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Arbitration in Space-related Disputes: A Survey of Industry Practices and Future Needs

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Abstract

To better understand the viability of arbitration in space-related disputes, we designed a survey that examines the use of arbitration clauses in contracts used by space companies, and if the use thereof is mandatory. More specifically, the survey gathers data on contracting parties' preferred seats of arbitration, arbitration institutions, selection process for arbitrators, and choice of procedural and substantive rules. The survey also captures actual use of arbitration within space related disputes by collecting data on how often such arbitration clauses have been invoked and the number of disputes ultimately resolved by arbitration. Finally, the survey solicits industry preferences for the future development of arbitration as a form of dispute resolution in the space sector. The survey is built in a way that allows break down of results and comparing segments, inter alia, based on the type of contract (e.g., launch contract, insurance contract, investment contract, contract for supply of parts or services). The results of the survey will expose the demand for arbitration and the successes and barriers for the use thereof. Furthermore, the results will allow us to evaluate the success of existing arbitration infrastructure for space-related disputes, including the PCA Optional Rules for Arbitration of Disputes Relating to Outer Space Activities and the Panels of Arbitrators and Experts for Space-related Disputes. To our knowledge, there exist no surveys or catalogues on the use of arbitration in space-related disputes. The results of the survey will provide empirical data and trends that may be used by scholars, policymakers and practitioners to anchor future theoretical papers and policy recommendations.

Keywords: space law, space related disputes, arbitration, dispute resolution

Acronyms/Abbreviations

IAC - International Astronautical Congress

PCA - Permanent Court of Arbitration.

UNCITRAL - The United Nations Commission on International Trade Law

1 Introduction

Traditionally, space-related disputes have been resolved through diplomacy and negotiation, since space activities were historically predominantly executed by States. For example, Articles VI and VII of the 1967 Outer Space Treaty [1] make States the responsible entities for all activities in outer space, whether such activities are governmental or commercial. The 1972 Liability Convention [2] expands on this liability, by proposing in Article XIV a dispute-resolution mechanism for States in the form of a Claims Commission. This mechanism was invoked once, notably pursuant to the crash of the Soviet satellite Cosmos 954 in the Canadian Northwest in 1978. However, the Claims Commission has never been used [3] and the Cosmos 954 incident ended with a diplomatically obtained agreement between the two countries. There exists no other specialized mechanism for resolution of space-related disputes between States.

The landscape of space activities has since changed. The global space economy is currently a \$350 billion industry annually and it is expected to increase to more than \$1 trillion by 2040 [1]. Notably, the space industry -- which was once occupied solely by State actors, including government agencies and state-owned enterprises -- is growing to include more and more non-State actors, including for-profit and non-for-profit entities (notably companies and NGOs). This wave of growth has included everything from aerospace manufacturers like Airbus SE and Space Exploration Technologies Corporation (SpaceX), to start-ups within the NewSpace movement, and established communications satellite services providers such as Intelsat and COMSAT Inc. Thus, with the increased size of the space industry and actors -- especially for commercial purposes -- there will inevitably be an expected increase in the types of space-related disputes.

Perhaps recognizing this very need, the Permanent Court of Arbitration (PCA), an intergovernmental organization, launched the Optional Rules for Arbitration of Disputes Relating to Outer Space Activities ("PCA Optional Rules"), which came into effect on December 6, 2011 [5].

Arbitration is a voluntary, but binding, method of alternative dispute resolution wherein disputing parties refer their dispute to one or more decision-makers, by whose decision (the "award") they agree to be bound. The main advantage of arbitration is greater control for disputing parties, who in deciding to arbitrate can establish various parameters of their dispute-resolution process, including, *inter alia*, the confidentiality of their dispute-resolution proceedings, the decision-makers chosen to decide their dispute, the amount of time taken to conclude a dispute, and the place where the dispute shall be resolved.

In addition to the PCA Optional Rules, which were themselves modelled after the highly successful 2010 UNCITRAL Arbitration Rules, the PCA also proposed a "Specialized Panel of Arbitrators," [6] a "Specialized Panel of Experts," [7] and a Model Clause [8] to help entities providing space-related products and/or services in resolving their technical disputes. In so doing, the PCA took the bold step of recognizing that space-related disputes may involve not only countries, but also private actors whose activities could involve outer-space components. However, within the almost 8 years of their existence, the PCA Optional Rules have never been publicly invoked by state or non-state actors.

This begs the question: how are non-State actors that provide space-related products and/or services resolving their existing space-related disputes? And, how will such disputes be resolved in the future? Although there exists a lot of fanfare and speculation on the topic, to our knowledge, there exists no empirical research on the use of arbitration in resolving space-related disputes. To better understand the viability of arbitration in resolving a perceivably growing component of space-related disputes, we designed a survey that examines the use of arbitration by space companies offering space-related products and/or services.

Specifically, our survey seeks to: (1) assess industry demand for arbitration of space-related disputes; (2) evaluate the success of the existing arbitration infrastructure for such disputes; (3) identify challenges hindering the use of arbitration for the resolution of such disputes; and, (4) collect empirical data that will drive opportunities for future research and policy. The high-level preliminary results of our survey are presented herein.

2 Methodology and methods

2.1 The survey

Co-authors devised a research survey that would target companies operating in the space industry, particularly those providing space-related service and/or products. The survey is meant to track the dispute-resolution cycle, from start to end. The target survey respondents are legal counsel and advisors for companies that provide space-related products and/or

services. Consideration was also given to the fact that such respondents could include in-house counsel, external lawyers, and even academics providing legal advice or services to such companies.

2.2 Definitions

For the purposes of this analysis, we use the following terms to which we prescribe the following meanings below:

- "Space-related disputes" are disputes having an outer space component, i.e., relating to the exploration and use of outer space (by State and non-State actors) and/or relates to the provision of space-related products and/or services.
- "Arbitration" is an alternate method of dispute resolution that exists outside the courts, wherein disputing parties refer the dispute to one or more persons (the "arbitrators" or "arbitral tribunal"), by whose decision (the "award") they agree to be bound. This definition includes both commercial and investor-state dispute settlement.
- "Space-related disputes" are disputes having an outer space component, i.e. relating to the exploration and use of outer space (by State and non-State actors) and/or relates to the provision of space-related products and/or services.
- Finally, by "State actors" we mean government agencies and state-owned enterprises, and by "non-State actors" we mean for-profit and non-for profits entities (notably companies and NGOs).

2.3 Question sets

The survey itself comprises 20 questions and is estimated to take 10-15 minutes to complete. The survey comprises six parts tracking the dispute-resolution cycle. Specifically, the first part, entitled "Survey Participants," includes general questions on the respondent and the company they represent; the second part, entitled "Dispute-related Needs," includes questions on the respondents' company' perceived dispute-resolution needs; the third part, entitled "Contracts," includes questions regarding the contractual relations of respondents' company and the inclusion of arbitration clauses in company contracts; the fourth part, entitled "Use," includes questions on the actual use of dispute resolution in the last five years, arbitration or otherwise; the fifth part, entitled "Future," includes questions on the respondent's perceived future use of arbitration in space-related disputes, both in terms of their assessment of such use and preferences guiding such growth; the sixth and final part, entitled "Comments/questions," includes an open question for

any comments, questions or concerns about the survey or the topic thereof. Except for the last question, all questions were multiple-choice questions of various types.

The first part of the survey, entitled “Survey Participants” comprises three questions and asked respondents to share a few details about themselves and their practice. Question 1: “What is your primary role? (Choose one)” The question has six optional responses to choose from: “External counsel”; “In-house counsel”; “General counsel”; “Consultant”; “Academic”; and “Other” (under which choice respondents can enter free text). Question 2: “In which sectors does your company operate? (Check all that apply)” This question has six possible responses to choose from with an indication for respondents to check all choices that apply: “Insurance services”; “Financing and investment services”; “Satellites hardware”; “Launch/spacecraft hardware”; “Launch services”; and “Other” (under which choice respondents can enter free text). Question 3: “In which region do you principally practice or is your business headquartered? (Choose one)” The question had eight optional responses to choose from with an indication to only choose one: “Asia-Pacific”; “Oceania”; “Europe”; “Middle East and North Africa”; “Africa (excluding North Africa)”; “North America”; “Latin America”; and “Other” (under which choice respondents can enter free text).

The second part of the survey, entitled “Dispute-related Needs”, includes four questions that test the perceived dispute-related needs of respondents and their companies. Question 4: “In your opinion, how important is CONFIDENTIALITY in the resolution of space-related disputes?” The optional responses were presented on a Likert scale of 1 to 5 from “Very important” (1) to “Not important at all” (5). Question 5: “In your opinion, how important is TIMELINESS in the resolution of space-related disputes?” The optional responses were presented on a Likert scale of 1 to 5 from “Very important” (1) to “Not important at all” (5). Question 6: “In your opinion, how important are COSTS in the resolution of space-related disputes? The optional responses were presented on a Likert scale of 1 to 5 from “Very important” (1) to “Not important at all” (5). Question 7: “In your opinion, how important is the TECHNICAL EXPERTISE of decision-makers in the resolution of space-related disputes?” The optional responses were presented on a Likert scale of 1 to 5 from “Very important” (1) to “Not important at all” (5).

The third part of the survey, entitled “Contracts”, includes three questions and asks respondents to share details about existing space-related products and/or services contracts entered into by their company. Question 8: “In the last five years, what PROPORTION of your company’s space-related contracts were with non-state actors (as compared to state actors) (Choose

one)?” The question has four possible responses to choose from with an indication to choose one: “Mostly with non-state actors”; “About equally with state and non-state actors”; “Mostly with state actors”; and “Don’t know/not sure”. Question 9: “In the last five years, how often has your company included arbitration clauses in their space-related contracts with NON-STATE actors? (Choose one)” The question has six possible responses to choose from with an indication to choose one: “Always”; “Very often”; “Sometimes”; “Rarely”; “Never”; and “Don’t know/not sure.” Question 10: “In the last five years, how often has your company included arbitration clauses in their space-related contracts with STATE actors? (Choose one)” The question has six possible responses to choose from with an indication to choose one: “Always”; “Very often”; “Sometimes”; “Rarely”; “Never”; and “Don’t know/not sure.”

The fourth part of the survey, entitled “Use”, is the longest, comprising seven questions which ask respondents to share details about how they use dispute resolution processes, including arbitration. Question 11: “Of the space-related disputes you have been involved with in the last five years, which dispute resolution mechanisms have you encountered? (Select all that apply)” The question has ten possible responses to choose from with an indication to respondents to select all that apply: “Litigation”; “Mediation”; “Negotiation”; “Investor-state arbitration”; “International commercial arbitration”; “Domestic commercial arbitration”; “Special tribunal”; “Expert determination”; “Don’t know/not sure”; and “Other” (under which choice respondents can enter free text). Question 12: “Of the space-related disputes you have been involved with in the last five years, how often have those disputes been resolved through arbitration? (Choose one)” The question has six optional responses to choose from with an indication to choose one: “Always”; “Very often”; “Sometimes”; “Rarely”; “Never”; and “Don’t know/not sure.” Question 13: “Of the space-related disputes you have been involved with in the last five years where the dispute was referred to arbitration, how long did the dispute take to be resolved (on average)? (Choose one)” The question has six optional possible responses to choose from with an indication for respondents to only choose one: “Less than one year”; “1-2 years”; “2-4 years”; “4-6 years”; “More than 6 years”; and “Don’t know/not sure.” Question 14: “Of the space-related disputes you have been involved with in the last five years where the dispute was referred to arbitration, what was the seat of arbitration? (Check all that apply)” This question has 14 possible responses to choose from with an indication for respondents to select all that apply: “Cairo”; “Dubai”; “Geneva”; “Hong Kong”; “London”; “New York”; “Montréal”; “Paris”; “São Paulo”; “Singapore”; “Stockholm”; “Zurich”; “Don’t know/not

sure”; and “Other” (under which choice respondents can enter free text). Question 15: “Of the space-related disputes you have been involved with in the last five years where the dispute was referred to arbitration, which arbitral institution was used? (Check all that apply)” The question has 11 possible responses to choose from with an indication to check all that apply: “Ad-hoc”; “Hong Kong International Arbitration Centre (HKIAC)”; “International Chamber of Commerce (ICC)”; “International Centre for Dispute Resolution (ICDR)”; “International Centre for Settlement of Investment Disputes (ICSID)”; “London Court of International Arbitration (LCIA)”; “Permanent Court of Arbitration (PCA)”; “Arbitration Institute of the Stockholm Chamber of Commerce (SCC)”; “Singapore International Arbitration Centre (SIAC)”; “Don’t know/not sure”; and “Other” (under which choice respondents can enter free text). Question 16: “What characteristics do you look for when appointing an arbitrator in a space-related arbitration? (Check all that apply)” The question has 10 possible responses to choose from with an indication for respondents to select all that apply: “I do not make arbitral appointments”; “Technical expertise”; “Diversity of the tribunal”; “Familiarity with applicable law”; “Experience in arbitration”; “Arbitrator availability”; “Interaction with other tribunal members”; “Prior appointments”; “Don’t know/not sure”; and “Other” (under which choice respondents can enter free text). Question 17: “Of the space-related disputes you have been involved with in the last five years, how often do parties voluntarily comply with arbitral decisions? (Choose one)” This question has six optional responses to choose from with an indication to respondents to only choose one: “Always”; “Very often”; “Sometimes”; “Rarely”; “Never”; and “Don’t know/not sure.”

The fifth part of the survey, entitled “Future”, includes three questions and asks respondents to provide their opinions about the future of arbitration in resolving space-related disputes. Question 18: “In your view, how likely is it that the use of arbitration for resolving space-related disputes will increase in the future? (Choose one)” The question has four optional responses with an indication to respondents to only choose one: “More likely”; “No change”; “Less likely”; and “Don’t know/not sure”. Question 19: “In your view, which of the following improvements and innovations would make arbitration more suitable for resolving space-related disputes? (Check all that apply)” The question has seven possible responses with an indication for respondents to select all that apply: “Establishment of a dedicated roster of arbitrators with specialist industry/sector experience”; “Greater industry harmonization of standards and processes (e.g., for the assignment of liability and responsibility)”; “More sector-specialized arbitral institutions”; “More sector-

specialized arbitral rules”; “Increased efficiency, including through technology”; “Don’t know/not sure”; and “Other” (under which choice respondents can enter free text). Question 20: “In your view, which stakeholders are best placed to influence the future evolution of arbitration for space-related disputes? (Check all that apply)” The question has 10 possible responses with an indication to respondents to select all that apply: “Arbitral institutions”; “Arbitration-related interest groups/bodies (e.g., ICCA, IBA Arbitration Committee)”; “Arbitrators”; “External counsel”; “In-house and general counsel”; “Space-related interest groups/bodies (e.g., Space Frontier Foundation, the Planetary Society, etc.)”; “States (e.g., Space agencies, Ministries of Justice)”; “Space-related companies (non-legal personnel)”; “Don’t know/not sure”; and “Other” (under which choice respondents can enter free text).

The Sixth and last part of the survey, entitled “Comments/questions”, provided respondents with some short-answer text space to note any other comments, questions, or concerns about the survey or the topic of space-related arbitration.

2.4 *Dissemination and administration of the survey*

This survey is designed to be completely voluntary and anonymous. Specifically, to improve rates of response, none of the questions inquire into personal or identifying details of the respondent. Further, none of the questions inquire into identifying details of the company the respondent advises, save for general details on the disputes activities of the company. Due to our commitment to anonymity, co-authors are not able to track response rates. As mentioned above, the target participants and/or survey respondents are legal counsel and advisors for companies that provide space-related products and/or services.

The survey was administered exclusively online using Google Forms, a survey administration app developed by Google LLC.

The co-authors’ appeal to respond to the survey included general information on the survey, its purposes and the intended respondents, as well as a link to the survey webpage and a QR code, which is a barcode that, when scanned, conveniently points the scanner directly to the survey. Thus, the survey was disseminated to potential respondents: (1) by personal contact, (2) through relevant space-related forums, and (3) by social media platforms, specifically LinkedIn and Twitter. Notably, the survey was not posted or advertised publicly to reduce the possibility of irrelevant respondents and dilution of results.

The first stage of dissemination started on August 12, 2019 and targeted space law scholars and practitioners which the authors personally know, or are affiliated to McGill University’s Institute of Air and Space Law. The second stage of dissemination targeted circulation

through relevant space-related forums, including the American Bar Association's Space Law Committee; the Canadian Bar Association's Air and Space Law Section; the Australia and New Zealand Space Law Interest Group; the Space Industry Association of Australia; and the International Institute of Space Law (IISL).

In addition to the above methods, limited information about the survey was uploaded to social media, specifically to LinkedIn and Twitter. This information did not include a link to the survey webpage, so as to refrain responses by non-relevant individuals. Instead, the posts on LinkedIn and Twitter encouraged users to share the information relating to the survey. LinkedIn and Twitter users thus had an opportunity to recommend possible survey candidates using the "Like" button, Direct Messaging, or by posting a comment. This approach allows the researchers to vet each person responding to the survey and send them the link to the webpage if – and only if – they meet the profile of a legal advisor or consultant of a space company providing space-related legal and/or dispute resolution services.

The survey will be administered for a period of four months ending December 11, 2019.

3 Results

3.1 Survey participants

The following results track the responses of 25 survey participants. The demographics of survey participants is broken down by their primary role, the sectors within which their company operates, and in which region they principally practice or where their company is headquartered.

Survey participants were primarily academics (24%), followed by external counsel (20%); consultants (16%); general counsel (16%); and in-house counsel (12%). Minority participants included CEOs and/or entrepreneurs (8%) and other professionals in the space sector (4%).

Satellites hardware (15%), launch services (15%), launch/spacecraft hardware (11%); financing and investment services (11%); and space research and technologies sectors constituted the top five sectors where survey participants' companies operated. This was followed by space governance (9%); insurance services (7%); and space telecommunications (7%) sectors. Operations services (4%); academia (4%); hosting services (2%); legal consulting (2%); and international dispute resolution (2%) were the remaining sectors where survey participants' companies operated. A small number of respondent(s) did not answer this question adequately and were thus excluded from results (4%).

Out of 24 responses, the majority of survey participants worked in businesses that principally practiced or were headquartered in Europe (37.5%) and

North America (37.5%), followed by those in Latin America (12.5%); global (8.3%), and Asia-Pacific (4.2%). Notably, there were no respondents from Oceania; Middle East and North Africa; and Africa (excluding North Africa). A small number of respondent(s) did not answer this question (4%).

3.2 Dispute resolution needs

We also tried to better understand the general dispute-related needs of our survey respondents. Overall, the top three needs of our survey respondents were confidentiality, timeliness, and technical expertise of decision-makers in the resolution of space-related disputes. The majority of survey respondents (80%) ranked confidentiality as "Very important" or "Fairly important" to the resolution of their space-related disputes. A slightly lesser majority of survey respondents (76%) ranked the technical expertise of decision-makers as "Very important" or "Fairly important" in the resolution of space-related disputes. Similarly, a majority of survey respondents (72%) ranked timeliness as "Very important" or "Fairly important" to the resolution of their space-related disputes. Finally, costs in the resolution of space-related disputes had the most mixed response. On one hand, a minority of survey respondents (24%) considered costs as being "Slightly important" or "Not at all important", and a larger majority (52%) considered costs to be "Very important" or "Fairly important". A notable group of survey respondents (24%) considered costs to be neither important, nor unimportant.

3.3 Existing contracts

Next, we were interested in understanding the underlying framework of dispute resolution for survey respondents, as exemplified in the space-related products and/or services contracts entered into by respondents' companies. Here, we first sought to inquire what proportion of space-related contracts were with state and non-state actors, and how often companies are including arbitration clauses in space-related contracts with state and non-state actors.

Interestingly, a little less than half survey respondents reported that a majority of contracts entered into by their companies (40%) were proportionally more with non-state actors than with state actors. A smaller group of survey respondents reported that their companies' contracts were about equally with state and non-state actors (24%). An even smaller subset of survey respondents reported that their companies' contracts were with mostly state actors (4%). These results are weakened by the fact that a large number of survey respondents (32%) did not know or were not sure what proportion of their companies' space-related contracts were with state or non-state actors.

Relatedly, we wished to know how often survey respondents' companies included arbitration clauses in their space-related contracts with non-state actors. The majority of respondents (52%) answered "Always," or "Very often," though these results were diluted by the fact that an equally large number of respondents (32%) did not know or were not sure of how to answer this question. A minority of respondents (4%) answered "Sometimes." The remaining respondents (12%) reported their companies as "Rarely," or "Never" engaging in space-related contracts with non-state actors.

Separately, we wanted to know how often survey respondents' companies included arbitration clauses in their space-related contracts with state actors. The majority of respondents (44%) did not know, or were not sure how to answer this question, which points to obvious limitations in the study. Nevertheless, at least some survey respondents (32%) were certain that their companies either "Always" or "Very often" had included arbitration clauses in their space-related contracts with state actors in the last five years. Another minority group of survey respondents pointed to their companies "Sometimes" (12%) using arbitration clauses in their space-related contracts with state actors. Others estimated this number as being "Rarely" or "Never" (12%).

3.4 *Use of dispute resolution processes, including arbitration*

The subsequent set of questions turned to the actual use of arbitration in resolving space-related disputes. First, to establish a baseline, survey respondents were asked which dispute resolution mechanism they had encountered during space-related disputes within the last five years. Second, the same respondents were asked about how many of the space-related disputes they were involved with in the last five years were resolved through arbitration. With respect to the disputes that were resolved using arbitration within the last five years, survey respondents were asked to respond on a number of technical questions, specifically: (i) the amount of time taken to resolve the dispute; (ii) the seat of arbitration; and (iii) the arbitration institution(s) used. Survey respondents were also asked to share which characteristics were of interest to them when appointing an arbitrator in a space-related arbitration. The last question in this question set sought to understand survey respondents' understanding of post-arbitration action, including how often they thought disputing parties had voluntarily complied with arbitral decisions.

Of the 24 responses, by and large, most survey respondents were familiar with negotiation (29.2%); international commercial arbitration (20.8%); expert determination (16.7%); and mediation (16.7%).

Surprisingly, a large set of survey respondents (33.3%) did not know or were unsure of which dispute settlement mechanisms they had encountered in the last five years, indicating a potential lack of technical knowledge on the topic. Other survey respondents reported encountering litigation (8.3%); investor-state dispute resolution (4.2%); domestic commercial arbitration (8.3%); special tribunals (8.3%) and inter-state negotiations (4.2%). Some survey respondents indicated that they had not been involved in any disputes at all (8.4%). A small number of respondent(s) did not answer this question (4%).

Looking to the number of space-related disputes over the last five years, the majority of survey participants were not knowledgeable (39.1%) (didn't know or were not sure) on how many of the space-related disputes they had been involved in within the past five years were resolved through arbitration. Out of the respondents who affirmatively answered the question, the majority of respondents (30.4%) estimated "Never" or "Rarely." In contrast, a few respondents (17.3%) pointed to arbitration as resolving their space-related disputes either "Always" or "Very often". A subset of respondents also signaled that their disputes had been resolved through arbitration "Sometimes" (13%). A small number of respondent(s) did not answer this question (8%).

3.4.1 *Time taken to resolve a dispute*

Although respondents hold timeliness to be an important quality for their method of dispute resolution, most of them were unaware of how long a space-related dispute they had been involved in took to be resolved through arbitration (on average) (60.9%). Of the respondents who answered this question, the majority estimated 1-2 years (17.4%), followed by 2-4 years (7.4%) and "less than one year" (7.4%). Only a small minority of respondents answered as their arbitral dispute taking 4-6 years (4.3%). Notably, no respondents answered that their arbitral dispute took more than 6 years to resolve. A small number of respondent(s) did not answer this question (8%).

3.4.2 *Seat of arbitration*

The majority of respondents did not know or were not sure about which seat of arbitration applied to their space-related disputes (35%). Common arbitral seats in space disputes resolved by arbitration were New York (15%); Paris (11%); and London (8%). Geneva (4%), Moscow (4%) and an unnamed city in Australia (4%) were also other seats identified by respondents. None of the respondents surveyed indicated a Cairo, Dubai, Geneva, Hong Kong, Sao Paulo, Singapore, Stockholm, or Zurich-based seat (0%). A significant number of respondents (15%) indicated this question was not applicable to them and others did not share their

preferences due to confidentiality concerns (4%). A small number of respondent(s) did not answer this question (8%).

3.4.3 *Arbitration institutions*

Looking to the use of particular arbitration institutions, the International Chamber of Commerce (ICC) seemed to be used more often than other disputes (16%). Other arbitral institutions included the London Court of International Arbitration (8%); the International Centre for Dispute Resolution (ICDR) (8%); the Australian Dispute Resolution Centre (4%); the International Commercial Arbitration Court (ICAC) at the Chamber of Commerce and Industry of the Russian Federation (4%). A number of respondents also reported the use of ad-hoc arbitration (8%). Unfortunately, these results are not very telling since a large majority of respondents (32%) did not know or were not sure of which arbitration institution was used to resolve their space-related disputes. Some survey respondents self-acknowledged that this question did not apply to their circumstances (16%) or did not share their preferences due to confidentiality concerns (4%). Further, a small number of respondent(s) did not answer this question (8%). Finally, and notably, the Permanent Court of Arbitration (PCA) was not indicated by survey respondents as an arbitral institution that was used by disputing parties to resolve their space-related disputes in the last five years. Similarly, none of the respondents referred to the Hong Kong International Arbitration Centre (HKIAC); the International Centre for Settlement of Investment Disputes (ICSID); Arbitration Institute of the Stockholm Chamber of Commerce (SCC); and Singapore International Arbitration Centre (SIAC) under this question.

3.4.4 *Arbitrator characteristics*

When assessing the preferred characteristics of arbitrators, many survey respondents recognized that they do not make arbitral appointments (21%). Nevertheless, of the respondents who went on to answer the question, the most sought out arbitrator characteristics were: (1) experience in arbitration (18%); (2) technical expertise (16%); (3) arbitrator availability, including arbitrator reliability (14%); and (4) familiarity with applicable law (12%). Respondents also expressed the importance of looking at prior appointments (6%); arbitrator interaction with other tribunal members (4%); diversity in a tribunal (2%); political acceptability (2%); and professional ethics (2%). A small sub-set of respondents were not sure or did not know how to answer the question (2%). A small number of respondent(s) did not answer this question (8%).

3.4.5 *Compliance*

Finally, most survey respondents did not know or were not sure how often disputing parties voluntarily complied with arbitral decisions (56.5%). Out of those who answered, a number of respondents (17.3%) reported that voluntary compliance of arbitral awards happened "Rarely" or "Never". In contrast, a slightly larger number of respondents (21.7%) reported voluntary compliance either "Always" or "very often". There were some respondents who reported voluntary compliance only "Sometimes" (4.3%). A small number of respondent(s) did not answer this question (8%).

3.5 *Future of arbitration in resolving space-related disputes*

Looking to the future, we also wanted to know our respondents' predictions of whether the use of arbitration to resolve space-related disputes would increase in the future. Unsurprisingly, survey respondents overwhelmingly signalled that the future use of arbitration was "More likely" (60%). A group of respondents predicted "No change" whatsoever (20%), with a smaller subset believing that the use of arbitration would decrease with time (8%). Some respondents did not know or were not sure whether the use of arbitration would increase in the future (12%).

When asked which improvements and innovations would make arbitration more suitable for resolving space-related disputes, respondents expressed interest in: (1) the establishment of a dedicated roster of arbitrators with specialist industry/sector experience (30%); (2) greater industry-wide harmonization of standards and processes (e.g., for the assignment of liability and responsibility) (28%); and (3) increased efficiency, including through technology (21%). A smaller group of survey respondents also expressed a need for more sector-specialized arbitral institutions (12%) and more sector-specialized arbitral rules (9%). A small number of respondent(s) did not answer this question (4%).

According to our respondents, the top four actors best placed to influence the future evolution of arbitration in the resolution of space-related disputes are States (e.g., Space agencies, Ministries of Justice) (52%); in-house and general counsel (48%); external counsel (40%); and space-related interest groups/bodies (e.g., Space Frontier Foundation, the Planetary Society, etc.) (40%). A large number of survey respondents also expressed the opinion that non-legal personnel in space-related companies (36%); arbitration-related interest groups/bodies (e.g., ICCA, IBA Arbitration Committee) (32%); arbitral institutions (28%) and arbitrators (24%) were also well-positioned to influence the future evolution of arbitration as a dispute-resolution method.

4 **Discussion**

A few high-level observations may be gleaned from the results of the survey, which are still preliminary.

4.1 *Participation in the survey*

To date, the survey has been in circulation for two months. Researchers have sent several dozens of emails, many of which have included multiple email correspondents. Together with the information disseminated through appropriate space-forums described previously, word of the survey has undoubtedly reached several hundreds of people.

Within this period, data collection on this topic has been difficult, especially due to the availability of target respondents (legal counsel and advisors for companies that provide space-related products and/or services) combined with the confidential nature of dispute resolution.

Indeed, only 25 people have responded to the survey thus far. This amount provides statistically valid results but a wider participation rate is needed to improve the reliability of the results and information collected through the survey. The interim results, presented in this paper, will be presented at the 70th International Astronautical Congress (IAC) to be held in Washington DC between October 21 and 25, 2019. The co-authors plan to further promote participation in the survey at the IAC, in particular, through their presentation. The co-authors are hopeful that more respondents will be persuaded to respond to the survey. As mentioned, the survey will remain open to responses through December 11, 2019.

While academics comprise the largest single category of respondents to date, most of the cumulative respondents are practitioners, a category that includes external counsel, consultants, general counsel, and in-house counsel. However, in terms of access and knowledge about company preferences and practices relating to dispute-resolution procedures, in-house counsel and general counsel typically have more information than external legal advisors (i.e., external counsel, consultants and academics) who may only have partial knowledge on a particular space-company's preferences and practices. This last group, together with CEOs and entrepreneurs, comprises, a little more than a third of respondents in the present results, and helps explain respondents' knowledge gaps, which are illustrated below.

Most of the respondents surveyed belonged to companies that are providers of satellites hardware products or hardware related services (e.g. launch services, launch/spacecraft hardware), with other categories including classic service providers, including financial services and space research and technology organizations. These results are in line with the breakup of the space-industry sector, which the satellites sector

dominates. Further, most of the surveyed respondents belonged to companies that were based in Europe and North America. This geographical distribution of the respondents represents a traditional distribution of the industry. However, this distribution of the space sector may be disproportional, as compared to other fast-growing regions, especially Asia. Two reasons explain the limitation of our research results to date. First, in India, a major spacefaring nation, space activities are still concentrated with the government as opposed to non-State actors. Second, China, another major spacefaring nation, has proven difficult to survey as individuals have been reluctant to respond, even under the conditions of anonymity. At the other side of the spectrum, there was satisfactory participation from Latin America, considering its share in the global space sector.

4.2 *Dispute resolution needs*

Not surprisingly, the survey revealed that respondents within space companies value confidentiality, timeliness, technical expertise of the decision-makers within their dispute-resolution processes. These are common reasons why commercial parties to a dispute often turn to arbitration, as litigation cases may last years, the discussions and decisions are open to the public and the judges often lack expertise in the subject matter. The perceived importance of costs varied greatly between the respondents, which might be attributed to the size of the company to which respondents belong – with larger companies being less price sensitive to dispute-resolution costs than smaller companies.

4.3 *Existing contracts*

The responses indicate that a majority of the contracts entered into by the surveyed companies are with other non-State actors. However, these survey results are weak due to a general lack of knowledge of the legal advisors and counsel surveyed. If these results reflect the actual contractual relations of the surveyed companies, this would confirm the trend by which the private sector is taking the lead in space-related activities. The results further indicated a significant majority of contracts with non-State actors include arbitration clauses. However, these results are similarly weak due to the large number of respondents that did not know or could not answer this question.

The results regarding contracts with State actors are similarly indecisive, though also hint at the use of arbitration clauses. If these results reflect the actual contracts of the surveyed respondents, then it may be a strong indication that space companies negotiating space-related products and/or services do see arbitration as a preferred mode of dispute resolution.

4.4 *Use of dispute resolution processes, including arbitration*

While most respondents seemed to be aware of the various modes of dispute resolution, including all major alternatives to adjudication (e.g., negotiation; arbitration; expert determination; and, mediation), they had little knowledge of their companies' own use of arbitration and whether such a method of dispute resolution has brought their companies success in resolving space-related disputes. This lack of knowledge is a significant limitation of the study results to date.

Some respondents indicated, in the survey comments or in their discussions with the co-authors, that small companies tend to avoid adversarial methods of dispute resolution in favour of resolving disputes through negotiations. These respondents further noted that even if litigation or arbitral proceedings are launched, negotiations continue and often lead to a settlement. This may be a reasonable strategy for smaller companies, considering the costs of arbitration. Similarly, large companies have the means to pursue arbitration but often may prefer negotiations in order to maintain adequate business relations with the other party.

The results from the survey do not sufficiently indicate the length of time it takes to resolve disputes through arbitration, as a large majority of respondents lacked enough knowledge to answer such this question. As mentioned, this insufficient knowledge may be attributed to the types of respondents, since in-house counsel and general counsel are more likely to be privy to such information through the dispute resolution cycle than all other respondent types.

The places most indicated as seats of arbitration in space-related disputes are New York, Paris and London, though many respondents were also similarly limited in their knowledge of this question. New York, Paris, and London constitute the most common seats of arbitration and match the distribution of the surveyed respondents, whose companies were primarily from North America and Europe. The International Chamber of Commerce (ICC) was flagged as the most used arbitral institution for the resolution of space-related disputes by space companies, though results here are similarly indecisive due to insufficient knowledge of the respondents. However, if these results reflect the actual use of arbitral institutions, this would demonstrate that the optional resources proposed by the PCA in 2011, have to date hardly been used. Further, considering the respondents' preference for decision-makers who have technical expertise in the field, it is surprising to see that the PCA expert panels and arbitrators were not referred to by any survey respondents. This may indicate insufficient awareness of the work of the PCA, or insufficient

acceptance of the procedure or arbitrator and expert panels established by the PCA.

Respondents' preferences regarding preferred characteristics of the arbitrators appointed to help resolve space-related disputes are not surprising, with respondents emphasizing an arbitrator's experience in arbitration, their technical expertise, availability and reliability, as well as familiarity with applicable laws. Such results are expected in any industry with specific commercial needs and the space industry does not seem any different in this respect.

Survey results assessing respondent's perceived compliance with arbitral awards, once such decisions have been issued, showed a slightly greater instance of compliance than non-compliance. It should nevertheless be noted, that the results are unreliable due to most respondents lacking knowledge on this question. However, to the extent respondents believe that arbitration of space-related disputes suffers from a voluntary compliance problem, this finding requires further follow-up, particularly by space-industry associations, as well as those in the legal industry who work on the recognition and enforcement of arbitral awards. This is particularly so given that one of the perceived advantages of arbitration is a high rate of voluntary compliance.

Insufficient knowledge of the respondents on the use of arbitration in contracts and disputes is a significant limitation in the preliminary results to date. Given the demographics of the survey participants, it is estimated that most respondents are legal advisors who provide partial legal consultation to space-companies who are not involved in the full dispute resolution cycle. Going forward, this limitation may be overcome by expanding the participant base of survey respondents to more practitioners, especially in-house general counsel within space companies.

4.5 *Future of arbitration in resolving space-related disputes*

To date, an overwhelming majority of survey respondents estimate a future for arbitration in resolving future space-related disputes. A smaller group of participants predict no change in the use of arbitration to resolve future space-related disputes. This hesitation indicates that there may be other alternatives to arbitration that are deemed sufficiently favourable by respondents, especially based on the size of their companies and the perceived maturity of the space industry.

To the question of which improvements and innovations may help make arbitration more suitable for resolving space-related disputes, respondents expressed preferences for the establishment of a dedicated roster of arbitrators who have the experience and expertise in the space sector, as well as industry-wide harmonization

of standards and processes. Considering that the PCA rules and panels provide just that, further research may be required to assess respondent's knowledge of the PCA Optional Rules and specialized arbitrator and expert panels. Increased efficiency, including through technology, was another preference expressed by the respondents. Making arbitration more efficient is in line with the view of arbitration practitioners and the application of technology to arbitration processes is a hot topic in the arbitration spheres.

Finally, survey respondents viewed States, in-house and external counsel and space-related interest groups/bodies as having the most effect on the future of arbitration in resolving space-related disputes. This is not surprising since States continue to be massive actors within the space industry and because they have similarly played an unparalleled role in establishing the global infrastructure for arbitration to succeed as a method of dispute resolution for commercial entities. Similarly, legal counsel, both in-house and external have a major role in the decision on the choice of dispute resolution offered within their space-related contracts, including decisions of whether or not to pursue arbitration following the rise of a particular space-related dispute. Finally, respondents' choices also signal an important role that space-related interest groups/bodies may play in shaping the use of arbitration to resolve space-related disputes, including educational resources for members (particularly smaller sized space companies) on the types of dispute resolution processes and/or opportunities for industry-wide harmonization with respect to particular types of disputes (e.g., for the assignment of liability and responsibility).

4.6 Continuation of the survey

Our preliminary results are helpful in indicating the strengths and weaknesses of arbitration as a method of resolving space-related disputes. While the results of our survey are not yet finalized and will not be until mid-December 2019, we expect that the additional rapid growth of the industry across continents may result in greater use of arbitration as a universal method of dispute resolution. As such, we expect it will be beneficial to repeat this survey in three to five years to assess the growth of arbitration within the commercial space sector. Such future survey would be well served by including a question about the size of the company respondents belong to, perhaps by asking about the number of employees at the company or the company's business turnover.

Moreover, additional strategies must be developed to target in-house or general practitioners, who undoubtedly have different experiences and exposure to space-related disputes given their proximity to space companies, particularly the contracts providing for space-related products and/or services. For example, in-

house and general counsel are more likely to have comprehensive knowledge of a company's dispute resolution preferences and practice due to their leading role in the adoption of policy and preferences and in the execution thereof. In contrast, external counsel and advisors are often hired on a case-by-case basis, often to deal with discrete issues. Future surveys must therefore prioritize the voices of in-house and general counsel of space companies.

5 Conclusions

This is the first empirical research on the use of arbitration in resolving space-related disputes. This paper presents preliminary results after two months of administering the survey. As preliminary lessons from the survey illustrate, our research will benefit from additional respondents, including specifically respondents who are either in-house counsel or general counsels of space companies. Cautious analysis of the interim results demonstrates a practice of inclusion of arbitration clauses in contracts, though a perceivably limited knowledge concerning the use of such clauses. This knowledge gap extends to the PCA Optional Rules and the PCA's specialized panels of arbitrators and experts. Despite the limitations in this study, the interim results provide a first attempt at deciphering the demand for arbitration of space-related disputes within the space industry, including the success of the existing arbitration infrastructure for the resolution of such disputes. The challenges hindering the use of arbitration for the resolution of such disputes are also identified, which brings opportunities for future research and policy.

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Appendix A – The Survey

Appendix A is the survey to which participants responded.

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