

Procedimiento de prueba innovador en el arbitraje internacional de la construcción

Innovating evidence procedure in international construction arbitration

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Resumen:

La complejidad de las disputas de construcción requiere una atención especial y una innovación constante. Afortunadamente, el arbitraje está bien equipado para hacer frente a los desafíos de tales disputas, debido a su flexibilidad y adaptabilidad. En este documento se examinan tres esferas de innovación en el procedimiento de pruebas exclusivas de las controversias sobre construcción: institucional, tecnológica y procesal. También se presta la debida atención a la audiencia virtual, una innovación que ha demostrado ser fundamental para la supervivencia del arbitraje en medio de la pandemia de COVID-19. La tecnología, si bien es valiosa, no mejorará la eficacia del arbitraje por sí sola: debe utilizarse junto con las innovaciones procesales. La aplicación de los avances procesales, tecnológicos e institucionales por parte de un tribunal proactivo con partes de mentalidad abierta puede crear una innovación sin límites y proporcionar el máximo valor para todos los implicados.

Abstract:

The complexity of construction disputes commands special attention and constant innovation. Fortunately, arbitration is well-equipped to meet the challenges of such disputes, due to its flexibility and adaptability. This paper discusses three areas of innovation in evidence procedure unique to construction disputes: institutional, technological and procedural. Due consideration is also given to the virtual hearing, an innovation which has proven critical to the survival of arbitration amidst the COVID-19 pandemic. Technology, while valuable, will not improve the efficiency of arbitration alone: it must be used in conjunction with procedural innovations. The implementation of procedural, technological and institutional advancements by a proactive tribunal and open-minded parties can create boundless innovation and provide maximum value for all involved.

Palabras clave:

Procedimiento de pruebas - Construcción - Arbitraje - Innovación - Prueba - Evidencia - Audiencias virtuales - Gestión de casos - Tecnología

Keywords:

Evidence procedure - Construction - Arbitration - Innovation - Evidence - Virtual hearings - Case management - Technology

Summary:

1. Introducción - 2. Evidence and innovation in international construction arbitration - 3. Virtual hearings: an emerging phenomenon - 4. Institution-driven innovation - 5. Technological innovation in the construction industry - 6. Procedural innovations - 7. Concluding remarks - 8. Bibliography

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1. Introduction

Innovation is a topic often discussed but seldom in relation to international construction arbitration. However, as these disputes are renowned for their technical evidence and significant complexity, it is appropriate that arbitration practitioners and the construction industry alike explore potential avenues of innovation that can be used to minimise cost and delay¹, and assist the tribunal's understanding of the case. Innovative new approaches within this space are very much within reach, even in the most complex of construction disputes.

The need for international arbitration to adapt and remain receptive to emerging innovations is greater than ever. The COVID-19 crisis has presented multi-faceted challenges for all of society. In the construction industry, one challenge that has emerged in the resolution of international construction disputes is the inability to hold in-person hearings, and the need to consider new ways of taking and presenting evidence. Fortunately, international arbitration is, at its core, an innovative and changing process that is built upon the creativity of parties, counsel, arbitrators and institutions. It is this flexibility which enables it to be receptive to new forms of evidence and to create new ways of tackling evidence.

With this in mind, I address the following in this paper. To begin with, in Part 2, I contextualise the importance of innovative evidence in construction arbitration. The presentation of evidence plays a vital role in any construction dispute. There exists a strong desire for arbitration to innovate to maintain its value as a method of dispute resolution. Part 3 addresses the virtual hearing: a phenomenon distinct from and more challenging than a traditional videoconference, with which many arbitrators are already familiar¹. The use of virtual hearings has significantly increased during the COVID-19 pandemic and is an example of the innovative and flexible nature of international arbitration. Part 4 addresses institutional innovation, namely the rules and guidelines that allow parties to engage in procedural and technological innovation. Part 5 considers technological innovation used specifically in the construction industry, such as site visualisation technologies and delay and disruption modelling. Part 6 considers developments in arbitral procedure which are particularly innovative and ensure the efficiency of the process. While technology plays an important role in innovation, its use will prove ineffective without proactive case management techniques², particularly in respect of lay and expert evidence. Accordingly, in this section, examples of procedural innovations will be discussed, including case management conferences, and the management of fact and expert witnesses. Finally, I reflect on the value of these innovations and the accompanying challenges which will have a significant impact on the future evolution of international arbitration.

2. Evidence and innovation in international construction arbitration

2.1 The Role of Evidence in Construction Disputes

Evidence plays a vital role in all disputes, but especially so in construction disputes, due to the complexity of modern projects and contracts. The nature of construction agreements has changed over time³. For example, prior to the industrial revolution, there were generally two parties to a construction contract: the owner commissioning the project, and the master builder, who undertook both the design and building components of the work. The centuries that followed witnessed the birth of specialisation, as owners began to rely on numerous specialists to carry out specific components of the project, in lieu of one master builder.

Today's construction projects are a new breed, emerging from an intricate web of contracts and subcontracts. In many cases, it is not possible for the contractor to undertake the entirety of the project. Instead, subcontractors are employed to perform certain aspects of the works. In addition, construction disputes are associated with high levels of risk due to unpredictable economic, political and climatic forces that may impact delivery. These risks have prompted the involvement of insurers, as well as external financiers. It is therefore unsurprising that a typical construction project involves many participants, including subcontractors, financiers, insurers, suppliers, architects, engineers, and of course, the employer and contractor. Indeed, according to the ICC, nearly 50% of new cases involved three or more parties while over 20% involved more than five parties⁴. The result of this is that construction disputes now arise from interrelated contracts, making the resolution of construction disputes challenging for those involved.

1 Janet Walker, "Virtual Hearings: The New Normal", *Global Arbitration Review*, 27 de marzo, 2020, <https://globalarbitrationreview.com/article/1222421/virtual-hearings-%E2%80%93-the-new-normal>.

2 Doug Jones, "Innovation in International Infrastructure Arbitrations" (Conferencia, Melbourne University Law School, 2018).

3 Aisha Nadar, "The Contract: The Foundation of Construction Projects", en *Global Arbitration Review The Guide to Construction Arbitration*, ed. Stavros Brekoulakis y David Brynmor (Londres: Law Business Research, 2017) 7.

4 "Full 2016 ICC Dispute Resolution Statistics published in Court Bulletin", International Chamber of Commerce, acceso el 3 de enero, 2019, <https://iccwbo.org/media-wall/news-speeches/full-2016-icc-dispute-resolution-statistics-published-court-bulletin>.

The last decade has also seen the advent of the ‘megaproject’, which are large-scale, complex and costly infrastructure projects that involve numerous private and public stakeholders⁵. The end result of these factors is that construction projects are set to increase in complexity and incorporate new technologies in project planning and management.

A significant challenge arising from construction and infrastructure disputes is the need to navigate technically complex facts. The sheer scale of construction disputes combined with their intricate and highly specialised factual matrices differentiates construction disputes from those of other industries. The management of the evidence relating to these technical issues is in and of itself, a huge challenge. The industry boasts a certain level of notoriety due to the sheer volume of documentary evidence. Construction disputes can involve mountains (or terabytes) of documents, particularly when projects span many years from conception to completion. Parties often incur high costs when attempting to trawl through a sea of documents to find those that are relevant to the dispute. Correspondence also accumulates over the life of a project. There was a time when communications occurred on paper, but now, most of it is electronic. The challenge of grappling with the data necessary to understand the facts of the dispute is a massive undertaking. In an arbitration over which I presided, involving the construction of an oil and gas platform, the claimant filed 126 document requests, with many documents sought exceeding 1,000 pages in length. My experience in dealing with this volume of documents is not unique: Schneider notes that it is not uncommon for an arbitral tribunal to receive “thousands, hundreds of thousands and sometimes millions of pages of documents”⁶. Kruzewski and Moj comment that the overwhelming nature of documentary evidence can be attributed to the immense number of documents produced over the life of a construction project and suggest that this will increase as construction projects grow in complexity⁷. Evidently, while these documents might be critical, producing them can be cumbersome and expensive.

Understanding the factual matrix of each case is rarely straightforward and often requires the aid of expert evidence. Expert evidence is therefore an indispensable component of construction disputes. Reliable and relevant expert testimony serves the dual purpose of providing insight that may support a party’s case, whilst also deciphering the technical evidence for the tribunal. While often necessary, the use of expert evidence does not come without its difficulties. Construction disputes often turn on evidence from experts speaking to issues of quantum and the extent or cause of delay or defects. However, in some circumstances, experts act like “hired guns”⁸ who are “no more than paid advocacy of a party’s cause”⁹. When experts adopt, in their expert reports, deeply entrenched positions that assist their party’s position (whether they are conscious of it or not), rather than providing independent insight into an area, expert evidence may prove futile. The unfortunate effect of this is that the Tribunal is left without any objective guidance on important technical issues. Moreover, when expert independence is an issue, the differences in the expert opinions are often attributable to a reluctance to deviate from their party’s case, rather than a genuine difference of expert opinion¹⁰. This practice casts doubt on the credibility of the expert’s evidence and serves to increase expense and delay proceedings. As the effective management of expert evidence is crucial to ensure parties and the tribunal derive value from the process, I suggest several strategies for managing expert evidence in this article.

The challenges associated with expert evidence are heightened in the context of virtual hearings, which are the norm in 2020. Due to the restrictions introduced in response to the COVID-19 pandemic, in many instances it is no longer possible to have experts and counsel in the same room. The Tribunal and the Parties must therefore devise new procedures for the taking of evidence. This may involve the sequestration of witnesses giving evidence virtually. Procedures have been introduced to address concerns that witnesses may be coached by an unseen person or script. For example, the Hong Kong International Arbitration Centre (“HKIAC”) recommends the use of 360 degree cameras to ensure the integrity of the room, as well as the use of a hearing invigilator at the same premises as the expert, to supervise the expert testimony¹¹.

5 Bent Flyvbjerg, “What You Should Know about Megaprojects and Why: An Overview”, *Project Management Journal*, vol. 45, no. 2 (Abril – Mayo 2014) 6-19.

6 Michael Schneider, “The Paper Tsunami in International Arbitration Problems, Risks for the Arbitrators’ Decision Making and Possible Solutions”, en *Written Evidence and Discovery in International Arbitration*, ed. Teresa Giovannini y Alexis Mourre, Informe de ICC Institute of World Business Law 6 (2009).

7 Bartosz Kruzewski y Robert Moj, “Documents in Construction Disputes” en *Global Arbitration Review The Guide to Construction Arbitration*, ed. Stavros Brekoulakis y David Brynmor Thomas (Londres: Law Business Research, 2017) 249, 256.

8 Doug Jones, “Party Appointed Experts in International Arbitration — Asset or Liability?”, *CI Arb International Journal of Arbitration, Mediation and Dispute Management* vol. 86 (2020): 2 – 21.

9 Jeffrey Waincymer, *Procedure and Evidence in International Arbitration* (Kluwer Law International, 2012) 933.

10 Doug Jones, “Party Appointed Experts”.

11 “Hong Kong International Arbitration Centre”, HKIAC Guidelines for Virtual Hearings, 14 de mayo, 2020.

Finally, infrastructure and construction projects are time-critical in nature¹². The completion of construction projects by the agreed date relies on the simultaneous performance of many distinct activities¹³. In many construction projects, failure to complete these activities by the agreed milestone will likely result in great monetary losses¹⁴. Indeed, any delays to project completion may lead to the contractor incurring overhead costs. The employer may too suffer loss as a result of the deferred date of completion, entitling it to liquidated damages. It is therefore unsurprising that delay is an inherent aspect of construction and infrastructure disputes. However, identifying the cause of delay is rarely simple. It will often require the use of complex schedule analyses, site diary entries, weekly or monthly reports, meeting minutes, photographs, witness and expert evidence, as well as critical path network software¹⁵. It is therefore important that the tribunal has the necessary evidence to deal with difficult questions of delay or applications for extensions of time.

2.2 The Momentum for Innovation

There is great momentum for innovation across the legal profession. The impact of the COVID-19 pandemic is that lawyers, judges and arbitrators have been forced to adopt new technology at an accelerated pace in order to continue their work. The recognition that technology can improve the procedure of construction arbitration is not a new concept and has been in the minds of participants long before 2020. Indeed, in the White & Case and Queen Mary University of London 2018 International Arbitration Survey ("Queen Mary Survey"), 61% of respondents thought that 'increased efficiency, including through technology' is most likely to have a significant impact on the future evolution of international arbitration¹⁶. Innovation through technology is therefore a vital ally for enhancing the quality and utility of evidence in construction arbitration. Even the most rudimentary technology, when deployed effectively, can add value.

Technology presents three distinct advantages for arbitration: first, it improves the convenience of the process; second, it assists the organisation and presentation of evidence; and third, it increases the efficiency of disclosure and production. Moreover, 2020 has seen a fourth advantage emerge: it allows international arbitration to continue to provide its services to international parties despite the catastrophic disruption caused by the COVID-19 pandemic.

Construction arbitration must adapt to maintain its value in the industry. Without detracting from its past successes, it is clear that there are areas that can be improved. A driving factor of dissatisfaction is the perceived 'judicialization' of arbitration¹⁷, and complaints of arbitration becoming overly formal and procedurally rigid. Extensive evidence, lengthy pleadings, wide ranging disclosure, and protracted evidentiary hearings have driven up the cost, particularly in construction disputes. These concerns with arbitration and the alternative options available to the industry provide motivation for arbitration to embrace innovation and to demonstrate a willingness to adapt procedure to each dispute in order to manage the complexity of infrastructure cases in a cost-effective manner.

The flexible nature of arbitration lends itself to embracing change¹⁸. Participants in arbitration herald from different legal traditions and geographic locations. The rules of arbitration, including decisions about forms of evidence and evidence procedure, are determined by the agreement of the parties, unconstrained by prescribed practice notes and civil procedures of domestic courts. Therefore, tailoring the arbitration to suit the particular features of a complex construction dispute is possible and rests in the hands of the parties.

3. Virtual hearings: an emerging phenomenon

An innovation that has proved to be critical to the success of international arbitration is the use of virtual hearings. The disruption from the COVID-19 pandemic has spread far and wide. It has had a disastrous

12 Stavros Brekoulakis y David Brynmor Thomas QC, "Introduction" en *Global Arbitration Review: The Guide to Construction Arbitration*, ed. Stavros Brekoulakis y David Brynmor Thomas (Londres: Law Business Research, 2017).

13 "A Global Perspective on Arbitrating Construction and Infrastructure", Herbert Smith Freehills, última modificación el 1 de julio de 2016, <https://www.herbetsmithfreehills.com/latest-thinking/a-global-perspective-on-arbitrating-construction-and-infrastructure>.

14 James Bremen y Leith Ben Ammar, "Contractors' Claims, Remedies and Reliefs" en *Global Arbitration Review: The Guide to Construction Arbitration*, ed. Stavros Brekoulakis y David Brynmor Thomas, (Londres: Law Business Research, 2nd ed. 2017), 63-64.

15 Yiannis Vacanas, et al, "Building Information Modelling (BIM) and Unmanned Aerial Vehicle (UAV) Technologies in Infrastructure Construction Project Management and Delay and Disruption Analysis", *9535 Proceedings of SPIE - The International Society for Optical Engineering* (2015), 2.

16 Paul Friedland y Stavros Brekoulakis, "2018 International Arbitration Survey: The Evolution of International Arbitration", *White & Case and Queen Mary University of London Research Survey* (2018), 29.

17 Phillip L Bruner, "Rapid Resolution ADR", *The Construction Lawyer*, vol. 31, no. 2 (2011) :26.

18 Doug Jones, "A new path forward: efficiency through transparency" (Keynote, 8th Asia-Pacific ADR Conference, Seoul, 20 de septiembre de 2019), Arbitration Institute of the Stockholm Chamber of Commerce, *Innovation in Arbitration Report 16*, https://sccinstitute.com/media/371112/innovation-in-arbitration_the-report.pdf.

affect on a key feature of arbitral procedure: in-person hearings¹⁹. In circumstances where international travel is not an option, international arbitration has had to adapt in order to ensure that scheduled hearings continue. Fortunately, one of its strengths is its flexibility. Participants in arbitrations have largely embraced the use of a virtual hearing to allow arbitration to continue even where in-person hearings are no longer possible.

3.1 Pre-COVID-19: Hearing room technologies

Before delving into the issue of virtual hearings, it is instructive to first consider developments in hearing room technologies, which have made the transition to virtual hearings much smoother. These technologies have been widely used in international arbitration before the COVID-19 pandemic. They include real time electronic transcripts, multimedia presentations, simultaneous translation, online hearing bundles and virtual hearing facilities. These services are offered by hearing venues such as Maxwell Chambers in Singapore²⁰ and the International Dispute Resolution Centre (“IDRC”) in London²¹. There is a clear appetite for arbitrators to embrace hearing room technologies as a means of improving the efficiency of presenting evidence²². 75% of respondents to the Queen Mary Survey indicated that they either “always” or “frequently” used hearing room technologies in an international arbitration²³, making it the most popular form of information technology presently used. Overwhelmingly, 98% of respondents thought that hearing room technologies are tools an arbitrator should make use of more often²⁴.

An example of one hearing room technology which has greatly improved the efficiency of hearings is the paperless e-hearing, which involves the use of hearing rooms equipped with computer screens. Documents are displayed on screen which reflect what is being referred to by counsel or tribunal members. This has the advantage of ensuring the tribunal, witness and opposing party are, quite literally, on the same page. Participants are better able to focus on the document or exhibit displayed, rather than browsing a physical bundle of evidence. Of course, the growing use of paperless e-hearings has proved critical when transitioning to virtual hearings, in which participants are forced to use electronic hearing bundles.

Regardless of whether a virtual hearing or physical hearing is conducted, electronic hearing bundles should be used. Removing the need to trawl through documentation and focussing one’s concentration on the oral presentation is useful in complex construction matters, not only as a presentation aid, but also as a means of saving time. According to the International Law Office, an electronic hearing can take 25% to 30% less time than a traditional hearing²⁵. Electronic hearings obviate the need to locate documents among volumes of folders, which causes disruption and delay to the hearing.

One example of an improvement in hearing room technology is instant translation technology, such as that developed by Microsoft Translator²⁶. Where the applicable rules or laws require the use of certified translators, then translation technology will not be appropriate. However, absent any applicable laws or contrary agreement from the parties, the international nature of many construction arbitrations makes instant translation eminently applicable, as was demonstrated at the ICCA Congress in Sydney in 2018²⁷. However, there is room for further development of instant translation software, particularly in a construction context, due to the technical or legal statements referred to in disputes. Moreover, where an award is being recognised and enforced under the New York Convention, translations of the award must be certified by an official or sworn translator or a diplomatic or consular agent²⁸.

Another form of hearing room technology that is increasingly common is real-time electronic transcripts, which increase the accuracy and efficiency of testimony and enable more efficient review of testimony. The use of these technologies by international arbitration practitioners provided an important springboard in the transition to virtual hearings. As highlighted later in this section, hearing room technologies not only remain useful tools in in-person hearings, but are also critical in virtual hearings.

19 Walker, “Virtual Hearings: The New Normal”.

20 “About Maxwell Chambers”, Maxwell Chambers (2020), <https://www.maxwellchambers.com/about-maxwell-chambers/>.

21 International Dispute Resolution Centre Limited, “Facilities” (2020), <https://www.idrc.co.uk/facilities.aspx>.

22 Friedland y Brekoulakis, *Queen Mary Survey*.

23 Friedland y Brekoulakis, *Queen Mary Survey*.

24 Friedland y Brekoulakis, *Queen Mary Survey*.

25 Rahul Thyagarajan, “Online Dispute Resolution and Electronic Hearings”, *Norton Rose Fulbright*, 26 de octubre, 2017), <http://www.nortonrosefulbright.com/knowledge/publications/157157/online-dispute-resolution-and-electronic-hearings>.

26 International Bar Association, “Technology Resources for Arbitration Practitioners: Translation and interpretation”, <https://www.ibanet.org/technology-resources-for-arbitration-translation.aspx>.

27 Geneva Sekula, “ICCA Sydney: The Moving Face of Technology”, *Kluwer Arbitration Blog*, 18 de abril, 2018, <http://arbitrationblog.kluwerarbitration.com/2018/04/18/icca-sydney-moving-face-technology/>.

28 New York Convention, abierto a firmas el 10 de junio, 1958, 330 UNTS 38 (entrada en vigor el 7 de junio, 1959), artículo IV.

3.2 Virtual Hearings

Prior to 2020, virtual hearings were rarely used in international arbitration. While 60% of respondents had used videoconferencing always or frequently, only 8% stated in the Queen Mary Survey that they “always” or “frequently” used virtual hearing rooms²⁹. Respondents to the survey also had reservations about increasing the use of virtual hearing rooms. 66% of participants said they should be used more often, which was the lowest scoring of the technologies considered in the survey. Before the COVID-19 pandemic, the concept of a virtual hearing room had only gained traction in a few contexts. For example, a completely online cyber court commenced operations in Hangzhou, China³⁰. All documents are submitted via an online portal and evidentiary hearings are conducted via a livestream.

The pandemic has radically shifted attitudes towards virtual hearings from a remote possibility to a commonly used tool that is the subject of significant academic debate and attention by arbitral institutions. As a practical reality, the uncertainty of international travel and social distancing requirements brought on by COVID-19 mean that in-person hearings are not a possibility for the majority of the arbitral community. This leaves international arbitration participants with two options. Option one is to vacate the hearing dates and wait for an unknown period of time until the restrictions are lifted, thereby delaying the resolution of the dispute and exacerbating potential cash flow issues. The second and preferred option is to embrace virtual hearings, which with the aid of several platforms, allow hearings to proceed with minimal disruption to the procedural timetable.

Of course, virtual hearings are not without their challenges, as will be further discussed. They require significant organisation and the settlement of numerous issues in advance. There are concerns that virtual hearings will not allow the tribunal to assess the credibility and probative value of a witness evidence. It may be difficult to be assured that a witness is not being coached off-camera or reading from a script prepared by counsel off-view. As commented by Professor Walker, these issues may cast doubt on the utility of a witness evidence when given virtually³¹. This section offers some practical tips for conducting virtual hearings and suggests ways to address these challenges. By and large however, virtual hearings are an important innovation that is proving critical to the survival of international arbitration during the pandemic.

In addition to allowing the evidentiary hearing to proceed despite pandemic disruption, virtual hearings have the obvious benefit of eliminating the time and cost associated with transporting arbitration participants to in-person hearings. Virtual hearing may also allow parties to choose diverse arbitrators who are the most experienced and specialised in construction disputes, regardless of how geographically proximate they are to the parties and counsel. It frees up the capacity of counsel and arbitrators who no longer need to work their schedules around complex travel plans. It is positive to see the majority of the international arbitration community welcoming virtual hearings.

3.3 Organising a Virtual Hearing: A Virtual Hearing Protocol

This section will discuss the practicalities of organising a virtual hearing, including the need to agree a virtual hearing protocol. There are a number of procedural and organisation issues to consider when planning a virtual hearing³².

Preparing a virtual hearing protocol will ensure that the taking of evidence at the (virtual) hearing can be done efficiently and effectively. It should, broadly, address elements under four categories:

- pre-hearing logistics;
- technical requirements;
- conduct of witness examination during the hearing; and
- cyber-security

Each category will be discussed in turn. Of course, the areas addressed in the protocol will turn upon the unique features of each arbitration and the Tribunal should remain proactive in developing procedural directions where changes are appropriate.

²⁹ Friedland y Brekoulakis, *Queen Mary Survey*.

³⁰ Thyagarajan, “Online Dispute Resolution and Electronic Hearings”, 83.

³¹ Walker, “Virtual Hearings: The New Normal”, 1.

³² “ICC Guidance Note on the Possible Measures aimed at Mitigating the Effects of the COVID-19 Pandemic” (2020), 28.

3.3.1 Pre-hearing Logistics

The organisation of pre-hearing logistics involves selecting a suitable virtual hearing platform and provider, managing the hearing schedule and time zones and making appropriate provisions for any interpretation required of witness evidence. Current virtual hearing platforms include Zoom, Microsoft Teams, Skype for Business, VidoCloud or Webex. The parties and tribunal should consider the differing logistical functions across these platforms when selecting service providers. For example, the capacity for private breakout rooms, screen-sharing and the number of participants able to be viewed onscreen will differ between platforms.

Additionally, the nature of a virtual hearing means that, if arbitrators and parties are in completely different countries and time zones, careful attention must be paid to the hearing schedule. Finding a time that suits participants across time zones should be the subject of discussion between the parties and the tribunal and may require a degree of flexibility. Other issues to consider in ensuring all participants have access is the number of remote locations, and the extent to which any participants will be in the same physical venue. The Tribunal and Parties should also consider the organisation of real-time transcription services or another form of recording and the use of interpreters, including whether simultaneous or consecutive.

Finally, engaging a suitable vendor to prepare electronic hearing bundles and transcripts is also important at this early stage. E-bundles can be hosted on a shared document platform, for example through service providers such as Epiq, Opus or XBundle. Ensuring all participants have ready access to soft copies of documents, which would ordinarily be available in hard copy, is crucial to ensuring the efficiency of proceedings.

3.3.2 Technical Requirements

To ensure that the virtual hearing runs as smoothly as possible and that counsel and arbitrators are able to participate to their fullest, there are a small number of technological requirements and workspace adjustments to be adopted³³. First, all participants should have a strong, stable internet connection, ideally by ethernet cable to avoid issues with wireless connection. The Seoul Protocol on Video Conferencing in International Arbitration further provides technical specifications of the minimum industry standards regarding video and audio quality³⁴. Put simply, participants should ensure that their video camera records with a High-Definition resolution and should minimise exposure of their workspace to external noise. Virtual hearing providers also recommend that non-active participants mute their microphone to minimise background noise and interference. It may be necessary to reduce echo by insulating hard surfaces in the room with rugs or curtains. A good quality external microphone and speaker may also be worthwhile investments. Of course, participants may have different preferences with respect to their camera, speaker and microphone set-ups. These suggestions are some of the minimum requirements necessary to emulate as closely as possible a physical hearing.

Availability of technical support and contingency plans should also be considered at this stage. This should include organising at least one test run of all the technical hardware and software in advance of the actual hearing. The parties and the tribunal should conduct a trial run ahead of the virtual hearing and it may also prove useful to engage a technical support person on-call during the hearing to troubleshoot any issues as they arise and nominate a secondary option in the event of a breakdown in communications or technical difficulties (e.g. a telephone number).

3.3.3 Witness Evidence

Next, the presentation of witness evidence during the hearing should be regulated. This is particularly important due to concerns of witness tampering in a virtual setting where the presence of lawyers or a script can be concealed behind the camera. The historically low uptake of virtual hearings may be due to 'reservations as to the effectiveness of conducting cross-examinations of witnesses or delivering and hearing the parties' closing arguments through a videoconference'³⁵.

There should also be consultation between the tribunal and the parties to address matters including the order of witnesses, virtual questioning, and consent to the use of synchronous or asynchronous communications between witnesses and parties in virtual chat rooms. Furthermore, when various participants are in different

33 Janet Walker, "Lights, Camera, Action - A Checklist for Virtual Hearing Participants", *Global Arbitration Review* (mayo 2020), <https://globalarbitrationreview.com/article/1226827/lights-camera-action-a-checklist-for-virtual-hearing-participants>.

34 Seoul Protocol on Video Conferencing in International Arbitrations, (Seoul: KCAB, 2020) artículo 5, anexo 1.

35 Friedland and Brekoulakis, *Queen Mary Survey*, 32.

locations, they must ensure there is no *ex parte* communication with the tribunal and no improper witness coaching³⁶.

Parties and the tribunal should agree to a witness sequestration protocol. This provides in express terms that witnesses must not have any access to any transcript, live audio feed or recording of the testimony given by other witnesses, nor can they discuss their evidence with anyone, counsel or otherwise, until they have completed their oral testimony. The HKIAC Guidelines for Virtual Hearings provide practical steps including organising a 'hearing invigilator' or arranging a 360-degree viewing of the room at the beginning of each session to ensure the 'integrity of the room', that is, that there is no unapproved recording device or person present³⁷. The virtual hearing protocol may also prohibit the use of the 'virtual background' feature on the hearing platform that allows a participant to display an image as their background during the call.

3.3.4 Cyber-security

Finally, there is the issue of cyber-security which has featured at the forefront of the conversation on virtual hearings. Horror stories of 'Zoom-bombings' where uninvited participants have hijacked video-calls have been widely circulated. With the proper protocol, however, it is possible to ensure against most security flaws in virtual hearing platforms. Of primary importance is securing the access points to the virtual hearing room. This will involve ensuring that entry to the hearing room is protected by password and that the invitation link and password are sent only to the necessary participants. Some virtual platforms include a 'waiting room' feature, in which participants must wait to be granted access into the room by an administrator. This can add an extra level of access control and security. The meeting host should verify the identity of all arbitration participants. It should also be noted that virtual platforms are continually being updated to address new security issues. Users should therefore always use the latest version of any virtual platform to ensure that they are receiving the most up-to-date security measures. In addition to using updated software, arbitral procedure should also take into account the need to verify the presence of all participants.

Many arbitral institutions have also produced their own protocols regarding cyber-security, including the ICCA-NYC Bar-CPR Protocol on Cybersecurity in International Arbitration, the IBA Presidential Task Force's Guidelines on Cyber Security and the ICC's Note on Information Technology in International Arbitration. These guidelines offer further suggestions to parties and arbitrators when settling on a virtual hearing protocol.

It is also crucial to maintain confidentiality of electronic documents and communications. In brief, some strategies to maintain security and confidentiality include use of password protected platforms, two-factor authentication, the use of link expiration dates and file access controls. Detailed consideration of how this can be ensured is beyond the scope of this section, which regards only the virtual hearing itself. The institutional protocols mentioned earlier, however, provide ample guidance as to best practices regarding confidentiality.

The establishment of an appropriate virtual hearing protocol, incorporating the key elements aforementioned will assist parties and the tribunal in maximising the efficacy of a virtual evidentiary hearing.

4. Institution-driven innovation

It is not only arbitration's inherent features which make it a suitable vehicle for innovation. If new technologies are to be used more frequently, their use must be supported by soft law instruments and the rules of leading arbitral institutions. The willingness of institutions to adopt technologically neutral rules has opened the door to technological innovation, particularly in respect of virtual hearings. It is therefore fortunate for international arbitration participants that institutional rules have been a source of innovation for years.

A variety of institutions have implemented arbitration rules which support new forms of evidence and evidence procedure. These rules tend to focus on the use of teleconferencing and videoconferencing during arbitral proceedings. Article 24(4) of the ICC Rules 2017 states that case management conferences may be conducted by video conference, telephone or similar means of communication. Article 3(5) of the Expedited Procedure Rules in Appendix VI of the ICC Rules 2017 allows hearings to be conducted by those alternative means of communication. A case management technique suggested in the Appendix to the

³⁶ Friedland and Brekoulakis, *Queen Mary Survey*, 32.

³⁷ Hong Kong International Arbitration Centre, *HKIAC Guidelines for Virtual Hearings*, mayo 2020.

rules also recommends “using telephone or video conferencing for procedural and other hearings where attendance in person is not essential and use of IT that enables online communication among the parties, the arbitral tribunal and the Secretariat of the Court”³⁸. Article 19.2 of the LCIA Rules 2014 states that “a hearing may take place by video or telephone conference or in person (or a combination of all three)”. The SIAC Rules 2016 contain provisions for an Emergency Arbitrator to provide for proceedings by telephone or video conference as alternatives to a hearing in person (Schedule 1, Rule 7). However, Rule 24 pertaining to hearings generally, is silent on technology, stating that the tribunal shall “set the date, time and place of any meeting or hearing”.

Of particular note are institutional rules which include consideration of how technology can be used fairly and most efficiently. The AAA Rules 2013 provide³⁹:

“When deemed appropriate, the arbitrator may also allow for the presentation of evidence by alternative means including video conferencing, internet communication, telephonic conferences and means other than an in-person presentation. Such alternative means must afford a full opportunity for all parties to present any evidence that the arbitrator deems material and relevant to the resolution of the dispute and, when involving witnesses, provide an opportunity for cross-examination.”

The emergence of soft law guidelines and protocols are also a source of innovation. ACICA provides a Draft Procedural Order for the Use of Online Dispute Resolution Technologies, providing convenience to parties by suggesting the procedural issues that should be settled when choosing to use online dispute resolution technologies⁴⁰. The ICC Commission on Arbitration and ADR Task Force on the Use of Information Technology in International Arbitration has similarly issued examples of wording that might be used for directions for the use of information technology⁴¹.

More recently, a series of guidance notes have been introduced in order to assist with virtual hearings specifically. Among these include: the CIArb Guidance Note on Remote Dispute Resolution Proceedings, ICC Guidance Note on the Possible Measures Aimed at Mitigating the Effects of the COVID-19 Pandemic, KCAB’s Seoul Protocol on Video Conferencing in International Arbitration and the HKIAC Guidelines for Virtual Hearings. By way of example, the ICC Guidance Note provides⁴²:

“If the parties agree, or the tribunal determines, to proceed with a virtual hearing, then the parties and the tribunal should take into account, openly discuss and plan for special features of proceeding in that manner, including those addressed below and in the attached Annexes. The Secretariat stands ready to assist the parties in this regard.”

These guidelines provide parties with practical tips for organising virtual hearings, as well as procedural tools available to parties that are designed to make international arbitration fairer and more efficient⁴³. These Guidance Notes also clarify the position of the institution in relation to virtual hearings. For example, the ICC Arbitration Rules are said to be sufficiently flexible to allow for virtual hearings⁴⁴:

“While Article 25(2) of the Rules provides that after studying the written submissions of the parties and all documents relied upon, the tribunal “shall hear the parties together in person if any of them so requests,” this language can be construed as referring to the parties having an opportunity for a live, adversarial exchange and not to preclude a hearing taking place “in person” by virtual means if the circumstances so warrant.”

Institutions recognise that while an in-person hearing may, in some circumstances, be indispensable, the reality is that waiting for restrictions to ease may cause “unwarranted and even prejudicial delay”⁴⁵. Consequently, arbitral tribunals are encouraged to adopt different approaches tailored to the circumstances

38 International Chamber of Commerce, *Arbitration Rules* (Paris: ICC, 2017) apéndice IV(f).

39 American Arbitration Association, *Commercial Arbitration Rules and Mediation Procedures* (New York City: AAA, 2013) rule 32(c).

40 Australian Centre for International Commercial Arbitration, *Draft Procedural Order for Use of Online Dispute Resolution Technologies in ACICA Rules Arbitrations* (agosto 2016), <https://acica.org.au/wp-content/uploads/2016/08/ACICA-online-ADR-procedural-order.pdf>.

41 International Chamber of Commerce Commission, *Information Technology in International Arbitration* (2017), 18-24, <https://cdn.iccwbo.org/content/uploads/sites/3/2017/03/icc-information-technology-in-international-arbitration-icc-arbitration-adr-commission.pdf>.

42 International Chamber of Commerce, *ICC Guidance Note on the Possible Measures aimed at Mitigating the Effects of the COVID-19 Pandemic* (Paris: ICC, 2020), 21.

43 International Chamber of Commerce (ICC), *ICC Guidance Note*.

44 ICC, *ICC Guidance Note*, 23.

45 ICC, *ICC Guidance Note*, 25.

of a particular case in order to fulfil the arbitrator's duty to conduct the arbitration in a cost-effective and expeditious manner.

Finally, Article 7 of Appendix I of the ICC Rules enables the ICC Court to make a proposal to modify or supplement the Rules to the Executive Board of the ICC in order to take account of developments in information technology, without laying such proposals before the Commission on Arbitration and ADR. Such a provision ensures institutional rules can adapt and innovate quickly in response to new technologies.

Having considered the role of arbitral institutions in driving the adoption of innovative evidence procedure, I now move to outline technological and procedural innovations in construction arbitration. These range from innovations which are emerging as best practice, to ideas which are rarely presently seen in practice, but will be critical to the continuing success of international arbitration in the future⁴⁶.

5. Technological innovation in the construction industry

The challenges associated with construction disputes are numerous and often unique to the construction industry. This has prompted the emergence of technology that is especially designed to meet the needs of the construction industry. These include site visualisation technologies, and delay and disruption modelling. It is important that arbitrators familiarise themselves with these technologies in order to understand the evidence, issues in dispute and the needs of the parties.

5.1 Site Visualisation Technologies

Site visualisation technologies are most distinctly tied to construction arbitration. Construction disputes are factually intensive and often turn upon the tribunal's findings of fact⁴⁷. The tribunal must therefore have a strong understanding of the factual issues in dispute before arriving at a decision on the merits⁴⁸. In these circumstances, allowing the Tribunal to see the site, including its facilities, equipment, access points and dimensions, can be very valuable in many cases (but not all) in assisting the tribunal to form its view on the evidence submitted in support of each claim⁴⁹. Traditionally this was achieved through site visits. My last major site visit was of a high-value light rail project in Korea, constructed through a public-private partnership. Both parties agreed that they wanted the tribunal to see the project, which had been completed but was not operating.

In another one of my arbitrations concerning the development of onshore natural gas processing facilities, a party made an application for a site inspection to assist the tribunal with developing a visual and physical framework to digest and evaluate the evidence presented during the arbitration (which would not be possible on the papers alone). It was argued that using videos or photographs as an alternative would be a poor substitute for a site visit and could be potentially misleading. New footage would also be required as no proper video was taken at the material time. In this case, the tribunal decided that the cost and inconvenience of a visit outweighed the value of a physical viewing of the site. In deciding the outcome of that application, the tribunal considered a number of factors, including the sizeable costs associated with site visits. These costs are normally attributable to the need for international flights for the majority of the experts and tribunal members, other transport expenses, accommodation expenses and legal and expert fees. The cost of undertaking a site visit is a key issue when considering a proposal for a site visit. The tribunal must carefully measure the cost of a site visit against its potential utility⁵⁰.

There can also be great difficulty in reconciling the parties' varying availability, particularly when the site is in a remote area. In the case described above, the time frame for the visit was of vital importance as the owner was soon to take charge of the site and could be less sympathetic to a visit. Consequently, I have not had a site visit in quite some time, the need for which has largely been obviated by technology. The availability of photographs, videos, presentations, satellite imagery and other documentary technologies have enabled tribunal members to understand spatial relationships without a physical site inspection.

46 Arbitration Institute of the Stockholm Chamber of Commerce, "Innovation in Arbitration Report", 3, https://sccinstitute.com/media/37112/innovation-in-arbitration_the-report.pdf.

47 The Hon Justice David Byrne, "The Future of Litigation of Construction Law Disputes", *Discurso*, Melbourne Law Masters Graduate Program in Construction Law (2007), 2.

48 Bernd Ehle y Courtney Furner, "Eyeopeners – The Enlightening Effect of Site Visits in Construction Disputes", *Dispute Resolution International*, vol. 12, no. 2 (October 2018): 179.

49 Ehle y Furner, "Eyeopeners – The Enlightening Effect of Site Visits in Construction Disputes", 175.

50 Ehle y Furner, "Eyeopeners – The Enlightening Effect of Site Visits in Construction Disputes", 178.

Photographic evidence has come before courts and tribunals in construction cases since at least 1875⁵¹. Under the International Federation of Consulting Engineers (FIDIC) 2017 Red Book, photographs are among the requirements for the progress report that a contractor should send to the owner daily, weekly, and monthly⁵². Therefore, there is typically no shortage of photographic evidence in construction arbitrations, particularly in matters concerning delay, disruption or defects. It must be conceded, however, that there are some limitations to this conventional method of digital camera photography in the viewing of a construction site. The ability to gain perspective on the high reach points and a broader view of the construction site largely depends on the technological capabilities of the camera or digital recording device⁵³.

New technologies have sought to provide alternative and supplementary visual perspectives to traditional photographs. These include time lapse cameras, video conferencing, presentation software, computer animations and simulations, and digital video⁵⁴. Of particular note is the “widespread availability of satellite imagery and GPS software to document the physical world in real-time”⁵⁵. These technologies not only improve delay analysis and record keeping in the event of a dispute, but also enhance project management throughout the life of the project. As reasonably inexpensive forms of new technology, they weaken the case for site visits even further.

Aside from the range of technologies described above, there are two technological developments which have more recently been considered in the realm of construction arbitration. These developments, being Unmanned Aerial Vehicles (UAVs) and augmented and virtual reality (AR and VR), have yet to reach their full potential. Regulatory and technological barriers remain. Yet, they have the capacity to heighten the tribunal’s ability to visualise the physical dimensions of a project without being physically present.

Micro UAV or drone technology can produce remarkably clear aerial footage. Indeed, I recently substituted party-agreed UAV footage in place of a site visit to an offshore oil and gas facility in the Indian Ocean and to an atomic power station construction site in the Middle East. The use of UAVs on these occasions proved useful in enhancing the tribunal’s understanding of the issues. When considering the use of UAVs, some brief points should be noted. UAVs are able to capture images from a greater number of angles compared to a common digital camera and generate a higher quality three-dimensional model⁵⁶. UAVs can be remote controlled by a ‘pilot’ stationed on the ground, or can be pre-programmed to fly autonomously on a flight plan⁵⁷. Data from UAVs can be gathered on a daily basis and compared to blueprints to ensure the project is on schedule⁵⁸. The data gathered by drones can be used in conjunction with BIM systems, to improve the accuracy of BIM models⁵⁹.

Equipping a UAV with high-definition, infrared or thermal-imaging cameras can create evidence which may prove particularly useful to construction disputes. In some circumstances, drone-based non-destructive testing (“NDT”) may assist in the detection of defects and flaws⁶⁰. Indeed, drone mounted thermal imaging is used by building consultants to detect construction defects, thermal bridges, hot and cold air loss and water ingress⁶¹. This technique has been employed by BP to inspect the Alaska pipeline, using infrared cameras to test for hot spots and other infrastructure faults⁶². As drone regulation continues to evolve, it remains to be seen whether this technology will play a larger role in construction arbitration⁶³. However, early signs suggest that deploying UAVs may be valuable in identifying delay causation, delay impacts and liability for defective works.

51 Vacanas et al, *Building Information Modelling*, 7.

52 Fédération Internationale des Ingénieurs-Conseils, *Construction Contract 2nd Ed (2017 Red Book)* (ICE Publishing, 2017) Sección 4.21-b.

53 Masiri Kaamin et al, “The Application of Micro UAV in Construction Project”, Artículo presentado en *2nd International Conference on Applied Science and Technology*, Kedah, Malaysia, 2017, AIP Conference Proceedings 1891.

54 Zohreh Soltani et al, “The Challenges of Using BIM in Construction Dispute Resolution Process” Paper presented at the *53rd ASC Annual International Conference Proceedings* (Seattle 7 de abril, 2017), 772, <http://ascpro0.ascweb.org/archives/cd/2017/paper/CPRT212002017.pdf>. Vacanas, *Building Information Technology*, 8.

55 Michael Becker y Cecily Rose, “Investigating the Value of Site Visits in Inter-State Arbitration and Adjudication”, *Journal of International Dispute Settlement*, vol. 8 (Mayo 2016).

56 Kaamin et al, *The Application of Micro UAV*, 4 6.

57 Kaamin et al, *The Application of Micro UAV*, 46, 2.

58 Andrew L Smith, “Drones Will Change the Game in Construction”, *The Critical Path*, vol. 21 (2017): 1.

59 Katie Walker y Oliver Bourchier, “Drones: disputes, disruption and efficiency in the construction industry” (16 de julio, 2018), <https://www.burges-salmon.com/news-and-insight/legal-updates/drones-disputes-disruption-and-efficiency-in-the-construction-industry/>.

60 Smith, “Drones Will Change the Game in Construction”, 2.

61 Sydney Building Defects Inspections and Reports Pty Limited, “Drone and Aerial Thermal Imaging”, <https://www.sbdir.com.au/drone-thermal-imaging/>.

62 Smith, “Drones Will Change the Game in Construction”, 1.

63 Walker y Bourchier, “Drones: disputes, disruption and efficiency in the construction industry”.

From a procedural standpoint, documentary material generated by UAVs should be admissible without substantial changes to rules of evidence⁶⁴. Institutional rules, IBA Rules and the ability for the parties and tribunal to agree on admissibility should leave little barrier for UAV-generated evidence to fall within the scope of evidence considered by the tribunal. Traditional evidentiary principles can and should apply. UAV-generated evidence, be it in statistical, graphical, audio, or visual form, “accomplishes nothing in substance that attorneys have not done in the past through documentary, real, demonstrative, or testimonial evidence”⁶⁵.

The more substantial barrier to the use of UAVs comes from government regulations. For example, current Federal Aviation Administration regulations in the United States do not permit the commercial operation of a UAV unless an exemption is sought. Of the more than 3300 exemptions granted since 2012, over 450 included the use of UAVs on construction sites⁶⁶. As the prevalence of commercial UAVs increases across the board, due consideration will need to be given to privacy and safety concerns⁶⁷.

In addition, Augmented Reality (AR) and Virtual Reality (VR) may become useful tools for evidence visualisation in the future. AR allows digital content to be layered over the real world using special glasses or a smartphone⁶⁸. VR completely replaces the real world using goggles and speakers, placing the person inside a virtual environment. The potential of this technology to facilitate efficient arbitral proceedings was displayed at an AR demonstration at the 2018 ICCA Congress⁶⁹. The audience considered a fictional case of negligent manufacturing. AR was demonstrated through an app which visually displayed the structure and physical circumstances of the case⁷⁰.

While the application of this technology in construction matters is in its infancy, its potential is impressive. AR may improve the presentation of evidence, by enabling the tribunal to visualise projects and understand the anatomy of particular arguments such as design change impacts and causation of alleged defects. VR and AR have a high frame rate and low latency, thus generating an immersive and realistic experience⁷¹. Data gathered from AR or VR technologies may serve as evidence in a dispute, providing a visual log of what site managers observed over time⁷². Presently, it has been applied in safety training modules in construction and engineering sectors. One mixed reality technology, Microsoft HoloLens, has also been used by the Gilbane Building Company to visualise projects and identify potential defects⁷³. Parties may be drawn to these technologies as it enables them to interactively present a construction site and its technical features. However, only time will tell the true appeal of AR and VR in construction arbitration.

5.2 Delay and Disruption Modelling

Beyond site visualisation techniques, the modelling of construction sites can also provide high quality evidence for delay and disruption claims. Building Information Modelling (BIM) and System Dynamics (SD) Modelling are two technologies which can be applied to construction disputes.

BIM has been defined as “a digital representation of physical and functional characteristics of a facility and a shared knowledge resource for information about a facility forming a reliable basis for decisions during the project life-cycle”⁷⁴. It is a multi-dimensional digital planning method rich with information such as contracts, specifications, staff, schedule, quantities, cost, and design data⁷⁵. BIM is not usually proposed at the dispute stage. Rather, it is a resource for the entire project life-cycle. It has been suggested that a BIM model which has been in use for the duration of the project can act ‘like a witness’ because of the large

64 Matthew DeVries, “Risk or Reward, Using Drones on Your Construction Project”, *Best Practices Construction Law* (blog), 14 de octubre, 2015. Acceso el 28 de enero, 2019, <https://www.bestpracticesconstructionlaw.com/2015/10/articles/technology/risk-or-reward-using-drones-on-your-construction-project/>.

65 Timothy M Ravish, “Courts in the Drone Age”, *Law + Informatics Symposium on Digital Evidence, Northern Kentucky University Salmon P. Chase College of Law* (27 de febrero, 2015), 23.

66 Smith, “Drones Will Change the Game in Construction”, 2.

67 Kaamin et al, *The Application of Micro UAV*, 6.

68 Mark A Lemley y Eugene Volkh, “Virtual Reality and Augmented Reality”, *University of Pennsylvania Law Review*, vol. 166 (2018): 1051.

69 Geneva Sekula, “ICCA Sydney: The Moving Face of Technology” (18 de abril, 2018).

70 Geneva Sekula, “ICCA Sydney: The Moving Face of Technology” (18 de abril, 2018).

71 Xiao Li et al, “A Critical Review of Virtual and Augmented Reality (VR/AR) Applications in Construction Safety”, *Automation in Construction*, vol. 86 (2018): 152.

72 Lemley and Volkh, *Virtual Reality*, 72.

73 Elizabeth Woyke, “Augmented Reality Could Speed Up Construction Projects”, *MIT Technology Review* (10 de agosto, 2016), <https://www.technologyreview.com/s/602124/augmented-reality-could-speed-up-construction-projects/>.

74 Aref Charehzei et al, “Building Information Modelling in Construction Conflict Management”, *International Journal of Engineering Business Management* vol. 9 (2017), 4.

75 Serdar Koc y Samer Skaik, “Disputes Resolution: Can Bim Help Overcome Barriers?”, *CIB 2014: Proceedings of the 2014 International Conference on Construction in a Changing World*, Sri Lanka, 4-7 mayo 2014, 8.

quantity of data it possesses⁷⁶. If the BIM project collected regular 'as-built' survey data, it would be able to serve as a reference point for data across the project's life and assist the tribunal in understanding what has occurred and why⁷⁷. A study recommended that even if the project did not adopt a BIM model earlier, a model can be created for a smooth process during the claiming and resolution of disputes⁷⁸. For these reasons, the Society of Construction Law Delay and Disruption Protocol recognises the use of BIM as a format of records which can be used in claims assessments and dispute resolution⁷⁹. This creates the need for project management teams to consider a protocol to order and preserve large amounts of data collected through BIM in the event that a dispute arises⁸⁰.

The applications of BIM in other phases of the project life-cycle have been successful. In the United Kingdom, all major public sector construction projects are required to implement BIM technology⁸¹. In China, BIM has been included in the Ministry of Science and Technology's Outline of the National Long-Term Science and Technology Development Plan (2006-2020)⁸². A survey conducted in the United States found that BIM was being used in construction for visualisation, architectural design/modelling, collision detection, estimating, MEP design/modelling, structural design/modelling, and marketing and scheduling⁸³.

The usage of BIM in the investigation of the collapse of the I35W Bridge in Minnesota in 2007 resulted in the model being renamed the Forensic Information Model (FIM)⁸⁴. However, despite its impressive capabilities, BIM's application in dispute resolution has so far been limited⁸⁵. Forensic engineers and construction lawyers have been asked to consider why BIM is not being utilised more greatly in a courtroom context⁸⁶. Cost and time barriers involved with creating a 3D model appear to be prohibitive, particularly if conventional tools could yield the same investigative results. The complexity of BIM, even for experts, and issues with its reliability were also factors against its usage in a dispute resolution context⁸⁷. The prevalence of experienced expert witnesses may also mean that long standing practices are more likely to be utilised, compared to new technologies that are less familiar⁸⁸.

In my view, these experiences are transferable to construction arbitration. In a recent hearing concerning claims for extensions of time and variations, I enquired as to whether BIM was used on the project. The response from counsel was that BIM should help in the coordination of projects between contractors and sub-contractors and minimise or resolve disputes. However, the implementation of focussed BIM is not sufficiently advanced and it was not used for this particular project.

System Dynamics modelling ("SD modelling") is "a computer simulation of a construction project which allows for 'but for' scenarios to be simulated to postulate the impact of employer-responsible disruption"⁸⁹. Like BIM, it requires significant expertise to master a technical understanding of the model. Also similar is the fact that SD modelling has typically been used prospectively, at an early stage of project development. While it has had limited usage in practice for dispute resolution, there is anecdotal evidence of its admissibility and consideration in an ICC arbitration⁹⁰. Larger hurdles have been faced in its admissibility in court proceedings⁹¹. Its inclusion in the SCL Delay and Disruption Protocol suggests that its usage may be on the rise. However, the Protocol makes clear that SD modelling is "not as commonly used as other methods in calculating loss of productivity" because the robustness of the conclusions it derives are dependent on multiple variables and carrying out this analysis has a substantial cost⁹². Accordingly, the technologies used by the construction industry also have great potential to increase the efficiency of the arbitral process, to reduce cost and clarify the issues in dispute.

76 Vacanas et al., *Building Information Modelling*, 7.

77 Graham Mills, *The Use of BIM in Dispute Resolution*, 2013, www.technicsgroup.com/2013/10/the-use-of-bim-in-dispute-resolution/.

78 Koc y Skaik, *Dispute Resolution*, 2.

79 Society of Construction Law (UK), *Delay and Disruption Protocol* (United Kingdom: SCL, 2014), 14.

80 Matthew DeVries, "Risk or Reward, Using Drones on Your Construction Project".

81 UK Government, *Building Information Modelling*, 2012. Acceso el 28 de enero, 2019, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/34710/12-1327-building-information-modelling.pdf.

82 Vacanas et al., *Building Information Modelling*, 3.

83 Anoop Sattineni y R Harrison Bradford II. *Estimating with BIM: A Survey of US Construction Companies* (Proceedings of the 28th ISARC, Seoul, South Korea 29 June–2 July 2011) 564-569.

84 Soltani et al., *The Challenges of Using BIM*, 773.

85 Soltani et al., *The Challenges of Using BIM*.

86 Soltani et al., *The Challenges of Using BIM*, 774.

87 Soltani et al., *The Challenges of Using BIM*.

88 Soltani et al., *The Challenges of Using BIM*, 775.

89 Ralph Goodchild, "Proven by Computer? System Dynamics and Disruption Claims", *Society of Construction Law Paper*, no. 212, 1.

90 Goodchild, "Proven by Computer? System Dynamics and Disruption Claims", 10.

91 Goodchild, "Proven by Computer? System Dynamics and Disruption Claims", 9.

92 Society of Construction Law (UK), *Delay and Disruption Protocol*, 48.

6. Procedural innovations

Arbitrators and parties have capacity to craft the arbitral process in innovative and bespoke ways to enhance the presentation of evidence. For this part of this paper, the focus is on evidence procedure, enabled by the inherent flexibility of arbitration and the will of the participants. The technologies referred to above and the use of virtual hearings will not be effective without proactive case management techniques. In the advent of a global pandemic, where communication has been made more difficult, the need for proactive case management from the Tribunal is more critical than ever in order to mitigate procedural disruption⁹³. To that end, I will share my experiences of procedural innovation in the following areas: procedural orders and case management; fact evidence; party-appointed experts; expert teaming and the evidentiary hearing.

6.1 Procedural Orders and Case Management

It is generally accepted in international arbitration that there needs to be early engagement in the design of the arbitration on a case-by-case basis, often depending on the particular evidentiary issues of a case. One of the theoretical advantages of arbitration is that it can be designed to meet the needs of each particular dispute. It has been accepted for many years that the commencement of that process is at the outset of the arbitration, in a meeting between the disputing parties, their counsel and the tribunal to produce a roadmap for the arbitration, otherwise known as the initial case management conference (CMC). This CMC is for the purpose of producing Procedural Order No.1 (PO1). The PO1 sets out a procedural framework which will largely guide the parties and tribunal in many aspects of the arbitration. There are some issues which can be usefully settled and decided at the first CMC and dealt with in PO1. At that first CMC, topics such as the procedural timetable, the date for the evidentiary hearing, a communication protocol, the format of documents to be exchanged, and hopefully, the assumptions in relation to the disposition of the parties' costs will be dealt with⁹⁴.

However, PO1 is only the first step on the journey to effective procedural innovation. There are other matters which should be dealt with in detail later. These include many aspects of evidence-taking: disclosure, factual evidence and expert evidence. Detailed consideration of these issues during the arbitral process increases the efficiency of the process.

While the importance of the initial CMC is widely recognised and enshrined in the ICC Arbitration Rules 2017,⁹⁵ the timing for dealing with each procedural issue is not as widely known. Many would agree that the concept of dealing with procedural issues as the arbitration develops is novel, because many arbitrators, particularly in the construction context, will try and set the roadmap for the entirety of the case from the beginning, and only deal with issues the subject of procedural dispute when and if they arise. Therefore, understanding which matters should be settled during the initial CMC and which matters should be reserved for further case management conferences is essential to ensure the efficient and effective engagement of the evidentiary issues in an arbitration⁹⁶.

6.2 Factual Evidence

There has been a shift away from oral evidence in chief in international arbitration, particularly in the realm of international construction arbitration. Instead, it is all in writing. The witness statements produced in international commercial arbitration generally, and certainly in infrastructure and construction disputes, are lengthy. The parties spend a significant amount of time, cost and effort into ensuring that the witnesses depose to every issue which might be conceivably relevant. In this section, I suggest strategies for streamlining the factual evidence in order to narrow the issues in dispute.

Parties' cases are presented broadly in two ways. The first is the pleaded case approach (which is becoming less common), in which the allegations to be proven are set out in the pleadings. The witness evidence is then produced after the pleadings are closed. The second approach, which is more common today, even in huge construction disputes, is the use of memorials. Under a memorial approach, the parties' cases include their arguments, all of the factual witness evidence by way of witness statements and all of the documents relied upon.

93 ICC, *ICC Guidance Note*, 9.

94 Janet Walker y Doug Jones, "Procedural Order No. 1 Revisited: From Swiss Watch to Arbitrators' Toolkit" en *The Powers and Duties of an Arbitrator: Liber Amicorum Pierre A. Karer*, ed. Patricia Shaughnessy y Sherlin Tung (Kluwer Law International: Alphen aan den Rijn, 2017), 393.

95 International Chamber of Commerce, "Arbitration Rules" (1 de marzo, 2017) Artículo 24(1).

96 International Chamber of Commerce, "Arbitration Rules".

Under the pleadings approach, my experience has shown that there is real value in holding a meeting between counsel and the tribunal, before the witness statements are prepared and after the pleadings have been exchanged. This meeting can enable the tribunal to uncover what is actually in dispute. By providing parties and witnesses with clear, precise directions, evidence will be limited to material issues. This saves parties from spending unnecessary time and resources on irrelevant facts or peripheral issues in their factual witness statements.

The parties should also be encouraged to prepare a list of issues to limit the witness evidence to that which is essential. In a recent construction arbitration involving 22 distinct claims and 47 factual witnesses, it was necessary to provide specific guidance to the parties. In this case, the tribunal explicitly directed the claimant's factual witnesses to confine their reply witness statements to addressing the disruption issues raised by the respondent's factual witnesses. This streamlined the factual evidence, allowing witnesses, counsel and the tribunal to focus on the key issues.

The extent to which one can limit evidence often depends on the approach that is adopted. If the memorial approach is used, it is my practice to have a CMC after the first round, before the reply round comes in. The tribunal, in advance of the CMC, will summarise for the parties for discussion at the CMC, what it sees as the key issues in dispute. This ideally limits the evidence needed in reply to the key issues⁹⁷. It also has the additional advantage of educating the tribunal at an early stage as to what the dispute is about and provides an opportunity to engage with counsel regarding the emerging issues that might prove critical to the case.

Arbitrators often find this process to be a challenging exercise. However, a CMC of this nature is in my experience always helpful in aiding the tribunal's early understanding of the case. It is innovative in the sense that it is not, in my view, done nearly enough. These case management techniques can help to confine factual evidence to material issues, thus containing time and cost, and should be encouraged by both parties and the tribunal.

6.3 Party-Appointed Experts

Procedural innovation is particularly valuable when engaging with party-appointed experts, to ensure that their evidence is efficient and useful⁹⁸. Tribunals often require the assistance of experts in construction disputes to provide independent opinions, based on facts presented by fact witnesses and the documents that comprise the evidentiary record in the case⁹⁹. When it comes to expert witnesses, we are blessed with the clash of cultures between the common law and civil law, which each have completely different approaches to experts. In the civil law approach, it is rare that a court would be interested in hearing from a party-appointed expert. By and large the court will appoint the expert, who will investigate and report back to the court independently of any party's submissions. They are remunerated by the court, although ultimately paid by the party who bears the costs of the matter.

On the other hand, for many years, the common law world has relied on party-appointed experts which, at times, the judiciary has recognised as being less than helpful¹⁰⁰. The role of expert evidence is to assist the tribunal in understanding the technical elements of the dispute. This is often forgotten as party-appointed experts act as 'hired guns', hindering the efficient and economic resolution of the dispute.

Civil law lawyers in international arbitration have embraced the concept of party-appointed experts with enthusiasm, not having experienced the problems faced by the common law world¹⁰¹. This 'hired gun' problem, which has been experienced by the common law world for quite some time, has accordingly become a real issue in international commercial arbitration, including construction arbitration. Tribunals should therefore take a proactive approach to managing expert evidence throughout the entire arbitration. This section suggests three strategies which collectively span the arbitration: first, early management of expert evidence; second, streamlining the exchange of expert evidence; and finally, assistance with the award and quantum calculations.

97 International Chamber of Commerce Commission, 7.

98 Jones, "Party Appointed Experts in International Arbitration: Asset or Liability?", 1.

99 Jeffrey Waincymer, *Procedure and Evidence in International Arbitration* (Kluwer Law International 2012), 931.

100 An empirical study conducted by the Australian Institute of Judicial Administration (AIJA) in 1999 found that Australian trial judges had serious concerns about the poor examination of party-appointed experts in court and the perceived bias of their evidence: Steven Rares, Ian Freckleton, Hugh Selby y Prasuna Reddy, *Australian Judicial Perspectives on Expert Evidence: An Empirical Study* (Carlton: Australian Institute of Judicial Administration Inc, 1999), 37.

101 The 2012 Queen Mary University International Arbitration Survey estimated that, where expert witnesses were involved in an arbitration, they were party appointed 90% of the time: Paul Friedland y Stavros Brekoulakis, *2012 International Arbitration Survey: Current and Preferred Practices in the Arbitral Process* (Survey, 2012), 29.

6.3.1. *Managing Expert Evidence*

Engaging early with the experts is critical to avoiding uncomfortable surprises about the nature or content of their evidence. This begins with the identification of experts and disciplines at an early stage. By doing this sooner rather than later, the tribunal and the parties may be alerted to, and can resolve expert issues which can later be intractable. There are many instances where the parties' willingness to consider expert evidence at the outset has saved all involved from unnecessary delay, cost and stress.

This strategy proved particularly useful in a recent arbitration involving the construction of a steelmaking plant. In the initial case management teleconference, the tribunal became aware that one party intended to use an employee as an expert. One can appreciate that this expert could not be considered independent, and in any event, there was not a matching of expert disciplines between the parties. The parties were therefore encouraged to reconsider and produce a Joint Statement, identifying the experts and disciplines, along with expert issues. The parties did this and were able to agree on expert topics and issues, avoiding any further CMCs or pleadings. The problem was thus averted and expert matters efficiently resolved. Had the tribunal and parties not been proactive in addressing these issues, extensive cost and time would have been wasted on considering expert evidence that was not entirely relevant or independent.

Second, the parties should be required to agree, or the tribunal should settle, a List of Expert Issues, identifying the principal issues upon which the experts of each discipline will opine. This may seem obvious, but the failure to create a common list of issues can have very significant consequences that will often be revealed at the hearing. This exercise is valuable in bringing together experts of like discipline and avoiding overlap or gaps between experts of different disciplines, which can leave the tribunal without assistance on critical expert issues. To avoid this situation, a List of Issues should be used to minimise uncertainty and inconsistency as to expert issues. The list should identify areas of disagreement on the relevant issues, which can be discussed between the parties, the experts and the tribunal, at a second CMC. This will ensure that all involved are clear as to the exact issues towards which expert evidence will be directed.

However, these first two strategies are all for naught if experts' opinions are based on different factual assumptions or datasets¹⁰². This can leave the decision-maker with the dilemma of having to 'pick one', which is concerning where both experts' opinions are based on cases pleaded at their highest, with the result that neither opinion appears entirely useful.

Therefore, the third strategy is ensuring that experts from like disciplines, to the extent possible, opine on the same factual assumptions, methodologies and datasets. To this end, the tribunal should suggest, at an early stage, that experts provide their analysis using the alternate assumptions and methodologies adopted by their counterpart. While it may appear that experts (particularly quantum and delay experts) have many differences of opinion, this technique will weed out the differences that are based solely on differing contractual interpretations, methodologies or other assumptions. It will highlight the areas of actual expert disagreement. Reaching consensus and establishing order at this early stage can then pave the way for further helpful engagement as the proceedings unfold.

6.3.2. *Exchanging Expert Evidence*

Having ensured that the expert evidence is of relevance and is based upon the same assumptions and methodologies, the next consideration is the process of exchanging this evidence. There are of course a broad range of approaches. This article will explore two: the use of expert conclaves and hot tubbing.

Expert conclaves involve the detailed conferral, "without prejudice", between experts of like discipline from an early stage in the proceedings. This culminates in a joint report identifying the matters of agreement and disagreement between the experts. Guided by this collaborative effort, subsequent individual reports can be confined to the matters upon which the experts disagree. This discourages experts from taking starkly opposed and deeply entrenched positions from which they may later be reluctant to depart. This process is most effective when experts embrace their duty to assist the tribunal and engage in good faith in the process of conferring with one another.

This conferral process also enhances the ultimate effectiveness of hot tubbing, another strategy used to streamline expert issues. Hot tubbing refers generally to the process of taking evidence from witnesses in the presence of other witnesses (from both sides of the dispute) and allowing them to engage with the tribunal, and each other, as to the accuracy of their claims. It is particularly helpful in circumstances

¹⁰² Walker y Jones, *Procedural Order No. 1*, 393.

where there are complex factual and technical issues and multiple experts and so is commonly deployed in construction arbitration. Hot tubbing allows the experts to share their conclusions in response to live issues put to them by the tribunal. Often this will provide the tribunal with insights that go to the root of issues upon which they seek clarification. While the benefits of hot tubbing are well-known, and the practice is commonplace¹⁰³, it is far more successful in situations where the tribunal has proactively managed the expert evidence.

One way to best utilise experts of like disciplines is to have each expert express conclusions on the reasoning or assumptions adopted by the other expert. This is often necessary in complex construction cases, particularly for quantum and delay analysis, where experts may adopt alternative positions. This approach essentially asks each expert to consider whether, if they adopted their counter-expert's factual assumptions, they would reach the same outcome or a different outcome, and if different, what those differences would be. This is useful because it prevents a situation where, if the tribunal decides a certain factual issue one way, they are not left only with the assistance of the one expert whose report makes the same factual assumption. The utility of the expert reports is therefore maximised irrespective of the factual or methodological position ultimately taken by the tribunal.

6.3.3. Assistance with the Award

It is my suggestion that the involvement of experts after their oral evidence at the main evidentiary hearing can greatly assist the tribunal in undertaking the calculations that underpin the orders in the final award¹⁰⁴. On one view, this is a radical consideration. After all, it might be asked, what role remains for expert witnesses after their testimony has been given? My suggestion is that the experts can play a highly valuable role— and particularly quantum experts — in assisting with the final calculations¹⁰⁵. This is particularly so for the calculation of damages or interest, which are often mathematically complex.

In some instances, the once the tribunal has formed its view on the relevant issue of principle or factual finding, the tribunal can insert its decision into a valuation model created by the experts using their mathematical methodology. The model will then generate the quantitative value of claims or resultant damages, based on the tribunal's findings.

However, the expense of building such datasets and models can be significant. Therefore, in other instances where the cost of producing such a model is disproportionately time consuming and expensive, the tribunal should instead decide each of the factual matters and provide those findings to the experts on a confidential basis for them to agree on the consequential valuation¹⁰⁶. In this setting, the experts are asked to confer and produce the relevant calculations based on the tribunal's actual findings of fact and principle. This economical approach eliminates the need to base the experts' conclusions off a range of assumptions or a complex model.

Such an arrangement requires the agreement of an Experts Access Protocol, which takes the form of a tripartite agreement between the tribunal, the parties, and the relevant set of experts¹⁰⁷. Most often this will be quantum experts, although the same approach can also be used for delay experts. This Expert Access Protocol involves a mutual agreement that the Tribunal is to confidentially communicate with the experts for the purposes of their performing the calculations. These communications should not involve the provision of expert opinion, but only the performance of calculations. The parties must also agree that the costs of the experts' work are approved by the tribunal for payment by the parties.

These approaches, whether the use of data modelling or joint assistance from experts of like discipline, ensures that the tribunal's calculations on quantum are correct, and can reduce the costs which would otherwise be required for the tribunal to ascertain quantum without expert assistance.

6.4 Expert Teaming

In his 2010 paper presented at the ICCA Congress in Rio de Janeiro, Dr Klaus Sachs introduced the concept of expert teaming¹⁰⁸. Briefly, expert teaming consists of parties presenting a list of desired experts to the

103 Jonathan Lee, "Controlling Expert Evidence in International Commercial Arbitration", *Asian Dispute Rev.*, vol. 19 (2017): 9.

104 Jones, "Party-Appointed Experts".

105 Jones, "Party-Appointed Experts".

106 Jones, "Party-Appointed Experts", 12.

107 Jones, "Party-Appointed Experts", 11.

108 Klaus Sachs, "Experts: Neutrals or Advocates. Protocol on Expert Teaming: A New Approach to Expert Evidence". *International Council for Commercial Arbitration Congress* (Rio de Janeiro, 25 de mayo, 2010).

tribunal. Each party is given the opportunity to register any conflicts of interest with the opposing party's listed experts. Taking these into account, the tribunal selects an expert from each list and appoints the two experts jointly as an 'expert team'. Following this, the tribunal, the experts and the parties meet to establish a protocol by which the expert evidence will be adduced. The expert team will then prepare a joint report and may be questioned by the tribunal or the parties at their discretion. The expert team is expected to work as an independent team, and all communication with the parties or the tribunal must be disclosed to both members of the team.

This concept has many strengths, in that it attempts to minimise the feelings of loyalty often associated with party-appointed experts. Further, it ensures that the parties are able to use an expert of their choice, as opposed to the use of a tribunal appointed expert. By having each party produce their own list of experts, each party is given significant input into the choice of experts, but without the difficulties associated with having both parties agree on a single expert. Finally, expert teaming has cost and time benefits, as only a single expert report is produced, reducing the amount of work undertaken by each expert. This also prevents a situation whereby two conflicting reports are produced, based on disparate assumptions. My experience in international arbitration suggests that party-appointed experts continue to be the popular choice by parties and unfortunately, despite its obvious benefits, expert teaming has not, so far, been widely adopted by parties and tribunals.

6.5 Evidentiary Hearing

A well-planned and managed evidentiary hearing is an essential part of a successful arbitration. To help achieve this, a pre-hearing CMC should be used to establish the procedure of the hearing, and to resolve any unresolved issues. This is critical for both virtual hearings and in-person hearings. Ideally, this should take place at least several weeks prior to the hearing, in order to leave sufficient time for the parties to address matters arising from that conference. This can include agreement on facts, chronologies and dramatis personae, translation (should this be necessary), and the alignment of both sets of counsel with the procedure agreed or established.

The tribunal should also address the format of opening submissions, which will differ from case to case. Where the parties' cases have not been pleaded in detail, pre-hearing submissions are required. However, the tribunal must consider the cost and time this entails. Written opening submissions should be reserved for cases that require them, and where they are adopted, appropriate procedural limitations should be put in place (e.g. page limits) in order to retain proportionality. Agreeing on the hearing timetable and adhering to it will also help to reduce delay.

Proactive case management does not end at the evidentiary hearing. The tribunal should continue to consider the parties' unique needs when shaping the format and structure of closing submissions. One consideration may be the incorporation of witness testimony from the evidentiary hearing. Ultimately, oral and written opening and closing submissions each have their merits and will depend on the case at hand.

7. Concluding remarks

Evidently, innovative evidence procedure in construction arbitration canvasses a broad range of concepts. In ordinary parlance, the term 'innovation' is almost synonymous with technology. It therefore seems impossible to overlook the significant advantages that technology brings to arbitration, particularly during the COVID-19 pandemic. In saying this, technology alone will not improve the efficiency of arbitration; it acts in conjunction with the proactive use of procedural innovations. Both procedural and technological advancements can make construction arbitration more efficient and effective. Innovations in these two spheres frequently overlap. For example, a proposal to visit a project site or use UAVs would have to be placed on the procedural timetable and may be the subject of a CMC via teleconference before a decision is reached. The integration of BIM could be particularly useful in creating a common set of data which expert witnesses can then be directed to opine on. Similarly, a virtual hearing will not be effective without a proactive approach to case management, the product of which is reflected in the virtual hearing protocol.

The complexity of construction disputes commands special attention and constant innovation. Arbitration is well-equipped to meet the challenges of such disputes. The disruption caused by the COVID-19 pandemic has demonstrated the need for international arbitration participants to embrace innovation and to respond to new forms of technology. Arbitration hearings are largely conducted virtually, new platforms have emerged to facilitate these virtual hearings and institutions have devised ways to facilitate the organisation of these changes. However, the value of technology is limited without the concurrent use of procedural innovation. My experiences have shown, time and time again, the value of proactive procedural

management, which can be deployed to reduce cost and delay. There is no one size fits all approach in arbitration. A creative tribunal and open-minded parties can create boundless innovation and provide parties with maximum value.

Although technology, and virtual hearings in particular, presents its own challenges, the examples of technological innovation highlight that the tribunal should remain open to new technology. Indeed, the use of these technologies and the willingness of arbitrators and the parties to incorporate them into their current practice is critical to the viability of international arbitration. Regardless of one's technical prowess, even the most basic forms of technology can contribute to the efficiency of construction arbitration. It is hoped that the ideas discussed will advance the quest for efficient arbitrations, in an industry with great potential for innovation.

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