (1985). This rule was abolished in the United States as reflected in Rule 704(a) of the U.S. Federal Rules of Evidence, which currently provides that “[a]n opinion is not objectionable just because it embraces an ultimate issue.”

24. Geert Philip Stevens & Emma Charlene Lubaale, *Revisiting the Historical Context Surrounding the Development of the Ultimate-issue Rule to Inform its Future in South African Law of Evidence*, 22 *FUNDAMINA* 94, 100–04 (2016).

legal expert but probably is also very experienced in the field of construction projects. This is why, as mentioned above, the mere fact that the expert opinion's subject matter is the same as the ultimate issue of the case does not imply, by itself, that such an opinion loses its evidentiary nature. It must be coupled with the fact that the technical issue is too complex for the tribunal to evaluate its substance. When the technical issue is both highly complex and outcome-proximate, the expert would be, in fact, invading the tribunal's province.

Moreover, the argument advanced in this article differs from that contained in the ultimate issue rule. There would be no gain in simply excluding this evidence because the issue must be resolved by someone with epistemic competence, which the nonexpert decision-maker does not have. My answer is that this is simply not evidence, but rather an assessment that must come from the tribunal. Herein lies the structural asynchrony between the nature of the described issues and process and rules under which they are resolved.

Consequently, when the expert's assessment falls on an issue that is both (1) too complex for the non-expert decision maker to evaluate in substance and (2) logically identifiable with the legal dispute on which the adjudicator must decide, then the expert's assessment should not be treated as evidence.

III. A DISPUTE SYSTEMS DESIGN APPROACH TO THE ASSESSMENT OF TECHNICAL ISSUES IN CONSTRUCTION DISPUTES

The natural next step from this conclusion is to analyze the structure of the arbitration proceeding. In this analysis, the aim will be to discover an appropriate way to shift the assessment of highly complex and determinative technical issues away from the parties' presentation of evidence and toward the tribunal. This is where Dispute Systems Design comes in.

Focusing on highly complex, outcome-proximate technical issues, DSD methodology can be employed to analyze the current practice of expert evidence production in construction disputes and to propose a design that better meets the interests of the relevant stakeholders.

Although there are different approaches to DSD methodology, some authors identify a unitary scheme with five phases:

- (1) conflict assessment—analysis of the context in which the disputes occur, identification of the stakeholders of the conflict, their interests and positions and investigation into the nature, costs and types of the disputes;

- (2) assessment of conflict resolution procedures in place—mapping the available procedures, identification of the most frequently used procedures and the causes for their use, assessment of the effects (cost and benefit) of the available procedures, particularly taking into account conflict assessment;
- (3) designing a scheme for improving the dispute resolution system—a systematic blueprint for improving upon the shortcomings of the available procedures guided by the DSD principles;
- (4) implementation of the designed scheme—putting the changes into place; and
- (5) evaluating and monitoring of the new system—receiving feedback from the stakeholders and analyzing the system to determine if further recalibration is needed.²⁵

Only the first three stages are relevant to assessing highly complex, outcome-proximate technical issues.²⁶ In this section, I identify the relevant stakeholders and their underlying interests in this assessment. Based on evaluation criteria that cohere with these interests, in the following section I assess the main issues that arise with regard to expert evidence and the ways in which current systems address them.

A. *Conflict assessment: Identifying the issue, the stakeholders, and their underlying interests*

The issue or conflict that is the subject of my analysis, as referenced above, is the expert’s assessment of technical issues that arise in construction disputes that (1) are too complex for the nonexpert decision-maker to evaluate in substance and (2) amount to a decision of the legal issue of the case.

Arguably, the main stakeholders in construction arbitration are the disputing parties, which often include owners, contractors, and subcontractors. However, other participants in the proceeding—arbitrators, counsel, and experts—also have a stake in designing the process through which technical issues are assessed and ultimately

25. Ilija Mitrev Penusliski, *A Dispute Systems Design Diagnosis of ICSID*, in *THE BACKLASH AGAINST INVESTMENT ARBITRATION: PERCEPTIONS AND REALITY* 507, 508 (Michael Waibel et al. eds., 2010).

26. Although Dispute Systems Design is commonly used to evaluate a dispute settlement mechanism as a whole, it also provides a useful framework to assess and re-design specific parts of it, such as the way in which a certain type of evidence (i.e., expert evidence) is produced. In this sense, the Dispute Systems Design process analyzes not only the existing systems that are in place to address a specific kind of conflict, but also “what about the system is effective and what is inefficient.” Susan D. Franck, *Integrating Investment Treaty Conflict and Dispute Systems Design*, 92 *MINN. L. REV.* 161, 184 (2007).

resolved in construction disputes. Consequently, for purposes of analyzing the existing mechanisms in accordance with step 1 of DSD methodology, I have chosen to consider the interests of the arbitral tribunal, the parties, their legal counsel, and the experts.²⁷

The arbitrators who have been appointed to resolve a construction dispute that presents complex technical issues are usually interested in obtaining an early,²⁸ objective,²⁹ coherent³⁰ and cost-effective³¹ assessment of the disputed technical issues as doing so allows them to focus on the legal assessment of the case. In other words, arbitrators may reasonably expect to get useful and effective assistance from experts to deal with the technical issues but not to be presented with conflicting and/or biased expert evidence over which they would have to perform an analysis that goes beyond their own area of expertise. Needless to say, arbitrators have an interest in rendering an award that is both legally and technically sound, and that

27. To the extent that an efficient and effective way to resolve technical issues in construction disputes contributes to the cost-effectiveness of the dispute mechanism as a whole (which I strongly believe to be true) and, consequently, to the overall stability and economic health of the construction industry, one can reasonably consider foreign and local investors, communities that interact with construction projects, employees of the construction companies, and similarly situated persons or entities to be at least indirect stakeholders.

28. ICC COMM'N ON ARB. & ADR, ICC COMMISSION REPORT CONTROLLING TIME AND COSTS IN ARBITRATION 13 (2012) ("It is essential for there to be clarity at an early stage (by agreement, if possible) over the subject matter and scope of any expert evidence to be produced.").

29. Judith B. Ittig, *Secrets of a Winning Presentation*, in CONSTRUCTION ADR 255, 261 (Adrian L. Bastianelli & Charles M. Sink eds., 2014) ("The common view among arbitrators is that experts are partisan, that they are not neutral evaluators and that they have been hired to express a particular view."). The author, who expresses the transcribed opinion as an arbitrator, adds that the skepticism directed to experts is reinforced by the fact that some attorneys show a lack of understanding (or confidence) on the technical aspects of the case by handing over the testimony to the expert without engaging in proper direct examination. *Id.* at 260–61.

30. Edmund M. Amorosi & Richard F. Smith, *The Arbitration Hearing*, in CONSTRUCTION ADR, *supra* note 29, at 227, 241. ("[A]rbitrators are seeking ways to improve the usefulness of expert testimony to avoid situations where the arbitrators are presented with two entirely different technical explanations for the issues in dispute."); John W. Hinchey, *Chapter 14: International Arbitration*, in CONSTRUCTION ADR, *supra* note 29, at 315, 380 ("Many experienced international arbitrators have recognized that, quite often, the expert reports or opinions are like 'passing ships in the night', never fully engaging with each other on the particular points in dispute.").

31. Drawing from his experience as an arbitrator, Mr. Bernard Hanotiau commented that "[q]uantum experts tend to be too wordy, too technical and unable to clearly express their reasoning in terms that are easily understandable by laymen, and this, even in the so-called didactic presentation before their cross-examination." Anne Véronique Schlaepfer & Vanessa Alarcón Duvanel, *Direct and Re-Direct Examination*, in THE GUIDE TO ADVOCACY 70, 76 (Stephen Jagusch QC, Philippe Pinsolle & Alexander G. Leventhal eds., 5th ed. 2021).

is based on the proper assessment of the technical issues that are involved in the dispute.

The two main interests of the disputing parties regarding the production of expert evidence are (1) the cost-effectiveness³² of the procedure and (2) the appropriateness of the resolution (i.e., that the technical issues are resolved by decision-makers with suitable expertise).³³ In turn, the decision-makers' expertise leads to a more reliable and predictable outcome.³⁴

So far, it is possible to identify aligned interests among the members of the arbitral tribunal and the disputing parties in ensuring that the technical issues are (1) resolved at a reasonable cost of time and money, (2) identified and narrowed at an early stage of the procedure, and (3) assessed by a person who is epistemically competent to do so.

While legal counsel and expert witnesses intervene in the arbitration to represent the interests of the parties that hired them,³⁵ they also have individual interests in the procedure that may or may not be aligned with the former. The attorneys and experts may not be as interested in reducing the time costs of the technical assessment of issues as their clients, especially if their fees are determined on an

32. James R. Madison, *Suitability of Alternative Dispute Resolution Processes for Resolving Construction Disputes*, in *ADR, A PRACTICAL GUIDE TO RESOLVE CONSTRUCTION DISPUTES: ALTERNATIVE DISPUTE RESOLUTION IN THE CONSTRUCTION FIELD* 11, 12 (Alan E. Harris, Charles M. Sink, & Randall W. Wulff eds., 1994) ("The first concern is the time required to educate the decision makers about the subject matter and vocabulary, to create a frame of reference within which to consider disputed issues. Time, of course, is money or, in this case, cost.").

33. According to a survey of corporate users of international arbitration performed by PricewaterhouseCoopers in 2006, some of the most important considerations when selecting arbitrators were specialization in the industrial sector and cross-disciplinary expertise, including technical expertise. PRICEWATERHOUSECOOPERS, *INTERNATIONAL ARBITRATION: CORPORATE ATTITUDES AND PRACTICES* 16–17 (2006), http://www.arbitration.qmul.ac.uk/media/arbitration/docs/IAstudy_2006.pdf [<https://perma.cc/763L-M8QN>]; see also Hinchey, *supra* note 30, at 352.

34. Madison, *supra* note 32, at 12 ("The second, and perhaps more serious, problem is lack of predictability of outcome, with an attendant potential for injustice. When a person not grounded in a field must decide issues of credibility or persuasiveness, the decision tends to be made on the basis of touch and feel factors, such as body language and speaking style. The decision coincidentally may be right, but the outcome of a construction dispute will be more reliable or predictable if based on technical merit.").

35. Even though experts can also be appointed by the arbitral tribunal, as we shall see, the prevalent practice in international arbitration is for the parties to appoint expert witnesses. Sebastiano Nesi, *Expert Witness: Role and Independence*, in *NEW DEVELOPMENTS IN INTERNATIONAL COMMERCIAL ARBITRATION* 2016 at 71, 72 (Christoph Müller, Sébastien Besson, & Antonio Rigozzi eds., 2016).

hourly basis; however, they incur opportunity costs with respect to other possible professional commitments.

Furthermore, the expert has an interest in maintaining a reputation for objectiveness and technical accuracy in assessing the case. Her ability to do so will depend, among other factors, on the possibility of freely expressing her scientific opinions³⁶ and the completeness of the information provided by the hiring parties to prepare the expert report.³⁷ Similarly, legal counsel have an interest in receiving input from the experts that is functional to the legal arguments, which will generally translate in technical conclusions that can be directly transcribed into the written submissions.

In conclusion, in evaluating existing mechanisms and proposing a new model based on the DSD methodology, stakeholders in a construction dispute have, to some extent, a common interest in ensuring that the technical issues are (1) resolved at a reasonable cost of time and money, (2) identified and narrowed from an early stage of the procedure, and (3) assessed by a person who is epistemically competent to do so (4) in a way that allows an objective and informed assessment of the relevant available information.

B. *Assessment of available procedures: Main challenges that arise around expert evidence and existing mechanisms to address these challenges*

Current mechanisms generally fail to satisfy the identified interests when it comes to the assessment of highly complex and decisive technical issues. Applying DSD methodology, I will evaluate these mechanisms using two main evaluation criteria: cost-effectiveness

36. Kate Parlett, *Parties' Engagement with Experts in International Litigation*, 9 J. INT'L DISP. SETTLEMENT 440, 451 (2018) ("Furthermore, an expert is likely to feel constrained by his or her own reputation and professionalism. These are likely to be highly valued and can be expected to limit the extent to which any third party can influence the expert's expression of honest opinion.").

37. Bernardo Cremades, *The Expert Witness in International Arbitration*, in DEFINING ISSUES IN INTERNATIONAL ARBITRATION: CELEBRATING 100 YEARS OF THE CHARTERED INSTITUTE OF ARBITRATORS 192, 195 (Julio César Betancourt ed., 2016) ("Counsel pursuing a particular line of argument may restrict the information provided to the appointed experts with a view to retaining control over strategy."); Guy Elkington & Paul Taplin, *Expert Evidence in Construction Disputes: Expert Witness Perspective*, in THE GUIDE TO CONSTRUCTION ARBITRATION, *supra* note 17, at 236, 245 ("For most experts, an area of continual difficulty is the availability and quality of evidence.").

and satisfaction with the outcome.³⁸ I review some of the main challenges that arise around expert evidence that are linked to cost-effectiveness and the stakeholders' satisfaction with the outcome, as well as the manner in which those problems are commonly addressed. I conclude that the asynchrony between (1) the nature of the assessment of highly complex, outcome-proximate technical issues and (2) the position of such assessment within the arbitration proceeding's structure to a great extent explains the existence of those challenges and the fact that they remain unsolved.

1. *Cost-effectiveness*

Construction arbitration generally entails major challenges in terms of efficiency³⁹ not least because the "use of experts can strongly affect the cost-effectiveness of the arbitration process."⁴⁰ Jonathan

38. Stephanie Smith & Janet Martinez, *An Analytic Framework for Dispute Systems Design*, 14 HARV. NEGOT. L. REV. 123, 127–28 (2009); CATHY A. COSTANTINO & CHRISTINA MERCHANT, *DESIGNING CONFLICT MANAGEMENT SYSTEMS: A GUIDE TO CREATING PRODUCTIVE AND HEALTHY ORGANIZATIONS* 171–75 (1996). This article does not reach other evaluation criteria such as the *effect on relationships* (since the assessment of technical issues takes place in an arbitration that commenced after the conflict arose between the parties and, in any case, the way in which this particular aspect of the dispute is managed will only have a marginal impact on the relationship compared to the arbitration proceeding as a whole), or the *recurrence of disputes* (as this will be mostly determined by the development of other elements within the construction industry).

39. As Kiefer and Cole point out, construction disputes have several characteristics that distinguish them from other types of commercial conflicts:

They can be exceptionally large in scope, involving multiple interested parties with independent contractual relationships and amounts in dispute reaching into the hundreds of millions of dollars, even eclipsing a billion dollars at times. The timelines of these projects—from initial development through engineering, construction and commissioning—span years, with key documentation created daily by dozens of witnesses. This often leads to an enormous amount of data to be reviewed and evaluated as evidence. Disputes concerning issues of time, cost and quality frequently give rise to the need to analyze and assess the cause of project delays through complex schedule analyses and expert testimony.

David Kiefer & Adrian Cole, *Suitability of Arbitration Rules for Construction Disputes*, in *THE GUIDE TO CONSTRUCTION ARBITRATION*, *supra* note 17, at 81, 81–82. Efficiency in construction arbitration has been addressed by many others before. *See, e.g.*, I. N. Duncan Wallace, *Deficiencies in Current International Arbitration Practice in Construction Cases*, 7 ARB. INT. 149, 149–54 (1991); James P. Wiesel, *Cost-Effective Construction Arbitration*, 31 CONSTR. LAW. 15, 15–22 (2011).

40. Wiesel, *supra* note 39, at 19. Out of the arbitration context (but in terms that are still applicable to it) expert evidence has been identified by some—and, more particularly, by Lord Woolf in his 1995 "Access to Justice: Report"—as being "the major cause of cost increases in civil litigation, particularly by reason of its excessive or inappropriate use and the partisanship of experts". Cremades, *supra* note 37, at 192. Interestingly, after acknowledging that some of the attempts to solve this problem,

Lee explains the problem by referencing two examples of arbitrations regarding the construction of industrial plants. The first example is a dispute arising from an Engineering, Procurement, and Construction (“EPC”)⁴¹ contract. Even though the amount in dispute was a relatively meager \$25 million, experts from at least six disciplines were involved: civil engineers, electrical engineers, software engineers, programming/planning experts, project management experts, and quantum experts. The direct costs relating to the production of expert evidence alone rose to \$5.5 million, without even considering the cost and time invested by the attorneys and the tribunal in reviewing the expert reports. In the second example referenced by Lee, one party spent almost ten times as much as the other party on technical evidence, without this imbalance being visible to either party or the tribunal in advance.⁴²

Reformers have proposed and implemented solutions to address cost-effectiveness in construction disputes. Some solutions arose in response to specific characteristics of construction arbitrations that make the production, management, and assessment of evidence complicated and costly.⁴³ The solutions include the use of Building Information Modeling (“BIM”);⁴⁴ Critical Path Network (“CPN”)⁴⁵

such as meetings between experts, have been unsuccessful, Lord Woolf advocates for the idea of a court-appointed expert and that “in complex litigation it may be beneficial for the court to sit with an assessor” Ian Richard Scott, George Applebey & Keith Uff, *Access to Justice: Lord Woolf’s Interim Report*, 14 CIV. JUST. Q. 231, 240 (1995).

41. Under this type of contract, “a single contractor takes responsibility for all elements of design (engineering), construction and procurement of a project on a ‘turn-key’ basis.” Ellis Baker, Richard Hill & Ibaad Hakim, *Allocation of Risks in Construction Contracts*, in *THE GUIDE TO CONSTRUCTION ARBITRATION*, *supra* note 17, at 74, 77.

42. Jonathan Lee, *Controlling Expert Evidence in International Commercial Arbitration*, 19 *ASIAN DISP. REV.* 4 (2017).

43. The complicated cost-raising characteristics include the number of documents involved, the importance of accurately locating facts in the timeline of a project, and the management of different claims that form part of a single proceeding.

44. The main purpose of using BIM in construction arbitration is to provide an accurate and easy reconstruction of the facts of an infrastructure project, instead of having to review a large number of documents such as workbooks or daily reports. Basically,

BIM digitally replicates the physical and functional characteristics of a building, facilitates the process of sharing that information, and permits decisions about the project to be implemented within the model, beginning with the design concept and continuing throughout the project’s lifecycle. It allows the design and construction team to build the project virtually, and after construction it serves as a continuing, interactive database for the operation, maintenance, and alteration of the project.

Carl J. Circo, *A Case Study in Collaborative Technology and the Intentionally Relational Contract: Building Information Modeling and Construction Industry Contracts*,

(provided that this tool was also used during the execution of the project);⁴⁶ and Technology Assisted Review of documents (“TAR”).⁴⁷ Other tools that generally contribute achieving efficiency in international arbitration proceedings include the Redfern Schedule⁴⁸ and the Scott Schedule.⁴⁹ While these tools are not strictly linked to the

67 ARK. L. REV. 873, 881–82 (2014). For the use of BIM in the context of construction disputes, see Aref Charehzehi et al., *Building Information Modeling in Construction Conflict Management*, 9 INT’L J. ENG’G BUS. MGMT., at 1 (2017); ANDREW BURR, DELAY AND DISRUPTION IN CONSTRUCTION CONTRACTS 573–85 (5th ed. 2016).

45. Gasan Kallo, *The Reliability of Critical Path Method (CPM) Techniques in the Analysis and Evaluation of Delay Claims*, 38 COST ENG’G. 35–37 (1996)

46. ICC COMM’N ON ARB. & ADR, ICC COMMISSION REPORT CONSTRUCTION INDUSTRY ARBITRATIONS RECOMMENDED TOOLS AND TECHNIQUES FOR EFFECTIVE MANAGEMENT OF ARBITRATIONS 18 (2019).

47. For a brief description, see Andrew Stephenson & Dado Hrustanpasic, *Managing Big Data - the Constant Challenge for a Construction Lawyer*, COORS CHAMBERS WESTGARTH (Apr. 26, 2018), <https://www.corrs.com.au/insights/managing-big-data-the-constant-challenge-for-a-construction-lawyer> [<https://perma.cc/LEW4-23GQ>]. The utility of these technology-based tools (such as BIM and TAR) will often depend on the extent to which technology-based record mechanisms were used during the construction project itself. In this sense, some explain that construction documents

frequently evade these methods, which largely rely on searchable written content not available in many typical construction records: photographs, drawings, and schedules frequently do not have sufficient written content to be located or analyzed using these technologies and techniques. Handwritten documents, such as project logs and diaries, generally do not yield machine-readable content, and optical character recognition (“OCR”) programs currently may not provide sufficiently-accurate results to successfully identify relevant documents using search terms or TAR.

Eric A. O. Ruzicka & Kate Johnson, *Constructing a Successful E-Discovery Strategy: Foundational Principles and Building Blocks*, 12 J. AM. COLL. CONSTR. LAWYERS 23, 23–24 (2018).

48. This tool, which is commonly utilized under Rule 3(3) of the International Bar Association Rules on the Taking of Evidence in International Arbitration, provides a way of keeping a record, in separate columns, of each party’s requests for documents, along with the reasons for each request, the response of the opposing party and, when applicable, the determination of the tribunal. Also, it “makes it possible for the arbitral tribunal to make an informed decision as to whether or not a particular document, or class of documents, should be produced, without having to be involved in the details of the exchanges between the parties’ lawyers and, usually, without the need for a meeting.” NIGEL BLACKABY ET AL., REDFERN AND HUNTER ON INTERNATIONAL ARBITRATION 384 (6th ed. 2015).

49. The Scott Schedule consists of a “table in which the plaintiff itemizes its allegations (for example, each defect or variation), and the defendant then adds its position with respect to each item. Parties may not make non-specific allegations or simply ‘not admit’ or ‘deny’ their opponent’s allegations. Scott Schedules are the antithesis of pleadings, which are often extremely voluminous and unnecessarily complex and require an inordinate amount of time just to decipher what the issues actually are.” Paula Gerber & Diana Serra, *Construction Litigation: Are We Doing It Better?*, 35 MELB. U. L. REV. 933, 961 (2011).

way in which expert evidence is produced and assessed, they contribute to achieving cost effectiveness in construction arbitrations. Whoever performs the assessment of technical issues in construction disputes, whether a party-appointed expert witness or a member of the tribunal, should take advantage of these mechanisms.

Other cost-effectiveness related solutions are directly linked to the assessment of technical issues. These solutions arise precisely from the procedural structure of expert evidence, specifically when experts are appointed by the parties, as is the case in most international arbitrations. These include, among others, the possibility for the experts,

to meet before the hearing, on a without prejudice basis, to identify those areas in their respective reports where they agree [on] the issues. There may be a direction for a joint report identifying those areas where they have reached agreement and those which remain in dispute, with a brief description of their respective views.⁵⁰

Efficiency in the production of expert evidence is also sought through the early determination of the expert's terms of reference, which consist of a "written set of instructions that contain the parameters by which the expert must conduct his investigation."⁵¹ The purpose of such terms of reference is precisely the early determination of the specific issues that will be covered by the experts. Similarly, the ICC has recently recommended holding case management conferences to agree on the scope and proceedings to produce expert evidence.⁵² It has also recommended that expert reports be exchanged prior to the hearing and drafting of supplementary reports.⁵³

However, especially when technical issues reach a certain level of complexity and logical proximity to the legal dispute, increased efforts are required to produce and assess expert evidence, as well as to resolve those issues in accordance with the underlying interests of the relevant stakeholders. In fact, when the technical issues are highly complex and outcome-proximate, treating them as evidence is

50. JANE JENKINS, *INTERNATIONAL CONSTRUCTION ARBITRATION LAW* 267 (2d ed. 2014).

51. DAVID D. CARON & LEE M. CAPLAN, *THE UNCITRAL ARBITRATION RULES. A COMMENTARY* 640 (2d ed. 2013). Although the transcribed definition is referred to the tribunal-appointed experts that are regulated in article 29 of the 2010 UNCITRAL Arbitration Rules, the early establishment of common terms of reference can also be agreed upon by the parties with respect to party-appointed expert witnesses.

52. Lee, *supra* note 42, at 4-5; ICC COMM'N ON ARB. & ADR, *supra* note 46, at 22-23.

53. ICC COMM'N ON ARB. & ADR, *supra* note 46, at 22-23.

the main source of inefficiency, as a significant number of extra steps must be taken for the assessment of the precise issues to be used in deciding the case. Each party must work with its own expert to draft the reports, and each party must review and analyze the expert reports prepared by the other party. Considering the complexity and relevance of the issue at stake, those activities will be particularly time-consuming. Likewise, the tribunal must spend time and effort to understand the reports and, in the common situation of conflicting reports, must introduce additional mechanisms to deal with such conflict. These efforts include asking the experts to meet and determine areas of agreement, appointing a third expert, and decreeing simultaneous witness conferencing at a hearing.

In other words, many of the challenges that these solutions are meant to address arise precisely from the presentation of the technical assessment of facts as evidence by the parties. If this were not the case, and such an assessment came from the tribunal, many of the extra steps would not be necessary.

2. *Satisfaction with the outcome*

As explained above, interested stakeholders are satisfied with the outcome of the assessment of complex and decisive technical issues to the extent that it is performed cost-effectively and by an epistemically competent person. This competent person must be able to provide an objective and honest conclusion on the technical issues that are relevant to the case, based on information that is complete and accurate.

At least two circumstances that interact with each other may hinder the achievement of the described standard: the level of independence and impartiality of expert witnesses (along with the intervention of legal counsel in the expert reports), and the quandary created by the submission of conflicting expert evidence by the parties. Existing solutions to address these issues are unsatisfactory, at least in cases where the assessment of the technical issue is not evidentiary in nature because the issue is highly complex and outcome-proximate.

a. *Independence and impartiality of expert witnesses and party control over expert evidence*

One of the main critiques directed to expert witnesses is that, since they are hired and paid by one of the parties,⁵⁴ they would lack independence⁵⁵ and impartiality.⁵⁶ This critique is particularly serious as the mission of the experts is to assist the tribunal⁵⁷ by presenting independent and impartial opinions.⁵⁸ The danger is that,

54. Unsurprisingly, the fact that the expert is compensated by one of the parties is commonly identified as the main source of the expert's perceived lack of independence. In Perrin's explanation,

[t]he financial aspect of expert witness practice has a pervasive influence on both sides of the relationship. The lawyer expects cooperation from the expert and 'good results' (i.e., a favorable outcome at trial). Meanwhile, the expert is motivated to please the lawyer so that the lawyer will hire the expert again. In addition, the expert, unlike lay witnesses, is motivated to spend time as a participant in the litigation, whether preparing to testify as a witness or assisting the lawyer in preparing to examine the opposing expert. The expert becomes an essential member of the trial team; an advocate of the party's position.

Timothy L. Perrin, *Expert Witnesses Under Rules 703 and 803(4) of the Federal Rules of Evidence: Separating the Wheat from the Chaff*, 72 IND. L.J. 939, 965 (1997).

55. It is important to note that "independence" may have more than one meaning. In this sense,

[t]here is a danger here of confusion because of the ambiguity of the term 'independence', particularly in the context of international arbitration. Independence can refer to the quality of mind of not being influenced by factors irrelevant to the expertise. In this sense 'independence' is used synonymously with the more precise and preferable terms 'objective' or 'impartial'. This is a quality required of experts. However, independence is also commonly used in international arbitration to refer to an absence of certain personal or economic relationships with the parties. Independence in this second sense is mandatory in a member of the tribunal, but not in an expert witness.

Cairns and Cremades, *supra* note 8, at 15. Two comments are important here. First, the difference between one meaning of "independence" and the other, as presented by Cairns and Cremades, might not always be straightforward. Indeed, the absence of independence as described in the second definition might give rise to reasonable doubts as to the independence of the expert according to the first definition. Second, as I will argue throughout the present work, the task that experts perform in many construction disputes turns out to be essentially similar to that of the arbitrator's. Therefore, applying a lower standard of independence seems less justified.

56. Although this critique would only be pertinent in the context of common law jurisdictions where the parties commonly appoint the experts and not in civil law countries in which the tribunal typically appoints experts; the critique remains relevant to our analysis because party-appointed experts are the general rule in international arbitration proceedings.

57. Nathalie Voser & Katherine Bell, *Expert Evidence in Construction Disputes*, in THE GUIDE TO CONSTRUCTION ARBITRATION, *supra* note 17, at 168, 172.

58. Doug Jones AO, *Methods for Presenting Expert Evidence*, in THE GUIDE TO EVIDENCE IN INTERNATIONAL ARBITRATION 154, 155 (Amy C Kläsener, Martin Magál & Joseph E. Neuhaus eds., 2021) ("The general role of expert witnesses, whether they are appointed by the parties or the tribunal, is to assist the tribunal in its decision-

contrary to the main purpose of having expert evidence, the tribunal will be presented with conflicting expert reports tailored to the appointing party's interpretation of facts, which is of little use for properly resolving the case.

From a practical perspective, this risk can materialize for two main reasons. First, the different technical approaches to common construction issues and diverse methodologies employed by expert witnesses may lead to distinct conclusions⁵⁹ without the arbitrators always being able to distinguish which is more appropriate for the case at issue. This is especially relevant when the issue involves a high level of complexity. Second, the involvement of attorneys throughout the drafting of expert reports guarantees that no report will be submitted that is damaging to the hiring party's interests.⁶⁰ In fact, as legal counsel has an interest in winning the case, she will likely exploit the diversity of technical approaches precisely to convince the expert to use the one that best serves her client's case.

This does not mean that every expert in every arbitration will seek only to please her hiring party. In fact, a reputation for objectivity might make an expert a better choice than one who simply accommodates the party's requirements. Moreover, most sets of arbitration rules contain mechanisms aimed to address and minimize the risks that come along with this apparently inherent lack of impartiality of party-appointed expert witnesses. These include cross-examination, questions by the tribunal, the duty of disclosure of conflict of interests, the possibility of submitting a joint report, expert conferencing,

making by providing relevant and independent evidence in their area of expertise.”); Guy Elkington & Paul Taplin, *Expert Evidence in Construction Disputes: Expert Witness Perspective*, in THE GUIDE TO CONSTRUCTION ARBITRATION, *supra* note 17, at 236, 237 (“In most legal systems rules of evidence and codes of practice require that an expert has an (overriding) duty to present independent and impartial opinion to a tribunal . . .”).

59. For example, in delay claims, there are many distinct approaches or methodologies that may be employed by experts and that may lead to different conclusions. The difference in methodologies may include the *Critical Path Analysis, As-planned v. As-built, As-planned v. Impacted*, or *As-built v. But For*. As a consequence, “it is likely that the experts from the various parties will approach the task armed with a different set of facts and approach the analysis from different—possible widely different—theoretical bases”. JENKINS, *supra* note 50, at 220–25; *see also* Gideon E. Kamyak-Lukoda & Anthony J. Morgan, *Role of Expert Witnesses in Construction Arbitration: Delay and Disruption and Quantum Issues*, in TRANSNATIONAL CONSTRUCTION ARBITRATION: KEY THEMES IN THE RESOLUTION OF CONSTRUCTION DISPUTES 78, 83 (Renato Nazzini ed., 2018).

60. *See* Mark Kantor, *A Code of Conduct for Party-Appointed Experts in International Arbitration - Can One be Found?*, 26 ARBITR. INT'L 323, 334 (2010). In Hunter's words, “[t]he party in question simply would not present the testimony to the tribunal if the expert's opinion was unfavourable to its case.” Hunter, *supra* note 16, at 1.

and a duty to disclose communications between counsel and party-appointed experts.⁶¹ Among others, the International Bar Association (“IBA”) Rules on the Taking of Evidence in International Arbitration⁶² and the 2007 Chartered Institute of Arbitrators’ Protocol for the Use of Party-Appointed Expert Witnesses in International Arbitration⁶³ contain specific provisions on this matter.

However, some commentators argue that full impartiality is not possible with respect to party-appointed experts. In Klaus Sachs’s words,

[a]s long as an expert is appointed and paid by a particular party, there will always be an incentive for him to sympathize with that party’s position. There will often be a reluctance to cooperate with the expert appointed by the opposing party. And counsel will always try to control the evidence submitted by their expert and to prevent him from making statements which might turn out to be unfavorable to the client.⁶⁴

Thus, the extent to which these mechanisms generally satisfy the interest in having an impartial assessment of technical issues is not obvious. The question is whether the standard of impartiality applied to party-appointed experts remains reasonable in cases involving highly complex, outcome-proximate technical issues. In other words, the fact that expert witnesses’ impartiality might never be fully achieved through current mechanisms is generally something to tolerate with respect to a particular piece of evidence that must be assessed by an independent tribunal and incorporated into a broader reasoning process. But when the product of the expert’s assessment goes beyond the decision-maker’s epistemic competence and determines the outcome of the dispute, such a lack of impartiality—perceived or real—should not be tolerated. Specifically, the standard of independence and impartiality should not be any lower than the one

61. A brief reference to each one of the mentioned mechanisms can be found in Nessi, *supra* note 35, at 88–96.

62. The IBA Rules require party-appointed experts to include in their report “a statement of his or her independence from the Parties, their legal advisors and the Arbitral Tribunal” (Rule 5.2.c) as well as an “affirmation of his or her genuine belief in the opinions expressed in the Expert Report.” (Rule 5.2.g). IBA RULES ON THE TAKING OF EVIDENCE IN INT’L ARB. Rule 5.2 (INT’L BAR ASS’N 2020).

63. Article 4 expressly requires the expert’s opinion to be impartial, objective, unbiased and uninfluenced by the pressures of the dispute resolution process or by any Party. RULES ON THE TAKING OF EVIDENCE IN INT’L ARB. art. 4 (CHARTERED INST. OF ARBS. 2007).

64. Klaus Sachs & Nils Schmidt-Ahrendts, *Protocol on Expert Teaming: A New Approach to Expert Evidence*, in *ARBITRATION ADVOCACY IN CHANGING TIMES* 135, 144 (Albert Jan van den Berg ed., 2011).

applied to the arbitrators themselves and, when this is the case, the mechanisms in place for experts naturally fail to ensure the fulfillment of such a standard.

b. *Submission of conflicting expert evidence*

After each party has retained and worked with an expert to produce expert evidence, the nonexpert decision-maker usually faces two (or more) expert reports that contradict each other. As some scholars note, the prevailing practice of submitting conflicting expert evidence on matters of great technical complexity is “[o]ne of the least satisfactory features of modern international arbitrations”⁶⁵ This is particularly true when the conflict arises from a genuine difference of opinion between the experts (tailored or not to the appointing parties’ interests, but in any case possible for the reasons stated above), in which case the tribunal will be unable to properly decide which one is more accurate. For instance, Brewer’s analysis of the respondents’ brief in *Daubert* is helpful in describing this issue:

[W]hen evidence supporting contrary or contradictory propositions is supported by “*grounds that are deemed good by the relevant scientific, technical, or other specialized field,*” then the nonexpert judge or jury is to make the decision as to which of those competing and well-supported claims is to be accepted for purposes of the legal decision at hand. That is, on this brief’s view and apparently on the view of the *Daubert* Court itself,

65. BLACKABY ET AL., *supra* note 48, at 396. Learned Hand’s description of this phenomenon, even when written in the context of jury trial litigation, is particularly illustrative here:

The trouble with all this is that it is setting the jury to decide, where doctors disagree. The whole object of the expert is to tell the jury, not facts, as we have seen, but general truths derived from his specialized experience. But how can the jury judge between two statements each founded upon an experience confessedly foreign in kind to their own? It is just because they are incompetent for such a task that the expert is necessary at all. Even where two supposititious propositions are not in direct conflict, the real reconciling grace which may lurk between them is not bestowed, save upon one familiar with the whole line of experience to which they belong; and when the conflict is direct and open, the absurdity of our present system is apparent. The truth of either combatting proposition lies just in its validity as an inference from a vast mass of experience, not usually in any great degree that of the witness, certainly in no part that of the jury, as to the truth of which trained powers of observation are quite essential, the result themselves of a life of technical training. What hope have the jury, or any other layman, of a rational decision between two such conflicting statements each based upon such experience. If you would get at the truth in such cases, it must be through some one competent to decide.

Hand, *supra* note 2, at 54–55.

when qualified epistemically competent experts disagree, the decision as to who is *correct* is to be given by the judge to the *least* epistemically competent institutional actor, the nonexpert judge or jury. Again, we are driven to ask, what is being expected or demanded of the nonexpert legal reasoner in assessing scientific testimony? The *Daubert* opinion and at least some sources on which it relies seem to have it thus: When the evidence is so weak that no reputable scientist in the field would endorse it, prevent the nonexpert from hearing it (and from hearing that no reputable expert would endorse it); but when the best scientific theories and methods underdetermine the result, let the nonexpert decide who is correct. How can an epistemically responsible decision emerge from that rule?⁶⁶

Solutions provided for this situation vary between civil and common law jurisdictions, although certain tools are increasingly prevalent in the practice of international arbitration, such as the use of Terms of Reference for expert witnesses, joint expert reports and expert witness conferencing.

i. *Civil law approach: Tribunal-appointed expert*

In most civil law jurisdictions, expert evidence generally comes in the form of tribunal-appointed experts.⁶⁷ Therefore, when facing two conflicting pieces of expert evidence, some civil law trained arbitrators may see appointing an additional neutral expert as a natural solution.⁶⁸ Even outside the domestic laws of civil law jurisdictions, most national and international arbitration rules also contemplate the possibility of having a tribunal-appointed expert.⁶⁹ Although this

66. Brewer, *supra* note 13, at 1600.

67. Torsten Lörcher, *Cultural Considerations in Advocacy: Continental Europe*, in GUIDE TO ADVOCACY, *supra* note 31, at 282, 285. As some scholars point out, the preference for tribunal-appointed experts under civil law systems is given by the conception of the experts as officers of the court. Michele Taruffo, *Principles and Rules of Transnational Civil Procedure: An Evidentiary Epistemology*, 25 PENN STATE INT'L. L. REV. 509, 517 (2006).

68. In Torsten Lörcher's words, "[a]lthough international arbitration has developed its own particular rules, the civil law principles for litigation in national courts may still influence the style in which both arbitrators and counsel with a civil law background will conduct arbitral proceedings, namely if they and the parties in such an arbitration share this background." Lörcher, *supra* note 67, at 283.

69. Examples include Article 37 of the English 1996 Arbitration Act, Section 25 of the Swedish Arbitration Act, Article 6 of the IBA Rules on Taking Evidence in International Arbitration, Article 21 of the LCIA Rules, Article 25.4 of the ICC Arbitration Rules, Article 26 of the UNCITRAL Model Law, Article 29 of the UNCITRAL Arbitration Rules, and Article 25 of the ICDR Rules. Sachs and Schmidt-Ahrendts, *supra* note 64, at 136–37.

solution is far less common in international arbitration, it is still worth mentioning for the purposes of this analysis.

While this alternative reduces the risk of partiality, it leaves other issues unresolved. One concern that comes mainly from a common law perspective, is that “the parties distrust the tribunal-appointed experts because they feel that they are unable to control the manner in which what may be the most critical element in their case will be presented.”⁷⁰ Another issue that has been raised is the risk of the tribunal-appointed expert rendering “a report despite a potential lack of factual information. Undisputedly, the flow of factual information between the party and the corresponding party-appointed expert is usually much smoother than between a party and the tribunal-appointed expert.”⁷¹

A leading issue that arises with regard to tribunal-appointed experts is the extent to which, by relying on the expert’s conclusions, the arbitrators unduly delegate their decision-making function to persons other than the ones agreed upon by the parties to resolve their dispute.⁷² In this sense, according to relevant caselaw and legal doctrine, no improper delegation takes place when the parties are duly informed about the expert’s tasks and make no objections;⁷³ when the parties “recognize the polarity of party-appointed expert views, and are given ample opportunity to comment on the tribunal expert’s findings;”⁷⁴ and when the tribunal does not simply take the findings “at face value without giving them any consideration.”⁷⁵

Finally, when an arbitral tribunal appoints additional experts because two conflicting expert reports have been submitted, the cost-effectiveness of the proceeding becomes a concern. The parties will assume new costs (i.e., the tribunal-appointed expert’s fees) and lose

70. *Id.* at 140.

71. *Id.*

72. Voser and Bell, *supra* note 57, at 170. (“[P]arties and counsel regularly have concerns when it comes to tribunal-appointed experts and sometimes fear that their dispute is essentially decided by the tribunal-appointed expert rather than the arbitral tribunal itself.”)

73. *Luzon Hydro Corp. v. Transfield Phil.* [2004] SGHC 204 (Sing.).

74. Giorgio Bernini, *The Civil Law Approach to Discovery: A Comparative Overview of the Taking of Evidence in the Anglo-American and Continental Arbitration Systems*, in *THE LEADING ARBITRATORS’ GUIDE TO INTERNATIONAL ARBITRATION*, *supra*, note 19 at 555, 843. Here, the authors refer to the CMS Gas Transmission Co. v. Argentina, ICSID Case No. Arb/01/8, 44 ILM 1205 (2005) and El Paso Energy Int’l Co. v. Argentina, ICSID Case No. Arb/03/15 (Sept. 22, 2014), cases.

75. Harris Bor, *Expert evidence*, in *ARBITRATION IN ENGLAND WITH CHAPTERS ON SCOTLAND AND IRELAND* 503, 521 (Julian D.M. Lew, QC et al. eds., 2013) (citing Price v. Carter [2010] EWHC 1451 (TCC) (Eng.)).

a significant amount of time (i.e., the time invested in preparing the first reports while the arbitration will require additional time in order for the new expert to educate herself in the facts and issues of the dispute and to draft a new report).

ii. *Common law approach: Witness conferencing*

Common law parties are usually much more comfortable with experts they select than with experts appointed by a tribunal. This has to do, in part, with the “nature and function of the expert in light of the Anglo-American procedural system, [which] tends to place the status and role of technical experts in the context of the parties’ ‘arsenal’ of evidence.”⁷⁶ Party-appointed experts are still the general rule in international arbitration.⁷⁷

In cases where experts are appointed by the parties and conflicting reports are rendered, the arbitral tribunal sometimes requires the experts to confer and discuss the issues on which they agree and those on which they differ. If no agreement is reached on one or more points of the debate, the arbitral tribunal and the parties may agree to have the experts, side by side, simultaneously cross-examined in a single hearing. This is commonly known as witness conferencing, or “hot tubbing.”⁷⁸ According to Wolfgang Peter, when it comes to technical questions,

the simultaneous hearing flushes out most differences and leaves only a few specific points of disagreement. But even in respect to these remaining open points, the transcript of the hearings generally show that they are well circumscribed, differences of view of the parties are established with clarity, and in most cases, the underlying assumptions which lead to these

76. Bernini, *supra* note 74, at 576. Another explanation regarding the preference by common law jurisdictions of party-appointed experts, as opposed to the tribunal-appointed expert model preferred in civil law jurisdictions, has to do with the tradeoff between certainty and impartiality. Ereche Tuzzini has stated that civil law regulations place the emphasis on impartiality over certainty, whereas the common law expert witness is designed in a way that allows a higher degree of certainty, but that sacrifices the expert’s impartiality. Claudio A. Ereche Tuzzini, *Prueba científica y peritaje en el Proyecto de Código Procesal Civil*, in *REFORMA PROCESAL CIVIL: PONENCIAS PRESENTADAS EN EL PRIMER CONGRESO DE ESTUDIANTES DE DERECHO PROCESAL* 103, 123 (Martín Vial Correa ed., 2014).

77. Nessi, *supra* note 35, at 72.

78. Wendy Kennedy Venoit, *Making the Construction Hearing More Efficient: Lessons Learned from International Arbitration*, 65 *DISP. RESOL. J.* 104, 146, 107 (2010); Tim Chelmick & George Spalton, *Organisation of the Proceedings in Construction Arbitrations: General Considerations and Special Issues*, in *THE GUIDE TO CONSTRUCTION ARBITRATION*, *supra* note 17, at 109–17, 115.

diverging views have been made clear. In other words, the ground for rendering the award has been well prepared.⁷⁹

Moreover, the “virtues of expert conferencing claimed by its supporters include that it embodies a more scientific ethos, it provides a better environment for experts to communicate their opinions, it reduces partisanship and the influence of lawyers, and it saves time, money and resources.”⁸⁰

Expert conferencing has its own flaws as well. For one, an *agreement* regarding a critical issue in dispute between the party-appointed experts will sometimes require one expert to go against the interests of the hiring party, which is unlikely to happen. Moreover, each expert might “defend” her own assessment of the technical issues, making the arbitrator’s task even more difficult and more a matter of persuasion rather than a clarification of technical issues. As Kantor points out, “[p]arties may engage experts who are good actors, appearing impartial but in fact partisan. The process of selecting, educating, and paying a party-appointed expert creates an environment that inherently puts pressure on the expert’s independence.”⁸¹ Some arbitrators, referring to this practice, have stated that “counsel should approach expert conferencing with caution. In my experience, the personalities of the experts can have a significant impact during expert conferencing. An expert with a more forceful personality can overshadow a more knowledgeable expert who is more reserved or does not insist on having the last word.”⁸²

The described scenario might turn even more complex for the arbitral tribunal in cases in which the parties come from different legal contexts. This is far from unusual in the context of international arbitrations on construction disputes. Burr’s explanation of this phenomenon is particularly enlightening:

79. Wolfgang Peter, *Witness “Conferencing”*, 18 *ARB. INT.* 47, 54 (2002).

80. Cairns and Cremades, *supra* note 8, at 8.

81. Kantor, *supra* note 60, at 374. This feigned impartiality does not cohere with the tribunal’s interest in understanding “the technical aspects involved in the disputed specialist area, and to receive honest opinions and advice from the experts, so that they may decide the specialist issues in dispute fairly as between the parties. It is not the function of the arbitral tribunal to decide the issues on which side has the best advocate, or team of advocates.” Hunter, *supra* note 16, at 5.

82. David Roney, *Cross-Examination of Experts*, in *THE GUIDE TO ADVOCACY*, *supra* note 31, at 100, 110. Such a risk is far from new. In 1947, Hammelmann had already referred to this situation in the court litigation context as the “danger that, among conflicting expert evidence, the Court may be induced to believe the expert who has succeeded in putting forward his views in the most persuasive and plausible manner.” Hammelmann, *supra* note 12, at 34.

In international arbitration, whenever the parties, their advocates, or their experts, are from differing cultures (or sometimes, professional disciplines), there will be a further issue to be considered. The difficulty is generally manifest in the manner of adducing evidence from lay witnesses and from experts. In some cultures the coaching of witnesses by the advocate both before and during the period of giving evidence is not only not frowned upon, but is considered to be a normal and advantageous practice. In other cultures, it can amount to professional misconduct on the part of the advocate, or result in the evidence becoming inadmissible, or both. If the parties are not playing by the same rules, then, without a tribunal-appointed expert, the tribunal may be in some difficulty.⁸³

While joint reports and expert conferencing may effectively help the tribunal decide over conflicting expert evidence, it is not clear that this is the case for overly complex issues that are, at the same time, decisive for the case. Arguably, the effectiveness of these procedures depends, to some extent, on the ability of the members of the arbitral tribunal to measure and test the substance of the issues being discussed (which might also prevent them from being distracted by the expert's oral advocacy). In any case, they are structured over the flawed assumption that the product of such a procedure is a piece of evidence that will be incorporated in the tribunal's reasoning and not the decision of the case itself.

3. *Conclusion: Current solutions are intrinsically inadequate for critical and complex technical issues*

While the aforementioned solutions have proven helpful to addressing some of the issues that arise in international arbitration, they are intrinsically inadequate when it comes to achieving an efficient and effective assessment of the critical technical issues that often arise in construction disputes.⁸⁴ At the core of this inadequacy lies the fact that the arbitral tribunal remains unable to treat the expert's assessment as evidence in a way that is epistemically sound. Indeed, as some authors recognize, these solutions

primarily focus on enhancing the rigor of the adversarial process, appointing 'independent' experts, and improving ethical transparency through the disclosure of potential conflicts of interest. Although these practices may sharpen points of disagreement and highlight flagrant biases, and the evaluation of expert

83. BURR, *supra* note 44, at 973.

84. To be clear, I am not critiquing the mentioned solutions in general terms, but only for the disputes involving highly complex, outcome-proximate technical issues.

evidence has generally improved over time, none of those practices assist the decision maker in engagement with the *substance* of that evidence.⁸⁵

The main reason for such inadequacy is the failure to recognize that expert assessments of highly complex, outcome-proximate technical issues are truly judgements and not evidence. Consequently, the solution for technical issues will not come from enhancing the specific rules and methodologies within the current structures. Rather, the solution will come from questioning whether these structures are at their core coherent with the nature of the task that must be undertaken to resolve the dispute.

IV. CHARACTERISTICS OF A COST-EFFECTIVE AND SATISFACTORY ASSESSMENT OF TECHNICAL ISSUES IN CONSTRUCTION DISPUTES

After describing other dispute resolution mechanisms, I discuss the characteristics that better meet the underlying interests of the relevant stakeholders. These characteristics are better suited to meet these interest because they cohere with the nature of the assessment of critical and complex technical issues in construction disputes. Such characteristics are (1) the presence of the expert in the decision-making body or arbitral tribunal, (2) the early determination of technical issues that are relevant to resolve the dispute, and (3) inquisitorial fact-finding powers on behalf of the expert member of the tribunal. For that purpose, I will review four models that present these features: (1) the World Trade Organization (“WTO”) Dispute Settlement Mechanism, (2) Dispute Boards, (3) the Sachs Protocol, and (4) expert arbitrators.

A. *WTO panels*

The dispute settlement system of the WTO contemplates a particularized approach to the adjudicator’s fact-finding authority, especially when it comes to technical issues that require expert assessment. Indeed, article 13 of the *WTO Understanding on Rules and Procedures Governing the Settlement of Disputes* (“DSU”) confers specific fact-finding powers to its panels that are considered more inquisitorial⁸⁶ than adversarial:

85. Swinehart, *supra* note 20, at 303.

86. Joost Pauwelyn, *The Use of Experts in WTO Dispute Settlement*, 51 INT’L COMPAR. L.Q. 325, 364 (2002). It is important to note, however, that while the author states that the inquisitorial aspect of the WTO panels is common to all international

Article 13. Right to Seek Information

1. Each panel shall have the right to seek information and technical advice from any individual or body which it deems appropriate. However, before a panel seeks such information or advice from any individual or body within the jurisdiction of a Member it shall inform the authorities of that Member. A Member should respond promptly and fully to any request by a panel for such information as the panel considers necessary and appropriate. Confidential information which is provided shall not be revealed without formal authorization from the individual, body, or authorities of the Member providing the information.

2. Panels may seek information from any relevant source and may consult experts to obtain their opinion on certain aspects of the matter. With respect to a factual issue concerning a scientific or other technical matter raised by a party to a dispute, a panel may request an advisory report in writing from an expert review group. Rules for the establishment of such a group and its procedures are set forth in Appendix 4.⁸⁷

Along with enabling the panel to have direct fact-finding powers, the aforementioned provision “authorizes panels to seek information and advice from experts and other relevant sources to help them to understand and evaluate the evidence submitted and the arguments made by the parties. This right is broad and comprehensive, and its exercise is left to the discretion of the panel.”⁸⁸

tribunals (as opposed to what happens in some common law jurisdictions), the inquisitorial role is justified by the fact that the disputing parties are generally states and not individuals, which drastically increases the stakes when it comes to the panel not having all the necessary information. *Id.* at 353.

87. Understanding on Rules and Procedures Governing the Settlement of Disputes art. 13, Apr. 15, 1994, Marrakesh Agreement Establishing the World Trade Organization, Annex 2, 1869 U.N.T.S. 401.

88. WORLD TRADE ORG., A HANDBOOK ON THE WTO DISPUTE SETTLEMENT SYSTEM 98 (2d ed. 2017). This discretionary power may not, of course, be used by the panel to make the case for one of the parties or relieving the complainant from its burden of proof. In fact, when deciding whether to exercise this fact-finding authority, the panel must take into consideration factors such as: “(i) what information is needed to complete the record; (ii) who is in possession of such information; (iii) what other reasonable means might be used to procure that information; (iv) why the information has not been produced; (v) whether it is fair to request the party in possession of the information to submit it; and (vi) whether the information or evidence in question is likely to be necessary to ensure due process and a proper adjudication of the relevant claim(s).” *Id.*

The utilization of panel-appointed experts, and reliance on expert evidence in general, has increased significantly over the last several decades in WTO disputes,⁸⁹ especially in those arising from the *Agreement on the Application of Sanitary and Phytosanitary Measures* (“SPS Agreement”). Indeed, in almost every dispute involving the SPS Agreement, panels have recurringly relied on the technical advice of scientific experts and/or international organizations.⁹⁰

Thus, the WTO model provides a template for satisfying some of the underlying interests in complex construction disputes. The presence of technical expertise on the WTO panels, as well as the inquisitorial proceedings employed in their fact-finding activity, respond precisely to the specificity of the disputes brought before them and to the need to obtain an efficient and technically sound settlement.

B. *Dispute Boards*

The Dispute Boards model, developed for resolving construction disputes, presents a useful tool for this analysis.⁹¹ Perhaps the most distinctive characteristic of Dispute Boards is that they are constituted at the beginning of the construction project and remain present during its entire execution, as opposed to arbitral tribunals, which are appointed only once the dispute has already arisen. As many commentators recognize, this

89. Swinehart, *supra* note 85, at 298–99 (“In the more than fifty years of the multilateral trading system under the 1947 General Agreement on Trade and Tariffs (GATT), only one panel requested an expert opinion out of approximately 300 disputes, and in that instance did not rely on it. Early cases in the WTO also tended to avoid reliance on expert evidence. Yet, today reliance on expert evidence has become a standard practice in the WTO, which since 1994 has routinely relied on such evidence. And WTO observers have called for more frequent use of experts in particular areas, including economics.”).

90. Cherise Valles, *Different Forms of Expert Involvement in WTO Dispute Settlement Proceedings*, 9 J. INT’L DISP. SETTLEMENT 367, 369 (2018). As Valles points out, the SPS Agreement contains a specific disposition that complements the general rule set forth in Article 13 of the DSU. Indeed, Article 11.2 of the SPS Agreement provides:

In a dispute under this Agreement involving scientific or technical issues, a panel should seek advice from experts chosen by the panel in consultation with the parties to the dispute. To this end, the panel may, when it deems appropriate, establish an advisory technical experts group, or consult the relevant international organizations, at the request of either party to the dispute or on its own initiative.

91. For general reference, see Juan Eduardo Figueroa Valdés & William R. Schubert, *The Role of Dispute Boards in the Construction Industry*, INT’L ARB. L. REV. 20, 55–68 (2017); Nicholas Gould & Christina Lockwood, *Dispute Boards*, in TRANSNATIONAL CONSTRUCTION ARBITRATION: KEY THEMES IN THE RESOLUTION OF CONSTRUCTION DISPUTES 193–219 (Renato Nazzini ed., 2018); JENKINS, *supra* note 50, at 99–117.

enables the board members to monitor the project's progress and be available as soon as the seeds of a dispute are sown. The early intervention of the [Dispute Boards] before parties become entrenched in their positions may avoid the dispute altogether or lead to an early resolution while the project continues.⁹²

What is especially relevant for the current analysis is the way in which Dispute Boards combine “technical expertise and legal professionals in a single decision-maker.”⁹³ Indeed, regardless of the specific version of the Dispute Board,⁹⁴ many of the key characteristics discussed so far in this article are present: technical experts are part of the decision-making body from the very beginning of the proceedings; the Boards have the power to conduct an inquisitorial proceeding; and they can also request documentation, evidence, and arguments from the parties.⁹⁵

However, the permanent nature of dispute boards might be a downside when compared to arbitration proceedings. The arbitral tribunal appointment once the dispute arises is an advantage. When parties seek the tribunal, they will have a clear idea of what the issues are and, therefore, what particular expertise is required from the members of the tribunal.⁹⁶

92. Gould and Lockwood, *supra* note 91, at 198–99.

93. Cairns and Cremades, *supra* note 8, at 4.

94. The most common forms that Dispute Boards may adopt are Dispute Review Boards (“DRB”), Dispute Adjudication Boards (“DAB”) and, under the ICC Dispute Board Rules, Combined Dispute Boards (“CDB”). A brief description of each modality may be found in BURR, *supra* note 44, at 1051–52.

95. John W. Hinchey, Luis Prats & William Karl Wilburn, *Construction Dispute Resolution*, in INTERNATIONAL CONSTRUCTION LAW: A GUIDE FOR CROSS-BORDER TRANSACTIONS AND LEGAL DISPUTES 247, 262 (Wendy Kennedy Venoit et al. eds., 2009); Figueroa, Valdés & Schubert, *supra* note 91, at 60–61. More specifically, as Jenkins pointed out, “the dispute board may have the express power to:

- request clarification or additional information from either or both of the parties;
- make such site visits and inspections as it considers appropriate;
- convene meetings upon reasonable notice to the parties at which both parties shall be entitled to be present;
- appoint its own advisors to advise on matters of legal interpretation or expertise outside the area of expertise of each of the members on which the parties are not agreed;
- open up, review and revise any decision, approval, recommendation or determination made, notice or certificate given by the employer and/or the employer's engineer or representative; and
- make use of the specialist knowledge of each of the members.”

JENKINS, *supra* note 50, at 100–01.

96. Volker Mahnken, *On Construction Adjudication, the ICC Dispute Board Rules, and the Dispute Board Provisions of the 2017 FIDIC Conditions of Contracts*, 5 MCGILL J. DISP. RESOL. 62, 81 (2018) (“[I]t is not easy to select [Dispute Boards] members with the appropriate expertise at the beginning of a project, particularly in plant

While the possibility of selecting the appropriate expert once the technical issues have been determined, as is the case with ad-hoc dispute resolution mechanisms (e.g., arbitration), is valuable, the Dispute Boards system's advantage lies in the integration of technical and legal experts within the decision-making body, along with the possibility of undertaking inquisitorial proceedings—both of which have proven to be effective in construction disputes.

C. *Sachs Protocol*⁹⁷

Sachs provides a comparative analysis of the advantages and disadvantages of party—and tribunal—appointed experts, along with a description of the “new techniques” developed to address some of the most frequent issues arising around party-appointed experts. These techniques include pre-hearing meetings, witness conferencing or “hot-tubbing,” and new codes of conduct for party appointed experts. Ultimately, Sachs concludes that such “instruments have already had and promise to continue having a significant and very positive impact on the way international arbitration proceedings are conducted.”⁹⁸ However, he acknowledges that, “in some cases, these methods are not always sufficient to ensure an efficient (measured in terms of time and costs) and successful (measured in terms of clarity, quality and objectivity of the expert’s finding before the tribunal) process of taking expert evidence.”⁹⁹

In response, Sachs proposes a valuable alternative to technical assistance for the arbitral tribunal, thereby addressing the concerns

construction. At the commencement of the project, the parties are normally unaware of the issues that will give rise to future conflicts. This makes it difficult to know whether they should pick specialists in civil, process, mechanical, electrical, or cost engineering, or a time-scheduling expert.”)

97. This model was presented more than a decade ago by Dr. Klaus Sachs, during the 2010 ICCA Congress in Rio de Janeiro, and is based on considerations very similar to the ones explained throughout this article (i.e., general pitfalls of both tribunal- and party-appointed expert witnesses). Although Professor Sachs does not inquire about the nature of the technical assessment of facts, he constructs his proposal on the basis of a critical analysis on the way in which expert evidence is produced in international arbitration. Sachs and Schmidt-Ahrendts, *supra* note 64.

98. *Id.* at 143. More specifically, Sachs explains that, “in particular, ‘pre-hearing meetings’ and ‘witness conferencing’ with the opposing experts are useful in order to

- (i) clarify technical and factual issues,
- (ii) outline areas of agreement and disagreement,
- (iii) focus on relevant points,
- (iv) narrow down the differences between expert reports,
- (v) encourage scientific debate and, as a consequence,
- (vi) render the taking of expert evidence more time- and cost-efficient.”

Id. at 142–43.

99. *Id.* at 144.

related to tribunal-appointed experts and combining the advantages of tribunal—and party—appointed experts.¹⁰⁰ According to this “Sachs Protocol”—which he calls “expert teaming”—the tribunal invites the parties at an early stage of the proceeding to provide a list of possible experts.¹⁰¹ From these lists, the tribunal appoints two experts, one from each list.¹⁰² Once the experts are appointed, the tribunal meets with the expert team and the parties in order to establish a protocol for the teams’ mission (i.e., terms of reference).¹⁰³ Complying with the protocol, the expert team prepares a preliminary joint report, which is later commented on by the tribunal and the parties.¹⁰⁴ Based on these comments, the team then submits a final joint report to the tribunal and the parties.¹⁰⁵ Finally, the members of the team must be prepared to testify during an oral hearing and to be questioned by the tribunal, the parties, their counsel, and consultants.¹⁰⁶

While the Sachs Protocol is considered a creative and useful contribution to the field,¹⁰⁷ important questions remain about its utility. Sachs properly addresses the insufficiency of current methods to address challenges associated with party-appointed experts. The appointment of the “expert team” from the beginning of the proceeding, participation of the parties in the selection of the members of the team, and the independence of the expert team are effective tools Sachs’ framework incorporates. However, Dr. Sachs’ proposal still presumes that the technical assessment of facts should be treated as evidence, which may not be true for all cases—especially those involving highly complex, outcome-proximate technical issues. Dr. Sachs’ presumption is reflected in the fact that the “expert team” has two members, each selected from one of the lists provided by the parties. However, with no ruling third member of the “expert team,” the adversarial scheme of party-appointed expert witnesses prevails, as each party is still somehow “represented” by the expert whose name was included in their list.

100. *Id.*

101. *Id.* at 144–45.

102. *Id.* at 145.

103. *Id.*

104. *Id.*

105. *Id.*

106. *Id.*

107. Nessi, *supra* note 35, at 89–91; Cairns and Cremades, *supra* note 8, at 10; Kantor, *supra* note 60, at 336; Howard Rosen, *How Useful Are Party-Appointed Experts in International Arbitration?*, in 18 LEGITIMACY: MYTHS, REALITIES, CHALLENGES 379, 382–83 (Albert Jan van den Berg ed., 2015).

Moreover, there are other unfortunate deficiencies with the protocol. As some have pointed out, the fact that the expert team is composed of two members increases costs and carries the risk of an impasse if the two experts do not agree.¹⁰⁸ For instance, while the experts are not paid directly by the party on whose list their name was included, the experts have an incentive to advocate in favor of that party, so as to be included in future expert lists. On the one hand, this would certainly increase the probability of disagreement. On the other hand, the experts might be incentivized to reach agreements on every matter of their report, so as to bring a rapid finality to the process. This poses a serious risk regarding the quality of the technical assessment of the issues in dispute, a relevant aspect to the stakeholders' interest in having a satisfactory outcome. Indeed, the tendency to achieve consensus among the members of the "expert team" has the flipside of disincentivizing a thorough testing of each other's conclusions and can lead to a poor debate between the experts.¹⁰⁹

Additionally, Kantor critiques the Sachs Protocol for its prohibition of *ex parte* contacts between the individual members of the expert team and the parties that included them on their lists.¹¹⁰ Kantor examines two possible interpretations of such a prohibition, with each posing a sacrifice to some of the stakeholders' key interests. Indeed, according to Kantor, if such prohibition is absolute, a challenge would arise as to the obtainment of complete information by the experts.¹¹¹ An absolute prohibition therefore affects the fulfillment of the expert's interest in having all the necessary data to produce her report and, consequently, affects the overall quality of the expert assessment of technical issues. If, on the other hand, the *ex parte* contacts prohibition is not understood as being absolute and, therefore, after their appointment, members of the expert team proceed as party-appointed expert witnesses, working closely with the party and counsel who nominated them, their "independence" would be affected in the same way as it would if they were selected by the party.¹¹²

108. Bor, *supra* note 75, at 509. In regard to this possible scenario, Sachs only proposes that "[a]reas of disagreement on which the experts cannot reach a joint conclusion should be identified and, if necessary, the parties will be permitted to comment or submit additional (expert) evidence on these." Sachs and Schmidt-Ahrendts, *supra* note 64, at 146.

109. Rosen, *supra* note 107, at 384.

110. Kantor, *supra* note 60, at 337–39.

111. *Id.* at 338.

112. *Id.* at 339.

The Sachs Protocol presents creative solutions to the challenges examined and its own set of difficulties. The limitations of the Sachs Protocol could be addressed by utilizing a single impartial expert that would have direct contact with the parties to obtain the necessary documents and information to perform their task instead of an expert team whose members are nominated by each party.

D. *Expert arbitrators*

Finally, expert arbitrators present a final option. Indeed, the inherent flexibility of arbitration in terms of the persons who may be chosen as arbitrators allows the parties or appointing authorities to appoint nonlegal experts as members of the tribunal. Expert arbitrators are in fact “commonly seen in engineering disputes where it is advantageous for the parties to have an expert on the tribunal. The arbitrator with specialist knowledge can advise on the weight of evidence, ensure the tribunal’s award is sound in terms of technical issues, and possibly shorten the proceedings.”¹¹³ In these cases, as Jenkins recognizes, the expert arbitrator “will be able to liaise competently with the experts (if they are also required) and help guide the tribunal in interpreting the experts’ opinions”¹¹⁴ An example of this approach can be seen in the *Indus Waters Kishenganga* arbitration.¹¹⁵ The dispute arose in the context of India’s plan to build a hydroelectric plant in part of Kashmir. The Indus Waters Treaty of 1960¹¹⁶ provides that the seven-member arbitral tribunal adjudicating the conflict would include a “highly qualified engineer,” selected by the Rector of the Imperial College of Science and Technology in London, alongside six lawyer arbitrators.¹¹⁷

In cases of expert arbitrators, the expert assessment of technical issues comes directly from the tribunal, and the expertise permeates

113. Ruth Fenton, *A Civil Matter for a Common Expert: How Should Parties and Tribunals Use Experts in International Commercial Arbitration*, 6 PEPPERDINE DISP. RESOL. L. J. 279, 283 (2006).

114. JENKINS, *supra* note 50, at 141.

115. *Pakistan v India*, PCA Case No. 2011-01.

116. Indus Waters Treaty, Sep. 19, 1960, Annexure G, ¶ 4(b)(ii).

117. Parlett, *supra* note 36, at 446. The author also refers to another form of including experts in the decision-making body that is relevant to this article: advisory experts under the United Nations Law of the Sea Convention. Article 289 of the treaty provides that, “[i]n any dispute involving scientific or technical matters, a court or tribunal exercising jurisdiction under this section may, at the request of a party or *proprio motu*, select in consultation with the parties no fewer than two scientific or technical experts chosen preferably from the relevant list prepared in accordance with Annex VIII, article 2, to sit with the court or tribunal but without the right to vote.” United Nations Convention on the Law of the Sea, art. 289, Dec. 19, 1982.

its activity throughout the arbitral proceeding. The proceeding incorporates the expert knowledge into the knowledge of the tribunal as a whole, thereby achieving what Brewer identified as “the only way to achieve epistemically responsible decision-making about expert evidence[, which] is to give the task to judges with both scientific and legal expertise.”¹¹⁸

However, this alternative also results in some sacrifices and poses some challenges. The first and most conspicuous difficulty is that having a non-legal expert appointed as a member of an arbitral tribunal implies not having a lawyer as an arbitrator or, in the case of arbitral panels, having one fewer lawyer. In a five-member arbitral tribunal, this might not be a big sacrifice; but arbitral tribunals do not typically have so many members. In the case of three-member arbitral panels, where each party appoints a non-legal expert, the tribunal will commonly be balanced through a legal chairman. However, the parties might face a real challenge when deciding whether to use their only chance of appointing a member of the panel in choosing a non-legal expert instead of a lawyer.¹¹⁹ Since all members of the arbitral tribunal will need to discuss and eventually agree on the legal solution of the dispute, only having one party-appointed arbitrator who is a lawyer may give rise to concerns regarding the balance of the tribunal.

Moreover, when the expert acts as an arbitrator, she is precluded from using any knowledge or information that has not been submitted by the parties in the form of briefs or evidence. This preclusion of considering external knowledge may not be so problematic when applied to a nonexpert judge or lawyer arbitrator. But in the case of a technical expert, whose presence and role in the tribunal is partly justified by the possession of some specialist knowledge, prohibiting or overly limiting¹²⁰ the use of such knowledge might defeat its purpose. It is crucial for the expert to preserve what is inherent to her

118. Brewer, *supra* note 13, at 1679, construed in Tony Ward, *English Law's Epistemology of Expert Testimony*, 33 J.L. Soc'y 572, 580 (2006).

119. Fenton, *supra* note 113, at 284. As pointed out by Fenton, the parties that face such a dilemma might be worried about whether the tribunal “will have the required knowledge or be unbalanced.” *Id.*

120. For a technical expert acting as part of the arbitral tribunal to use her specialist knowledge in deciding a case, she must fulfill two duties: imparting such knowledge to the rest of the arbitrators and providing the parties with an opportunity to put their case in relation to such knowledge or information. The expert's failure to do so and reliance on her personal knowledge was considered, for example in *Fox v. P.G. Wellfair*, as a “serious irregularity” and a breach of natural justice, justifying the decision to set aside an award. Fenton, *supra* note 113, at 283–84.

nature even when she is a member of the tribunal, part of which consists precisely in the ability to apply her specialized knowledge to the particular issue on which technical assessment is required. This approach, for example, is the one adopted in dispute boards, where each of the members of the board normally has express power to make use of her specialized knowledge.¹²¹

Having an expert arbitrator achieves the objective of shifting the assessment of complex and decisive technical issues from the parties' control, as evidence, to the tribunal's activity as adjudicators. However, this solution is still unsatisfactory, especially due to the practical challenges derived from the need to appoint an expert member of the tribunal instead of a lawyer and the restrictions on the use of specific technical knowledge.

V. DESIGN FOR IMPROVEMENT: FITTING THE FORUM TO THE FUSS¹²² IN COMPLEX CONSTRUCTION DISPUTES

In the present section, I propose a model wherein the technical assessment comes from an expert who is agreed upon by the parties in the same way the arbitrators are agreed upon and who becomes part of the decision-making body but does not take part in the decision of the case (as a nonlegal expert arbitrator would). Instead, her sole task is resolving the specific technical issue that justifies her presence and providing her assessment to the tribunal. This model is designed to address the issues raised in Sections II–IV and assumes that the assessment of technical issues that are both highly complex and determinative of the answer to the legal issue is not a matter of evidence, but rather of adjudication.

A. *General description of the model*

A sole expert should be appointed alongside the arbitral tribunal from the beginning of the process or as soon as the parties are able to agree on (1) the need for an expert under this scheme and (2) the subject matter of the technical issues to be addressed by the expert. This will be the case where the parties agree that there is a specific technical issue that may be critical to the decision of the case but that it is too complex for the arbitral tribunal to assess substantively.

121. JENKINS, *supra* note 50, at 100–01.

122. This expression refers to the importance of ensuring the dispute settlement mechanism is coherent with the subject matter of the conflicts that are resolved through it. The expression is drawn from Frank E. A. Sander & Stephen B. Goldberg, *Fitting the Forum to the Fuss: A User-Friendly Guide to Selecting an ADR Procedure*, 10 NEGOT. J. 49 (1994).

Such an expert will be a non-arbitrator member of the tribunal. She will not participate in deciding the legal issues of the dispute and her mission will be solely to render a decision on a specific technical aspect or aspects of the dispute, which will be binding for the nonexpert arbitrators.

In particular, she will have the duty of (1) narrowing the relevant questions involved in the technical issues of the case as early in the proceeding as possible; (2) receiving and obtaining, through inquisitorial proceedings when needed, the documents and other evidentiary means in order to perform her assessment; (3) maintaining direct and constant communication with the non-expert members of the tribunal, as well as sitting with them at the hearings; and (4) performing the assessment of the technical issues of the case and providing both the analysis and the conclusions to the arbitrator/s, either throughout the procedure or when the tribunal is drafting the award. It will be the duty of the nonexpert decision-maker to (a) test the procedural reliability of the expert's assessment; and (b) make sure that the analysis and conclusions provided by the expert actually fall within her scope and area of expertise.

The nature and mission of the expert within the proposed design might be illustrated by reference to the expert jurymen and expert assessors who were present in some English Courts:

Where the Court consists of a Judge and a special jury composed of men with particular experience and knowledge (for instance, merchants), the expert knowledge of the jurymen forms part of the knowledge of the Court, since the jurymen are members of the tribunal and take part in the deliberations and in the decision of the Court. The Rules of the Supreme Court (R. S. C., Order XXXVI, r. 2) make it possible in special circumstances to call upon persons with particular knowledge and experience to take a place on the bench as assistants of the Court. If such assessors do not inform the tribunal, they cannot by definition be instruments of proof; they become auxiliaries of the Court, 'collaborators in the task of discovering the truth'¹²³

123. Hammelmann, *supra* note 12, at 35 (internal citations omitted). Interestingly, although the cited text is from 1947 and refers to a practice that, at that time, did not seem to be very frequent anymore, some authors argue that many reforms have implied returning to the described scheme. In particular, the solution contained in the 1998 reform of the English Civil Procedure Rules would

lay in bringing expert evidence under the control of the judge. The Anglo-Saxon tradition of each party presenting their experts was, from the perspective of this reform, the root of the problem in civil procedure. The reform aimed at introducing the figure of a single joint expert, appointed by common accord and coming under judicial control—thus making the evidentiary

What I propose is quite similar. The technical expert will not be another arbitrator with whom to reach an agreement as to the legal outcome of the case. In fact, if properly implemented, there should not be any overlap or conflict between the technical expert and the legal decision-maker, since the model itself is based on the distinction of epistemic competences: *Cuilibet in arte sua perito est credendum*.¹²⁴ Only in that way will the expert's knowledge become the knowledge of the tribunal.

B. *Technical expert as part of the arbitration tribunal*

Perhaps the most important characteristic of the proposed model is that the technical assessment of the issues in dispute will come from an expert who will become part of the tribunal.¹²⁵ The expert would not be an arbitrator. Instead, after the arbitrator assesses the expert's findings in terms of reliability (by applying some test such as that presented in *Daubert*) and being within the scope of her expertise, the findings should not be subject to a substantive qualification by the nonexpert arbitrator. The practical effect of this change is that the nonexpert member or members of the tribunal may question the process by which the expert reached her conclusions but shall not revisit the content of the conclusions themselves. Having an expert reporting to the arbitrator on technical matters would help the tribunal avoid facing two contradictory expert reports on the same issue and assist the tribunal in understanding the technical issues from the beginning, thereby speeding up the arbitral proceeding.¹²⁶ Additionally, as with tribunal-appointed experts, this alternative "allows an arbitral tribunal to be independently educated on issues and form the

phase more efficient. The aim was to secure greater impartiality, a reduction in costs, increased efficiency, party equality, and the potential to facilitate the settlement of disputes.

Cremades, *supra* note 37, at 192.

124. Any person skilled in his or her peculiar art or profession is to be believed (i.e., when he or she speaks of matters connected with such art). See *Cuilibet in arte sua perito est credendum*, BLACK'S LAW DICTIONARY (11th ed. 2019).

125. Such a proposal, at least with reference to court proceedings, is far from new. Indeed, in 1860, Dr. Angus Smith had already concluded, after analyzing the various positions that a "scientific man" (as he called it) may occupy within a court of law, that an expert acting as an assessor who sits with the judge and assists him or her in examining and obtaining scientific evidence, and is not questioned as a witness, does not depart from his nature as a scientist and, therefore, would be in an appropriate position to occupy. Smith, *supra* note 1, at 137-41.

126. Chelmick and Spalton, *supra* note 78, at 112.

basis for its decision on a source of information untainted by party bias.”¹²⁷

Of course, this is precisely what many parties and practitioners, especially from common law jurisdictions, are not comfortable with: “the inclusion of a further, unendorsed member in their carefully selected arbitral panel whose opinion and views expressed in private conversations with the tribunal members, although not binding, are likely to be highly influential on the decision-making process.”¹²⁸

Such a concern, however, is not applicable to the schema discussed here, because the nature of the expert member of the tribunal is different from that of an expert witness. Indeed, as the expert’s assessment does not fall within the realm of evidence, but rather as part of the decision-making process, the parties’ lack of control is rather desirable. Because of that nature, the expert must be carefully selected and appointed by the parties, under the same standard of impartiality as the arbitrators, precisely because she will decide an issue that will be critical to the outcome of the case. Thus, no concern on the tribunal “unduly” delegating its task shall be advanced, as the parties will appoint (or agree on a process to appoint) the expert knowing from the outset that she, and not the nonexpert members of the tribunal, will settle the technical issues of the dispute.

C. *Appointment of the technical expert*

Since the expert reaches a conclusion on technical issues that determine the resolution of the case itself, her appointment should follow a similar—if not the same—mechanism as the appointment of arbitrators. In this case, however, before attempting to agree on who will sit as an expert with the arbitral tribunal, the parties must agree (1) that the dispute contains technical issues that are both critical to the outcome of the case and probably too complex for a legal expert to properly assess (this can come from either party’s or even the tribunal’s suggestion); and (2) what the general subject matter of the technical issues are and what specific type of expert is therefore required.

Provided that the previous agreements exist, the parties may agree on the person or entity that will serve as expert. If no agreement is reached, the Arbitral Tribunal or Arbitral Institution can act as appointing authority. What is critical is that the expert complies with both the field of expertise defined by the parties and the same standard of impartiality as the arbitrators.

127. Kiefer and Cole, *supra* note 39, at 84.

128. JENKINS, *supra* note 50, at 201.

D. *Relationship with the tribunal*

The expert's relationship with the rest of the tribunal should be constant, transparent, and active.¹²⁹ That way, real collaboration can be achieved by the technical and legal experts and, just as with the expert arbitrator, the technical knowledge can become the knowledge of the tribunal.

A classic question that arises with respect to the relationship between an expert and the tribunal is whether the expert's conclusions are binding for the tribunal or not. In accordance with this article's analysis, the conclusion of the expert's assessment of the technical issues that meet the requirements of criticality and complexity discussed above should be binding for the arbitrator if the expert's analysis is procedurally reliable and she operates within the scope of her expertise and what was previously determined.

E. *Relationship with the parties*

The communication between the parties and the expert should be limited to the relevant technical issues of the case. This relationship should also be transparent and ensure that both parties are informed of the expert's activity and receive equal treatment from her. When it comes to the expert's fact-finding task, for the model to achieve efficiency and effectiveness, she should have the power to undertake inquisitorial proceedings.¹³⁰ Once the technical issues are determined,

129. Among other benefits, such a continuous dialogue would avoid the situation described by Mereminskaya and Landeros:

[C]onstruction experts are, by definition, non-lawyers and have no ability to decide legal issues incidental [to] their conclusions. Evidently, on many occasions, in order to establish the facts, the experts need to interpret the contract and related documents. As a result, they are frequently accused of making decisions on legal aspects that fall under the tribunal's jurisdiction. This concern is rather easily addressed by arbitral tribunals, given that they are not bound by the conclusions of the expert report and are free to amend their decisions that are of a legal nature.

However, opposite challenging situations may arise when the tribunal-appointed experts find themselves forced to consider issues that are outside of their technical expertise and would require[] the tribunal's guidance to approach them. Should the tribunal decide to adopt a distant stance, avoiding contact with the expert, this could have complications for the expert's work. Mereminskaya and Landeros, *supra* note 22, at 10. Consequently, the best way to avoid those situations, from my perspective, is that the expert maintains a constant dialogue with the tribunal in order to manage and resolve the dispute in the most effective way.

130. Interestingly, current international arbitration rules do permit tribunal-appointed experts to undertake inquisitorial proceedings in the process of fulfilling their

which should happen at the very beginning of the arbitration, the expert will probably know better than anyone what questions to ask, what documents to request, and the individual who would possess such relevant documents.

One objection to this scheme would be that, by shifting the “control” over the technical assessment of facts from the parties (i.e., through their expert witnesses) to the tribunal (i.e., through the expert member of the tribunal), the parties would lack the technical assistance that might be critical in their relationship with the expert. This fear, however, would be merely theoretical for two main reasons. First, parties to construction disputes, which are companies that operate in the construction industry, almost always retain personnel who are dedicated to the technical aspects of the project that are central to the dispute. Such personnel may play a key role in responding to the expert’s requests for information and preparing the corresponding party’s case from a technical perspective. Second, as the ICC Commission on Arbitration and ADR recognizes, “[i]t is now common in international construction arbitrations for parties to use experts as consultants (quantity surveyors, claims consultants, etc.) from a very early stage in the preparation of claims. Such consultants often provide expert knowledge in certain aspects of the dispute, such as programming, quantification or special areas of engineering.”¹³¹ These experts are different from those who act as expert witnesses,

task. Specifically, article 6, subsection 3, of the IBA Rules on the Taking of Evidence in International Arbitration provides:

Subject to the provisions of Article 9.2, the Tribunal-Appointed Expert may request a Party to provide any information or to provide access to any Documents, goods, samples, property, machinery, systems, processes or site for inspection, to the extent relevant to the case and material to its outcome. The Parties and their representatives shall have the right to receive any such information and to attend any such inspection. Any disagreement between a Tribunal-Appointed Expert and a Party as to the relevance, materiality or appropriateness of such a request shall be decided by the Arbitral Tribunal, in the manner provided in Articles 3.5 through 3.8. The Tribunal-Appointed Expert shall record in the Expert Report any non-compliance by a Party with an appropriate request or decision by the Arbitral Tribunal and shall describe its effects on the determination of the specific issue.

IBA RULES ON THE TAKING OF EVIDENCE IN INT’L ARB. Rule 6(3) (INT’L BAR ASS’N 2020).

131. ICC COMMISSION, *supra* note 46, at 22. Judge Learned Hand, who also proposed transferring the technical assessment of the issues in dispute to an expert advisor who sits with the tribunal, recognized that “[e]ither side might call all the experts that money could procure or diligence discover, and put hypothetical questions for them to answer till the end of time. The right of cross-examination could be exercised without limitation. Only the difference would be that the final statement of what was true would be from the assisting tribunal.” Hand, *supra* note 2, at 56.

since their purpose is not presenting “objective” evidence to the arbitrators but rather to directly aid the party in its preparation for the dispute.

F. *Timing of expert member appointment and scope of her assessment*

This question might be interpreted both from a temporal perspective and from a pertinence or appropriateness point of view.

As to the first, the active presence of the expert member of the tribunal from the beginning of the arbitration might be crucial to achieving cost-effectiveness. Indeed, one of the main principles that underlie the ICC’s “Techniques for Controlling Time and Costs in Arbitration” report is that “the arbitral tribunal should work proactively with the parties to manage the procedure from the outset of the case.”¹³² This translates, among other improvements, into determining the central issues of the dispute from the beginning of the proceeding.

The same can be said about technical issues in construction disputes. Great amounts of time and effort are invested into producing all-encompassing expert reports, most of which will be useless once the critical technical issues are determined. The problem is that, usually, such a determination happens extremely late in the proceeding. In this sense, a proactive expert on the side of the tribunal might reduce costs dramatically by narrowing from the outset of the arbitration which technical facts will have to be proved by the parties in order to resolve the dispute.

Likewise, once a determination has been made in terms of the pertinence of having the expert as part of the arbitral tribunal, she must be appointed immediately. In accordance with my main arguments, the “test” to provide for the presence of the expert within the tribunal requires fulfilling two conditions. One or more of the technical issues involved in the dispute must be (1) too complex for the arbitral tribunal to assess substantively and (2) determinative of the outcome of the legal dispute itself. This could be either agreed upon by the parties and the arbitral tribunal or ordered by the tribunal at a party’s request.

Equally important will be to make sure that the expert limits her assessment to the precise issue that justifies her presence in the proceeding. As Brewer explains, it will be the tribunal’s task to make

132. Christopher Newmark, *Controlling Time and Costs in Arbitration*, in THE LEADING ARBITRATORS’ GUIDE TO INTERNATIONAL ARBITRATION, *supra*, note 19, at 493.

sure that the expert stays within her scope of epistemic competence in order to rationally defer to her conclusions:

But there is also good reason to believe that epistemic deference, and, concomitantly, epistemic authority, is a matter of *degree*, not an all-or-nothing relationship. For one thing, Hart himself acknowledges that, when B treats A as an epistemic authority, B's deference extends *only so far as B recognizes A to be speaking within the subject area of A's expertise*. Thus, even in paradigmatic cases of epistemic deference, the nonexpert must police the epistemic boundaries between assertions by A that are *within* what B recognizes to be the zone of A's expertise and assertions by A that are not within that zone. These borderlines will inevitably be fuzzy. For example, where *exactly* does the epistemic authority of a physicist end when he is testifying to the nonexpert about the advisability of nuclear energy? Not exactly anywhere. Even if such an expert is testifying as an 'instrumentally rational' expert, one who is using his expert knowledge to advise the nonexpert about how best to achieve goals the nonexpert has chosen, the nonexpert must be ever vigilant to keep the expert within his proper epistemic domain. The price of rational deference is eternal vigilance.¹³³

In conclusion, the expert member of the tribunal should be appointed as soon as the arbitral tribunal determines the parties agree that a highly complex, outcome-proximate technical issue exists in the dispute; and the expert member should limit her assessment to that precise issue.

G. *Predicted benefits of implementing the proposed model*

While many of the potential gains of the proposed design have been covered by now, this new scheme will better serve the interests of the relevant stakeholders, specifically from the perspective of the selected evaluation criteria: cost-effectiveness and satisfaction with the outcome.

As to cost-effectiveness, the presence of an expert within the arbitral tribunal might improve the current situation at least in the following respects:

1. The overall cost of expert fees will decrease by having only one expert instead of two and, in some cases, even three.
2. A significant amount of time will be saved by:
 - a. Eliminating pre-hearing or joint expert conferences;

133. Brewer, *supra* note 13, at 1586–87.

- b. Eliminating the costs arising from the revision of expert reports by each party;
- c. Narrowing the technical issues from the beginning of the proceeding and devoting time only to those relevant to the dispute;
- d. Eliminating the time and efforts that the nonexpert arbitral tribunal would otherwise need to devote to dealing with conflicting expert evidence.

As to the stakeholders' satisfaction with the outcome, I predict that the new model for assessing certain technical issues within construction arbitration might allow the following improvements:

1. The assessment will be performed by a person who has the necessary epistemic competence and, at the same time, is part of the decision-making body;¹³⁴
2. Such an assessment will be performed in an objective and impartial way;
3. It will address the technical issues that are relevant to the case without expanding into topics that are either outside the expert's competence or not relevant to the resolution of the dispute; and
4. Given the inquisitorial powers of the expert and her participation from the beginning of the proceeding, the information on which the technical assessment will be performed will arguably be more complete and more accurate than it is under current models, as the information provided to her will not be subject to any filtering by an interested party (as is the case with party-appointed experts) and will be available from the outset (as opposed to what happens to tribunal-appointed experts, who usually enter the proceeding in a later stage).

H. *Possible challenges of the proposed model*

At least from a theoretical perspective, the supposed singularity of the expert member and the parties' decreased control may seem to be problems of the proposed design.

134. *Id.* at 1677 ("If legal systems are to endorse and aspire to satisfy the intellectual due process norms (and other related rule-of-law norms), they would be well advised to move toward a 'two-hat' model of legal decision-making in areas to which scientific results are rationally pertinent. On this model, the system seeks to ensure that one and the same decisionmaker has both legal legitimacy (by being duly elected or appointed by a legitimate elective or appointing authority) *and* epistemic competence with the basic formal tools of scientific analysis.").

The first objection is that the proposed model seems to be constructed on the assumption that only one type of expert will be qualified to assess all the technical issues in dispute, despite the fact that most construction arbitrations require not just one, but several types of experts.¹³⁵ In such cases, an individual expert will be of little use with respect to the issues that fall outside her specific area of expertise. Moreover, if many experts are appointed in order to avoid that situation, the value created by having a single individual (less monetary cost and a unitary methodology or approach to the technical issues) might then be minimized.

However, such concern is only theoretical. First, the proposed expert will only be present when there is an issue that satisfies the two conditions mentioned above—complexity and logical proximity to legal issues—and, therefore, insofar as the rest of the technical issues do not reach that threshold, they will continue to be treated as evidence. Second, even when there is more than one technical issue that meets the criteria articulated above, it will still be more efficient and effective to have one expert sitting with the tribunal for each of those issues, rather than having several expert witnesses, conferencing hearings, and associated proceedings. Finally, the fact that there would be more than one expert should also be irrelevant to their reasoning processes and conclusions, since each expert will limit their work to the issues that fall within their respective area of expertise.

Another objection is that stripping the parties of the control over expert evidence might have a significant impact on the outcome of their case, thereby decreasing their level of satisfaction with the process. This would be contrary to the whole purpose of the new design.¹³⁶ The answer to this question lies within the first question of this Article: is the assessment of technical issues that are overly complex and logically too close to the legal issue really *evidence*? Depriving the parties of the freedom to determine when and how to present their evidence is certainly not desirable. However, I conclude that

135. John Uff, *Arbitrating International Construction Disputes*, in *THE LEADING ARBITRATORS' GUIDE TO INTERNATIONAL ARBITRATION*, *supra* note 19, at 1011, 1016–17 (“Most disputes arising from the construction process concern matters either of quality (defects or fitness for purpose) time issues (claims for extension and consequences of delay) or issues of cost (payment of the contract sum, extras and damages claimed by either party). Each type of dispute gives rise to different types of issue, different types of expertise and different requirements for factual evidence.”).

136. Indeed, under Dispute Systems Design methodology, one of the metrics utilized to evaluate a dispute resolution mechanism is the user’s satisfaction with the process, which is determined in part by the “view[] that they have more control over their destiny when dealing with disputes and more active involvement in resolving them.” COSTANTINO AND MERCHANT, *supra* note 38, at 174.

such assessment is not evidence and therefore does not belong in the full spectrum of the parties' control. In other words, the fact that there is so much party control over a type of "evidence" that the non-expert arbitrators will have limited space to assess in substance and that will, in any event, be determinative for the outcome of the case, is the real anomaly.